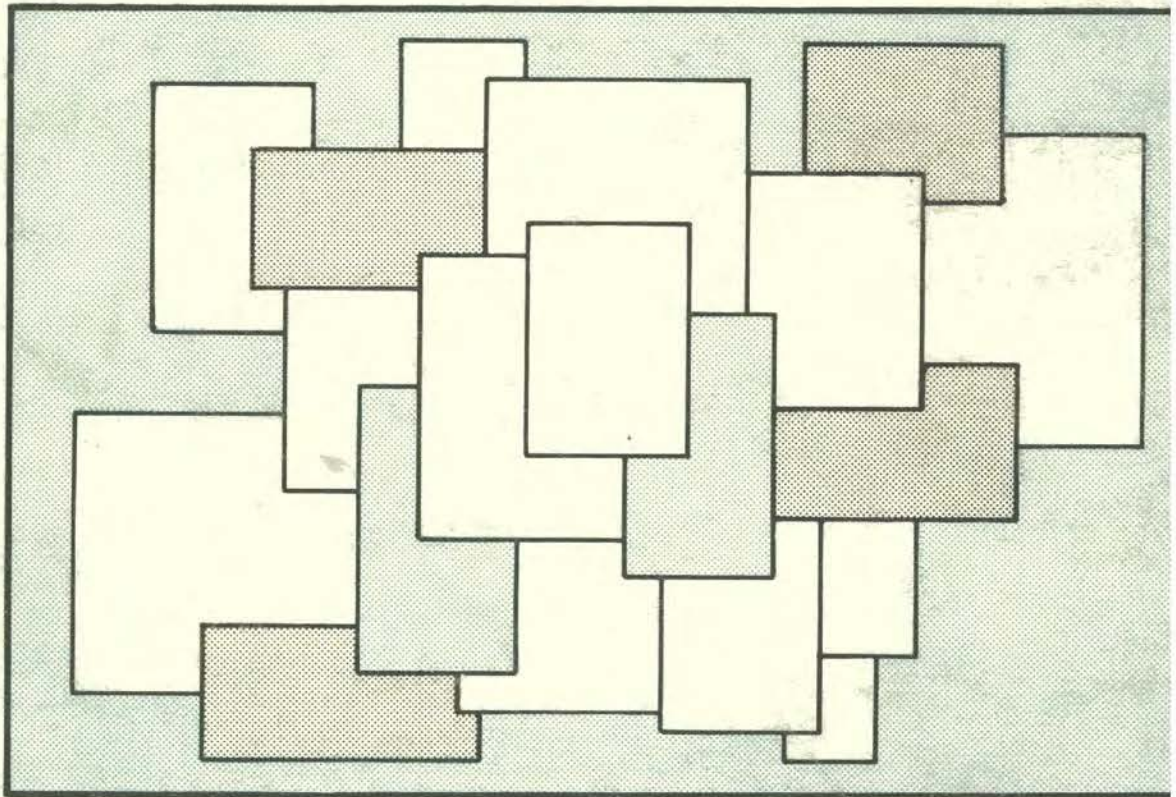


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# **LIFE-STYLES, ENVIRONMENT AND DEVELOPMENT**

## **A European perspective**



**UNITED NATIONS ENVIRONMENT PROGRAMME**

Lifestyles, Environment and Development  
A European Perspective

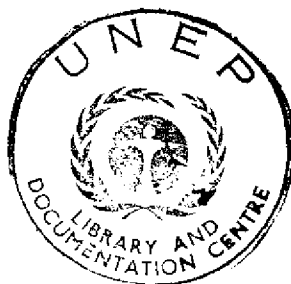
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# Lifestyles, Environment and Development

## A European Perspective

Background papers and report of a regional  
seminar convened by the United Nations  
Environment Programme and the  
United Nations Economic Commission for  
Europe



Ljubljana, Yugoslavia  
3 - 7 December 1979



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## PREFACE

International discussions on development experience and policies over the last decade appear to suggest that past development patterns in industrialized and developing countries alike have not adequately met social goals. Concerns have been expressed about, for example, persistence of mass poverty, increase in unemployment, wide disparities in the distribution of benefits of economic growth, environmental degradation, rapid depletion of scarce natural resources, and erosion of the quality of life.

Contemporary issues, problems and prospects of world development have been examined at length from various angles - most notably from the standpoints of international economic relationships and distributional equity. However, the environmental and natural resource aspects of sustainable social and economic development have not received the attention they merit. In particular, the close linkages of the environmental aspects with the social and economic aspects of development need to be systematically investigated for proper diagnoses of current development maladies as also for the design of viable policies and programmes to mark an improvement over the past. Therefore UNEP commissioned during 1978-1980, a number of region-specific studies encompassing the concern for sustainable and environmentally sound development and convened a series of regional seminars on a theme entitled "Alternative Patterns of Development and Life-styles".

The present volume contains the proceedings of the seminar for the region of the Economic Commission for Europe (ECE). The countries of this region, covering Europe and North America, account for a large part of man's impact on world resources and the global environment. This is so not only because of the development activities of these countries, but also because of their world-wide economic and financial reach and the pervasive impacts of their development and life-style models. Significantly, in several member countries of the ECE innovation and practical action for purposeful social change are emerging in response to the growing problems. Thus in the UNEP/ECE seminar, representatives of countries with different socio-economic and political systems examined various environment and development issues from diverse perspectives and sought to bring numerous approaches and experience to bear on the discussion of solutions.

Growing world interdependence and its effects provided a backdrop to the seminar debate. It was observed that the countries of ECE could no longer afford to seek solutions viable for themselves alone from narrowly nationalistic standpoints. Neither could they afford to ignore the impacts of their actions on other countries and the global environment. This broad theme of accountability was especially evident in the introductory panel discussion of the seminar. Another major theme of the seminar was that, if the great problems of contemporary societies were to be solved, the analysis of global concerns must be linked to practical problems faced by citizens and their institutions in daily life. This was a leading argument in the seminar discussion, which dealt broadly with such questions as the interdependence between lifestyles, consumption patterns, technological options and resource constraints, between food systems and rural development patterns, between patterns of urban development and transport structures, and between institutional innovation and individual motivation, for environmentally sound changes of development and life-styles.

In order to provide a framework of reference to the seminar, some 50 background papers, ranging from synoptic reviews of the various subjects to descriptive presentations of local community experiments in "ecodevelopment", had been prepared by government-appointed rapporteurs and experts. These papers are reproduced here either in full or in summary form and, taken together, may be seen to reflect leading issues of public debate on environment and development in post-industrial societies of Europe and North America. The present volume also includes summary accounts of various statements and discussions at the seminar.

Lifestyles, Environment and Development:  
A European Perspective

A.

BACKGROUND

The emergence and spread of several economic, social and environmental problems during the 1970s brought into clear relief the notion that integrated and structural approaches are necessary to achieve sustainable social and economic development. In developed and developing countries alike, public policies and measures based on incremental, piecemeal and palliative approaches have not helped in bringing about lasting improvements in the quality of life. As regards consideration of the environment in particular, it is increasingly evident that an appreciation of the relationships among economic, social and environmental aspects of development is essential for prudent formulation of policies and plans.

First, there is the relationship between the natural world and the human society and its development. The natural system supports life on earth, and activities of man in turn introduce changes - at times far-reaching - in the natural system. These changes involve both the quality of the environment and the availability of natural resources and energy. It is therefore necessary that man's activities which thrive on resources of the environment and introduce changes in it are wisely managed. Economic development, in order to be sustainable, has to be based on proper environmental management. Sound environmental management requires not only appropriate national policies and measures but also international co-operation at sub-regional, regional and global levels, since the impact of human activities on the environment, and the implications of natural systems for human well-being, are not confined to national boundaries.

Secondly, there is the relationship between economic growth and improvement in the quality of life of people. It is now well recognized that while economic growth is necessary to bring about social and economic development, the composition of that growth, its spatial distribution and the technologies and policies associated with it greatly determine its impact on the quality of life of people. In particular, the qualitative aspects of development such as income distribution, employment, nutrition, health, housing, education, quality of living and working environment are coming under close scrutiny. Recognition of the relationship of economic growth to social and economic development has, inter alia, led to a certain disillusionment with sectorial remedies and a growing concern with integrated, trans-sectoral, multi-disciplinary approaches to the design of policies and plans. Consideration of the environment contributes to providing such a unifying perspective for development policy and planning.

Thirdly, it is necessary to recognize that every intervention for development entails environmental consequences, apart from the social and economic changes directly addressed by it. Thanks to modern science and technology such environmental transformations can be spectacular and can, over a period of time, entail cumulatively aggregated impact on the quality of life. It is therefore necessary that social costs and benefits of planned interventions for development are comprehensively assessed and evaluated. Such scientific collection and analyses of information should facilitate decision-making in favour of those courses of action as would protect and further not only the present but also the future well-being of societies.

In 1974 at Cocoyoc, Mexico, UNEP and UNCTAD jointly convened a symposium on "Patterns of Resource Use, Environment and Development Strategies". This symposium of eminent experts resulted in the "Cocoyoc Declaration", which helped crystallize the concept of "development without destruction". The Cocoyoc Declaration noted, inter alia, the great international disparities in the use of scarce natural resources and in the progress towards alleviation of mass poverty, and called for identification of such patterns of resource use, production, consumption and life-styles as would be socio-economically more satisfactory and environmentally sound. It emphasized that the carrying capacities of the biosphere were limited, and that national policies and programmes of international co-operation for development and for use of natural resources need to be based on recognition of this fact.

The series of Regional Seminars on Alternative Patterns of Development and Life-styles organized by UNEP in co-operation with the United Nations Regional Economic Commissions represented a step forward in the search for patterns of development, national policies and programmes of international co-operation of the kind envisaged at Cocoyoc. Between the Cocoyoc symposium and these regional seminars, several world conferences on topics relating to environment and development issues were held and their recommendations helped underscore the far-reaching significance of rational use of natural and human resources and the need for greater attention to long-term and qualitative aspects of development. The regional seminars themselves sought to examine the rationale, nature, scope and feasibility of the changes needed in patterns of development and life-styles within the contexts of the environment and development problems and prospects of the respective regions. Participants in the seminars included policy-makers, planners and experts from the respective regions. One major objective of the seminars was to promote exchange of experience and information on pertinent innovations and experiments within the respective regions and to help catalyse action at national, sub-regional and regional levels for the design and implementation of policies, plans, programmes and measures for environmentally sound development. It was also envisaged that the convening of these seminars and their conclusions and recommendations would contribute substantively to the process of preparation of the International Development Strategy for the Third United Nations Development Decade.

The seminar in the ECE region may be said to have had a special significance in this co-ordinated programme of regional seminars which covered the Africa, Asia and the Pacific, Latin America, and West Asia regions as well.

First, the ECE region accounts for a large part of man's impact on the global environment. This impact is entailed not only because of the longer histories of economic growth of the countries of the region, but also because of their more pervasive application of modern science and technology as well as the significantly transnational reach of their various economic activities.

Second, it is well known that patterns of economic development, application of technology, and consumption patterns of the countries of the ECE region have tended to be widely emulated by developing countries in the other regions. So, in a way, the ECE region has often tended to be regarded as a pace-setter in matters concerning economic betterment and social progress.

Thirdly, in several countries of the ECE region environmental problems and aspects of economic growth have been and are being examined intensively, not only from the standpoint of protecting and enhancing domestic quality of life but also from the standpoints of transfrontier pollution and global environmental change. There have also been notable experiments and innovations including the harnessing of modern technology in the search for prudent and socially satisfactory development patterns and life-styles.

The background papers before the UNEP/ECE seminar discussed wide-ranging issues covering conceptual, institutional as well as sectorial aspects of environmentally sound development - in particular, energy, transport, agriculture and rural development. Along with the discussion of problems and issues, promising and innovative experiments and ideas were discussed. This publication brings together, in a suitably edited form, the various background papers and summary reports on the discussions at the seminar. It is hoped that by reaching a wider audience it will encourage further scientific work and action at national, sub-regional, regional and international levels to promote life-styles and patterns of development that are environmentally sound and socially satisfactory.

**B. THE LJUBLJANA SEMINAR**

## 1. Organization and participation

Preparations for the UNEP/ECE seminar were initiated in January 1978 in the form of consultations among experts representing various disciplines and geographical areas of the region. On the basis of this broad inquiry into the subject area, two intergovernmental meetings were called (in November 1978 and in May 1979) to discuss and agree on a programme and background documentation to be submitted by ECE Governments. In August 1979, an ad hoc meeting of the government-appointed discussion leaders for the selected topics was held. In order to complement the documentation, a number of special reports were commissioned by the international secretariats responsible for the organization of the seminar.

At an early stage of the preparations, the Government of Yugoslavia had offered host facilities to the seminar at the International Centre for Public Enterprises in Developing Countries, in Ljubljana. The participants comprised official delegations from ECE member countries, representatives of various United Nations bodies and specialized agencies, representatives of secretariats of regional intergovernmental organizations and various non-governmental organizations (for details, see annex I). The official addresses setting the stage of the seminar are reproduced in section 2 below.

The specific objectives of the ECE-sponsored seminar were stated as follows:

(a) To enable ECE Governments to discuss problems and opportunities for long-term compatibility between economic and social development and the improvement of environmental quality, and explore to what extent such solutions may require changes in present development patterns and lifestyles;

(b) To exchange views and experience on (i) attempts to develop long-term perspectives, strategies and approaches for achieving socio-economic and environmental objectives; and (ii) practical measures designed to test the accuracy of such perspectives, and concrete actions to implement the new approaches;

(c) To stimulate a continuing effort in the ECE region and in individual countries to formulate policies and programmes for environmentally sound development, and to that end to map out priority areas for national action and international co-operation to promote alternative patterns of development and lifestyles.



Taking the basic objectives of the seminar into account, the discussion was structured around five main topics. The debate on the first topic was introduced by a panel of specially invited experts; and that of the subsequent sessions by government-appointed rapporteurs. Section 3 gives an account of the deliberations. At the end of the seminar discussion, as is customary at ECE seminars, the representatives of participating member Governments adopted a series of conclusions and recommendations, which are reproduced in section 4, after a short introduction to the broad framework of the New International Development Strategy. The background documentation for the seminar is presented in Part C.

## 2. Official addresses

### STATEMENT ON BEHALF OF THE GOVERNMENT OF YUGOSLAVIA AND THE SOCIALIST REPUBLIC OF SLOVENIA

Mr. A. VRATUSA, President of the Executive Council  
of the Assembly of the Socialist Republic of Slovenia

The deliberations of this seminar are taking place in the International Centre for Public Enterprises in Developing Countries. This centre is a joint governmental institution set up by non-aligned and other developing countries for research, training and consultation on problems closely related to development patterns and lifestyles in countries that have embarked late upon the road of independent socio-economic development. During the seminar, participants may also gather impressions of public life in Yugoslavia, in itself an experiment in social change based on socialist self-management and non-alignment. The goal of social self-management is to enable the working people to decide on the output of their labour and to participate directly at their places of work in decisions on social problems. The aim of non-alignment is to fight for the right to self-determination, independence and authentic development, through international co-operation in the spirit of peaceful coexistence.

The theme of the seminar concerns all countries, regardless of development level or socio-political system. ECE Governments have been right to attach great importance to the development-environment issue. Their countries belong to the economically most developed region of the world and are in the forefront of scientific and technological progress. Consequently they bear heavy responsibility in the search for solutions to present world problems of resources, environmental protection and social equity.

In order to be authentic and viable, patterns of development and lifestyles should evolve primarily on the basis of individual and collective self-reliance and mobilization of the natural and human resources of each country. Yet in an increasingly interdependent world it is extremely important to establish active international co-operation. Such co-operation may involve a wide spectrum of activities ranging from exchanges of information to mutual assistance and joint efforts, provided the right of each nation to authentic development is respected. In this context, the United Nations, its regional economic commissions and specialized agencies have played an important role in establishing joint programmes. Yugoslavia has been a determined promoter of such programmes, always contending that resolutions once adopted should be converted rapidly and purposefully into action. This international seminar on patterns of development and lifestyles can in many ways promote dialogue and co-operation for the establishment of a new international economic order. It is important to

examine conditions and institutions in all countries, regardless of their size or level of development, in order to understand better the process of social change and devise instruments by which it can be guided.

In the past four decades, Yugoslavia has undergone a profound social change. With simultaneous emphasis on development of production and human culture, we have always tried to understand and manage the interplay between the factors of change and the living and working conditions of our society. The point of departure was a sound programme motivating the whole people to participate in the development of the very resources of the country. The achievements have been significant. Today, together with a small group of countries, and on the basis of its active participation in foreign trade and international affairs and its position as an independent socialist and non-aligned country, Yugoslavia may strive - with some hope of success - to bridge the gap between developed and developing countries.

STATEMENT BY THE EXECUTIVE DIRECTOR  
OF THE UNITED NATIONS ENVIRONMENT PROGRAMME, Mr. M. TOLBA,

delivered by Mr. S. EVTSEV, Assistant Executive Director

It is now almost two years since UNEP took the initiative of organizing a series of regional seminars on alternative patterns of development and lifestyles, in co-operation with the United Nations regional economic commissions. Focus on this subject was a logical step to promote the new concept of the interrelationship between environment and development that had evolved in the preparatory process for the Stockholm Conference and subsequently.

Environment is interpreted in a comprehensive way; it encompasses the socio-economic as well as the physical environment. It follows that development policy, if it is to arrive at satisfactory solutions to environmental and resources problems, cannot rely on incremental, piecemeal, or palliative approaches. It is true that such approaches may buy us time, and in some cases may even rid us of certain serious problems. But for longer-term solutions, integrated and structural approaches are imperative. Moreover, it is essential that we evolve such approaches jointly and through consultation, co-ordination, exchanges of experience and pooling of efforts in science and technology. The most critical problems are beyond the capacity of any given country, or even group of countries, to resolve on its own, and therefore we cannot afford to work separately or at cross purposes.

By their very nature, environmental issues are transdisciplinary. To deal with them effectively, it is usually necessary to master the insights, knowledge and approaches of different disciplines, and to bridge the traditional institutional and sectoral gaps. Environmental issues have a systemic character. Through physical and biological subsystems and cycles, they all feed into a single global system. These physical linkages and interdependences are further strengthened, and made more complex, by the ever-growing economic and social linkages between countries, and the increasing impacts beyond national frontiers of policies and actions taken within individual countries.

These self-evident facts need constant emphasis, because they explain the *raison d'être* of UNEP and its special position in the family of international organizations. Our approach has to go beyond the traditional sectoral and jurisdictional divisions of the United Nations system. It has to be comprehensive in the horizontal sense - a challenging task in itself, even within a single institution. It has also to be comprehensive in the vertical sense, which means dealing with the entire chain of causes and effects. An environmental problem is a dependent variable par excellence, if you will forgive my using the jargon of the social sciences. The problems that you will be discussing are often a consequence of decisions taken in highly different

contexts - from those involving global plans and strategies to those of a single individual deciding how to use his leisure time over the weekend, what to eat for dinner, or how often to activate his electric dish-washer. That is why we have to look at issues which have traditionally been considered to fall within the domain of national action, or which countries have not generally been prepared to discuss in the framework of the United Nations, even though they have dealt with them in their own regional groupings. For very obvious reasons, we are also deeply concerned with international economic relations and the establishment of a new international economic order. The subject of alternative patterns of development is inextricably linked to issues which are placed high on the international agenda.

It was with these reasons in mind that UNEP considered holding regional seminars on alternative patterns of development and lifestyles. These seminars are intended to take a comprehensive and synoptic view of recent developments and to point out the factors and interrelationships that are of significance to our present concerns.

In terms of breadth and scope, the seminars represent an innovation in the United Nations system. Those of you who are used to the classical, sectorally oriented discussions and debates may wonder at our agenda in Ljubljana. Admittedly, it is difficult to look simultaneously at international comparisons of energy use, transport systems and the role of the motor-car, macro-economic and regional planning, the role of domestic households, motivations of the individual citizen and patterns of consumption, long-term scenarios and planning on a global scale, and other issues, but the interrelatedness of problems should not discourage us. By facing it squarely, we shall eventually be in a position to get to grips with some of our predicaments, and to gain better control of the situation.

To organize a few seminars makes little difference, you may say. However, if the seminars are held at a strategic moment in time, they can have a significant impact and represent seeds for a new process and direction. The very fact that we meet here today, in the wake of the successful ECE High-level Meeting on the Protection of the Environment, seems to indicate that the moment is ripe for work in a new direction.

UNEP felt that issues of alternative patterns of development had first to be examined at the regional level, drawing into the discussion representatives of individual countries, planners and decision makers as well as experts in various fields, so as to single out specific problems, views and experience. The United Nations regional economic commissions were the obvious partners in this enterprise. The three seminars held so far - with the Economic Commissions for Africa and Latin America and the Economic and Social Commission for Asia and the Pacific - have proved that we were basically right in our assumptions and expectations. They all differed considerably, in spite of the same underlying themes, but conclusions were very much shared.

The ECE region occupies a special and critical place in this co-ordinated exercise. There are at least three basic reasons why this is so. First, the countries of the ECE region account for the principal share of man's physical impact on the global environment. They are prodigal users of natural resources, both in absolute and relative terms, and their activities have direct or indirect effects far beyond their borders. Consequently it is in this region that the need, as well as the scope and potential, for action to achieve rational and sustainable use of the environment and the resources of the earth is the greatest. Secondly, the countries of the ECE region have evolved the dominant patterns of development and lifestyles that are diffused and

transmitted globally through demonstration effects, international trade and investment, transfer of technology and know-how, mass communication and advertising, diffusion of consumption and cultural patterns, etc. The countries at the receiving end have often had little choice but to follow suit. Indeed, more often than not, they have imitated the patterns without fully assessing their diverse implications. Thirdly, it is the ECE countries that have experienced most clearly the unwanted consequences - social, political, economic and environmental - of the existing patterns of development and lifestyles. The region has thus in many ways been in the forefront of discussion and practical innovative action in this field. The emerging alternatives will be of global significance, not simply as directly useful examples, but also as a way to ensure that various options are not foreclosed for countries that have embarked on the development process too late to enjoy the virtually free access to the environment and the resources of the earth which the industrialized countries enjoyed until recently.

On the basis of the rich and diverse background documentation prepared by governments, institutions and individual experts, the seminar rapporteurs and the panel of experts will extract and highlight the key issues of the seminar and help channel your deliberations during the forthcoming week. I shall limit myself to a few general remarks. Among the questions that might be particularly relevant when considering alternatives and appropriate strategies for the period of transition into the next century are the following.

The vulnerable society - In borrowing the title of one of the background papers for this seminar, I would like to emphasize that the growing vulnerability of modern societies to disruption and to the serious risks inherent in some of our more advanced technologies have made it necessary to plan and build resilience into our society. We must identify the weak links and develop alternative solutions, or at least fall-back positions.

"The invisible hand" - It has been argued that "the invisible hand" - to use an expression coined in the past - has led modern societies to environmental and natural resources dilemmas, and that it is at the root of many problems in existing production-consumption patterns and individual lifestyles. Even those who fully support the principle of "the invisible hand" have begun to realize that the sum total of choices for individual consumers can no longer be sustained. It seems that, in certain societies, the point has already been reached where the very simple question of "how much is really enough?" should be asked. Quite obviously, this question does not apply to the countless millions - even in affluent societies - who are struggling to make ends meet, and who live in material deprivation. Rather, it is a generic question that in a larger setting touches on the issue of equity at a global level. At the same time, it will be necessary to re-examine the whole rationale of the production process, to eliminate certain objectives which are increasingly hampering the attainment of societal goals, and to give it a new conceptual basis.

The role of knowing and understanding - In the industrialized societies, the individual is often blamed for his wasteful behaviour. We must not forget, however, that he is a product of the society in which he lives and he acts in a certain way because conditions so permit or require. In the complex modern society, people have to be able to understand the total picture, the interrelatedness and global impact of seemingly different and totally unrelated issues and actions, including their own. Only then can we count on correctly informed public opinion, which in itself is a primary force for change both in terms of innovative action and in terms of support, rather than opposition, for what otherwise may be unpopular measures.

Decentralization and centralization - These two concepts are not necessarily mutually opposed, as it may at first appear. Proper linking of centralized and decentralized decision-making systems can, in a given society, provide solutions to many of the problems of concern to this seminar. The structure and practice of decision making differ considerably between the countries of the ECE region. Here I would like to stress the importance of keeping in mind the broad scope of the process, ranging from decisions of individual citizens to decisions taken at the level of society as a whole. The role of the so called "grass roots" is important. We need to harness the creativity of the local community and of the work place, and we can do so only if citizens are given the right to manage their own problems and have a voice in the vital decisions affecting their own environment and well-being. At the other end of the decision-making spectrum, society as a whole must obviously become more active in dealing with environment-natural resources problems. We can no longer afford to leave some of the most critical problems and processes to develop without control and guidance. A given society has to know where it is going and where it wants to go: broadly formulated objectives can then be translated into appropriate actions at different decision-making levels. "Centralized" does not necessarily mean the building up of a rigid pyramidal system; it should rather be interpreted as a recognition that certain problems are no longer amenable to piecemeal and irresponsible approaches, and that we can no longer afford to ignore what the sum total of societal activities may amount to, especially in terms of implications for choices and freedom of action in the future.

Long-term and short-term costs and benefits - The response of society and governments to environmental issues has been hampered by the difficulty of finding conventional answers to the twin questions of how to incorporate long-term objectives effectively into decision making, and how to figure out the cost-benefit equation. At stake is the current economic paradigm and rationale, including the accounting system. Some of the new societal concerns about the environment cannot easily be forced into the strait jacket of traditional economic analysis. Thus, while decision makers can be made clearly aware of the quantified costs of various environmental measures, the costs of inaction are much more diffuse and difficult to substantiate. This matter will require special attention in efforts to evolve environmentally sound and sustainable patterns of development and lifestyles.

Financial resources - One of the obstacles to many actions of special importance for the improvement of the physical habitat and its infrastructure, or for developing new environmentally sound technologies, has been the lack of the necessary financial resources. This again is a matter which will require systematic action and attention. The first step would perhaps be to put the objectives of environmentally sound development higher on the ladder of public interests, on a par with health and education, and thus secure greater material resources. Several papers submitted to the seminar discuss the issue of disarmament and alternative patterns of development. If, through a shift in governmental priorities, even a minor part of the financial, scientific and technological resources locked up in the arms race and the military establishment could be released and allocated for purposes of evolving environmentally sound and sustainable patterns of development, we would be taking a giant step forward towards improving the quality of life for humanity.

It will also be necessary to pool resources. We cannot afford to tackle a given problem separately, everyone in his own small corner. This would be not only a squandering of resources and talent, but also a waste of precious time. We must co-ordinate our efforts. Joint action has obvious potential and has been proved to work.



Global equity and global interdependence - In the last few years, the fact of global interdependence has often been proclaimed in the industrialized world. The primary reason has been the energy problem, but awareness that we all belong to the same 'ecosphere' and ultimately depend on each other has also played its role. The question of interdependence, however, cannot be treated in isolation from questions of global equity and fair relationships between the developing and the developed countries. Some background papers for this seminar have brought these issues into focus and infer that in the ECE region some environmental and natural resources problems are being resolved at least in part at the expense of weak and poor nations and through a power scramble for control of diminishing supplies of non-renewable resources. In an interrelated world, such an approach is no longer acceptable. The establishment of a new international economic order, and the promotion of alternative patterns of development and lifestyles in the ECE region and in the developing regions, should fall within an integrated and purposefully guided process. Within such a framework it would be easier to work out solutions satisfactory to all, to assess available options and trade-offs, and to determine the specific obligations and responsibilities of countries for the attainment of given goals.

Leadership - My final point has to do with vision and leadership, which are necessary conditions for success. We are in the process of creating the future. The ECE region is fortunate in having at its disposal most of the skill and resources needed to achieve this objective. Our thinking and understanding of the problems have matured to the point where action in many areas has become possible. Well informed and determined leadership with vision is necessary to involve us all in a common effort.

OPENING STATEMENT BY THE EXECUTIVE SECRETARY  
OF THE ECONOMIC COMMISSION FOR EUROPE

Mr. Janez STANOVNIK

This is an important station on a long journey. In a way, this seminar in Ljubljana on alternative patterns of development and lifestyles is a synthesis of the work of the Economic Commission for Europe throughout the 1970s. It takes place at the moment when we are preparing our strategies for the next decade, namely the third United Nations Development Decade.

The development which occurred in the 1950s and 1960s was extraordinary in the historical perspective of our region; extraordinary, particularly in terms of growth and change. The gross national product - the yardstick which we still use in economics - tripled in these two decades, and there was a lot of change in the structural sense. The proportion of the working population engaged in agriculture in the ECE region fell from an average of 20 per cent in the 1950s to only 10 per cent.

But the trends were not all favourable. As early as the late 1960s, clouds started gathering in the sky, and this became more evident in the early 1970s and after. The concern about the environment was probably the first significant event of the 1970s. The disclosure of the energy problem was the second. The so-called energy crisis was accompanied by inflation, and soon afterwards growth slowed down. There was early apprehension that the events of 1974 were not just another cyclical development, but something new, profound and deeply troubling. In the course of the 1970s we learned that our own societies are not as integrated as we thought when riding the high tide of so-called prosperity. We discovered that there is still no equality between men and women, and that the question of equality within and between societies is a very essential and vital problem for our future. As the 1970s wore on, it was practical daily experience, not just research, which brought home the fact that our region is still an island of wealth in the sea of world poverty, and that we are vitally dependent on the rest of the world. For too long we have been accustomed to living in an economic environment that regarded others as dependent on us, but believed that we were independent of them.

It is a specific feature of ECE that it responds to the changes of the day. As new challenges have emerged in our societies, they have been brought to the ECE conference table, and we have been dealing with them one by one during the 1970s. Therefore this seminar here is but a large-scale summary, a synthesis of what we have been doing in the 1970s. Various socio-economic aspects and technical problems were clarified, and a completely new approach to development was conceived. The need is now to replace the earlier, unduly one-sided,

economic approach, with GNP as the main guidance, not with another equally one-sided approach - which claims that profitability is nothing and the conservation of nature is everything - but with a comprehensive approach that integrates national and international, economic and social, economic and ecological, regional and global aspects. We must not indulge in extremes but find a balance. This, in my view, is our major task here in Ljubljana.

There is first the problem of energy. Even on such a topic, one cannot rely on facts; value judgements and preferences intervene. The problem of energy is not primarily a problem of price, as most people think; it is a problem of transition. If ever there was a problem of price, it was due to the fact that over two or three decades the price of energy was too low. Since the price was particularly low for one source of energy - oil - we shifted unduly from diverse sources of energy to only one source. When the moment of truth came in 1973, we awoke one morning and realized that our economies were badly structured. We were faced with the tremendous task of making the transition to a new energy system. In earlier transitions, new resources were already available at a very cheap price. There was no problem in the transition from wood to coal, nor in the transition from coal to oil. Now we have to move from oil to something else. This something else is not just nuclear power; indeed it is not just one source of energy. Much more hard thinking is required. A resource is a combination of the gift of nature, human work, capital, technology, organization and so many other things. One could easily say: if oil is coming to an end, there is plenty of coal, and if we burn the coal, then we will use breeders, and when the breeders have used all the uranium, something else will turn up. This is an optimistic view, but as an economist I immediately have to ask about the investment cost. A rapid calculation of the cost involved for the ECE region, in the next 15 years, would indicate about \$4 trillion. For comparison, the United States produces annually only \$2 trillion. We would need therefore tremendous investment, which probably cannot be made without very profound social changes.

These changes, however, might not be rational, but something dictated by the struggle for survival. The question can then be asked: is it not time to think about the meaning of the first word in the title of our seminar, namely "alternative"? Is coal or the breeder reactor the only way, or are there alternatives? Of course there are alternatives, and they are first and foremost to be found in conservation. An analysis by the ECE secretariat has pointed out that up to a third of total energy use in the region could be saved by known technologies, while maintaining present standards of living.

To undertake this great task of energy saving involves a change in the direction of efforts. In the 1950s and 1960s the main task of the ECE region was to produce. If you study the history of the Economic Commission for Europe you will find that 15 of its principal subsidiary bodies were clubs of producers. There was a club of coal miners, a club of gas producers and so on. During the 1970s, it was suddenly realized that something was happening on the way from production to consumption. Distribution takes more of the final price than production does. Consequently, economists gradually started to take a more comprehensive view. And so we arrived at the next phase in the work of ECE, with environmental concerns playing an increasingly important role in every single activity. By pollution and environmental damage we lose annually between 3 and 5 per cent of the so-called gross national product. We behave like Alice in Wonderland: by running faster and faster we stay in the same place. The GNP grows at 3 to 5 per cent annually, but this growth does so much damage to our environment that we actually stay in the same place. This leads to a basic reconsideration of the pattern of development.

In discussion on the environment it is often argued that our planet Earth is limited in its capacity. This may be true. If we permit growth to be concentrated in one part of the world only, while the rest is unaffected by economic and technological change, and accordingly by cultural change, then the population explosion can happen. In the modern age of technology, there is only one way of bringing resources and socio-economic development into balance with demographic trends, and that is through sharing.

This leads me to our third preoccupation, one that concerns economic and social aspects of development in our region and in the world. In the 1970s we suddenly came into a situation of decelerating growth. Earlier, my profession had proclaimed that, after the Keynesian revolution, there was continuous growth ahead. No recessions, no depressions any more. The 1970s brought home the fact that growth could slow down in a situation of increasing inflation. The pressure on resources was increasing not only in market economies but also in planned economies.

Recent studies have showed that it is impossible to pretend that oil and oil prices are responsible for all the ills of our society. Inflation was well under way before the rise in oil prices. Examining the figures I was forced to the conclusion that something had happened to productivity. The steady growth of the 1950s and 1960s had suddenly stopped, and decline set in during the 1970s. Why? The answer seems to be insufficient investment and a slow down in innovation. When looking at research, you will be astounded by the amount devoted to military purposes. In contrast, so little is spent on solar energy research that progress will be very slow unless a radical change occurs.

Stagnation combined with inflation was considered impossible by classical economics, whether Marxian or Keynesian. There could be one or the other, but never the two together. In the 1970s we suddenly got simultaneous inflation and stagnation. The way out of this vicious circle is evidently a big push, something that would start a new wave of technology. I propose that this should be the alternative pattern of development which the Canadians call a "conservative society". There is a need for a deliberate and conscious human effort to take a different attitude towards natural resources, towards society and towards mankind as a whole.

This brings me to the problem of equality between our region and the rest of the world. This is the central issue of so much that is debated in the General Assembly, and it is the core of the search for a new international economic order. As Gunnar Myrdal, the first Executive Secretary of ECE, wrote in 1975: "All the talk about a new international economic order without changing lifestyles in the developed world is just humbug". There is a profound relationship between the pattern of development and lifestyles in the developed world and what we call today a new international economic order.

We are speaking of interdependence in the world, but sometimes our region is simply not aware of the dependence it has developed in modern times. We are vitally dependent on the markets of the developing countries. We export manufactured goods to the developing countries, creating a surplus of \$100 billion; \$100 billion means 10 million jobs. Those who advocate protectionist measures against the import of manufactures from developing countries do not know what they are talking about. We import less than 2 per cent of our total consumption from the developing countries.

When it comes to international negotiations, it is sometimes absurd to see who negotiates with whom. It is Western Europe negotiating with North America, while the developing countries "wait in the corridor" until the discussion is over. At this moment, when we are preparing the balance sheet for the 1970s, it might be appropriate to recall how vitally our future depends on our relationship with the rest of the world. The situation is no longer that of the 1950s and 1960s, when it was felt that mighty technology (with 80 per cent of world research and development capacity belonging to the ECE region) would solve all our problems. Not so in the 1970s: mighty technology has brought us truly into a global interdependence. May I therefore suggest that in considering the problems of the patterns of development and lifestyles in our region, you should take this international aspect into account. We can no longer behave as a wealthy island.

It is certainly not for the Executive Secretary of the Economic Commission for Europe to preach austerity. On the contrary, I consider that our lifestyle - if the population of our region so desires - could remain very much the same. This is not to deny that those who are concerned with consumption patterns may have a valid point. However, from a macro-economic point of view, it would seem that the experience of the 1970s has led us to one unequivocal conclusion: that our attitude towards resources and economic production must change. Resources and environmental assets need to be protected and safeguarded. We cannot just squander them for our own short-term benefit and leave the waste for future generations to clear up. This kind of behaviour is not only immoral, but also profoundly non-economic.

If you still consider my approach too economic, it is my duty to remind you that new lifestyles and new behaviour are a necessity if we are to resolve the many problems that confront us: the energy problem; the environmental problem; the profound economic problems; the problem of equality in our society, including equality between men and women; and the problem of equality between national economies all over the world.

### 3. Programme and discussion

#### TOPIC I

##### PATTERNS OF DEVELOPMENT AND INTERNATIONAL RESPONSIBILITY

Introduction by a panel of experts chaired by Mr. MAURICE STRONG,  
former Executive Director of UNEP

Mr. STRONG:

The panel procedure has often been used in ECE seminars on subjects of a novel character. Lifestyles are not an esoteric subject, however; lifestyles are really the purpose and the product of the development process. For instance, there has always been a clear relationship between technology and lifestyles. The problem today is that the rapid technological change of the past has generated patterns that make the whole world vulnerable to the same risks without permitting equal sharing of the benefits. Biased emphasis on economic growth has given rise to many socially adverse side effects. Although it would be irresponsible, in present circumstances, to abandon the notion of growth, it has to be recognised that some forms of growth can be destructive to the human environment. In order to correct the course, it will be necessary to create a dynamic society in which the adoption of environmentally sound and socially equitable patterns of development and lifestyles is seen as a progressive action. This is the basic issue that will be addressed by the panel members, speaking in their individual capacities and from their own viewpoints.

Mr. J. WIATR, Professor and Dean of the School of Social Sciences, University of Warsaw:

Throughout the world the 1970s have been a period of crisis in expectations. Public opinion in many countries is showing wavering confidence about the future. The intrinsic value of expectations that were widely held 10 to 15 years ago is now being questioned. If we had been a little more cautious in our thinking in the past, we might have noted that no socialist revolution has ever promised that everyone should enjoy the lifestyles of aristocrats. Yet on the world scale, the dominant set of expectations is still closely linked to the lifestyle of the advanced industrial countries. There are not sufficient resources in the world for this to be achieved. It is therefore necessary to look, not towards austerity as many believe, but towards "alternative patterns of affluence". Prominent features of such patterns would be:

(a) A reduction in the conspicuous consumption which is evident at present not only in capitalist societies but also in socialist countries and the developing world;

(b) A shift in emphasis from individual to collective forms of consumption, for instance in regard to transport and other urban amenities; and

(c) More attention to the qualitative and non-material aspects of lifestyles, and to forms of education that would provide for a richer life in terms of self-fulfilment.

Mr. ALEXANDER KING, Chairman of the International Federation of Institutes of Advanced Study:

The world may be entering a transition period of some 30 to 40 years that will be marked by very profound economic and social change. Three aspects seem of particular importance:

(a) If present demographic trends persist, the now developed countries will at the turn of the century represent only about a fifth of the world population. Whereas the average age in these countries will generally be over 40, it will probably be under 20 in the developing countries. The world may therefore become dangerously divided between small islands of rich and ageing societies and a large mass of young, hungry and frustrated people.

(b) During this period it is obvious that the energy systems of the world will need complete renewal. A shortfall in supply is likely by the early 1990s or even before. To develop alternative systems will require a long lead time and it is very late already.

(c) The impact of new technology may be greater than is generally anticipated. The lead time for translating new ideas into large-scale production is still about 30 years; we are thus now witnessing only the first fruits of the massive investment in research and development which has taken place in the post-war period. If agriculture may be profoundly affected by enzyme-based biological engineering, the widespread consequences of advances in micro-electronics in all walks of life may be still more important. Microprocessors and similar devices will influence both primary and secondary activities, but major effects will probably be evident first in the services sector. The result may be a massive decline in conventional employment opportunities, raising difficult policy choices between productivity and job creation. Social change will be required in order to escape from the employment/unemployment dichotomy and move towards the notion of one individual having several occupations in addition to the employment that provides his or her principal source of income. At the world level other problems will arise, because the electronic revolution will tend to eliminate the competitive advantages at present enjoyed by developing countries, for instance in the textile industry.

Mrs. LAURA NADER, Professor in the Department of Anthropology, University of California at Berkeley:

I have recently participated in a study of the decision-making process in energy planning in the United States. One of the findings is that the field is dominated by men, mainly with a professional background in physics, engineering or chemistry; there are few social scientists, no one with medical or legal expertise, and little representation from the public. This leads to a lack of diversity in thinking and attitudes. My own study group has concluded that two energy scenarios could be considered as realistic for the year 2010; one with approximately the same level of energy use as today, and another with a much lower over-all level of energy demand, involving changes in lifestyles but no basic loss of amenity. These conclusions have been challenged by scientists and



engineers, who feel that the scenarios rest on an inadequate numerical data base and are impossible to achieve. The critics have also made the incorrect assumption that low levels of energy necessarily imply low levels of technology in society. On the basis of this experience, it is suggested that if alternative patterns of development are to be adopted, greater diversity of attitudes, experience and training is needed among the decision makers. In general, whatever efforts to change are made, they should be concentrated on areas where there is likely to be least resistance. For instance, fuel-efficient cars rather than bans on car use should be the policy. Similarly, it is desirable that forces already moving in the right direction should be turned to advantage, as for instance the desire for greater self-reliance expressed by groups in several countries. The adoption of new development patterns and lifestyles should never be presented as a threat to existing and valued amenities.

Dr. R.A. NOVIKOV, Head of Department at the Institute of the World Economy and International Relations of the USSR Academy of Sciences:

Significant improvements have been achieved in international relations during the 1970s; they have led, inter alia, to new systems and machinery for international co-operation for environmental protection, in which United Nations bodies have played important roles. Several major causes for concern remain, however. The environmental problems to be tackled in the coming decade are more complex than those of the 1970s, and action must be taken urgently to solve them. It has now become necessary for all countries to consider their national interests within an international context. This will require a new level of mutual trust that may be difficult to establish because of the legacy of the past. Although progress in co-operation on environmental matters has been made during the 1970s, it has not been possible to stop the arms race. The latter undermines the whole process of environmental protection and can lead to ecological catastrophes of global dimensions.

Mr. ROMESH THAPAR, Editor of Seminar, New Delhi:

The developing countries will never be able to match the lifestyles of the ECE region. One possible consequence is that, unless emigration is prevented, these countries will lose all their skilled people to the advanced countries. India now produces more people with technical training than any other country except the United States of America and the USSR. Yet most of them are being trained for the benefit of developed societies. The claim that this expertise cannot be absorbed by developing countries is incorrect. Such arguments are a convenient way to rationalize the situation. There have been great achievements in India and China during the last 30 years. Though following different paths, Gandhi and Mao both emphasized that society must enhance the dignity of man. It is not necessary for man to be affluent, but he should be happy. In formulating strategies for establishing a new international economic order, attention should be given to both minimum and maximum levels of consumption. Survival below decent minima tends to reduce mankind to a near-animal status; consumption above reasonable maxima is simply vulgarity.

#### General discussion

Several speakers referred to the need for the kind of international sharing mentioned by the Executive Secretary of ECE in his opening address. The difficulties were recognized. Some developing countries were beginning to resist offers of economic and technical co-operation from industrially advanced countries, considering that they led to unhealthy dependence. Several developed countries were becoming less enthusiastic about such co-operation than in the past, especially as their competitive position in some markets seemed to be

increasingly challenged by developing countries. If carefully managed, the technological change that had been forecast might provide important new opportunities for sharing knowledge and resources. It was equally possible, however, that the process would divide developed and developing countries even further, by reducing the dependence of developed countries on materials and markets in the rest of the world.

The problems of international sharing were considered to be closely linked to those of managing the "common heritage of mankind". Through the United Nations Conference on the Law of the Sea, it might be possible to arrive at a new legal concept for management of the international "commons". The notion of international responsibility should similarly be incorporated in the new international economic order, with emphasis on (i) conservation of natural resources and protection of the environment; (ii) equitable sharing of technology and resources; and (iii) development of mutual self-interest among nations, based on a comprehensive and long-term view and on democratic relationships. In that context, new thinking, new strategies, new legal regimes and in particular new institutional arrangements for international sharing would be required.

Among the changes that had been forecast, the rapid decline in conventional employment opportunities, especially in developed countries, attracted attention. The potential repercussions of new technologies seemed immense. The concept of employment based on the "work ethic" might possibly have to be replaced by alternative concepts emphasizing greater self-reliance, both in the form of self-employment and in the sense of individuals and communities becoming less dependent on centralized facilities. In that respect, developed countries might have much to learn from developing countries, especially in Asia. It was noted that, starting immediately after the revolution the authorities in the USSR had striven to separate the notion of individual human dignity from that of personal wealth. That was reflected, for example, in the allocation of national resources, where particular weight was given to public consumption (schools, medical facilities, sports, etc.) rather than to material enrichment of the individual. However, such resource allocation required clear and firm policies and a strong basis of public support.

Although human happiness was considered a more appropriate goal for development than material affluence, it was recognized that the "quality of life" had to be defined partly in material terms. Nevertheless, alternative lifestyles should not be so wasteful as present ones, even if they were likely to be more diverse. With reference to the uncertainty, in both developed and developing countries, concerning present development trends and desirable alternative patterns, the opinion was expressed that the terms "developed" and "developing", while convenient in dealing with aggregate models, had little meaning in connexion with alternative lifestyles.

Much of the discussion centred on certain structural features of the world economy which, it was suggested, led to fierce international competition and an unequal distribution of resources and income in the world, and ultimately constituted a threat to the global human environment. Attempts were made to identify some of the driving forces behind that unsatisfactory state of affairs. Exaggerated emphasis on the productivity of capital, with disregard for the value of human and natural assets, seemed to be one of the causes. The strong trend towards large-scale and highly complex technology appeared to work towards greater inequality in the international context, although it was suggested that technological progress to liberate man was basically a positive feature. It seemed that people ought to have more control over technology. That raised the question of criteria for selection of technology, and of who should decide on

the criteria. A plea was made for intensified research on more subtle patterns of technology development, with the aims of avoiding the unnecessary waste of resources and environmental destruction, and creating more favourable conditions for international sharing of income and wealth.

In the discussion on practical measures for establishing a new international economic order, the difficulties of bringing about a change were clearly indicated. First of all, it seemed necessary to establish an appropriate definition of development and its objectives. In that context, the seminar documentation seemed to provide sufficient scientific evidence to show governments and the general public that the present ecological situation constituted a threat to the world community. Though understanding of the link between general ecological problems and international development problems had been enhanced, the will to carry out the necessary changes had still to be strengthened. At the national level, consumption and production patterns might have to be modified, and the international distribution of resources and income should be made more equitable. The question of alternative patterns was thus an international problem. The view was expressed that ECE countries had a major responsibility to promote development that could provide improved living conditions in the developing countries, and at the same time ensure ecological balance. Concerning practical measures for the establishment of a new international economic order, reference was made to the experience over the last 20 to 30 years in most ECE countries, which had shown that social inequalities could be lessened by appropriate policies. Social security systems had been established to provide insurance against unemployment or assistance in finding employment; and measures had been taken to reduce regional disparities and to encourage collective bargaining. In the view of some participants, governments had acted to remedy the deficiencies of the market, and such policies were now fundamental features of democratic society. Although the scale might be different, there seemed to be no reason in principle why similar policies could not be applied to solve problems now facing the international community.

During the discussion it was noted that, despite a number of significant successes in strengthening pan-European co-operation in environmental protection, prospects for action to alleviate the most acute regional and national ecological problems continued to depend, to a decisive degree, on the strengthening of the policy of détente and the adoption of genuine measures for disarmament. A new round in the arms race might nullify the efforts to protect the environment that were now being made at the national and pan-European levels, and become a permanent threat to the continent's ecology. The most important alternative to the present political trend in Europe was the immediate initiation of negotiations to reduce the level of the nuclear forces confronting each other in Europe, and the adoption of other disarmament measures.

It was argued that, unless existing international relations were adjusted in the spirit of the Declaration and Programme of Action on the Establishment of a New International Economic Order and with concern for the protection of the environment, present patterns of development and lifestyles in the advanced industrial countries would continue to dominate expectations at the global level. Complex problems required a comprehensive international effort; the opportunity provided by the current negotiations for a new International Development Strategy should therefore be seized.

TOPIC II

INTERDEPENDENCE BETWEEN ENVIRONMENT AND  
DEVELOPMENT; LIFESTYLES, CONSUMPTION PATTERNS,  
TECHNOLOGICAL OPTIONS AND RESOURCE CONSTRAINTS

Rapporteur: Mr. G. BÄCKSTRAND (Sweden)

In the short-term perspective, development is understood by everybody to be synonymous with fast economic growth, rapid industrialization and large-scale technological change. Recognition of the interdependence between environment and development imposes "another development", a form of development different from the traditional pattern, which is defined as "maldevelopment".

"Another development" does not mean simply the reversal of conventional patterns. It does not require zero economic growth and a ban on industrialization or technological change. People turning their backs on "maldevelopment" are exploring new avenues. They explore novel concepts, such as basic needs, lifestyles, consumption patterns, appropriate technologies, the quality of life. These concepts are difficult to interpret within the framework of the predominant analytical models. They are necessarily vague, reflecting societies in search of transitional paths without a clear sense of direction. There is basically nothing wrong with the double acknowledgement that previous models for development - based on the trinity of fast economic growth, large-scale technology and rapid industrialization - ignored the interdependence of environment and development, and that we have no equally well-designed models for "another development" on hand.

The topic to be addressed could thus be called: "another development". Before proposing a few questions for discussion, drawn from the background documentation, some further clarification might be appropriate. Contemporary maldevelopment is the result of an almost universal conception of society as an economic model with a certain set of economic imperatives. The search for "another development" does not necessarily mean that there will be only one other development model. We are confronted with global problems, but there are no general global solutions. To argue for "another development" demands recognition that alternatives and diverse development models exist.

The questions of relevance to the present topic that have been raised in the background documentation can be grouped under four main headings: spatial development, energy, time use and the informal economy, and cultural authenticity.

Spatial development

Attention is frequently drawn to the fact that the excessive concentration of socio-economic activities in large urban-industrial agglomerations is a direct cause of high material consumption, frequently accompanied by environmental

pollution; it also has an important influence on lifestyles and choice of technology. Future development should therefore place more emphasis on regional and local activities. This cannot be achieved merely through a change in attitudes, however; effective institutions for purposeful spatial planning will be needed.

The background documentation contains an analysis of a long-term national plan for spatial development (in Poland) to combat further spatial concentration. This plan has three basic features: it is polycentric; it promotes settlements of moderate size; and it places emphasis on protection of the environment. Great importance is attached to the development of regional and local socio-cultural activities, which to a certain degree are self-reliant. These activities help to shape regional and local spatial and economic patterns.

The principle of moderate concentration obviously underpins the idea of providing access to the greatest possible variety of resources in all regions. The aim of equality in options or choices between regions is more easily attainable in respect of such characteristics as level of income, education, social benefits etc. than of resource endowment, especially environmental assets; but taking such differences into account may help to achieve a better balance between regions in the course of over-all national development.

In the paper just referred to, it was pointed out that to think of sudden and radical reshaping of a civilization pattern, and in particular its physical shape, would not be realistic. What can be visualized, however, is a change in the dominant tendencies, and this is our main concern. In this context, it must be clearly recognized that it is not possible to rely on some vague change in attitudes. In order to implement the principle of moderate concentration many different instruments are needed. The question is: which instruments would be the most effective?

### Energy

The dimension of "another development" that has been most commonly understood is the role of energy in society. Until recently energy was mainly regarded as a problem of adjusting supply to a planned end-use, whereas it should rather be the other way round, i.e. end-use should be adapted to a given level of supply, at least in respect of conventional non-renewable sources.

Because of the hitherto prevailing cost structure of production, scarce high-quality energy is used for tasks where abundant low-quality energy would serve the purpose. Large centralized systems for electricity generation often constitute a real obstacle to measures that could reduce demand for electricity, and investments in such alternatives as combined generation is discouraged. Public utilities often tend to advocate end-use patterns that are highly inflexible, such as space heating by direct electrical resistance. In a system that has already invested in nuclear plants, electricity utilities will have to set rates that protect existing investment and consequently dissuade consumers and local authorities from investing in more dispersed technologies.

The existence of informed public opinion is not a sufficient condition for change. Effective action may require that energy policy should be determined from "down-stream", i.e. from the viewpoint of the consumer, whose needs for low-quality energy for heating and similar uses can in principle be met through a variety of systems. Such an approach will yield different results from conventional "up-stream" planning, which is mainly concerned with production facilities and considers the needs of the consumer only in aggregate terms, with little attention being given to the nature of the various demands.

One of the seminar papers relating to policies for promoting consumer energy conservation presents an interesting framework for discussing new dimensions of the energy problem. The analysis is based on a premise that is increasingly gaining support: "energy conservation is our most important energy resource". The goal of conserving energy can be reached in various ways through:

- (a) Better technical efficiency, (easy to achieve in cost-conscious industrial economies at times of increasing energy costs);
- (b) Recourse to alternative sources (induced by competitive cost structures and purposive efforts in science and technology);
- (c) Changes in behaviour (e.g. lowering temperatures at night);
- (d) Lifestyle modifications (e.g. a move from a single-family to a multi-family dwelling).

Such a framework might serve to guide discussion of alternative patterns of development and lifestyles. It could help to show that many energy conservation measures can be undertaken without relying on the more uncertain outcome (both in time and space) of modifications in lifestyles. The categories listed above are neither complete nor perfect. For instance, there are certain alternative sources which are directly connected with lifestyle changes, as far as time use is involved.

In the background documentation it is strongly argued that knowledge of conservation techniques is not sufficient in itself to motivate people to take conservation action. The entire networks of relationships in various sectors of society must be geared to the over-all aim of energy conservation, whether in the field of technology, the economy, government, the information media or social and personal contacts. In the governmental context, several important features can be mentioned, such as regulations governing public utilities, standards for equipment efficiency and information, community codes, and also the public stance of government officials as regards energy savings and leadership to promote conservation.

In one of the papers on the transport sector comments are made on the difficulty of getting people to take conservation action even if they know how to do it. Again public awareness is not sufficient. Without interfering with the freedom of choice of the general public, and thereby with the whole transport system, problems such as increasing pollution, excessive physical segregation of activities, poor competitiveness of public transport, noisy dwelling areas, impoverishment of nature, soil stripping etc., cannot be solved. This idea has been expressed as follows: "the market of transactions between private buyers and sellers is unable to cope with the management of a 'commons'."

#### Time use and the informal economy

A number of background papers discuss in different ways societal models of time-use and the future roles of the domestic, non-market or informal economic sector.

In three case studies, relating to laundry, television and shopping, developments resulting from the interplay between firms (technology), households and society are studied. They point to the ambiguous role of socio-economic planning and management over the past few decades; ambiguous, because attempts have been made to steer the technologies indirectly, either by introducing or intentionally withholding support measures. Concerning the residential

environment, such attempts relied on tax policies, systems of housing allowances, building regulations, loan regulations, etc. The studies urge policy makers to be more aware of the consequences this indirect steering can have on technology choices.

New technologies have often meant that work as such has been stripped of its social content. This evolution can have dangerous and far-reaching implications. The question is whether technology in the context of "another development" could be of more direct social benefit, or less directed towards private individual convenience. In other words, how important is it that we should know more about the implications of technology for time use? Such implications have often brought about a situation where one social demand on time, e.g. parents' shift work, conflicts with another demand, e.g. children's need for care and stability. These conflicts have until very recently been entirely neglected by the political and economic establishment.

The machinery behind the economic policy collects data about all money transactions, with some exceptions for those taking place in the illegal 'black' economy. The health of the 'formal' economy is measured in various ways, but in general by GNP growth. Most concern about the economic future is in fact closely related to unsatisfactory GNP growth. At the same time, the social cost of high GNP growth (measured in human and non-monetary terms) is claimed by many observers to be unreasonably high. Moreover, trends indicate very clearly that services (offered to consumers and households) represent a type of commodity that is gradually squeezed out of the market economy. The traditional remedy for this - expansion of the public service sector - seems to have fallen into disrepute and has perhaps reached a technical limit, unless there is some innovation in the fiscal system.

All this indicates that the informal economy deserves more attention, both in research and policy. Even a rough estimate shows that the total number of working hours in this sector in Sweden equals or slightly exceeds that recorded in the total official labour market (6 billion hours a year). Fuller study and understanding by public authorities of the informal economy and its links with the money economy might open up vistas for important social developments.

#### Cultural authenticity

In examining food systems, one of the seminar papers suggests that it is not merely physical factors but culture, economics and politics that are the prime determinants of such systems and the context within which they function. Without taking these relationships fully into account, the industrialized countries of today seem too prone to prescribe their own food systems which ought to be regarded as local responses to local problems and conditions - as solutions to the problems of hunger and under-development in the third world. The analysis of food systems has a thrust that goes beyond its immediate subject matter. It can be directly associated with the contention in another seminar paper, concerned with problems of urban development, that the reconstruction of many heavily damaged city centres after the war was an expression of the need of people to identify themselves with their historical past. This leads to the conclusion that it is important, in any development process, to maintain links with authentic values.

In the search for cultural change and authenticity the present emphasis on people's rights has to give way to emphasis on social responsibilities, the only means by which such rights can be created and maintained. "Autonomous egoism", i.e. individual greed, must yield to a sense of organic interdependence. The objective of continuous expansion must be replaced by the ideal of self-

sustained growth. Economic imperatives should give way to ecological imperatives; technological imperatives should be subordinated to judgements of political need.

With this set of principles it might be possible to establish a society based on equality of responsibility, which has been described as "one of the cultural conditions for western survival".

Industrial development has not only been banking on natural resources and on science and technology for using them but, more important, it has also been banking on immaterial social capital. The "challenge of the commons" is to discover how to change human behaviour and society so that the goal would become one of balancing or integrating private expediency with public responsibility.

Polluted water and air, chemically contaminated food and different types of scarcity are forcing society to incorporate environmental considerations into the whole process of development planning. We now know that we cannot continue "banking on the biosphere".

It should be made clear to everybody that industrial societies are now running down the immaterial capital of social cohesion, helpfulness, loyalty, honesty, reliability, public common sense, etc. which is just as necessary for all true development as is the physical capital of natural resources. In the search for new immaterial social capital, one could perhaps ask, as did Robert Jungk at the World Future Studies Conference in 1979, whether a possible new contribution might not be third-world help for the industrial world. The concept of communal work is still deeply rooted in the third world; it is still possible to find there a level of community participation and sharing of resources that Western societies can rarely expect from their members. We may have to learn and re-learn mental attitudes and human skills from those who still master them - and the wisdom may come from other societies than our own.

#### General discussion

In a broad context, a number of statements were made to the effect that policies and strategies to promote new patterns of development and lifestyles should place emphasis on the positive and progressive aspects of the change. Public opinion might already be receptive to the idea of change if concrete examples could be put forward that represented reasonable alternatives to present patterns. As an example of comprehensive measures to bring about such change, reference was made to traffic management measures introduced in Ottawa, Canada, during the 1970s to reduce congestion and encourage the use of public transport. The measures included the introduction of flexible working hours and car parking charges for civil servants, as well as the extension and improvement of bus services. The result was a rapid and significant shift in behaviour patterns by many people. In other cases, change might be initiated as a spontaneous activity, with little need for institutional support. It was felt that many more experiments in alternative lifestyles should be encouraged on both small and large scales; in that context there was also a need for increased recognition and understanding of the so-called informal economy. It was suggested that public authorities should give more attention to the analysis of present consumption patterns and their implications.

It was observed that post-war development based on narrow economic considerations had made contemporary society increasingly vulnerable. Its vulnerability was inherent in the excessive centralization of essential facilities and over-dependence on imported energy and other materials. The view was expressed that advocacy of alternative patterns of development and



lifestyles could easily become too authoritarian; many of the necessary changes, for example in regard to energy conservation, could be achieved through market forces. It was also argued, however, that the environmental and other problems discussed had often developed because the market was a very imperfect mechanism for handling such matters. Many decisions had therefore to be taken on the basis of social values, even when a narrow economic viewpoint indicated another choice.

Although many experiments in alternative development could evolve naturally over a substantial period of time, it was recognized that time was often an important constraint when acute, chronic or long-term problems required immediate and forceful action. Once again energy provided many examples. How, for instance, could institutions and individuals be persuaded to take action on problems obviously demanding early intervention if they were likely to produce real risks only in a distant future? The possible climatic and other effects of continued increases in atmospheric carbon dioxide caused by the burning of forests and fossil fuels were cited as a relevant case. The situation was often complicated by the contradictory information available to the public (e.g. in regard to the current energy supply situation). Yet another problem exemplified very clearly in the energy field was that of making reliable forecasts about the future. The tendency to extrapolate energy demand curves characteristic of the 1950s and 1960s to the end of the century and beyond had led, in many countries, to quite unrealistic forecasts of future needs; nevertheless, the extrapolations were still used as a justification for massive and expensive new production facilities. Reference was made in this connexion to the potential value of establishing systems for natural resources accounting and budgeting to improve the information and forecasting basis of macroeconomic planning.

It seemed probable to several participants that alternative development patterns and lifestyles would be needed to solve many emerging problems arising from the relationship between income and employment. Several recent scenarios had worked with the assumption of a large increase in the proportion of people who would be self-employed.

However, it was noted that in many parts of the ECE region the tradition of self-employment had practically disappeared and might be difficult to restore. Unfortunately it was often the case that technological progress tended to make unemployed those who were least able to switch to self-employment. Furthermore, it could well be true, in the ECE region as elsewhere, that too loose a definition of the expression "self-employment" might hide the fact that many people were underemployed.

### TOPIC III

#### FOOD SYSTEMS AND PATTERNS OF RURAL DEVELOPMENT

Rapporteur: Mr R. JACKSON (Canada)

Why discuss alternative food systems and lifestyles? Undoubtedly because some current trends seem to take us in a false direction.

This seminar will primarily focus on the need for alternatives in the ECE region. It has become evident that many agricultural methods, food systems and rural lifestyles as they have evolved in the ECE countries are often inappropriate, if not directly damaging, in developing countries. Before recommending to others how they should keep house, we should therefore look under our own rugs and examine how the food systems function within the region. Of course, this should not preclude consideration of their economic, social and environmental impact on other regions. Such an analysis may even lead to better understanding of the basic problems.

The current trends in the ECE region stem from the very process of industrialization. The farm has increasingly come to be regarded as a kind of factory. The effects of intensification, specialization, mechanization and the use of manufactured inputs on traditional patterns of rural life have been profound. Some of the current trends have been statistically well illustrated in the background documentation. Conceptually it might be possible, as suggested in one of these papers to define the situation by saying that "the dialectical relationship between man and nature is in a phase of contradictions, as the practices based on an older science are encountering the realities revealed by the new ecological sciences".

In line with this introduction, there are a few headings under which the issues at stake might be discussed.

#### Labour displacement

In earlier stages of industrialization, the policy was to displace labour from the land to ensure a supply of cheap labour for the mines and factories. One might now ask whether a policy of labour displacement from agriculture is still appropriate when manufacturing is reducing its labour force through automation. Further, on the basis of certain criteria of desirable lifestyles, some kinds of food production, full-time or part-time, may today represent more attractive forms of work than many of the jobs we are left with in the city. Another question is whether agriculture should be regarded as "just another industry" when it bears such a close relationship to self-sufficiency and is not so much a job as a way of life.

### Energy

In the pursuit of high output per man-hour, industrial food production has been increasing its dependence on energy - for mechanization, transport and distribution, processing and packaging, agricultural inputs of fertilizers, pesticides, herbicides, and feed. Existing systems were to a large extent structured during the era of cheap oil, and may now be inappropriate. As the costs of energy based on fossil fuels rise, the economic balance may well shift to favour methods that take more advantage of the various forms of solar energy - both directly and as stored in crops and biomass - as well as methods that reduce transport, distribution, processing and storage costs. Market gardens within or close to cities, or even on roof tops, exploiting low-grade waste heat, may become more prevalent. As suggested in one of the seminar papers, one end-point of long-term trends towards intensification and a rising ratio of energy input could be the production of food using micro-organisms and nuclear energy thus doing without sunlight altogether. A new or alternative agriculture might equally take a quite different direction: not a return to older farming methods, but an agriculture based more on ecological sciences than on chemical engineering. The energy ratio could be improved by low tillage techniques, highly selective herbicides and pesticides, or biological controls, nitrogen-fixing plant mutants, recycling of wastes with the aid of micro-organisms producing ethane or methane fuel, and, finally, changes in dietary patterns.

### Sustainability and vulnerability

Market or other pressures to maximize production and minimize costs encourage resort to short-term expedients that cannot be sustained. They lead to a drain on resources - fossil fuels, phosphate mineral deposits, water tables, top-soils, ecological reserves, wildlife, genetic diversity - and to an accumulation of effluents and wastes in the form of manures, pesticide residues, fertilizer run-offs, salination. The ecosystem may become so simplified that it is vulnerable to collapse from blights or weather fluctuations. Risk has not been sufficiently allowed for in the system - maybe even because of such a kindly act as government crop insurance.

### Scale

Pressures to produce at lowest cost, along with deliberate government policies in some countries, have led to large-scale capital-intensive farming. The consequences include heavy debt burdens on farmers, take-overs by large corporations including transnationals, the disappearance of the family mixed farm and, with declining rural population density, disappearance of the supporting network of services and social structure: an "inverse multiplier effect". Various non-conserving practices may result from the need for an adequate return on the heavy investment in capital equipment. In this context, we must, of course, be wary of generalizations. Different farming approaches are suited to different conditions. Quite large-scale farming is appropriate in certain circumstances. Sometimes, for example, the ecological characteristics of the soil may be essentially the same for miles in any direction. Sometimes, in more rolling country, the soil type varies from hilltop to valley and from one hillside to the next.

### Nutrition and diet

The nutritive quality of food has tended to become a minor factor in its pricing and marketing, compared with appearance, mechanical properties and shelf life, for instance. Taste, after all, can be dealt with by various flavourings and additives in the processing. The consumer nowadays has to trust the manufacturer and the government inspector, rather than establishing a direct personal relationship with local grocers and farmers. A current subject of debate is whether food grown with inorganic fertilizers is nutritionally equivalent to that grown organically. It is appropriate here to note the existence of a new theory, essentially based on the ecological viewpoint, that "man's biological essence calls for organic unity between himself and nature". This means that there may be many vital exchanges which we do not yet understand between humans and the plant and animal life on which they feed. There may thus be risks in lengthening and complicating the linkages, interposing molecules that have not been part of the long evolutionary symbiotic adaptation. As against that, dietary trends in ECE countries have continued towards high consumption of animal protein from grain-fed livestock, which is expensive in terms of money, energy and land, and of doubtful benefit to health. The food system has encouraged market growth by selling convenience, appearance and taste (often through the addition of excessive quantities of fats, salt and sugar), rather than optimizing nutrition. The result, if we were to measure it in terms of nutrition per dollar, would be seen to be a food system which is much more expensive than it needs to be.

Social impact - human ecology - Under all the above headings, reference has been made to the implications of food systems for lifestyles, both at the producing and at the consuming end. This last heading is introduced to provide an opportunity for summing up and also to allow consideration of the ways in which our food systems reach out into the developing world, where, as is argued in several background papers, they may have quite drastic consequences. One aspect of the general social impact of modern food systems is the division of society into a group of relatively few producers and a mass of dependent consumers. Self-reliance has to a large extent been lost, perhaps not appropriately in a matter so simple and vital as food. These are all reasons to search for alternatives.

In attempting to suggest some characteristics that most alternatives should share, it is necessary to avoid over-generalization: agriculture is a varied activity taking place in a wide range of physical, economic and social situations, even within the ECE region. Nevertheless, it seems probable that any alternatives should stress the principle of conservation with respect to energy, material and environmental assets and would build on ecological/biological interrelationships. Desirable alternatives could therefore be characterized as low-entropy systems. Other desirable features might include resilience and self-reliance, closer contact between producers and consumers and a shorter path from waste back to the land. The proposed alternative patterns may be incremental or radical. They need not be "feasible" in terms of a complete and simultaneous revision of the agricultural and food system of a whole country but rather in the sense of being "viable", relatively small-scale developments, that might constitute the nuclei around which the future might expand.

### General discussion

It was pointed out that contemporary agriculture in the ECE region was a blend of the traditional North American dependence on mechanization to achieve high productivity of labour and the European tradition of using fertilizers to gain high yields from land. Extreme efficiency in industrial terms had resulted, but serious secondary effects in the form of environmental deterioration and high

social costs had begun to show up. Many of those problems were inherent in the system, which without sufficient attention to the consequences, was spreading throughout the world, as a solution to the problems of developing countries. It was observed that the dominant pattern of industrialized agriculture led to waste of material and human resources; in that context declining employment was regarded as a critical factor to be watched carefully, not only in developing countries but also in the ECE region.

Attempts were made to define the goals of alternative food systems. Along with ideas expressed in some seminar papers, it seemed that ecological sustainability should be an important characteristic. A certain orientation towards "self-sufficiency" and more reliance on local bio-regimes and local solutions, accompanied by scientific upgrading and enrichment of locally accumulated knowledge and techniques would be desirable. In a situation of great concern about world production of food, such a policy would seem highly justified. It appeared that in many industrialized countries, the large-scale industrialized food systems had meant the steady disappearance of local produce in favour of imports. To a large extent and not only in North America, the food system was controlled at one end by suppliers of equipment and other manufactured inputs, and at the other end by marketing agencies and firms, which were basically uninterested in matters such as farming costs, the structure of rural society and nutritional values. In comments on certain efforts to adjust present trends, it was held that new nutritional knowledge was making some difference; it had been realized that milk policy had wrongly emphasized butterfat instead of protein content. That would bring about changes in livestock feeding. In another field, a recent ECE seminar had recognized the frequent misuse of fertilizers and, in a period of rising prices, much more attention was now being given to the methods, timing and quantity of fertilizer application. It was also strongly argued that in many countries in the ECE region, the complex agriculture and food sector would require structural changes which could only be brought about by more comprehensive approaches. Similarly, it would be rational, for instance, to co-ordinate agricultural, economic and environmental protection policy.

Much progress towards the widespread adoption of alternative systems could be made by individual initiative and by action on specific problems, such as the use of pesticides, but it was noted that in many ECE countries the major problems involved the interaction of agricultural systems, environmental protection and the quality of life. Such complex situations required structural changes involving a comprehensive approach. Although more concern was being expressed nowadays in regard to those complex problems and conflicts, it should be recognized that distorting influences were well established; the existence of wide agreement on the need for alternatives was not a sufficient guarantee that change would occur.

Several participants drew attention to the importance of small, part-time, marginal and hobby farms. About 10 or 15 years previously they had been regarded as an insignificant component of agriculture in the ECE region; even now there were few data on them, and little attempt had been made to respond to the needs of that type of farming or to recognize its potential contribution to future needs. Yet 20 to 25 per cent of total food production in some ECE countries now came from such holdings, including urban agriculture, which might play an important role in the impending structural adjustment of employment in the region. Many forms of agriculture required relatively small and infrequent labour inputs in order to achieve efficient production on a small scale. Recognition was also given to the usefulness of arrangements whereby people in other occupations grew food part-time. It was suggested that research and development of machinery appropriate for small-scale or part-time use were required, and that there was a corresponding need for research on appropriate

products, which would be characterized not by low yields but by low labour and low industrial input needs. Despite massive financial support to agriculture in the ECE region, there was little encouragement to the sector. Better understanding and public awareness of the role of marginal farming seemed to be required, together with better status for marginal farmers; at present, as the term "marginal" indicated, they were still regarded as unimportant elements, and sometimes as "drop-outs" from the main agricultural scene.

Although there was widespread agreement that increased attention should be given to small-scale farming in the context of the search for alternative patterns of development and lifestyles, it was also pointed out that in some parts of the ECE region further progress in the direction of industrialized agriculture would yield economic, social and environmental benefits. In Yugoslavia, for example, a relatively high proportion of the population was still employed in agriculture, and benefits from the use of machinery were much higher in larger units than on small farms. Although the force of that argument was recognized, it was also noted that several other countries had been in a similar position in the recent past; the trend towards industrialized agriculture should be monitored carefully to ensure that the limits, where such benefits were beginning to turn into social costs, would not be exceeded.

The difficulties encountered in monitoring the costs and benefits of contemporary agriculture and food production were demonstrated by the suggestion that in some countries of the ECE region, to supply a litre of milk to a consumer, might, on average, require an equivalent amount of petroleum. That statement was probably an exaggeration, but at present it seemed that no accounting system or reference base existed which could support or disprove the contention. In order to determine where alternatives were needed, and to assess the comparative advantages of different alternatives, such an information system seemed essential. Among other matters that were suggested as meriting study and attention by Governments was the possibility of shifting agricultural subsidies from equipment and other capital expenditure towards employment. Farmers might also benefit from some relaxation of the constraints imposed on them by government policies and other controls. Much could be done to restore the structure of rural society if housing subsidies were directed more towards rural areas than they had been in the past. Overall, Governments had to ensure that farmers gained a reasonable income from a meaningful occupation.

TOPIC IV

IV. PATTERNS OF URBAN DEVELOPMENT  
AND TRANSPORT STRUCTURES

Rapporteur: Mr. G.P. HEKSTRA (Netherlands)

Provision of "shelter, infrastructure and services" in the form of human settlements represents one of mankind's greatest historical achievements. In bringing these three elements under a single heading, the 1976 United Nations Conference on Human Settlements recognized that they were closely interrelated. Although it might not always be possible to provide for all the functions simultaneously, it would be inefficient to plan and develop them in isolation from one another. Yet unco-ordinated planning continues and is still prevalent in the ECE region and all over the world. The consequences are most evident in the growing conflict between the quality of life in cities and the transport systems which are both cause and effect of prevailing lifestyles.

Almost everywhere in the ECE region, there are long-standing architectural traditions and practices and rules of community management on which local and regional authorities can rely for decision making in respect of human settlements and their organization. Conflict has arisen when this base of reference is dislocated by new systems to meet increasing demand for transport, in particular by car. It seems to be generally recognized, however, that a strict ban on the use of private cars is today hardly a feasible policy. Long-term remedies will therefore have to be sought in technological innovation and new design for urban settlements. Measures favouring public transport at the expense of private car traffic have mostly been beneficial to the environment, but in a transitional period it might be necessary to learn to live with the motor-car.

Stressing the virtue of meeting latent transport demand has not proved a valid strategy, at least not if one judges by experience in the Netherlands, one of the most "car-crowded" countries in the ECE region. Clearing one congestion point has invariably given rise to others. Such a policy provides no lasting solutions, but leads to more encroachment upon nature, the countryside and the urban environment. There is an array of possibilities for improvement within the existing framework, but the range of policy options seems to be narrow in most ECE countries. The approach will probably have to be a balanced policy of changes in lifestyles and control on energy and car use. As the seminar documentation points out this is partly because of a "lack of political will" and the "apparent unwillingness of the major part of the population to allow stringent restrictions". Priorities for different modes of urban transport should be established, and the Seminar might consider what criteria could be used for determining such priorities, and how they could be applied.

In considering the subject of urban planning, reference can be made to a recent ECE seminar dealing with particular problems of integrated physical, socio-economic and environmental planning. The participants stressed that integrated planning cannot be brought about simply by adding more concerns to a given set of objectives; it requires a fundamental change in the selection of objectives and the establishment of priorities, and, above all, a new way of thinking in terms of systemic relationships. It was also suggested that it might be sensible to accept the inconsistency of objectives and to plan for parallel courses of action. Integrated planning was to be considered as a continuous learning process which should reflect constantly changing social goals.

Analysis of post-war urban development in several countries has indicated many areas of concern, including the poor quality of recently constructed neighbourhoods, inner city decay and environmental and psychological problems. This is the cumulative result of too many people doing too much in too small an area in too short a time span, without proper co-ordination. Anticipatory planning is rare; the policy at various government levels is rather to "muddle through" the crisis. In general it seems that urban planning ought to provide more opportunities for public participation.

Two themes to be addressed are rehabilitation of older urban areas and the role of public participation. Although public participation is becoming a necessary and important element throughout the urban planning framework, it is closely linked to urban rehabilitation and renovation, which will involve more than the restoration and improvement of physical elements in the city. The maintenance of the existing community structure is important, and consequently the local population should help to define objectives and participate in the rehabilitation process.

Concentration and subsequent deconcentration appears to be a widespread phenomenon in the evolution of cities, irrespective of their size, location or relationship to other centres. In eastern Europe the trend still seems to be towards greater concentration, although one paper prepared for the Seminar indicated the importance in any over-all planning strategy of "a polycentric moderate concentration, with emphasis on protection of the environment". Another paper describes an example of the use of explicit regional development policies as a means to overcome inherited regional disparities. Concentration can also be observed locally in western Europe, but the general trend appears to be towards deconcentration and declining centres. This trend might well be borne in mind in the consideration of national urban policies. Another important problem is the network of energy flows in urban systems, which vary considerably across the ECE region; understanding the nature of these flows is essential to more economical and more efficient energy use in our cities and urban agglomerations.

#### General discussion

It was suggested that modern cities were becoming groups of urban villages, in which the inhabitants were anxious to preserve and enhance the distinctiveness of their respective neighbourhoods through effective participation in the planning process. In some countries, the neighbourhood plan was a recognized element in the hierarchy of national, regional and local planning. It was also argued, however, that the view of the city as a collection of distinctive villages or neighbourhoods reflected no more than overdue recognition by municipal governments of a characteristic that had always been evident to those who lived in cities; however, care should be taken to prevent that view from leading to new forms of disintegration of larger human settlements as social and regional entities.



In the discussion of spontaneous settlements in and around urban areas, it was noted that such settlements often had various positive qualities, including the rapid development of a sense of community among the inhabitants and emphasis on green areas and other amenities. However, it was also pointed out that spontaneous settlements usually had serious harmful effects on the wider urban area of which they were a part, since their occupation of land and other resources tended to prevent appropriate provision of services and other amenities for the community as a whole. It was noted that the need to consider local actions and plans in a broader context was a general characteristic of urban planning. It was often the case that municipal governments were expected to tackle practical problems that could be resolved only in a wider geographical or administrative context than the urban area itself. That could be regarded as the spatial expression of the need for integrated physical, socio-economic and environmental planning. In connexion with the appropriate roles of different levels of government, it was suggested that central governments should establish general principles or guidelines, leaving the form and method of implementation to be decided at the local level.

Reference was made to several positive features of the new trend towards integration of urban facilities at the neighbourhood level. By reversing the functional separation that had characterized urban development for several decades, it tended to reduce energy use in transport, and also had other benefits. It was pointed out that planning for polynuclear urbanization had many similar characteristics and objectives. Such urbanization appeared consistent with urban rehabilitation; in Norway, for example, one objective of recent legislation was to link rehabilitation with existing planning measures and thus to provide an opportunity for "grass roots" participation. It was suggested that even if rehabilitation, from a short-term viewpoint, might sometimes be more expensive than new construction, the longer-term benefits were considerable, especially if factors such as the protection of agricultural land were taken into account.

Attention was also drawn to the general recognition of the need for consistent urban planning. At the 1976 Conference on Human Settlements agreement had been reached on the desirability of urban policies at the national level, but in many countries the corresponding recommendation had not yet been implemented.

TOPIC V

INSTITUTIONAL INNOVATION AND INDIVIDUAL MOTIVATION FOR  
ALTERNATIVE PATTERNS OF DEVELOPMENT AND LIFESTYLES

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A technical debate on alternative patterns of development has its limits. It is currently believed, however, that there is always a technically feasible and economically viable solution to any well-defined problem. This ignores the fact that existing institutional structures and the inherent rigidity of individual behaviour play a decisive part, as soon as modifications of power structure or conflicts of interest are at stake.

The stance taken in the documents prepared for the Ljubljana seminar deliberately follows a different course. One is struck by the richness and diversity of the reflections on the importance of institutional innovation and individual motivation in the search for alternative patterns of development. Almost a third of the seminar papers deal explicitly with this problem, which, moreover, underlies most of the contributions. Indeed, if it is recognized that the problems of resources and environment can be solved only by a change in patterns of development and lifestyles, the question is no longer one of particular techniques or specific institutions; the institutional structure as a whole, the decision-making processes and the socio-economic dynamics are all involved. The emphasis previously placed on curative technology to fight pollution and waste within the framework of specialized bodies, with direct responsibility for the protection of the environment has been shifted so as to make the management of natural resources and the human environment a collective responsibility at all levels of action.

Interpreted in such a broad way, seminar topic V obviously opens the way to many diverse approaches, especially in ECE member countries where institutions, expectations and social systems are so varied. It would be impossible, in a few words, to summarize the seminar papers, ranging as they do from studies of local experience in participation (as for instance in the city of Pavia) to projects for alternative societies (e.g. the "conservation society" as introduced by the Government of Canada), and embracing a whole series of analytical reviews and suggestions related to ecodevelopment, integrated planning, internalization of social costs, decentralization, community life, development of international co-operation, etc.

What makes for unity, when dealing with the diverse aspects of this theme, is not only a certain number of common concepts, such as ecodevelopment, but also, and above all, the common historical context. It is necessary to put all these scattered experiences into a dynamic perspective in order to understand their meaning and relationships. Only then will it be possible to highlight the

principal problems, alternatives and strategies which emerge from the mosaic of the seminar papers and to trace a few possible institutional paths for change in the development patterns of the ECE countries.

Institutional innovation and change in the behaviour of individuals are two of the major challenges of the 1980s.

A reminder of some of the developments of the last 15 years in the field of environment and resource management may help to bring the current problems of institutional change into focus:

(a) Since the 1960s, the general public has become increasingly aware of environmental problems. In some countries this has even given rise to real social movements. However, citizen mobilization is mostly limited to local or specific practical questions, and concern about changes in the environment is very sensitive to the impact of economic fluctuations.

(b) In the 1970s, most ECE Governments have, with remarkable unanimity, set up specific institutions for environmental management; but these institutions, which differ considerably from one country to another, are highly vulnerable and are having to adjust to an economic and social context that is quite different from that in which they were conceived. The area of competence of these institutions has been extended progressively from problems of pollution and protection of nature to an increasing number of concerns relating to the quality of the human environment; and this has sometimes led to interagency conflicts.

(c) The establishment of specific institutions has gone hand in hand with the development of environmental law - particularly at the national level much less at the international level - and, in many countries, the testing and institutionalization of mechanisms to internalize external costs.

(d) These initial institutional responses have not been sufficient, however, to prevent conflicts over the environment or criticism of the poor functioning of administrative arrangements for environmental protection. In many countries, efforts have been made to cope with public discontent by strengthening local powers and introducing information exchange and citizen participation in decision making on matters that concern them directly. However, as a report from Canada indicates, attempts to provide for participation have often led only to increased frustration, because the role of the general public has not been properly understood, or because participation has not been organized at the appropriate time, thus giving the impression that "the dice were loaded".

(e) This explains why so many experiments and proposed new solutions to various problems of daily life have emerged on the margin of the existing institutional systems. However, these social innovations mostly have a precarious status and limited credibility.

(f) In fact, even if the decade of the 1970s may be recognized as a period in which, for the first time, the problems of the environment were considered in a comprehensive and explicit manner, this has not led to any scrutiny of the behaviour of individuals, the institutional structures or the prevailing patterns of development. The integration of concerns about the environment and resources into economic, social and technological policy, or physical planning, is still at an embryonic stage, although some success has been achieved in terms of integrated planning, technology assessment and environmental impact assessment. Changes in social motivation and behaviour recommended with greater or lesser forcefulness by the public authorities have not been of an order of magnitude to match the problems resulting from the deterioration of the physical

environment and the depletion of energy resources. The behavioural patterns of the 1980s are not in essence very different from those characteristic of the early 1970s.

(g) For many reasons, all these collective or individual responses, representing a first generation of environmental policies, are not suited to the situation in the 1980s. On the one hand, general economic difficulties coupled with diminishing returns from purification techniques have made specific anti-pollution policies less rewarding; more attention is thus given to preventive or "anticipatory" policies which, of necessity, require a reorientation of lifestyles. On the other hand, the energy problem and the problem of the food system will demand more vigorous action on the part of both individuals and institutions.

(h) The oil crisis has actually shown that the real problem lies not in the global availability of resources but in the behaviour and attitudes of certain groups of countries, and particularly of consumers. It is often said that conservation constitutes the prime energy resource of the ECE countries and would by itself, permit a reduction of the energy needs of the household sector by 30 to 50 per cent. Many other examples of "institutional" rather than actual scarcity could be cited.

(i) Finally, there is a tendency to let the problem area of the environment extend to cover the qualitative dimensions of development and, in particular, the conditions of daily life; this evolution will have a direct bearing on forms of social organization.

Greater emphasis on the quality of development and the need to meet the challenges of the economic crisis and the concomitant problems of natural resources ought to bring about a profound change in technology and lifestyles in the 1980s. It is difficult to imagine, however, that such an upheaval could take place without a minimum of support from the general public; this would require strengthening of the forces working for increased decentralization, information and participation which were set in motion in the 1970s. Moreover, several seminar papers contend that these developments will at the same time promote new spontaneous forms of social organization or new demands on the institutional system; and they stress the need to render the conventional processes of decision making more open.

After a decade of efforts to draw up specific policies to protect the natural environment and improve the quality of life, a new generation of environmental policies is now required by the socio-economic context itself. In this new policy phase, the possibilities for modifying lifestyles, i.e. behavioural patterns and institutional mechanisms, will be of decisive importance. It is in this light that the seminar should examine the need for institutional change which has been documented in the background papers.

Turning to the challenges of institutional change, the first one concerns ecology. The problem is to promote a priori integration of environmental concerns into collective and individual decision making, by internalizing the external costs and instituting preventive policies.

Such an orientation can only come about through a reversal of the present tendency of institutions to give priority to short-term financial criteria and to chop reality into isolated pieces. It will also be necessary to ensure radical changes in dominant patterns of behaviour in which individual interests

are pushed as far as legal constraints permit, ignoring all that is specific to the natural environment, e.g. the existence of collective concerns, interdependence between ecosystems, risks of irreversible damage, etc.

Changes in attitudes and decision-making processes will not be sufficient, however; in certain areas new legal rules will have to be adopted in order to make up for the "lack of management" in respect of all non-appropriated spaces: non-territorial seas, the upper atmosphere, regions in the process of desertification, complex ecosystems, etc., as referred to in "the tragedy of the commons".

The second challenge is an economic one. The problem is to modify the attitudes of producers and consumers so as to cope with the increasing scarcity of cheap resources and also, through social innovation, to help European societies adjust to a new international economic order which, in many countries may take the form of slow rates of growth and profound technological change. This evolution towards more frugal societies, and more vulnerable and interdependent economies, is to a large extent dependent on the possibilities for profound social and institutional change: new attitudes towards work and property (e.g. the revaluation of non-material satisfaction, the search for simplicity, the need to put down roots and become independent, the rejection of the pursuit of size for its own sake; new forms of persuasion or collective organization (ranging from simple information to the organization of economies based on scarcity which will require appropriate adjustments in structures, powers and procedures for decision making); new forms of co-operation with third world countries; and so on.

In such a context, will European societies be able to safeguard their social cohesion and economic homogeneity? Many doubt it. A split into two parallel economic sections seems more likely. This may provide opportunities for creating employment in the non-commercial sector directly related to improvements in the quality of life, but may also result in new forms of social differentiation which will be difficult to accept.

The third challenge is of a socio-cultural nature. The problem is to promote patterns of social organization that would permit a form of development which is better attuned to the needs and expectations of all - majorities as well as minorities - and corresponds more closely to the profound desire of individuals for identity and cultural roots.

The notions of an "alternative society" and "autonomous and diversified development" frequently referred to in the seminar documentation, call to mind the decentralized institutional structures of small regions or communities that exist at the margin of the dominant systems. Are these places of social innovation doomed to marginality, or do they represent valuable experiments for the creation of alternative lifestyles? This question has long been debated; it relates to ways of linking the State, the market and the civil society, i.e. the coupling of centralized and decentralized structures. It is becoming more topical again now that the ECE countries are being challenged to adapt their way of life to new conditions and mobilize their powers of innovation in order to offset greater vulnerability by increased flexibility in social organization. To reject the trend towards uniform patterns of development does not necessarily imply a desire to create isolated and self-centred micro-societies. Many participants in this seminar have argued that the search for greater autonomy is perfectly compatible with the strengthening of solidarity between the inhabitants of a single region using the same resources, present and future generations, developed countries and the third world. Here again, cultural change is the challenge.

Finally, the prospects outlined above imply a fourth, political, challenge. The objectives of preventive environmental management, the fight against wastefulness, the adjustment to a new international economic order or the development of autonomous and diversified lifestyles, all require that at least four fundamental conditions should be fulfilled: a redistribution of competence among the State, economic forces and independently organized social groups (and also among the different administrative powers); wider social participation by individual citizens; acquisition by industrial societies of a capacity to control change while accepting great diversity in lifestyles; and finally, the creation of adequate forms of political co-operation between regions within a country and between nations. It is not sufficient a priori to identify the most appropriate procedures for decision making (e.g. integrated planning, contractual arrangements etc.) or levels of decision making (e.g. regions, communities, etc.). The capacity of political systems to overcome their own rigidity also has to be examined. Without institutional innovation, there will be no real change in patterns of development.

When addressing the question of means and strategies for change, we find that a great number of alternatives have been suggested in connexion with the challenges just discussed. Despite their numbers, these alternatives can be grouped into a few main types. We will first examine those proposals on which various seminar papers seem to agree.

It appears that the practical application of the "ecodevelopment" concept (the search for a viable symbiosis between man and his environment; emphasis placed on basic needs; the tendency towards "self-reliance", etc.) would correspond fairly closely to the economic, ecological and social concerns of the seminar and constitute an appropriate form of change in lifestyles, especially in the sparsely populated areas of ECE.

Consensus also seems to exist on preventive environmental policy measures, such as: improved co-ordination between administrative agencies; integrated planning; environmental impact assessment, improved methods for technology forecasting and assessment; taxation of externalities; and accounting applied to environmental and cultural assets.

Similarly, the mobilization of public opinion through better information and education appears to be an indispensable condition for the evolution of new lifestyles. It must be accompanied, however, by a re-introduction of classical approaches to education and training, which would mean: more emphasis on comprehensive knowledge; a revaluation of individual experience; diversification of the network for communication; and an enhanced role for consumers' associations.

The strengthening of public participation is also considered an appropriate instrument for institutional change, but the various seminar papers stress that in order to make it efficient, the following conditions must be fulfilled: general popular interest in the problems at stake; open access to information; the feeling that participation is useful and leads to alternative solutions; and a real redistribution of power in favour of the persons consulted, or their representatives.

Finally, the majority of the papers consider that the "regional" level is the one best suited for management of the environment and the "quality of life".

Opinions are much more divided in respect of such subjects as: the organization of government structures for management of the environment; decentralization of power; the respective roles to be played by the market, the State and the civil

society in changing lifestyles; the role of social experiments and the "informal" sector; and, finally, institutional recognition of new forms of solidarity.

The main divergences of opinion concern the roles of the State and individual initiative in the search for alternative lifestyles. Some people believe that the evolution of new patterns of development is dependent on the strengthening of planning or the launching of more dynamic government policies; others think that, on the contrary, social innovation should emerge from the "grass roots" and develop in an autonomous way (i.e. outside the existing institutional system).

This debate ties in with the discussion of diversity versus uniformity of lifestyles. Some people believe that social integration ought to be strengthened by improved institutional co-ordination or through global projects for a new society; conversely, others would accept diversified patterns of development, even at the cost of a differentiation in social status (e.g. the juxtaposition of a productive sector and an "informal" economic sector).

Placing the problem in a geographical context, the same fundamental divergences separate the proponents of centralization and the proponents of autonomous regional power that would give new impetus to lifestyles rooted in local culture.

Another series of divergences relate to the problem of how to adjust political structures to guarantee proper management of the environment and natural resources. Opinions differ on the best choice of approach: creation of specialized ministries; co-ordinating bodies; or integration of the environmental concerns into the institutional system as a whole. It is, furthermore, difficult to find agreement on such questions as the best geographical level for decision making (the country as a whole, the region, the small community or the ecosystem) or the mode of linking together the public, local communities, public authorities and the economic system (e.g. project implementation on the basis of contracts between small communities, regions, various associations and government institutions).

Keeping in mind all the divergences as well as the differences in structure and institutional context in the ECE region, a reading of the basic documentation for the seminar would seem to suggest four different strategies for a transition to alternative lifestyles: one relying on adjustments by means of standards and prices (to be laid down through central planning or by the market); a second involving the restructuring of existing institutions; a third based on encouragement of social innovation at a decentralized level; and a fourth that implies intentional, or purposeful, change in accordance with a global project for a new society.

(a) For immediate purposes, the most efficient strategy, and the one by which drastic institutional reforms might be avoided, would be the adjustment strategy, relying on the regulation of consumption habits, internalization of external costs, anticipation of long-term trends in resource prices, or utilization of convergent interests between environmental conservation and economic growth. However, such instruments as taxes or regulations have the disadvantage of being too global (i.e. insufficiently differentiated at the geographical and social levels); they are also difficult to apply and do not allow proper attention to be paid to long-term problems, and, finally, are heavily biased towards strictly legal or economic determinism. In a scenario using this strategy, the public would play only a passive role and would have to carry the burden of the standards or the price variations, often difficult to justify on a scientific basis. If the people concerned are insufficiently

motivated or refuse to accept price measures or standards, the strategy may prove not only difficult to apply but also inefficient, as has been demonstrated by the low elasticity of demand for oil in relation to the increase in prices after the 1973 crisis.

(b) A second possible short-term strategy could be based on the introduction, by government initiative, of a series of institutional reforms aiming, inter alia at the improvement of administrative co-ordination (integrated planning); the promotion of preventive environmental management (impact assessment, technology forecasting and assessment); the development of various forms of information and public participation (beginning with self-management in matters of direct concern to a community); the reinforcement of local management levels (local communities or regions); and, finally, the promotion or at least legitimation of social experimentation. Such measures would introduce greater flexibility into the decision-making system and thus prevent the progressive breakdown of institutions, or the irreversible degradation of the environment. This scenario does not assume any violent social change; it relies on a process of gradual learning by experience on the part of the public and administrative managers - effects which will be felt only in the long run.

The fundamental conditions for developing a new growth model would not change, however, and there is the risk of strengthening the role of the technocrats, as arbitrators of disputes between defenders of the status quo and partisans of change in lifestyles.

This is one of the reasons why a number of seminar papers reflect the opinion that change in development patterns can be brought about only by multiplying decentralized initiatives and social innovation at the "grass roots" level. Such a strategy in favour of the right to diversified and autonomous lifestyles would rest in particular on such factors as: the strengthening of local organization in self-reliant associations and communities; the multiplication of successful experiments in voluntary restraint of needs (e.g. the Norwegian movement "The future in our hands"); the creation, at the local level, of institutions for the management of our heritage; and, finally, the development of a non-commercial or "informal" economic sector.

However, there are doubts as to the ability of decentralized innovation to bring about comprehensive change in lifestyles; nor can the risks of social breakdown, the "marginalization" of a great part of the population and the collapse of still precarious experiments be ignored. Any solution which attempts to dodge the problems of conflict, tension or complementarity between the public authority (ensuring "macro-regulation") and decentralized communities (ensuring "micro-regulation") would seem doomed to failure.

(c) A fourth possible strategy would, therefore, rely on some kind of "coupling" between a purposeful policy, defined at the national level in the form of a comprehensive project for a new society, and the promotion of social innovation at decentralized levels. The Canadian "Conservation society project" provides an illustration. Such a strategy might combine a set of national policies (e.g. formulation of a long-term development plan; restructuring of certain economic sectors; promotion of technical research and development, consumer information, collective management of environmental assets necessary for survival; reform of property law, time use, etc.) with the granting of autonomous decision-making powers to local or spontaneously organized communities and the construction of "bridges" between the public and private sectors, between trade unions and other associations, between central and regional authorities, etc., for instance in



the form of contractual arrangements or financial aid for social innovation. In such a context the public authorities, having control over considerable financial means, could play an important part, by example and persuasion, in the promotion of conservation attitudes and behaviour.

However, this latter strategy depends for success on at least two conditions: the creation of minimal social consensus about the need for radical change in traditional lifestyles; and the capacity of governments to promote autonomous change - in spite of economic interdependences at the international level. Owing to a number of obstacles, effective application of this strategy would seem improbable in the medium term. As a consequence, it is likely that the actual strategy for bringing about change in development patterns will have to be of a composite character, to be worked out in accordance with the institutional systems of the various ECE member countries.

In concluding, it might be appropriate to summarize the situation in respect of institutional change as follows:

Just as there are physical limits to growth, there are social limits, which determine the rate at which human societies are able to absorb change without breaking down. Knowledge of these limits and the factors working for change is necessary in order to assess the real prospects for alternative lifestyles in the ECE countries.

A whole set of factors seem to facilitate the adoption of new patterns of development in the 1980s: first of all, increasing recognition of the need for change as a result of threatened shortages and economic difficulties; secondly, new trends in values and attitudes towards work, consumption and the environment. Then there are the new technological developments which would permit decentralized and non-polluting forms of production and human settlements; and, finally, the wide diffusion of information, education and knowledge of successful experiments in alternative lifestyles.

Nevertheless, it will be necessary to reckon with many potential obstacles: rigidities due to vested interests and existing structures; inertia and fragmentation of administrative management; slowing down of economic growth; ageing of populations; cultural conditioning; isolation of the individual and fear of change; the tendency to rely on public authorities rather than on personal initiative; the preponderance of the market and financial criteria, etc. However, historical experience shows that unless exceptional circumstances prevail, or a great external shock intervenes, changes in values or the introduction of social innovation always require more time than would be desirable for satisfactory adaptation to the change in economic and physical realities.

In the 1970s, the important stage of growing awareness of the problem was reached and passed. The 1980s are likely to be a new period of transition, characterized by the juxtaposition of lifestyles and values inherited from the post-war decades with a multitude of innovations in the technical, institutional and social fields. In spite of differences in the political context, the diffusion of information on experiments in the various ECE member countries might be an important factor in accelerating the adjustment process.

#### General discussion

It was pointed out that discussion of alternative patterns of development and lifestyles was liable to lead to confusion because of the many often closely interrelated aspects involved. Unfortunately, such patterns were also frequently

analysed and evaluated in terms of social and political systems that were themselves complex. A new and readily understandable method of analysis was needed, as referred to in several seminar papers, and it was suggested that the Canadian distinction between the "conserver society" and the "consumer society" provided a suitable model. If that model and conventional political distinctions were visualized as the axes of a two-dimensional graph, it would be relatively easy to indicate the general contrast between existing conditions and proposed alternatives.

Several speakers referred to recent experience in promoting concern for the protection of the physical and human environment through existing or novel institutional structures and arrangements. Reference was made, for example, to measures taken in the Soviet Union to make environmental protection and improvement an integral part of State planning and an essential element of the socialist lifestyle. For the development of practical policy the preparation of forecasts was the most important stage of the planning process, since it allowed choices to be made among alternative proposals before deciding on the course of action to be implemented. A further advantage was that environmental planning was closely linked to the planning of economic development. As an example of institutional modifications to promote change in a local context, mention was made of the city of Pavia, Italy, where the planning and development process had been based entirely on public participation. In particular, the historic centre of Pavia had thus remained a thriving residential area, since office employment had not been permitted to replace the existing community. There were powerful reasons why significant changes in lifestyles could best be initiated at the municipal level. Similarly, it was well known that the self-management system in Yugoslavia was designed to provide for the full participation of the population in the taking of decisions on all aspects of daily life.

It was pointed out that one essential element of development patterns and lifestyles that had received insufficient attention was human health in all its aspects. To use health as one criterion of a desirable alternative future had three particular advantages: it was a comprehensive criterion, including physical, social, spiritual and mental well-being; it was a universal characteristic that was readily appreciated by human beings everywhere; it was also indivisible.

Reference was made to a number of institutional rigidities at present inhibiting the adoption of alternative development patterns and lifestyles. Some of them were related to the nature of business activity; for example, banks were less interested in providing finance for small-scale initiatives, which imposed a relatively greater administrative burden than large loans to established enterprises. It was argued that governments of many industrial countries tended to promote large-scale, capital-intensive industrial activity; investment in such activity was subsidized by governments, using revenues which were derived largely from taxes levied on private incomes and consumer purchases. It was also held that drawing a sharp distinction between profit-making and non profit-making forms of organization placed unnecessary burdens on self-help groups, which were not permitted to accumulate capital for subsequent reinvestment. Many people were interested in the possibility of sharing specific job opportunities, but were hampered by barriers related to unemployment insurance and pension systems. If governments seriously wished to encourage the adoption of alternative patterns of development and lifestyles, they might begin by examining their own practices in order to identify and reduce such obstacles.

#### 4. Conclusions and Recommendations

##### (a) The Ljubljana Seminar in the context of the new International Development Strategy

When the UNEP regional seminars on alternative patterns of development and lifestyles were planned, a major factor in the timing was that they should coincide with the preparations for the new International Development Strategy. It was considered important that the relationship between environment and development and the need to prevent further environmental degradation and depletion of resources, be taken fully into account in the intergovernmental deliberations and reflected in the Strategy itself. The regional seminars were intended to contribute to this goal by considering appropriate changes in current socio-economic, institutional and behavioural patterns to permit the transition to long-term sustainable and environmentally sound development. In the case of the UNEP/ECE seminar, a special effort was made to highlight the global dimension of the basic problems and the mutual interests and concerns of developed and developing countries in the quest for such development.

Although it is hard to say to what extent the discussion and the various conclusions and recommendations of the regional seminars directly influenced the preparatory and negotiating process for the new International Development Strategy the regional seminars in fact anticipated many of the major new concerns which are reflected in the goals and objectives of the Strategy. By elaborating on the nature and characteristics of the issues at stake, and suggesting policy instruments for purposeful change, the seminars also contributed to the initial phase of implementing the provisions of the Strategy.

There are numerous points of intersection between the Ljubljana seminar and the International Development Strategy for the Third United Nations Development Decade. This can be clearly seen in the various themes and conclusions of the seminar. Here it would seem important to draw attention to the recognition by the seminar that the patterns of development in the ECE region have an impact far beyond geographical borders, and that in pursuing their own chosen paths of development, individual countries bear responsibility for taking that impact into account.

This explicit statement, coming as it does from government representatives, is of fundamental importance. It does not simply note the well-known fact of growing interdependence between countries as a result of their involvement in the world economy and their reliance on a common natural resource base and the global environment; it marks the need to understand and scrutinize the effects of their lifestyles, and gives support to the new extended notion of responsibility. This, of course, is crucial for the implementation of the International Development Strategy.

The Strategy in fact expands on this theme when it calls for the rational development and use of natural resources in order to prevent the early depletion of finite resources and an excessive burden on renewable resources. In this context, the Strategy notes that it will be necessary - in particularly for the industrialized countries, which exert the heaviest pressure on natural resources - to encourage new patterns of consumption and production compatible with the new reality. Similarly, the Strategy notes the limited supply of fossil fuels and the often wasteful and inefficient way in which they are used, and calls for the speedy adoption of effective measures for conservation, especially by the developed countries, which at present consume the major share of world

hydrocarbon production. All this should be considered as part and parcel of an intensified search for transitional and long-term solutions to the problems of energy and development.

The Strategy sets out the duty of all nations to avoid environmental degradation and ensure that future generations enjoy a sound environment, by pursuing a pattern of development which is environmentally sustainable in the long run and does not disturb the ecological balance.

Thus, while the new International Development Strategy makes explicit reference to continuing efforts to accelerate the development of developing countries and to establish a new international economic order, it emphasizes that changes in patterns of development and lifestyles in the developed countries are a vital and integral component of the process. The UNEP/ECE seminar made an important contribution to study and analysis of the problems involved in the transition to a new order; it drew attention to the inherent rigidities of existing institutional and behavioural patterns and proposed workable government policies for purposeful social change. Whatever its immediate effects, the Ljubljana Seminar would seem to have raised questions that are likely to constitute the web of public debate throughout the 1980s, both in individual countries and in the international community as a whole.

(b) Excerpts from the official report

CONCLUSIONS

The Seminar has shown the need for Governments to consider alternative options of development and lifestyles in connexion with changing world economic and environmental conditions.

Patterns of development in the ECE region have an impact beyond national borders; in pursuing its own chosen development, each country has a responsibility to take such impact into account.

The conclusions have to be understood in the light of the great variety in the stages of economic development, political and social systems as well as environmental conditions prevailing in each country of the ECE region.

The following conclusions represent a synthesis of the papers submitted and of views expressed during the seminar.

Patterns of development and international responsibility

The relationship that exists between the development patterns and lifestyles of industrialized countries, on the one hand, and (i) the general availability of resources and the state of the global environment, as well as (ii) the development options and the access to natural resources and the environment of the developing countries, on the other hand, constitutes an important aspect of global interdependence. These international effects of national strategies and actions require further study and, wherever possible, quantification; they should, on a regular basis, be fully taken into account in the work and deliberations of the United Nations system and also in the actions of individual countries.

Industrialized countries are faced with increasing environmental, social and economic problems. The resolution of these problems requires these countries individually, and as a group, to explore and possibly to adopt alternative patterns of development and lifestyles, if they consider this necessary. Such patterns should be in accordance with the objectives of the new international economic order and the new International Development Strategy. They should contribute to fundamental changes in the structure of international economic relations, which broaden the scope for the developing countries to evolve their own self-reliant approaches and values, patterns of development and lifestyles.

In this comprehensive context, and as a part of the integrated approach to development, the following issues will require special attention and action by industrialized countries, in close co-operation with developing countries:

(a) Prevention of environmental degradation and depletion of natural resources; search for more equitable access to natural resources; redirection of scientific effort and technological changes;

(b) Examination of policies relating to trade, investment, technology, food systems, development assistance and cultural and social questions, so as to avoid a negative impact on the development potential, the natural resources and the environment of developing countries;

(c) The elaboration of alternative policies on the basis of new concepts and approaches to economic reasoning and agricultural and industrial development so as to prevent, in particular, social and environmental costs and damages being transferred to others;

(d) Ways and means to reduce their disproportionate consumption of raw materials and energy;

(e) Support for the efforts of developing countries to strengthen their ability to benefit from their own natural resources in an environmentally sound manner;

(f) Continuing efforts to control the operations of transnational corporations, inter alia, through the adoption and application of a code of conduct, in view of the fact that such corporations play an important part in developing and promoting certain patterns of development and lifestyles;

(g) The close relationship between alternative patterns of development and lifestyles, on the one hand, and détente and disarmament, on the other; disarmament could release important material resources for development and for a better quality of life; and

(h) The elaboration of global and regional rules for the prevention of pollution of the environment and the conservation and better management of natural resources in order to improve the quality of life.

#### Energy and lifestyles

The search for alternative patterns of development and lifestyles implies a better understanding of energy use in society, particularly the changing role of different energy sources to meet different energy needs.

Saving and conservation of energy - inter alia, reducing losses in the course of production, transformation, transport or utilization of energy and losses due to wasteful consumption - ought to be given a central place in all energy policies. Local and regional planning could probably widen the options. Research

under way shows increasingly that for the near future energy savings are the most important energy resource available.

National investigations of energy end-uses should serve as tools for national decision making and international comparison of energy use.

It will be necessary to develop and publish low energy use scenarios based upon different lifestyles.

#### Spatial and time use management

The proper use of space requires integration of physical planning with socio-economic and environmental goals. Such integrated planning, in accordance with functional requirements, implies decision-making institutions with appropriate authority, responsibility and financial resources at the local, regional, national and international levels.

Budgeting and planning of time use could help to save resources and energy and assist the optimum use of infrastructure and existing equipment and facilities (e.g. school buildings open to other social uses, flexible working hours).

Recreational habits have today important consequences for energy consumption and the protection of the landscape and the human environment. Present trends indicate an aggravation of the effects of these habits. It would be appropriate to develop new forms of leisure that would be less energy-intensive, e.g. urban and peri-urban facilities, especially for the inhabitants of densely populated areas; to introduce time use planning to achieve better utilization of means of transport; and to promote facilities for pedestrians and cyclists.

#### Urban development and transport

Changes in resource availability, in energy uses, in environmental constraints and in development patterns impose new requirements upon urban planning to promote the development and self-fulfilment of individuals and groups.

In order to achieve these goals:

(a) The development of diverse lifestyles adapted to particular local environmental conditions will increasingly be considered essential to the quality of human settlements; this can be achieved by the decentralization of authority and of financial responsibility, the encouragement and promotion of public participation and the development of neighbourhood plans and services. Practical experiments and pilot projects in regard to alternative habitat developments and lifestyles should be promoted by local and national authorities on the basis of environmental, social and economic criteria;

(b) Urban planning must recognize the interdependence of physical, socio-economic, environmental and cultural factors so that plans and programmes address all these facts of urban life. In order to improve integrated physical, socio-economic and environmental planning of human settlements, a new way of thinking in terms of systemic relationships is required. In the training and education of planners, architects, engineers and public administrators in particular, more environmental, cultural and social aspects should be integrated and emphasis laid on continuous learning. More efficient use of energy, the protection of the environment and the protection of agricultural lands should be recognized as essential factors in urban planning;

(c) The revitalization and rehabilitation of the urban core can often be a most effective way to achieve these objectives while preserving and enhancing specific cultural values and habitats and reducing urban sprawl. Urban construction should emphasize durability and low maintenance and operating costs. Forestalling real estate speculation and cartel formation by contractors can, inter alia, reduce costs and excessive use of energy and materials;

(d) Urban transport is a major user of energy and of urban space. In particular, the proliferation of private cars has introduced serious distortions in the environment and social fabric of the city. Transport planning must therefore be integrated in comprehensive urban planning. Innovation is required to reduce total transport times and to permit the best possible integration of activities (work, leisure, residential) so as to reduce the social cost of transport;

(e) Measures giving priority to pedestrians and bicycles in cities and controlling private car use should be taken in conjunction with ensuring efficient public transport in dense areas and in peak-hour traffic;

(f) Reducing the separation between producers and consumers, providing more opportunities for daily activities and social functions within a shorter radius, making greater use of electronic communication facilities and eliminating unfair terms of trade that enhance long-distance transport are steps that can reduce the amount of transport;

(g) While recognizing that the magnitude of existing investment in the urban structure does not often permit radical changes, anticipatory planning that would take into account the factors enumerated above would permit, along with effective local and public participation, improvement in the quality of life;

(h) Public awareness of urban environmental and social issues can be enhanced through the media; to increase competence of judgement in public consultations full information on the short-term and long-term consequences of development is indispensable;

(i) Urban development should be closely related to employment opportunities and to patterns of economic development that take account of the equalization of living conditions within and among nations, and of local and regional environmental and resource constraints. The energy flows through urban-industrial systems need more detailed monitoring and investigation. Because cities both harvest and exploit the environment, balance-sheets of material flows are essential planning tools. Compensation in kind for environmental losses should be a guideline for regional planning, in conformity with the principle of non-deterioration.

#### Agriculture, rural strategies and food policies

In the formulation of agricultural and rural development policies in developed countries, attention should be given to possible adverse effects on food systems in developing countries, to meeting nutritional needs and to ecological systems on a local, regional, national and international scale.

The need was stressed for ECE Governments to take the lead in emphasizing the intrinsic value of local food systems. Such emphasis might contribute to renewed reliance in developing countries on their own cultural inheritance and on the need to build on their own traditional food systems.

The changing realities of energy costs require continuing re-examination of agricultural methods. Optimizing use of the solar energy content of crops, allowing for alternative uses of what at present are wastes, at every stage, and reducing handling and transport costs may lead to integrated systems on a more local scale. The appropriate balance between mechanization and human labour may also be expected to shift, and agricultural policies should be re-examined with that in mind.

The material inputs to agriculture, in the form of fertilizers, pesticides, etc., should be examined from the point of view of their sustainability over the long term and their effects on the environment. Related information and advice should be available to agricultural producers, both large and small.

Scenarios that involve the disruption of transport systems, difficulties in energy supplies or radical degrees of self-reliance should be constructed in order to permit the evaluation of the importance, the place and the status to be given to diversified agriculture. The role of suburban, or even urban, agriculture should be re-examined. Such forms of agriculture are of interest for economic reasons as well as for reasons of culture and lifestyle. Their promotion would require concurrent strategies and policies for land use, human settlements development, conservation of flora and fauna and, in particular, the establishment of genetic pools of domestic plant and animal species.

The diversity of agricultural systems ("polyculture" as opposed to "monoculture") ought to be safeguarded and promoted in order to stabilize the ecosystems and minimize ecological risks.

Agricultural research and development of biological techniques should be strengthened in the interest of diversified agriculture and small scale production, together with continuation of research on topics of interest to large scale producers.

Research should be considered that will particularly assist experiments in alternative systems. This might include the breeding of plant varieties which, as against maximum yield, offer maximum resistance to diseases, weeds or insects, or require a minimum of care and attention.

Research should be considered that may help to elucidate and evaluate the total social benefits and costs of different food systems, so that they can be accounted together with the direct material input and output costs and benefits in arriving at decisions on national policies.

Efforts should be made, as far as economically possible, to close the food systems by recourse to recycling. What is waste for human beings is often food for livestock or raw material for energy production, or can be used to enrich agricultural systems.

#### Education, information and research

When considering the introduction of stereotyped or imported models of development, more attention should be given to cultural identities and specific geographical conditions, taking into account the saving of energy and resources.

International and national information and education of the general public, including the elementary school level, should be strengthened in order to present clearly the dynamic relations between lifestyles and social and economic change.



Research policies could usefully be oriented towards further study of the interdependence between social conditions, consumption patterns, institutional organization, lifestyles, environmental policies and conservation of energy and resources. Education for survival should be developed, to make people more aware of the value of self-reliance and more prepared to cope with potential social and ecological breakdowns.

Research on ways and means to make citizens and local population groups better aware of the interrelationship between their own lifestyles, the environment, resources and economic conditions might be helpful in order to develop citizen responsibility. The establishment of accounting systems, showing stocks and flows of energy, resources and environmental and cultural assets might be of great value in this context.

#### Institutional questions and social innovations

Industrial economies are usually organized without regard for the environment. Their institutions and populations may have to change their attitude. The implementation of ecodevelopment, harmonizing socio-economic activity and the environment, requires institutional innovation at international, national, regional and local levels, in order to reconcile individual and group interest and projects.

The question of alternative energy sources is not a question of technology. When a process of decentralization is taking place, technological decentralization is also needed, to provide a higher level of self-sustainability in local communities.

Decisions will increasingly have to incorporate criteria relating to:

- conservation of ecosystems;
- physical indicators of the environment;
- resource accounting;
- physical and mental health;
- time needed for natural cycles, etc.

Impact studies are necessary to permit preventive measures to be taken. Governments make use of planning, regulations or incentives (monetary and otherwise) which influence development patterns; financial institutions also have an impact. There is a need for scientific research to provide better understanding of the effects of these planning and management measures on development patterns. In addition, means to avoid negative consequences of present development patterns should be sought through institutions that are close to the problems involved or the people concerned. Institutions should take all aspects of environmental change into account.

The environment may be affected by market mechanisms or actions taken by public authorities. But it is individuals and households whose lifestyles depend on development models and the quality of the environment. Thus, over-all living conditions change and society adjusts through new lifestyles, within the limits of man's anthropological and historical nature. This process can be affected by public interventions or by individual or collective initiatives that take more account of resource constraints and social aspirations.

Educational systems can make people aware of ecological problems, while community groups try out model projects based on social aspirations. Lifestyles cannot be dictated, but social innovation and the development of values associated with respect for the human ecosystem can be facilitated through the provision of information and the creation of the conditions necessary for adaptation.

Due account should be taken of the advisability of encouraging support for resource-saving technologies by governmental institutions. Meaningful experience and the lessons to be learned from it would have to be disseminated at the international level.

Effective public participation within existing institutional structures can be very useful in achieving desirable modifications of the institutional context, to bring it closer to individual and social needs.

#### RECOMMENDATIONS

The Seminar invites the Senior Advisers to ECE Governments on Environmental Problems and the Governing Council of the United Nations Environment Programme to consider:

(a) The preparation by the UNEP and ECE secretariats, in close consultation with the rapporteurs, of the Seminar documentation for publication and wide dissemination and use;

(b) The desirability of giving further attention to questions of alternative patterns of development and lifestyles, within their respective fields of competence;

(c) The recommendation that, when formulating and implementing national strategies and policies in the field of environment and development, the countries of the ECE region should take account of the Seminar conclusions, in particular as they relate to the international implications of their national actions.

C. DOCUMENTATION

Seminar papers and summaries

DEVELOPING IN HARMONY WITH NATURE:

CONSUMPTION PATTERNS, TIME AND SPACE USES,  
RESOURCE PROFILES AND TECHNOLOGICAL CHOICES

Background paper prepared by  
I. SACHS\*

I. WHITHER INDUSTRIALIZED NATIONS?

The recent United Nations Symposium in Interrelations Among Resources, Environment, Population and Development identified the question of consumption problems and lifestyles as one of the most basic sources of conflict in the world today:

"It is a critical manifestation of stratification in the world, both internationally and domestically. It fuels a major confrontation in the world, with the developed countries wanting to maintain - and indeed enhance - the standard of living attained by them, and the developing countries seeking to achieve tolerable living standards for their people.

"Three aspects of growing conflict are involved. The first is the global structure of relations between resources and human beings in which a minority of countries has, in pursuit of a wasteful style of life, pre-empted a large part of the world's resources. The second aspect is the spread of the same style of life to the dominant strata of the third world, which has accentuated divisions within and among these societies. The third aspect arises out of the first two and takes the form of a growing conflict over the access, distribution and control over the world's resources for maintaining and raising standards of consumption of the industrialized world and of the privileged strata of developing countries." (1)

It also stressed the urgent need, both in the North and in the South, to explore alternative patterns of consumption and development that are less wasteful, environmentally sound and socially responsible. For obvious reasons, major responsibility in this regard rests on industrialized countries.

To state that the industrialized countries stand at a cross-roads has now become commonplace. They are beset by problems much deeper than actual or potential energy shortages, inflation and recession. GNP per head is less and less revered as the indicator of development and happiness; economic growth, while not renounced, is denied the status of a goal that overrides all others. The excessive social, cultural and environmental cost of joyless affluence (2) are being questioned as much as the ability of Western economies and policies to

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repeat their performance of the 1950s and 1960s.

One of the papers prepared for the seminar contains a persuasive analysis of the physical, ecological, social and human limits to further unlimited growth of the "consumer society," even in a nation as richly endowed with land and resources as Canada. (3) The argument applies a fortiori to resource-poor and densely populated countries. It is, carefully stated, however, that "limits" should not be understood as some precise and definite ceiling, but rather "the entrance into a régime where cost and other problems begin to escalate markedly and returns diminish", (4) while a catastrophe-free future can no longer be guaranteed. The Canadian debate on the "conserver society" has strongly emphasized the qualitative aspects of another development, sustained by selective economic growth:

"Though the concept is clearly against continuation of indiscriminate growth, growth for its own sake, or growth of the GNP regardless of what it means, it is clearly in favour of continued growth in human development and quality of life, much of the improvement being gained through the use of science and technology. Implied here is a questioning, at least for industrialized or "mature" countries, of the supposed necessary connexions between industrialization, living standards, GNP -- and the throughput of materials and energy. What is undoubtedly a fairly firm correlation up to some stage of development ceases to hold at higher levels, especially when the society begins to shift its composition of technologies, introducing new, more sophisticated technologies based on the biological sciences, ecology and micro-electronics. In such a transition energy consumption may even drop, but invention, business, building and rebuilding will go on. Implied here also is a questioning of the meaning of GNP, income, and other indicators, in relation to human needs and goals. As various material growth components reach the point of adequacy and begin to slow down, what continues to grow, and how does it show in social or economic indicators?" (5)

In other words, the economic efficiency criterion must be replaced by other basic criteria for success:

"...we should abandon our tradition of minimizing cost and replace it with a new trend toward minimizing waste and pollution, decreasing vulnerability and maximizing such qualities as resilience, safety, comfort, and beauty." (6)

Indeed, the industrialized countries are affluent enough to be able to afford to give up short-term maximization of economic gains while disregarding the longer-term social and ecological costs. The importance of being impractical along with our efficiency has rightly been stressed: no economist looking at Chartres and Notre-Dame from the point of view of cost-effectiveness would have approved. "Yet it is this kind of effort which enables us to call ourselves human" (7). At the same time, it is argued that a larger share of national output has to be diverted from individual consumption to the common good, e.g., to the improvement of cities so as to make them comfortable, healthy and resilient. (8) Thus, a distinction has to be made between development and maldevelopment. Both outcomes can be sustained by the same rate of economic growth, but they will sharply differ in the composition of the final product, the "rates of exploitation of nature" (9) and the kinds, intensity and distribution of social costs.

In the final product it may be useful to differentiate between goods and services corresponding to socially legitimized needs (i.e. authentic

use-values), pseudo-use values that are at best "positional goods" (10) in inequality-ridden societies, and non-values. The latter consist of the bundle of goods and services of GNP that serve no constructive purpose but go to cover the rapidly increasing management and transaction costs of our societies caused by the diseases of affluence (11), the accidents inherent in contemporary urban lifestyles and transport modes, environmental disruption, the diseconomies of scale of the "megamachine" and its twin, the "megabureaucracy" (12). Last, but not least, the same category includes the \$450 billion spent on military purposes, while the "armament culture" pervades and perverts the whole fabric of our societies (13).

We lack at present suitable indicators to monitor the "rate of exploitation of nature" and the incorporation into the flow of GNP of the stock of depletable resources, (14) as well as indicators to measure the social, psychological and human costs of economic growth. The latter may not lend themselves easily to measuring, but can certainly be identified and described. The manifold forms of alienation in the affluent world have inspired some of the finest literary works of our century. Emphasis on the qualitative aspects of development/maldevelopment means giving up the pretence of finding a comprehensive measure of development performance and ranking. Nor is it possible to reason in terms of a computed social optimum, because of the complexity and heterogeneity of the development goal function. Planning must rely on bounded rationality and satisfying approaches (15). Hence the importance of institutionalizing meaningful citizen participation in future-oriented decision-making processes and environmental-cum-development planning (16). The challenge of our time is to use the present crisis as an opportunity to initiate a shift from maldevelopment to development and, in this way, to attempt to build a broad social consensus around a new social construct (projet social).

The participants in the OECD INTERFUTURES project (17) are right in saying that since 1968 such a consensus no longer exists concerning economic growth as the paramount development objective. At the same time, they point to a far-reaching search in our societies for new value scales. This search is reflected in people's lifestyles, patterns of time use, attitudes and interests, the place assigned to work and professional attainment as against extra-economic goals and gratifications, the roles of the formal and informal (non-market) sectors in the economy, alternative lifestyles and forms of political expression, sensitivity to environmental issues, etc. The "middle majority" is not likely to accept wholesale the alternative lifestyles and development patterns proposed by active minorities committed to "post-materialistic" values. But some of the new ideas will permeate its thinking. These ideas therefore deserve careful scrutiny. The authors of the INTERFUTURES report recommend an open-minded attitude towards the demands of the forward-looking groups, not in order to follow a fashion, but in order to prepare for profound transformation by seriously considering the social postulates of minorities and reflecting on the process of value change. Yet they tend to dismiss a transition strategy predominantly oriented by the new values as a "premature utopia," opting for a less bold solution likely in their opinion to prove less divisive (but how efficient?).

A more radical view of the transition strategies emerges from the hitherto unpublished materials collected by the so-called Third System Project of the International Foundation for Development Alternatives (18). The adjustment process will call for a restructuring of economic institutions and of welfare systems. The latter - a major social conquest of the working class in the West, achieved in response to the challenge of socialist régimes in the East - suffer from two major short-comings. The recipients of welfare payments are reduced to a condition of dependence which is damaging for their personalities. Moreover, the welfare systems have proved ill-suited to coping with the diversity of

peoples' needs, besides being very costly (19).

A broad and democratic political debate must be prepared by unfolding to public opinion the full range of development alternatives, the formidable promise of modern science and technology (which moreover, requires an effective social lead) and the no less formidable constraints arising out of institutional rigidity and the strait jacket of entrenched prejudices. The "Ljubljana seminar" is a step in the direction of open debate (20).

#### The symbiosis between man and earth (21)

Sustainability has proved to be an important aspect of development. Ecological prudence is a tenet of development ethics, side by side with social equity. But is sustainable growth in harmony with nature at all possible? Can further growth in industrialized countries be envisaged without transgressing the "outer limits" of resource exhaustion, excessive pollution or adverse climatic change?

Both the United Nations study (22) and the INTERFUTURES report take an optimistic view of the physical availability of resources, including energy. By and large this attitude is probably justified, even though the environmental problems related to the massive use of nuclear energy and coal might prove much more difficult to cope with than these studies believe (23). Clearly, access to resource is above all a geopolitical and economic issue underlying the whole complex of North-South relations. This does not necessarily make it easier to deal with (as the so-called oil crisis demonstrated) and should not lead to complacency: as the transition towards sustainable development will take a fairly long time, we must learn to eliminate wastefulness and to shift to lower energy and resource profiles over the next few decades if we want to avoid the kind of stalemate some time later in the twenty-first century that doomsday studies consider already imminent (24). As for the environmental disruption which threatens the supports of biological life and directly affects our quality of life, a recent OECD study has pointed out that even a considerably slower rate of economic growth will generate rapidly increasing pollution unless environmental safeguards become more stringent: a 3 per cent rate of annual economic growth would bring about a 20 per cent increase in the release of pollutants during the years 1978 to 1985 if the present norms are not strengthened (25). A French study has estimated that the damage caused by 24 major pollutants alone totalled 70 to 90 billion francs in 1978, i.e. from 3.4 to 4.2 per cent of GDP, three to four times more than total expenditure on environmental management (26). The carrying capacity of many ecosystems is being overtaxed, and irreversible damage is likely to follow. Thus, we must be prepared for a painful transition towards a more reasonable relationship between mankind and the ecosphere. The aim is to arrive at a true symbiosis, making the best possible use of the flow of renewable resources and reducing to a minimum the depletion of the capital of nature. In this context, ecologically sound management of the supports of renewable resources - soils, water, forests and climate - becomes a condition sine qua non of sustainable development. We are confronted here with an issue which transcends the choice of appropriate technologies and has far-reaching social, political and institutional implications. The unrestricted play of market forces cannot be trusted to establish such management; left to themselves, enterprises are inclined to internalize profits and externalize costs.

The symbiosis postulated by René Dubos in Only One Earth should not be equated with strict conservationism characterized by lack of human intervention in the ecosphere. This is clearly both impossible and undesirable. Many man-made production systems are indeed ecologically sound and bring about a higher sustainable yield than any natural ecosystem. The double challenge is, on the

one hand, to design these systems as true systems using the ecosystem as a model, and, on the other, to ensure that the entries and exits of man-made systems are properly articulated with the cycles of nature. The above stance has been systematically taken by UNEP and is encompassed in the concept of ecodevelopment, dealt with in several papers prepared for this seminar (27).

### Only one earth

The search by industrialized nations for socially responsive and environmentally sound development strategies must be looked at in a global, world-wide perspective. The Stockholm Conference on the Human Environment rightly pointed out that we all inhabit only one earth and must all learn to cope with its ultimate finiteness.

The present picture is a dismal one in terms of uneven access to resources. A handful of rich nations still share the bulk of world economic activity, using most of the planet's exploited resources. At the same time, they are responsible for most environmental disruption, even if pollution of poverty and by poverty also exists. The larger and the richer a country, the bigger the international impact of its domestic development (or maldevelopment) strategies, in terms both of the relative share in world resources and of the use - direct or indirect - of the "international commons" proclaimed by the United Nations as the common heritage of mankind. These world-wide repercussions are compounded by the demonstration effect and forced transmission of Northern consumption patterns and growth models on Southern nations (28). Additional difficulties arise from the fact that economic relations between North and South are still to a large extent asymmetrical and one-way.

It may be sobering at this stage to present a radical Southern view of the problem. The following lengthy but self-contained quotation is taken from a paper prepared for a similar meeting on Alternative Patterns of Development and Lifestyles in Asia and the Pacific, organized by UNEP earlier this year:

"The primary cause for large areas of under-development and iniquity is to be found in the global structuring of the man-resource relationship, in which a minority of nations have, in pursuit of a parasitic and wasteful style of life, shored up a large part of world resources. The spread of the same style of life among the élites of the countries of the third world has also meant that they remain divided, both within each of them and between them severally. The result is that most of these élites have failed to exert themselves at regional and world levels (except in endless rhetoric) and have also failed to pursue policies within their own countries that are called forth by their socio-economic, demographic and cultural conditions which happen to be quite different from the conditions that obtained in the richer nations during their respective phase of development. Instead, they (or most of them) are found to indulge in a rhetoric of confrontation, both at global and at domestic levels, and to seek alibis for their failure to restructure a world in which they happen to be in a majority".

"This in effect means that the richer segments of both 'developed' and 'developing' nations continue to indulge in lifestyles that result in perpetuating global inequity, depleting world resources and unsettling nature's fine balances. In sum, due largely to the inimical consequences of modern technology, the dominant economic model that has resulted from it and has been accepted almost universally, and the politico-philosophical underpinnings of this model by a 'theory of progress' that had stemmed from



the presupposition of infinite expansion of nature's bounties that could become universally and equitably available, the world is being ruled by elites that are incapable of handling the problems confronting it".(29)

The problem of alternative development patterns is thus closely linked with the continuing debate on a new international economic order. The points of intersection are manifold:

- (a) Access to and control over resources; reallocation of scarce resources for development purposes;
- (b) Commodity pricing, taking into consideration depletion and future scarcities; (30)
- (c) Management of international commons and, hopefully, their use as a source of independent financing for development activities sponsored by the United Nations;
- (d) Social control over the direction of technological progress;
- (e) The possible role of the United Nations system in promoting mutually beneficial, socially responsive and environmentally sound development patterns in the North and in the South.

As a first step, international responsibility for national development should be recognized as a tenet of development ethics, calling for the exercise of self-restraint in the use of potentially scarce resources and fragile ecosystems which can certainly be husbanded for mankind's benefit but require careful, environmentally sound management. Governments must learn to assess their performance in terms of external diseconomies - present and future - for other nations. Moreover, they should be accountable, perhaps to some United Nations forum, as far as the international impact of their national strategies is concerned. As the definition of these strategies would remain a strictly national concern, the principle of sovereignty of nation States would be fully respected. The first step in this direction could be taken by the industrialized nations, those which exert overwhelming pressure on the environmental resources of the planet. A recommendation to this effect, as contained in the INTERFUTURES report, could be endorsed and further elaborated upon by the Ljubljana seminar, (31) moving us nearer to the sensitive and fundamental issue of self-imposed ceilings on material consumption on the part of rich nations and people, coupled with massive transfers of resources to those who need them most.

## II. ECODEVELOPMENT STRATEGIES : HARMONIZING SOCIAL AND ENVIRONMENTAL OBJECTIVES

Opportunities for the harmonization of socio-economic goals with environmental prudence remain still largely unexplored, while considerable concern has been expressed in literature and international gatherings at the trade-offs between environmental management and economic growth (32). The existence of such trade-offs cannot be denied, but their pervasiveness and intensity have been overrated (33) to the detriment of a search for "the best of both worlds": a different, environmentally prudent, sustainable and socially responsible growth directed to a higher and equitably distributed quality of life.

It would be preposterous to try first to define a comprehensive indicator of quality of life and then to maximize it. Man has a primary value system which is multidimensional and non-maximizing (34). Aesthetic and "convivial" criteria coexist with economic ones. We may say that development alternatives deal with three sets of interrelated options (35):

- (a) Issues related to class justice and ownership of the means of production;
- (b) Choices between hard and soft technologies;
- (c) The nature of human satisfaction; the difference between being and having (36) leading to different ways of embedding (37) the formal economic sphere into the cultural matrix. Difficult as it may prove to institute, participatory planning in which people spell out development objectives for themselves and relate them to broader national concerns is probably the only sensible approach. In such a perspective, planning ceases to be a static picture of the future taken by an expert, and becomes a moving sequence of programmes and actions planned and executed by those directly concerned (38).

The search for development alternatives calls for a simultaneous reassessment of consumption patterns and lifestyles (i.e. the demand side) and of the production function (i.e. the supply side) envisaged in a broad fashion so as to include, together with the technological choices, the patterns of spatial distribution of production activities.

The first task is to review the existing situations in the light of four criteria of environmental soundness:

- (a) The energy profile;
- (b) The resource profile;
- (c) The space use profile;
- (d) Environmental impact proper.

It is suggested that, in the same analytical effort, two additional criteria should be considered:

- (a) Spread and backlash effects in third world countries, in accordance with the principle of international responsibility for national development outlined above; and
- (b) Employment effects, including the effects on parallel markets and the informal sector (39) owing to the importance of structural unemployment.

The next step should be to explore the potential scope for purposive change, associating in this endeavour the people concerned both as consumers and as producers (40).

#### Changing consumption patterns and lifestyles

Theoretically, there is considerable scope for changing consumption styles and ways of life through an emancipatory process, (41) even though they are deeply rooted in socio-economic conditions and are culture-specific. As a matter of fact, both man-designed environments and lifestyles can be understood as the outcome of a series of choices among alternative uses of material, temporal and symbolic resources, each reflecting the schemata of a particular culture (42). Individuals, groups of people and industrialized societies in general should be able to substantially modify their consumption baskets and, even more so, their patterns of time use, (43) the relative importance given to professional activities on the labour market, to individual or collective self-production of goods and services in the household sector and to time available for cultural and social activities in the broadest sense of the term.

Hence the importance of the growing debate on "voluntary simplicity", arising out of social and ecological considerations: synchronic solidarity with the poor of the third world, as well as those from the 'fourth world' inside our own societies, and diachronic solidarity with future generations. The question "how much is enough?" (44) ought to be asked increasingly in order to plan for socially rewarding and acceptable uses of further increases in the productivity of labour. And also to get ready, in deeds and not only in words, for the implementation of strategies guaranteeing a decent minimum livelihood for every human being: the provision of floors might prove impossible unless ceilings are established (45).

Yet it would be unwise to expect rapid progress towards "voluntary simplicity" in industrialized societies unless the present crisis worsens appreciably. Most people still consider that the pursuit of material comfort and the piling up of "positional goods" (46) are a desirable goal of life. We are all, to a considerable extent, prisoners of the living past - cultural traditions and long entrenched habits - and of the institutional maze geared to the promotion of consumption qua consumption. The still prevailing inequalities of wealth, income and access to resources, on the one hand, and the memories of the long and difficult struggle of the working class to achieve improved standards of living, on the other, further explain the appeal of consumerism. The shape of our cities, transport systems and all other social assets, including the productive apparatus, constrains the range of available options, at least in the short run. The very existence of these assets and the fact that they cost so much in the past militates against changing the patterns of their use, as is eloquently demonstrated by the individual motor-car (47). Moreover, retooling our societies for less wasteful and yet more rewarding ways of living cannot happen overnight, quite apart from the political will required. A fairly long period of transition to genuine development will be necessary. Last but not least, one should mention the powerful economic and bureaucratic vested interests in maintaining the structural status quo.

That is why, side by side with life-size experiments in development alternatives inspired by radical philosophies of "voluntary simplicity", it is necessary to foster less spectacular and less politically demanding piecemeal changes in lifestyles, consumption patterns and forms of organization of social life. At least three potential levels of action should be mentioned in this connexion (48):

(a) Changes in behaviour aiming at the elimination of careless attitudes and wasteful uses of goods;

(b) Retooling of the "consumption apparatus" by improving the design and performance of cars and domestic appliances and establishing regulatory measures to this effect (49);

(c) Exploring equivalent or quasi-equivalent consumption patterns, yielding roughly the same use-values and gratifications, in keeping with prevailing lifestyles, but differing in patterns of resource use and environmental impact.

The substitution problem at the demand level has been persistently neglected in research and planning practice, partly because neo-classical economics begs the question by postulating the so-called consumer sovereignty concept, while the Marxist school of economics has over-emphasized the production theory (50). Transport provides a good illustration of the different, albeit interrelated levels of potential change in consumption patterns. On the one hand, people may decide voluntarily to reduce their mobility, as part of a different lifestyle. This is a strong assumption. On the other hand, they may wish to continue

enjoying the present pattern of mobility, but learn to take better care of their cars, reduce speed and drive more carefully (i.e. behave more responsibly). A further saving of energy and reduction of polluting emissions may result from improvements in car design.

Finally, people may decide to consider alternative ways of moving from one place to another, giving preference to walking and cycling over public transport and to public transport over private cars, whenever the more ecologically beneficial choice does not entail substantial losses of time or major inconveniences. Of course, they must be given the opportunity of choosing, i.e. alternative transport systems must exist. Italian and Dutch experience would indicate that positive results can be achieved by means of imaginative, "grass-roots" urban planning.

#### Space as a strategic variable

The second potential degree of freedom lies in policies concerning space use. Physical and regional planning can play a fundamental role in the harmonization of economic and ecological concerns, to the extent that proper siting of industrial and other activities may lead to better utilization of resources, while at the same time reducing negative environmental impact. An important concept in this respect is that of the natural carrying capacity of ecosystems. Furthermore, gains can be obtained by exploring complementarities between different activities and by reducing unnecessary transport. The above stance should not be understood as an indiscriminating plea for local autarky, but rather as an invitation to plan at all levels for coherent but selectively independent production systems, which means a rationalization of transport flows and a sharp departure from the present pattern of frequently redundant exchanges which have evolved through the interplay of economic forces in imperfect markets (51). Furthermore, one should observe that industrial concentrations, while still providing positive externalities to individual enterprises, may prove very costly in social and environmental terms. The prevailing locational patterns are only understandable within a framework where enterprises - be they private or public - are allowed to internalize profits and externalize social costs. Finally, recent technical advances in telecommunication open new possibilities for scaling down and dispersing modern industrial activities, provided access to information becomes a public service, and not a private monopoly in the hands of powerful transnational corporations (52).

All this shows the need to integrate physical planning with socio-economic and environmental planning, as was strongly emphasized in several papers prepared for the Ljubljana seminar. Space must be used in such way as to keep open, as much as possible, the options for the future. In particular, this entails an improvement in our ways of handling the multiple uses of space. Industries, fisheries and tourism, for instance, put conflicting demands on coastal areas. Is it at all possible to make these activities compatible on the same territory? - or would recourse to careful zoning be a better solution? What kind of safeguards and modifications in the original programmes must be introduced? Many decisions related to the use of space prove irreversible, as is illustrated by the losses of agricultural land to roads and cities. The danger of wrong choices is reinforced by our imperfect knowledge of potential future uses of specific territories (53). Finally, one should note that environmental disruption caused by wrong patterns of space use may occur in far removed places, often in other countries. The UNEP Blue Plan, devised to save the Mediterranean Sea, will not succeed in removing the causes of land-based pollution without inducing the coastal States to revise their land use policies in the valleys of the major rivers of the region.

### Appropriate products and technologies

The third margin of freedom is related to the choice of appropriate products and product and process technologies. This subject has been discussed mainly in the context of developing countries. But the conceptual framework evolved is universally valid. Industrialized countries must also learn to handle technological choices as a focus for the harmonization of economic, social and environmental concerns. Failure to do so may bring further increase in the social and environmental costs of growth. The more powerful the technology, the more important it becomes to assess its likely social and environmental impact carefully with the participation of all social actors concerned, and with a view to providing guidance for technology management. Most countries are still experimenting with institutional and regulatory procedures in this field. Criteria of appropriateness, relative to a given social, economic, historical, cultural and ecological context, must first be spelled out, in order to evaluate both product and process technologies. The six criteria proposed above - energy profile, resource profile, space use profile, environmental impact, effects on the third world and employment effects - could be used together with other criteria selected according to specific needs.

A few general concerns can be mentioned here. First of all, the very concept of product "design" must become socially and environmentally responsive (54). As far as the product technology is concerned, an important consideration is durability. Planned accelerated obsolescence, currently fostered by many producers, leads to the wasteful use of resources. Considerable possibilities exist for increasing the durability of less durable goods at marginal cost, although care must be taken not to carry the argument too far, preventing future technical progress (55).

The search for appropriate process and product technologies should centre on the replacement of potentially scarce or environmentally disruptive resources by resources which are potentially abundant and less damaging in the course of their exploitation. Recycling and promotion of renewable resources belong to the same area of concern. Finally, instead of the present escalation of production, pollution and anti-pollution, emphasis should be put on low-waste technologies and the design of production systems with closed circuits. The Economic Commission for Europe and UNEP have been active in this field.

The three margins of freedom outlined above can in certain cases be combined, thus creating considerable space for concrete alternatives, provided there are sufficient resources, political will and institutional capacity for innovation.

### III. EXPLORING THE ALTERNATIVES

The search for another development pattern is essentially a national responsibility, with the civil society in the forefront. International organizations could usefully clear the way for exploration of options and alternatives by promoting the exchange of information on experience, the creation of the networks of relevant life-size experiments and comparative studies based on hard data. Whenever possible, detailed studies should apply the six criteria mentioned above. It is submitted that national planners and public opinion could in this way be provided with solid building blocks for alternative development scenarios. Furthermore, ECE enjoys a unique position which permits the comparative analysis of solutions and projects evolved in countries with similar levels of progress as far as productive forces are concerned but different patterns of socio-political organization.

The following annotated list of themes (A to G) is neither exhaustive nor arranged according to a sequence of priorities. Three considerations were present in their choice, namely:

(a) They should be illustrative of a pragmatic approach to development alternatives (as distinct from exercises in "concrete utopias", which are useful but are better dealt with in national fora);

(b) They should deal with aspects relevant to the problem of harmonizing socio-economic goals with environmental concerns, as defined above;

(c) They should cover gaps in our present knowledge (at least in terms of international comparability) or else provide a new framework for recasting available data.

A. Societal models of time use

Predominant lifestyles in a society can be fairly well described through the patterns of time use of their different strata, classified according to such criteria as age groups, socio-professional categories, the urban-rural distinction, sex, etc. The aim would be to provide a unifying perspective for rapidly expanding research on time budgets, which ought to be connected with the problems of environmentally sound development alternatives. It is proposed that four major categories of time use should be employed:

(a) Time spent in the "labour market-place" (including the constrained time required for commuting, etc.);

(b) Time spent on self-production of goods and services in the domestic sector;

(c) Rest;

(d) Time available for all cultural, educational and recreational activities, and socializing.

These uses of societal time are constrained by five factors:

(a) Body rhythms;

(c) The burden of the living past (cultural models of time use);

(d) Access to organized space and other social assets, including housing and productive capacities;

(e) Ecological and climatic constraints;

(f) Institutional constraints.

What are the energy resource and space use profiles of different lifestyles? How do they affect, or are themselves affected by, the environment? What kind of demand do they create for goods and services from the third world?

How will technical progress affect future patterns of time use? How will further increase in the productivity of labour be apportioned between increase in total output and reduction of working hours? Different societies are likely to give different answers to these fundamental questions, which are closely linked to the present situation of structural unemployment.

The challenge is to permit the time thus released to be used for cultural freedom and fulfilment; the danger is that it will be exogenously programmed and colonized, thereby becoming an additional source of alienation. Closer analysis of the problem will show that technical progress, while creating opportunities for the reduction of working hours, has also introduced certain rigidities in the uses of societal time, such as work divided in three shifts, the growing relative share of unproductive bureaucratic work required to manage the "megamachine", and daily waste of time incurred by people in order to overcome the negative externalities of metropolitan life (e.g. commuting). What can be done to reduce these social costs of technical progress?

#### B. The future roles of the household sector and parallel markets

The economic debate usually deals with the production of goods and services distributed through the market, or else supplied free of cost to the population by the public sector; the latter can be technically considered to be produced by the non-market sector (56). The producers of both these categories of goods and services work in the labour market and are accordingly remunerated (57). However, there exists another non-market sector, which in turn may be subdivided into two parts: individual (household) and collective (e.g. services organized outside the market on a neighbourhood basis). Moreover, in many industrialized countries, both West and East, parallel and informal markets as well as moonlighting jobs have emerged in a variety of forms and for different reasons. Activities in the parallel and informal markets, as well as the domestic non-market sector, consume at least as much societal time as work conducted within the labour market. This "other half" of our economies, more or less hidden and insufficiently taken into account by policy-makers, requires urgent attention.

How much of released working time goes into self-production of goods and services by individuals, families and local communities? How is this "domestic sector" coupled with the market? Can the development of "non-market" social services provide a partial alternative to free public services and thus contribute to solving the crisis of the welfare States, which are crumbling under their mounting costs?

The energy, resource and space use profiles of the "domestic sector" as well as its environmental impact must be compared with those of the market economy. It may be useful to introduce into the analysis a fundamental distinction between the household sector colonized by the market economy and the so-called "vernacular domain" resulting from a conscious choice of lifestyle (58).

#### C. Models of habitat

The fundamental role of "habitat" (which is more than just housing) in lifestyles and consumption patterns does not require elaboration. A systematic assessment of alternative models of habitat and of the resulting profiles is urgently required, as cities and houses are built to stay. The tasks of putting our cities back into reasonable working shape and designing new cities and human settlement networks should therefore be given the highest priority in the strategies for transition to genuine development (59).

The problem is highly complex and involves choices of appropriate products and technologies as well as patterns of space use, as can be ascertained from the following simplified outline of the exercise.

Let us assume: two "cultural" patterns of housing (the individual cottage and the flat); two modes of implementation - new construction or restoration of the existing stock of houses; two methods of construction (mechanized and artisan); three types of building materials (wood, bricks, concrete); three techniques of heating (conventional, passive solar, solar panels); two possible locations (in the city and in the countryside); two situations with respect to the need of daily commuting to work (yes or no); and three transport techniques (individual car, bicycle, public transport). Out of the matrix of possibilities for each country study, a limited number of cases should be selected and assessed with respect to the six criteria proposed. The most typical situations, and also those which produce the best and the worst profiles, would be the most interesting.

#### D. Models of recreation

The reduction of working hours will increase the role of recreation in all its forms (daily, weekly, annual or biannual holidays). Technical progress in transport has broadened the spatial models of recreation, which range from intra-city activities to transcontinental tourism.

It should be possible for each country to describe the different models of recreation in terms of patterns of time and space use, forms of organization and techniques employed. It is submitted that these models have fairly divergent energy and resource profiles and environmental impacts. Furthermore the development of recreation is likely to create employment opportunities and North-South exchange, but the ultimate consequences for the third world countries will depend much more on the forms of tourism than on its volume.

#### E. Population distribution, patterns of urbanization and territorial occupation

Instead of taking patterns of time use as the starting point, we may change the perspective and postulate the study of energy profiles and the environmental impact of space use, through alternative population distribution and models of urbanization and territorial occupation.

Two themes deserve special attention here:

(a) The rationalization of transport flows of people and goods - first, by means of a better integration of local and regional economies, and only then, by the choice of transport systems;

(b) The opportunities created by technical progress in telecommunication and computers for the replacement of transport by long-distance communication.

More generally, the combination of telecommunication and data processing unfolds the possibility of "ruralization" of modern, small-scale industries and tertiary activities; we must thoroughly reappraise the concept of external economies created by industrial and urban concentration. The same goes for economies of scale.

Is it reasonable to expect that at the turn of the century, a more balanced pattern of territorial occupation, less exacting for the environment and less energy-intensive than the present one will emerge? Is this development going to be combined with a shift towards more environmentally sound agricultural techniques requiring fewer industrial inputs and making far better use of biological knowledge? (60) If this happens, lifestyles may drastically change



for some people. People will move from the town to the countryside where they will live and work, paying visits to the big cities and their cultural amenities on holidays and long week-ends.

#### F. Technology assessment

Rather than proposing specific studies in this field, it is suggested that a data bank should be created for systematic and continuous retrieval of information on the energy intensity, space and resource requirements, environmental impact, etc. of industrial and agricultural techniques. A more ambitious target would be to study the profiles of entire production systems, including all the backward and forward linkages across several branches of industry, agriculture and services. Food production systems would constitute a particularly important and rich subject, taking into account the range of cultural choices (e.g. what to eat), of spatial requirements (e.g. where to grow food), and of available agricultural and industrial techniques and institutional settings. The proposed UNRISD study on food systems and several papers presented to the Ljubljana seminar offer an excellent starting point in this respect.

Other obvious choices of themes for study would be the motor-car, energy and, last but not least, armaments production systems.

#### G. Social innovation

The successful application of the ecodevelopment approach will to a great extent be determined by the ability of institutions to foster social innovation and to engage in new forms of participatory and contractual planning. In this subject area three tasks can be singled out:

(a) Comparative analysis of life-size social experimentation in urban and local management, organization of social services and cultural life, quality of working life, management of resources, protection of environment, etc., with special attention to situations where a new balance of power is emerging between market forces, the State and the civil society, giving the latter a new say in the shaping of development patterns and lifestyles (61);

(b) Creation of networks of communities engaged in parallel experiments, as such cross-fertilization may prove far more fruitful than desk studies;

(c) Comprehensive encouragement of new life-size experiments, which will be the most dynamic factor in the search for development alternatives and new lifestyles and the nearest equivalent for the societies (and social sciences) of the scientist's laboratory. Besides, they give us an insurance against unknown futures, by letting us taste today some of the puddings of tomorrow. Development is a societal learning process for which deductive thinking is no substitute. Bureaucrats tend to be suspicious of innovative social experiments. International organizations have a great role to play in helping to change this state of mind.

## References

1. Statement of the United Nations Symposium on Interrelations between Resources, Environment, Population and Development, Stockholm, 6-10 August 1979, Interrelations: Resources, Environment, Population and Development (United Nations publication, Sales No. E.80. II. A.8), Chap. I. See also UN document A/34/467.
2. T.Scitovsky , The Joyless Economy - An inquiry into Human Satisfaction and Consumer Dissatisfaction (New York, Oxford University Press, 1977).
3. R. Jackson, "The conserver society : a Canadian discussion about development alternatives" (paper submitted to the Ljubljana seminar and published in the present volume).
4. Ibid. See also, for a discussion on "outer limits", W. Matthews, ed., Outer Limits and Human Needs, 1976. Resources and Environmental Issues of Development Strategies (Uppsala, The Dag Hammarskjöld Foundation, 1976).
5. Jackson, op. cit.
6. Harrison, Brown, "The crisis of affluence," Bulletin of Atomic Scientists, September 1979, p.16.
7. Ibid., p.17.
8. For a parallel argument in favour of changing efficiency criteria in the context of a communist economy, see R. Bahro, The Alternative in Eastern Europe (New York, Schocken Books, 1978).
9. The concept is borrowed from R.G. Wilkinson, Poverty and Progress, an Ecological Model of Economic Development (London, Methuen, 1973). It encompasses here both the depletion of exhaustible resources and environmental degradation.
10. See Fred Hirsch, Social Limits to Growth (Cambridge, Massachusetts, Harvard University Press, 1976).
11. The United States Surgeon General's Report on Health Promotion and Disease Prevention, released in July 1979, contains a wealth of data on this subject. It attributes a large share of unnecessary disease and disability in the United States to personal lifestyles and over-consumption of sugar, salt, red meat, fat and cholesterol (International Herald Tribune, 30 July 1979).
12. Recognizing these diseconomies does not amount to indulging in the refrain that "small is beautiful".
13. I. Thorsson, "Disarmament and Development" (paper submitted to the Ljubljana seminar and published in the present volume).
14. The French Ministry of the Environment is sponsoring a research project on Patrimonial Accounts of Nature which might pave the way towards a more accurate quantitative description of the sustainability of production systems and processes. (For a definition of sustainability see Nancy Hetzel, "A sustainable development strategy", IFDA Dossier, 9/1979, presented at the Seminar.)

15. For an elaboration on these concepts, see Herbert Simon, "Rational decision-making in business organizations", The American Economic Review, vol. 69, No.4 (September 1979).
16. See Olivier Godard, "L'adaptation des structures institutionnelles à la prise en compte de l'environnement dans l'orientation du développement", and also, at a more specific level, A. Bonesmo, "New planning concepts for residential environments in urban areas" and J. Deelstra, "On the quality of the urban environment" (all three are papers submitted to the Ljubljana seminar and published in the present volume).
17. See Facing the Future; Mastering the Probable and Managing the Unpredictable (Paris, OECD, 1979, the final report of the INTERFUTURES project. The report centres on macro-economic issues, but, significantly, it contains an important discussion on the process of societal value changes and their likely impact on the composition of final demand (see in particular pp. 99-112 and 139-143).
18. This major effort to bring into the discussion on international development the independent voice of institutions and people who identify neither with the establishment nor with big business consists in reality of over 100 individual projects differing in magnitude and scope. Their main findings are being currently published in IFDA Dossier available from IFDA headquarters, 2 place du Marché, CH 1260 Nyon, Switzerland. See also Cathy Starrs, Exploring Development Alternatives (Canada, 1979).
19. In Sweden, often considered a model welfare state, a major study has recently been carried out on care and the need for care: Care in Society - A Project Presentation, (Stockholm, Secretariat for Future Studies:1978).
20. The author's views on the issues at stake in the transition from maldevelopment to development are summarized in the following papers: I. Sachs, "Crises of maldevelopment in the North: a way out", IFDA Dossier, 2/1978; "How do we get there? Transition strategies towards another development in the North", IFDA Dossier, 3/1979; "The challenge of development: a prospective view", The changing expectations of society in the next thirty years (A joint project of the American Assembly of Collegiate Schools of Business (AACSB) and the European Foundation for Management Development (EFMD)), Washington - Brussels, 1979.
21. This is the title of an article by René Dubos, published in Science, 1976, 4252.
22. Wassily Leontief and others, The Future of the World Economy: (New York, Oxford University Press, 1977)
23. The Three Mile Island case acted as a dramatic reminder of the uncertainties of nuclear energy technologies (for a summary of the findings of the Presidential Commission, see International Herald Tribune, 1 November 1979.) On the other hand, the 1978 Austrian referendum which refused to sanction the operation of a completed nuclear plant showed how politically sensitive nuclear power has become. A recent article published by Kommunist would indicate that in the USSR a careful reassessment is under way of the risks involved in a crash nuclear programme (see "Second thoughts about nuclear?" The Economist, 27 October 1979).

24. Several papers prepared for the seminar indicate the importance, the scope and the opportunities for an energy saving development path. See in particular L. Schipper, "Implications of international comparisons of energy use: the Swedish/American case reviewed"; B. Jorges, and M. Olsen, "Policies for promoting consumer energy conservation: an American-European perspective"; D. Pimentel, and M. Pimentel, "Food, energy and the environment: alternatives for new life styles"; C. Marchetti, "On energy and agriculture (all Seminar papers); Foell, W.K., Energy/Environment Management: A Tale of Four Regions. For a sober assessment of the difficulties of the soft energy path see Jean-Charles Hourcade, "Choix énergétiques et choix de société", IFDA Dossier, 5/1979. A forceful plea for energy conservation policies in the American context is contained in Robert Stobaugh and Daniel Yergun, eds., Energy Future, Report of the Energy Project at the Harvard Business School, New York, Random House: 1979.
25. "L'environnement et les problèmes économiques actuels", L'Observateur de l'OCDE, May 1979, p.29.
26. J. Theys, "Redéploiement économique et environnement", (Seminar paper). The author explores 11 different growth scenarios for 1995 and shows that exposure to pollution varies from 1 to 4 depending on the socio-economic assumptions made and the intensity of environmental management.
27. See in particular R.A. Novikov, "Environment and development" W. Burger "The quest for sustainable patterns of development," S. Nordström, "Outline of an ecodevelopment project in a small rural community in Southern Sweden" (Seminar papers); and the two papers by Jackson and Starrs already mentioned. The author's views are summarized in Ignacy Sachs, Stratégies de l'écodéveloppement (Editions ouvrières, 1980).
28. For an excellent analysis of this problem as exemplified by food systems, see S. George "Impacts of food systems on industrialized countries, on society and the environment in developing countries" (Seminar paper) and also UNRISD, "The impact of industrialized countries on third world food systems and environment" (Seminar paper).
29. R. Kothari, "Environment and development", Conceptual paper DP/EDRS/2 prepared for the ESCAP/UNEP Regional Seminar on Alternative Patterns of Development and Life-styles in Asia and the Pacific, held in Bangkok from 14 to 18 August 1979.
30. History offers ample proof that the price mechanism cannot properly take into account the long term or adequately internalize the ecological dimension. The pricing of resources in situ poses an insurmountable theoretical problem according to Georgescu-Roegen, "Myths about energy and matter, Growth and Change, vol. 10, No.1 (1979). It should be recognized that money royalties are fixed by people, not by nature. They reflect a balance of power.
31. "Governments should learn to take account in their decisions of the diseconomies which their policies are liable to inflict on others. ... One of the tasks of existing intergovernmental organizations should be to evaluate, on a continuous basis, the policies of the different States and to publish their results." Facing the Future, op. cit., p. 415.

32. J.K. Galbraith rightly observed: "Neo-classical economics, as even its most prideful communicants would agree, did nothing to prepare people for the explosion of concern over the environment - something that might have been expected from a good and competent science. So economists would be wise to be restrained in recommending remedies that grow out of these ideas." Yet the neo-classical economists were prompt in suggesting that environment could be internalized in the price system. The debate on the trade-offs is based on this presumption. For a variety of reasons that would take too long to discuss here, the "no-growth" solution proposed by a stream of ecologists is also unacceptable, among other reasons because "a reduction in growth only becomes a decent remedy as the distribution of income becomes more nearly equal". A third option is left: "to continue economic growth but to specify by legislation the parameters within which it can occur. These parameters define the permissible damage of consumption and production to the environment. The setting of these boundaries becomes a major - in some ways the major - task of the modern legislature. On occasion it involves the prohibition of particular types of production or consumption - the public damage, as duly assessed by the legislature, is greater than the public enjoyment from the service or product." (J.K. Galbraith, Economics and the Public Purpose (Harmondsworth, Middlesex, Penguin Books, 1977), pp.306-307.
33. In 1975 one million people were employed in anti-pollution activities in the United States, and it was estimated that another 193,000 jobs would be created by 1980. In the Federal Republic of Germany, environmental policies accounted for 220,000 jobs between 1970 and 1974, and the estimate for 1975-1979 is for 366,000 additional jobs. OECD experts calculate that a new job is created for every \$15-20,000 allocated for anti-pollution which compares quite favourably with other economic activities. Energy conservation programmes have still greater employment potential in countries where home heating is an important energy consumption item. Moreover, various studies show that the cost of energy saved would be much lower than the production of new energy. In practically all industrialized countries there is scope for additional, economically justified resource and land management activities. Some of these were traditionally provided in Europe by small and medium-scale farmers who, throughout the centuries, have performed the double function of food producers and landscape keepers. In this connexion there is a need for a reassessment of present agricultural policies based on subsidization of the product and the producer and directed at the most intensive use of the best land instead of a more balanced agricultural occupation of the territory. Less intensive use of land would probably bring about more employment, better income distribution and environmental gains at the expense of lower unit yields, but not necessarily lower net income for the farmer, whose expenditure on industrial inputs would decrease.
34. Gregory Bateson, Steps to an Ecology of Mind (Fragmore, Paladin, 1973), p.95.
35. Ivan Illich, "The new frontier for arrogance: colonization of the informal sector", Paper prepared for the General Assembly of the Society for International Development, Colombo, 15 August 1979.
36. This opposition originally attributed to Erich Fromm, has been developed, inter alia, by René Passet in L'économie et le vivant (Paris, Payot, 1979).

37. This suggestive term is borrowed from Karl Polanyi.
38. P. Garau, "Alternative patterns of development and lifestyles in Italy (Seminar paper).
39. On the importance of the informal sector, see Garau, op.cit. and below.
40. A "horizontal" dialogue between consumer associations and trade unions might play an important role in participatory planning.
41. For a comprehensive definition of both these terms see Liisa Uusitalo, "The ecological relevance of consumption style" (Seminar paper).
42. See Amos Rapoport, "Culture and environment", Ecologist Quarterly, Winter 1978, p.278.
43. For a review of the current methods of time planning see Claude Paturle, "Aménagement du temps et stratégies de développement", IFDA Dossier, 3/1979. At a more fundamental level, one can postulate the broadening of the very concept of consumption by way of encompassing the patterns of time use. This can be done in two diametrically opposed ways: by putting a price tag on time (as suggested by the Chicago school) and thus extending the economic calculus to all human decisions; or else by taking a non-reductionist approach to human behaviour, recognizing that it is guided by a pluralistic scale of values and a non-maximizing attitude (as forcefully suggested, inter alia, by Bateson, op.cit.). In this approach, the anthropology of daily life becomes a major source of relevant information for the planner interested in unfolding ecologically prudent and socially responsive alternatives aimed at maximizing people's chances of "having time for living", i.e. as an opportunity to lead meaningful lives and fulfil themselves. The category of "time for living" supersedes the opposition between work time and leisure; it includes creative work, while forced idleness or empty "time to kill" are excluded.
44. A paper with this title by Bäckstrand and Ingelstam provoked a nation-wide discussion on the subject in Sweden. See What Now?: Another development, Development Dialogue, 1975, No. 1/2 (Uppsala, Dag Hammarskjöld Foundation, S. Linkholm, "Another Sweden: how the Swedish press reacted, Development Dialogue, 1976 1; J. Galtung, "Alternative lifestyles in rich countries; M. Nerfin, (ed..) Another Development: Approaches and strategies (Uppsala, Dag Hammarskjöld Foundation, 1977); and N. Akerman, "Can Sweden be Shrunk?", Development Dialogue, 1979/2.
45. See on this point the Cocoyoc Declaration (1974) adopted by the participants in the UNEP/UNCTAD symposium on Patterns of Resource Use, Environment and Development Strategies (UN document A/C.2/292).
46. See Hirsch, op. cit.
47. See, inter alia, Hoekwater and Hupkes, "Traffic and transportation: Challenges and Outlooks in the Netherlands" and W. Owen, "Urban development and transportation" (Seminar papers).
48. See Jeorges and Olsen, op.cit.

49. All the papers on energy conservation presented to this seminar emphasize this aspect of energy conservation, which is essentially a "technological fix" applied to the consumption apparatus. For the difficulties involved in the household sector, see T. Cronberg, and I.L. Sangregorio "Within our own walls - new technology and its impact on lifestyle" (Seminar paper).
50. The need for a more elaborate theory of consumption as a corner-stone of socialist planning has been stressed by Jan Szczepanski see J. Szczepanski, ed., Badania nad wzorami konsumpcji, Polish Academy of Sciences, Ossolineum, (Wroclaw, 1977).
51. See "A Finnish view on alternative patterns of development and lifestyles" (Seminar paper), and also Theys, op.cit.
52. See Minc Nora, L'informatisation de la société, (Paris La Documentation Francaise, 1978).
53. Tricart and Kilian in L'éco-géographie (Paris Maspero, 1979) - rightly criticize the concept of land vocation as too static in not allowing for future technological breakthroughs.
54. See on this subject: V. Papanek, Design for the Real World (St. Albans: Paladin, 1974).
55. See J.-P. Ceron, and J. Baillon, La société de l'éphémère, (Grenoble, P.U.G., 1979).
56. This is the definition adopted by V. Cao-Pina and S.S. Shatalin in Consumption Patterns in Eastern and Western Europe, (Oxford, Pergamon Press 1978).
57. With the exception of those serving in the army in countries where military service is compulsory.
58. Illich, loc. cit.
59. Harrison Brown's insistence on the improvement of collective services (loc.cit.) and this author's bias in favour of the collective household sector are complementary.
60. The Seminar paper by D. and M. Pimentel, contains a wealth of data indicting prevailing agricultural practices, and at the same time points out available options.
61. See, inter alia, M. Schiray, "Styles de vie et de développement dans le monde occidental: expériences et expérimentations" (Seminar paper), and Anne Charreyron, Expérimentations sociales, changement de styles de vie et de l'organisation de la production dans les pays anglo-saxons, IFDA Dossiers, 11/1979.

ASPECTS OF ENVIRONMENTAL PROTECTION  
MANAGEMENT IN THE USSR

Paper transmitted by the Government of the USSR  
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Summary

The quality of the environment is becoming one of the main factors in determining to what point it is possible to satisfy societal demands. The task of identifying this point is a matter of public concern and responsibility. In the USSR, measures to ensure appropriate environmental protection and the reproduction of natural resources while improving the well-being of the people have therefore been incorporated in the process of social and economic development planning. The constitution of the USSR lays down the main principles of this policy and determines the related functions of the State and local authorities.

The problems of qualitative environmental control are being solved on the basis of comprehensive plans and programmes, including the following measures:

- (a) Development of new, and perfection of existing, legislation on environmental protection and the rational use of natural resources;
- (b) Creation of all-union and sectoral norms and standards regulating the use of natural resources;
- (c) Incorporation of specific environmental tasks in the State plans for economic and social development;
- (d) Setting up of special bodies for environmental control and management;
- (e) Development of scientific research on new methods of pollution abatement and the feasibility of low-waste and non-waste technological processes;
- (f) Formulation and implementation of comprehensive programmes for the study of global and long-term ecological problems;
- (g) Creation of public awareness of nature as a treasure to be protected by the population;
- (h) Development of general education in nature protection and the rational use of natural resources;

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(i) Promotion of international co-operative programmes for the protection of the environment.

A series of decisions taken by the Central Committee of the Communist Party of the Soviet Union and the Council of Ministers between 1972 and 1978 lay down the main principles for the planning and management of environmental protection and the rational use of natural resources. The most important instruments for policy implementation are: (a) the preparation of long-term forecasts of the state of the environment in order to supply State bodies with timely and reliable information on possible changes resulting from the impact of economic activities and the intensive use of mineral and biological resources, the growth of the urban population and other factors; and (b) the formulation of comprehensive territorial plans for nature protection and the rational use of natural resources.

A major aid in the implementation of the constitutional and legislative principles for the use of natural resources was the introduction in 1975 of a separate section for "Nature protection and the rational use of natural resources" in the State plans for economic and social development. The main purpose is to prevent economic and social activities from having harmful effects and to preserve and improve the resource potential of the country through the rational all-round use of its natural resources.

Planning measures for environmental protection are based on a policy aimed first and foremost at elimination of the causes of pollution.

As man has to design and create the natural and technological environment necessary for his existence, it has been decided in the Soviet Union to conduct extensive scientific research and design work both at the national level, in the USSR Academy of Sciences, and within the framework of international scientific and technical programmes co-ordinated by the USSR State Committee on Science and Technology. In addition, the ministries and departments include specific subsectoral research and pilot design testing in the plans of their subordinate bodies.

The main lines of fundamental scientific research work are:

(a) Investigation of the influence of human activities on the atmosphere, the lithosphere and biological and soil resources, development of rational methods for the use of such resources and for the protection and reproduction of biological and ecosystem resources;

(b) Global and regional forecasts of the impact of major economic measures on the environment;

(c) Development of a scientific basis for environmentally sound processes; improvement of the social, economic, administrative and legislative machinery for environmental protection and control of the use of natural resources.

INSTITUTIONAL INNOVATIONS AND INDIVIDUAL MOTIVATIONS  
FOR ALTERNATIVE PATTERNS OF DEVELOPMENT AND LIFESTYLES

Background paper prepared by  
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Introduction

The patterns of economic development and lifestyles which have made Europe one of the most prosperous areas in the world today now face a dual indictment. First, for their past history, because these patterns were developed to the detriment of peoples on other continents. Secondly, for their prospects, because they will be unable to guarantee further progress, or even the maintenance of acquired standards of living. These accusations point to the need for change in patterns of development and lifestyles. But this realistic assessment is usually vitiated by three other considerations which evade the real issue:

(a) The reasons behind the need for change are sought at the periphery of the human condition, e.g. in the relationships between exhausted resources and the degraded environment, rather than in man's daily life;

(b) The solutions are equated with the exercise of outside pressure on citizens, and workers in particular, to make them modify their aspirations and habits, for instance under the threat of energy shortages and contamination of the environment by toxic substances;

(c) Alternative lifestyles are pictured as implying restrictions or outright sacrifices, which are alleged to be the only way to correct the tendency to "live beyond one's means" and gain acceptance for restrictions on living standards and even on personal freedom.

Such reasoning fails to highlight the importance of man himself, both as a victim of distortions and as a protagonist of change.

When speaking about distortions, or criticizing industrial society, there is the risk of advocating a rejection of technology with reference to some happy era of natural man. In this context it might be remembered that, of the 187 fossil skeletons from early prehistory so far unearthed, only 3 had passed the landmark of 50 years of age, the broad majority of them failing to reach adult age. 1/

Statistics obtained from readings of ancient Greek gravestones, birth and death dates of Egyptian mummies and, in later times, parish registers of the Middle Ages, provide evidence that in the course of some 1,000 years the lifespan of the

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populations to which the records applied was extended by a few years only (for slaves, who were not buried under gravestones, the average life span was probably shorter). For the Egyptian mummies, the average life span was 25 to 30 years; by the end of the eighteenth century, as shown by parish registers, it was about 30 to 35 years. Later, industrial development coincided with a great leap forward and, in the industrialized areas, the life span now falls in a range of 65 to 70 years. Therefore, instead of pondering the doubtful possibility of mankind's returning to age-old conditions, it would be appropriate to examine the causes and the limits of this change.

There are basically three causes: (i) growth of the productive forces, which made indispensable means of subsistence available (food, housing, clothing); (ii) development of the medical, chemical and biological sciences; and (iii) processes of political emancipation which favoured broad material and cultural progress (partial and insufficient as it may still be).

The limits derive from social disequilibria, as well as from phenomena of anthropological stagnation or regression involving whole populations. Social disequilibria show up clearly in differences in death rates by profession. Taking average age rates as 100, the following index figures are obtained for males in the 20-64 age bracket: 2/

Teachers	66
Farmers	70
Physicians	90
Clerks	101
Shoemakers	140
Night-watchmen	163
Building workers	173

A building worker's chances of reaching the average age at death are therefore almost three times as poor as those of a teacher or farmer. These statistics show the extent to which the health advantage is shifting in favour of the rural population.

Such data serve to invalidate the theory that differences between social classes tend to level out, a feature that strikes all those who only observe common features in dress, dwelling or nutrition, but fail to consider the key determinant in man's life (and death), namely work. These data also stand as a criticism of Marxists who are wont to interpret society, its imbalances and crises in a narrow economic framework, thereby neglecting and even condemning any analysis of human biological phenomena, which precludes any insight into contemporary reality. For instance, when we discover, to our surprise and regret, that there are more young people seeking professional qualifications in teaching than looking for a job in the building industry - even at times of higher wages in the latter - it might be wise instead of blaming the school system or the tastes of young people, to examine whether they are not right, after all, to consider life expectancy more important than the certainty of a wage. And what other incentive can be provided to manual workers today - now that the traditional trades have collapsed - than better safety and a decent income?

Phenomena of anthropological stagnation or regression may be evaluated on the basis of three factors: (a) a drop in human life expectancy, amounting to a poorer quality of life; (b) an alteration in bio-rhythms, in daily activities as well as over the full life span; and (c) phenomena of alienation extending from the working environment to consumption and social life as a whole.

In many European areas, life expectancy, which is still far from having reached its biological limits, has failed to make any significant further progress in recent times. The trend is actually downward. One of the grounds for loud boasting about the virtues of the capitalist development pattern is thus disappearing. Along with the "limits to growth", highlighted some years ago by the Club of Rome report on resources and the environment, another limit of the utmost concern to human society has appeared: the limit to our survival. Since the turn of the century, with capitalist production still thriving, mortality rates have been rapidly declining, but the pace has now begun to slow down. New progress is mainly achieved by reducing child and female mortality rates; for males of working and post-working age, the downward slope of the curve is flattening and sometimes shows a tendency to reverse itself.

Much the same conditions - although the social imbalances are less obvious - prevail in some socialist countries in Europe, where the predominant industrial and urban model has much in common with the Western pattern as far as technology and work organization are concerned. When it became clear that the picture of major diseases was changing - i.e. that the development of science and industry had succeeded in drastically reducing death from contagious diseases and malnutrition, but that the conditions of capitalist production had paved the way for tumours, cardio-vascular diseases, toxic contamination, violence and accidents - in short, when both the benefits and drawbacks of this type of society were discovered, a conceptually extremely simple approach to the problem was developed. All victories were attributed to social progress, all defeats to the deficiencies of human nature. Statisticians were therefore inclined to divide diseases into endogenous and exogenous types, physicians gave priority to biological factors in explaining them. Later, more thorough investigations were conducted into modern scourges whose causes were assigned to individual heredity and reactivity. In addition, various social, behavioural and environmental causes were brought into focus.

On the basis of the historical development of work and social patterns, human bio-rhythms can be considered to have gone through three basic stages. In the era of craftsmanship and farm work, the alternation of work and rest was basically regulated by seasons and religions. With the beginning of industrial mechanization, the work period became unlimited, and could reach 14 to 16 hours a day. Finally, the major achievement: eight hours of work, eight hours of study and leisure, eight hours of rest. Where do we stand now?

There are two basically new factors. First, the "Magna Charta" of workers' rights sought by Marx, namely a working day limited by law so as to clarify "the end of the time sold by the worker, and the beginning of the time belonging to the worker himself" - a somewhat withered and outdated charter. Today the three phases of the day (and of the week and the year as well), traditionally defined as "work", "study and leisure" and "rest", are closely interrelated, and the outcome of their merging may equally well be psycho-physical, cultural and political development, or the all-out oppression of man. The second new feature is a greater interplay between the three aspects of working time, namely duration, intensity and quality, which may lead in turn to greater alienation or more gratification.

The prevailing tendencies are alarming. Although work schedules formally provide for greater freedom, potential leisure time is often absorbed by transport and a second job. Even sleep has been reduced in quantity and quality by excessive light and noise, and its restorative function is thus diminished. If psycho-analysts were not biased in favour of wealthy patients, the dreams of workers obsessed by their work could provide convincing material to show that today even the unconscious is enslaved. The separation of work and rest, rooted

in the genesis of life and characteristic of the higher orders of animals, is tending to give way to an unnatural and harmful mixture, with certain "scientists" barbarically suggesting that sleep can be used for learning.

Let us consider leisure, the relationships of a human being with others or with nature. Medical investigations have shown that monotonous, fragmented, repetitive work, with no scope for initiative, gradually erodes the capability for verbal expression. 3/ The worker exhausted by long years of unsatisfying work is driven back to a level where mental operations are concrete rather than abstract and, to a large extent, unconnected and undifferentiated. This eventually leads to general loss of interest in mental work and withdrawal from verbal contacts with other people. Such work thus involves a loss of language, will-power and ability to communicate with others.

The relationship with nature also tends to be negative. Universally available resources, such as air or water, are being adulterated; and workers obtain them at lower levels of purity than the privileged classes, both at places of work and places of rest. In many cases, urban congestion has increased and the ground is covered with concrete and buildings; in other areas depopulation is the problem and the soil is being eroded and degraded. Man's primary needs, which constitute his very nature, are being crushed or twisted; other needs, often unnatural and harmful, are being stimulated by industry, and even rest time is occupied with a drive for consumption. Travelling time has been extended, and current modes of transport bring great hazards to man and great damage to the external environment. Even when leisure time quantitatively exceeds the number of hours required for mere reproduction of the labour force, social conditions put limits on its use and force it into the traditional framework, to such an extent that the specifically human dimension of leisure is practically obliterated. 4/

Individuals thus have a greater interest in social change. This interest has its roots in a life experience that is still only partially understood, because of distorted cognitive processes. Institutions can either hinder or foster growing awareness of the need for change, depending on their skill in interpreting facts and stimulating participation or, conversely, blunting reality and promoting submissiveness. In examining the impact of institutions the focus of this paper will be on aspects related to the organization of public health services.

It has become clear by now that the causes of many diseases lie in man's activities and conditions themselves, which must therefore be controlled and modified in the interest of his health. Yet present doctor-patient relationships are unsuited for the purpose, as they are centred on problems at the individual level. At best, the doctor prescribes what the patient must do personally to fight disease. But disease may be just the symptom, at the personal level, of the impact of social phenomena. A doctor-patient relationship, which has a merely individual character and finds social expression only in economic terms (the doctor's performance triggering off reimbursement machinery), fails to convey proper signals to society and thus to serve as a spring-board for changes in morbid social relations. Indeed, this relationship may contribute to growth in the consumption of health services, which is not always useful and may sometimes be harmful. Hence, ever-increasing funds are required to pay for services which fail to protect human health. This is an international phenomenon, which is most evident in Western countries; but Governments are more concerned with its economic implications than with its human and political consequences. The President of France stated on 29 September 1977 that "the share of resources any society is willing to allocate to health is not determined once and for all; but it is not infinite either". It would have been more appropriate to speak of health expenditure, rather than health tout court,

as the two notions are not equivalent. Very much the same concern is felt in a country with a strong economy and a hard currency, the Federal Republic of Germany, where the cost of health insurance has almost quadrupled in a ten-year period, from DM 24,293 million in 1969 to an estimated DM 95,354 million in 1979. 5/ Should the cost continue to increase at this pace, the dilemma will be whether to slow down other social expenditure and productive investment or to cut back public health consumption drastically, thereby turning health assistance once more into a private question directly correlated with income.

In Italy, one of the most significant cultural and political events of the last few years has been the participation of the working classes in safeguarding health and environmental conditions. Until recently, the working class movement broadly shared the following objectives: in respect of health service policy, an extension of medical assistance through social insurance, with no lowering of the quality of the services; in respect of trade union policy, increased and guaranteed wages, with risk factors being converted into monetary terms. New concepts and new claims then emerged, accompanied by political and legislative moves; they were based on recognition that wage increases could easily be counteracted by inflation, whereas improvements in health would be a real asset to the workers and have a strong influence on social awareness, technological developments and the distribution of power in society. Union policy was therefore modified, with financial claims exchanged for claims to control over working conditions and the environment. At the same time it was urged that traditional scientific criteria for checking workers' health (medical examinations, and objective analyses of the working environment and arrangements for the organization of work) should be supplemented with criteria based on subjective assessment by workers exposed to specific risks. In public health policy, the change entailed a shift in emphasis: the systems of medical assistance or the medical profession were replaced as the starting point by the diseases themselves, viewed as signs of unsound relationships between man and his environment. At the same time, attempts were made to promote scientific research, administrative experiments and legislation to improve the health services.

Some efforts ended in defeat, or their short-lived success was soon re-absorbed by the economic system, which reacted by exporting polluting activities to enterprises with weak trade unions or to more permissive nations. The biggest difficulty in Italy, at present, lies in the promotion of social struggle for health in an economy which creates mass unemployment. Nonetheless, some noteworthy results have been achieved, which may be summarized as follows:

(a) A partial, though insufficient, reduction in accidents at work and in some occupational diseases;

(b) A modification in the linkage of science and work: along with more rapid dissemination of existing knowledge, new research has been stimulated, and the concept of the "scientific community" has been broadened to include workers and citizens as protagonists;

(c) The fact that the health profession and the working class are tending to draw closer together (even if there is still a long way to go) as both of them learn new languages and the social role of health workers is being modified;

(d) The adoption of a "revolutionary" model of health action - revolutionary in the sense that it is based on a transformation of the working and living environment and on the leading role of the working class. The working class, by detecting and fighting its own diseases, "infects" populations subject to the

same risks, and this will lead to a transformation of the health services and the social system;

(e) Power in society and the relationship between the masses and the State are changing. A power change has partially taken place inside the trade unions, and is now developing in the State sphere, with the social insurance system being transformed into a national health service. It should be borne in mind that this experience is still incomplete; moreover, it is threatened by economic and political crises in Italy and other market economy countries; it is constantly under heavy stress, periods of progress alternating with periods of retreat.

However, experience shows that workers do not react to the changes in lifestyles imposed by the current crisis merely by attempting to earn a living as best they can or seeking personal advantage. Genuine threats to well-being may give rise to collective tension, involving the whole population and not simply one single class. People may learn better understanding of real health and cultural needs, as opposed to induced needs; and growing awareness may lead to institutional change.

These processes also provide food for thought on social systems, present injustices and possible improvements.

So far the basic criticism of capitalism has been that it hinders development of the productive forces. Marx's fundamental thesis holds that revolutions occur when the development of an emerging class and its production activities are being increasingly hampered by prevailing social relations, institutions, and political and cultural barriers. If the bonds of confinement are broken, further growth becomes possible. This is how the bourgeoisie reacted against feudalism. The socialist revolution was conceived as a struggle of the working class, the productive class par excellence, against the social relations which prevented social equality and development.

The basic philosophy has since been enriched by new elements: the alliance of the working class and the peasants; the enlistment into the productive forces of the middle classes and the entrepreneurs who were open to new alliances; the role of the growing numbers of intellectuals in propagating the view that power should be based on consensus instead of domination, and on hegemony instead of dictatorship; emphasis on the value of democracy as a viable argument for social struggle and as an intrinsic aim of development.

In however distorted and haphazard a manner, capitalism is still proving able to guarantee productive growth by using and abusing science, forcing consumption and exploiting labour, resources, and the environment of its own or other peoples.

At the same time a new phenomenon - unprecedented in human history but characteristic of contemporary society - has appeared. Capitalist society both accumulates and triggers off destructive forces on a previously unimaginable scale. This allows the productive forces to increase, but development is distorted, as may be clearly seen from the material damage to resources and the environment and also from the emotional and psychological stress on the population: each inhabitant of the earth carries at present the burden of the 3,000 kilogram of TNT which are "at his disposal" as armaments in the arsenals of the various countries in the world.

This cannot be dismissed as a fact with little bearing on our daily lives. We cannot overlook the profound transformations in the living environment: the substantial increase in the CO<sub>2</sub> content of the air over the last few decades;

the shortage or pollution of water in so many areas; the appearance of new mass diseases for which vain attempts are made to find scapegoats outside history or remedies outside social struggle; the huge increase in numbers of social outsiders or outcasts for whom no job opportunities are provided; the crisis in the family, because authority has disappeared without being replaced by solidarity; the spreading of criminality and violence of all kinds. Within this framework a chemical war has broken out, continuously ravaging air, water, food and the working environment; this is the poisoning forced upon us all. In addition, there is the so-called "voluntary" poisoning resulting from commercial conditioning and social pressures, i.e. abuse of or addiction to drugs, alcohol and tobacco.

Struggle is required, therefore, to defend both the body and the mind. This is an essential objective. It took centuries to establish the principle of habeas corpus, the right to one's own body, but freedom of thought still exists only within the limits imposed by a class-divided society. Now the opportunity to extend these rights to everybody seems to have vanished, and there is a risk of losing the rights altogether, because the organization of work and society as a whole does not allow sufficient protection at the individual level.

The accumulating destructive forces do not tend to destroy capitalism, as is claimed by those who believe that allowing them to expand freely would make revolutionary processes easier. Quite the contrary: not only can capitalism coexist with these forces; it can thrive and strengthen its power through them. Indeed, the development of such destructive forces could jeopardize and divert those political and cultural strivings which are fundamental for societal change; it may lead astray young people and even the working class, thus breaking the link between generations and halting the necessary exchange of experience.

If this analysis is correct, the task of transforming society cannot be entrusted to an alliance between producers, the working classes and their prospective collaborators alone; all those who risk being or have already been struck by the destructive forces must also be involved.

This highlights the great revolutionary value of the struggle for disarmament, for environmental protection and for health, and the struggle against violence and terrorism, chemical poisoning and social tendencies which make outcasts of people. These struggles must clearly be conducted without indulging in regressive romanticizing that would depict all drugs as dangerous, all industries as an enemy, all forms of consumption as waste and all mass action as violence.

This struggle can revive the sense of words that have now become political jargon, but are still needed to explain and guide present activity. For instance, "exploitation", which in the past century had clear-cut connotations - i.e. the appropriation of the workers' resources and skills by capital - now has an extended meaning; it involves everyone and the whole process of historical evolution. Another concept with a broadening horizon is "planning", viewed as man's ability to comprehend his development organically. Planning must make use of all the sciences in order to gain deeper insights into man and his relationship with nature; it must involve everybody, not only business people, technocrats and central State activities. The purpose should be to stop degradation and promote evolution, essentially on cultural and political grounds. And the biological aspects of man, namely the experience and information contained in his genetic heritage, should be enhanced, so that the best features can be expressed and enjoyed to the full.



- 1/ M. Reinhard, A. Armengaud, and J. Dupaquier, Histoire générale de la population mondiale (Paris, 1968).
- 2/ J.N. Morris, Uses of Epidemiology (Edinburgh, 1975).
- 3/ A. Massucco Costa, "Il contributo della psicologia allo studio del lavoro femminile", "Rivista italiana di sicurezza sociale", A.IV, n.4 (October-December 1966), p. 480.
- 4/ R. Richtz, Civiltà al bivio (Milan, 1968) (original edition: Prague, 1967).
- 5/ Sozialbericht 1976 (Bonn, Bundesministerium für Arbeit und sozialordnung, 1976).

THE QUEST FOR SUSTAINABLE PATTERNS OF DEVELOPMENT

Long-term perspectives for ecologically  
sustainable development policies and  
lifestyles in industrial countries  
in a global context

Paper transmitted by the Government of the Netherlands  
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1. INTRODUCTION

A. Purpose and general perspective

This study attempts to outline some fundamental policies which might allow governments of the ECE region to bring about a development process that would be socially acceptable and environmentally sustainable over extended periods of time. It has been undertaken as a contribution to the UNEP/ECE Regional Seminar on Alternative Patterns of Development and Lifestyles, and indeed reflects the views implicit in the title of the Seminar, namely that such policies must be of an alternative, unorthodox kind, as current approaches are becoming increasingly inappropriate for securing a viable social and economic future. This is true for Europe as well as for the rest of the world. These approaches are causing rapid degradation of the natural environment on which mankind depends, and are leading to the depletion of the mineral resource base of present economies at a rate which is widely recognized to be disastrous if maintained anywhere near current levels. To mention only the increasingly scarce, yet indispensable fossil fuels; it is both economically irresponsible and socially unacceptable that they are being consumed by the rich industrial countries at per capita rates 20 to 30 times higher than those of the third world.

The postulate that any alternative pattern of development must be socially acceptable is taken for granted, and will not be discussed in this paper. No single country, region or social class should carry a disproportionately heavy burden in the over-all effort to secure fair living standards and welfare for everyone in the world. Furthermore, alternative policies can only succeed in bringing about the required patterns of development if society as a whole gradually adopts alternative lifestyles to match those policies, a problem that will be discussed at the end of the paper.

Another crucial question treated by this study is that, given the very close economic and ecological linkage between industrialized and industrializing countries, policies for long-term development in the ECE region cannot be divorced from the development processes in the third world. Safeguarding a viable future for economically weak and strong countries alike calls for continued efforts to combat not only traditional forms of exploitation, but also recent tendencies to saddle economically weak countries with environmental

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hazards that the economically strong countries no longer accept on their own territories. Besides, if destabilization of oceanic life and climates - a very real danger - should produce ecological crises on a global scale, the effects would hit all countries but surely bring most suffering to the poor of the third world. In other words, if the present style of production becomes an obstacle to long-term sustainable development in the industrialized countries, it can certainly not be a sound basis for the third world.

In the same long-term ecological development perspective, the new policies will also have to cover the environmental impact of development aid and foreign investment in third world countries. This viewpoint has received increasing official recognition through UNCTAD and the plea of the Group of 77 for a new economic order, even though the industrialized nations are reluctant to take the necessary steps.

Finally, it would make no sense to recommend alternative policies and lifestyles that could not be implemented without a complete break with conventional policies and lifestyles. This would in fact be a contradiction in terms. If, nevertheless, the new lines of economic and technological development proposed in this study may sometimes appear revolutionary or even utopian, it should not be forgotten that, conventional economics and technology will to a large extent, remain indispensable for making the transition. In other words, practicability stands first on the list of priorities for recommended policies, in recognition of the fact that comprehensive and immediate implementation would be impracticable. Thus, the perspective is long-term. At the same time, implementation of the policies proposed would be on a "not too small" scale, and should actually have "started yesterday". Transition will take time; the question is not actually whether to start on a small or a large scale, and when, but to get the process of change going.

#### B. Methods and scope

To deal with the complex issues at stake, the study will begin by listing a number of ecodevelopment assumptions which, from the analytical point of view, are treated as premises. They will be regarded as the ecological frame of reference within which alternative development policies will have to be implemented.

These premises have been derived from a large number of recent scientific publications, and reflect a reasoned, but in no sense value-free, stand on the issues of long-term global development. This stand is based on the conviction that long-term economic policies must take account of basic ecological criteria in order to make a lasting positive contribution to the progress of human society. As such, it has been repeatedly expressed in reports prepared for the United Nations Environment Programme and as a majority opinion in its intergovernmental conferences; it also forms the basic ideology of most non-governmental associations and societies that are active in the field of nature conservation and environmental protection.

Studies like the present one can be useful only if they take an integrated approach combining social, economic and ecological considerations. Taking a number of succinctly described "premises" as the starting point, some major policy issues will be analysed more specifically in subsequent sections. The choice includes questions of energy, urbanization, industrialization and rural development as well as problems of appropriate functional and spatial frameworks for promoting alternative approaches.

Policies concerning population and environmental protection have been discussed only in rather general terms, although it is recognized that they are essential for the success of economic policies, and vice versa, as all these concerns are interdependent. It should also be emphasized that the analysis is of a qualitative character, though the arguments leading to the recommendations for policies and strategies are based on quantitative studies made by others.

References to the most important publications consulted appear at the end of the report. Most publications discuss the general issues along the same lines as the present study; specific references are therefore made only if particular sources substantiate controversial elements in the analysis or support stands on policy issues where the debate is only just beginning.

## II. SEVEN PREMISES OF "ECODEVELOPMENT"

### (a) Long-term ecological stability as a condition for life

Human beings have been able to survive as a species in much larger numbers than natural conditions would allow. They have succeeded in doing so by organizing regional and local niches within the global ecosystem; in these niches nature is manipulated, through artificial means, to supply "unnaturally" large amounts of resources vital for the human species. However, the continued "hyper-productivity" of these niches of human culture and civilization can only be maintained over longer periods of time if the natural environment surrounding them remains essentially intact and stable. It is this relative stability that permits the larger local, regional and ultimately global, ecosystems to perform the function of biological, biophysical, geophysical and climatological infrastructure, without which no human civilization could be kept at the necessary minimum level of economic productivity.

### (b) An alarming rate of ecological disruption

In the past century, and in many places even earlier, growing populations, rising material demands and the application of inappropriate, often highly destructive technologies for intensified manipulation of nature and exploitation of mineral resources seriously degraded, destabilized and, in several instances, virtually destroyed local and regional ecosystems. In recent decades, the combined side effects of production in the heavily industrialized nations have placed the global ecosystem under direct threat of destabilization and collapse, the greatest threat being the chemical effluents that kill life in the oceans and modify the composition of the atmosphere.

### (c) Shrinking deposits of easily exploitable mineral resources

To an increasing extent, fossil mineral resources have replaced renewable resources as the primary material and energy base for production. With the development of specific technologies for using these minerals, natural energy conversion systems could be bypassed in spite of ever growing production of industrial goods. However, even if the world population remained stable and total production was kept at its present aggregate level (which would suffice to cover basic needs for all people if more evenly distributed), stocks of several vital, now easily exploitable and therefore low priced, minerals would soon be depleted. A dramatic shift towards alternative resources will be necessary to create the energy and material surpluses needed to support a world population expected to double over the next 35 to 40 years at living standards sufficiently above basic subsistence levels to be considered socially acceptable.

(d) High energy needs for extraction and recycling of minerals

For the foreseeable future, accessible stocks of mineral resources other than fossil fuels are large enough to prevent prices from rising to levels where they could cause major problems in the sphere of production and consumption. Generally, industrial recycling and the application of substitutes would secure continued availability wherever such resources were indispensable. However, both mining and recycling of these minerals are very energy-intensive processes, especially where metallurgy is concerned. Further possibilities of using metals and several metalloid and non-metallic minerals in quantities anywhere near those of today will thus depend on a continued supply of relatively cheap energy.

(e) The urgent need to restrict the use of fossil fuels

Consumption of the three main energy-carrying fossil minerals - coal, oil and natural gas - has become immense and is still increasing. To curb this trend over the coming decades is an urgent task for two reasons:

(i) Since 1890 the carbon dioxide content of the earth's atmosphere has already increased by as much as 20 per cent; this has largely been attributed to the massive burning of mineral hydrocarbons and, to a minor degree, to deforestation and desertification; further increases of such magnitude are likely to destabilize the earth's climatic equilibrium, with incalculable economic and human risks;

(ii) At present rates of consumption, the depletion of easily exploitable mineral energy deposits will, in the coming decades, push the price of their use as fuels beyond the level at which alternative sources become profitable so rapidly that major energy crises and subsequent economic upheavals cannot be avoided before energy from the alternative sources become available in sufficient quantities.

(f) Need for early and large scale development of alternative sources of energy

Although relatively minor operational adjustments and the gradual introduction of energy-saving technologies in industrial economies could, without causing economic stagnation, significantly extend the era of production predominantly based on mineral energy, the economic advantages of early and large-scale application of alternative energy sources are very great. The only known alternative sources which in principle are available for large-scale supply of energy at economically acceptable (off-source) prices are nuclear fission reactors and various devices for capturing and converting solar energy, wind and hydropower. <sup>1/</sup>

(g) Emphasis on mixed solar/mineral scenarios as economically and technically feasible, and thus preferable to nuclear scenarios (3, 9, 12, 14, 16)

Recent debates have produced the following four compelling reasons for opting for "solar/mineral" rather than "nuclear/mineral" energy scenarios:

(i) A transition to a world economy based on mixed "nuclear/mineral" energy will not only involve higher costs than a transition based primarily on solar energy, but will have to be followed by another transition to that very solar

<sup>1/</sup> Nuclear fusion will not be discussed, as its technical and economic applicability has not been proven; neither will geothermal energy be treated because of its usually unfavourable economic prospects for large-scale use as compared to solar energy.

base, after a period of some 30 to 50 years, when accessible uranium deposits will be nearing depletion - if not earlier for reasons of environmental deterioration. Within the span of one generation, this would mean financing two costly changes of the energy base of society, instead of one. 2/

(ii) The environmental hazards of large-scale nuclear energy generation are incomparably larger, both because of the tremendous chemical toxicity of plutonium - a vital element in the production cycle, once breeder reactors have replaced conventional reactors to save scarce uranium - and because of the risks of radio-active leakages from regularly operating plant and wastes. In the event of accidents, the environmental impact will be uncontrollable and of indefinite duration, and possibly disastrous for very large inhabited and uninhabited areas. Carefully planned, large-scale energy production from renewable sources need not pose any threat to larger ecosystems and may even in many instances make positive contributions to environmental quality; accidents causing any serious environmental harm are virtually inconceivable.

(iii) The political and economic advantage of "solar" over "nuclear" scenarios are significant: solar scenarios have great potential for creating employment and on the average require smaller capital outlays; the intrinsically dispersed nature of renewable energy production systems will tend to counteract trends towards haphazard urban growth and improve the economic potential of many currently impoverished and depressed regions.

(iv) An economy based on nuclear energy would, both in normal conditions and in the case of accidents, sabotage or war, involve serious threats to human life. Even leaving aside the case of war, the social and psychological burden will be enormous if society is compelled indefinitely to maintain sophisticated and maximally fail-proof technical control and security systems in large sectors of the production system in an attempt to diminish the risk of nuclear catastrophe without ever succeeding in removing the fears that it may occur.

### III. POPULATION CONTROL AND ENVIRONMENTAL PROTECTION

#### A. Population policies

In spite of the millions who have settled on conquered territory in other continents, the population of Europe is larger than ever before on its own territory. Since the total world population far exceeds the optimal size for securing a long-term sustainable ecological and economic future for everyone, further emigration of Europeans to swell the population in other parts of the world would definitely be undesirable.

Furthermore, the populations of Europe have been able to achieve their high standards of living only thanks to increasing flows of food and energy from other continents. Policies for maintaining and raising these high standards while restricting the subsidies received from other areas would certainly be greatly helped if the total population was stabilized as close as possible to its present level. Appropriate policies to promote such stabilization - mainly through lower birth-rates - should therefore be implemented, in spite of temporary problems of "ageing", i.e. growth of the economically non-active age groups compared to those economically active.

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2/ Only a few countries which have already invested heavily in nuclear devices and in related capital goods industries may, from an economic point of view, benefit from letting nuclear energy play some limited, and temporary, role in meeting part of their future energy needs.

Advisers from many European countries are involved in the family planning programmes of the third world. Generally, such involvement can be positively valued. However, a primary ethical condition for technical support to programmes for the limitation of births should be strict adherence to the principle that participation should be voluntary. Care must also be taken to ensure that nobody practising family planning will be economically penalized when older. For this purpose, the setting up of social welfare funds at a communal level can guarantee a minimum subsistence income for all those who have no children, or too few to take care of them when they can no longer take care of themselves (7, 17, 22). Experience has shown that, in the absence of such minimum social security, efforts to persuade people to reduce births remains rather ineffective, not because of outdated religious beliefs, superstition or ignorance but for reasons of well-understood rational self-interest.

#### B. National policies for protection and rehabilitation of the natural environment

Because the largest ecosystems transcend national or even continental boundaries, there is an evident need to tackle the problems posed by their degradation and destabilization through ecological policies at the international and global level. The development of such policies through agreements between nations and the work of international organizations is briefly dealt with in the next section.

Control on the growth and quality of production, consumption, transport, etc., lies mainly in the hands of national governments; and the degradation of larger ecosystems also has its roots in harmful, sometimes ruinous practices tolerated on national territories. Any future international ecological order must therefore be based on sound national environmental policies. It would, moreover be quite unjustified to wait for international agreements to become effective before developing and implementing such policies.

In high-income and low-income countries alike, environmental policies should contain at least the following measures and elements:

(a) General rules and regulations at the highest national policy-making and planning level to govern all human activities which are potentially harmful to the natural environment (specific legislation for mining, industrial production, agriculture, animal husbandry, transport, construction, housing, dumping and treatment of waste and garbage, sewerage, heating, recreation, hunting, etc.);

(b) Further control over activities with regional environmental impact; establishment of criteria for density of settlements, type of recreation, type of industry or agriculture, ceilings for the pollution of air, surface water, ground water, etc.; and designation of nature reserves and other specially protected zones where only certain activities can be allowed;

(c) Promotion of positive action to improve the environment in close co-operation with regional authorities, non-governmental organizations and local communities, in such areas as water management, soil preservation, afforestation or reforestation, protection of flora and fauna, greening and cleaning of urban regions, etc.;

(d) Extensive monitoring of environmental contamination and changes in the quality of the natural environment; and the establishment of effective systems for inspection and sanctions based on legislation;

(e) Organization of ecological, biological, biophysical and biochemical research to provide the scientific basis for balanced environmental policies;

(f) Institutional and financial support for special activities, experiments or projects undertaken as a result of governmental, or non-governmental, initiatives with a view to environmental protection and rehabilitation, and the development of new styles of production, consumption and human settlements which are less harmful to the natural ecosystems.

Environmental policies of the kind just indicated must be part of an over-all policy-making and planning process, relating in particular to land use, i.e. regional planning, designation of industrial zones, urbanization plans, etc. <sup>3/</sup> Viewed from this angle, environmental protection defines and improves the infrastructural conditions for selective economic production and consumption growth with the aim of maximizing its long-term efficiency and welfare effects. As nature's local and supra-local carrying capacity constitutes the limiting factor, it is essential that the potential for supporting a carefully adapted and qualitatively and quantitatively well defined complex of human production and consumption activities should be continuously assessed and monitored.

### C. International platforms for promoting a new ecological order

The design and implementation of measures to prevent overloading of the ecosystems should not be a matter of policy-making at the national level alone; international action is also required. It would be an exaggeration to say that recognition of this need is reflected in the attitudes of most Governments of the ECE region at, the Law of the Sea conferences, for instance, or in their determination to ratify and apply the various conventions on the limitation of specific environmental hazards (e.g. pollution of international rivers; pollution of the oceans; transport of oil, transport of radio-active material, etc.). In the ECE region, a first step towards a comprehensive environmental policy would be the ecological mapping of the whole territory through a concerted international effort. Such mapping could assist national governments in designating subnational ecological zones in an internationally comparable manner, which would greatly facilitate the specification and mutual co-ordination of environmental protection and rehabilitation policies.

A fundamental guiding principle for policies to maintain the stability of ecosystems, adopted by the European Economic Community (EEC) as well as the Organisation for European Co-operation and Development (OECD), is that no further deterioration of the environment can be allowed without compensation in some form or another. Further extinction of species through human interference with nature is unacceptable and dangerous, even though impoverishment of some local ecosystems cannot always be avoided. But the larger ecosystems should be enabled to maintain or regain the full variety of flora and fauna that they are naturally capable of accommodating. It seems timely and appropriate to elaborate and adopt the principle of "non-degradation" for the ECE region as a whole.

The work of the International Union for the Conservation of Nature and Natural Resources (IUCN) on a world conservation strategy is of invaluable importance for laying the basis for international conventions on environmental protection and the management of ecosystems. The activities of IUCN, in close co-operation with UNEP, deserve the full support of national governments and international organizations.

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<sup>3/</sup>This subject was discussed at the ECE Seminar on Integrated Physical, Socio-economic and Environmental Planning held in Bergen, Norway, from 18 to 22 June 1979.



Technical assistance to third world countries for the protection of their environment has so far been mainly concerned with water control, afforestation and anti-erosion measures, and primarily with economic objectives, e.g. to increase agricultural or timber production. Promotion of broader environmental awareness in third world countries is necessary. Reforestation or "agro-forestry" ventures on a decentralized basis (communal forests), in combination with alternative (solar) energy devices to replace wood and cow dung as fuels, could in many rural regions of the third world play a vital role in halting ecological and economic decline caused by soil erosion, salination and desertification.

Regarding economic development schemes in the field of agriculture, forestry or industry pursued by public or private agencies or transnational corporations, ECE governments should abstain from direct or indirect involvement, e.g. through guaranteed loans or infrastructural support, unless these projects have been thoroughly assessed for their environmental impact; minimization of such impact should be made the condition for support. UNEP should be the appropriate forum for developing an international convention on environmental impact assessment of international trade, aid and investment as one of the corner-stones of a new international ecological order (7, 20, 21).

#### IV. ECONOMIC POLICIES

##### A. Reintegration of economics and ecology

For a correct perspective on long-term sustainable development it is essential that economic policies and environmental policies should be viewed as counterparts, closely integrated and yet distinct.

Environmental policies should focus on the management and strengthening of natural ecosystems, while leaving the largest possible scope for economic activities within a specified context. Economic policies should focus on support and improvement of human life and welfare through the production of goods and services while limiting as far as possible negative effects on ecosystems.

Given the rapid deterioration of the natural environment and the unsatisfactory economic situation in most parts of the world, human activities must be reorganized in a way so that their over-all negative impact on ecosystems can be drastically reduced and kept at a minimal level, while production for meeting human needs still grows and improves.

Quantitative growth will be necessary in those regions of the world where the total economic surplus - even if its different composition and distribution were changed - is insufficient to cover the basic needs of the population. In the ECE and other high-income regions higher welfare levels may be reached at lower production levels through qualitative improvements and a reduction of waste ("qualitative growth") (5, 14, 22, 23, 24).

In principle, ecologically sustainable economic production could best be organized in carefully selected localities and regions in so-called "total production-consumption cycles", or "self-reliant economies" between ecosystems and human consumers, where there would be no extraneous inputs of mineral or other depletable resources and no output of by-products or waste that could not be fed back into the cycle at one place or another to make a positive contribution to production, to the ecosystem or to both. Until a few centuries ago, such "self-reliant economies" constituted the basis of subsistence for the

vast majority of the world population. It has been mainly the expansion of the "western" - or rather "northern" <sup>4/</sup> - style of production that has made previously self-supporting countries and regions dependent on energy subsidies in the form of fossil fuels and their chemical derivatives (i.e. fertilizers) as well as on food. To base modern economies on "total production-consumption cycles" would now be unrealistic in all but a few exceptional cases. The most that can be achieved in the foreseeable future is the establishment of "mixed economies" consisting of "eco-regions" which are largely self-supporting in energy and food from renewable sources, and strongly industrialized regions which will for a long time remain heavily dependent on energy and food subsidies. To improve the long-term sustainability of such mixed economies, the energy independence of "eco-regions" as well as their over-all economic importance should be increased, while the energy dependence and economic importance of the heavily industrialized regions should be lowered.

B. The Need for a regionalized policy approach <sup>5/</sup>

Since ecosystems are inherently territorial, economic policies which are supposed to be compatible with ecosystems must be tailored to the ecological characteristics of different regions. More specific arguments for a regionalized policy framework may be summarized as follows:

(a) Ecodevelopment policy in highly industrialized and densely populated regions must in many respects differ from that applied, for example, to agricultural or forestry regions which could develop essentially on the basis of renewable energy. In cases where metallurgical industry using fossil fuels produces large amounts of waste heat, it might be appropriate to use this heat rather than solar energy for generating electricity or space heating. In large cities it may be more efficient to use refuse for fuel than to compost it for agricultural use. In realistic and differentiated planning, the targets for energy self-sufficiency on the basis of renewable sources should be set much lower for urban regions than for sparsely populated rural regions.

(b) As the harnessing of widely dispersed renewable sources (sun, wind, biomass, hydropower, etc.) proceeds, the centralizing economic forces deriving from the uneven spatial distribution of coal, oil and gas deposits will weaken, and it will be easier for the regionalized policies fully to take into account the local and regional availability of the renewable sources.

(c) Regionalized ecological and energy-saving policies and the concomitant monitoring and controlling institutions are likely to be more effective than centralized ones: the people living in a specific region have an interest in high environmental quality in that region; they have also better knowledge of locally polluting industries, and of the efficiency of local agencies in protecting the environment, etc. If the people and institutions of a region are made collectively responsible for economizing in the use of fossil fuels,

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<sup>4/</sup> Highly capitalized and mechanized production as developed through west European capitalism has now become the predominant style of industrialization in the northern hemisphere. It is thus now better to speak of a "northern" style of production rather than a "western" style, to avoid the suggestion that its features would be technologically or ecologically any different in eastern European socialist countries, or for that matter in Japan or South Korea.

<sup>5/</sup> Unless otherwise indicated, the term "region" refers to areas or zones which are part of a national or continental territory (subnational or subcontinental regions).

monitoring and control of wastage will equally tend to improve. The psychological factor - people having the feeling that they can themselves do something about the environment and energy crisis in their own region - may well prove decisive for the success or failure of national or international ecodevelopment policies.

C. Criteria for establishing regions for economic and energy planning

For purposes of economic policy-making and implementation, it is recommended that the national territory should be divided into planning regions, the primary criterion being the estimated degree to which they could become self-supporting in energy on the basis of renewable resources.

In European countries, which are mostly densely populated, the classification below might be convenient for planning purposes:

Planning region	Socio-economic characteristics	Future population density per sq km (indicative)	Potential future renewable energy production as a percentage of total energy consumption
A	Very highly industrialized and urbanized regions around large cities	20	600
B	Industrialized regions with one or a few medium-sized cities in a rural setting	300-600	20-50
C	Agricultural/forestry regions with industrial and urban centres of limited size	150-300	50-80
D	Agricultural/forestry regions with very little urbanization and industrialization	80	150

Population, size and administrative position of planning regions

In the European setting, the A regions would be all-metropolitan regions, also covering other types of regions around cities of about a million inhabitants or more, suburbs included. The area of the largest metropolitan regions of 5 -10 million people might reach up to 4,000 sq. km, but would, on average, be about 2,000 sq. km.

The B regions might comprise a few medium-sized and smaller cities with a total population of up to about a million, but would cover an area larger than the average A region, e.g. 2,500 to 3,000 sq. km.

The C and D regions might vary greatly in size and population. Sparsely populated D regions might contain less than 10,000 people in an area as large as 5,000 sq. km. In contrast, relatively urbanized C regions might have up to a million in cities and the countryside, in an area of little more than 3,000 sq. km. The average C or D region might be some 4,000 sq. km in area.

The above classification serves only to formulate the basic principles of regionalization. In practice, it would of course be necessary to work with a far more refined regional classification and a more diversified set of ecological targets. It is essential, however, that the regions should be administratively manageable, preferably coinciding with existing or territorially adapted provinces or districts and provide a clear frame of reference so as to be identifiable by the public. The most important requirement is that they should be given sufficient powers to reach their ecodevelopment targets in a decentralized fashion.

Regionalization does not mean that higher policy-making levels (national or international) would become less important. The crucial need to lay down general norms and economic and environmental targets has already been pointed out. No international authority or central government will be in a position to implement ecodevelopment policies by central directives alone, however. Neither is it possible to count on private initiative alone to bring about economic activity in accordance with ecological requirements; nor are most local and municipal authorities equipped to do so. A strong intermediate policy-making and regulating level is necessary to match the magnitude of regional ecosystems and to control and steer development while guaranteeing the differentiation necessary to promote optimal interplay between economic activities and the ecological infrastructure. In most countries, this level coincides roughly with the provincial, county or district level of administration.

The relationship between these planning regions and the environmental policy regions (mentioned in the previous chapter) should of course be clearly defined. Within the planning regions it will generally be necessary to establish norms and delimit areas for various types of productive activity, recreation, settlements, etc., and to set criteria for over-all environmental quality. In many cases, environmental protection measures may have to be taken for an entire planning region, such as prohibiting the use of certain insecticides or the shooting of certain animals; and there will be other instances that might apply to all the planning regions of a nation, or even a group of nations (e.g. the European Economic Community (EEC); the Council for Mutual Economic Assistance (CMEA); and ECE member countries).

#### Realistic target-setting and monitoring of energy consumption

The aim of the over-all strategy should not be to achieve the technically highest possible degree of economic autarky for each region, not even for D regions. Though much energy might be saved on the transport of supplies and commodities, this would for many products cause great losses in production efficiency. Interregional and international trade must continue to play a role. For instance, regions which have become largely self-supporting on the basis of renewable energy may trade, among each other, large amounts of renewable energy and food items; they might exchange wood-pulp for rice, wheat for coconuts, hydroelectricity for biogas.

Because of the involved flow patterns of commodities for production and consumption in contemporary industrial and industrializing societies, it would complicate matters immensely if, for all planning regions, the import and export of commodities whose use value does not derive from their intrinsic energy content were to be recorded and entered into the regional energy account. The extent to which a region is self-supporting in manufactured goods, aluminium or cement, for instance, will have to be ignored. If a region pays for large industrial imports with exports of services, renewable energy or fossil fuels

from its own territory, it can be treated as self-supporting in energy, in so far as it could meet the needs for running its economy from its own renewable sources.

On this basis, the monitoring of regional energy subsidies can be limited to the following components:

(a) Total production of primary food commodities in the region minus total food needs (estimated per capita);

(b) The regional export-import balance of primary animal fodder produced;

(c) The regional export-import balance of primary bio-energy (wood, other non-fossil biomass fuels, biogas);

(d) The regional export-import balance of energy-carrying commodities derived from primary biomass and fossil sources of energy (animal fodders, fertilizers, alcohol, phenol, benzene, etc., which are used as bulk items for agricultural or industrial production);

(e) the regional export-import balance of electricity, whether from renewable or fossil sources (but treating as imports all electricity generated in the region by nuclear reactors);

(f) Total consumption of primary fossil energy carriers (from within or outside the region) counted as "imports".

By calculating the basic energy needs for each region - according to a specific per capita subsistence ratio of energy turnover in the sphere of consumption only (food, manufactured goods, housing, heating, recreation, etc.) - and by adding up the positive and negative balances of the six items specified above, it will be possible to establish the degree to which each region is self-supporting in energy on the basis of renewable energy sources and to use this indicator for comparison with the ultimate target, throughout the transitional period.

How high should these energy targets be set for ECE planning regions? The present contribution of renewable energy to total energy consumption in most European regions is less than 20 per cent, but recent studies indicate that, in the first decades after the year 2000, independence from fossil energy sources must reach 40 to 60 per cent if severe economic and/or environmental crises are to be avoided (1, 11, 12, 14, 15, 16, 22). For several countries, it has been calculated that such ratios of energy independence are economically and technically feasible without recourse to nuclear energy - in scenarios with a modest growth of GNP and the same investment rates as in past decades - while total per capita consumption of energy from fossil and renewable sources taken together should decrease by 20 to 40 per cent in comparison with present levels (9, 12, 16).

In any case, if the target of 40 to 60 per cent independence from fossil energy sources is to be reached, planning regions and energy policies must be designed so that the majority of people in Europe, about 50 years from now, could live and work in C and D regions with an average ratio of energy independence of well over 60 per cent. This is a formidable task indeed.

D. Policy concentration areas

To reach the targets of energy consumption and environmental protection the following economic and technological policies should be given high priority in all the planning regions:

(a) Conventional measures for saving energy and limiting the environmental impact of production and consumption, using existing technologies; some measures by which substantial savings and improvements would be possible without any drastic alterations of current procedures are:

(i) Better thermal insulation of working and living space;

(ii) Increased length of life of consumer durables, and technical modifications for easy repair and replacement of parts;

(iii) Partial substitution of vegetable proteins for animal proteins in the daily diet;

(iv) Energy saving in transport;

(v) Decreased use and recycling of paper and cardboard products, metal, glass and plastic disposables;

(vi) Diminishing losses and waste of food products in production, transport, storage and consumption.

b) Energy saving and environmental protection by better co-ordination of heat-producing industrial processes, electricity generation, refuse incineration and district heating; recycling of industrial waste and by-products, recycling of fresh water used in industrial processes and households; recycling of building materials.

(c) Introduction of newly developed energy-saving technologies in industrial processes, transport and households (household appliances, heating technology).

(d) Development and application of new technologies for harnessing renewable sources of energy (solar devices, wind engines, biomass digesters, biological fertility improvement of soils), and better protection of ecosystems against contamination. Some very important possibilities in this category are:

(i) Biotechnologies to make agriculture (largely) independent of chemical fertilizers and pesticides (biological soil recuperation, composting techniques and compost application, biological pest control) without significant losses in productivity;

(ii) Architectural designs allowing general application of solar heating and air-conditioning devices;

(iii) Alternative treatment of household effluents, water and refuse (sewage treatment, septic tanks, recovery of valuable materials).

As has been stressed before, determined efforts and the allocation of ample funds are necessary to ensure that in all these areas sufficient progress is made to complete the transition to alternative styles of production and consumption before all cheap fossil energy resources have been spent. If progress is too slow, the transition will demand tremendous sacrifices and

drastic cuts in living standards, which would cause such tensions that our national and international political systems might not be able to cope with them without severe risks of armed conflict.

In this connexion, attention should be drawn to the pernicious effect of the current arms race, which uses up stupendous amounts of scarce mineral resources, thus aggravating the very political and economic tensions in the world it is supposed to control. In the last decade, armament in the third world has been increasing at an alarming rate, particularly in the richly endowed countries with strategically important mineral supplies.

An important contribution to disarmament and détente could be made by stepping up research on alternative defence concepts, with less emphasis on resource-wasting military hardware and on the premise that only a large "first-strike capacity" can provide a shield behind which nations can feel secure. Implementation of these alternative strategic concepts will become increasingly feasible, as the reorganization of economic production proceeds along the lines of regional decentralization and higher degrees of regional self-sufficiency in energy and food, as advocated in this study.

#### E. Emphasis on prospective "eco-regions"

For many years to come the best and most rapid economic returns can probably be expected from techniques and measures to economize on resources, especially energy, rather than from attempts to meet ever-growing demands with ever-growing investment (3, 12, 16). To save investment will be attractive especially in the A and B regions, where low energy prices in past decades have led to the unprecedented waste of mineral resources.

From a long-term strategic point of view, it is equally, if not more urgent to concentrate research and development efforts (economic, technological, biological, institutional and sociological) on policies for transforming the C and D regions into new sustainable units with a minimum of fossil energy subsidy. A viable economic future for the ECE countries will depend on their success in developing alternative energy production systems, intensive forms of biological agriculture and sophisticated types of low-energy production, together with low-energy styles of living and recreation. The best testing grounds for these new styles of production and consumption are not the large metropolitan conurbations, nor any other highly industrialized areas in which the present economic order has evolved, but those rural areas which, for various reasons, have been lagging behind in modern industrialization and are therefore in a position to enjoy certain "advantages of backwardness" - the C and D regions of the classification used in this study. Since these regions will have the potential to become largely self-supporting in renewable energy, they could be termed "prospective eco-regions".

The growth in importance of the C and D regions in quantitative terms (creation of new employment, population growth through net immigration from regions A and B) may gradually decongest the now over-industrialized regions and create possibilities for basic restructuring of the latter at a later stage.

#### F. First practical steps to prepare for the transition

Without going into detail, it would seem possible to indicate some immediate measures that could be taken to curb the strong, almost universal bias of financial, commercial and institutional arrangements towards increased resource use in production and consumption:

(a) In agriculture, present policies should be discontinued to the extent that they aim at further increases in scale and stimulate the energy intensity of production, thereby causing a decline in employment by another 25 to 40 per cent in the coming 10 to 15 years, according to official estimates for some European countries (5, 7, 25);

(b) Conditions should be created to enable small and medium-sized enterprises in manufacturing and trade at least to maintain their present share of the market. All discrimination in the form of direct or indirect financial and institutional support for the most capital-intensive and energy-intensive industrial sectors and enterprises should be removed (1, 11, 14, 16, 24).

Such measures might halt the social and economic decline of rural areas and small urban centres, where the scale of production is relatively modest and a chance would exist for ecocodevelopment initiatives to take root. It might also be possible to check the constant escalation in demands on public funds to keep the large conurbations in acceptable physical, economic and social condition, if efforts were made to stabilize their population and infrastructural requirements at present levels:

(a) Discounts on the large-scale use of public utilities (gas, electricity, piped water, transport) should be abolished;

(b) Financial and institutional support by the government for local and national initiatives for the protection of the environment and promotion of ecologically more appropriate lifestyles should be enhanced;

(c) The still very strong bias of research funding towards the further development of high-power technologies which, until recently, appeared very promising (e.g. in metallurgy, petro-chemistry and the nuclear industry) should be shifted towards areas where knowledge may still be elementary but where economic prospects are better, as in the generation and application of renewable energy and new technologies for energy saving (1, 3, 12, 16).

#### G. Experimental micro-units as building blocks of the future

Before restructuring the regions, it will be necessary to gather some local experience. In rural areas, experiments could be carried out with new forms of integrating low-energy agriculture, horticulture, animal husbandry and forestry with settlement structures which, in turn, are closely related to experimental forms of small-scale, low-energy manufacturing and other industries. In cities, similar experiments should be undertaken at a district and neighbourhood level to establish how far local diversification and reintegration of functions (work, economic and social services, recreation, traditional residential functions) could contribute to a decrease in energy, transport and other infrastructural needs, while improving the over-all quality of life. On the basis of experience gained with these "nuclei" of a new ecological order, the most successful could be replicated, enlarged or, with appropriate modifications, applied to townships and subsequently to entire planning regions.

#### H. The phase of transition: an economic and financial challenge

It is obvious that experimenting with ecocodevelopment units, increasing their numbers and eventually transforming entire regions on the basis of the most successful alternative production technologies, energy generation technologies, settlement patterns, methods of waste treatment, etc., will require significant capital outlays.



At the same time, the contraction of the now most profitable but energy-intensive industrial sectors as a result of rapidly rising energy prices will undoubtedly cause problems of regional unemployment and other symptoms of recession. The substantial expenditure recommended to create new employment and income in less urbanized or less industrialized regions may partly solve these problems. The economic benefits of this investment, though potentially very high, will only make themselves felt in the long run, however. To steer away from steep rates of inflation and other serious symptoms of economic malaise during the period of transition towards a "new ecological order" will demand great foresight, imagination and creativity from economic and financial experts and policy-makers.

The challenge is of the same order of magnitude as that faced during times of war. In this case, the war to be waged is one against economic wastage and environmental destruction, and the long-term prospects of economic gains are incomparably better. Setting modern economies on a new course will be impossible without far-reaching government planning and intervention to modify the free play of economic forces. Apart from measures to make privately owned funds for investment flow in the most desirable direction, government participation in productive activity, especially in the ecodevelopment regions, will be an important economic instrument (3, 17, 18, 22).

1. Removal of international obstacles to national eco-development policies: co-operation between industrialized countries (17, 18, 19, 22)

It is obvious that countries determined to restructure their economies in line with sustainable patterns of development should seek mutual support and co-operate, wherever possible, to create international conditions favourable to economic restructuring. However, it is no secret that in both major economic systems of today, the capitalist economic order and the order governing the relations between socialist countries, the forces opposing national and international efforts aimed at an "economic restructuring" are very strong and essentially similar. In many ways, countries in the east and the west are mutually bound by long-standing institutional arrangements (especially in respect of international trade and capital movements), diverse economic agreements of a bilateral or multilateral nature, and in some cases by treaties such as those underlying the EEC and the CMEA which greatly limit national room for manoeuvre.

This is not an argument against international economic treaties and agreements. They usually help to ease certain economic tensions and benefit the parties involved. But these agreements and treaties were concluded on the basis of economic perceptions, now being recognized as embedded in short-sighted nineteenth-century optimism about mankind's ability to conquer nature and reap unlimited benefits from its exploitation, with a quick return on man-made capital as the prime mover, and it may now be time to update these perceptions and modify our international economic relations accordingly.

International treaties and agreements should first of all be amended so that they no longer penalize countries experimenting with alternative patterns of industrialization and energy generation, or make such experiments impossible. In the longer run, efforts should be made to conclude international agreements which actively promote energy saving and environmentally sound styles of production and consumption instead of, at best, tolerating them as odd phenomena for which some measure of protection is temporarily allowed.

As regards international co-operation in the field of science and technology, it would seem to be time to reconsider earlier priorities. Several international consortiums in the field of nuclear research are supplied with yearly budgets of many millions of dollars. 8/ Internationally, nuclear research funds should be drastically diminished in favour of research and development funds for more promising sources of energy.

J. Ecocodevelopment and the changing relations between the ECE region and the third world

Comparative advantages for third world countries

Though the indigenous economies of the third world, which are based on ecocodevelopment, have been seriously damaged by the introduction of Western-type agriculture and industrialization, much has remained intact; the transition to a modern, ecosystem-based economy will therefore require far less radical changes than in the industrial countries. The transition will be easier because of:

(a) Lower rates of urbanization; where large cities have emerged, they offer a most miserable existence to the majority of their inhabitants;

(b) High potential for labour-intensive forms of agriculture and low-energy rural industrialization, to be developed on the basis of traditional skills and technology which will progressively be surpassed;

(c) High potential for energy generation on the basis of renewable resources, and low energy demands for space heating because of climatic conditions.

Lack of capital, insufficient expertise and skills for development of new appropriate techniques, unfavourable social conditions and the psychosocial drawback of feeling "under-developed" will of course continue to pose serious problems. But these will tend to be small compared to the difficulties that could arise if current desperate attempts were to be continued and bring about a transition to even more alien styles of production - which are already recognized to have no future.

Nature-based growth

It makes no great difference how the dilemma is expressed: growth of production of food and other essential commodities for basic subsistence in third world countries will remain a primary development goal for many decades to come - which is the same as saying that it is impossible for most third world countries to base such production on Northern-style energy-intensive technologies in view of the large amounts of fossil fuels required by these technologies. Moreover, export-led economic growth, a carry-over from a colonial past, has so far steeply increased indebtedness and widened economic dependence, while further impoverishing the low-income groups. These effects will only become more acute as prices of energy and imported manufactured goods from industrial countries increase and cause the terms of trade of agriculture-based economies to deteriorate.

The effects of export-led growth on ecosystems have generally been disastrous: plantations drove local food producers into marginal lands, which rapidly

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8/ A recent example of lavish funding of international nuclear research from public funds is the International Nuclear Fuel Cycle Evaluation (INFCE). This intergovernmental project received a budget of \$50-100 million in pledged contributions from 40 countries at its founding conference in 1977.

deteriorated as a result of excessive grazing and cultivation; forests were cleared to obtain new land for farming, even on hillsides too steep to hold the soil; various forms of erosion and desertification have seriously diminished the productivity of the land in many regions (5, 6, 8, 19).

For most third world countries it is not yet too late to stop these trends by reserving the best agricultural land for domestic food production and restoring the productivity of poorer soils by reforestation and restrictions on cultivation and grazing. If, in addition, dispersed forms of renewable energy generation and application were gradually substituted for fossil fuels, especially where these have to be imported, this would greatly help such countries to regain the economic self-sufficiency necessary for long-term sustainable development. Economic strategies based on the optimal exploitation of all domestic natural resources, primarily to satisfy domestic needs instead of foreign greed, could free the third world countries from the neo-colonial stranglehold of the rich and powerful or, in less ideological terms, bring about the necessary, though always partial and selective, uncoupling of their economies from those of the highly industrialized North.

#### Development and foreign investment (18, 19, 20)

Development aid and co-operation programmes should constantly be reviewed in the light of new notions of desirable development such as those discussed in the preceding paragraphs. Third world countries in particular have an immense need of new technologies, techniques and skills better adapted to their geographical, ecological and social environment, and capable of promoting higher levels of welfare for the poor and unemployed instead of maximizing the profits of domestic or foreign investors. The research capacity and technical know-how of industrial countries could be of great assistance in developing such new techniques, if the prejudices of the past were overcome.

In this context, however, the activities of private corporations, especially transnational firms, and their socially or State-owned counterparts from the east European industrialized States, are of greater impact than aid and co-operation programmes financed by governments.

Governments of industrialized countries should combine efforts with governments of third world countries to orient these activities so that they no longer work against the long-term economic and ecological interests of the countries where they are undertaken. In fact, such control could only be effectively established by global international agreements. The industrialized countries should refrain from thwarting attempts to reach such agreements in such forums as UNCTAD.

#### Trade patterns between industrialized and third world countries (18, 22, 23)

The establishment of a new ecological order as proposed in this study might initially lead to a decline in the total volume of world trade:

- (a) Trade in oil will diminish in proportion to the depletion of oil deposits;
- (b) Bulk transport, especially of food items and minerals, is likely to become so expensive as to have a negative impact on world trade;
- (c) Rising energy prices will push up the prices of metallurgical, chemical and other commodities so that most countries will have to economize on imports and shift as far as possible to domestic low-energy substitutes produced using non-fossil energy;

(d) The tendency towards uncoupling the third world economies from those of the highly industrialized world will affect world trade.

Also in this context, commonly held beliefs will have to be revised: world trade and the international division of labour must not necessarily increase in order to bring greater economic prosperity to the world as a whole, and to third world countries in particular. Surely in some sectors trade may still expand for mutual benefit, e.g. sales of low-priced manufactured goods from third world countries on the consumer markets of industrialized countries. There are indications, however, that the over-all volume of such international trade has in the past led to a situation where national economies suffer from unduly high economic dependence or interdependence that has profited only domestic and foreign business circles and the classes to which they belong.

The attempts by UNCTAD and the Group of 77 to establish a more equitable new economic order deserve more support from industrialized countries. Several of the proposals in the Plan of Action for the Establishment of a New International Economic Order, in particular those concerning capital flows, transfer of technology and the orientation of development aid towards basic needs (placing more emphasis on domestic agriculture and food self-sufficiency) are valuable and indispensable elements for creating sustainable development patterns. These proposals have to be broadened, however, in order to ensure that technological innovation and investment will promote appropriate patterns of agriculture, industry and consumption and that the economies of the third world countries evolve in a way compatible with ecological conditions (22).

#### V. ECODEVELOPMENT AND LIFESTYLES: SOME FINAL REMARKS

Major changes in development patterns are unthinkable without changes in lifestyles.

In the sphere of consumption, hardware will be more expensive and longer-lasting, software more often of local and regional origin, foodstuffs in general to a greater extent produced locally and in accordance with the seasons than is now the case (14, 22). For most commodities production will be rather decentralized, smaller in scale, more labour-intensive and intended for regional and local markets. The rigid vertical organization of distribution and trade should be relaxed in favour of short and strong horizontal circuits, thus decreasing the need for swelling employment in intermediary functions, advertising, sales promotion and actual selling. This will allow relatively more people to be engaged in direct production (5, 7, 23, 24).

The decision-making structures will be decentralized, but within regulatory frameworks of over-all planning and economic steering which are far more developed than is now the case in west European countries. There will be more stringent criteria governing the siting and environmental impact of productive activities, as well as the integration and diversification of local productive activities.

For most people life need not be more austere: in some fields there will be more constraints and scarcities, in others more freedom of choice and greater fulfilment of material needs and comfort. Local, regional and national characteristics will be strengthened, and work in most fields will tend to be more interesting and satisfying; unemployment will fall. In short, a brake will be put on the generally alienating tendencies in the organization of production, housing and social life (17, 22, 24).

There is probably no reason to fear that people's attitudes will be a major obstacle to the development of new lifestyles (which, incidentally, may resemble those of the past in some respects, but in others will have to be very different and in any case far more flexible). Research findings confirm the everyday experience that people are satisfied with their life as long as they perceive that their work and initiatives are appreciated in terms of social relationships and material rewards; that the future is sufficiently secure and attractive for themselves and their children; and that they are not asked to carry an unduly large burden for the public good (i.e. that sacrifices in respect of work, free time or living conditions are equitably shared).

The public must be made aware not only of the need, but also of the scope, for reforming the economy along ecodevelopment lines. The teaching of economics and geography in colleges and universities should include basic environmental and ecological notions as should all forms of general education for children and adults. The same would apply to mass communication media. This will be a major factor for creating the necessary public and political will for ecodevelopment reforms.

Finally, it is of the utmost importance that educators, political leaders and governments should stimulate people to believe in themselves, their own communities, their own skills and the land they inhabit. The resources of human communities and the ecosystems of which they are part are more than sufficient to provide for all human needs, if developed and husbanded with imagination and caution, in a true spirit of self-reliance.

#### RERERENCES

1. Colombo, U. and Bernardini, O. "A low energy growth 2030 scenario for the Europe of the nine" (unpublished draft, prepared for the EEC Panel on Low Energy Growth, 1979).
2. Commoner, B. The closing circle (New York, 1971).
3. Commoner, B. The poverty of power (New York, 1976).
4. Curray-Lindahl, K. Conservation for survival (London, 1972).
5. Dasmann, R.F., Milton, J.P. and Freeman, P.H. Ecological Principles for Economic Development (London, 1973).
6. Eckholm, E.P. Losing ground (New York, 1976).
7. Hekstra, G.P. (ed.) "Ecological aspects of economic development planning", Background study by a group of experts from the Netherlands for the ECE seminar, Rotterdam, 7-11 April 1975 (ENV/SEM2/R5).
8. I.U.C.N.: A world conservation strategy (second draft) (Morges, 1978).
9. Johansson, T.B. and Steen, P. Solar Sweden (Stockholm, 1978).
10. Leontief, W. et. al. The future of the world economy (New York, 1977).
11. Lönnroth, M., Steen, P. and Johansson, T.B. Energy in Transition (Stockholm, 1977).
12. Lovins, A. Soft energy paths (Penguin, Harmondsworth, 1977).

13. Meadows, D.H., Meadows, D.L. et al. The limits to Growth (New York, 1972).
14. Mesarovic, M., Pestel, E. Mankind at the turning point (New York, 1974).
15. Odum, H.T. Environment, power and society (London, 1971).
16. Potma, T. Energiebeleid met minder risico (Amsterdam, 1977).
17. United Nations Final Report on United Nations Conference on Human Settlements (Vancouver 1978).
18. UNEP: The Cocoyoc Declaration (Mexico, 1974).
19. UNEP: The state of the environment: selected topics - 1979 (Nairobi 1979).
20. Van Raay, H.G.T. "The need for environmental assessment", background paper written on the request of the Netherlands Ministry of foreign Affairs and the International Institute for Environment and Development in London (The Hague) 1978.
21. Recommendations on Ecology, Aid and Development. Dutch National Advisory Council for Development Co-operation (The Hague, 1978).
22. RIO "Reshaping the International Order": a report to the Club of Rome. New American Library, 1977.
23. Schiray, M. Tiers monde et monde industrialisé (Paris, 1978).
24. Schumacher, E. Small is beautiful (London, 1973).
25. Van der Weyden, W.J., ter Keurs, W.J. and van der Zande, A.M.: "Nature conservation and agricultural policy in the Netherlands", Ecologist Quarterly, winter 1978.

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WITHIN OUR OWN WALLS: NEW TECHNOLOGY AND  
ITS IMPACT ON LIFESTYLE\*

Report transmitted by the Government of Sweden

Prepared by Ms. T. CRONBERG and Ms. I.-L. SANGREGORIO

INTRODUCTION

Studies of the future are mostly concerned with the macro-perspective. The development of society as a whole or of its various sectors is seldom analysed in terms of its impact on the individual and his living conditions. Even less attention is given to prediction of changes in ways of life and means of influencing them in order to attain certain goals, e.g. an adjustment to a new international economic order. In order to examine possibilities of integrating this dimension into future-oriented studies, the Secretariat for Future Studies in Sweden has initiated research focusing on the concept of "lifestyle" in its various material aspects. One of these aspects is "technological development". This study attempts to analyse the role of technological change in changes in lifestyles, asking whether specific social goals can be attained by steering technological development.

To avoid making the discussion too general, the study is confined to the residential environment as an important framework for "lifestyle". The area of investigation was further restricted by focusing on certain major functions performed in this environment, such as washing clothes, watching television and buying and storing food.

WHAT KIND OF TECHNOLOGICAL DEVELOPMENT?

In official documents, technological development is defined as a process leading to new techniques and new products. But nothing is said about the purpose or the consequences of alternative courses or possibilities of steering technological development.

Broadly there are two conflicting views of the relationship between technological development and the development of society as a whole. On the one hand, technological development is considered an independent force; on the other, as subordinate to the development of society. However, most would probably admit that there are possibilities of influencing technological development. This brings us to the question: how and by whom should it be steered?

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\*The present paper, though conceived in a somewhat different context from that of the seminar, has been included in the documentation because of its general interest in the context of policy design for purposeful social change.

Analytical frameworks for study of this question can be constructed. One approach would be to assume that business enterprises steer development, whereas the needs of households are reflected in their behaviour. By deciding whether to buy or not to buy, the consumer is assumed to influence development indirectly. Society can refrain from intervening, attempt to eliminate or offset adverse side effects, or play an active role by creating the necessary infrastructure. Another approach would be to postulate that households identify their real needs, which are then expressed as collective goals at the national level and act as steering instruments for the technological development that takes place at the level of business enterprises. One point of pivotal importance in this model is the identification of these needs. Many attempts have been made to establish a universal catalogue of human needs. The best known are Maslow's inventory of priority needs and the United Nations list of basic needs. These two systems have one thing in common. They divide the needs into two main groups: physiological (or material) and others (immaterial).

In recent years the discussion of needs has mostly been related to problems of ensuring quality of life and welfare. The Swedish Commission of Low-income Groups used a list of resources available to man. In a comparative study on well-being in the Nordic countries, needs were divided into three categories: (a) living standards (having); (b) social relationships (loving); and (c) ways of self-fulfilment (being). These categories of needs were in turn divided into measurable sub-aspects. The basic tenet of the study was that needs develop and change as changes occur in society. Consequently, universal lists of needs can be compiled. In the present analysis the above method of classifying needs has been adopted.

#### WASHING CLOTHES - THE HEAVIEST JOB IN THE HOME

There is no doubt that technological change has helped to lighten the heavy, time-consuming and essential task of washing clothes. The interesting point to study is, therefore, not the technical development in itself but the use made of the facilities offered; in other words, how the spread of the technical innovations - washing machines, spin dryers, etc. - has been organized.

#### Society's scale of values

Reading the many reports of committees which have studied the question of washing over the years gives a good picture of the options desirable from the societal point of view at various times. Few areas have been studied so thoroughly. This is possibly due to the fact that this was an area where the problem was obvious and technical means for solving it existed.

As far back as 1941, the Swedish Population Commission found that "theoretically speaking, it would be logical from an economic and technical point of view to relieve households of all heavy washing work. However, there are both subjective and objective reasons why this is not happening". The final report of the Commission also wavers between the wish to organize housework more efficiently and the fear of depriving homes and housewives of their raison d'être:

"The present situation where practically every household does its own washing by hand is so obviously inefficient that the Population Commission has dealt with the question in a separate report on how laundry could be washed collectively, making full use of available mechanical equipment. In the view of the Commission central laundries could be established to permit housewives either to do their own washing, with the help of laundry personnel, or to leave their washing to the laundry. Which methods will prevail in the future depends on many factors, such as the extent to which



married women join the labour force, actual reductions in laundry costs resulting from improvements in efficiency through fully industrialized operations, etc. It is essential that the economic and other aspects of various types of laundry installations should be continuously analysed for the benefit of new residential construction."

Eight years later, a committee studying collective housing reported that nearly 70 per cent of all washing was still done by hand. In the view of the Committee the reason was that the collective laundries had been designed to suit traditional forms of laundering, in spite of the fact that more labour-saving methods were available:

"The system of sparsely located central laundries often leads people to defer their washing for long periods. Clothes and household linen are heavily soiled, and the dirt gets ingrained. Very thorough and laborious washing becomes necessary. The equipment installed in most central laundries has to a certain extent been adapted to these traditional habits of infrequent and large washes. Households have to wait a long time for their turn, and the washing machines, spin dryers, etc. are designed for large amounts of washing."

Experience shows that the collective systems did not work satisfactorily. This was not because the laundries were collective but because they were not geared to the needs of the households and therefore could not solve their problems. The committee recommended the setting up of smaller laundries which would be able to cope with all laundering, even the weekly wash: "if households are to be induced to switch to a laundry system of this kind, access must be provided to machinery suitable for smaller, more frequent washes, and these machines must be made available for use with convenient frequency". In the opinion of the committee, it should be possible "to combine the flexibility of washing at home, which can cope with all types of washing, with the economic benefits of the collective laundry, e.g. the spreading of capital costs over a number of households".

The committee concluded that provision should be made for joint use of easily accessible, effective, medium-sized washing machines, and its optimistic forecast was that, with the help of such machinery, there would be a rapid improvement in efficiency in household washing. At the same time, the committee noted that "in this as in other types of housework" the current trend pointed in the opposite direction: "modern home washing machines could, if the purchasing power of households continues to increase, make it possible to retain washing as part of household work to a much greater extent than previously envisaged".

Reporting in 1973, a committee on services observed that:

"When setting the situation today against the social goal of reducing the amount of heavy work in households, we find that the new washing machines, the new washing methods and to a certain extent the new textiles have brought alleviation but have not effectively reduced the workload. Most collective laundry systems available today do not seem to meet the efficiency requirements of the households.

"In the absence of clear social goals and standards for collective laundries, the housing corporations have chosen equipment and designed premises in accordance with their own ideas of the consumer's wishes. Despite their good intentions, the consumers have not been happy with the collective laundries. Studies in this field show that there are several reasons for this reaction. The central laundries are not used because they

are distant from the dwellings; families have to wait their turn and can only use the laundry for a limited time booked in advance. Poor equipment also affects the extent to which these laundries are used. Consequently, households either get their own washing machine or do their washing by hand in the home."

After the war, sales of small home washing machines rose rapidly. At the beginning of the 1950s, it was estimated that 12 per cent of household washing was done at home in small washing machines, while 8 per cent was done in laundries installed in blocks of flats and only 2 per cent in central self-service laundries. Seventy per cent of household washing was still carried out by hand.

In 1955, the Committee on Collective Housing estimated that only 12 per cent of the population had access to mechanized laundries in blocks of flats. In 1974, it found that the figure had increased to 88.2 per cent. The degree of saturation, i.e. the ratio between the number of machines and the number of households, was 41 per cent in 1969 and 47 per cent in 1976. The reason for increasing numbers of home washing machines could hardly be economic advantage. Estimates by the National Association of Tenants' Savings and Building Societies in 1969 and by the Gothenburg City Housing Corporation in 1968 show that washing at home in the family's own washing machine is the most expensive method, with costs of around SKr 1.30 per kilogram. Costs in a laundry in a block of flats total about SKr 0.78 per kilo (for 25 dwelling units), and SKr 0.74 (for 40 dwelling units), while costs in a central laundry are SKr 0.86 (for 25 dwelling units), SKr 0.78 (for 105 dwelling units) and SKr. 0.71 (for 210 dwelling units). It is interesting to note that, according to the Association of Tenants' Savings and Building Societies, the cheapest and best alternative was a laundry in a block of flats (SKr 0.68 per kilo of washing).

While it is difficult to express the trends in costs in clear-cut figures, it is even more difficult to quantify the changes in time required for washing. Do people spend more time washing today than they did 10, 20 or 30 years ago? This is a difficult question to answer. In the United States Vanek has made comparisons of time spent on household work since the 1920s, based on regular time use studies carried out by the United States Bureau of Home Economics using uniform guidelines. It was found that no part of household work had benefited more from technological development than washing but that the time it took up had nonetheless increased. People have more clothes and wash them more often. A statistical comparison of the number of hours per week spent on washing by women not working outside the home, at the time of introduction of various technological innovations, showed that none of them had radically reduced time consumption. Developments might roughly be characterized as follows: more sophisticated equipment and less need for mangling, ironing, etc. have led to a reduction in time required whereas more frequent washes have had the opposite effect.

The impact of technological change on washing as a component of lifestyle cannot be understood only by measuring time use; it is equally important to examine whose time is being spent. After having been a task mainly of women in the lower classes, washing is now performed by women in all social classes and, to a growing extent, by men in the younger age groups. Possibly, the small-scale inefficiency which has become characteristic of washing as a result of the diminishing size of households and more frequent washes, can be justified by reference to the postulate that democracy is promoted by making everyone wash his own dirty linen.

In this context it may also be of interest to comment on the social attitudes predominating at various stages of development. When the Association of Tenants' Savings and Building Societies introduced mechanized laundries in the 1920s, most tenants objected, arguing that their clothes and linen might be damaged by the machines. The Association responded with an information campaign and, some decades later, when the Institute for Consumer Affairs carried out an inquiry into washing problems among 1,000 housewives, the overwhelming majority (85 per cent) declared that they preferred a common laundry in the block of flats to the alternative of having a central laundry for the whole residential area or a washing machine in every dwelling unit". A later inquiry in 1958-1963 found that, in blocks of flats centrally equipped with automatic washing machines, only 50 per cent of the housewives were satisfied with the equipment, whereas 30 per cent considered it to be poor or very poor.

#### Some conclusions

Societal values, as expressed in reactions to the inquiries quoted, have consistently been in favour of collective laundries. Nevertheless, the actual trend has been towards increased private ownership of mechanical aids. This can be interpreted in at least two ways: as a proof that, in the end, the needs of individuals steer development in spite of resistance on the part of society; or as an indication that individuals have simply adapted themselves to the only sensible alternative available at a certain point of time.

We are inclined to accept the latter explanation. It seems likely that the individual would not need or want washing equipment of his own if other, cheaper and trouble-free centralized alternatives were available. The number of privately owned washing machines per dwelling unit in blocks of flats seems to vary greatly depending on the convenience of the common laundry facilities. It has been reported, for example, that in blocks of flats with common washing facilities an average of 10 per cent of households had bought their own washing machines, whereas the proportion rose to 30 per cent for households which had no access to a laundry in the blocks of flats but only to a central self-service laundry.

There are several factors contributing to the trend towards private rather than collective solutions of the household washing problem:

(a) The financial circumstances of households have improved at the same time as their members have become increasingly pressed for time. Being able to do the washing at home (while doing other things, such as looking after children, watching television, etc.) has been given such a high rating as to justify the increased costs of having individual equipment.

(b) Collective facilities have not been sufficiently geared to the needs of the households. The drawbacks of the collective solutions have included: laundries not open when they were needed; complicated booking systems; too many households per laundry; long distances between laundries and dwellings.

(c) Technical developments in other fields, such as the construction of dwellings with no basements, have led in many residential areas to the replacement of washing facilities in individual buildings by large central laundries far distant from the dwellings.

(d) Competition in the household equipment business and improvements in efficiency in production processes have lowered the relative prices of household capital goods, thus making them accessible to more and more households.

In sum, the result of these contradictory tendencies in some new residential areas has been a duplication of washing equipment: households have their own equipment as well as access to collective equipment. Of course, this has had a stimulating effect on trade, but the real question is the impact of this development on broader aspects of lifestyles. For instance, how much energy and resources and how much dwelling space could have been saved if appropriate collective laundry facilities had been provided from the beginning, making it unnecessary for each household to buy its own washing machine?

#### TELEVISION - "A WINDOW ON THE WORLD" OR "COMMUNAL ISOLATION"?

Television differs in many ways from other technological innovations which have made their way into our homes, such as the washing machine, the refrigerator and the freezer. Television is not directly useful, and it is difficult to know whether it appeared in response to a need. Its spread was not the result of a "spontaneous" process of development, but required specific decisions on infrastructure investment by public authorities. In addition, possession of a television set is - at least in principle - purely optional, whereas costs for washing and refrigerating facilities are often included in the rent. Nevertheless, 95 per cent of the population in Sweden have access to television in their homes.

The primary interest here is the influence that television has had and still has on lifestyles by its very presence in the home. An attempt has been made to disregard programme content, although in practice it is impossible to keep the medium and the message entirely separate.

#### Society's scale of values

In the case of television, society had every opportunity to steer developments. It is interesting, therefore, to review the hopes and fears associated with the new medium and the ways in which societal values were reflected in official committee reports and government bills. The 1951 Television Commission stated in its report: "The advent of television has introduced a completely new element into the life of the nation and upset previously well-established conditions and habits".

With the wisdom of hindsight it is intriguing to read the terms of reference of the Commission and find that the Ministry of Transport and Communications was almost exclusively concerned about the financial aspects of the problem. On the question of the rate of expansion, it was argued:

"On the one hand, a comparatively slow pace of development may be of economic advantage, as experience gained can be gradually incorporated in the continuing expansion process. On the other hand, it may be economically essential, assuming that the problems of programme transmission can be solved at reasonable cost, to set up a number of transmitters in other densely populated areas of the country as soon as possible, so that programme costs can be spread over the largest possible number of viewers."

Although economic considerations were given a prominent place in both the terms of reference and the report of the Commission, the only costs really discussed were costs to the Treasury. In fact, the costs involved in expanding the distribution network and the production of programmes were negligible in comparison to the costs borne by consumers in purchasing and maintaining television sets and aerials. According to Schein the investment made by Swedish consumers was probably about ten times greater than that of the State. But the

true impact on the national economy of the introduction of television, and later of colour television, was dealt with only in a cursory way, if at all, in the reports preceding the decision on policy.

The 1951 Television Commission wrote: "Economic problems are the alpha and omega of the worries of television. However, it is vital not to become exclusively concerned with these problems but rather to consider television as a new and significant factor in the technological revolution which is rapidly changing the foundations of contemporary civilization". Accordingly, the Commission also discussed possible social consequences. For example, it placed great hope in the ability of television to increase contacts between people: "To break down the sense of isolation, to create the basic conditions for people to take an active part in the affairs of society, to make it easier for people to exchange ideas and to bring people from different environments and occupations together are important tasks indeed".

Only in the section of the report dealing with television and popular movements was there any mention of risks of development in the opposite direction, i.e. that meeting places of organizations might be deserted as a result of television invading the home:

"Generally speaking, it would seem reasonable to assume that there will always be need for a public place where people can meet face to face. By taking advantage of facilities for projecting television programmes on large screens, organizers of meetings may actually find an ally in television, when it comes to arranging attractive programmes for their meetings. They will be able not only to use controversial and educational programmes, but also to provide pure entertainment."

This was the only sign in the report that television did not automatically belong to the sphere of the home. In the chapter entitled "The technical principles and pre-conditions of television," a brief survey was made of different types of receiver, both direct picture receivers and projection receivers; the latter type would be more suitable for group viewing, the picture being enlarged and projected on a separate screen. In Sweden, however, there seems to have been no discussion of anything else than private television sets for each home. Once in the home, television would not only "help to solve leisure problems for many elderly and sick people" but also "bring into the home new and important values". "Experiencing and learning things together is a good way of strengthening family ties," it was believed. It was even hoped that antisocial attitudes and alcoholism could be prevented by gathering the members of the family around the television set.

Even at this time, British and United States studies quoted by the Commission showed that once the novelty had passed, television spread mainly among the lower income groups. The Commission assumed that the interest in television, which is a cheap form of entertainment once the set has been bought, is directly correlated with the living conditions of the family and various opportunities for using spare time. Yet after quoting other foreign surveys of children's viewing habits, the Commission stated: "To remedy these disadvantages will have to be the responsibility of parents and, to some extent, of the schools".

### The role of industry

The introduction of both black and white and colour television was carried out in full agreement between government and industry. From the very outset, representatives of the firm of L.M. Ericsson were included in the Television

Research Board which was set up in 1947 to prepare for the introduction of television in Sweden. Ericsson made equipment available and bore half of the costs. Later on, a group of radio manufacturers affiliated to the Swedish Association of Radio Suppliers (including Swedish Philips and Luxor) joined the Board. At that time the Swedish radio industry had extensive idle capacity and, consequently, was eager to conquer the new market which would result from the introduction of regular television broadcasting. But at the same time the industry was apprehensive about foreign competition and foresaw that tubes and some other components would be imported.

In 1968, discussing a Government bill on the introduction of colour television, the Minister of Education and Cultural Affairs emphasized that account would be taken of the Swedish radio industry's need to "adapt its production planning to the demand situation that was likely to arise as a result of regular colour television programmes".

As when black and white television had been introduced, detailed assessments were made of the very modest financial implications for the State (SKr 7<sup>^</sup>million for the National Telecommunications Administration and about SKr 30<sup>^</sup>million for the Swedish Broadcasting Corporation, spread over a six-year period), whereas the implications for the national economy were treated with extreme vagueness. It was assumed that television sets would be gradually replaced, not only because of the state of colour transmissions but also because of the introduction of a second channel. Total sales of television sets between 1967/68 and 1974/75 were estimated at SKr 4,500 - 5,000 million, but on fairly vague grounds the additional expenditure expected to follow from the introduction of colour television was estimated at not more than SKr 1,500 - 2,000 million.

#### The spread of television and its impact on household time and money budgets

Regular television transmission was introduced by the Swedish Broadcasting Corporation in September 1956. Television spread far more rapidly than had been envisaged. The 1951 Television Commission had estimated that, after 14 years, the number of licences in Sweden would reach 925,000; this figure had already been passed after 4 years. The 1956 Television Commission had expected 72,000 licences to have been bought by mid-1959; the actual number was 407,000. Although costs for a television set were much higher than for a radio, television viewing spread - quite contrary to expectations - far more quickly than radio listening, and the rapid rise in the number of television licences made it possible to expand the television network more quickly than was originally planned. On 30 June 1962, 14 stations ought to have been functioning according to estimates; there were in fact 47, the number of television licences was 1,500,000 as compared with the 245,000 forecast by the Commission.

By the autumn of 1958, 15 per cent of the population had access to television at home. Four years later the figure had risen to 75 per cent. Today 95 per cent of the population is equipped with television sets, 50 per cent of them colour sets. At the end of 1976 there were nearly 3 million television licence holders, of whom 1,737,000 had paid an extra charge for colour television.

As television was introduced at a time of rising disposable incomes, it cannot be claimed that the money spent by households on television sets and licences was shifted from something else.

As far as time use is concerned the problem is different. The time spent on viewing must have been devoted to something else before the advent of television. The average viewer in Sweden spends some 11 hours a week in front of his set, but this average figure conceals a wide range of individual variations. Admittedly, working hours were shortened several times during the period under review, but the time gained was partly absorbed by longer journeys to work, particularly in the cities, and by the growing amount of housework in the evenings and at week-ends, as fewer adults were working full-time at home. Several surveys have established that some viewing has been at the expense of listening to the radio. The average time for listening to the radio was halved between 1959 and 1963. However, watching television is a more demanding occupation than listening to the radio; "therefore, viewers must do things that in the golden era of radio could be done while they were listening" either before or after the television programmes".

It seems that part of previous sleeping time is now used for viewing. In 1956, 30 per cent of Sweden's adult population was asleep by 9.30 p.m. and 70 per cent by 10.30 p.m. During the oil crisis in February 1974, when television broadcasting closed down before 10.30 p.m. people seem to have returned to their pre-television bedtimes. A further facet is that, with television acting as a baby-sitter, adults are free to do jobs they would otherwise have done later in the evening. Children's time use has been greatly affected by the introduction of television. The interesting and so far unanswered question about children's viewing is not only what effect programmes may have upon them, but also how they are affected by spending so much time watching television (regardless of whether the programmes are "good" or "bad"), instead of doing something else.

As in the case of washing, the interesting question is not only how much time is spent on watching television, but also whose time is spent. Sjöden found that men watch television more than women; pensioners watch most, young people the least (although children put in as much viewing time as pensioners) and people with higher education watch less than those with a lower level of education.

An American study which divided the population into six different groups according to income and education showed that the lowest social group watched television every evening for 180 minutes, the highest social group for 16 minutes. The programme research unit at the Swedish Broadcasting Corporation based its studies on three educational categories. During two weeks in 1977, less educated persons watched television for 95 to 143 minutes a day, whereas the corresponding figures for the well-educated were 65 and 115 minutes. But these differences are partly due to the large number of elderly people among the less educated; the elderly watch television more than the young and the middle-aged.

#### Other consequences of television

All observers seem to agree that television has had a decisive impact on our way of life, but it has been impossible to make a satisfactory analysis of its true nature. The 1960 Broadcasting Commission explained the short-comings of research in this way:

"Studies to compare the knowledge, values and behaviour of people who have or lack access to television, or to compare conditions before television was in general use, can no longer be carried out in Sweden. The breakthrough was so fast and so universal that there was no time for comprehensive systematic research before the process was complete."

Rune Sjöden, who was in charge of programme research at the Swedish Broadcasting Corporation for a long time, wrote: "Research by Swedish social scientists and humanists has been so meagre that most questions concerning the role of radio and television remain unanswered". When television workers went on strike in 1977, a leading national daily paper tried to foresee the effects; the speculations were a mixture of nostalgic hope and unanswered questions:

"Summer evenings will be summer evenings once more. No television to keep us away from the skerries, from the football match and from the evening walk through fragrant woods or along quiet streets. Once again, at least temporarily, life will become a little more local and less national and international, a little more Swedish and less American.

"Are there any old patterns to take hold of, and if so, what are they like? How many people in this country used to drop off to sleep after dinner out of sheer tiredness before television existed? How many people had an organized, active leisure?"

The 1960 Broadcasting Commission argued against the view that spending the evening in front of a television set was a sign of deprivation:

"For most people who devote any time listening to the radio or watching television, these media have enriched their life, broadened their outlook, deepened their knowledge and provided a general stimulus. They often express great appreciation and gratitude. The time they spend listening to the radio and watching television has seldom been diverted from occupations like reading books, studies, hobbies, club activities and so on."

However, the Commission presented no evidence to support this view.

Although mass media research itself is not much help when trying to analyse changes in lifestyles as a result of television, accounts of how television has influenced people's ways of using their homes and their social and recreational habits are not entirely lacking. According to two studies of residents' habits in a housing area of a small town the advent of television was the biggest change which had taken place in the survey period. Ninety per cent of the sample population had television sets in 1962, and their acquisition had radically changed the use of their dwelling space. "In 1962 television occupied the living room and the sleeping places were pushed out, sometimes even into the kitchen". "Television is evidently sufficiently expensive and high-class to belong to the 'best room' and entertaining enough to be looked at. It is thus possible that television will gradually provide the family with a use for the often deserted 'best room'. Even the location of the dining table and chairs and eating habits have been affected by the advent of television, and it seems as if all changes in dwelling habits between 1956 and 1962 in this sample population were associated with the fact that the television set had become a member of the family."

Another researcher gives a vivid description of how the invasion of the home by television affected the lifestyle of a homogeneous community with a stable population and a firmly established local cultural life:

"Pure social life played a much smaller role than it did before 1961. That was the year when television came to Batskärsnäs - both Swedish and Finnish television. Lectures arranged by the Workers' Educational Association came to an abrupt end, and only one study circle managed to get off the ground that year. After television came, it was mostly young people who went to the cinema at the Folk Hall, whereas previously their elders had gone just as



much. Nor could the previously very popular ice hockey team any longer attract spectators. People stopped going rounds in the village. People came and went much more before; they often borrowed salt or matches, had a cup of coffee and then came back the next day to return the things', a worker recalled. One woman complained that few people came calling nowadays: 'If you have to invite people before they come to see you then you just don't bother'."

A survey of social patterns in two southern municipalities also touched upon the role of television. As far as leisure was concerned, the researchers distinguished between two groups of families with different lifestyles. About half of the families had "a lifestyle based on the home and the family". Leisure was devoted to "family life, the children, the house and the garden, excursions into the woods and the countryside, and watching television together". In many cases, the leisure occupations have so little to do with the world around the family that the researchers found it justified to use the term "communal isolation".

In the other families, the males spent a great deal of their spare time outside the family. "Some of them like 'sports with the boys', while others go fishing, take extra jobs or drink. The women of these families are closely tied to the home and often very isolated. The wife sits in front of the television in the evenings and at weekends, not idle, but sewing, crocheting, knitting or embroidering." The researchers found that the families were like small islands having little contact with their surroundings or "the community". The relative isolation and very "private" lifestyle surprised the authors of the survey, who had expected to find a more vigorous social network in these small communities. Lack of time, television and the car are factors usually cited as reasons for the disappearance of local contacts.

### Conclusions

Television is a good example of how a technological innovation introduced for a specific purpose, i.e. to provide information and entertainment, has had effects in quite unrelated areas, such as family life and spontaneous contacts with people outside the family. Television helped to strengthen a trend that was already apparent in other fields: people had less reason to go outside their own homes. Activities for which it had been necessary to go out, such as films, the theatre, political discussions and sporting events, were suddenly transported into one's own living room.

The effects of television cannot be considered as inevitable consequences of the technology itself; they stem rather from the fact that the television set is placed in the home. Other alternatives were never even discussed. There was and still is no choice between having television in the home or being able to watch it in communal premises near one's own dwelling.

Telecommunications is moreover, a field in which several technological innovations have already been developed and may possibly be introduced in the next few years. Before these innovations spread it would seem appropriate to examine not only the technological, economic and resource consequences but also the social and political effects of satellite technology, cabletelevision, video, home data terminals, etc.

BUYING AND STORING - FROM THE NEIGHBOURHOOD SHOP TO ONE'S OWN FREEZER

Many people nowadays have one meal out every day during the week. Nevertheless, the main responsibility for catering still rests with each household. The rationality of this situation has often been debated. The Swedish writer C.J.L. Almqvist asked: "Is there anything more extravagant, stupid and preposterous than everyone being busy with preparing vegetables and meat for human consumption?" A hundred years later, Alva Myrdal expressed the same thought: "A city block of flats where people in 20 small kitchens on top of and beside one another are all busy making meat-balls ... doesn't this scream out for planned organization, some kind of collectivism?"

Development has taken a different course. In this study the approach has therefore been to start from the existing situation, assuming that each household does its own catering. Only two functions associated with catering, i.e. buying and storing of food-stuffs, will be dealt with. Technological change that has affected cooking itself (cooker design, etc.) will not be considered.

The community and trends in food distribution

As late as the 1940s, the Consumer Co-operative and the Swedish Retail Federation considered that a customer base of 200 to 250 households was sufficient to support a small shop selling food products. By the middle of the 1960s the requirement had risen to 1,000 - 1,200 households; today it is even higher, especially for new establishments in residential areas. From 1962 to 1972, the number of shops in Sweden declined by about 13,450. In the county of Stockholm a quarter of all grocery shops disappeared between 1968 and 1972. In practice this means that an increasing number of households have longer distances to cover for everyday shopping.

This shrinkage has been caused by structural changes in retail trade that do not result directly from technological change. It is probable, however, that structural change has been speeded up by technological development in other branches, forcing the retail trade to raise labour productivity. The Distribution Commission sums up the views of retail traders as follows:

"It is impossible to be sure what kind of retail trade structure will spontaneously emerge during the coming 10-year period. According to company estimates, the concentration of shops will necessarily continue unless special measures are taken to prevent it. The main reason is that rapidly rising payroll costs necessitate improvements in efficiency to prevent large increases in prices. The possibility of such improvements is greatest in large, wholly or partly integrated corporate groups, as productivity per work unit at retail level is much higher in large than in small shops."

In recent years the trend seems to have been reversed, and a number of small neighbourhood shops with longer opening hours have been established. Their success indicates that many households have found it difficult to adopt the "rational" behaviour required for less frequent large-scale shopping.

Development in the distribution sector was made possible by concurrent development in other fields:

(a) More households bought a car, and it was assumed that the "rational" consumer would use the car for bulk shopping;

(b) More households found it easier to cope with bulk purchases, as they had access to larger refrigerators and freezers;

(c) The packing industry made the transport and storage of food-stuffs easier.

The community neither promoted nor obstructed this development, which was generally regarded as a consequence of "progress".

In an annex to the 1970 Long-term Economic Survey, representatives of commerce listed the following reasons for the increasing size of retail units: larger population groups had access to a car; households had acquired larger storage space; and, above all, households had better economic resources for making bulk purchases at weekends and were no longer dependent on daily shopping at nearby shops.

According to the survey the closing down of small neighbourhood shops was, the result of changes in shopping habits; to reverse the trend seemed impossible. This view did not tally with the facts, however. Only a few years later the Distribution Commission felt obliged to point out the increasing disadvantages to households and the need for the community to intervene:

"... for a couple of decades or so the distribution system has developed with practically unrestricted competition between firms. No national goals for the system have been laid down; interest has focused instead on the economic efficiency of distribution methods to lower costs and prices. As the 1970s approached, other aspects of the distribution system began to attract attention. They concerned mainly the inequality stemming from structural change. The community had to intervene with support measures in certain parts of the country where the paucity of retail shops had become a most acute problem."

In a report issued in 1975 the National Board of Physical Planning and Building declared that, as it was the most important service for most households, a shop selling everyday items should be within walking distance of each home, i.e. less than 500 metres away. In many areas of single-family housing this seems to be a pious wish, but even in more densely populated areas the concentration of all services in shopping centres has wiped out the shops previously scattered throughout the neighbourhoods.

In this development, the role of the community has, on the whole, been ambiguous. There are examples of municipal authorities having intentionally promoted the concentration of shops. But even when they tried to safeguard the interests of consumers, their efforts often had the opposite effect as they failed to take into account the distribution chain as a whole. Small shops in rural areas frequently found it difficult to finance reconstruction in compliance with standards of hygiene.

#### Ideas and reality

How do the views in the Long-term Economic Survey tally with reality? Do consumers behave as they should in order to fit into the new distribution system? Have they changed to well planned bulk shopping once a week? Is it possible for them to behave like "rational" consumers? There would seem to be three requirements: he, or more often she, must have access to a car, sufficient storage space and sufficient planning capacity. But the majority of the consumers can rarely meet all three requirements.

(a) Access to a car

Contrary to general opinion, by no means all households have access to a car. In 1970 less than one household in two in Stockholm had a car. Just over half of the households in Gothenburg and Malmö, and not quite two thirds of other households had cars. The Distribution Commission estimates that there are about 400,000 households without a car which live more than 500 metres from the nearest shop selling everyday items. Many of those involved are pensioners. Were all households to own a car, the number of cars in Sweden would rise from 1.8 million to 3 million. In Greater Stockholm alone there would be 300,000 more. There are other reasons why such an influx of cars can hardly be regarded as desirable.

Even in car-owning households, it is not always the person responsible for shopping who has access to the car. The access of housewives to a car was studied by the Swedish Price and Cartel Office in 1965 and by the Distribution Commission in 1971. The findings were as follows:

	<u>Percentage of households</u>	
	1965	1971
Car usually at her disposal	12	27
Car not usually at her disposal	51	51
No car	37	22
	<u>100</u>	<u>100</u>

The structure of retail trade would probably not be what it is today had its most frequent customers - women in charge of everyday chores - been asked for their opinion. However, researchers often forget that improvements in efficiency in retail trade have mainly had the effect of shifting the work and time load of distribution to the customers.

(b) Access to storage space

The access of the average household to cold storage has increased considerably. Simultaneously access to well-ventilated larders and food cellars has decreased. Interviews by the Institute for Consumer Affairs, in 1957, revealed that 40 per cent of households in sparsely populated areas and 75 per cent of households in Stockholm had a refrigerator, 4 per cent had their own freezer and 9 per cent used a collective freezer installation. The findings of the two previously quoted studies by the Price and Cartel Office and the Distribution Commission were as follows:

Type of storage space	<u>Percentage of households</u>	
	1965	1971
Ventilated larder	84	69
Food cellar	85	55
Refrigerator	94	97
Freezer box or cabinet	30	58

Discussing storage space in 1960, a leading Swedish household magazine (God Bostad) considered that freezers and freezer compartments were not yet part of standard kitchen equipment. In 1967, noting the rapidly rising consumption of industrially frozen products and the use of freezing as a method of preserving

food in the home, the same magazine considered that freezers should be installed. The recommended volume was 300 litres. In 1971, statistics showed that 44 per cent of households could store less than half a week's requirements of perishable goods; only 26 per cent could store requirements for about one week.

(c) Household planning capacity

Even households with access to a car for shopping and sufficient storage space for a week's necessities very often lack the planning capacity necessary to limit shopping to once a week. It is in fact quite unrealistic to expect that a unit as small as the household should have the thorough knowledge of food product characteristics and the discipline required to serve nutritious meals for a whole week on the basis of one bulk purchase. The advocates of bulk purchasing have overlooked another weak link in the chain, namely the limited ability of a human being to carry heavy loads. Overflowing shopping bags do not get themselves from the shop into the car, nor from the car into the home. In practice, the carrying capacity of two people is necessary to cope with bulk shopping. Another factor which has been overlooked is that shopping also has a social function. For many people going to the shop for the daily necessities is a social activity, possibly the only opportunity to see other people and have a chat.

The impact on the way households allocate their resources

The fact that the majority of households have failed to adjust to once-a-week shopping is clear from the studies quoted above. The average reduction in shopping expeditions per week from 7 to 6 in the survey period, as shown in the table below, was slight considering the great changes which had taken place in both shop networks and the storage capacity of households.

Number of shopping expeditions a week	<u>Percentage of households</u>	
	1965	1975
1 to 4	10	33
5 to 6	32	36
7 to 8	30	32
11 or more	7	3
Total	100	100
Average	7	6

It is hardly possible to give a definite reply to the question whether time spent on shopping has decreased or increased. According to an official government report in 1965, families with children spent more than an hour a day on shopping; in a family with only one child of school age, this time was reduced to half an hour. According to the United States survey quoted earlier, the time spent on shopping and related administrative tasks has increased considerably. Vanek states that women in the United States now spend half a working day per week on the roads and in shops, compared with less than two hours in the 1920s. However, the increase may partly be due to the fact that today people buy many products which were previously manufactured at home.

The changes in the amount of time spent on shopping might briefly be summarized as follows: longer distances from shops, more time required for planning purchases and more people necessary to carry and transport purchases are factors that have led to an increase, whereas fewer shopping expeditions per week have

meant a decrease. This oversimplification takes no account of changes in the content of purchases, nor of changes in the distribution of purchasing tasks in the households over the years. Comparable statistics on changes through time as regards what is bought and who buys it are not available.

Whereas many households have been able to adapt fairly easily to the structural change in retail trade, others have been hard-hit by the increase in distances to shops selling everyday items. This is particularly true of pensioners and mothers of small children who have no car. Household budget studies show that outlays for purchases and storage of food have increased, because a substantial proportion of the transport and storage costs have been shifted to households. Retail trade maintains, however, that a different distribution structure would have hit households in the form of higher prices. In this, as in other fields, the effect of change has been that people have less contact with their neighbours.

### Conclusions

The great changes which have occurred in the retail distribution of goods cannot be regarded as a response to any need of the consumer. On the contrary, a sparse network of shops has meant that much of the work of the retail trade has been shifted to the consumers, in terms of transport and storage. Technological change has helped to make life easier for the distributors and not for the consumers. The community has remained passive, and in some cases has even actively promoted this development. The impression is that the consumers have lost more than they have gained, and that there has been very little they could have done about it. They had no choice but to adapt to the new order, and the smaller the resources of the household, the more difficult the adjustment.

### CONCLUSIONS ON TECHNOLOGY AND LIFESTYLE

#### Technology - a driving force?

Is technological development an independent force, or is it a product of the economic and social situation? The answer seems to be that it works both ways. Any technology produced by a community is hardly an accident, but that technology can influence the community in ways that cannot always be foreseen.

The main concern of this study has been to examine how economic and social conditions in a society affect - and are affected by - the way technology spreads. In other words, the social solutions rather than technology itself is the focus of interest.

#### The interplay between firms, society and households

In the three examples studied there is an interplay between households, firms and society, although their respective roles are not always well defined and the rules of the game vary. However, an analysis of the ambiguous role of society would seem to be of particular interest.

In respect of washing society has in principle recommended collective solutions, but has not steered development so as to gear these solutions to the changing requirements of the households. In the same way as early cars imitated horse-drawn carriages, the mechanized collective laundries were for a long time equipped to cope with the washing habits of the past (infrequent, large washes) and did not in the long run meet the real needs of the households. It was easier

for them to satisfy their own unsatisfied needs (easy access to a washing machine) by making their own arrangements (buying and installing home washing equipment) than by trying to influence the housing corporations and/or society.

In the case of television there was concurrence between all three parties, society being in a key position as the guarantor of the necessary infrastructure. Co-operation between commercial firms and society has taken place quite openly, but it would be wrong to say that households resisted being shepherded into the television era. For anyone who believes that "society" is more enlightened and far-sighted than its weakest members, it is surprising that the social consequences of television in the home were not foreseen at all and have hardly been the subject of analysis since the breakthrough of television.

The dual role of society is particularly striking in the case of shopping. Here firms have planned in a way that primarily takes the wishes of distributors into consideration. Planning has been based on the ideal household with "rational" shopping habits (rational in the eyes of the distributor), whereas households are rarely "ideal" in this sense and have had to adapt, with varying degree of success, to a planning which from their point of view is often irrational. On the one hand, society has promoted and facilitated the trend towards larger units (planning of shopping centres, standards for parking facilities, requirements for shop premises and equipment), while on the other hand it has tried to alleviate the subsequent adverse effects (assistance to shops in sparsely populated areas, home aides to help the elderly with their shopping).

#### What needs?

The prerequisite for improvements in housing and living conditions in terms of more space and equipment was the long period of rising disposable incomes; in other words, an economic situation which has allowed a high level of private consumption. In the areas studied however, technological development - or, more precisely, the way in which new technology was applied and diffused - has made the households more introverted. Activities have been moved into the home, opportunities for meeting other people have diminished and the neighbourhood environment has been impoverished.

If human needs are divided into "having, loving and being" it seems that it is primarily the need to "have", the material need, which has been satisfied, but this has taken place individually and in a way which probably makes it more difficult to satisfy other non-material needs of togetherness and self-fulfilment. In speculating about the reasons, it might be suggested that "society" has presumed that, once material needs were satisfied, the rest would take care of itself. Another explanatory factor may be that it is easier to measure material than non-material needs. And one final explanation may be that concentrating on material needs has created an institutional and corporate structure that, although the target of high material standards has been reached, can no longer be changed, but instead creates new ways of satisfying needs which have already been satisfied.

#### Choosing technology

In a market economy the choice of technology is primarily guided by business enterprises, but through assistance for the development of new products, the State has some power to influence developments. However, the allocation of resources for this purpose is mainly decided on the basis of criteria set by technology expertise and business economics. A minimum requirement would be to

complement technical and economic criteria by assessment of the consequences of technological development on lifestyles and the satisfaction of basic human and social needs.

Society may have little control over technological innovation, but it might possibly steer the dissemination process in a desirable direction. For example, the spread of television might have been organized in a way so as to increase contacts between people, and the washing problem might have been solved with greater attention to the real needs of households, so that they would not have felt inclined to buy their own equipment.

Such indirect steering is in fact taking place today through the giving or withholding of government support. The evolution of the residential environment, for example, is steered by tax policies, housing allowances, building regulations, loan regulations, etc. Actual developments in the areas which have been subject of study in this report seem to indicate that policy-makers ought to be more aware of the consequences of indirect steering. One conclusion is that it seems essential to devise methods for systematic monitoring of technological change in its relation to the social, political and economic development of society. Continuous public debate of these questions and intersectoral monitoring of developments by means of reports and inquiries are examples of feasible methods. One important question remains, of course: who should be responsible for the organization of this debate and these enquiries? And we have the question about the kind of technology to promote. It would seem that in every attempt to choose a future, consideration should be given to the fact that the resources of the earth are limited and inequitably distributed. The aim should be to increase the durability of products for private as well as collective consumption. If the lot of the majority of mankind is to be improved technology will have to become more socially oriented and more suitable for joint ownership and use.



SOCIAL CHANGE AND RENEWAL OF THE CAPITAL STOCK

Paper transmitted through the International Centre  
for Industry and Environment (ICIE)

Prepared by Mr. C.A. COCHRANE\*

Summary

Changes in public demand for goods and services imply changes in the means of production. If due consideration is not given to economically feasible time rates for their replacement or improvement, the resultant economic instability can stultify or delay the social benefits that could be derived from new technologies. The purpose of this paper is to draw attention to the need for any study of development patterns to examine how, and how quickly, new technology could be brought into widespread use, when the desirable and possible alternatives have been clearly defined.

The emerging philosophy of environmentally sound development makes major demands for technological change, which calls for renewal over time of the capital stock of production machinery. This should be taken into account in the formulation of the strategic plan for the Third United Nations Development Decade. Classification of principles and objectives can only be a start to deeper penetration into the problems of feasibility, however. Implementation will often require study by specific industrial sectors and specific branches of manufacturing industry - a very complex task. Not only does the cost of pollution avoidance vary greatly between sectors and branches, so also does the useful life of the capital means of production. Many problems involved are site-specific, and averaging of feasible investment rates can easily conceal critical variations in regional or national consequences of change. Major new investment needs some social guarantee of a minimum period of operation, extending in many instances to periods of 10 or more years, if an economically stable programme of capital renewal is to be possible. Where new production processes are seen to be eminently more appropriate than those widely used, the phasing-out programme must also take into account local employment and social factors, as well as purely economic considerations. Such problems arise, for example, in the pulp and paper industry in the major shift from the sulphite process.

It seems clear that the examination of alternative patterns of development and lifestyles implies further and more detailed feasibility studies, whose time scale must embrace periods of 10 to 50 years ahead. Change will depend on technological development and innovation and policies must be framed to encourage and stimulate concomitant investment. Study programmes in this area

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should encompass the feasibility of an economically stable policy for development which incorporates resource conservation and environmental quality as essential elements of acceptable industrial growth. One of the difficulties is the need to examine feasibility sector by sector as a micro-economic problem. Thus, projections must not only be extended dramatically in time, but must also range widely in detail.

AN APPROACH TO THE EVALUATION OF THE EUROPEAN  
ENVIRONMENT AND LIFESTYLES

Paper transmitted by the United Nations  
Institute for Training and Research

Prepared by Mr. S. COLE\*

Summary and excerpts

INTRODUCTION

This paper outlines one approach for the consideration of the relationship between environment and development, which is currently employed in an on-going study, "Technology, domestic distribution and North-South relations", as part of the preparations for the Third United Nations Development Decade under the auspices of the UNITAR Project on the Future. 1/ The scenario analysis allows alternative styles of development to be compared and social and institutional variables to be linked to economic and other changes in a consistent manner. It permits, for example, an integrated discussion of international, national, industrial, urban and life-style variables (such as family life, work and recreation) with possible consequences for the environment. This form of analysis (illustrated later) was developed for an earlier study of global development alternatives, and already included some consideration of environmental factors. 2/

The following parts of the original text, presenting the approach of the study and an analysis of problems of restructuring in the countries of the ECE region, have been reproduced as being of particular interest within the framework of the Ljubljana Seminar:

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"Overview and Approach

"Since the 1972 United Nations Conference on the Environment in Stockholm it has been a principle accepted by most, if not all, international agencies concerned with this issue that questions of environment and development are inseparable. Even though consideration of specific pollutants, targets and impacts within a more or less closed ecosystem may often be judged with reasonable precision, with the help of relatively sophisticated and complex mathematical techniques and with supporting monitoring apparatus, the same cannot be said of broader environment trends and their impacts. Thus there arises the problem of developing a methodology for the analysis of these issues. These broader trends are contingent on a wide range of developmental factors - social, economic and physical, at a local, regional and global level, and obviously a broadly conceived approach is required for analysis.

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"Although impact assessment work is ultimately carried out at a local level, many of the factors determining the different aspects of environmental quality in a region do not depend only upon the local situation. This is increasingly the case as regional global development becomes systematically more integrated. In addition to the many direct environmental impacts of development in one region or another (e.g. through transfer of pollutants), indirect impacts through the interrelationship between styles of economic and social development are likely to be at least as important. For example, the pattern of the world-wide distribution of industry, the degree of industrial and agricultural specialization, the diversity of lifestyles, the evolution of national and international institutions are all likely to have a major impact on future levels of environmental quality and opportunities for control.

"The level and type of environmental threat at a local level depend, in particular, on the concentration of industrial and urban development. For example, visual, particulate, chemical and noise pollution have all been shown empirically to be linked (or are hypothesized to be linked) to the concentration of 'heavy' manufacturing, to the density and layout of cities, and to the agricultural mix.<sup>3/</sup> Variations within these broad generalizations, and opportunities for control, depend upon local natural phenomena, the specific industry, the age of technology employed, and the lifestyle of the population. However, environmental degradation is not only an aspect of over-development or mal-development in industrial countries, but is increasingly an aspect of under-development and absolute poverty in developing countries. Empirically, too, it is found that the distribution of chemical and visual pollution and the level of concern of people for their environment is linked to their level of economic well-being. Further, the level and type of pollution or the type of legislation required to legislate against polluting activity in both industrial and developing countries depends upon the proportion of 'economic' activity which takes place in the formal industrial sector, the 'informal' sector and the home.

"Given the range of issues to be considered, it cannot be expected that any one approach can provide a sufficient basis for understanding and formulating policy with regard to the environmental implications of development in the ECE region. Even if the underlying principle of existing linked environment-development models were judged to be sound, the patchiness of empirical data and the sheer complexity of the problem limit the usefulness of this approach. In any case, many of the factors described above as being important to analysis are beyond the scope of such models.

"The mathematical multiregional global model being constructed for the UNITAR Third Development Decade Study has been designed explicitly to explore the economic and especially the distributional consequences of alternative patterns of regional and global development. <sup>4/</sup> As has been noted above, international and domestic distributional issues are a key element in environmental concerns. In particular, the model allows the economic consequences of changes in the production system within one region to be followed through for that region and for the rest of the world.

"The third component of the approach is the analysis of a wide range of case studies of technical and social organizations which are believed to indicate possible alternative routes for development. The incorporation of the studies into the scenarios depends upon economic and social criteria (e.g. employment, import dependence or industrial structure) and environmental considerations (e.g. concentration of pollutants or material resource or land requirements). <sup>5/</sup>

"On the basis of these case studies, and the conclusions of the scenario and modelling studies, some evaluation of the viability and implications of

alternative patterns of regional and global development is possible. An iterative method of integrating these three elements of analysis has been elaborated. The approach is partly discursive and partly quantitative. It attempts to explore development alternatives up to the limits of available knowledge and data in as consistent a manner as possible. It is directed towards an exploration of the factors promoting development and the implications of alternative styles of development.

"In many respects, the project methodology directly confronts many of the issues which are the concern of the ECE region countries in the UNEP/ECE seminar on Alternative Patterns of Lifestyles and Development. With regard to environment specifically, the approach is not intended to provide quantified indices of pollution or its effects but rather to indicate trends which pose immediate or potential threats, and hence require immediate action or monitoring, or alternatively, opportunities for improvements in environmental quality. The approach, in principle, provides an environmental quality assessment of alternative styles of development within which more detailed studies of specific impacts or legislative proposals can be worked out.

...

#### Domestic restructuring in the Countries of the ECE Region

"The alternative changes in the international system considered earlier obviously depend upon developments within countries, and in turn affect these developments. Of particular relevance to environmental issues are future lifestyle patterns in the now industrialized countries (of which the ECE countries comprise about half). There are potentially very different future alternatives 6/ with regard to changes in urban structures, including systems of transport, although for many countries in Europe these may not be quite as wide as implied in the earlier study. In addition, the way in which many public services and goods are provided, including environmental protection, would be related to these and the foregoing trends.

"In the present study, many of these factors will again be explored in relation to the new scenarios. In particular, for the industrialized economies, a set of scenarios based on a detailed examination of post-war trends in lifestyles and modes of production, including especially changes in technology, are being devised.

"The main arguments behind most analyses of expected future trends in developed countries have been based on the idea of the 'post-industrial society' in which employment and production shift systematically towards the so-called 'service' sector. This scenario has rested on the assumption of continuing high over-all growth in the industrialized economies and a similar and even dependent style of development in developing countries. Neither of these assumptions necessarily holds. Changes in techniques of production, the onset and continuation of the present economic crises, widespread dissatisfaction with current styles of development and continual pressures to restructure the world economy all indicate that this path of development is much less likely than has hitherto been believed. A detailed study of technological trends and changes in lifestyles as part of the UNITAR study gives some clues as to a more likely course of development and suggests alternative directions for change.

"In investigating these trends, particular attention has been paid to changes in lifestyles in a range of industrial nations. 7/ Although analysis of the data is not yet complete, the preliminary results indicate that for different European countries, four scenarios are of interest and require further study.

These are summarized in Figure 1. Each of these scenarios, taken in conjunction with a corresponding set of assumptions about the international economic and political environment, has quite different implications for the structure of production and hence for the physical environmental impacts and relevant policy. Ultimately, it is intended to develop a detailed description of these scenarios similar to those developed for World Futures - The Great Debate, but backed up by a more definitive evaluation of economic and political opportunities and constraints.

"As figure 1 indicates, within the present pattern of consumption and production in industrial countries it is possible to observe a 'dualistic' structure, based not simply on the distribution of income or wealth or on an urban-rural division but on a distinction between the formal productive sector and the household. 8/

"One theory evolved to account for this trend is that the relative costs of different goods and services in some countries are such as to encourage a sharp division of activity such that 'services' are both consumed and produced in the home (using small scale capital goods). Production of these small capital goods is carried out in the formal sector. Paralleling this process is a growth in an 'underground' economy largely consisting of 'moonlight' type activity and again having a basis in the relatively low costs of small scale capital goods (tools, in this case) and the possibility of avoiding direct taxation. Some authors have suggested that this activity, properly regulated through the encouragement of small businesses and semi-voluntary social and other work, could provide a way of overcoming the unemployment problems foreseen because of the introduction of new labour displacing technologies. Thus a highly productive formal sector based on new technologies would operate in parallel with a less productive dual sector subsidized by the formal sector and households. A crucial question here is whether the informal sector would not, if externalities to production were taken into account in evaluating changes in production techniques, turn out to be considerably more productive both in economic and social terms. This may be especially true when many environmental considerations are taken into account.

"Whether such a solution to the problems posed by the advent of new technologies is economically viable is difficult to say, but immediately several issues arise. Some are straightforward and concern the relative productivities of the formal and informal sectors, and hence the levels of employment, income and demand which would be created over-all. An evaluation of these over-all effects, although difficult, may be the least problematic. Distributional questions are less easily settled. For example, since there already exists de facto a dual economy of this type in European economies, any existing problems may be exacerbated. Depending on sectoral and over-all levels of productivity achieved, this 'solution' could be strongly inflationary if a strongly redistributive system of payment is retained. Alternatively, if the arrangement operated on a firm-by-firm or nation-by-nation basis, as is largely the case at present, the temptation would be to use the implicit low wage of the informal sector as a restraint on wages in the formal sector, and use the resulting competitive advantage to expand production for international markets rather than increase domestic wages and domestic consumption. This leads to another concern - that a dualistic economy may imply a further widening of the gap in economic and hence political power between members of the 'non-essential' or 'substitutable' informal economy and the formal sector. In view of experience with the present 'dualistic' economy in European as well as developing countries, it is clear that long term structural redistribution is vulnerable to all kinds of political and economic pressures. Unless handled with great care, technical change and greater economic integration could combine to exacerbate social and economic problems. For some countries in Europe, the labour displacing impact of new technologies may largely be offset by expanded exports to European and other

Figure 1

Alternative approaches to dualism in Northern economies

(a) A Northern 'dual' economy

A 'formal economy', largely based on the production of material goods, increasingly capital-intensive and maintaining high levels of increase in labour productivity - and with a decreasing number of jobs, themselves increasingly demanding in terms of technical skills - operates in parallel with an 'informal economy', centred on the household as a productive unit, using unpaid and relatively unskilled labour, together with an increasing quantity of 'domestic capital', in the production of final services.

(b) The 'hidden' economy

A 'subterranean' or 'hidden economy' parallel to the formal economic system and producing goods and services, but concealed from tax authorities and trade unions. Low wages and relatively low overheads cause the economic advantages of the 'self-service' economy to be undercut. The central authorities of the State recognise the existence of this economy but, for reasons of expediency, take no action to curb it. The outlines of such an economy are already visible in many developed countries; where the alternative is unemployment, many people are willing to accept low-paid, extra-legal jobs.

(c) The 'enforced' economy

The State takes vigorous action to curb the 'hidden' economy. At the same time it enforces increasingly high tax levels in order to pay for employment in service industries, and this leads to relative stagnation in the economy. To enforce such measures the State becomes increasingly 'strong': the bureaucracy, and particularly law enforcement agencies, become the dominant arms of government.

(d) The balanced economy

Technology becomes a variable of strategic policy designed to avoid economic and political dualism. Economic policy is concentrated on long-run structural variables including production techniques, patterns of investment and education.

markets. In this case the potential unemployment is transferred to weaker economies. Thus the formation of a dual economy may affect the distribution of economic growth both across as well as within economies. Indeed, current technical changes may lead to a rapid acceleration in the relative rates of growth between sectors and economies. Accommodating these changes, and ameliorating their impact equitably, is a major challenge facing the European societies, in both economic and political terms, and a prerequisite for efficient handling of environmental concerns.

"In the UNITAR project, exploratory work into alternative development strategies has taken as a principle that, if both economic and political duality are to be reduced, the system of production should be such that the operation of markets themselves results in a situation as close as possible to this objective, and that non-market distortions are minimized. Although to adopt this principle might result in some lessening of over-all economic 'growth', a more candid evaluation of the total costs and benefits of enterprises working at different scales, including externalities such as environmental and social relocation costs and internal transfers (including those between countries) and overheads (e.g. organizational versus production costs) may well indicate that the shape of the production system which maximises social welfare is quite different from that which maximizes profits and control of markets. In this case, economic policy should, through taxes and subsidies, be concentrated on the reformation of long-run structural variables, such as production techniques, patterns of investment and education, which, through the market, determine short run variables such as prices, wages and levels of trade and consumption".

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- 1/ This study is co-directed by S. Cole at the Science Policy Research Unit, University of Sussex, and G. Chichilnisky at Columbia University.
  - 2/ See Miles, Cole and Gershuny (1978) in World Futures - The Great Debate, Freeman and Jahoda, Martin Roberston/Universe, 1978, and Futures, February, 1978.
  - 3/ See for example, C. Wood, and N. Lee, "Cities and pollution", Journal of Environmental Studies, 1976; and The State of the Environment in OECD Countries (Paris, OECD, 1979).
  - 4/ See G. Chichilnisky, "Terms of trade and domestic income distribution," Journal of Development Economics, 1979, and Chichilnisky and Cole, "A model of technology, domestic distribution and North-South relations", Technological Forecasting and Social Change, May 1979.
  - 5/ See Acero, Cole and Rush, Analytic Techniques and Issues of Long Term Development, (Paris, UNESCO, 1979).
  - 6/ See Miles, Cole and Gershuny (1978) in World Futures - The Great Debate, op. cit.
  - 7/ The empirical work is concentrated on the analysis of data on patterns of time use, variations between countries and patterns of change over time. Time series and time budget data are used for the United Kingdom, and access to United States and Japanese data has been arranged. Cross-sectional comparative data compiled by Szalai which cover Belgium, Bulgaria, Czechoslovakia, France, German Democratic Republic, Germany,



Federal Republic of, Hungary, Poland, United States, USSR, and Yugoslavia are also used. There are comparable studies for Finland, Italy, the Netherlands, Norway, and the United Kingdom. The cross-sectional data, therefore, cover at present about half of the ECE countries (and all the larger countries in this group).

8/ See in particular, Gershuny, J., After Industrial Society, Macmillan, London, 'Post-Industrial Society - An Alternative Approach, UNITAR Working Paper, Sussex, 1979.

ALTERNATIVE PATTERNS OF DEVELOPMENT  
AND LIFESTYLES IN ITALY

Report transmitted by the Government of Italy  
Prepared by Mr. P. GARAU\*

Summary

To most foreign observers, Italy remains a puzzling terrain for social and economic analysis. The main question that political scientists, economists and sociologists seem unable to answer is how a country afflicted by chronic political turbulence, recurrent economic crises, a volatile internal social situation and the many internal contradictions of an intense and rapid economic development process can manage to produce, progress and survive. Another feature which perhaps makes Italy unique among industrialized countries is the speed with which it invents, metabolizes, discards, regenerates and re-invents models of political and socio-economic behaviour.

The present paper does not attempt to deal exhaustively with all these issues. It simply aims to describe and put into some sort of historical perspective the main changes which have occurred in terms of both socio-economic evolution and lifestyles in the post-war years as a background to the principal phenomena which can currently be observed.

Italy is a young country. It achieved unity in 1870, well after most other European nations. Its first "modern" constitution dates to 1948. Yet democracy, in the sense of a community's participation in its own destiny, and of deep involvement in affairs beyond the scope of the household, is a deeply rooted national feature. The contradiction between the two separate histories of societal traditions and institutional evolution is an important element to keep in mind in order to understand many phenomena in Italy, and to attempt an assessment of the post-industrial development of Italian society.

"Reconstruction" was the key password for the new republic emerging from the war. Of course, it meant different things to different societal groups and individuals. To a confused middle-aged generation reconstruction meant forgetting the past as soon as possible; to people leaving their uniforms for civilian clothes, simply starting anew; to many young people and to those who had been part of the underground liberation movement, reconstruction meant a common effort to build a new social and political system radically different from the only two models which the country had experienced since unification: constitutional monarchy and a dictatorial regime.

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The model of development which emerged in the post-war years was a mixture of all these aspirations. Industrial production regained its potential where it was first developed, in the northern industrial triangle. Its development attracted masses of migrants from rural areas, and particularly the depressed southern regions known as the Mezzogiorno. The dualism already evident in pre-war years was thus reinforced. However, the context was different from that of other industrialized countries which had experienced similar phenomena almost a century before. Existing opportunities for mobility of people, ideas, information and social exchange offered much greater scope for social development and political awareness.

In addition, a not so minor phenomenon emerged in those years, partly contradicting well-known models of class polarization and social and political behaviour. This was the dream of individual well-being, the symbol of the emerging middle class. Nothing can exemplify this phenomenon better than the transition from the crude features of neo-realist cinema right after the war, to the rosy escapism of mass-oriented film production in the fifties and early sixties. Under the guiding star of industrial expansion, urban growth and the limitless promise of mass production, almost every middle-class Italian was convinced that social mobility, prosperity and happiness in a context of inexhaustible opportunity and economic expansion was a tangible and realistic prospect for all. The chronic problems of the Mezzogiorno were to be solved in a reasonable time span through massive government aid, the problems of agriculture through rural reform and technological innovation.

The family, as always, was the motor of reconstruction and the transmission belt of societal continuity. Italy's largest private industrial concerns are still family businesses, and the same mentality still permeates all sectors of society, down to the most neglected rural areas.

The main contradictions of this development process began to become evident in the early sixties. While the so-called "economic miracle" could be measured in terms of a healthy balance of payments, a strong currency, rising productivity and higher national per capita income, existing imbalances between industrialized regions and depressed rural areas continued to grow. The facts of uncontrolled growth were also more manifest: congestion, pollution, shortages of affordable housing and social services in the growing urban areas and physical degradation of both man-made and natural resources in regions affected by the exodus.

Moreover, it was apparent that the phenomenal rate of growth which had accompanied Italy's economic recovery could not be sustained. Many factors could account for this: growing competition for manufactured goods on the world market, the rising economic and social aspirations of the labour movement, the growing economic burden of imports and the emerging gap in the area of sophisticated technological innovation.

The questioning of the merits of the "economic miracle", as well as the political and societal changes which this very process had brought about, were two basic elements of a new development strategy launched in the mid-sixties. Its goal was to re-direct resource allocation and investment in the sectors and areas which had suffered most from unbalanced growth. "National economic programming" was the means to achieve such ends. It was to be based on the harmonization of the options and policies of State and private business, co-ordination of the roles of institutions at the national, regional and global levels, and a concerted effort on the part of all strata of society to foster a different and more equitable societal model.

But planning requires hard and explicit choices. It also has to be introduced when political and institutional conditions make its formulation and implementation viable. In a way, the first National Economic Programme was produced both too early and too late. Too early, because the benefits of planning were clearly anticipated and perceived only by a cultural and political élite; too late, because none of the already established social and economic constituencies were willing to make major concession to what seemed a system of unilateral choices.

At the beginning of the seventies, national programming was for all practical purposes shelved. Ironically, in the very same period external and internal conditions were beginning to develop which could have fostered national planning efforts. The end of the sixties had already witnessed momentous growth in the labour movement, not limited to wage increases but demanding both better working conditions and a better environment. The quest for an alternative to the drudgery of the production line and for shorter working hours went hand in hand with the demand for affordable housing and more and better services in the congested urban areas. Even more significantly, the development of the Mezzogiorno was seen as a fundamental issue for all workers.

A wider consensus also started to grow around the isolated efforts of small cultural groups concerned with the preservation of the nation's historical and architectural heritage, the protection of the physical and cultural environment, and the safeguarding of nature from the concomitant effects of speculation and neglect. The environment became a political issue, notwithstanding the traditional élitist bias of the pro-nature movement. The oil crisis was obviously another major factor which affected many traditionally held views on "progress" and "development". For example, one of the major shocks to current wisdom was the general popularity of the banning of the movement of private cars on Sundays, introduced as an emergency energy conservation measure in late 1973.

All these developments combined to bring about a quest for an "alternative model of development". Its connotations were and still are rather diverse, depending on the particular approach of each movement or societal group. However, there was a general consensus on what its main features should be. In terms of economic development, more emphasis was needed on the agricultural sector and related manufacturing activities, as well as the needs of the small-scale farmer. A strategy of diffused diversified industrial development had to be sought, especially in depressed areas, to replace the capital-intensive "industrial pole" strategy pursued before. Major institutional reforms were also needed to bring about a more decentralized administrative and decision-making system.

Governmental circles were not left out of this general reassessment of post socio-economic policies. For example, the official national report to the United Nations Conference on Human Settlements was largely devoted to an analysis of the negative consequences of the urbanization model followed in post-war years. The report also highlighted the search for policies to regain control of the urbanization process.

Two corner-stones of this approach were public participation and legislative and institutional reform.

Important innovations have taken place in the Italian institutional and administrative system, especially in the past few years. The most important was the creation of Regions in 1972 as administrative units governed by elected bodies, with a wide range of legislative and administrative powers previously held by the central government: agriculture, forestry, transport, health,

housing and physical planning. New administrative bodies have also been created at the subregional level. At the municipal level, neighbourhood councils and spontaneous citizens' committees are increasing their sphere of action, so that marked decentralization of the decision-making and management system is well under way.

As far as physical planning policies are concerned, the slowing of urban growth in congested areas and the adoption of stringent land use policies are two important factors for achieving more rational use of physical resources. City plans are becoming more responsible and responsive, both in quantitative and qualitative terms. The plan has changed from a still photograph of the future taken by an expert, to a moving sequence of programmes and actions planned and executed by those directly concerned. The reuse of the existing urban fabric is becoming a viable alternative to new development. Examples of these efforts can be seen throughout the country.

There are advantages to this process. While decision making is made more elaborate and time-consuming, decisions are taken at a level closer to local realities and actual needs. As regards "alternative patterns of development", the advantages offered for innovation and freedom of experimentation on various scales are balanced by serious difficulties in developing a unified strategic approach. The question arises of whether a "unified approach" is really the best option, and if it is, can it be put into effect?

Another element which poses serious difficulties to traditional, centralized planning approaches is the progressive atomization and diversification of economic activities. Such phenomenon is seen as the main factor in the surprising "economic recovery" which has taken place in the last two years. The "informal" component of this recovery is well known, and so are the factors of instability connected with it. The recovery is explained in terms of the elasticity of individual and social behaviour, the ability to invent new activities and a rediscovered gusto for initiative and self-realization.

Much of the experience summarized so far points to a marked evolution in people's attitudes to the system of choices designed to affect their future. There is a general tendency to question present models of organization of society, to propose a "softer" approach to development. The negative pole of this tendency is a retreat into individual values, into the family as a citadel of security. But an equally potent phenomenon is evident: a striving to operate inventively within the system, and to modify existing administrative, economic and political structures so that they conform more closely to emerging values, aspirations and needs. The current transition from centralized to decentralized decision-making models is a clear example. The lesson to be learnt is of a continuing and universal nature: people have the ability and the wisdom to create better solutions for their future.

L'ADAPTATION DES STRUCTURES INSTITUTIONNELLES  
A LA PRISE EN COMPTE DE L'ENVIRONNEMENT  
DANS L'ORIENTATION DU DEVELOPPEMENT

Rapport transmis par le Gouvernement de la France  
Préparé par M. O. GODARD\*

Summary - This paper discusses regulation patterns and institutional structures in the context of the need to incorporate environmental concerns into development planning in industrialized mixed-economy countries, with special reference to the situation in France. The basic hypothesis is that the present economic crisis will not lead to a relaxation of current efforts to protect and enhance environmental quality. On the contrary, this crisis reinforces the already strong environmental arguments for a profound adjustment of prevailing development patterns, both in technologies and in institutions.

Environmental problems (pollution, ecosystem disruption, over-exploitation of resources, etc.) are regarded as the result of a process in which environmental considerations are placed outside the decision-making context of most public and private social actors. Two types of externalization are distinguished:

(a) The one is the effect of a vacuum in regulation, e.g. the free use of public goods by individuals in a market system, as there is no incentive to take environmental impact into consideration. In this case, measures to enforce "internalization" are required; this is the main subject of environmental economics.

(b) The other, often neglected in theoretical writing, is the very result of existing regulation systems and can be interpreted as a symptom of their partial or complete inadequacy in a specific context or period. For example, the generally applied social discount rate - which is so important for project analysis as it determines the conditions of capital accumulation - establishes social accounting periods that are at variance with ecological rhythms; this rate does not guarantee investment decisions and management practices which promote development that is environmentally sustainable in the long term. The question is thus not one of internalizing externalities by extending the existing regulation system, but rather of modifying or limiting its operation.

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\*Centre international de recherche sur l'environnement et le développement (CIRED). Les vues exprimées dans ce document ne représentent pas nécessairement celles du Gouvernement français. Les thèmes abordés dans ce document sont développés en: O. Godard, Aspects institutionnels de la gestion intégrée des ressources naturelles et de l'environnement, Paris, Ed. de la Maison des Sciences de l'Homme, 1980.

Against this background the author of the paper proceeds to an analysis of the short-comings of the market mechanism in respect of environmental protection. Stress is placed on the following points:

(a) Extensive individual property rights, which condition the form of market regulation, lead to sectoralized management of the environment, which is incapable of tackling general ecological problems;

(b) The basis of the market system is that scarcity determines profitability; the market may thus incorporate concern about environmental quality when it becomes very scarce, i.e. when it is too late;

(c) Short-term market options cannot be used as criteria for handling ecological problems because of the irreversibilities and non-substitutabilities involved.

This is not to say that public (administrative or political) regulation should always be regarded as a panacea, even if it can take account of both types of externalization. The following issues are analysed:

(a) Political and administrative systems usually ignore the long-term effects of development on the environment;

(b) Administrative action is taken and public policies are formulated in a piecemeal and haphazard manner; they differ between types of resources and functional and territorial units; and resource policy is often separated from environmental policy. Environment is thus treated as a marginal concern and decisions on major development action are taken without considering their environmental implications;

(c) Institutional structures set up by governments to ensure a comprehensive approach are too weak to induce changes in the behaviour of sectoral bodies;

(d) Administrative regulation is inadequate for implementing ecologically sound land use by such measures as zoning, nor can it ensure the rational use and management of renewable resources; the combination of market processes and administrative devices often produces unexpected adverse effects.

A few approaches to the problems of devising institutional structures to guarantee proper attention to the environment are discussed. The solution does not generally entail strengthening particular types of regulation (market, administrative, judicial, political) but rather restructuring the relationships between them so as to combat any process of externalization. Nor would it be of great avail to create new institutions with full responsibility for environmental affairs, - although that may be sometimes useful. What is needed is the establishment of new relations between social actors whose decisions have an impact on the environment. One way of promoting such a restructuring is to foster participation by people and organizations outside the State sector and the business world: non-profit associations, trade unions, informal social groups, etc. It is also necessary to guarantee counterweights in each field of institutionalized power (the market, administration, politics) in order to combat inherent tendencies towards the externalization of environmental concerns. This requires the adoption of contextual approaches and measures.

Certain changes in the organizational structure of public bodies must also be introduced. Two specific proposals are made:

(a) A new balance between territorial levels and the establishment of co-operative, rather than hierarchical, relations between local, regional and national bodies;

(b) The development of contractual relationships between the different levels of public territorial bodies, and between these bodies and private actors, involving representatives not only of industry and business but also of environmental groups, consumer organizations, trade unions, etc.

In the context of the first proposal, it would seem important to note that consideration of the environment implies two somewhat contradictory requirements. The need for more attention to the physical and spatial aspects of development planning in order to adapt projects to the diversity and variety of site-specific ecological conditions argues in favour of a decentralization of planning, with emphasis on the regional or "multicommunal" level. But from an environmental point of view, decentralization by itself is not sufficient, since the handling of ecological problems requires both horizontal and vertical integration.

At all events it is rarely possible to separate decisions according to their level of impacts following the common rule of big decisions at the central level and small decisions at the local level. In fact, most projects have a multi-level environmental impact. Each level must therefore be considered as representing a specific and irreducible point of view, the purpose of the decision-making process being to harmonize conflicting interests, instead of sacrificing some of them to the advantage of others or simply introducing new ones.

With respect to the second proposal, contractual arrangements can be considered an alternative to market or administrative regulation; such arrangements can take the best of the two solutions and avoid most of their disadvantages. They should go beyond piecemeal financial incentives and take the form of "programmes of integrated development agreed in a contract," where consideration of the environmental impact of development operations is guaranteed. Consultations with non-profit organizations and groups should be built into the implementation process. The success of such contractual schemes would make it possible to reduce rigid planning and administrative control, although minimal norms of environmental quality should be maintained.

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#### INTRODUCTION

La tentation est grande dans la période actuelle où les problèmes d'emploi, d'inflation et d'énergie préoccupent tous les acteurs sociaux, de reléguer à l'arrière-plan les problèmes d'environnement (pollution des milieux, bruit, dégradation du cadre de vie, surexploitation de ressources renouvelables et stérilisation de potentiels de ressources, perturbation d'équilibres écologiques, etc.). Cependant, il est clair que même dans la perspective d'une croissance modérée pour les prochaines années, la dégradation de l'environnement va connaître une nouvelle poussée à moins que les efforts déjà consentis pour l'environnement ne soient sensiblement accrus, comme le suggérait la dernière réunion de l'Organisation pour la coopération et le développement économiques (OCDE) au niveau ministériel pour les problèmes d'environnement.



L'ampleur des efforts à consentir et la réticence à les supporter témoignent à notre sens que la mesure n'a pas été pleinement prise de l'importance des adaptations à assurer pour harmoniser en profondeur les considérations liées à l'environnement et les objectifs du développement social-économique et pour échapper ainsi au choix impossible entre un conservatisme écologique bloquant tout développement et un développement économique laissant derrière lui la ruine écologique. L'exigence d'une transformation en profondeur des styles de développement répondant conjointement aux différents défis actuels ne peut que conduire à mettre en avant les conditions de régulation du développement socio-économique et les structures institutionnelles comme un des principaux champs où se jouera la possibilité de parvenir réellement à une nouvelle croissance en harmonie avec l'environnement.

En dépit de leur grande diversité, l'émergence sociale des problèmes d'environnement dans les pays industrialisés fait ressortir que le développement rapide connu dans la période contemporaine a été le produit de logiques économiques de croissance externalisant massivement les coûts sociaux et notamment les coûts sociaux d'environnement. L'enjeu actuel est la mise en place de mécanismes et processus de régulation et de structures institutionnelles qui permettent de mettre fin à ce mouvement d'externalisation et de stimuler la nécessaire transformation du style actuel de développement. Le présent document a simplement pour ambition d'esquisser quelques lignes de réflexion dans cette direction.

#### 1. PROBLEMES D'ENVIRONNEMENT, MECANISMES DE REGULATION ET CONDITIONS INSTITUTIONNELLES

Au-delà d'une des caractéristiques importantes des problèmes d'environnement, qui est l'incertitude élevée existant ex ante, pour toute action de développement, sur les conséquences immédiates et futures, directes et indirectes pour l'environnement, la généralisation des problèmes d'environnement amène à interroger les conditions de régulation des interactions entre processus naturels et processus sociaux et à comprendre ces problèmes comme le résultat de processus d'externalisation, rejetant totalement ou partiellement les considérations liées à l'environnement hors du cadre décisionnel des acteurs sociaux.

Il est utile de distinguer à cet égard deux types généraux de défaillances qui, d'ailleurs, se combinent souvent dans la plupart des questions concrètes. Le premier type est caractérisé par le fait que les phénomènes ou problèmes considérés se trouvent en dehors du champ d'influence du système de régulation existant qui oriente ou détermine le comportement socio-économique des acteurs individuels. Ce premier type de défaillance correspond en quelque sorte à un vide de régulation.

Cette notion a une portée générale pour divers types de société et de systèmes de régulation socio-économiques. Dans une économie planifiée, elle s'applique aux phénomènes et processus qui ne rentrent pas dans la comptabilisation des coûts ou dans la définition des objectifs imposés aux producteurs. Dans une économie traditionnelle non monétaire où la terre est un bien collectif, elle s'applique aux activités individuelles non soumises aux règles collectives d'utilisation des sols et d'organisation du travail.

Dans une économie de marché, cette notion trouve son application dans le concept néo-classique d'effets externes technologiques qui désigne des interdépendances directes, non régulées par l'échange marchand et s'exprimant au travers des arguments des fonctions d'utilité ou de production. L'existence de ces interdépendances est rendue possible par le fait que certains biens et services

d'environnement ne font pas l'objet de droits de propriété, alors que ces droits sont la condition de l'échange. Le concept d'effet externe est utilisé ainsi pour appréhender les diverses situations d'usage individuel de biens libres ou de biens publics: utilisation de ressources naturelles, émission de pollutions dans le milieu, jouissance des aménités d'environnement. La présence de ces effets externes est considérée par les économistes comme portant atteinte aux vertus supposées du marché pour assurer l'allocation optimale des ressources, des facteurs et des marchandises.

Naturellement ce premier type de défaillance conduit à préconiser des solutions d'internalisation qui tendent à réinsérer les phénomènes et problèmes en cause dans le champ d'influence du système de régulation existant. Dans le contexte des économies de marché, on aboutit alors à des instruments tels que les taxes sur la pollution (principe pollueur-payeur) ou les droits de péage pour l'accès aux biens publics. Cette approche constitue un réel progrès en ce qu'elle introduit une régulation là où il n'y en avait pas auparavant. C'est ainsi que la création en France d'agences de bassin mettant en oeuvre un système de régulation économique des prélèvements et des rejets dans l'eau a pu conduire à l'amélioration appréciable de la qualité des rivières. Mais est-ce suffisant ou adéquat? Cela dépend des problèmes, mais il faut compter avec le second type de défaillance, souvent oublié ou méconnu.

Ce deuxième type est caractérisé par le fait que certains problèmes d'environnement résultent du fonctionnement lui-même du système de régulation existant et non pas de son application seulement partielle comme c'est le cas du premier type. Il s'agit alors d'une défaillance ou insuffisance intrinsèque du système de régulation dans le contexte ou la phase historique où il est appliqué.

Cette notion peut, elle aussi, avoir une application générale. En ce qui concerne les problèmes d'environnement, deux questions doivent être mises en avant parmi d'autres: celle de l'inégalité de la répartition du revenu et de l'accès aux facteurs de production (terres, capital) et celle de l'horizon temporel des acteurs individuels:

- Les mouvements de concentration entraînés, à certaines phases, par les conditions de régulation économique ne sont pas neutres pour l'environnement. En modifiant les conditions d'accès aux moyens de satisfaire les besoins fondamentaux, ils induisent des transformations de la rationalité du comportement des individus par rapport à l'environnement et aux ressources naturelles. Par exemple, les paysans pauvres sont souvent condamnés à surexploiter les terres marginales parce que les meilleures terres sont essentiellement utilisées par de grandes exploitations qui, de plus, privilégient souvent les cultures d'exportation. Ainsi les conséquences distributives des systèmes de régulation peuvent être une source majeure "d'externalisation" de l'environnement;
- Les mécanismes de régulation et les structures sociales correspondantes assurent la prééminence d'un certain temps social qui délimite l'horizon temporel des acteurs individuels. La nature de cet horizon temporel est d'une importance considérable pour les problèmes d'environnement, compte tenu des temps parfois très longs qui caractérisent les processus de dégradation ou de renouvellement. La divergence entre la dimension temporelle des processus écologiques et le temps propre au système de régulation peut être elle aussi une source majeure d'externalisation de l'environnement.

Ainsi dans une économie marchande, le fait que les ressources naturelles fassent l'objet d'une appropriation privée et soient engagées dans des processus d'échange n'empêche pas, au contraire, leur surexploitation et le dépassement des capacités de renouvellement des ressources renouvelables (mode d'exploitation minier). L'apparition de problèmes d'environnement dépend alors des rapports entre le temps écologique et le temps économique déterminé par les taux de rentabilité exigés et par les possibilités pour un capital particulier de se dégager du processus d'exploitation des ressources dans lequel il a été investi. Dans certains cas, il peut être plus profitable pour un exploitant de détruire la capacité de renouvellement des ressources par une surexploitation rapide, et d'investir après dans d'autres ressources ou activités, que de maintenir son capital investi dans des ressources alors gérées pour assurer leur renouvellement à long terme.

La prise de conscience de l'existence de ce deuxième type de défaillance renouvelle la problématique de l'internalisation, car les problèmes d'environnement qui proviennent, au moins en partie, de ce type ne peuvent être traités simplement par l'extension des mécanismes de régulation prévalant. Au contraire, la prise en charge de ces problèmes nécessite que leur champ d'influence ou leur rôle régulateur soit réduit au profit d'autres mécanismes qui les substituent ou les complètent. De plus, il convient d'examiner avec un nouveau regard les solutions habituellement proposées pour traiter les problèmes résultant d'un vide de régulation. En étendant d'une manière ou d'une autre le système de régulation prédominant, sommes-nous sûrs de ne pas substituer des problèmes d'environnement du deuxième type aux problèmes du premier type? On peut penser que c'est précisément souvent le cas, soit avec les solutions relevant du paradigme néo-classique du marché, soit avec les solutions purement administratives et réglementaires.

## II. CE QUI ECHAPPE AUX MECANISMES DE MARCHE

La régulation de l'emploi des ressources par l'échange marchand et le mécanisme des prix est celle qui prédomine dans les pays à économie de marché. Du point de vue de l'intégration de l'environnement, elle bute cependant à la fois sur des obstacles relevant des deux types de défaillances.

### La régulation par l'échange et la condition de propriété

L'établissement de droits de propriété sur l'espace et sur les ressources dont l'espace est le support assure leur insertion dans la sphère économique et leur fait bénéficier de la régulation correspondante. Mais cela se fait au prix d'un morcellement ou d'une destructuration de l'environnement, puisque l'espace est alors découpé en parcelles faisant l'objet d'utilisations et de règles de gestion définies par chaque propriétaire individuel. Les solidarités écologiques entre les diverses parcelles, leur complémentarité au regard de l'exercice de fonctions écologiques socialement utiles (entretien des sols, épuration et stockage de l'eau, maintien des conditions climatiques, etc.) ne sont pas reconnues et prises en charge. Chaque propriétaire peut aussi faire des ressources naturelles l'usage qu'il entend sans tenir compte des liaisons écologiques qui relient ces ressources aux autres composantes des écosystèmes. De cette manière, la combinaison d'une multitude d'actions déterminées en fonction de rationalités parcellaires et locales aboutit à des effets globaux et une transformation d'ensemble de l'environnement qui restent ignorés. Les phénomènes d'encombrement et beaucoup de problèmes de pollution peuvent être analysés ainsi.

En fait, deux formes d'activités productives peuvent être distinguées: celles qui contribuent à la dégradation de l'environnement et celles qui, en sus de leur finalité productive propre, participent à l'entretien et à la reproduction du milieu naturel et des ressources. La régulation marchande ne fait aucune différence entre ces deux types d'activités et tend, par le jeu de la concurrence, à assurer la domination des premières, les fonctions d'entretien du milieu naturel et des ressources n'étant pas spontanément prises en charge par le système marchand. C'est le cas par exemple de la transhumance liée à l'élevage qui assure en même temps l'entretien et l'enrichissement de l'ensemble des parcours et se voit condamnée à disparaître parce que la valeur de la production animale tirée de cette forme d'élevage, qui n'est qu'un sous-ensemble de son utilité sociale, ne permet pas, sous l'effet de la concurrence de méthodes de production n'assurant pas les mêmes fonctions, de donner un revenu suffisant aux bergers et éleveurs concernés.

Par ailleurs, un nombre important de ressources ou d'aménités d'environnement ne font pas l'objet de droits de propriété privée et relèvent du statut de biens publics, même si les prélèvements individuels dont ils font l'objet sont insérés comme marchandises dans les mécanismes d'échange (c'est le cas des ressources halieutiques), avec les conséquences dommageables que l'on sait sous forme de surexploitation.

Ces observations amènent à souligner l'insuffisance des mécanismes de marché pour assurer, à eux seuls, une gestion adéquate de l'environnement. Par exemple, pour envisager une réconciliation entre la préservation des sites et la logique marchande, il faudrait que des investisseurs privés achètent tout un site et puissent rentabiliser les fonds énormes engagés en prélevant une rente qui trouverait son origine dans le monopole ainsi constitué. Cette hypothèse suppose en fait que l'ensemble des sites et paysages non appropriés de cette manière soient complètement dégradés pour assurer une rareté suffisante. La régulation marchande de l'entretien des sites ne peut aboutir ici qu'à préserver des poches d'environnement naturel et humanisé de qualité au milieu d'un environnement dégradé à une grande échelle; elle ne peut assurer l'entretien de la qualité de l'ensemble d'un pays.

Il faut voir aussi que l'extension des mécanismes d'échange à une échelle de plus en plus vaste, c'est-à-dire maintenant à une échelle mondiale, a rendu possible une attitude de plus en plus insouciante vis-à-vis des conditions de renouvellement des ressources de chaque espace particulier; il y a un lien étroit entre l'insuffisance d'entretien et de gestion des ressources et de l'environnement dans certaines régions développées d'une part et la surexploitation de type minier des ressources renouvelables et non renouvelables de nombreux pays du tiers monde d'autre part.

#### Temps écologique, temps économique et régulation marchande

La myopie de la régulation marchande tient évidemment d'abord au fait qu'il n'existe pas de marché des biens futurs, ce qui confère une grande incertitude sur les prix relatifs qui prévaudront à l'avenir et sur les conditions respectives de l'offre et de la demande futures. Mais, le deuxième facteur, tout à fait essentiel, qui est porteur de la conception dominante du temps social, est le rôle régulateur confié à la rentabilisation à court terme des capitaux investis, ou à leur équivalent public qu'est le taux d'actualisation.

Chacun sait que l'actualisation introduit une insensibilité progressive à long terme qui est généralement justifiée par le fait de la croissance du revenu économique. Plus le taux d'actualisation est élevé, plus les bénéfices tirés dans le futur des ressources convenablement conservées ou entretenues, doivent

être élevés pour que les décideurs économiques évitent un type d'exploitation minier ou très rapide des ressources. Le souci d'accroître le potentiel de ressources (par l'accroissement de la productivité des écosystèmes par exemple) suppose des investissements dont les résultats ne se font sentir qu'à très long terme et qui ne sont pas compatibles avec un taux d'actualisation élevé. A l'inverse, l'adoption d'un mode d'exploitation minier des ressources renouvelables permet de faire l'économie des coûts d'entretien et de renouvellement et de lever la contrainte sur la pression admissible dans le court terme: cela diminue le montant du capital à investir et permet d'obtenir un produit beaucoup plus élevé à court terme. Si d'autres mécanismes régulateurs que la régulation marchande n'interviennent pas, le niveau du taux d'actualisation va être tout à fait déterminant pour le choix des modes d'exploitation et de gestion des ressources. Il est vrai que des rentes de rareté traduisant l'anticipation de raretés futures peuvent atténuer un peu ce jeu, mais elles ne peuvent jamais avoir la force suffisante - sauf si elles résultent de choix politiques rendus possibles par des positions de non-concurrence, par exemple.

Ainsi, on peut accepter que l'actualisation régule le mouvement d'accumulation du capital, mais il est inadéquat de déterminer les modes de gestion et les rythmes d'exploitation des ressources sur cette base. Il est tout aussi inadéquat de vouloir comparer les coûts d'environnement à long terme avec les coûts économiques classiques par le biais de cet instrument en raison du caractère d'irréversibilité qui s'attache souvent aux processus de dégradation de l'environnement et qui les rend non "compensables".

Si les conséquences négatives de la prédominance des mécanismes de marché pour la gestion des ressources et de l'environnement ne se sont pas encore fait sentir plus, cela tient à deux raisons qui malheureusement peuvent ne plus jouer de la même manière à l'avenir. Tout d'abord, avant l'essor technologique de la période contemporaine, l'échelle de l'action humaine était encore relativement réduite par rapport aux capacités d'absorption des écosystèmes et de l'écosphère, bien qu'on ait pu observer des exceptions très notables à l'échelle régionale - il suffit de se pencher sur l'histoire écologique du bassin méditerranéen pour s'en convaincre. Ensuite, l'intervention juridique, administrative et économique des états et des collectivités publiques territoriales a pu dans le passé apporter un certain nombre de limitations aux effets excessifs des mécanismes de marché. Mais ces modes de régulation sont aussi porteurs de défaillances du deuxième type, aboutissant à créer ou renforcer certains problèmes d'environnement.

### III. LES DEFAILLANCES DE LA REGULATION PUBLIQUE

Au fur et à mesure de l'apparition des problèmes d'environnement, et avec plus ou moins de retard selon les pays, les vides juridiques et administratifs ont été partiellement remplis en ce qui concerne les territoires nationaux - beaucoup reste à faire par contre pour les espaces internationaux, et en premier lieu pour les ressources de la mer et des fonds marins.

Il faut reconnaître que les institutions publiques et l'organisation administrative sont très différentes d'un pays à l'autre et qu'il est difficile de proposer une analyse générale des défaillances propres aux mécanismes de régulation publique. On prendra donc appui sur des observations à partir de la situation française.

### Une prise en compte insuffisante du long terme

La première observation est la grande difficulté qu'a le système politique et administratif à prendre en compte le long terme, quand il s'agit d'environnement, de ressources ou d'espace. Cela tient pour une part à l'horizon propre au fonctionnement administratif (annualités budgétaires) et à l'importance que revêt jusqu'à présent une logique d'équipement, et même de suréquipement, sur la scène politique. Cela tient aussi au fait que d'importants secteurs de l'appareil public orientent leur action en fonction de critères de décision et d'efficacité définis en référence à la régulation marchande - comme par exemple le taux d'actualisation. Cela tient enfin au fait que l'espace, les ressources et l'environnement sont perçus comme des variables résiduelles et mineures par rapport à des enjeux fondamentaux ayant trait aux taux de croissance économique, la défense de la monnaie, la compétitivité des entreprises nationales sur le marché mondial, la maîtrise de technologies de pointe (avion super-sonique, énergie nucléaire, informatique, etc.). Dès lors, les efforts consentis pour assurer la prise en compte de l'environnement sont condamnés à une perspective défensive de limitation des dégâts tendant à préserver certains espaces ou à limiter certains processus, sans qu'il puisse s'agir d'une véritable harmonisation en profondeur de l'environnement et du développement.

### La parcellisation et la sectorialisation de la régulation publique

Ensuite, il faut remarquer que si la régulation marchande dépend du morcellement de l'environnement établi par la propriété privée, l'intervention publique est, elle aussi, marquée par une profonde parcellisation et sectorialisation de l'action; on peut en distinguer les formes suivantes:

- Une parcellisation de l'approche des divers types de ressources; les sols, l'eau, les ressources minérales, etc., relèvent d'administrations différentes et plus ou moins spécialisées. Le principe de gestion sectorielle spécialisée est d'ailleurs appliqué aux divers niveaux de l'administration;
- Une parcellisation de l'approche d'un même domaine de ressources; le plus souvent chaque domaine de ressources fait l'objet à la fois d'une parcellisation territoriale et d'une parcellisation fonctionnelle. Une telle décomposition serait efficiente si elle était complétée par des structures d'intégration suffisantes, ce qui n'est pas le cas. La combinaison de ces deux types de parcellisation (territoriale et fonctionnelle) peut aboutir à plusieurs cas de figure. Dans un premier cas, un domaine de ressources comme la forêt est géré par un acteur ou une institution qui ne l'appréhende que d'un point de vue privilégiant un usage ou une activité, délaissant les autres potentialités ou aspects, qui ne sont pas alors pris en compte dans les modes de gestion. Dans un autre cas, un domaine de ressources est soumis à l'intervention d'acteurs multiples qui, chacun avec ses intérêts et ses objectifs, cherchent à étendre leur influence. Cette compétition pour les ressources et l'espace entraîne à la fois gaspillages et dégradations en raison de l'incompatibilité souvent élevée existant entre les exigences des divers acteurs et entre leurs projets. Les zones de montagne, les zones littorales, et les zones péri-urbaines connaissent actuellement très vivement ce type de situation;
- Une coupure entre les institutions chargées des ressources et celles chargées de la protection de la nature et de l'amélioration de la qualité de l'environnement; cette coupure aboutit à une amplification des conflits entre ceux qui veulent valoriser et exploiter et ceux qui veulent protéger.

Deux types de solutions, également insatisfaisantes, prévalent généralement: soit de mauvais compromis, qui limitent la dégradation sans l'enrayer; soit un clivage spatial des deux objectifs conflictuels: un nombre limité d'espaces fait l'objet d'une protection quasi-absolue, tandis que les autres sont soumis à une exploitation se souciant peu de protection.

Ces multiples parcellisations et coupures font que concrètement les actions publiques sont guidées par des rationalités parcellaires et conflictuelles, analogues, d'une certaine manière, à ce qui se passe sur le marché, et ayant le même genre de conséquences pour l'environnement. C'est pourquoi l'appropriation publique de l'espace et des ressources n'est pas en soi une solution garantissant la prise en compte de l'environnement.

#### Les insuffisances des structures d'intégration

Naturellement, les pouvoirs publics n'ignorent pas les besoins d'intégration de l'action de l'administration et ont mis en place des procédures de coordination intersectorielle ou territoriale. Une des principales fonctions de l'organisation territoriale de l'Etat (régions, départements, cantons, communes, etc.) est précisément d'assurer une telle intégration adaptée aux conditions spécifiques du territoire considéré. Cependant, il est possible de constater les points suivants:

- Demi-échec des structures légères de mission ayant pour but de stimuler les administrations sectorielles afin de leur faire intérioriser des attitudes nouvelles vis-à-vis des problèmes d'environnement. En fait le terme de coordination est trop faible pour répondre réellement aux besoins d'intégration liés à la prise en compte de l'environnement;
- Face aux pressions tendant à assurer une coordination et une intégration inter-sectorielle, l'attitude des administrations sectorielles est celle d'une intégration sectorielle à prétention globale, ces diverses tentatives d'intégration entrant en conflit et n'aboutissant certainement pas à une véritable harmonisation: chaque administration tend à se présenter comme celle qui est la mieux placée pour intégrer le tout. Ainsi, à la parcellisation initiale se substitue alors une compétition entre des approches partiellement intégratrices mais à prétention exclusive. Le lieu de cette compétition se trouve être précisément les structures prévues pour assurer une coordination d'ensemble, telles les commissions interministérielles, dont les fonctions réelles se trouvent ainsi profondément biaisées;
- Si on considère l'organisation territoriale de l'Etat, on peut constater qu'elle relève surtout à présent d'une juxtaposition entre, d'une part, une centralisation excessive, rendant délicate une adaptation aux conditions spécifiques des problèmes d'environnement à l'échelon local, et, d'autre part, un esprit de clocher au niveau des unités territoriales de base, qui traduit leur insensibilité à des enjeux ou des problèmes d'environnement ayant un caractère plus global. Ce dernier trait tient fortement aux modes de financement des collectivités locales qui les amènent notamment à développer une compétition par l'équipement. Quant à la coopération intercommunale, qui a obtenu des résultats non négligeables pour des problèmes délimités (voiries, adduction d'eau, etc.), elle est soumise à une régulation politique qui rend difficile la prise en charge de problèmes plus globaux et l'adoption d'actions qui ne se réduisent pas à un saupoudrage des différentes communes impliquées.

### Les inadéquations de l'approche réglementaire

Si l'on considère à présent les moyens réglementaires d'intervention à la disposition des pouvoirs publics, plusieurs remarques doivent être faites:

- Les moyens privilégiés d'intervention sur l'espace que sont le zonage et la réglementation de la densité d'occupation des sols permettent certainement, s'ils résistent aux pressions spéculatives, de préserver certains sites, mais ils ne constituent pas un moyen d'assurer une gestion écologiquement saine de l'espace qui tout à la fois favorise le développement socio-économique et préserve la qualité de l'environnement. Ainsi, le zonage s'avère parfaitement contradictoire avec une organisation de l'espace fondée sur les aptitudes écologiques du milieu, puisqu'une telle organisation supposerait une intégration complexe des diverses fonctions et, par là, la coexistence harmonisée sur un même espace proche de multiples activités (production agricole, établissements industriels, habitat, espaces ouverts, etc.) dans une perspective mise en avant par les travaux de planification écologique;
- La combinaison de l'action réglementaire et de la régulation marchande aboutit souvent à ce qu'on peut appeler des effets pervers, aussi bien pour la gestion de l'espace que pour celle des ressources. Le pouvoir réglementaire peut faire et défaire les valeurs foncières, constituant par là une formidable pression à la spéculation liée aux mécanismes de dérogations. Ce faisant, elle intervient directement dans le comportement patrimonial des individus et peut aboutir à l'abandon de comportements qui assuraient traditionnellement la gestion patrimoniale de l'environnement et des ressources. Les réglementations destinées à protéger les ressources ou à limiter les prélèvements peuvent aussi avoir des effets opposés à ceux qui sont recherchés. C'est par exemple le cas pour les coquilles Saint-Jacques: la réglementation portait sur le nombre d'heures d'utilisation des bateaux destinés à cette pêche; elle a en fait abouti à ce que chaque entreprise se suréquipe pour pouvoir bénéficier d'un maximum de rendement pendant les heures d'exploitation; l'ampleur des investissements consentis a alors rendu nécessaire le maintien de l'exploitation des ressources à un niveau élevé pour assurer une rentabilisation suffisante. Dans ce cas la réglementation n'a finalement pas évité la surexploitation mais a conduit aussi à une dépense excessive de capital;
- Par ailleurs, l'action réglementaire est de nature statique et réactive, et au demeurant peu stimulante - une fois que la norme ou le règlement est satisfait; elle aboutit vite à une bureaucratie formelle.

Au total, si l'action réglementaire est en tout état de cause nécessaire, elle doit trouver sa place dans un ensemble d'actions à caractère beaucoup plus dynamique et prospectif et évitant l'apparition des effets pervers indiqués.

On est ainsi conduit à rechercher des formes adaptées de régulation publique de l'environnement, comme la création d'agences chargées spécifiquement de la gestion d'un milieu naturel ou d'un problème d'environnement (l'eau, l'air, le sol, les déchets). C'est une solution qui a été appliquée dès 1964 en France dans le domaine de l'eau, et dont l'application s'est généralisée à partir de 1975 pour les problèmes de l'air, des déchets ou de l'espace (Conservatoire du Littoral). L'intérêt des agences est de constituer un lieu de négociation entre l'administration, les entreprises et, dans une moindre mesure, le public. L'expérience montre cependant que le rôle des agences est limité d'une part par la pression des intérêts économiques qui s'y exercent, d'autre part par l'insuffisance des moyens réglementaires et de contrôle dont elles disposent,



ceux-ci restant mis en oeuvre par les administrations sectorielles. Enfin les agences ne peuvent prendre en compte les interdépendances entre milieux.

Ainsi, la régulation publique, normalement destinée à pallier les déficiences de la régulation marchande, joue partiellement ce rôle, et contribue par ailleurs à de nouvelles formes d'externalisation de l'environnement en raison de son organisation propre et de ses moyens d'intervention. Il reste donc à se demander sur quelle base faire reposer un système de régulation du développement qui assurerait réellement une prise en compte profonde des considérations liées à l'environnement.

#### IV. VERS UNE NOUVELLE ORGANISATION INSTITUTIONNELLE

Les défaillances et limites de la régulation marchande, de la régulation politique et des logiques sectorielles administratives sont telles qu'il n'est pas possible de confier la tâche de la prise en compte de l'environnement exclusivement à l'une d'entre elles. Il ne s'agit pas non plus de dessaisir les divers acteurs actuellement impliqués dans les tâches de gestion de l'environnement et des ressources ou dans les tâches de développement économique et social (acteurs privés, administrations, collectivités locales, élus politiques, etc.) pour confier la prise en compte de l'environnement à une institution de gestion spécialisée. Par contre, il est clair qu'il est nécessaire de ménager de nouveaux rapports entre ces acteurs de manière à enrayer les processus d'externalisation de l'environnement dont on a pu constater l'existence. Pour ce faire, il nous semble que les représentants organisés de la société civile - c'est-à-dire les acteurs qui n'appartiennent pas à l'appareil d'Etat ni à la sphère du marché, mais qui se définissent à côté ou en opposition à l'un et l'autre - pourraient avoir un rôle tout à fait déterminant.

La deuxième orientation est la suivante. Le souci d'assurer à la fois la prise en compte des enjeux locaux et globaux des problèmes d'environnement amène à préconiser la réorganisation des structures territoriales et à établir de nouveaux rapports entre les divers niveaux du système de planification ou d'orientation du développement.

Enfin, pour dépasser à la fois les inconvénients propres à la régulation marchande et à l'action administrative réglementaire, un rôle pilote devrait être donné à la régulation contractuelle, avec des programmes-contracts qui seraient le lieu par excellence de l'intégration des considérations liées à l'environnement et à la gestion des ressources dans les programmes de développement et d'aménagement. Reprenons ces divers points.

#### Changer le contexte décisionnel des acteurs gestionnaires de l'environnement

Tout d'abord la prise en compte de l'environnement n'implique pas, au contraire, qu'on désaisisse les acteurs des gestions dont ils sont responsables, et ce malgré les défaillances et insuffisances qu'on a pu noter. Mais cela demande que l'on change le cadre institutionnel à la fois économique et administratif dans lequel ces acteurs exercent leur fonction de gestionnaire des ressources et du milieu. Aussi l'objet d'institutions spécifiques liées à la gestion de l'environnement et des ressources est-il, non d'assumer principalement une tâche de gestion directe, mais de faire prendre en compte d'une manière efficace par les acteurs directs de la gestion tous les éléments pertinents qui dépassent a priori leur propre cadre de référence, en sachant très bien que cette internalisation ne saurait être spontanée et qu'elle doit faire l'objet d'une activation permanente luttant contre les tendances à l'externalisation interne. Cela nécessite que les structures institutionnelles liées à la prise en compte

de l'environnement et à la gestion des ressources naturelles ne soient pas confondues dans les institutions habituelles d'orientation et de planification du développement ou de l'action administrative ou encore de l'organisation économique marchande.

Ce principe d'internalisation suppose, pour être mis en oeuvre, que soient adoptées des politiques d'action contextuelles sur les acteurs directs de la gestion de l'environnement et des ressources. Il s'agit par exemple de rompre les mécanismes actuels du marché foncier avec ses mouvements spéculatifs tout en protégeant les comportements de type patrimonial qui tendent à assurer la reproduction des ressources et des milieux. L'enjeu est en quelque sorte ici de restaurer la responsabilité de la société civile vis-à-vis des ressources et de l'espace en la dégagant de l'emprise croissante de la seule rationalité marchande. Dans cette perspective, un instrument privilégié pourrait être des contrats de gestion négociés entre les représentants de la collectivité publique, les agents individuels (propriétaires de l'espace) et des organisations civiles attachées à la préservation de l'environnement ou à la gestion des ressources (associations de défense de l'environnement, etc.). De tels contrats de gestion se définiraient, au plan du droit, comme des servitudes de droit privé et devraient donc comprendre des mécanismes de compensation et de financement.

Un autre élément important de changement du contexte serait, le thème n'est pas nouveau, une profonde réforme des finances locales pour rompre le lien qui unit si fortement la réalisation d'équipements toujours plus nombreux et la densification de l'utilisation de l'espace avec l'alimentation des caisses des collectivités territoriales.

En ce qui concerne les organisations civiles non directement insérées dans des activités économiques et qui ne sont pas liées à l'appareil d'Etat, deux fonctions majeures pourraient leur être attribuées:

- D'abord, dans certains cas, elles pourraient assumer des fonctions de gestionnaire direct de certains espaces ou de certains domaines de ressources;
- Ensuite, et de manière plus importante, il leur appartiendrait de stimuler de manière permanente les entreprises privées, les élus politiques et les représentants de l'administration pour assurer une prise en compte adéquate de l'environnement. Ce faisant, ces organisations auraient l'avantage de mettre en évidence les problèmes locaux et les conditions spécifiques propres à chaque espace micro-régional, de souligner les incohérences ou les insuffisances des actions de l'administration, de rassembler les informations nécessaires pour éclairer une gestion d'ensemble ou les impacts possibles de certains projets, d'élaborer de nouvelles options de développement, d'équipement, d'aménagement ou de gestion, de participer aux travaux d'orientation, de planification, etc.

Naturellement, cette forme d'institutionnalisation de la société civile suppose que des moyens propres soient dégagés pour permettre à ces organisations de faire face réellement à ces nouvelles fonctions (moyens d'information, moyens d'études, moyens financiers). Il faut souligner d'ailleurs que le rôle conféré à ces organisations ne signifie pas qu'on les considère a priori comme plus aptes à prendre en charge toutes les questions liées à l'environnement que ne l'ont été dans le passé le marché, l'administration ou le système politique. Mais il faut plutôt concevoir leur intervention comme un moyen de déclencher une nouvelle dynamique plus favorable du point de vue de l'environnement et tendant à modifier les rapports entre les partenaires habituels du développement et de

la protection de l'environnement; de cette manière, par un changement des cadres de référence des divers acteurs, on peut espérer parvenir à rapprocher les rationalités parcellaires des gestions individuelles ou sectorielles d'une rationalité plus globale correspondant au souci d'assurer l'harmonisation en profondeur entre l'environnement et le développement.

Mais l'institutionnalisation de la prise en compte de l'environnement ne nécessite pas seulement la redéfinition du rôle des divers acteurs publics et privés; elle implique aussi une nouvelle organisation territoriale des structures institutionnelles.

#### Une nouvelle organisation territoriale et de nouveaux rapports entre niveaux

Il convient d'abord d'assurer un rééquilibrage du pouvoir économique et administratif au profit des instances locales et régionales. Ce rééquilibrage est destiné à permettre une revalorisation de la place des aspects physiques et spatiaux du développement, largement sous-estimés dans les conceptions centralisées de la planification où les objectifs et les stratégies formulés en termes macro-économiques ne sont finalement régionalisés qu'au bout du processus, sans que la prise en compte de l'espace ne soit autre chose qu'un cadre de décomposition du plan national. Il a aussi pour but de rendre possible l'effort nécessaire d'adaptation à la diversité et à la spécificité des conditions écologiques et des problèmes de gestion des ressources et des milieux, un tel effort ne pouvant évidemment se faire à l'échelon central. Il faut souligner que ce mouvement de rééquilibrage ne doit pas seulement être entrepris dans le domaine de la gestion des ressources et de la protection des milieux, mais doit affecter de la même manière la structure décisionnelle impliquée dans les choix de développement économique, faute de quoi la gestion régionale et locale de l'environnement serait condamnée à s'opposer, dans une perspective étroitement défensive, à une orientation du développement impulsée principalement à un échelon central et sans considération pour les problèmes d'environnement.

Cette première proposition de rééquilibrage semble s'inscrire dans un courant d'idées, très fort de nos jours, prônant la décentralisation des décisions de l'Etat central vers les collectivités locales ou vers les entreprises.

En fait, la problématique courante de la décentralisation apparaît, dans une large mesure, insuffisante ou inadéquate. En tant que telle, elle ne saurait constituer une réponse aux besoins d'intégration que nous avons soulignés et qui résultent du morcellement des processus de production et de la propriété de l'espace ainsi que de la parcellisation fonctionnelle ou territoriale de l'action administrative. La décentralisation n'est pas à même non plus d'assurer correctement une articulation entre le local et le global du point de vue de l'environnement alors qu'il s'agit d'un des aspects fondamentaux de la thématique de l'environnement.

Qu'est-ce en fait que la décentralisation? Dans l'esprit de la plupart de ceux qui la revendiquent, elle se traduit essentiellement par un transfert de pouvoir du niveau central vers les niveaux locaux dans le cadre d'une structure territoriale qui répartit les responsabilités et les moyens entre les divers niveaux territoriaux, en concevant ce partage comme exclusif. Selon le degré d'importance des décisions, elles sont considérées comme relevant du centre ou du niveau régional ou local. Le plus souvent, derrière la revendication de décentralisation, on trouve la volonté de se débarrasser de toute tutelle de l'Etat central. L'application de cette approche aux problèmes d'environnement

conduirait à distinguer parmi les décisions ayant un impact sur l'environnement, selon l'ampleur de cet impact, entre celles qui doivent être considérées au niveau local et celles qui doivent être considérées aux divers échelons intermédiaires jusqu'au niveau central.

Une telle spécialisation des problèmes et des décisions entre les divers niveaux territoriaux sous-estime considérablement le fait que la plupart des décisions ont à la fois des implications locales, régionales et globales et que toute affectation spécialisée de décisions particulières à un niveau territorial donné se révèle en fait souvent arbitraire et mutilante. C'est dire que la plupart des décisions appellent une implication des divers niveaux territoriaux et que la question centrale qui se pose est celle de l'organisation de cette implication pour parvenir à une décision prenant en compte à la fois les intérêts et objectifs locaux, régionaux et nationaux, voire internationaux. Cela nécessite de nouveaux rapports entre les niveaux en limitant les zones de responsabilité exclusive et en étendant les zones de responsabilité conjointe.

Cette conception des rapports entre niveaux qui cherche à répondre à la double exigence d'adaptation aux conditions spécifiques et de prise en charge des interactions entre les divers sous-systèmes aboutit à ce que la gestion des milieux et des ressources doive être assurée par une structure à plusieurs niveaux mettant en oeuvre une co-gestion de ces divers niveaux aux dépens de relations hiérarchiques.

Il devient alors illusoire de rechercher le meilleur niveau auquel il est possible de rechercher de manière exclusive la prise en compte de l'environnement car, quels que soient les critères que l'on puisse retenir, aucun niveau n'est capable à lui seul de répondre correctement aux diverses exigences qu'elle implique. Par exemple, si on considère la question de la gestion de l'eau, l'échelle des bassins s'avère être une échelle judicieuse, mais elle ne peut être la seule et d'autres échelles territoriales doivent être adoptées pour traiter de problèmes tels que le nettoyage de certaines rivières ou la gestion de nappes phréatiques.

Le refus de cette approche de la décentralisation et la recherche de nouveaux rapports entre les divers niveaux d'organisation territoriale mènent à un ensemble de problèmes encore insuffisamment explorés. La remise en cause du caractère hiérarchique de ces relations doit aboutir à donner à chaque niveau un pouvoir autonome de blocage des décisions qui constitue une sorte de reconnaissance de la légitimité de la spécificité de son point de vue. Il est nécessaire aussi que l'ensemble des divers niveaux soit stimulé à coopérer effectivement entre eux et à ne faire jouer leur pouvoir de blocage que dans certaines situations extrêmes. Il s'agit donc de trouver les moyens institutionnels associant à l'utilisation du pouvoir de blocage un coût élevé pour celui qui en est responsable.

Il est certain aussi que la mise en oeuvre complète de cette co-responsabilité de l'ensemble de la structure territoriale de planification et d'administration vis-à-vis de la gestion des milieux et des ressources suppose une structure de concertation inter-niveaux qui pourrait notamment se concrétiser dans des contrats de gestion négociés entre partenaires publics de divers niveaux.

S'il est acquis que c'est l'ensemble d'une structure territoriale à plusieurs niveaux qui est pertinente pour se saisir à la fois des aspects locaux et globaux de l'environnement, il reste à savoir quels sont les niveaux qu'il convient de privilégier. On aboutit alors à deux problèmes: le premier est celui du découpage territorial le plus adéquat pour l'environnement et la gestion des ressources, s'il en existe un; le deuxième résulte du fait que le découpage

territorial des institutions publiques doit normalement répondre à des critères administratifs, économiques, écologiques, historiques, culturels et politiques, autrement dit qu'aucun découpage territorial ne peut satisfaire à la fois aux divers critères qui doivent présider à sa définition.

En ce qui concerne le premier problème, il faut remarquer que chaque domaine de ressources, de manière plus ou moins marquée, implique une certaine échelle spatiale pour sa gestion. La prise en compte de ces espaces de gestion propre à chaque ressource aboutirait à autant de découpages spatiaux que de types de ressources considérées (eau, forêts, etc.). On peut aussi partir des problèmes de la gestion de l'espace, qui est centrée sur les interactions entre les divers types de ressources, entre les activités qui les mettent en valeur, et qui vise la gestion de la qualité d'ensemble des milieux, qualité résultant de la confrontation des diverses activités et demandes concurrentes. Le découpage territorial répondant le mieux aux exigences de gestion de l'espace est donc celui qui permet la prise en charge maximale de ces interactions et qui est donc défini en fonction du niveau de leur densité.

L'opposition entre le découpage territorial issu soit de critères internes à chaque domaine de ressources, soit des conditions de gestion globale de l'espace illustre bien l'alternative: le plus important est-il l'intégration interne à un domaine de ressources ou un secteur ou bien l'intégration externe liée à la confrontation des activités, des domaines et des secteurs?

Il semble que du point de vue de l'environnement, l'intégration externe est celle qui ait le plus manqué jusqu'à présent.

Quoi qu'il en soit, il sera toujours nécessaire de recourir à plusieurs types de découpage territorial pour assumer ces diverses fonctions d'intégration. La question essentielle est celle de savoir quel doit être le découpage de base et quels sont les découpages plus spécifiques qui se greffent sur ce dernier. Le problème posé est alors analogue au problème plus général à résoudre.

Si on privilégie les questions d'intégration externe, le découpage territorial devrait être abordé à partir des deux notions d'espaces de problèmes et d'espaces de solutions. Il s'agit en effet de distinguer des unités territoriales telles qu'on soit à même d'identifier et de se saisir des principaux problèmes qui les concernent, et aussi et surtout qu'on dispose de marges de liberté suffisantes sur les diverses variables de choix pour qu'il soit possible de mettre en oeuvre de réelles solutions. Par exemple, les problèmes d'environnement posés par les zones littorales soumises à de multiples pressions et demandes contradictoires ne peuvent trouver de solution si on définit l'espace littoral comme une bande d'un kilomètre de large: il convient là d'intégrer l'arrière-pays pour regagner des marges de liberté pour l'aménagement de l'espace et le choix des localisations.

Cependant, il est clair qu'une telle organisation territoriale ne pourra jamais être également satisfaisante pour tous les problèmes liés à l'environnement; elle devra donc être considérée comme le noyau autour duquel s'organiseront des procédures complémentaires correspondant à d'autres découpages spatiaux et plus adaptées à certaines questions au contenu spécifique.

Il n'y a pas à cet égard un découpage territorial unique qui soit le bon découpage et qui satisfasse tous les points de vue. Au lieu de le chercher il faut partir plutôt du point de vue qu'on ne le trouvera jamais et que c'est cependant dans ces conditions-là qu'il faut parvenir à trouver des solutions institutionnelles au problème de l'organisation territoriale.

Les solutions complémentaires à mettre en oeuvre seront ce qu'on appelle des solutions non institutionnelles, dans le sens où il ne s'agira pas d'institutions territoriales publiques. Elles peuvent donc prendre les formes les plus diverses et les statuts les plus différents en fonction des problèmes spécifiques d'interface qu'elles auront pour objet de prendre en charge. Il peut s'agir, par exemple, d'associations du type loi de 1901 regroupant des acteurs privés, des collectivités locales et des représentants des divers niveaux territoriaux de l'Etat, et il faut dire qu'actuellement de nombreuses formules de coopération entre ces partenaires prennent cette forme d'association.

Ces structures complémentaires peuvent aussi être des comités de développement, des syndicats cantonaux d'aménagement rural, des syndicats intercommunaux à vocations multiples (SIVOM), etc.

Dans le cadre français, cette réflexion conduit à vouloir renforcer les deux niveaux que sont d'une part la région et d'autre part le pays, sorte de micro-région, intermédiaire entre le canton et le district, où pourraient être mieux traitées la programmation des équipements, l'orientation du développement et la gestion des milieux.

#### Vers l'extension de la régulation contractuelle: les programmes-contrats

La volonté de faire intervenir, dans le domaine de la gestion des ressources et de la prise en compte de l'environnement, des acteurs aussi divers que des administrations sectorielles et des collectivités locales, des représentants du pouvoir politique, des entreprises et des agents économiques, et enfin diverses formes d'organisations de la société civile, pose naturellement le problème de la forme commune d'action qui peut les rassembler, et des rôles spécifiques qui reviennent à chacun.

Puisque le but de la redéfinition du rôle des acteurs est de dépasser à la fois des logiques sectorielles de l'administration, la rationalité de l'économie marchande et la simple régulation politicienne, une nouvelle organisation des rapports entre acteurs doit éviter que chaque acteur puisse agir dans sa zone de responsabilité en fonction de sa logique propre. Il convient par exemple de limiter les zones de responsabilité sans contrôle de l'administration en soumettant celle-ci à un contrôle beaucoup plus étroit de la part des élus politiques et de la société civile. Il en est de même en ce qui concerne les divers agents économiques. Quant aux élus locaux, il paraît exclu qu'on leur laisse les mains libres en ce qui concerne la gestion des ressources et des milieux. En quelque sorte, il s'agit d'insérer des contre-pouvoirs ou des contre-influences au sein de chaque zone d'influence et de pouvoir.

La réalisation d'un tel projet ne peut certainement pas être mise en oeuvre par la seule approche réglementaire ou par le jeu pointilliste des incitations financières. Pour initier une réelle dynamique de prise en charge de l'environnement, il semble que la régulation contractuelle soit le moyen le plus adéquat et le plus puissant. Aussi bien est-il possible de proposer une extension considérable des rapports contractuels entre les divers acteurs concernés par les objectifs et les tâches du développement et de la protection de l'environnement. Ces rapports contractuels ne s'établiraient donc plus seulement entre l'Etat central et les collectivités locales ou entre l'Etat centre et les représentants du monde économique, mais aussi à l'intérieur de l'administration entre ses divers niveaux et entre cette dernière et les agents économiques, les collectivités territoriales et les organisations de la société civile.

Le souci d'assurer le regroupement de l'action des divers acteurs concernés par la gestion des ressources pourrait se manifester dans la notion de programme-contrat de développement, d'aménagement et de gestion des ressources, qui serait le véhicule privilégié de l'établissement de modes de développement harmonisés avec les conditions d'une gestion à long terme des ressources et de l'environnement. Ces programmes-contrats seraient définis dans le cadre territorial le plus adéquat selon la nature des problèmes considérés. Comme on l'a noté plus haut, on peut cependant penser que c'est au niveau de la région et au niveau du pays qu'il serait le plus judicieux d'entreprendre l'organisation de leurs négociations tout en maintenant les contrats de branche qui ne devraient pas être abandonnés. Pour certains problèmes à caractère plus spécifique, ces programmes-contrats pourraient être éventuellement élaborés et mis en oeuvre dans un cadre spatial différent qui est celui des solutions complémentaires évoquées plus haut (structures inter-régionales ou inter-cantoniales par exemple).

Ces programmes ne devraient pas être des projets isolés mais un ensemble intégré d'actions ou de projets complémentaires tendant à favoriser d'une part l'émergence de systèmes d'activités où les interrelations puissent être davantage qualifiées de synergies que d'externalités négatives, et d'autre part la mise en place de systèmes d'ensemble de gestion des ressources et des milieux prenant en considération les besoins d'intégration interne et externe à chaque domaine de ressources. Ces programmes, qu'on peut donc appeler intégrés, autoriseraient aussi, par les plages de négociation qu'ils ouvrent, un jeu de compensation possible entre les divers partenaires impliqués par leur élaboration et leur mise en oeuvre. Les désavantages subis par certains du fait d'une action peuvent être compensés par les avantages retirés d'une autre action sans que chacune d'entre elles doive nécessairement assurer par elle-même la compensation de l'ensemble des désavantages dont elle est responsable. De cette manière, on peut tendre à limiter l'importance des oppositions absolues en ouvrant les possibilités d'harmonisation; de ce fait, on éviterait des situations de blocage déjà trop fréquentes et qui ne manqueraient pas de devenir un problème majeur si l'on voulait simplement associer un plus grand nombre d'acteurs à un jeu institutionnel relevant des mêmes règles de fonctionnement que celles que l'on connaît aujourd'hui.

Naturellement, de tels programmes ne peuvent avoir une force d'impulsion réelle que s'ils ne sont pas seulement un document de référence comme tant de documents de planification, et s'ils aboutissent à des engagements fermes liant au plan du droit les divers partenaires; ils doivent donc effectivement aboutir à des engagements contractuels. Comme il s'agit d'établir une certaine permanence dans les options et d'éviter une remise en cause incessante par des pressions provenant soit des logiques politiciennes soit des logiques économiques, il convient que de tels programmes et les engagements contractuels correspondants aient un horizon temporel qui est celui du moyen terme, ou soient même définis sur une base permanente s'il s'agit d'actions de gestion de base des milieux.

Evidemment, l'insistance sur les relations contractuelles constitue aussi une reconnaissance du droit des divers partenaires de refuser de s'engager contractuellement sur un programme. Il est donc nécessaire que ces formules contractuelles ne restent pas des formules marginales par rapport aux circuits de financement public existants, mais qu'elles deviennent un des principaux canaux de circulation de ce financement public; cela serait de nature à rendre ces programmes-contrats suffisamment attractifs pour susciter le désir des divers partenaires de s'y engager. D'autre part, il faut aussi que soient prévues des positions de repli constituées par des solutions beaucoup plus

traditionnelles. Ainsi la réglementation devrait à la fois définir un certain nombre de protections minimales au caractère impératif, et constituer un recours en cas d'échec des solutions recherchées au travers des programmes-contrats.

Cette formule des programmes-contrats présente enfin l'avantage de ne pas plaquer partout la même structure institutionnelle, les mêmes actions et les mêmes priorités, puisqu'en fait il appartient aux divers acteurs associés à leur élaboration d'en définir le contenu et les modalités.

En conclusion, la formule des programmes-contrats devrait constituer le moyen concret de donner un contenu à un projet politique et social d'environnement dont il faut souligner l'absence réelle dans la situation présente.

#### BIBLIOGRAPHIE

- J.P. BARDE et E. GERELLI, Economie et politique de l'environnement, Paris P.U.F., 1977.
- D.W. BROMLEY, "Property rules, liability rules and environmental economics", Journal of Economic Issues, vol. XII, n° 1, March 1978.
- M. FALQUE, "Environnement et contrôle social de l'espace" Futuribles, n° 18, décembre 1978.
- O. GODARD, Aspects institutionnels de la gestion intégrée des ressources naturelles et de l'environnement, Paris, Ed. de la Maison des Sciences de l'Homme, 1980.
- O. GODARD et I. SACHS, "Environnement et développement: de l'externalité à l'intégration contextuelle", Mondes en développement, n° 24, 1978.
- L.P. MAHE, "Une note sur la théorie des ressources naturelles libres", Revue d'économie politique, T. 85, n° 5, septembre-octobre 1975.
- A. PALANCHON et A. JOVENIAUX, L'étude d'impact en France: éléments de pathologie, Paris, Ministère de l'Environnement et du Cadre de Vie, 1978.
- D.C. RANNEY, Water Quality Management: An Analysis of Institutional Patterns, Madison University of Wisconsin Press, 1972.
- S. SIGAL, "Pauvreté et pollution", Nouvelles de l'écodéveloppement, n° 1, février 1977.
- R.M. SOLOW, "The economics of resources or the resources of economics" Richard T. Ely Lecture, American Economic Review, vol. 64, n° 2, May 1974.



### THE THIRD SYSTEM PROJECT

Papers transmitted by the International Foundation for  
Development Alternatives

#### INTRODUCTORY NOTE

The International Foundation for Development Alternatives (IFDA) of Nyon, Switzerland, was set up in 1976 with the aim of mobilizing and supporting a growing network of individuals from all parts of the world who are committed to and engaged in alternative approaches to local and national development and international co-operation. It is inspired by the concept of "another development" enunciated in the 1975 Dag Hammarskjöld Report - development that is need-oriented, self-reliant, endogenous and in harmony with the environment; such development will require structural transformations, which are in the interest of industrialized countries as well as those of the third world.

Since 1978, IFDA has been implementing a project aimed at broadening and deepening discussion of development issues by the extra-governmental community, the "third system". This "Third System Project" is intended to give a voice to those who are rarely or never given an opportunity to participate in the international debate and thus contribute to the formulation and implementation of a new United Nations development strategy.

Written contributions to the Third System Project are being published in the IFDA Dossier. Its contents cover issues and cases in four main areas: local development initiatives, national transition strategies, third world collective self-reliance and North-South arrangements.

As an illustrative contribution from the Third System Project to the Ljubljana seminar, IFDA transmitted four papers selected from the IFDA Dossier, which are briefly presented below.\*

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\*Further information on IFDA, the Third System Project and the IFDA Dossier may be obtained by writing to: IFDA, 2 place du Marché, CH-1260 Nyon, Switzerland.

1. CHOICE OF ENERGY AND SOCIETAL CHOICES:  
MYTHS AND REALITIES OF SOFT ENERGY PATHS  
(IFDA DOSSIER 5, March 1979)

Paper prepared by Jean-Charles HOURCADE\*

Summary

The tenet of this paper is that the proliferation of studies on soft energy paths is a symptom, within the scientific world, of the refusal to accept the inevitability of nuclear energy. These studies have the merit of widening options for arriving at very low levels of per caput energy consumption. However, in putting forward apparently technical solutions, they neglect the full impact of these on the organization of society and they underestimate the opposition to change arising from social inertia.

The paper contains the principal conclusions from an analysis of the specific energy scenarios listed below:

John S. Steinhart et alii: A Low-energy Scenario for the United States 1975-2050, Institute for Environmental Studies, University of Wisconsin, Madison, IES Report 83, July 1977.

A time to choose Scenario ZEG (Zero Energy Growth), project of the Ford Foundation, Ballinger, 1977.

Amory B. Lovins: "Exploring energy-efficient futures for Canada", Carnets d'Epargne, Conseil des Sciences du Canada, vol. 1, No. 4, May-June 1976.

B. Sorensen, "Energy and resources", Science, vol. 189, No. 4198, 25 July 1975.

Work Group of the International Federation of Institutes for Advanced Study, Energy Demand in Denmark 1990-2025: A Case Study, Nils Bohr Institute, September 1976.

Lönnroth, Steen and Johanson, Energy in Transition, Secretariat for Future Studies, Stockholm, 1977.

G.S. Harris, M.J. Ellis, G.C. Scott, J.R. Wood and P.H. Philips, "Energy scenarios for New Zealand", University of Auckland, Auckland, Energy, vol. 2, pp. 1-14, Pergamon Press 1978.

"US energy demand: some low energy futures", Demand and Conservation Panel of the Committee on Nuclear and Alternative Energy Systems (CONAES), Science, vol. 200, 14 April 1978.

Projet ALTER, Etude d'un avenir énergétique pour la France axé sur le potentiel renouvelable, Esquisse d'une régime à long terme tout solaire par le Groupe de Bellevue.

Assessment of Alternative Energy/Environment Futures for Austria: 1977-2015, 25 October 1977, Schloss Laxenburg, Austria.

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The following excerpt from the original French text, dealing with problems of transition to a new energy economy, would seem to be of particular interest:

"Les problèmes de la transition: quelques obstacles socio-politiques"

Plutôt que la discussion purement technique sur l'optimisme de tel ou tel coefficient d'économie adopté ou du jugement qu'on peut porter sur tel objectif adopté en matière de mode de vie, la priorité nous semble devoir être donnée à l'analyse du passage entre la situation actuelle et le régime à long terme. Un certain nombre de travaux donne quelque éclairage sur ce point (Alter, scénario suédois) mais force est de reconnaître que la remontée de l'image à long terme vers l'image de départ est rarement effectuée. C'est pourquoi nous présenterons surtout une série d'interrogations sur des "non dits" qui nous paraissent décisifs dès lors qu'on passe aux politiques concrètes d'application.

1. Les pré-supposés économiques des sentiers doux: le problème des contraintes extérieures

Même s'il est totalement non pertinent d'utiliser une analyse économique traditionnelle pour raisonner sur le très long terme, on ne saurait, comme le fait A. Lovins, justifier l'absence de tout recours aux prix de l'énergie. En effet, toute stratégie de réduction de la demande d'énergie ne peut se justifier que par rapport à un niveau donné des prix implicites sauf à perdre toute critère de cohérence. Une isolation totale des bâtiments ( $G=0$ ) est théoriquement possible si on admet des coûts d'investissement illimités. L'exercice effectué par le CONAES montre par exemple que des niveaux voisins de ceux envisagés par A. Lovins pour les USA deviennent économiquement justifiés sur la base d'un quadruplement des prix de l'énergie entre 1975 et 2000.

Les deux critères sous-jacents à tous les "sentiers doux" sont:

- une taux d'actualisation bas significatif d'une meilleure prise en compte du long terme pour accepter de supporter des sur-côûts d'investissement, que ce soit au niveau des appareils utilisateurs ou dans la sélection de l'offre d'énergie;
- une hausse tendancielle des prix de l'énergie et une politique systématique d'anticipation de cette hausse.

Ces deux critères doivent permettre d'orienter l'économie vers des investissements massifs dans le secteur énergétique (production et économies d'énergie) pendant une longue durée. Mais, même si, à long terme, les investissements exigés sont plus faibles que dans le cas d'une stratégie acceptant le dérapage de la demande, le risque existe, pour tout pays qui prendrait le premier la décision de relever ses prix intérieurs, de grever la compétitivité de son économie sur les marchés internationaux.

Par rapport à cette contradiction, deux types de solutions sont envisageables:

- le premier (Alter (FR), Auckland (NZ), IES Wisconsin (USA) est la réalisation progressive d'une économie tendant à l'autarcie et où la nécessité d'exporter est réduite au maximum. Une telle solution n'est pas à exclure a priori mais on peut douter de sa cohérence pratique en termes de "système industriel complet" dans un espace national en l'état actuel du développement prévisible des techniques. Il conviendrait donc de faire l'hypothèse d'un modèle technologique permettant de revenir sur les

économies d'échelles, c'est-à-dire de réaliser des petites et moyennes industries à forte productivité mais n'exigeant pas des marchés importants pour se rentabiliser;

- le deuxième se place dans l'acceptation d'une interdépendance entre les économies nationales mais suppose, à l'échelle mondiale, l'adoption d'un accord pour anticiper la croissance des coûts énergétiques. Cette question décisive est d'autant plus délicate que:

- . les situations de chaque pays quant aux dotations énergétiques sont très inégales;
- . on ne voit pas de raison théorique d'imposer des prix directeurs mondiaux de l'énergie sans imposer de la même manière une harmonisation de la rémunération des autres facteurs de production où il y a de fait mondialisation du marché.

## 2. Le problème du progrès technique

Un sentier énergétique doux n'est probablement pas une stratégie à bas profil technologique. Au contraire, elle repose entre autres sur le développement des moyens de traitement de l'information et de télé-information comme le souligne le CONAES. On doit par contre être plus prudent quant à l'idée d'une substitution automatique entre le capital et le travail d'une part, l'énergie d'autre part et éviter de reproduire à ce niveau l'erreur des courbes d'isoproduction de l'économie néoclassique qui postule l'indépendance et la substituabilité des facteurs de production. S'il est vrai par exemple que la climatisation, l'augmentation de la durabilité des biens, le recyclage entraîneront la croissance d'activités de main d'oeuvre, le développement des télécommunications, la croissance du rail, la stabilisation du secteur commercial vont dans le sens inverse. De même, la nature du progrès technologique mis en oeuvre ne se traduit pas automatiquement par un surcoût en biens de capitaux.

## 3. Le cadre institutionnel à l'échelon national

Comme l'a montré l'analyse par poste, les "sentiers énergétiques doux" ne peuvent s'envisager que dans le cadre de choix sociétaux de grande ampleur: transformation du cadre bâti, structure des transports, localisation des activités dans l'espace national, choix industriels, sans compter ce que nous venons d'évoquer concernant la stratégie internationale. L'ambiguïté n'est pas levée dans certains travaux de savoir si "la force contraignante du marché" serait suffisante pour enclencher les transformations structurelles nécessaires. En fait, la majorité des auteurs plaident pour une politique planifiée en fonction d'objectifs pré-établis qui permette de coordonner l'évolution de domaines aussi divers. Mais se pose alors la question de la contradiction entre le contenu et le rythme de ces transformations et la participation de la population à ces changements. En clair, un certain rythme de transformation nécessaire pour atteindre les objectifs énergétiques peut être contradictoire avec l'idée même de décentralisation, de convivialité, d'autonomie. Il est donc nécessaire de donner une priorité à la réflexion sur l'articulation entre les choix d'Etat, la transformation des modes de vie, et les initiatives individuelles ou collectives.

II. A SUSTAINABLE DEVELOPMENT STRATEGY  
(IFDA DOSSIER 9, July 1979)

Paper prepared by Nancy K. HETZEL

Summary

The "Stockholm Conference" - the United Nations Conference on the Human Environment of 1972 - announced a new era of international relations. To some of the participants and planners the radical implications of the environmental problématique were obvious. Many national and international actors, however, still do not understand or accept the message and lesson of Stockholm and their implications for the New International Development Strategy (NIDS). This essay attempts to clarify the Stockholm message, analyse the lessons that have been learned since Stockholm and draw conclusions on how the environmental problématique can provide a framework for the NIDS.

The conclusion is straightforward: a viable and relevant development strategy must be founded on new world views and on the concept of a sustainable global society. Change in tactics - necessary if this message is to be accepted - is analysed and the roles and interactions of the first and third systems are set out.

The following passages concerning policy change and strategies for the New International Development Strategy have been taken from the original English text:

"At the political level, it has been assumed that policy changes will be forthcoming if a critical mass of decision makers can be convinced of the importance and legitimacy of the environmental issue. Persuasion is only a minimal first step. It does not provide policy makers with concrete ideas on how to analyse complex issues, or how to develop policies and tools to deal with urgent problems that are their daily concern. It does not involve them in a process of defining and assessing environmental problems and in formulating and evaluating approaches, methods of analysis and policy choices. Commitment not backed up by the tools to deal with real issues can lead to frustration and disillusionment. An important lesson is that information and persuasion are inadequate for the construction of a foundation from which policy makers and implementers can constructively participate in the action phase of the process.

"The experience over the past seven years in attempting to incorporate environmental concerns into domestic and international political processes offers a lesson on how change occurs and can be induced, in relation to a complex, structural problématique. Theories which attribute a major role to knowledge, necessity, the force of a new idea or influencing a few decision makers have proved inadequate. These may be individually or collectively sufficient for simple issues which can be comprehended within the existing societal model and for solutions which improve the situation. They are, however, not adequate for dealing with complex issues which challenge the current political and economic order. Such issues demand a change in political configurations and fundamental alterations in conceptual frameworks and attitudes. The latter necessitates a more profound attitude towards education. It requires participation in an intellectual, emotional and consciousness-raising educational process. This process must include the analysis and comparison of the assumptions, norms, values, priorities, methods and analysis, methods of problem-solving and means of social change of current and emerging world views. At the political level the process must result in a change of perspective in the method of perceiving and calculating opportunities and

constraints of systemic relationships. For the public at large, it must result in widespread consciousness and commitment and inspire and motivate groups that influence public decisions."

...

"It is necessary to pass from the stage of critique to constructing alternative models and new development patterns. The existing model of international political and economic relations, which assumes that nations should and do act to maximize their individual benefit, should give way to models in which nations are forced by the finite nature of the earth's resources and support systems to act according to the criterion of long-term survival in an equilibrium state. The hypothesis is that ecological scarcity, political and economic constraints and resource conflicts are converging to produce a new set of functional norms in international relations, stressing equilibrium as the new pre-eminent criterion for the conduct of international relations and the organization of society.

"The lesson for the NIDS is that what is needed is not a chapter on environment or even a mention of the environmental dimension in each section. This method could be counter-productive because it could perpetuate the view of environment as an additional factor or another sector. What is needed is the elaboration of alternative approaches for a sustainable society, where dynamic equilibrium can maintain a long-term balance between the needs of the population and objectives of society and the environment".

III. A BALANCE SHEET OF THIRD WORLD-CANADA RELATIONS:  
SUMMARY ANALYSIS AND POLICY PRIORITIES  
(IFDA DOSSIER 10, August 1979)

Paper prepared by the North-South Institute, Ottawa, Canada

Summary

This balance-sheet of economic relations of Canada with the third world provides an analysis of direct private investment in the third world (the "challenge of the transnationals") food aid (including concessional development assistance), technology and agricultural relations, trade in manufactures and commodities, and monetary/financial issues. The analysis confirms that Canada - like other industrialized countries - is torn between helping to maintain the global status quo, with its grave imbalances and obstacles to development, and working towards a more equitable and more basic reorientation of its relations with the third world. The failure of comprehensive analysis and policy development for change is underlined.

IV. SOCIAL EXPERIMENTS, CHANGING LIFESTYLES AND THE  
ORGANIZATION OF PRODUCTION IN THE "ANGLO-SAXON" COUNTRIES  
(IFDA; DOSSIER 11, September 1979)

Paper prepared by Anne CHARREYRON-PERCHET

Summary

The "Anglo-Saxon" countries are experiencing an economic, social and cultural crisis which the State and the market, given their existing structures, are incapable of solving. The "civil society" must therefore seek new means of satisfying certain needs.

This document, presented in French, examines a series of social experiments in those countries, springing from popular initiatives in various areas of communal life, such as urban development, consumption, health, education, appropriate technology and life at work. It shows that the interest of these local initiatives lies in their capacity to generate a genuine social dynamism leading to structural transformations and redistribution of power in favour of the "civil society".

NOTES ON ALTERNATIVE PATTERNS OF  
DEVELOPMENT AND LIFESTYLES

Background paper prepared by Mr. L. INGELSTAM \*

at the request of the UNEP and ECE secretariats

THE THIRD ENVIRONMENTAL DEBATE

The UNEP-ECE regional seminar is part of a global quest for different lifestyles, in view of the need for economically equitable and environmentally sustainable development patterns.

For ECE, covering a highly industrialized region of the world, the subject also has a logic of its own at the present new stage in the debate on the human environment. We may speak of two earlier stages. The first had to do with poverty, and focused on such problems as poor housing and inadequate sanitation, i.e. "pollution through poverty". In an early period of development these conditions directly affected the health and life-span of the population (in economic jargon: the quality of the labour force). At that time - as is the case in many less developed countries today - these environmental conditions had immediate economic implications.

The second stage had to do with threats to the natural environment, but gave attention also to hazards in the working environment. With some justification this may be looked upon as "pollution by dynamic industrialization". Concern about such problems led to the Stockholm Conference (1972) and the creation of UNEP.

We are now in the midst of a third stage. The debate is less sharply focused, at least as seen from our present short-range perspective, but it emerges as a widespread call for increased attention to the quality of life. It is reflected, for instance, in the broadening scope of organizations that were originally concerned only with environmental questions. They are now going into areas like energy and transport, and extending their interests to alternative technologies and non-conventional communal life. There is a widespread and growing concern, not only for physical health and ecological soundness, but also for people's mental conditions and the psychological environment created by our technologically advanced societies. The task of the seminar is perhaps to help governments understand and interpret this "third environmental debate"; to put the issues into a global and long-range perspective; and to derive some insights for the reorientation of government policies.

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In this introductory paper no attempt will be made further to trace the origins of the debate, although this might in itself be a subject for study. The important point is that the debate exists, and governments cannot suppress it, even if they wished. No attempt will be made to "recommend" new patterns or lifestyles; that would be preposterous, and almost certainly counter-productive. Instead, this paper will deal with a few questions of national and global concern that member countries might wish to put to themselves.

#### ALTERNATIVE PATTERNS - ALTERNATIVE QUESTIONS

The seminar is organized jointly by ECE and UNEP. Each organization represents a particular way of looking at life in the member countries. For each of them there is a set of questions that may legitimately be asked. We may ask whether these sets of issues, labelled "economics" and "environment" respectively, are still relevant to understanding of the third environmental debate. Or do these approaches represent the kind of "educated incapacity" that should be avoided so as not to misinterpret a new situation? The "economistic" approach, in particular, has been under fierce criticism for many years. Some of the changes in emphasis that may be called for in relation to these approaches will be discussed below.

Even if these two "standard" approaches may still provide some useful insights, a number of non-standard questions must also be raised if the third environmental debate is to be reasonably well understood. To argue "for" or "against" modern technology may have a certain philosophical appeal. But such a debate is far too general to provide governments with new insights into the changes in needs and aspirations that run parallel with technological development. A number of non-standard questions and approaches that may be relevant to policy-making for development (although admittedly still rather vague) will be suggested.

The seminar proposes a new methodological starting point by using the term "lifestyle". In planning and policy making there is a need for aggregate concepts, such as gross national product (GNP), total energy consumption and over-all emission levels of polluting substances. It is quite evident, however, that the use of such aggregate concepts may blur or overlook important aspects. In the field of energy the following viewpoints may be relevant:

(a) The result of all this effort is a new perspective on energy - one that locates the observer down-stream, amidst the amenities provided and at a point where the oil wells, coal-fields and power-plants appear as grey objects in the distance. Until recently, energy policy analysis always took place up-stream, amidst the wells, fields and plants, where data could be provided in categories agreed upon worldwide; from there, the grey consumer and his demand were lacking in detail;

(b) Conservation, from up-stream, looks like deprivation. The suppliers of energy, believing demand to be insatiable, expect upheaval and dislocation if supply fails to grow at historical rates. In a perfectly natural way, they see the most essential functions that energy permits (keeping warm, having light at night, going quickly wherever one wants) as the functions at peril if they do not do their jobs well;

(c) From down-stream, conservation looks different. The marginal uses of energy, not the most essential ones, are at stake in the economics of conservation. Conservation is a set of opportunities to be more clever with end-use technology and to attend to portions of the economy where waste has gradually become embedded in the social fabric. 1/

There is a strong case for applying an individual-based, disaggregated analysis to the problems at hand. The "down-stream" approach will certainly bring out new understanding about technological potentialities. It will also reveal that access to the blessings of modern technology is distributed inequitably (and quite often in ways that are not even correlated very closely with economic indicators such as income). Since the test of a humane society is the way it treats its weaker members, it is clear that the role of the least powerful and the underprivileged should be in the forefront of this analysis.

#### NOTES ON ECONOMICS

The standard variables of national economics are associated with systems of national accounts and aggregate measures, above all GNP. Some methods for estimating future changes in these variables exist in all countries; in some cases they are called planning models, in others forecasts, and they are to varying degrees based on elaborate mathematical methods (e.g. input-output analysis).

While the use of formalized measures of economic activity has undoubtedly increased, so has criticism of them, and in several different directions. One is that GNP is a misleading indicator since it does not distinguish the useful from the harmful: a car accident and the subsequent medical, legal and mechanical work add to GNP, while an uneventful bicycle trip does not. A related criticism is that GNP does not take into account exhaustible resources or the natural environment. In Bertrand de Jouvenel's words: "... our whole accounting procedure underestimates our relationship with nature as a resource and as a framework of our lives". 2/ A still broader criticism is that GNP, and other simplified "hard" variables, tend to define away "soft", mainly social, aspects such as the importance of regional imbalances, inequalities between individuals and groups and other aspects contained in the broad concept of "quality of life". Some authors have gone a step further and claimed that the whole philosophy of our society has been twisted by "economistic" approaches and the single-minded pursuit of GNP growth. 3/

Two questions present themselves to governments. The first is whether the above-mentioned tools for analysis are given their proper place in planning and policy making, or whether they have been extended too widely into areas of inquiry where other methods of description might provide greater understanding. The second question is whether, inside the paradigm of economic accounting, some change in the modes of description may be called for. Efforts have been made to extend the systems of description to cover factors such as welfare distribution, regional imbalances and the depletion of stocks of natural resources. The third environmental debate seems to call for such efforts to be renewed.

National accounts in principle cover only entities present in the monetary economy: goods and services that command a price on the market. There is no doubt that better understanding of activities and transactions that take place outside the market is needed if one is to understand lifestyles and alternative patterns. A rather impressive shift has taken place in a few decades: activities like food preparation, for instance, have been moved from the home into the market. This change is of course reflected both in GNP and in lifestyles, but the former gives little understanding of the latter. A recent study of time use 4/ found that almost half of all productive work is still done outside the market. Since an interesting future development may be the re-emergence of a "self-service economy" 5/ coexisting with the "formal economy", it would be next to irresponsible for governments to plan the economy without knowledge of or concern for work outside the market.

Unemployment is a critical social issue. The methods of measuring it are neither very well developed nor, for various political reasons, always objectively applied. Youth unemployment, in particular, is generally underestimated in quantitative terms, whereas its harmful social effects can hardly be over-estimated. If a sizeable number of young persons discover, through the unequivocal experience of simply not finding employment, that they are not wanted, the solidarity that ultimately keeps society together may be in serious danger.

Finally, it should be pointed out that, for a number of sectors, a fairly long time perspective is called for. Energy planning ought to extend at least 20 to 25 years into the future, and probably longer. For mineral-based raw materials, and also for certain renewable resources, the shadow of physical shortages calls for a time perspective of at least 20 to 50 years. The transport network will leave its traces in society for at least 50 years, and planning must take this into account. All these planning fields call for some economic analysis as the basis for a reference scenario. Methods developed for a time span of 1 to 5 years are not necessarily useful to the longer-range thinking required. This ought to take us far beyond "economic" theory concepts, but the question of the proper role of economic planning models should at least be raised.

#### NOTES ON ENVIRONMENT

In a remarkably short time, the second environmental debate led to the introduction of an array of institutions, legislation and fiscal techniques to prevent pollution and preserve and enhance the environment. There is no doubt that much more needs to be done in this field, but our concern here is rather with aspects that are relevant to the "third debate".

Concern for the physical limits of non-renewable resources does not, of course, date from the publication of The Limits to Growth in 1972. But one may note that, with the citing of highly visible examples of the wasteful and environmentally harmful use of resources, the warnings against depletion carried high credibility with the general public. The arguments and counter-arguments on the reports by Forrester 6/ and Meadows and others 7/ are well known. Perhaps it is necessary to recall, however, that even if the "physical limits" argument for conservation and careful husbanding is rejected, this does not necessarily imply that no problems exist. The resource base is likely to become a problem for most countries towards the beginning of the next century. In this context, it has to be understood, however, mainly as a problem related to trade and global distribution of production.

A generally accepted assessment of the future situation is that the physical availability of resources will permit currently projected levels of extraction of raw materials other than energy until about the year 2000. 8/ For many raw materials, it is estimated that the annual rate of extraction at that time will be twice that of today.

But we can already perceive physical limits to sustainable yields of renewable resources, in particular fish and wood. Increases in harvests from these resources can hardly be expected far beyond the year 2000. The crucial limits for certain substances (including a small number of metals), which in the long term form the material basis for our civilization, come rather from energy considerations than from the physical availability of the minerals. Also, it is likely that the prices of certain metals will rise to levels where there is practically no market for them.

Hence, in a 20-30 year perspective, physical limits are not the primary problem. Instead, questions related to the distribution of power and income will be decisive for human well-being. This is further underlined by the fact that institutional inadequacies even now cause starvation and suffering, although physically the productive potential of the earth could provide for today's population, at least on a decent level of basic needs.

It is also possible that environmental problems related to the extraction of resources will in some cases place limits on global supply. It seems reasonable to suggest, therefore, that governments should not let themselves be entangled in the original "limits to growth" controversy, but should rather study their supply problems from the viewpoint of the international distribution of wealth and production, taking into account global responsibility for the environment.

Since the theme of this seminar contains the term "lifestyle", one can also ask what kind of experiences and aspirations at the individual level were responsible for the strong sentiments that triggered off the second environmental debate. It seems that the concern could not have been only for the state of nature, nor strictly for the long-term viability of the resource base. It should probably be interpreted primarily as a concern for the aesthetic and sensual qualities of life. Among these, nature is but one component. Man-made environments incessantly impose images, impressions and colours upon us. Aural, visual and tactile signals form the surroundings in which man's lifestyle is realized; and the most important environmental factor is clearly the presence of other human beings. Subjective concern for the natural environment is only a special case of the concern for a beautiful and socially rewarding lifestyle. Ecology develops into human ecology. Concern for environmental pollution extends to protection against mental pollution, and calls for the eradication of socially harmful environments.

Can this rather general observation be rendered politically operative? It amounts to introducing into social planning not only criteria for admissible pollution levels, but also requirements for aesthetic quality. It would mean not only limiting noise and smell, but also finding reasonable (and enforceable) standards for mental stimulation and sensory stress.

To sum up: beyond concern for the environment proper lie the largely political constraints on the use of resources, and also the broader questions of aesthetic qualities. Is it too much to ask that our societies be made both sustainable and beautiful?

#### NON-STANDARD QUESTIONS

Broadly speaking, the third environmental debate deals with the mismatch between modern technology and man's fundamental needs and aspirations. Proper understanding of this phenomenon, in research as well as in policy making, will require modes of analysis that not only extend the economic and environmental approaches but represent completely different lines of thought. Four such modes will be suggested below.

##### A. Time use and time fit

It is well known that analysis of time budgets can provide important insights into lifestyles. Data for the United States <sup>9/</sup> suggest quite drastic shifts over time (see table 1). A very general impression is that the pace has quickened. Time used for meals and reading books has lost in importance. This may indicate an extension of the predicament of today's elite, the "harried leisure class", <sup>10/</sup> i.e. people whose time is so precious in money terms that they cannot afford

to enjoy life; they eat their meals on the run, rush through the world's beauty spots and buy books they never have time to read.

Table 1

Time use of an average United States wage or salary earner (minutes/day)

	1934	1966	Change
Meals	107	70	-37
Walking for pleasure	22	1	-21
Movies	22	1	-21
Radio listening	26	4	-22
Playing cards	9	4	-5
Watching sports events	7	2	-5
Reading books	22	9	-13
Purposeful travelling	129	76	-53
Watching television	0	90	+90
Shopping	16	34	+18
Visiting	26	46	+20
Doing housework	95	140	+45
Correspondence	3	9	+6

A special case of great importance is the time allotted to transport. Table 1 suggests that time spent on travel has decreased in comparison with 1934. The private automobile no doubt plays a great role in this context. However, if the time necessary to earn money to pay for the car, to bring it in for repair, to look for parking space, etc. is taken into account, effective velocity becomes surprisingly low (see table 2).

Table 2

Real velocity of automobiles 12/

Three models, and four categories of users  
Speed in km/h

	<u>Vehicles</u>			
	Bicycle	Citroën 2CV	Simca 1301	Citroën DS 21
Senior official, Paris	14	14	14	12
Lower official, medium-size city	13	12	10	8
Worker, medium-size city	13	10	8	6
Agricultural worker	12	8	6	4

The most dramatic change, clearly reflected in time use is the introduction of television. According to Swedish figures, 11/ there is no other leisure activity to which we devote so much time and attention as television; 95 per cent of all Swedish families own a television set; 62 per cent have colour sets. All children have access to television. Between 42 and 50 per cent of our real leisure time between the hours of 6 and 10 in the evening is spent in front of our television sets. Mr. Average watches television for 12 hours a week, the equivalent of one and a half working days. Children aged between 9 and 14 watch

the most - more than 17 hours per week. Men watch more than women. The less educated watch for 13 hours a week, 4 hours more than the more highly educated. About 3 out of 4 people watch at least one programme a day. We watch more in winter than in summer. Those who spend least time in front of the television set belong to the 20-24 age group. Statistics vary between surveys, so they must be taken as approximate. Of course, many people read the paper, drink coffee, eat or do housework while keeping one eye on the screen, but the amount of time spent on television is too important to be ignored. Further statistics illustrate the point. The number of available evening classes increased by 15 per cent from 1973 to 1974, to the satisfaction of many educators and politicians. But that increase of 90,000 hours is smaller than the total viewing time for a single edition of the evening news on Channel 2. In 1976, for a family entertainment programme transmitted in 11 sessions, the total viewing time was equivalent to the annual number of hours worked by all the personnel employed by Volvo. Detailed scientific surveys are hardly necessary to prove that television has had an effect on social life.

These remarks on time use are mainly intended to show that important new insights may be gained through such analyses. It can be argued, however, that analysis of time use in "budget" terms cannot provide the basis necessary for suggesting policy improvements and alternative forms of social organization. It is fairly clear that time shortages, rush and stress are created not so much by an absolute lack of time as by an inadequate time fit between activities. In fact, studies of the interplay between spatial and temporal factors (time geography) have shown that a modern urban area imposes heavy restrictions on the opportunities open to individuals: the combined effect of the time schedules of work, child care institutions, shops, public service and transport is often to stifle their ability to pursue a desired pattern of activities. Hence an analysis that follows the path of different individuals through time and space may reveal difficulties and limitations created by the joint impact of several technical systems. Such effects are normally not known to planners because of their "up-stream" outlook, but are deeply felt by the individuals and therefore highly relevant to the third environmental debate.

An illustration of this effect is given by the interplay between the working hours of parents and the hours spent at day care centres by children. <sup>13/</sup> The centres are planned to meet varying needs, but the whole rhythm is adapted to children coming and leaving at regular hours, day by day. With part-time work, even if regular, the child's stay at the centre becomes irregular, looked upon from a daily or weekly basis. With irregular working hours (for example shift work), the child's schedule becomes confusing. In this case, it is fairly obvious that one social demand on time (parent's shift work) conflicts with another (the child's need for stability).

#### B. Information, stimulation and stress

The worst thing about humans - and about domestic as opposed to wild animals - is that they can adapt themselves to anything. (Swedish poet Gunnar Ekelöf)

The technology of "modern" society might be compared to a landscape with huge variations in altitude between mountains and plains, i.e. between super-high technology and no technology at all. Most of us travel through this landscape every day. How do these variations affect us? Do the heights make us giddy and the plains depress us? Do our ears buzz and stomachs turn at each rapid change? Much leads us to believe that this is the case.

Researchers in the behavioural and social sciences emphasize that on a psychological level people and their environments are badly matched. To what extent are we capable of absorbing the flood of information, the speed of change and the demands on our performance? What are the long-term effects of the adaptation of the human being to highly technological surroundings? Stress has become a key word in almost all contexts. Why?

The human being is a biological entity and, as such, changes very slowly. In comparison to other animals, however, we are extremely adaptable and can function in many different situations and surroundings. Therefore, there is a strong risk that we may "adapt" to circumstances that could be dangerous in the long run. We know that such risks exist, especially in regard to chemical pollutants in the environment and at places of work. The same is true for the psychological and emotional conditions of our lives.

Man must receive sufficient stimulation in order to function well. The brain has to take in a stream of impulses from the outside world. If that stream is meagre, as for example in a very monotonous job or during enforced isolation, a lack of stimulation results. If, on the contrary, it is intense and extremely variable, as in more strenuous jobs, in the midst of heavy traffic, or in the surroundings of advertisements and commerce in a large city, the stimulation might be too strong. The actual level can effectively be graded by measuring the adrenalin content in the blood. Tendencies towards increasing over-stimulation seem to exist, and it is likely that the present panorama of psychological disorders and mental disease results from information overload and strain. Certain mental problems related to agitated depression (due partly to "obsessive compulsion") are found only in technological societies. 14/

The citizen of the highly developed technological society must, to a hitherto unknown extent, be able to deal with information in order to survive. Information can take the form of simple IN or OUT signals, more complicated instructions such as televised information about new traffic regulations, or brochures about social rights. Many studies have concluded that the effectiveness of using words as policy instruments is shockingly poor. The situation is probably just as difficult with regard to information in other forms. Brain scientists believe that only a tenth of the population is receptive to more complex forms of information. An adult with a normally functioning central nervous system should be able to regard himself as "healthy, strong, calm, relaxed, sober, satisfied, contented, mature, happy, generous, gifted, sovereign and curious". But what about those who lack these qualities, those who are very young or very old, sick, untalented, intoxicated, tired, depressed, or simply inattentive? It has been said to be "immoral to carry on the way we are doing, directing the progress of information media as if society consisted only of people with perfectly functioning nervous systems" (David Ingvar).

### C. Systemic technology and democracy

The technology of today differs from that of former times not only in its greater power. It is also to an increasing extent organized into systems of considerable complexity - both technological and institutional. Very "high" technologies, like nuclear reactors or super-jets, require far-reaching and complicated supporting systems. Very broad and widespread (but perhaps only "medium high") technologies - like the automobile and plastics - lead to adjustments and secondary effects in adjoining sectors: supporting systems, city planning, environmental legislation, quality specifications for products, etc. In both cases, the interrelated nature of the technology makes it difficult to understand the systems completely, and this makes them hard to change.

Applying democratic principles to this situation clearly involves a dilemma. If the people must decide, they must understand and comprehend the problem at stake. It is clearly impossible for everyone to understand everything. But if technical systems tend to interlock in a way that no one any longer understands, what then? In such a situation it might not be unreasonable to consider certain trade-offs between complexity, and consequently technical and economic performance, and gains in the human and democratic qualities of life.

Multisystemic and multi-organizational technology will often (though not always) lead to high vulnerability. By this we mean that in modern, highly industrialized society, disruptions of various kinds can have very drastic and large-scale effects. As a rule resources are available to solve the problems, even though disruption may come as a complete surprise. Society is equipped with institutions to meet or prevent emergencies: defence and security arrangements, fire brigades, police forces, etc. Society becomes really vulnerable when basic supplies are threatened. The various logistic systems of society are becoming increasingly interconnected, so that disruption in one system can spread to neighbouring systems and possibly lead to complete breakdown. Energy supplies, transport and communications are cases in point. (15)

Many important social services are based on technical and administrative systems which can be put out of action by incorrect procedures resulting from carelessness, ignorance or sabotage. Errors of this kind are relatively easy to commit but seldom occur. Most people discharge their duties with great care and accuracy.

Since the trend is towards growing complexity, vulnerability is likely to increase in the long run. What are the factors conducive to such a development? What is the relationship between vulnerability and the very structure of society? For example, is there any connexion between vulnerability, the growing concentration of population and production and increasing demands for efficiency in working life? What bearing do the size and scale of social systems and human feelings of anonymity have on the vulnerability of society?

Questions are increasingly being asked about citizens attitudes towards technology and the "acceptability" of various new techniques. In this context, concern has been growing in several countries about an apparent decline in interest in technical education. Viewed from "down-stream" - taking lifestyles as a starting point - many technologies certainly look anti-human, incomprehensible and dangerous. "Acceptance" is complicated by the fact that the benefits of technological innovation will in most cases accrue to other people than those who bear the costs and disamenities. No doubt this is a political and psychological problem that will grow in importance. Researchers in this field warn against attempts to impose too narrow a concept of rationality on the general public. The following reference to statistical risk calculus in the nuclear power sector would seem relevant:

"Arguments in favour of nuclear energy often take the form of comparisons of theoretical estimates of this unfamiliar source of risk with statistical data on the experience of familiar risks. Nuclear risks are invariably seen to be orders of magnitude lower than the familiar risks, thus implying a rational basis for the acceptance of the former. Even if the public were to accept the conceptual validity of such comparisons, the attitude model we have discussed shows that they are unlikely to be the only informal input to the over-all attitude. To expect people's attitudes toward a new technology to be primarily determined by statistical estimates of physical safety is a highly simplified model of human thought processes and implies such a degree of 'rationality' as to be itself 'irrational'." 16/



Part of the opposition to super-technologies such as nuclear energy seems to go beyond the technology itself and be directed to the social and political institutions associated with it. General concerns include the centralization of scarce and vital resources (such as energy), their control by ever larger and impersonal bureaucracies, and the growing dependence on the specialized knowledge of technocratic élites. 17/

In sum, the political implications of the systemic nature of modern technology certainly merit more attention in the social debate and in research. The risk of damage to vital democratic values must be carefully studied and evaluated.

#### D. Affluence and basic needs

Industrialized societies have achieved a material standard of living which is quite unique in a historical perspective. For some of the richer countries in the ECE region one can claim - out of simple common sense - that the over-all level need not be any higher. I will not enter here into the "growth/no growth" debate. From the perspective of lifestyles, the pattern of production and consumption in most countries appears rather confusing and contradictory. In spite of an admittedly high level of material well-being, certain new types of poverty are emerging. One such type is known particularly in suburban areas. Life there may be well organized, but on a fairly high level of fixed expenditure. The exigencies of daily life add up to a situation leaving little room for improvisation and the absorption of unexpected events like unemployment or ill health. Expenditure is high, but the quality of life is low. Another indication is given by the spread of serious malnutrition: pensioners, "office girls" and schoolchildren are categories often mentioned in this context. Even though basic resources are available, the mechanisms of allocation lead to extremely poor diets in many cases. The suggestion that poverty exists in, and to some extent is created by, the affluent society may seem superficial and even preposterous in a global perspective, but the problem should be taken seriously. The mismatch between basic human needs and actual consumption is one of the key arguments in the third environmental debate.

Many attempts have been made to explain this mismatch. The role of advertising comes quickly to mind. Scientific evidence is not conclusive, however. Advertising is conspicuous and expensive, but most econometric work suggests that it has no significant impact on expenditure patterns and consumption habits. 18/ There is clearly a very strong producer influence on consumers' tastes; it is not certain, however, that advertising plays the decisive part.

In a study of cultural and psychological mechanisms underlying consumer behaviour in modern societies 19/ one of the hypotheses, for which there is some numerical evidence, is that the puritan ethic has some influence. This ethic values work more than leisure, stresses toil rather than enjoyment, promotes production instead of consumption. The result is a type of human who is a hard-working producer (not unwilling to earn good pay), but as a consumer has an ambiguous attitude, being suspicious of most things outside the basic necessities and less prone to seek the pleasures of consumption than to cultivate the virtues of work.

Numerous surveys have shown that most people, when directly questioned, would prefer more leisure, more culture, better social services, etc., to an increase in material goods. These preferences are seldom borne out in actual consumer behaviour, however. It would be disturbing if this ambiguous attitude should develop into a sort of social schizophrenia.

The study above has been quoted not only because of its intrinsic interest but also to point out that a new understanding of the fulfilment of needs in the affluent society may in fact be necessary. There may be some truth in the words of a young Swedish sociologist, summing up the findings of a research project on the relationships between work and consumption: "Oppression today consists in forcing working people to work unnecessarily hard, not primarily to satisfy the consumption demands of another class but to consume themselves the results of their superfluous excess labour". 20/

#### PLANNING IN THE FUTURE

In this paper an attempt has been made to enumerate the reasons behind the urge for alternative patterns of development and lifestyles, i.e. the third environmental debate. Some dimensions of inquiry - debate, investigation, research - which seems vital to the policy implications of this debate, have also been suggested. In conclusion it might be appropriate to reflect on the manner in which governments could handle the issues.

It has been pointed out that modern technology systems require extensive co-ordination: between organizations, legal systems, research, etc. Politically, such a co-ordinated effort is sometimes difficult to achieve, and it is time-consuming. In this context the following presentation of the problem may be relevant:

"The zip-fastener mechanism that made us decide on the use of light water reactors during the 1960s is still with us and still locks us up in a system where we replace the use of oil with coal (or natural gas) and nuclear power. All energy producing companies are working in that direction, the oil companies, the owners of coal mines, the mining industry,... the electric power companies and so on, and in that direction work also the governments and the authorities in all the highly industrialized countries. The reason is simply that these new technologies fit the already established structures, technically, organizationally, and from the point of view of power". 21/

The long lead times from design to production and use, together with the zip mechanism, call for longer perspectives in planning. But important as the "long range" (15, 25 or 50 years) may be in itself, there is also the need for some real alternatives to be spelled out, alternatives that are qualitatively different, and not merely surprise-free extrapolations of existing trends. Without such alternatives the whole exercise of long-range planning becomes meaningless. ("Same old war" sighed a somewhat disillusioned defence planner after a massive round of long-range planning.) The need to work out alternatives, the long-range nature of many problems and the "down-stream" way in which many of them present themselves call for some re-evaluation of government practices. The following four points may be worth considering:

(a) In many areas formalized systems for long-range planning are indispensable, but they easily become powerful vehicles for extending the present into the future. Necessary co-ordination across sectoral boundaries may be made difficult. The emergence of a "planocracy" with its own professionalized terminology may seriously limit and impede future-oriented political debate. And parliaments, in principle working on a one-year basis, run the risk of being steam-rollered by the plans of the bureaucracy;

(b) Government administrations are organized into sectors (ministries, departments, etc.) in ways that are practical for day-to-day business. Problems pertinent to alternative patterns of development and lifestyles will not as a

rule present themselves in sectoral terms. Such administrations will have to develop new forms of co-operation to deal with relevant problems;

(c) Special units must be organized for cross-disciplinary and cross-sectoral work to maintain continuous contact with the "normal" political machinery. Such units exist in several countries, 22/ although they have a rather chequered history and have performed their mediating function in quite different ways;

(d) Communication is needed with autonomous groups that have potentially interesting ideas about the environment, communal life, health, peace, food, etc. Such groups work with small resources, but may be heralds of needed change. At times they produce "creative disorder", 23/ although it is often difficult for governments (and the police) to distinguish this from other forms of disorder. Generally speaking, a more open attitude is called for. Autonomous and activist groups are of course free to promote one specific view, e.g. about the environment, and pursue it in an "absolutist" manner. Policy decisions, however, must be taken in an all-round perspective. It would seem, nevertheless, that some policy administrators have abused this latter argument, closing their ears to new signals and turning away autonomous groups, thereby impoverishing the debate about the future.

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- 1/ Robert H. Socolow, "The coming age of conservation", Annual Review of Energy, No. 2, 1977, pp. 239-289.
  - 2/ The Center Magazine, July/August 1978 (reprint of a 1966 paper on technology and human values).
  - 3/ See, for instance, Hazel Henderson, Creating Alternative Futures: Beyond Economics, (1978).
  - 4/ "Tid nyttet till egenarbeid" ("Time used for work for oneself"), Statistisk Sentralbyra, (Oslo), 19/1975.
  - 5/ J.I. Gershuny, After Industrial Society? The Emerging Self-service Economy, (London, MacMillan, 1978).
  - 6/ J. Forrester, World Dynamics (Cambridge, Mass., 1971).
  - 7/ D. Meadows, and others, The Limits to Growth, (New York 1972).
  - 8/ See, for example, Resources and Raw Materials; A Swedish Future Study, (Oxford, Pergamon, 1979).
  - 9/ J.P. Robinson, Social Change as Measured by Time Budgets (American Sociological Association, 1967). See also A Szalai, Ed., Use of Time (The Hague, Mouton, 1972).
  - 10/ Linder S. Burenstam, The Harried Leisure Class (New York, Columbia University Press, 1970).
  - 11/ Swedish Broadcasting Corporation. Also Margareta Ingelstam, Ordet är fritt? (Malmö 1977).
  - 12/ Y. Debouverie, and J-P. Dupuy, quoted in Ph. d'Iribarne's Le gaspillage et le désir (Paris 1977).

- 13/ Information supplied by T. Hägerstrand, and S. Martensson, Department of Geography, University of Lund, Sweden.
- 14/ S. Lesse (personal communication).
- 15/ Roberto Vacca, The Coming Dark Age (New York, Anchor Books, 1974).
- 16/ Harry Otway and Kerry Thomas, Understanding Public Attitudes Toward Nuclear Power (IAEA/IIASA, 1977).
- 17/ Ibid.
- 18/ R. Schamlensee, The Economics of Advertising (Amsterdam, North-Holland, 1972).
- 19/ Tibor Scitovsky, The Joyless Economy (Oxford University Press, 1976).
- 20/ Göran Ahrne, Den gyllene Ledjan (Stockholm, Prisma/Verdandi, 1976).
- 21/ The final report from the Swedish Futures Study on Energy and Society is to be published by Pergamon Press. See also Energy in transition (Stockholm, Secretariat for Futures Studies, 1977).
- 22/ Scientific Council for Government Policy, Netherlands; Secretariat for Futures Studies, Sweden; Poland 2000, Poland; etc.
- 23/ This expression was coined by the American historian/futurist, Arthur I. Waskow.

THE STRUCTURE OF THE WORLD ECONOMY-  
ENVIRONMENT AND DEVELOPMENT

A conceptual approach to study of the impact of the development strategies of developed countries on the conditions for development and environmental protection in the developing countries

Report transmitted by the Government of Yugoslavia  
Prepared by the Institute for Developing Countries, Zagreb\*

1. INTRODUCTION

The growth in world production capacity based on the capitalist system has been concentrated in a small part of the world. The development strategies applied in this small part make the achievement of long-range social objectives and goals dependent on the maximization of individual economic gains at the expense of collective interests and needs. Because of the economic power of the countries involved these strategies are spreading throughout the world; and in this context, it is important to note that they go hand in hand with a specific approach to the global environment.

The economic interests of one segment of the world economy have thus acquired predominance over the whole of mankind.

In recent years, considerable efforts have been made to define the ultimate capacity of the earth to sustain the growing volume and intensity of man's activities. So far, the outer limits remain uncertain. Experts disagree in their predictions, constrained as they are by the specific methodological or ideological frameworks within which they operate. Much more useful and fruitful have been the attempts to clarify the close relationship between the quality of the environment and specific objectives and patterns of social and economic development.

11. THE CONCEPTUAL APPROACH TO ENVIRONMENT AND DEVELOPMENT

Development can be conceived as a process of change in the economic, social, political and cultural structure that has a direct bearing on societal relations; the entire population of a given country, or the whole international community, participates in this process. As socio-economic development is a means by which nations try to enhance the product of their activities and improve the quality of life, it follows that the environment - the totality of natural and social resources with their constraints and potentialities in a specific time and place in given socio-economic conditions - plays a determining role in the process.

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In other words, all development is the result of a social evaluation of the environment as its material base. Though such a definition of the environment in the context of development may appear very broad, it is the only one acceptable in view of the important socio-economic and political dimensions of the environmental factors.

"There is no environment without development, and no development without environment" - this is the motto of the growing ranks of those who reject the view that development equals economic growth and advocate an integrated policy approach.

Throughout the twentieth century, the productive capacity of the world economy has increased in volume and the dynamics of change have accelerated at a rate that may rightly be described as unprecedented in human history. The key motive of the agents of capitalist growth has been the increase (in absolute and relative terms) of the rate of profit per unit of finished product. In order to ensure maximum rates of profit, it is necessary to reduce the unit costs of production. With wages rising steadily, the capitalist could hold unit costs down only by increasing productivity and cutting expenditure on other inputs.

The existing mode of production ("industrial production") places an increasingly heavy burden on the environment, which is reflected in the costs of production. In order to maintain existing rates of profit in the face of growing costs, economic agents try to externalize their rising production costs. We are thus witnessing undisguised attempts to externalize costs and internalize profits. The final result is a steady increase in the social costs of production and a parallel rise in the profits of individual economic agents. In this process, society faces increasing difficulties in absorbing the growing costs. The developed and developing parts of the world experience different manifestations of these difficulties (problems of food, health, employment and education, as well as problems of the biological, physical, economic and social environment).

At the level of the world economy, these processes appear as a series of economic, socio-political and even cultural and rural crises. They are just segments of what is known as the crisis of development, which in the above-mentioned sense also means the crisis of the environment.

#### 111. ECONOMIC STRUCTURE AND ENVIRONMENT - THE EXAMPLE OF ENERGY

One of the most evident manifestations of the impact of the dominant development strategies on the world economy - imposed by the economic agents of the most highly developed countries - is the distortion of its structure. The existing polarization into developed and developing countries is a sublimated expression of that distortion.

The structure of the world economy should be considered as the framework of reproduction relations between different economic branches, activities and sectors and its repercussions on socio-economic relations in the world community. The distortion of the economic structure is thus indicative not only of distorted relations between sectors and branches within the economy but also of the relations among States and individuals in the global context. Distortions in economic structure are among the principal generators of global environmental problems. For this reason, the problem of the environment presents itself in a new light: because the source of the problem lies in the structure of the world economy, any serious attempt to understand and solve environmental problems must necessarily address itself to this problem.

Clearly, the problem does not belong exclusively to the economic sphere. Political, cultural, military and other relations in the international community mediate in, or are mediated by, the economic sphere in creating and solving environmental problems. This means that, although the problems may originate in the economic sphere, they cannot necessarily be solved in that sphere. In trying to solve environmental problems, it is important to avoid a one-sided view of world development.

Any development policy aiming at rapid and harmonious development to meet human needs, while protecting basic natural assets, should approach the problem of the environment through the following questions:

(a) How does the dominant capitalist mode of production distort the structure of the world economy?

(b) In which sphere of interest of the international community (political, economic, military, cultural, psychological, etc.) or combination of them is the distortion generated or developed?

From this viewpoint the distortions in the world economy appear in the accumulation of production and consumption capacity in a small area of the world and the concentration of environmental problems, especially pollution, in that same area. In other parts of the world, i.e. in the developing countries, the problems of pollution are less evident but the exploitation of non-renewable raw materials is greatly intensified. There is a very real danger that many countries may run short of these materials before they begin to use them properly for their own development. Developing countries also produce renewable raw materials (in agriculture, forestry, etc.) to meet the needs of the developed countries; distortion of their production structure is manifest in the use of certain limited production resources (i.e. land) for purposes which are not centrally important in order to meet the primary needs of their populations. That is why - despite the increasingly intensive development of agricultural production - large masses of people in developing countries (about 750 million) cannot yet satisfy their basic needs, including the need to understand and control their physical and social environment. Mass poverty and environmental problems are mutually conditioned. This coupling is becoming increasingly evident. The only solution is social and economic development with a preventive and forward-looking view that integrates concern for the environment.

The development strategies of the developed countries - which tend towards cost externalization and profit internalization at all levels (from the autonomous production unit to the whole national economy) and relegate the developing countries to the role of suppliers of cheap raw materials, cheap energy and cheap labour - result in the transfer of certain kinds of environmental problems to developing countries. In certain conditions of economic exploitation, this makes developing countries highly vulnerable to any new environmental problems generated by specific strategic moves of the developed countries.

A characteristic development in this respect was the emergence, in the 1970s, of the crucial problem of energy. The industrial and transport systems of the developed countries used to rely, as late as the 1950s, on their own energy sources. They then began to depend increasingly heavily on a cheap source of energy from developing countries - namely, oil. The general strategy of maintaining comparatively low prices for inputs from developing countries was continued and, in a very short period, the developed countries shifted to oil, thus saving their own sources of energy such as coal.

Cheap energy and petrochemical inputs permitted the unhindered development of agriculture in the developed countries. The United States, for instance, was at that time the world's biggest single producer and exporter of cereals, as well as many other agricultural products. Since production costs in the United States were comparatively high, these products could not compete on world markets without substantial government support - even when demand for agricultural products was rapidly rising as a result of qualitative and quantitative changes in the food needs of the growing world population. Detailed cost analysis of agricultural production in the United States shows that energy is a key item in the structure of costs.

The key expedient used in the conversion to new energy sources was to gain full control over the countries and regions possessing major oilfields and oil reserves with the help of co-ordinated policy, political pressure and military force. The narrow economic objective was to gain absolute command of world oil price developments. No risks were allowed: with all available means, oil prices were held at extremely low levels.

With the depletion of oil resources, this development strategy is approaching its physical limits. The developed countries are thus being forced to change their strategy; they realize that the present pattern of cost externalization cannot continue indefinitely, and that changes in technology will be necessary. A rise in oil prices is imperative if this process is to be initiated and developed. This will automatically trigger off structural change in the world system of production, and lead to the relocation of production capacity and to new forms of cost externalization on the part of the developed countries. Again, the developing countries will bear the costs of the restructuring - costs which are not only economic but also social and environmental. That is why the environmental problems in developing countries are now assuming new dimensions.

Since it is no longer economically rational, or even possible, to maintain low oil prices, and since the expansion of industrial capacity and energy-intensive agriculture is proving economically and environmentally counter-productive, the developed countries - using the mechanisms of the transnational corporations - transfer the crisis-loaded production activities to developing countries, where externalization of costs to the physical and social environment is still feasible.

Such developments lead to further aggravation of the structural problems of the world economy. A mechanical transfer of the model of agricultural and industrial growth, characterized by energy-intensive production, from the most developed to the under-developed countries, may appear at first sight to offer short-term solutions for two central problems: (a) it increases the share of industry in the production and exports of developing countries; and (b) it reduces the relative share of energy in the total production of the developed world. This trend may be described as an attempt at a partial solution of what is essentially a global problem; in this way, developed countries will reduce their dependence on oil but, for precisely the same reason, the dependence of developing countries will increase as a result of the continued strategy of cost externalization by the developed countries.

All this in fact represents an attempt to revive the view that social and economic development proceeds by stages, repeating or imitating past patterns in the already developed countries which, despite important technological innovations and other positive achievements, have led to the ruthless exploitation of natural and social resources; moreover, they have greatly endangered the environment, thus negating the very notion of development. In



other words, this view ignores the need for developing countries - learning from the experience of developed countries - to base their development not on profit-oriented economic efficiency alone, but on rational environmental policies which will enable them to make full use of their natural and human resources and thus stimulate further development.

"Intimidation by figures", a stratagem of certain developed countries, has been used for some time; the developing countries have been warned of the huge financial, material and human investment required to satisfy some of the basic needs of their peoples. India, for instance, would need to build one fertilizer plant every day to meet its food requirements through energy-intensive farming; to open 10 new schools every day to keep illiteracy at present levels; or to put into operation a new 250-megawatt power plant every three months to enable every household to use two 40 W electric bulbs. This, however, is to miss the real point. These figures are based on wrong assumptions - on the belief that developing countries will develop in the same way, and use the same methods and standards, as developed countries. But these methods and standards, as the Cocoyoc Declaration notes, no longer provide an effective model for the developed countries themselves. If all agricultural development projects stumble over the lack of fertilizers, ignoring the great amounts of unused animal manure, it is obvious that prospects must appear bleak. Similar arguments are applied to the problem of electric power, which could be solved more easily and rapidly at the local level (through the use of alternative sources).

In this context, attention should also be paid to the question of technological growth in developing countries. The close relationship between technology and the quality of the environment has become a subject of extensive research as a result of the energy crisis. Research covers both conceptual issues and practical solutions related to the so-called alternative technologies that might be used in an attempt to bring development and the environment into a mutually stimulating relationship. The question of "clean", "energy-saving", "renewable", "adjustable" technologies thus must necessarily include the socio-economic and political aspects of their use. The interdependence between individual development objectives and components of the physical and social environment necessitates a re-examination of the possible effects of technology on these objectives, or rather its ecological and social acceptability. Thus, technology should be assessed from the standpoint of its impact on the distribution of earnings, the intensity of labour and capital utilization, employment, the production of consumer goods, centralization versus decentralization of production, mastery of the knowledge needed for its use and maintenance, the continued use of traditional technologies, political participation, alienation, changes in cultural values, etc.

#### IV. THE NECESSITY OF CHANGE

In the long term, the present strategy of economic growth is unable to solve any of the key structural problems of the world economy; at the same time, it creates a series of new problems which, owing to the complexity of international relations, cannot be handled in strictly economic terms. It may be sufficient here to give a few examples of the repercussions of the currently dominant strategy of growth and development and the resulting world economic structure on the environment.

In spite of considerable individual and regional differences, the developing countries share many environmental problems which are directly related to the low level of social and economic development that is a consequence of their dependent economic structure. It will suffice here to list some of the most striking examples of common problems: immoderate extraction and export of vital

natural resources (a large proportion of which are non-renewable), primarily to meet the needs of developed countries, instead of using them for own development; primitive agriculture and inadequate production of food, with constant degradation of fertile soil (through salinization, erosion, uneconomic expansion of pasture land, desertification, etc.), despite enormous unused agricultural potential; excessive dependence of industrial production and consumption on the needs and objectives of developed countries, and in particular those of multinational corporations. These problems are accompanied by a range of side effects, which include the growing contradictions between modern and traditional sectors, marginalization of arable land and peasants, as well as of the urban poor; the rural exodus; excessive and unplanned urban development; a very unhealthy demographic structure; uncritical acceptance of new values and lifestyles imposed from outside. All these processes and phenomena have negative effects not only on economic but also on social, cultural and political conditions in developing countries.

As the development of most developing countries is based on exports of primary products and as the prices of raw materials are low and fluctuating while inflation and the prices of their imports are steadily rising, these countries are forced to export more and more in order to cater for their own needs. The exploitation of their resources is therefore highly destructive and ecologically harmful. This is particularly the case when the control of the natural resources is in foreign hands. The consequences are evident in the rapid depletion of easily accessible mineral ores and in the destruction of tropical forest ecosystems (further aggravated by forest clearing to obtain new agricultural land), which undermines the development basis of countries exporting raw materials.

Moreover, the production of cash crops exacerbates the economic and political dependence of developing countries. Monoculture often leads to adverse environmental effects because it increases sensitivity to plant diseases and pests and necessitates large inputs in order to improve land fertility as well as extensive application of pesticides and fertilizers (which means increased use of energy) and sophisticated technology (for instance, irrigation systems).

Changes in the way of life in developing countries are brought about first and foremost by the environmentally unsound behaviour on the part of producers and consumers, particularly in respect of mass consumption items. In this context, it would seem appropriate to ask at what level of development the population of a given developing country can afford to spend over a third of its earnings on private motoring (7.5 per cent of GNP is spent for that purpose in the United States). The question is whether so much should be spent for that purpose at any level and, if so, where and when.

The problem is particularly acute in view of the fact that motoring is being introduced as a lifestyle in many developing countries. The main question is not whether motor-cars will be imported or manufactured in a given developing country, but rather whether a bias towards the private car as a means of transport is justified. Cars are being produced in many countries where bicycles or tractors would be much more useful; and no regard is paid to the social consequences. Traffic congestion is growing in developing countries at the same pace as slums on the outskirts of the large cities. Countries which in the pre-automobile era had a chance to choose other solutions (e.g. integrated public transport) have, with few exceptions, opted for development of the car manufacturing industry. The heavy investment needed for this purpose has often been made at the expense of other branches of the economy, thus boosting an industry which at best can meet the needs of only the upper 10 per cent of the population.

Acculturation is becoming increasingly widespread. Owing to the uncritical acceptance of foreign values, authentic local values cannot continue to develop independently and acquire new, modern and socially useful qualities; instead they become dependent on continued imitation of foreign elements. This is true, for example, of many spheres of art and aesthetics in general. Artificial needs are thus created, which - in conditions of social inequality - lead to further aggravation of the problem of social and economic stratification.

#### V. CHANGE - AN INTEGRAL APPROACH

Among the different conceptual approaches to change, special attention has been given to "ecodevelopment". Though the concept of ecodevelopment recognizes many problems of interdependence between environment and development, it may still be too ecologically based to offer an integral approach to the problems at stake. However, the advocates of the strategy of dependent development are now using it precisely for this purpose. Originally conceived as a development strategy for use at the local level, the concept of ecodevelopment is today considered an adequate approach at the wider, national level. Such an extension could have undesirable political and economic implications, particularly within the framework of existing international relations, where the developing countries find themselves in an unequal and dependent position.

Under a heavy burden of development problems, many developing countries are inclined readily and uncritically to accept funds and professional assistance for various pilot ecodevelopment projects in order to restore disturbed, or to preserve and enhance still undisturbed, physical components of the environment. Ecodevelopment could become an attractive area for technical assistance. Ecologically sound methods are being developed and introduced in agriculture and fisheries, biological species are being successfully protected, and ecologically positive results are being obtained in a wide range of problem areas. But the problems of the environment cannot be solved in this way.

The technological approach - which treats the biosphere and its problems separately from the sociosphere - has a strong tendency to emphasize those factors in human activity that can be measured, quantified and expressed in numerical terms, and thus easily included in analytical procedures.

The culmination of the techno-ecological approach to environmental problems is found in scientific research on and forecasts of the availability of global natural resources; in the context of potential ecological problems, man's increasingly felt presence and activity is seen as a negative factor. "The world has cancer, and the cancer is man" - says the preface to the second report to the Club of Rome. This statement denies that man plays a positive role, within the context of his geographic and socio-economic conditions, in the transformation of the environment and its physical and social dimensions.

A characteristic example is the manner in which developed countries offer their help for solving ecological problems of the habitat in developing countries. Human settlements constitute a domain of the environment in which human life is most directly, and often quite drastically, exposed to various effects of pollution and nuisances. However, the assistance is confined to the services of architects, physical planners, designers, technologists, etc., who can ensure that rural houses in the Punjab are built solidly enough to withstand the monsoon winds, that shanties in the slum districts of Rio are replaced by multistorey apartment buildings, or that water mains are brought to Bangkok junks. The solution of genuine socio-economic, (which also means development) problems of the habitat is thus side-stepped, and certain other economic, political, cultural objectives are pursued instead.

Problems of the so-called urban ecosystem cannot possibly be equated with problems of the urban environment. Waste disposal, urban hygiene, air quality in the cities, etc., are simply not issues which can be resolved by ecological principles and methods, even though the approach may be multidisciplinary; solutions must be sought in the context of socio-economic relations which - at a certain, historically determined level of development - result in particular conditions of social and physical environment.

Developing countries should try to avoid such negative experiences as the generous distribution of contraceptive pills to people with excessively high birth rates or "irrational demographic behaviour", as a substitute for provision of the security and socio-economic conditions in which it would be in their interest to reduce the size of their families.

For developed countries, protection and improvement of the environment in developing countries may become highly profitable and remain so, as long as their political and economic relations with developing countries continue to follow present patterns. What the developing countries really need is co-operation among the entire international community to make environmental protection an integral part of the global process of development. If developed countries really wish to help developing countries, they should not confine themselves to tackling passing or isolated problems, however critical, but should assist in the long-range planning of development. In this process, consideration should be given to long-term environmental, as well as ecological, objectives that will contribute to the progress of social and economic development for mankind as a whole.

#### VI. SOME DIRECTIONS FOR DEVELOPING COUNTRIES

The critical point in the restructuring of the world system of production - a process in which the developed countries will seek to preserve and strengthen their technological superiority - is reached with the development of alternative sources of energy. This will increase the autonomy of the developed countries, reduce their environmental problems, especially pollution, and help them to maintain their dominant role.

Unless existing international economic relations are changed, unless the main trends in the world economy are corrected in the spirit of a new international economic order, and unless an integrated, i.e. developmental, approach to environmental problems is adopted, the pattern of development of the developed part of the world will become a global pattern. For developing countries this means that their many existing problems will be combined with environmental problems arising from further under-development.

While striving towards a new international economic order, developing countries must ensure that, in the course of the restructuring, negative economic and environmental effects are not transferred to them. Their development policies should consciously stimulate the allocation and development of activities which are environmentally sound and beneficial for over-all development.

In accordance with the principle of self-reliance, they should also develop their own "scientific-technological-organizational-information-education" complexes which will enable them to choose and evolve autonomous lifestyles and, more generally, autonomous paths of civilization.

Within the framework of the options taken, they should further concentrate their efforts on the development of alternative sources of energy (both independently and with the assistance of developed countries), which will free them from environmental problems and, equally importantly, from dependence on developed countries.

Developing countries should urgently identify their common environmental interests and resolutely seek international agreement on issues which are vital for the protection of these interests in the course of the coming structural changes in the international division of labour. A decisive role in this effort should be played by the groupings of developing countries organized for international action.

In the context of the establishment of a new international economic order it is imperative that the whole range of environmental issues should find their proper place in the plans and programmes of activities of international organizations. FAO, UNIDO, UNEP and other specialized bodies in the United Nations system, among which UNCTAD deserves special mention, should regard the environmental dimension as an integral part of their efforts to solve the development problems of developing countries. UNEP's catalytic role in this regard should be emphasized more strongly than at present.

It follows from the foregoing analysis that the environmental consequences of present development patterns are global in character. The solution of these problems on a global scale is of importance for the developed countries in order to ensure their economic progress and social and political stability. That is why the developing countries rightly expect that their plea for an integral and global approach to these issues will meet with a favourable response and support from the developed countries. The current negotiations for a new international development strategy, based on the principles and objectives which underline efforts to establish a new international economic order, offer an opportunity which must not be missed. Provided the environment-development dimension is included, the strategy for the Third Development Decade will represent not only the most comprehensive, but also the most decisive collective effort of the international community so far to ensure stable and balanced social and economic development for present and future generations.

ALTERNATIVE PATTERNS OF DEVELOPMENT AND  
LIFESTYLES IN THE ECE REGION AND THE  
CONSERVATION OF LIVING RESOURCES

Paper transmitted by the Secretariat of the  
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INTRODUCTION AND DEFINITIONS

Development patterns and lifestyles in the ECE region have an effect on the conservation of living resources within the region - and beyond. Conversely, the status of living resources and the ways in which they are utilized influence the sustainability of development and lifestyles.

This paper discusses these complex interrelationships, in the context of the World Conservation Strategy,<sup>\*/</sup> with the intention of emphasizing the central importance of the conservation of living resources to achieve sustainable and balanced development in the ECE region - and beyond. It argues that development patterns and lifestyles more in harmony with conservation objectives than those which are currently being pursued should be adopted, or encouraged and strengthened where they exist.

"Development" is used here to refer to the modification of the biosphere and the application of human, financial, living and non-living resources to satisfy human needs and to improve the quality of human life.

"Conservation" is defined as the management of human use of the biosphere so that it may yield the greatest sustainable benefit to present generations, while maintaining its potential to meet the needs and aspirations of future generations. The conservation of living resources has three particular objectives:

(a) To maintain essential ecological processes and life support systems (such as soil regeneration and protection, the recycling of nutrients and the cleansing of waters), on which human survival and development depend;

(b) to preserve genetic diversity (the range of genetic material found in the world's organisms), on which depend the breeding programmes necessary for the protection and improvement of cultivated plants and domesticated animals, as

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<sup>\*/</sup> World Conservation Strategy; Living Resource Conservation for Sustainable Development, Switzerland, International Union for Conservation of Nature and Natural Resources, (Gland, 1980). The Strategy was drawn up in co-operation with the United Nations Environment Programme (UNEP) and the World Wildlife Fund (WWF).

well as much scientific advance, technical innovation and the security of the many industries that use living resources;

(c) To ensure the sustainable utilization of species and ecosystems (notably fish and other wildlife, forests and grazing lands), which support millions of rural communities as well as major industries. Ecosystems are systems of plants, animals and micro-organisms together with the non-living components of their environment.

Conservation differs from the term "environment" in two ways:

(a) It is a process, whereas "environment" refers to the set of conditions that surround the object of interest, but

(b) Conservation, as used here, is narrower than the entire range of environmental concerns, since it focuses on living resources although it is also concerned with other resources (soil, water, minerals etc.) in so far as they play a role in the support of living ones.

The premises implicit in the foregoing definitions, and upon which the rest of the paper is developed, are these:

(a) That, directly or indirectly, development always involves the use of living resources;

(b) That conservation is the means of ensuring that use can be sustainable;

(c) That conservation is an integral part of environmental concerns;

(d) That in any review of the impact of development patterns and lifestyles on environment, and the environmental influences on development patterns, the role of conservation is central.

Applying such principles - in fact merely taking conservation issues fully into account in the development process - will in itself lead to alternative patterns of development and lifestyles.

#### CONSERVATION IN THE ECE REGION

Much of the ECE region, with its relatively rich soils and temperate climates, can tolerate extensive alterations to natural conditions without the major breakdowns in life support processes which commonly occur in tropical areas and in areas, such as the Mediterranean, where ecosystems are very vulnerable to deterioration. Perhaps because of this, modification of the natural systems of living resources has been more widespread and profound in the ECE region than in most parts of the world. The consequences can be seen in terms of ecosystems and their component species, for example:

##### Ecosystems

(a) Apart from certain extensive tracks of boreal forest, very little of the region's original forest cover remains untouched;

(b) Coastal, freshwater and mountain areas have been severely affected by poorly planned tourist development, mainly associated with seasonal pressures on ecosystems;

(c) Marine habitats have been seriously affected by oil and other forms of pollution;

(d) Many of the waterways are polluted. Only recently has this led to negotiations on international agreements to prevent further degradation and to secure an improvement of water quality;

(e) A drastic diminution has taken place in the number and acreage of European wetlands. Very few remain in their original form, and many of those which are still important in ecological terms are under some form of threat;

(f) Even modified agricultural ecosystems, which under traditional farming systems were ecologically varied and provided attractive landscapes, have been drastically affected by the impact of modern forms of agriculture.

### Species

(a) Many animal species have seen their area of distribution reduced to tiny patches, or have even become extinct. This is well illustrated by the plight of the most obvious indicators of the health of a natural ecosystem - large carnivores (including marine species) and birds of prey, which have declined at an alarming rate throughout the ECE region. The most evident proof of over-exploitation of species of economic importance is the collapse of various major fisheries;

(b) Plant species have also suffered badly from habitat destruction, and a good number of them are threatened. Even some widespread species of weeds are steadily diminishing as a result of the increased use of herbicides;

(c) More serious is the rapid erosion of the genetic base of cultivated crops through the loss of habitats where their wild relatives still survive, the hybridization of such relatives with cultivated strains and the increasing tendency to restrict cultivation to a handful of varieties.

A common feature of these examples is the lack of consideration given to the long-term negative implications, as against the short-term economic gains, of resource destruction. And even when the negative effects on the environment are strongly suspected, although not fully proven, the prevailing attitude is often to "take the risk" even if few benefits are expected, rather than to follow a more cautious and prudent course. For example, it is established that chlorofluorocarbons may well have damaging effects on the ozone layer of the atmosphere and indirectly on the biosphere; but their proposed prohibition, which would have only the most marginal economic implications, is gaining acceptance only slowly.

### WORLD-WIDE IMPACT OF POLICIES AND PRACTICES IN THE ECE REGION

The policies and practices of ECE countries regarding the use of living resources naturally have effects confined to the region itself, but there are in addition at least three ways in which they have a world-wide impact.

First, to supply demand in the ECE region, many countries of the third world have permitted widespread destruction of their own natural resource bases. This is true both for basic products, such as energy, minerals, food and timber, and for goods such as furs, ivory, seashells, tropical plants, etc., where the market is principally in the ECE region or is created by citizens of that region when they visit developing countries.



Secondly, large-scale capital-intensive forms of development, which are characteristic of the ECE region, have too often been transferred to other regions without any attempt to adapt them to different environmental, social and cultural conditions. This explains why so many development projects - for example for agricultural expansion, forestry exploitation, river basin development and the establishment of tourist facilities - undertaken with the support of multilateral or bilateral aid programmes, largely funded and operated by countries within the ECE region, have been damaging, in their side effects, on living resources.

Thirdly, the relatively affluent lifestyles of the region have had a very pervasive influence on developing countries, providing a model which may be even more inappropriate in terms of resource use and inequity amidst the relative poverty of the developing world than it is in the ECE region itself, especially as it usually influences and benefits only a limited elite.

#### CHARACTERISTICS OF THE ECE REGION IN THE SEARCH FOR ALTERNATIVE PATTERNS OF DEVELOPMENT AND LIFESTYLES

The widespread abuse of natural resources within the ECE region, or elsewhere under its influence, should be a source of major concern because it throws into doubt the ability of the region to sustain economic and social progress over the long term.

When compared to other regions of the world, however, the ECE has certain characteristics that would facilitate the adoption of more sustainable approaches to development. The most important are:

(a) In general, the basic needs of most of the population have been satisfied, and there is not the pressure of a hungry rural population searching for ever more marginal plots of land;

(b) The rate of demographic increase is relatively low - indeed, in some countries it has ceased altogether;

(c) Many of the region's ecosystems are astonishingly resilient, and even those drastically affected by man's activities have a chance to be rehabilitated and regain their productive capacity - although it must be recognized that the cleaning of the most polluted freshwater systems and coastal zones will take many years, that some may already have reached the point of no return, and that the resilience of some of the best crop lands is being greatly diminished by the impact of modern technologies, carelessly applied;

(d) There are still some communities which live in relative harmony with their immediate environment. This harmony can be maintained, and the prosperity of these communities improved on a long-term basis, if they conserve not only their environment but those aspects of their lifestyles which help to conserve resources. This should, of course, not be done at the expense of the environment elsewhere in the world, for example through the creation of excessive demand for energy which has to be imported from elsewhere;

(e) The wealth of expertise and resources available in the region, which could be mobilized to work out and implement fundamental changes, is enormous. This is further helped by the well-established network of institutions and communications which are essential if an impact is to be achieved throughout the region;

(f) Although the region has been the focus of two world wars in this century, social and political institutions now appear relatively stable;

(g) The long history of rural settlement in Europe has seen the adoption of agricultural and forestry practices which, consciously or otherwise, are based on principles of sustainable yield. Also, the long and until recently relatively slow development of agriculture and forestry has given time for techniques and crops to evolve, and thus has caused little harm to the environment and has produced harmonious landscapes. However, the sustainability of the intensive, high-energy agricultural systems which have more recently been adopted in many parts of the region is by no means assured;

(h) There are, moreover, many attitudes and institutions which should favour conservation in the ECE region. For example: acceptance in many countries of control of land use and constraints on the rights which individuals can exercise over their own land; acceptance of the concept of the management of land for the public good and, in some parts of Europe, a long history of laws to regulate hunting and fishing; the emergence of a public which is increasingly concerned about, and vocal in advocating, the cause of conservation; the creation of conservation institutions at the local, national and regional levels; and the establishment of international agreements for the protection of the environment for parts of the region, such as the recent adoption of the Convention on Long-range Transboundary Air Pollution in the ECE region and the Convention for the Protection of the Mediterranean Sea against Pollution and its related protocols;

(i) Through aid programmes and in other ways, the countries of the ECE region have considerable influence upon development patterns world-wide. These instruments could be used to promote ecologically sound forms of development in developing countries, whose environments have hitherto often suffered rather than benefited from the influence of the ECE region.

Unfortunately, these favourable factors do not fully counterbalance other often contradictory attitudes of society, which are still deeply entrenched, at least in parts of the region, such as: the belief that ownership of land conveys the right to exploit its resources to the full, solely for the benefit of the owner; the belief that resources will withstand any added human pressure; that nature can and should make available for the many those resources which earlier benefited only a few; and that the simple accumulation of wealth is the best objective to pursue. Furthermore, the sense of responsibility and stewardship towards the resources at stake is eroded when more and more decisions affecting the way land is used are taken in company headquarters or government departments far away from the places where such decisions will have an impact.

On balance, however, conditions in the countries of the ECE region are such as to present a good opportunity for making a smooth transition to ways of life that are more conserving. Such a transition is most likely to be successful if it is initiated deliberately as a means of ensuring a better future. A transition forced by developments such as limited energy supplies, loss of productivity of key agro-ecosystems as the result of increasing poor practices and a need to reduce consumption sharply in the interests of global harmony could be uncomfortable indeed.

TOWARDS ALTERNATIVE PATTERNS OF DEVELOPMENT AND LIFESTYLES

The ECE region can, indeed must find ways of living and patterns of development that can be sustained, but they will not just happen as a consequence of sudden decisions; they should follow from integrating conservation into development, so that development can be influenced by ecological as well as financial and social considerations.

Development must also be guided by other basic considerations, such as the search for peace, universally applied human rights and a new international economic order. However, ecologically sound development will protect the ecosystems and living resources that are the base of human existence and ensure that these resources are maintained for the use of future generations while providing their benefits to the present one.

Governments, institutions and individuals must realize that conservation is not an element to be added to the development process, but a dimension to be integrated at every stage of development. This requires the following:

(a) A deeply rooted commitment to achievement of the objectives of conservation. This implies more than accepting the most visible elements of conservation, such as the preservation of outstanding areas and the protection of the most threatened species. It requires that ecological considerations should become as important in forming a society's approach to its development as social and financial considerations, and will thus have profound implications for all aspects of human behaviour which bear on the environment;

(b) Policies attempting to anticipate events rather than simply react to them. This requires the integration of conservation from the outset in economic and physical planning at the national, regional and local levels, and in planning of individual projects. The former is needed to reduce the likelihood that potentially damaging projects are proposed, the latter to remove or reduce the environmentally destructive elements of project proposals; both will help to promote developments which are positively beneficial for the conservation of living resources and reduce the time-consuming, costly and divisive business of proposing projects which are the subject of widespread criticism on environmental grounds;

(c) As great a concern for maintenance as for production. The performance of a forester or farmer should not only be judged on the basis of the amount of timber or wheat produced, but also in terms of the preservation (or loss) of the resource base and the sustainability of the yield. Agricultural policies should require:

- (i) The supply of food and other agricultural products in sufficient quantity and of acceptable quality, consistent with the maintenance of the resource base, particularly soils, water, the habitats of organisms necessary for pollination and integrated pest control, and the genetic diversity of crops, livestock and their wild relatives;
- (ii) The maintenance and enhancement of the quality and attractiveness of rural areas;
- (iii) The recycling of nutrients, ensuring that crop residues and livestock wastes are returned to the land, controlling pollution and assisting where practicable in the recycling of urban wastes.

(d) An economic system and institutions which reflect the requirements for conservation. Such a system would measure the value of land in terms of its ecological importance, e.g. its role in maintaining essential life support systems and ensuring the stability of the hydrological cycle, as well as its value as potential building land. It would also bring sources of production closer to sites of consumption, thus reducing the need for complex and expensive transport systems, and promoting better understanding by consumers of the problems and values of productive ecosystems;

(e) Much more emphasis on diversity and less on uniformity. Samples of all types of wild places should be maintained as reservoirs of genetic resources, sources of creative inspiration and sites for monitoring and research. Varied landscapes should be maintained especially around cities (this would, for example, discourage urban dwellers from crowding into national parks and reserves, demanding further facilities and access roads, which in turn attract more people into sensitive areas already subjected to too much pressure). The extinction of species of plants and animals should be prevented, thus avoiding the consequent permanent loss of opportunities to use and enjoy them. Varied energy-producing technologies and devices adapted to local needs and conditions should be developed and promoted, with preference given to those which are based on renewable resources. Agriculture should tend towards diversification rather than standardization: it should be based on a variety of crops, as an insurance against pest problems and adverse climatic change, using the best adapted varieties to maintain an extensive genetic base and take full advantage of the natural enemies of pests and pollinators of crops;

(f) Development of a sense of solidarity, not only with other people but also with their environments. Trade patterns should be discouraged if they favour over-exploitation of resources in other regions. Such patterns include the promotion of cash-crop monocultures on sensitive soils in other regions at the expense of much needed local food crops; the import of timber from tropical forests in the form of logs rather than transformed products; the development of trade in luxuries which provides a considerable incentive to evade measures established for the wise management of populations. The export of pollution should be avoided by controlling the discharge of effluents and emissions into international rivers, the atmosphere and the sea. There should be concerted efforts to exploit global commons sustainably for the benefit of all (e.g. the oceans beyond national jurisdiction, the atmosphere and Antarctica; whales, and most deep-sea fisheries).

#### CONCLUSION

The last 10 years have seen the gradual acceptance of the principle that sustainable development is dependent upon scientifically based management of the environment, in which conservation of living resources plays a key role. The next 10 years will establish whether the Governments and peoples of the world really have the courage and foresight to apply that principle. The countries of the ECE region have a higher material standard of living, a greater concentration of capital and technological capability and a higher proportion of trained manpower in nearly all aspects of human endeavour than any other part of the world; they should be able to take the lead in designing and adopting sustainable patterns of development. If they do not do so, there is little hope that countries in other regions will.

THE CONSERVER SOCIETY; A CANADIAN  
DISCUSSION ABOUT DEVELOPMENT ALTERNATIVES

Report transmitted by the Government of Canada

Prepared by Mr. R. Jackson\*

INTRODUCTION

Industrially developed economies, after a period of rampant growth based on new technologies, eager consumption and cheap energy, are experiencing a number of problems related to that growth. With respect to further growth or development, these problems seem to take the form of limits, where by limit we mean not some precise and definite ceiling, but the beginning of an area in which costs and other problems begin to escalate markedly and returns diminish (1). Examples will be given for Canada under headings of resources, environment, ecology and economic, social, political, institutional/governmental and human factors. The concept of the "conserver society" has arisen in Canada as one of the more visible and talked about responses, offering what may be a sustainable, but still evolving and hopefully catastrophe-free future. The term "conserver society" is intended to convey, by contrast with the popular term "consumer society", not simply an attitude of conservation, but a shift to a more humanly meaningful and constructive scale of values.

Canadians, living in one of the world's larger land areas (nearly 10 million square kilometres), with a relatively small population (23 million), have tended to grow up with a mythology of possessing vast and inexhaustible resources. Other nations have had the same impression of Canada. What recent information shows, however, is that even in such supposedly fortunate circumstances, a modern industrialized nation can begin to feel the pinch of limits.

OIL AND GAS

The major Canadian oil finds in Alberta 30 years ago passed their peak production levels in about 1976, and with demand continuing to increase, Canada faces growing costs of importing energy. The industry is now exploring in inhospitable and environmentally vulnerable waters among the Arctic ice, and in the Atlantic Ocean off the east coast, in the path of icebergs. At present prices, the extraction of oil from the very large Alberta tar sand deposits (an estimated  $10^{12}$  barrels) is beginning to appear 'economic'. How much of those

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deposits can in fact be extracted at tolerable financial, environmental and energy cost remains to be seen. Even with those resources, a Canadian policy for energy "self-reliance" 10 or 20 years from now can be achieved only with the assistance of strong conservation measures. (2) Thus Canada, like other industrialized nations is faced with the impossibility of indefinite growth in the consumption of fossil fuels.

#### FORESTS

In Ontario, a province nearly twice the size of France, forest industries have always been an important component of the economy. To many people, including some of the cutters, the trees seemed to go on for ever. It was interesting to learn, therefore, within the last two or three years, that the last major tract of forest, 4.7 million hectares, but of doubtful recuperative power, was about to be leased for exploitation, and that within the next two decades many pulp mills in other parts of the province will find themselves short of trees. Much of the problem is due to short-sighted management and inadequate reforestation. Moreover, growth is slow in the northern forests, and many areas are inaccessible to heavy equipment and transport. In New Brunswick, another forest-dependent province, the cutting rate exceeds the growth rate. Undoubtedly operating practices can be much improved, and might even make possible continuing cutting at present levels (about 200,000 cu. m. a year in Ontario). The situation illustrates, however, that Canada is discovering the boundaries of sustainable yield.

#### LAKES

The Great Lakes, which contain in one closely connected system five of the world's largest freshwater lakes (with a total area of 245,000 sq. km), were once bountiful sources of fish, and clean enough to drink. The upper two lakes, Huron and Superior, are still sparkling clear for the most part, but the lower three, Erie, Michigan and Ontario, with the smaller Lake St. Clair, are close to North America's industrial heartland. Industry after industry, and towns and cities, have been founded on their shores, each apparently believing that the effects of their untreated effluents would be inconsequential for so large a body of water. About 10 years ago several species of fish in Lake Erie were noted to be dying as excessive eutrophication removed their oxygen supply during the night hours. About five years ago mercury levels in Lake St. Clair were found to be too high, and people were warned against eating the fish; the herring gulls of Lake Ontario were ceasing to reproduce because of rising levels of DDT and PCB contamination in their prey. Fortunately a body to negotiate such matters of mutual concern between the United States and Canada was already in existence: the International Joint Commission. The reactivation of the Commission, with the formation of a Great Lakes Water Quality Board and a concerted programme for water testing and identification of the offenders, has succeeded in reversing the decline, and water quality is beginning to improve again, though the recovery time will be lengthy. (3)

Canada is said to possess an appreciable proportion of the world's surface water. However, much of this is shallow, in muskeg or in pools on glacially ploughed rock, and generally has a low buffering capacity. Ontario has some 250,000 bodies of water that could be called lakes. Recently Ontarians have realized with a shock that acid rain, which they formerly thought was a European problem, is killing those lakes, 50,000 of which will probably be dead within 20 years. The acid rain comes mainly from coal-burning electricity generating plants in the United States and Canada, and from smelters of sulphur-bearing

ores. Similar problems will begin to afflict Saskatchewan lakes and rivers in 10 years or less if the expected scale of tar sands operations materializes in Alberta.

#### WASTE DISPOSAL

The city of Toronto (population about 2 million) has always disposed of its garbage by landfill. Now suitable sites are becoming harder to find and farther away. The public is raising objections, and transport costs are rising. More efficient methods must be found. In the suburban borough of North York, a plant for recovery of energy and materials from urban wastes is undergoing trials. The disposal of toxic industrial wastes in southern Ontario is becoming a serious problem, particularly since the case of the Love Canal, near Niagara Falls, New York, illustrated the hazards to human health of the past practice of pouring liquid wastes onto the ground or into pits - or even storing them in steel drums, which inevitably corrode in time. Such poor housekeeping practices, carried out in the name of industrial efficiency, should never have been acceptable; they are becoming less accepted now as their effects accumulate, as our knowledge grows, as public awareness rises and as techniques improve for medical diagnosis and for the detection of environmental poisons. Urban waste disposal problems for cities above a certain size occur almost regardless of how "empty" the land around is, being determined rather by the high volume of waste and the distances that must be travelled to get outside the congested metropolitan region. The uninhabited northern tundra is of no use to Canada as a waste-basket for its large cities clustered in the southern belt.

#### ECOLOGICAL LIMITS

Over half of Canada's cropland is found in the prairie provinces; it is dry grassland, suitable for grazing and for growing wheat and other cereals. Suitable genetic stock and efficient techniques have been developed to produce good yields in spite of a short growing season, with the result that this area is not only Canada's "bread-basket", but exports wheat on a large scale to the rest of the world (13.6 million tonnes in 1976/77). Wheat is thus an important item in Canada's trade, and an important source of income for western farmers. Because of those incentives, it would be surprising not to find considerable pressure being placed on the grasslands ecosystem. The initial high fertility of the grasslands soils, a legacy of the retreat of the glaciers, is increasingly being maintained by artificial inputs. Over the last 70 years "native soil productivity" has dropped by about half, mostly as a result of loss of organic matter. (4) Concern is being expressed that present practices are not sustainable in the long run, that the costs of the artificial inputs are rising, and that a retracing of steps back to a "natural" or ecologically sustainable agriculture may now be impossible. (5) The original long-grass prairie ecosystem has essentially been destroyed already; efforts are under way to try to preserve at least one reservoir of the short-grass plains ecosystems as a national park in southern Saskatchewan and Alberta. Some Canadian agrologists now believe that the factory-like monoculture approach to food raising has to be a transitory phenomenon, that the long-run approach will involve intelligent working with complete, diverse, more or less self-regulating ecosystems, and that diverse naturally evolved ecosystems in working order are extremely valuable resources that must be preserved.

### ECONOMIC LIMITS

In common with other industrialized nations, Canada is experiencing a slowing of industrial growth, relative to the trends of the last 30 years. At the same time, it is suffering from inflation (about 9 per cent a year), high unemployment (7-8 per cent) and diminishing returns on capital investment. (6) There is a continuing belief that high rates of growth are desirable, but measures designed to stimulate growth are inhibited by fear of making inflation worse. The current fashion is to blame governmental regulation and intervention, and to hope that by cutting back governmental spending, and turning resources back to the private sector and free market mechanisms, the problems will cure themselves. Meanwhile, many members of the middle class, while they find their incomes apparently still rising, also find taxes and other costs rising, and suspect that their net purchasing power is static or in decline. Others question the meaning of GNP and wonder if the Canadian economy has entered a régime of rising social costs, or "externalities", in which, though GNP continues to rise, the quality of life, or net human benefit, does not. These may all be signs that the limits of present sectors or of present dimensions of economic growth are being reached. They may be symptoms of a transition taking place, that policy makers do not yet comprehend or are unwilling to accept. We suspect many things, but still lack adequate indicators with which to prove our suspicions. (7)

### SOCIAL LIMITS

The continued drive to raise production and incomes in industrialized countries through mechanization and automation improves conditions for some workers but displaces others into low-skilled, unsatisfying and alienating jobs; the drive for high levels of activity, consumption, and income leads to the neglect of other activities, such as those in the voluntary and domestic sectors; market-contracted activity, e.g. for child care, tends to replace voluntary activity to the frequent detriment of family and love relationships; high rates of change, along with the above factors, lead to instability in human relationships, and thus to broken homes, and psychological problems of children and teen-agers; large-scale impersonal technological systems for banking, food marketing, information and other services alienate and breed indifference in the customer, and tend to increase vandalism, shop-lifting and other types of crime; the frenetic general economic activity, the constant drive for change and growth, the high-intensity communications environment - all tend to erode the sense of security, shorten the attention span, reduce the ability to enjoy leisure, create dissatisfaction and lead to many forms of social breakdown, paralleled by rising consumption of alcohol and tranquillizers. In many cases, as in competition for "positional goods" (8) - a degree, a peaceful country cottage, a motor-boat - the effort may turn out to be in vain; the person who already has one may have to work harder to maintain his amenities, while newcomers may find their relative advantages little changed and the achievement hollow, since the situation has been made worse for everyone (except the last arrival). These symptoms of social stress are familiar to all highly industrialized countries and, though difficult to quantify, indicate that economic growth, at least as usually defined, has limits as far of the good society is concerned. Though most industrialized societies feel they are better off than at some time in their past, it is clear that a régime approaches a point where continued gains in some aspects (e.g. the quantifiable or the marketable) are achieved only at the expense of losses in others (which may be non-quantifiable but are more important).



#### INSTITUTIONAL/GOVERNMENTAL LIMITS

As a country becomes more populated, and as the power of its technologies increases, the impacts of people on each other and on their environment increase, and must be regulated (by common consent). This requires growth in regulatory institutions and in government - a growth in the institutional apparatus of the society. Canada, in spite of its vast size relative to its population, is not immune from this problem. Most of its population is concentrated in the southern strip of the country, and is, to a high proportion, urbanized. Only 13 per cent of the land mass is arable, and many of the northern ecosystems are delicate and slow to adapt or recover from damage. In the north, the sparseness of settlement puts most of the onus for environmental protection on the government, and the necessary ecological research is expensive, being large-scale in both space and time. In the south, control of automobile pollution is essential for health, and is legislated accordingly, yet the government finds it cannot afford the resources to enforce the regulations. (9) Besides the technological/environmental regulatory problem, modern society presents an increasing variety of social, economic and health interactions that require an institutional response. Canada has a quite advanced and comprehensive health insurance plan, but rising costs are prompting desperate attempts to achieve economies on the part of some provincial governments, who carry the supporting and administrative responsibility. Beyond a certain point these "transactional costs" must impose a bureaucratic burden on the society that the citizens will find increasingly onerous. Unless a society can devise some better way of governing itself for the common good, it will find such bureaucratic/institutional costs imposing an ultimate limit on its ability to carry out its prime functions. (10)

Governments find another limit in the policy tools with which they have to work. If commonly accepted ideas can be regarded as social institutions, then the inability to conceive of the needed new ideas within the accepted conceptual structure can be seen as a form of institutional limit. Governments seek to control inflation by creating unemployment and raising bank interest rates, at the same time as they try to reduce unemployment by providing incentives to investment in capital-intensive technologies. They try to solve or avoid problems of distributional inequity by stimulating more growth in the sectors that are already well off. In the international sphere, industrialized nations, seeking to aid themselves while aiding others, provide loans for purchase of their advanced technology; for the recipients this kind of trade can have the effect of importing unemployment. These are the kinds of policy tools that are regarded as credible in the prevailing framework of thinking, yet they seem to be approaching the limit of their effectiveness.

#### POLITICAL LIMITS

In the usual industrial pattern of growth, capital investment and growth tend to flow toward a centre, which gets richer and richer, and may or may not pull the periphery up with it. The usual hope is that as the total pie grows everyone will become better off. However, this may not happen and relative disparities may become large, in which case redistribution becomes a serious political concern. As Mesarovic and Pestel pointed out in their report to the Club of Rome (11) the political tensions created by large disparities may be uncontrollable and may present limits to that pattern of growth. In Canada, as a matter of history, the various regions have tended to be dominated from the industrial and financial heartland, centred in the province of Ontario. But Canada is a geographically spread out and diverse country, development has been uneven, and the various provinces and regions have been growing restive. As the provincial governments have gained in strength and competence, they have increasingly

challenged the authority of the central government in Ottawa; they seek alternative ways to develop their own regional economies and cultures against the centralizing tendencies. Canada is ethnically and politically diverse as well; no one political party at the federal level even approaches an even representation from different parts of the country. The consequence is that one senses a growing problem of governability - an inability of central government to take decisive action on matters of importance.

Canada is not unique. The situation is similar in other industrialized countries, where development has brought about a specialized and articulated pluralism of powerful interests, and affluence has spawned a diversity of goals. Unless some coherent outside threat to national security can be identified, a national consensus on priorities seems not to exist. In what sense the evaporation of central governability constitutes a limit to growth may be debatable. It may only constitute a limit to patterns of growth as we have traditionally conceived them, and in fact new dimensions of growth currently taking root may be facilitated by greater regional diversity and autonomy. The situation within Canada mirrors the situation in the world at large, where region after region is seeking alternatives to the centre-periphery pattern of development, and world government by two or three central power blocs is diffusing to many centres and diverse dimensions of influence.

#### HUMAN LIMITS

Finally, it seems there are limits to some kinds of growth that follow from the nature of the human individual. The time and attention of the human being are limited. The great religions have always known this and have always taught that spiritual progress is hampered to the extent that the individual is burdened and distracted by material possessions. In the language of the modern psychologist, a person's attention seeks variety (12) and can be expected to shift to higher needs, e.g. on Maslow's scale (13) as the more basic needs are met - except when his drives have become fixed on the lower needs, to turning them into fetishes. Of course, the North American cultural milieu encourages just such a displacement of goals. Commercial advertising continues to lead the consumer to expect to satisfy basic personal-relational needs in the purchase of still more material goods (14) and moreover creates false needs or wants by inventing new threats. Turning to economics, and the relation between production and consumption, the human time limit imposes a definite constraint. Even though, through automation, the output of material goods per man-hour might in principle be increased almost indefinitely, the time to use and enjoy those products remains fixed by the length of the day and the length of a human life. In the affluent "consumer" society many people have a surfeit of possessions they rarely have the time to use, certainly not to repair or maintain.(15) In industrialized countries generally today, as public opinion polls reveal, (16) the sense of enough-ness seems to be growing, with "more" not being worth more of the hassle and stress of the modern high-consumption society. These findings are supported in Canada by the sympathetic response in the popular magazines and in conferences elicited by the idea of a "conserver society", by statements by the Consumers' Association of Canada and similar organizations, and by the apparently increasing numbers of Canadians experimenting with alternative ways of living to develop definitions of work and leisure that correspond better to their own scale of human priorities. (17)

The possibility of natural human limits to consumption is important because it offers hope that high material consumption in the developed countries may slow down for its own internal reasons, and in fact may already be doing so - except in so far as it is resisted by artificial stimulation of false wants and waste by various commercial and bureaucratic agencies that have a vested interest in

their own growth. Encouraged and given a chance to work, the internal person-centred controls that are already having some effects may moderate the severe pressures against the various limits sketched previously, which may otherwise make necessary the desperate authoritarian political scenarios envisaged by Heilbroner. (18)

#### THE RESPONSE OF THE GOVERNMENT OF CANADA

The above set of problems has inspired numerous discussions in policy groups within the federal government. Many of these have focused around the work of the Science Council of Canada. The Science Council, a federally appointed independent advisory body, inserted in its review of natural resource policy issues in 1973 the following admonition:

"Canadians as individuals, and their governments, institutions and industries, should begin the transition from a consumer society preoccupied with resource exploitation to a conserver society engaged in more constructive endeavours. Ideally, Canada could provide the leadership necessary to work toward more equitable distribution of the benefits of natural resources to all mankind". (19)

In that same year the Science Council initiated a study on the implications of a conserver society, which culminated in the issue of a report in 1977 entitled Canada as a Conserver Society: Resource Uncertainties and the Need for New Technologies. (20) The Council's terms of reference meant that it tended to concentrate on scientific and technological aspects, of both diagnosis and prescription. Nevertheless, the use of the term "conserver society" itself constituted recognition that the cure would lie, not simply in conservation (which might imply mainly tighter regulation from the top) but in a shift in attitudes that would lead to changed behaviour at all levels in Canadian society.

The different values to be emphasized were set out in a definition:

"The concept of a 'conserver society' arises from a deep concern for the future, and the realization that decisions taken today, in such areas as energy and resources, may have irreversible and possibly destructive impacts in the medium to long term.

"The necessity for a 'conserver society' follows from our perception of the world as a finite host to humanity, and from our recognition of increasing global interdependence.

"A 'conserver society' is on principle against waste and pollution. Therefore it is a society which

- Promotes economy of design of all systems, i.e. 'doing more with less';
- Favours reuse or recycling and, wherever possible, reduction at source;
- Questions the ever growing per capita demand for consumer goods, artificially encouraged by modern marketing techniques;
- Recognizes that a diversity of solutions in many systems, such as energy and transportation, might in effect increase their over-all economy, stability and resilience.

"In a 'conserver society', the pricing mechanism should reflect not just the private cost, but as much as possible the total cost to society, including energy and materials used, ecological impact and social considerations. This will permit the market system to allocate resources in a manner that more closely reflects societal needs, both immediate and long-term." (21)

Thus the statement reflected several now widespread observations regarding the world's industrial system, namely the need for industrial systems to come to terms with the ecological context; the tendency of market systems to oversell; the tendency of industrial and market systems to follow their internal imperatives towards a larger and larger scale, eliminating diversity and creating dependence; and the need for policy to be guided by a more integrated social assessment of benefits and costs, as the market of transactions between private buyers and sellers is unable to cope with management of a "commons".

Changed policies cannot simply be imposed, however. They must arise from and be supported by changed perceptions among the populace. As the Report says:

"A 'conserver society' is not something that can be legislated into existence. The many aspects that we have reviewed in this report will require actions at many levels. Legislation can only confirm and formalize ethical rules and principles that are generally believed in. Individual citizens, educators, business people, engineers, if they agree with the principles set out here, will change their perceptions of our society and its problems, and will do things differently. There are many things governments can do to facilitate changing perceptions, but widespread sharing of perceptions and attitudes is fundamental. This gives great importance to the informational, educational and communication processes of society". (22)

It was therefore inevitable that the Science Council should suggest closer examination of the processes of advertising and marketing that have so much to do with making the Canadian "consumer society" what it is. In the main, however, the Council in its recommendations emphasized the ways in which technology could be different, building in the values of economy, conservation, ecological harmony, and total social efficiency - at the same time emphasizing the new opportunities all this presents for invention, innovation and new business growth.

Consequently the report contains immediate recommendations for improvements in automobile fuel economy, improvement of public transport as against the private automobile, substitution of electronic communication for travel; energy conservation through insulation of homes and buildings, design of multiple-unit housing and district heating systems, legislation of sun rights and revision of electricity rate structures; encouragement of renewable energy sources; recycling of materials, design of durable products with low maintenance costs; assistance for the necessary industrial innovation, adaptation and retraining. Further studies and research are recommended on low-energy transport systems, total-energy communities, urban design, energy storage, government incentives, e.g. performance standards, purchasing policies and taxation; the possible regulation of advertising, the total costing of products, and examination of the social costs of excessively large scale operations such as manufacturing plants or even cities.

It is likely that the chief value of the report has been its presentation of a perception and a technological philosophy that offer an alternative direction of development to what has been the prevailing trend in industrialized societies. What is involved is nevertheless continuing development rather than stagnation

or a freezing of the status quo. The selective choice of development that is implied is a concept following naturally from the basic premise of science policy, which is that technological decisions need to be examined in their own right. It is no longer safe to assume (if it ever was) that technologies simply follow along after, and are entirely decided by, market forces and political decisions. Certainly all those dimensions are present, and interrelated, but it seems to have been ignored frequently that similar market and political considerations might have been satisfied by different technological choices, and that in fact the choices that have been made may have been decided by such factors as the preference of engineers for glamorous equipment. We need to be alert to the fact that, just as we shape our tools, so do our tools shape us. The technological choices do matter.

In the main, the observations and recommendations of the Science Council report were familiar and widely shared among the "college" of groups exploring low-energy and environmentally benign development alternatives. Other initiatives that were proceeding at the same time as the Science Council study included the Advanced Concepts Centre, a small advisory futures group in the federal Department of Environment, which was concerned with exploring new concepts of development that would have an inherently low deleterious environmental impact, as an alternative to a future in which the Department of Environment would be forced into a heavier police-like regulatory role. The "conservator society" was one such concept, and one output was a handbook on environmentally appropriate technology. (23) Another was the social sounding Canadians in Conversation about the Future. (24) Although it has now been dissolved, the Advanced Concepts Centre was very active during that period under the leadership of Dr. R.W. Durie; with the Prospective Unit of the Canadian International Development Agency, it organized several interdependent seminars around the theme of environment and development. (25) Durie was instrumental in arranging departmental sponsorship of the Ark, in Prince Edward Island, as an ecology-energy-agriculture research and demonstration project, and organized an interdepartmental study group around the concept of the "conservator society", principally to discuss and supervise the work of the GAMMA Conservator Society Project (see below).

Following the publication of the Science Council report, the federal Ministry of State for Science and Technology organized a series of seminars in five cities across Canada on the theme of the "conservator society". (26) Among other government departments the Department of Energy Conservation, recently broadened to cover energy conservation and renewable resources, was particularly supportive, by reason of its own mandate.

#### THE GAMMA CONSERVATOR SOCIETY PROJECT

GAMMA, a consulting consortium based at the universities of Montreal and McGill, under the direction of Professors Kimon Valaskakis, Peter Sindell and Graham Smith, was awarded a federal government contract in 1974 in response to their proposal for a study of the "conservator society" concept. The result was a collection of 15 academic papers from various disciplines ranging from philosophy and physics through anthropology and psychology to economics and politics, along with an integrating essay and review, all of which were published in July 1976 in four volumes under the title The Selective Conservator Society. (27) A condensed version, principally of the integrating essay, was later published separately. (28)

The studies were structured around a framework which assumed three levels of definition or implementation of a "conservator society". The first, "doing more with less", assumed continuing in most ways as we are, but with technical

improvements in efficiency and conservation; the second, "doing the same with less", assumed flattening out to a stable state at a reasonable level of affluence, with improvements in efficiency; the third, "doing less with less", also called the Buddhist scenario, assumed a throughgoing value change, such that people would prefer the freedom and leisure for spiritual and other pursuits that they would gain by striving for less in the way of material possessions and growth. One particularly interesting analysis, by the psychologist W.L. Gardiner, (29) drew correlations between the consumer society and the behaviourist paradigm in psychology, which regards the human being as an object to be organized and manipulated - whereas the "conserver society" correlates with the newer paradigm of subjective or humanistic psychology, regarding the human being as free, responsible, and having intrinsic worth. Under the latter viewpoint high priority is given to internal psychological needs and intimate relationships. Gardiner argues that, just as this shift of paradigm is taking place in academic psychology, so is the corresponding shift of perspective taking place (and is well under way) in society at large, from a consumer mentality to that of conserver.

#### OTHER GROUPS AND INSTITUTIONS

Numerous other agencies and organizations have been supportive of the concept, and have tended to adopt the same or similar language. These include: the various environmentalist groups such as Pollution Probe, SPEC, Friends of the Earth (Canada) and the National Survival Institute; some universities that are beginning to incorporate such concepts in their curricula; small businesses with names like the "Conserver Society Product Co-operative"; and small groups living "conserver" lifestyles. Some groups, of course, demand a more radical conceptual and social reconstruction and, to them, the "conserver society" concept is expressed too much in terms of the existing paradigm; consequently, they claim, it serves only to modify, defend and ultimately reinforce the established systems. Such an argument is difficult to counter. It must be left to history to decide whether incremental transformation or radical bypass is the more practical strategy for change. A wider sampling of these various conserver and other "alternative" groups will be found in the paper by Cathy Starrs. (30)

The concepts have also been taken up in varying degree by all three main political parties. The federal Progressive Conservative Party, elected to power in May 1979, wrote in its party programme in 1975:

"It is increasingly obvious that we cannot continue to utilize our non-renewable resources along the exponential growth pattern of the past. The Progressive Conservative Party believes that ours must become a "conserver society", and our party recognizes that science and technology are a fundamental key to achieving such a society."

#### BOOKS, JOURNALS AND CONFERENCES

Conferences of all sizes have been held over the last five years, either with the "conserver society" as the main topic, or as one of the principal themes. The Canadian Futures Association regularly includes it as one of the main alternative futures for discussion. The Couchiching Conference, an annual public affairs conference, had as its subject in 1978 "Growth in a conserving society"; the proceedings have now been published. (31) A popularizing paperback, The Conserver Solution, has been produced by the Pollution Probe Foundation. (32) The Science Council during its study project started its own informal bulletin "Conserver Society Notes/Carnets d'Epargne" to communicate with and get feedback

from the growing network of people who were interested in the idea. When the project ended, that bulletin was taken over by the editor of Alternatives, first as a separate subscription magazine and now as a special section incorporated in Alternatives. (33)

#### SUMMARY

Without going more deeply into detailed discussion of the ways in which the concept of the "conserver society" has been developing and broadening in Canada since the Science Council document, attention will be drawn to three main themes or implications that may be of interest, and that were implicit in the original version.

##### A. Internalization of values

Many citizens and groups in Canada - environmentalists, religious groups, communities, labour, small business - see the concept of a "conserver society" not as a mere negative reaction against high consumption or pollution, but as a positive concept emphasizing values, or lifestyles, which are good in themselves. (34) Instead of looking forward to a society of endless battle - between wasters and conservers, or between exploiters and protectors of the environment (a society of "pollute until you're caught") - they hope for a society in which ecological comprehension has been internalized, and humans live voluntarily within their species niche. It may still be possible to call it a society of self-interest, but if so, it will be self-interest of a highly enlightened kind.

##### B. Continuation of growth

Though the concept is clearly against continuation of indiscriminate growth, growth for its own sake, or growth in GNP regardless of what it means, it is clearly in favour of continued growth in human development and the quality of life, much of the improvement being gained through the use of science and technology. Implied here is a questioning, at least for industrialized or "mature" countries, of the supposedly necessary connexions between industrialization, living standards, GNP - and the throughput of materials and energy. What is undoubtedly a fairly firm correlation up to some stage of development ceases to hold at higher levels, especially when the society begins to shift its composition of technologies, introducing new, more sophisticated technologies based on the biological sciences, ecology and micro-electronics. In such a transition energy consumption may even drop, but intervention, business, building and rebuilding will go on. Implied here also is a questioning of the meaning of GNP, income and other indicators, in relation to human needs and goals. As various material growth components reach the point of adequacy and begin to slow down, what continues to grow, and how does it show in social or economic indicators?

##### C. Appropriate technology for full employment

If industrialization continues and follows past trends, it will lead to a more and more highly organized corporate State in which highly efficient production requires a work force dwindling in numbers but escalating in skills, while increasing proportions of the population are left dependent on the system but with little or nothing of much importance to do, in a materially productive sense. Social problems, alienation, loss in total efficiency and probably coincident unemployment and inflation are outcomes of this incomplete and unbalanced use of human abilities. Thus the "conserver society" concept joins other current movements in seeking to redress the balance toward the "person"

and the "community" as against solely the material efficiency of the system itself. The use of appropriate technologies can support diversity and improve people's participation in the social process, and can promote greater self-reliance and a feeling of self-esteem. The result of a better distribution of personal and community contributions and responsibility may well be higher total efficiency. This should not be the primary aim, however, unless it is understood that the outputs in terms of which social efficiency is measured are not only material but include many intangibles - such as, for example, satisfying human relationships, true leisure and the feeling of self-esteem mentioned above.

#### WHAT NEXT?

The Science Council of Canada concentrated on the technological features of a "conserver society" what needed to be done technologically, what it might look like, and what initial actions might be taken by people and Governments to move in the right direction. However, there is a great deal yet to be done.

Perhaps the most important area for investigation has to do with the dynamics of human social behaviour. Why do people over-consume, waste and behave in short-sighted, self-interested ways? It is not the same in all societies. How much has to do with basic human nature and the social structures in which people find themselves, and how much is a matter of education, conditioning and propoganda, including advertising and television and radio programming? How much is due to conditions of rapid growth and social change - as against conditions of security and social stability? Conscientious housekeeping requires a sense of having the time to do it, and a sense that things are going to be tomorrow much as they are today. How much wasteful consumption follows from the structure of the welfare State (or the impersonal corporate State), which leads people to feel that goods are free, or collectively paid for and therefore characterized by a high disparity between private costs and private benefits? How much is, in a way, philosophical or cultural, being caused by an excessive preoccupation with market economics? How much depends on the locus and control of power in the society, and the processes of capital accumulation, i.e. the relative benefits and power of producer relative to consumer? And how much is simply a question of morality or ethics? These questions need to be explored and understood so that the necessary transition which is now taking place in the industrially advanced countries can be facilitated.

#### CONCLUSIONS

Internationally, the concept of the "conserver society" as an alternative development may be seen as a response appropriate to other industrialized countries besides Canada as they encounter the pathologies of an excessive growth that attempts to continue along the same lines as in the past. At the same time, the concept will be seen to contain many of the same elements as other alternatives under current discussion. Most important, it is compatible with the concepts of ecocodevelopment being discussed and recommended for other countries at different stages of development.



NOTES AND REFERENCES

1. The use of the words growth, development and limits may be questioned here, in the light of trends toward developing a new language where, for example, development is distinguished from growth, and growth is assumed to have been taken over in popular usage to mean always material growth, as measured in tons per year, dollars or the level of GNP. A country following a proper ecodevelopment path will by definition not encounter limits, and therefore in this sense limits are symptoms of "maldevelopment". However, to my mind growth, development, and limits are very useful ordinary words, and I am not prepared to yield up their use to the enemy, so to speak. I prefer to try to clear up the corruption around them and restore them to respectable meaningful language.
2. An Energy Strategy for Canada (Ottawa, Federal Department of Energy, Mines and Resources, 1976); Energy Futures for Canadians (Ottawa, Federal Department of Energy, Mines and Resources, 1978). Some Canadians consider the assumptions made in these two reports concerning feasible conservation and efficiency goals to be much too modest. See, for example, D.B. Brooks, "Economic impact of low energy growth in Canada: an initial analysis", discussion paper No. 126, prepared for the Economic Council of Canada (Ottawa, 1978); and also Amory B. Lovins, "Exploring energy-efficient futures for Canada", Conservation Society Notes/Carnets d'Epargne, May-June 1976.
3. Great Lakes Water Quality, Seventh Annual Report to the International Joint Commission (Windsor, Ontario, Great Lakes Water Quality Board, July 1978).
4. The Shape of Saskatchewan, report submitted by the province of Saskatchewan to the eleventh Congress of the International Society of Soil Science, Edmonton, Alberta, 19-27 June 1978.
5. The Science Council of Canada is conducting a study on "Canada's scientific and technological contribution to world food supply. See papers by L. Siemens and Stuart Hill in The Agrologist, 1979.
6. Orio Giarini, "Dialogue on wealth and welfare", contribution to a project for the Club of Rome on World Capital Requirements and Capital Formation (in draft, 1979).
7. Some critics go so far as to say that the very search for "indicators" betokens continued preoccupation with the "scientistic" paradigm that has been responsible for many of the social distortions which have already occurred in the name of "economics". To search for solutions in more of the same will only compound the problems. Moreover, in a period of changing paradigms, it is characteristic that what is clear information to some people is invisible or unpersuasive to others.
8. Fred Hirsch, Social Limits to Growth (Cambridge, Mass. Harvard University Press, 1976).
9. "Minister admits auto pollution law unenforceable - no money, no staff", The Ottawa Citizen, 23 August 1979, p. 1.
10. Hazel Henderson, Creating Alternative Futures: the End of Economics (New York, Berkley, 1978). See particularly chapters 5 and 17.

11. M. Mesarovic, and E. Pestel, Mankind at the Turning Point (Dutton/Reader's Digest Press, 1974).
12. Tibor Scitovsky, The Joyless Economy (Oxford University Press, 1976).
13. A.H. Maslow, Toward a Psychology of Being (New York, Van Nostrand, 1968).
14. W. Leiss, The Limits to Satisfaction: An Essay on the Problem of Needs and Commodities (University of Toronto Press, 1976.)
15. Staffan Linder, The Harried Leisure Class (Columbia University Press, 1970).
16. Willis Harman, "Humanistic capitalism: another alternative", Journal of Humanistic Psychology, winter 1974. "Poll shows Norwegians yearn for simple life", Montreal Star, 27 October 1975, p. C-2. Peter S. Sindell, "Cultural dimensions of a conserver society in Canada", Study No. 13 of the GAMMA Conserver Society Project, 1976. (Available from GAMMA, Suite 210, 3535 Queen Mary Road, Montreal, Canada).
17. Cathy Starrs, Exploring Development Alternatives: Canada 1979, (Ottawa, Environment Canada, August 1979). This paper as well as a summary of it were presented to the Ljubljana seminar.
18. Robert L. Heilbroner, An Inquiry into the Human Prospect (Norton, 1974).
19. Natural Resource Policy Issues in Canada, Science Council of Canada Report No. 19, Ottawa, January 1973.
20. Canada as a Conserver Society: Resource Uncertainties and the Need for New Technologies (Ottawa, Science Council of Canada, September 1977).
21. Ibid., pp. 13-14.
22. Ibid., p. 72.
23. Bruce MacCallum, Environmentally Appropriate Technology, (Ottawa, Environment Canada, 1975).
24. Cathy Starrs, Canadians in Conversation about the Future, (Ottawa, Environment Canada, 1976).
25. The set of seminars and workshops produced the following reports: Charles Jeanneret, and R.W. Durie, Prospective on Environment and Development: Asia: Pacific Rim, Report of a Workshop, 5-7 November 1975 (Ottawa, Environment Canada, 1976); George Francis, Eco-Development, National Development and International Co-operation Policies, Report of a Workshop, 13-15 October 1976 (Environment Canada, 1976); Tibor Mende, The Socio-Political Scene in the Coming Years - with special reference to East Asia, Joint project on Environment and Development 1 (Ottawa, Environment Canada, 1976); Ignacy Sachs, Environment and Development: A New Rationale for Domestic Policy Formulation and International Co-operation Strategies, Joint Project on Environment and Development 2 (Ottawa, Environment Canada, 1977); Johan Galtung, Towards Self-Reliance and Global Interdependence, Joint Project on Environment and Development 3 (Ottawa, Environment Canada, 1978); George Francis, Environment and Development - Phase III Prospective on Eco-Development: Strategies for Action, Report of a workshop held from 1 to 3 December 1977 (Ottawa,

Environment Canada, 1978); Michel, Chevalier, and T. Burns, A Public Management Strategy for Development and Environment, Joint Project on Environment and Development 4 (Ottawa, Environment Canada, 1978); Simon Milner, Eco-Development and Third World Urban Regions: A Prospective for International Development Cooperative Policy, Joint Project on Environment and Development 5 (Ottawa, Environment Canada, 1979). The reports are also available from the Policy Branch, Canadian International Development Agency, Ottawa.

26. The particular themes, sites and co-sponsors of the seminars were:

20 February 1978 - Halifax, Renewable Energy, Institute of Public Affairs, Dalhousie University

6 March 1978 - Regina, The Technological Challenge for Small Communities, Canadian Plains Research Centre, University of Regina

31 March 1978 - Vancouver, Recycling and Solid Waste Management, The Recycling Council of B.C. Research Foundation

10 April 1978 - Toronto, Industry and Business, Peter Middleton Associates and Canadian Business magazine

24 April 1978 - Montreal, Industrial Opportunities for a Conserver Society, GAMMA

27. The GAMMA Conserver Society Project: Vol. 1, The Selective Conserver Society; Vol. 2, The Physical and Technological Constraints; Vol. 3, The Institutional Dimension; Vol. 4., Values and the Conserver Society. Available from GAMMA, Suite 210, 3535 Queen Mary Road, Montreal, Quebec, H3V 1H8.

28. K. Valaskakis and others, The Conserver Society: A Workable Alternative for the Future (Toronto, Fitzhenry and Whiteside - New York, Harper and Row, 1979).

29. W.L. Gardiner, "The consumer and the conserver", Study No. 12, to be found in vol. 4 of the GAMMA study.

30. Dean Walker, ed. Growth in a Conserving Society, based on papers prepared for the 47th Couchiching Conference of the Canadian Institute on Public Affairs (Toronto, Yorkminster Publishing, 1979).

31. Lawrence Solomon, The Conserver Solution, (Toronto and New York, Doubleday, 1978).

32. Alternatives, a quarterly journal with perspectives on society and environment, published at Trent University, Peterborough, Ontario, Canada.

33. The Science Council of Canada convened a Workshop of Concerned Citizens interested in the concept of a "conserver society" in Toronto from 13-15 January 1978. The result was a public statement: Canada as a Conserver Society: An Agenda for Action, published in Conserver Society Notes, Summer 1978.

A FINNISH VIEW ON ALTERNATIVE PATTERNS OF  
DEVELOPMENT AND LIFESTYLES

Paper transmitted by the Government of Finland

Prepared by Ms. P. KASANEN\*

Summary

Specific geographical and climatic conditions play an important role in the shaping of development patterns and lifestyles in a country like Finland. Two thirds of the population live north of the 60th latitude, and the population density is low. As far as natural resources are concerned, renewable resources are the most important, although the resource endowment also includes some ores and minerals. Fossil fuels have never been found, and no discoveries are expected. The forest is the dominating resource; exploitation is already close to restoration capacity, i.e. no important expansion is expected to occur.

Recent trends in economic life are similar to those in most other industrialized market economy countries. Owing to its rather narrow spectrum of natural resources, Finland is highly dependent on exports and imports. Changes in international trade therefore have considerable impact on domestic circumstances. The establishment of a new international economic order is likely to bring about profound changes in the structure of production. Since the 1940s urbanization has been very rapid, although the pace began to slow down towards the end of the 1970s. At present the major immediate socio-economic problems arise from the exceptionally high unemployment, the rapid rise in energy prices and the automation of production.

Present development patterns and lifestyles are considered incompatible with proper management of the environment and natural resources, especially in respect of energy supply and consumption. Many of the important economic activities in Finland are energy-intensive. This is true in particular of the two major industrial branches based on indigenous resources, namely pulp and paper and basic metallurgy. The inputs of imported energy into agriculture are also sufficiently large to cause anxiety. Due to the prevailing climatic conditions, large amounts of energy are required for space heating; the transport sector is also a heavy consumer, because of the usually long distances.

Two alternative adaptation strategies are outlined in the study; they are not entirely contradictory, however. The first alternative is based on continued participation in the international division of labour and an open economy. A certain self-sufficiency in basic necessities, such as energy and food, will be required, but no priorities for particular items or branches have been set. Production should be developed in a way which makes it possible to follow the principles laid down by the advocates of a new international economic order and

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adapt the economy to changes in the international division of labour. Renewable resources should be utilized within the limits of their restoration capacity. In production relying on non-renewable resources, attention should be given to the principles of non-waste and low-waste technology and the reuse and recycling of wastes. Industrial and other production should be made less energy-intensive. The importance of know-how as an export product would strongly increase. It is thought that this strategy would allow the ecological processes to function without serious disturbances.

The second alternative is based on a certain decentralization of activities, which would permit a shortening of transport distances and ensure proper circulation of raw materials and nutrients. Industry and agriculture would be labour-intensive. Self-sufficiency in energy would be markedly enhanced. However, extended use of expensive and scarce indigenous energy sources could cause transition problems. This second alternative would be protectionistic, but would not lead to a closed economy despite emphasis on the use of indigenous natural resources, self-sufficiency in products for the satisfaction of basic needs, decentralized human settlements and promotion of small communities.

Whatever the strategy for adjustment to an alternative development pattern, it will be necessary to promote the use of so-called soft technologies, i.e. technologies which are compatible with rational use of natural resources and protection of the ecosystems. Less energy-intensive transport systems have to be developed. Despite the geographical and climatic conditions, the use of renewable sources of energy - such as biomass and solar energy - must be intensively studied and promoted in Finland. To reduce waste in the use of raw materials, the life of consumer goods must be significantly extended. Although it will be impossible to reject automation, measures to regulate its impact on employment will be necessary. In any case, employment problems will cause difficulties, even if the main issue will be income distribution. Food production is also likely to be much more labour-intensive than generally in the industrialized countries today.

Public debate in Finland deals rather intensely with the problems of ecological limits to human activities. Predictions are rather pessimistic. It is often claimed, for example, that the present lifestyles of the population are in contradiction with basic ecological principles. Deep societal changes are thus considered unavoidable. In the same context it is also held that democracy should be extended with emphasis on individual rights, self-government even in small communities, etc. No satisfactory answer has as yet been found to the question of whether a strongly "ecologically oriented" society should be based mainly on centralized or on decentralized decision-making. The discussion of policy instruments therefore remains rather confused. The paper considers some major possible instruments, however. They include the "polluter pays" principle and other modifications of the market mechanism, public participation and the role of citizen organizations, information and education, comprehensive environmental policy, and international as well as national support for experiments on alternative technologies and development patterns.

THE ORGANIZATION OF LIFE ON THE BASIS OF  
SOCIALIST RELATIONS AND SELF-MANAGEMENT

Report transmitted by the Government of Yugoslavia  
Prepared by Mr. A. LAH\*

Summary

In Yugoslav experience, progress towards a high quality of life and the maintenance of a sound environment can be attained only through continued efforts to reconcile the immediate and individual interests of the working people and all citizens with the broader and long-term concerns of the social community at large. The objectives of socio-economic development include the elimination of regional disparities, the establishment of conditions that stimulate creativity and productivity, and the provision of opportunities for direct participation by the people in all social activities, particularly in decision-making on labour, income and the allocation of resources. In Yugoslavia these objectives are being implemented with the help of a strategy, in which the following elements play a major role:

- (a) Self-management and socio-political mobilization of the working people;
- (b) Systematic negotiations between representatives of the production sector and of other activities and between the suppliers and the users of various public services;
- (c) Promotion of education, research, culture, health care and social welfare;
- (d) The consistent assertion of the rights and liberties of working people and citizens;
- (e) Establishment of agreements on common objectives and actions.

Resources destined for socio-economic development have two origins: income from the formal economy which is allocated for investment, or extended reproduction, and direct contributions from the population, which guarantee the functioning of the social services. Decision-making is organized accordingly. Programmes for activities of common social interest (e.g. energy supply, health care and research) are drawn up jointly by the suppliers and the users. Contributions from those directly concerned are pooled to provide the resources needed to implement the programmes. The workers in the formal economy decide on production plans, enterprise management and the allocation of resources to other activities and to the State. Over-all development is their own responsibility. At the level

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of local communities, where the workers play the role of citizens and users of infrastructural services, they discuss and decide on ways and means of satisfying individual and communal needs.

These are the basic features of so-called "social planning" in Yugoslavia, which encompasses economic, social, regional and ecological development. It is considered most important that all these aspects should be discussed by the working units and the communes.

The concept of "social planning" is now also being applied in drafting medium-term plans. Special management agreements are concluded for each specific project and task, defining the details of implementation. Great importance is attached to assessment of the environmental impact of development action. Through the agreements, economic agents are held responsible for the protection and improvement of the environment and for careful management of natural resources. The agreements also cover social aspects, such as employment, income and security, and opportunities for cultural activities as a means to enrich the development process.

All this does not mean that Yugoslavia is free of the problems of contemporary society. A characteristic feature of its development pattern and lifestyle is, however, that the community acts to correct deficiencies and imbalances. It is in this context that the self-management agreements on plans, social infrastructure, lifestyles and long-term concepts of development acquire their real sense and meaning.

It should be noted that the Yugoslav model is not a general recipe. Implementation of its principles and objectives takes place in thousands of organizations and communities, on the basis of pluralistic interests and diverse expectations, possibilities, constraints and degrees of commitment. Some undertakings are successful, others not. Development results from the working of multitudinous interdependent factors, and progress is dependent on appropriate social awareness at both macro and micro level.

ENVIRONMENT AND DEVELOPMENT  
A brief exposé on methodology

Report transmitted by the Government of the USSR  
Prepared by Mr. R.A. NOVIKOV\*

A. INTRODUCTION

The theme of "environment and development" emerged in the course of the preparation for the United Nations Conference on the Human Environment. It was included in the final agenda of the conference, where the discussion focused on problems of harmonizing the socio-economic development of the developing countries with the new requirements of environmental protection. The outcome was the formulation of the general concept set forth in principle 9 of the Declaration of the conference, which states that environmental deterioration due to inadequate development has posed serious problems which can best be overcome through accelerated development.

"Ecodevelopment" problems continue to be the subject of animated debate in the world scientific community, at high national government levels and in national and international political organizations. There are two main reasons for the unflagging interest in the problem of "ecodevelopment".

Firstly, the subject has outgrown its original framework; it now also attracts the attention of a large number of developed nations. The popularization of certain notions, making demographic and economic growth the main cause of deteriorating ecological conditions in the world, has been instrumental in this process. However, the goal of "global balance" (zero growth in population and material production) has never become part of social practice, the weakness of the methodological basis being all too evident. Other views on "ecodevelopment" have established themselves. They generally proceed from the premise that the key to orderly relations between society and nature lies in the continuous economic, social, technological and cultural progress of society, guided by rational management of natural systems, on the basis of profound scientific knowledge. It should be emphasized that the need to incorporate environmental considerations into the strategic objectives and current tasks of socio-economic development planning has been recognized in practically all countries of the world, both developing and developed.

Secondly, in recent years there has been growing interest in "ecodevelopment" as a conceptual basis for policy to optimize relationships between society and nature, i.e. to ensure an integrated approach to the protection of the

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environment at various levels of economic management. Such policies are being drawn up in almost all countries, regardless of their levels of economic development, social systems, ideologies, environmental situation or availability of natural resources. This, in turn, poses a broad range of questions - above all of a methodological nature - which require further study.

The above considerations underline the vital importance of the current UNEP project on environmental problems connected with development and the quality of life. This brief methodological note represents the contribution of the USSR to discussion and active study of the subject within the United Nations system.

Basic ideas on the interaction between nature and society at the present stage of development

The dialectics of the interaction between society and nature stem, objectively, from man's specific position in nature. Unlike animals, man not only adapts himself to his natural habitat, but also constantly strives to adapt his habitat to meet his continuously evolving needs, using his intelligence, labour and social forms of organization for that purpose. During the continuously reproduced process of labour, which constitutes the basis of social production, man strives purposefully to change nature by modifying its processes in an increasingly varied and complex manner; but in this way he has always to deal with a modified, anthropogenically transformed nature.

Man's biological essence calls for organic unity between himself and nature; at the same time his social essence makes his nature-transforming activity a sine qua non condition for his existence and social and cultural development. In the course of this development, man acquires new potential to influence nature, which in turn makes it possible for society to reach a higher stage of material and spiritual progress. This complex "development spiral" has the force of an inescapable and irreversible natural and historical law.

Consequently, the interaction between society and nature is a continuous process in all social formations and evolves in accordance with the law of unity and the struggle of opposites. The organically unbreakable unity with nature, on the one hand, and the vital need for man to transform nature, on the other, constitute the essence of the inherent contradictions in the relationship between society and nature. The key problem, in this context, is whether anthropogenic transformation of nature through man's industrial or other activities can last indefinitely without causing irreconcilable conflict - a conflict which carries with it the danger of undermining the physical conditions for man's existence as a biological species.

The possibility of overcoming the contradictions between society and nature lies in the very character of man's nature-transforming activity. Karl Marx noted this: "Labour is in the first place a process in which both man and nature participate, and in which man of his own accord starts, regulates and controls the material reactions between himself and nature."

Human labour thus produces the material and intellectual values which increase society's potential to regulate and control its relationship with nature in a proper and constructive way.

At each historical stage of the relationship between society and nature the contradictions can thus, in principle, be overcome. This may happen through a transition, or a conscious and purposeful transformation of the system into a qualitatively new relationship.

In a specific practical sense, however, the attainment of such a relationship depends on a multitude of factors and their combinations. Scientific socialism approaches this theoretical problem on the basis of two basic considerations:

(a) society and nature are two heterogeneous objective realities (two different forms of matter), the contradictions being external with respect to each of them; and (b) the character of the relationship between society and nature depends on the social forms and the levels of the productive forces of society, the status of human knowledge and the degree to which it is utilized, etc. All this explains the multidimensional character and the extraordinary complexity of the links and feedbacks between society and nature, and the constant process of overcoming the contradictions between them.

This process is profoundly influenced by the fact that the contradictions emerge as external phenomena in the development of two different objective realities, society and nature - which obey their own, qualitatively different laws, with no common denominator. Dialectical materialism proceeds from recognition of the dominant role of the internal contradictions in the process of development of both society and nature; the process of social development, in the final analysis, derives its content and motive force from the dynamics of social forms and laws, rather than from any determinism of nature. Emphasizing that it is the social mode of production and the ensuing social relations that ultimately determine the character of the relationship between society and nature, dialectical materialism does not belittle the role and importance of nature in the development of society. In the circumstances obtaining today, with human activities bringing about a rapid change in the natural environment, and even creating a new environment - an artificial, "techno-environment" or "techno-sphere", - it seems justified to say that the development of society is more dependent on the environment; the negative impact on society of some of the environmental changes are a case in point.

The current stage in the relationship between society and nature is in fact characterized by the emergence of a whole set of ecological problems, some of which previously existed in latent form. The problem of the interaction between society and nature has become incomparably broader, richer, and more complex than in the past. The chief components of the current situation in respect of the environment are:

(a) The high, in some cases critical, level of environmental pollution by residuals arising from production and consumption, which are damaging to man and lethal to some of the biological systems, such as various chemicals and dangerous forms of physical disruption of the environment (noise, vibration, microwaves, ionizing radiation, etc.);

(b) The excessive growth of consumption and the misuse of many types of primary resources and energy, accompanied by a continuing increase in industrial and household discharges and wastes;

(c) Exacerbation of the traditional problems of environmental protection - deterioration of individual ecosystems and natural landscapes; the destruction of some valuable components of nature; reduced populations of some species of wild animals and varieties of flora, etc.

Correct understanding of the environment problem as it presents itself today is impossible without taking into account its social aspects. Whereas in the past the negative implications of human activity used to affect only some isolated, individual components of the environment, today it is man himself, his health and well-being that have become a direct target. This new development has caused

the traditional problem of "environmental protection" to evolve into the much bigger and broader problem of the "human environment".

We are at present witnessing a new historical stage in the interaction between society and nature, a stage affecting not only the physical conditions of existence of present and future generations, but also the material and social prospects for development. Hence the increased socio-economic and political importance of the ecological problem, which has acquired both new content and a global dimension. The problem has become "internationalized" because the ecological contradictions have to a varying extent, and in a direct as well as an indirect way, affected all the countries of the world. And the problem has become global because the contradictions touch a higher ecosphere level; the field of intensive economic activity now includes all the subsystems: the biosphere, the atmosphere, the lithosphere, the hydrosphere and even the cosmosphere.

The present paper does not aim to identify all the different causes of the current unsatisfactory ecological situation. Briefly, these causes include a broad spectrum of phenomena and processes of societal and world development, including types of social systems, which primarily determine the nature of the ownership of the means of production and natural resources and, thereby, the ability to transform the natural environment; the level of development of the productive forces and scientific knowledge, as well as the scale and character of their use; the social, economic, moral and ethical goals of society, as well as the degree of freedom to attain these goals; the state of international political and economic relations; the degree of public awareness of the specific character of the current stage of the relationship between society and nature; and, finally, the state of ecological awareness of the broad masses.

Nevertheless, it would seem desirable to examine the links between the environment and such important socio-economic phenomena as scientific and technological progress, economic growth and demographic development.

#### Environment and scientific and technological progress

The implements of labour, i.e. machines and technology, are of vital importance for the way in which man, through his activity, affects nature. It would be wrong, however, to attribute to them any absolute value in the set of factors shaping society's attitude towards nature. Machines and technology as such are neutral with regard to nature (and to man, for that matter); it is only the way they are used - which is determined chiefly by social factors - that gives rise to ecological (as well as social) consequences of differing content and thrust.

Science and technology nevertheless enjoy a certain degree of independence which stems from the logic of their own development. The present trend, for instance, is characterized by increasing differentiation of technological resources and growing size, concentration and complexity of the technological systems. This, in turn, frequently means that technological innovations have unforeseen consequences.

All this greatly enhances the importance of purposeful control and management of the scientific and technological development process on the part of society, so as to anticipate undesirable socio-economic and ecological consequences.

There is no direct, predetermined link between scientific and technological progress and the worsening of the ecological situation. There are indications that technological development can bring about substantial savings of natural and energy resources in the production of various goods, and a reduction and

even complete elimination of environmental pollution. There is also evidence that many modern forms of environmental damage have nothing to do with the application of technology.

A major challenge today is how to combine scientific and technological progress with rational use of the natural environment. It is not a question of giving up scientific and technological progress, but rather of giving it a new dimension, namely that of greater responsibility for the protection of nature. In principle, the task is quite feasible: through the progress of science and technology, it is possible to develop a system of knowledge and adequate technical means ("ecotechnics" and "ecotechnology") for the rational management of ecological systems. Since the development of science and technology is a cumulative rather than linear process, it can also be made to accomplish the function of monitoring changes in ecological systems in places where the impact of human activity on nature is a highly dynamic factor.

However, the adjustment of technological progress to the new ecological requirements will not solve all the problems involved in regulating the relations between society and nature. A purely technical approach is not sufficient. The whole set of factors shaping the relationships between society and nature must be improved.

Environment and economic growth. - Economic growth as such does not necessarily cause degradation of natural resources and deterioration in the quality of the environment. A priori there is no irreconcilable contradiction between the production of material goods and the state of natural resources and the environment. The conflict is above all the result of the social and historical conditions that have provided the framework for economic development, i.e. social motivations and objectives, subjective attitudes towards factors which sustain this development, technological modes of production and the technical systems, etc. In other words, objective natural and physical limits to development in the sphere of material production only arise from a "nature-exhausting" type of economic growth.

To stop development in the sphere of material production would be impossible not only because of the potential socio-economic consequences but also from considerations of environmental protection. The transition to a type of economic growth that improves the natural environment is one of the main tasks in developing a sound environment. It is through such growth that the material and technical means required for restructuring the present production apparatus can be created. The problem is to develop and introduce a number of radically new technological modes of production of goods for intermediate and final consumption, including energy; to develop waste-treatment, low-waste and non-waste technologies on a large scale; to provide equipment and facilities for collecting, transporting and recycling various production and consumption wastes; to strengthen and develop machinery and technologies for the rational reproduction and use of natural resources, etc.

The over-all policy aim must be to limit as far as possible the probability of immediate or long-term damage to nature, and to promote the effective reproduction of natural resources which are of both economic and ecological importance. These new tasks in the field of nature protection and utilization can only be tackled in the context of economic growth.

Of course, this does not exclude the possibility that in respect of a specific economic activity or certain combined effects (e.g. high local concentration of highly pollutant production combined with unfavourable weather conditions; sharp degradation or depletion of natural resources), it may be found advisable to

reduce the scope of production or to halt it altogether. Similarly, in countries where large-scale deterioration of the environment approaches unacceptable limits, resort to the regulation of economic growth may be necessary as a means of avoiding ecological disaster. Such measures should only be considered as palliative and temporary, since they fail to provide a radical solution to the long-term problems of nature protection and utilization.

One of the conditions for an optimum relationship between economic growth and the preservation of the environment, while fully meeting the needs of man and society, is that economic growth must be oriented towards the attainment of humanistic goals and real social progress.

Economic development cannot be guided by a narrow or simplified philosophy of consumerism or, at the other extreme, by an ideology of ascetism, nor should it be based solely on such concepts as "quality of life" or "quality of the environment". Today, economic growth finds its true dimension in the notion of "way of life" which covers the characteristic features and forms of life of various social classes, ethnic groups, community groups and individuals in a given society. The notion of "way of life" includes the socio-economic concept of "standard of living", the general sociological concept of "quality of life" and the socio-psychological concept of "lifestyle".

The creation of a way of life for the broad masses of the population which would correspond to their inherent desire to live in conditions of material well-being and spiritual improvement, in full harmony with nature, is the only justifiable goal of material production.

Environment and population. The problems of population and the problems of environment are becoming increasingly intertwined. Environment influences the patterns of human settlements, the physiological aspects of man's life and some of his working conditions. This is why a consistent scientific approach to societal and ecological processes must take into account demographic factors, especially those determining economic development, consumption of resources and the state of the environment. At present, the conditions for human reproduction, i.e. work and rest, well-being and a secure future, are largely dependent on finding a solution to the problems of the environment, which in turn demands planned human activity to protect nature.

A strictly scientific approach must refute the ideas of "ecological Malthusianism", which view man solely as a consumer of nature's resources with an inherent urge to destroy nature. Man is above all a creative force: man represents the growing potential for increasing the wealth of nature and, in a broader sense, for improving the functioning of the biosphere.

In a developed economy, a man engaged in productive labour can, during the period of his active life (40 years), produce two and a half times more than he can consume during his lifetime (70 years). In the final analysis, the nature of man's impact on nature is determined by the goals of human labour, i.e. not by "human nature" but rather by the forms and laws of his society. In the current ecological and demographic situation, the relationship between society and nature can be enhanced not through artificially achieved zero population growth, but rather by changing the structure of social labour in the economy, and especially by increasing the share of social labour expended on restoring, preserving and enriching the environment. In order to achieve optimal socio-economic conditions in the briefest possible time, such restructuring must take place in the context of economic and demographic growth.

The "ecological discussion" of recent years has focused, inter alia, on the crucial question of damage to the global ecological system. On the basis of past trends, some demographers have concluded that there is a "law" of exponential population growth and that, if this growth is not checked artificially, it will soon bring mankind to the brink of disaster. Such a view of the global demographic problem has no serious scientific basis, however.

In the long-term perspective, demographic growth is determined by socio-economic, rather than biological, laws. Historically, the general dynamics of world population have been characterized by a shift from high to low birth and mortality rates, the latter being typical of societies with high levels of economic, cultural, scientific and technological development. Exponential population growth corresponds to a transitory stage of high birth rates and low mortality.

The current world situation is characterized by relatively low birth rates in the economically developed nations, and a "population explosion" in the developing nations. In many countries and regions of Latin America, Africa and even Asia, population density has not yet reached a level that can be considered optimal from the viewpoint of modern industrial development. The demographic situation is serious because the "explosion" is occurring in extremely poor countries, containing more than half the world's population.

The chief cause of the economic backwardness and poverty of these countries, however, is not over-population - although this adds to socio-economic difficulties in certain circumstances - but the low level of development of the productive forces and of labour productivity as a result of long periods of colonial exploitation.

Even if the expected maximum level of the world population 1/ will not necessarily be beyond the carrying capacity of the ecosphere, it is true that the rapid and spasmodic increase in a short period of time furnishes a strong argument in favour of a radical reappraisal of many current principles and methods for the use of natural assets, and resolute steps towards a more active policy of environmental protection and the rational management of natural resources.

To sum up, the following tasks must be tackled in an integrated manner;

- (a) Improvement of the quality of the environment as a prerequisite for man's existence and survival;
- (b) Regulation of the scale, structure and character of the reproduction process in respect of living and inanimate natural resources;
- (c) Creation of adequate natural conditions for the long-term stable development of social production to give full opportunities for comprehensive development to future generations;
- (d) Active participation by all States in the international programme of co-operation aimed at preserving the environment within national borders as well as finding positive solutions to international ecological problems.

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1/The main stages in world population dynamics projected by the United Nations are: a period of high rates of population growth until the year 2000; a period of slowly decreasing growth rates after the year 2000; a period of low growth rates after 2075; and stabilization of the world population at the level of about 12 billion after the year 2100.

The new content of the ecological problem, its clear-cut social dimension and global scale make it impossible for any one science fully to encompass the related findings; this means that a wide-ranging synthesis of knowledge is needed. Study of the problem will demand contributions from numerous branches of scientific knowledge, including the natural, physical and social sciences. Historical materialism may provide the general methodological basis for study of the interaction between society and nature, but the theory of social ecology, a new branch of knowledge that has incorporated the methodologies of many sciences, will have to assume the task of formulating concrete approaches. The main role of this discipline is to suggest specific practical means of rational management of the natural resources required for social development, including the reproduction of these resources, if needed. The management concept must be based on recognition of society and nature as integral systems, and on awareness of the need to ensure an orderly exchange of substances and energy between the two in the process of their development.

A specific branch of this new integrated science is global ecology, i.e. study of the interactions in the world system (the totality of the world's nations, the world economy, international political, economic and commercial as well as scientific and technological ties and relations) with global natural systems, i.e. the ecosphere and its major structural and functional subdivisions and components. This scientific discipline combines the methodological approaches of social ecology with those of the sciences dealing with the world economy and international relations.

The major task of global ecology is scientific analysis of the international aspects of managing the processes occurring in the ecosphere. This includes: clarification of the socio-economic and international political origin of a particular ecological situation in the world and in its main regions; appraisal of ways and means of organizing broad collective action based on solidarity among States in order to control and forestall large-scale ecological problems or conflict situations; the study of the most adequate and acceptable forms and methods for pooling efforts and dividing responsibility between States so as to achieve these goals; analysis of the present and possible future interaction between the main processes in the ecosphere, including those caused by man's activities, and international political, social and economic development.

B. Major contemporary problems of the environment and a general strategy to combat them

The new content and the global dimension of the environment problem require the development of qualitatively new social attitudes towards nature. Scientists throughout the world are now working on the problem; at the present, initial stage of study, the most general principles of such attitudes can be outlined.

Society's new attitudes towards nature will be reflected in the management of natural resources based on an integrated and comprehensive assessment of the impact of development projects on the environment.

Management of natural systems must have as its main objective the attainment of a dynamic equilibrium between socio-economic development and the functioning of natural systems. This means that a much greater share of society's energy must be allocated to the task of controlling and improving the quality of the natural systems. The new relationship between society and nature must be regarded as a process of mutual adaptation.

Consequently, the transformation of nature within the process of social production today requires improved management of the productive forces which, in an organic way, should combine management of both the dynamic societal system and the complex, multidimensional, natural systems. The attainment of such a level of management, with the purpose of optimizing the relationship between society and nature, both nationally and globally, both at present and in the future, presupposes scientific forecasting of societal and natural processes, in their combinations and interaction, as well as the formulation of long-term strategies for national policy and international co-operation to protect the environment.

The point of departure, and in a sense the core of the strategies, must be a scientific concept, i.e. a general methodological approach to contemporary ecological problems and their systematic, internal and external, cause-effect relationships that determine the way in which they evolve and become intertwined with societal and international processes.

Pollution of the environment. Anthropogenic pollution means the introduction of extraneous physical, chemical and biological agents into the external environment. The chief sources of such pollution are man's production activities and the functioning of the supporting technical structure.

Anthropogenic pollution not only lowers the quality of the environment, its aesthetic and recreational potential, but also causes significant disturbances and disruption in natural processes. At present, pollution even threatens the stability of the ecosphere as a whole by damaging, or even destroying, many major natural resources.

Prevention of environmental pollution requires a broad range of economic, scientific, technological and organizational measures that involve major material and financial costs.

A strategy for dealing with the problem would include activities such as:

- (a) Establishment of a system to monitor the quality of the environment and changes in it;
- (b) Organization of fundamental and applied research to broaden knowledge about the impact of anthropogenic activity on ecosystems of different types and levels;
- (c) Creation of a system of ecological standards and norms (e.g. environmental quality standards; emission standards; technical norms; quality standards for individual goods and products, etc.);
- (d) Implementation of a set of measures to improve the quality and stability of ecosystems, their aesthetic value and ecological stability.

In some cases, a reduction in local concentrations of environmental pollution can be achieved through the spatial dispersion of the polluting industries. In a long-term perspective, however, such a policy has clear limitations and must sooner or later be replaced by more radical measures. In many countries of the third world, the availability of vast tracks of land so far unaffected by major technological intervention and with a considerable capacity for self-purification and self-restoration can from an ecological standpoint be regarded as a resource for development. This resource is not unlimited, however, and calls for careful and controlled use.



Levels of environmental pollution can, to a certain extent, be checked by changing the structure of the economy (e.g. by switching to production methods consuming less energy, natural resources, or particular raw materials) or the structure of material and energy use in products and processes.

With regard to the discharge of pollutants, there are three types of link between technical production facilities and the environment: uncontrolled discharge; retaining and neutralizing the pollutants at the end of the technological cycle; and low-waste or non-waste production. The second type requires the addition of waste treatment plants to the technical production facilities. Such solutions usually involve high costs, which sharply increase with improved control of the pollutants. The third type involves a revolutionary change in equipment and technological processes to prevent the release of pollutants and the generation of waste.

Orientation towards technologies with built-in environmental protection capabilities is the most progressive, effective and economically and ecologically most appropriate way of achieving technological development in the future.

Natural resources. Given the immense variety of natural resources used by man, it is difficult to find a generally applicable approach to the related problems. The concept of resource cycles has proved to be useful, however. A resource cycle comprises all the transformations and spatial movements of a particular natural substance (or group of substances) which occur in the framework of human activities, including: identification of a resource; preparations for its development; extraction from the natural environment; processing; consumption; and final discharge into the natural environment.

In the past, man used to pay greatest attention to the primary stages in the resource cycle, and did so for economic and technical, rather than ecological, reasons. At present, the objective is to optimize the exchange of substances between society and nature at all stages of a resource cycle. The criterion is that natural resources should be used on the scale imposed by society's needs, with minimum input of production factors, fullest possible use of the primary natural resource, and preservation of the quality of the environment.

Human society has today, in a number of cases, come close to a level of consumption beyond which even renewable resources are near depletion. The general strategy for dealing with this problem includes measures such as: restoration of depleted resources and normal ecological conditions for their natural reproduction; establishment of reasonable proportions between the volume of resource consumption and their increment resulting from the natural cycle of reproduction; further development of resources (increased reforestation, development of new lands for agriculture, regulation of river discharge); increasing the productivity of cultivated ecosystems on the basis of advanced agrotechnical and zootechnical methods and the broad application of biological methods; a shift from "picking" or "gathering" of natural resources to intensive cultivation on the basis of advanced knowledge and experience (industrial fishing, breeding of wild animals, etc.); protection and restoration of wild flora and fauna and preservation of genetic stocks; provision of services and amenities and creation of landscapes to expand facilities for recreation.

Non-renewable resources can be divided into exhaustible or finite resources, such as coal, petroleum and natural gas, and conditionally exhaustible resources (this category includes about 95 per cent of all metalliferous mineral resources).

The finite nature of energy resources means that it is imperative to save them. The only way of avoiding conflict between socio-economic development and preservation of the environment is to promote maximum effective use of energy resources and to improve the extraction ratio. This is especially true of mineral fuels. Present technology for energy conversion is extremely wasteful, involving the loss of 60 to 95 per cent of primary energy. The effective use of fuels in technical and economic development can be achieved by: avoiding losses in extraction, processing, enrichment and transport; saving on consumption; increasing the share of electricity in the energy balance through further electrification of the economy; development of thermal power-stations (to produce electric energy and heat for technological processes and central heating); and a radical improvement in the efficiency of energy conversion, including a shift from steam generating methods (which have now reached their limits) to different types of direct conversion of energy - magneto-hydrodynamic processes, electrochemical processes (fuel elements), direct conversion of atomic energy, etc.

The known deposits of non-renewable minerals contained in certain rock formations or the oceans are always limited, because of the economic resources needed to develop them (investment in prospecting for deposits that can be developed only after 30 to 50 years does not make economic sense). In respect of the so-called potentially extractable resources, actual exploitation may be difficult for economic reasons. Extraction and enrichment technologies are progressing, however. This is why mineral resources must be included in the category of exhaustible resources on the global scale.

The current gigantic scale of mineral resource consumption, with emphasis on primary resources, can hardly be economically justified any more, as public spending on their reproduction exceeds the social benefits derived and threatens to deplete the resource potentials of individual countries. However, ecological conditions are being upset at the sites of mineral resource extraction and processing to such an extent that one may speak of an act of aggression against the environment and society as a whole.

At present the main technical and economic means for resolving the problem of mineral raw materials consist in further prospecting and the development of more frugal attitudes towards the wealth of the earth. Ore extraction ratios have to be increased and losses reduced, the level of integrated utilization of ores has to be raised and the consumption of materials per unit of final product has to be lowered. Moreover, the nature and scale of mineral resource reproduction must change. A much greater role must be assigned to such forms of reproduction as the extraction of useful mineral raw materials from industrial gases, dust, ash, slag, effluents, discharges of solid particles and other industrial by-products, and their reuse in production.

Access to fossil fuel resources has long been an international problem. The fact is that the centres of extraction and the centres of consumption rarely coincide, which means that most countries of the world can gain access to fossil fuel resources only by developing international economic relations. At present, however, the international importance of the problem has become acute. The reason is that, with consumption of natural raw materials increasing in individual countries and the world as a whole, the system of capitalist economic relations does not permit the reproduction of the necessary volume of mineral resources.

C. Optimization of the interaction between society and nature through a comprehensive systemic approach and the integration of ecological policy into the machines governing socio-economic development

Recent progress in the theory of resource utilization shows that traditional approaches to the problem of environment and development are inadequate. They are based on purely economic and static methods and fail to take into account the links in the large and complex socio-ecological or bio-economic system, which has two major subsystems: one natural and the other anthropogenic.

The natural subsystem, or the environment, gives mankind the sum total of resources pooled into an integrated system, the whole of which is greater than the sum of its components. Seven basic groups of resources, or ecological components, can be singled out: (1) energy, including that coming from outer space and atomic fission; (2) gases, first and foremost the Earth's atmosphere; (3) water, i.e. the hydrospheres of the planet; (4) the lithosphere and its upper layer, the soil; (5) producers, i.e. autotrophic plants producing organic matter by utilizing solar energy and chemical producers using the energy of chemical reactions; (6) consumers, chiefly animals, serving as a governing subsystem in the systems of the biosphere; (7) reducers, which are organisms - as a rule microscopic - that turn organic matter and all the complex compounds of anthropogenic origin into simple mineral components.

The above-mentioned system ensures a biogeochemical cycle, both in the global biosphere and in all its regional and local subsystems, right down to the basic ecological system. It serves as a natural basis upon which to integrate the resources used by man for economic development. The above environmental components are interconnected according to the law of system supplementation, i.e., the exploitation of any of them over and above certain limits alters the whole integral complex, and this leads to a change in the quantity and quality of all the interconnected components. It is thus vital to determine the limits of their exploitation in order to avoid drastic change in the complex as a whole, which would be detrimental to the economy of human society.

Man's economic and biological needs have historically been adapted to a definite state of the natural system, usually termed a natural ecological equilibrium. This type of equilibrium is maintained by a number of natural mechanisms. An indispensable condition for their functioning is a definite proportion between the natural ecological systems and the complexes transformed by man into agricultural and urban aggregates. As a result, the "integral resource" can be considered to consist of two parts: (a) one that maintains an ecological equilibrium of a type to which the economy has been adapted historically, and (b) one that ensures the physical conditions for man's survival (recreation in the broad sense of the word), i.e., the optimal natural environment for man.

The natural system of resources can function without any special investment by human society, provided the natural ecological equilibrium is maintained. However, such an equilibrium cannot meet the growing requirements of society for long. People create a "second nature", which, unlike "first nature", cannot be self-supporting, because it is not a real system. The natural anthropogenic environment of agriculture, cities and infrastructure facilities functions in so far as, and as long as, it is maintained artificially. The larger the share of the "second nature" component, the more society will have to invest in protection of the environment.

The third element in the socio-ecological system is the social environment proper, i.e. the relations among individuals and their social groups.

The natural resource components are not independent. They form an integral system with the "second nature" elements and, indirectly, with the productive forces of society.

All these systemically linked complexes form a system that is subject to evolutionary historical development. In this very instable supersystem, the components are connected with each other both in time and in space. It is impossible, therefore, to develop standardized patterns of ecological development for all countries. The ecological development of any one country, past or future, does not repeat itself. However, there can be several common typological tendencies.

It should also be borne in mind that the "pressure on the environment" exerted by the productive forces of society, including the very mass of its population, should be evaluated on the basis of the state of the ecological systems occupied by one or another nation, i.e., in relation to the vulnerability of these systems. The primary natural ecological systems, or those close to the climatic phase in their development, and the ecological systems of marginal zones, are more vulnerable than derivative systems, which have been subjected to primary anthropogenic transformation, and natural systems functioning under the typical zonal conditions of the geographical area. However, ecological systems that have been transformed many times and have lost many of their natural dynamic qualities, i.e. have been turned into "second nature" systems, are very vulnerable and can become desert within a short space of time, if special efforts are not made to maintain their delicate equilibrium.

As a rule, the developing countries possess highly vulnerable ecological systems of the first and third types. In such conditions the "export of pollution" by transnational corporations and, in general, the shift of maximum pressure on the natural environment from developed to third world countries are fraught with serious ecological consequences. The transfer may impede the further development of those countries or even destroy their life-supporting environment. At the same time, the ability of the patriarchal economy, chiefly centred on the use of renewable natural resources to meet the growing needs of the population in developing countries, is nearly exhausted. There is hence a whole series of tasks to be accomplished in order to promote ecologically sound development in the third world countries. These tasks include: (a) efforts to maintain and strengthen the existing natural ecological equilibrium in order to preserve their natural potential - by setting up a network of protected territories of various types and optimizing the economic methods of utilizing nature; (b) a change-over from patriarchal economic methods to industrialization on the basis of efficient and low-waste technologies; (c) efforts to achieve minimal social stratification of the population through a general improvement in welfare and cultural standards.

The territories of the now developed market economies as a rule have ecosystems of comparatively low vulnerability. However, the type and structure of these economies lead to deterioration of the environment. Characteristic ecological problems of development are: (a) the need to maintain ecological equilibrium, by introducing low-waste technology in industry and agriculture, which makes it possible to extend the area of natural preserves and thus to strike a better balance between the natural ecosystems and the "second nature" systems; (b) a complete change-over to reutilization cycles in all production processes, with maximum recourse had to recycled natural resources, including energy resources; and (c) the solution of acute social problems, such as political and economic inequality, lack of the right to work, etc., which are indispensable in order to ensure broad democratic control over the utilization of natural resources and adaptation of society to the changing environment.

For the most part, the socialist countries also have territories with ecological systems of comparatively low vulnerability. In these countries pressure on the environment is generally lower than in the developed capitalist countries as a result of more favourable social conditions, but preservation of the ecological equilibrium stands out as an urgent task. Typical problems facing the socialist countries are the following: (a) the need to ensure the best possible natural environment for every resident by optimizing the natural ecological equilibrium on a regional and local basis; (b) a gradual transition to advanced technology for resource utilization in industry and agriculture; and (c) the promotion of continuing expansion of social production and improvements in living and cultural standards on the basis of scientific and technological progress. For "ecodevelopment" planning, information is needed on a global, regional and local scale, concerning the availability and condition of all natural resources and the stability or carrying capacity of the ecological systems, i.e. their ability to resist anthropogenic influences. Information is also required on the needs of society, both individual and collective.

It should be pointed out that changing social needs are not equal to the sum total of individual ones, but from an integrated whole which considerably exceeds that sum total. On the basis of quantitative and qualitative data on natural resources, individual and social needs and technological possibilities, it might be possible to determine the dynamic correlation between resources and needs and probable avenues of development in the local, regional and global "environment-society" system. If a crisis situation threatens in the natural environment, recommendations can be made for socio-economic change. The same would apply if it was considered desirable to introduce "ecodevelopment" within a short period of time. In this context, it should be stressed that actual measures must be specific to each region and country and cannot be standardized, still less imposed on countries from outside.

In world scientific literature such analysis is called ecological planning and forecasting, for which the methods are still being developed. Given agreement by member countries, the Economic Commission for Europe could be an appropriate forum for study of ways and means of ecological forecasting. The starting point should be to define the data required for putting the concept of planned "ecodevelopment" into practice.

The basis for ecological planning and management is public, national ownership of all natural resources and all principal means of production. "Ecodevelopment" planning is one of the vital elements in managing social development. This means that the management of natural systems has to be merged with that of socio-economic development in an integrated system. "Ecodevelopment" planning should be based on the principle that the growing requirements of all members of the society should be satisfied by means of rationalized reproduction and intensified use of natural resources.

In general, the following stages and concrete, practical tasks are involved in "ecodevelopment" planning: (a) inventorying of individual natural resources, assessment of their economic value, and drawing up of a balance-sheet of utilizable natural resources; (b) calculation of maximum demands on the environment and resources, taking into account the needs of society; (c) optimization of the economy from a technological and economic point of view, taking into account the maximum demands; (d) optimization of the potentialities of the environment and natural resources on the basis of ecological equilibrium; (e) regulation of man's biological environment; and (f) evaluation of expenditure on the programme and the development of a system of financing.

Certain types of administrative economic instrument for promoting "ecodevelopment" have been established and are now being tested in practice. They are generally based on a system of charges imposed for violations of established standards of environmental quality, which essentially means that rent should be paid by those who consume resources or modify the quality of the environment.

The principle of mobilizing financial resources for "ecodevelopment" is of major social significance. Notwithstanding the principle that "the polluter pays", it is inevitable in a market economy that part of expenditure on environmental protection will have to be paid by broad sections of the population in the form of direct and indirect taxes. As a result, the policy of environmental protection becomes a source of new social antagonisms.

As a basic principle, environmental protection in the USSR is financed through funds created by the growing efficiency of social production.

#### D. The international aspects of "ecodevelopment"

It is apparent that unsatisfactory political and economic relations at the international level have greatly contributed to the harmful ecological effects of world economic growth and technological progress in recent decades. From a general point of view, it is worth noting that the emerging global ecological problems reflect the intertwining of a number of positive and negative processes in world development.

The unprecedented acceleration of world historical development is certainly to be included on the positive side. Radical social changes have been taking place. A large number of new States have attained independence and entered the world political scene. The world population is growing, as are large cities and industries. The scientific and technological revolution is gaining momentum. Cultural standards are rising and so are levels of material and intellectual requirements, consciousness and political maturity.

However, these developments face considerable opposing forces: the desire of the developing countries to strengthen their productive forces; the trend towards internationalization of the world economy; and the need to preserve the Earth's wealth in terms of both organic and inorganic nature. These forces lead to phenomena such as the cold war policy; the arms race diverting vast material resources - more than \$350 billion a year - to non-productive purposes; neo-colonialism and a system of unfair economic relations imposed on third world countries by the developed market economy States; the activities of the multinational corporations as vehicles of neo-colonialist exploitation, etc.

The new ecological problems place an objective limit on a certain type of growth of productive forces that has been characterized by the development of technical and economic systems in isolation from nature. The problem of the environment has now assumed global dimensions. This implies that the relations between society and nature now embrace the whole ecosphere and all mankind. In other words, each national economic system is becoming dependent not only on its "own" national environment, but also, in some very important respects, on the global environment. The emergence of objective ecological, natural and physical interdependence among national entities is a new phenomenon in the history of human civilization.

The present ecological situation presents the whole of mankind with a huge practical task. It implies the exercise of new very important functions, such as control and management - on a long-term and systematic basis - of a dynamic

equilibrium in the ecosphere as a whole and its main structural components, as well as on all geographical levels of continents, subcontinents, large regions, oceans and seas, etc. Formerly all these functions were performed automatically, by nature itself, without any outside interference. Mankind is thus facing a new, extremely sophisticated task that can be carried out only if a great number of States take large-scale, co-ordinated and collective action on the basis of solidarity. The ecological problem has become one of the most important factors in foreign policy and international relations.

The fact that the problem of the environment is becoming increasingly internationalized lends urgency to the natural, scientific and socio-economic and also the international political aspects of managing natural systems. The reason for this is that the whole world is now the arena for environmental protection. International co-operation is called upon to play an exceptionally important part in solving a number of environmental problems vital for individual countries, groups of countries or even all States. Such co-operation is not optional; it is an extremely urgent necessity. The solution of some global ecological problems is beyond the abilities of individual countries, and even groups of countries. That is why extensive, effective and diversified international co-operation on ecological problems is the only way to protect the ecosphere and use its wealth. Action in respect of this "dire necessity" is far from being taken automatically or spontaneously. Such action depends on a large number of factors and motive forces, both objective and subjective, and very often highly contradictory but these are the forces that determine the dynamics and structure of international relations at various periods of time.

The present ecological conflict, a natural historical contradiction between mankind and the environment, is taking place in a complex international and political situation. The essence and dynamics of the latter are first of all determined by the socio-historical class contradictions of our time - in particular, those between the two groups of States with different social systems. Prospects for solving global ecological problems largely depend on the way in which relations between these States develop - whether they will take the shape of peaceful coexistence or acute confrontation with the use of military force.

The new content and global scope of environmental problems makes any co-operation efforts to solve them greatly dependent on the international political climate. As far as countries with different social systems are concerned, co-operation is becoming possible mainly as a part of the world-wide political process of improving the entire system of international relations.

This implies consistent efforts to remove from the international stage such negative features as "cold war policy", which has been one of the causes of the worsening ecological situation in the world; it also implies the strengthening of international security, in accordance with the principle of peaceful coexistence, effective measures of disarmament, an end to the most acute political conflicts in the world, and the reshaping of international economic relations on a more democratic and equitable basis.

In recent years, the general policy of easing international tension has opened up wide vistas for co-operation on measures to achieve sound ecological development. This policy is making headway in international affairs thanks to the efforts of all the peace-loving forces in the world. Détente creates favourable conditions both for solving ecological problems in individual countries and for joint collective action by the world community to maintain a normal ecological situation on the planet as a whole.

One of the remarkable achievements of détente has been the emergence of complex machinery for international co-operation in environmental protection at various levels. The new system of co-operation in this field is characterized by emphasis on inter-State programmes and efforts by intergovernmental organizations to implement them.

There are, nevertheless, many unused opportunities for promoting international co-operation, particularly, among countries with different social systems and between developed and developing countries. Some recently established programmes should be put into effect as soon as possible. This applies specifically to the programme of region-wide co-operation developed as a result of the Helsinki Conference on Security and Co-operation in Europe.

Most efforts to conserve the environment must, of course, be made at the national level. International co-operation programmes should back up, supplement and co-ordinate environmental protection measures launched at the national level. International co-operation can cover both environmental problems common to all the participating countries and those of regional or world-wide importance which go beyond national boundaries. The concentration of international efforts on solving national environmental problems should not obscure the concern of the world community for collective action to solve both regional and global ecological problems.

International environmental problems involved in maintaining fundamental equilibrium in the ecosphere as a whole or in specific large areas include the following:

- (a) Man's influence on the world climate and the ozone layer;
- (b) Growing desertification;
- (c) Exhaustion of the planet's genetic resources;
- (d) Degradation of the natural environment in the oceans;
- (e) Deterioration of water quality and pollution of "transnational" river systems;
- (f) The need to protect large and representative types of biogeocenoses shared by several States; and
- (g) The need to protect migratory fauna.

The gravest danger for man, future generations and organic nature as a whole stems from material preparations for war. This is why the struggle to limit and put an end to the arms race, and particularly, the nuclear arms race, is the most urgent among the international measures to protect the ecosphere.

There is also another problem of concern to the whole of mankind which is closely linked to natural conditions for the development of human civilization at present. It is the basic restructuring of the machinery regulating the reproduction and distribution of natural resources. Two thirds of the mineral and fuel resources in the non-socialist part of the world are controlled by multinational corporations, which find it profitable to sell raw materials at low monopoly prices, a policy that has led to an acute crisis in the world capitalist market for raw materials. The most effective countermeasures would be to assert the effective sovereignty of third world countries over their natural wealth, to control the activities of multinational corporations and to



co-ordinate the policies of producer countries and to fix new, fair prices for raw materials.

The new prices should be fair to everybody, and should serve as a positive factor in the over-all economic development of third world countries.

Various forms of economic, industrial, scientific and technological co-operation in the development and utilization of natural resources are of special importance for relations between countries with different social systems.

International co-operation in environmental protection can bear fruit only if it is based on democratic principles, ensuring respect for the sovereignty of States and non-interference in domestic affairs, and if every State shoulders greater responsibility for the international ecological consequences of actions taken as part of its national policies.

International co-operation programmes should be closely co-ordinated with the tasks of "ecodevelopment" at the national, regional and global levels.

PROTECTION OF THE ECOSPHERE AND ALTERNATIVE WAYS OF  
DEVELOPING INTERNATIONAL RELATIONS

Report transmitted by the Government of the USSR  
Prepared by Mr. R.A. NOVIKOV\*

There is every reason to believe that bold restructuring of international political and economic relations in keeping with the principles of peaceful coexistence, limitation of the arms race and effective measures of disarmament are crucial, indeed decisive, conditions for maintaining the natural macro-environment of mankind. Failure to meet these conditions will not only hamper the implementation of international and national programmes for the protection of the environment, but will also bring mankind face to face with the threat of nuclear and ecological disaster.

I. New content and global dimension of the environment problem and features of related international co-operation.

Never in the history of human civilization have the relations between society and nature played so great a role in domestic policies and on the international scene as they do at present. Since the 1960s the problem has acquired two qualitatively new features:

- The relations between society and nature have become complex in nature, and have increased in social, economic and political significance;
- The environment problem has acquired a universal and global character and therefore emerges as a factor in, as well as a subject of, international relations.

New dimensions have emerged in the interface between man and nature. For the first time in the history of mankind, both national economic systems and the world economic system as a whole are dependent on ecological processes which, in turn, are increasingly subject to the impact of human activities. The emergence of a fairly broad range of specific ecological problems which are common to several countries, large regions, whole continents or the entire world should be regarded as an indication that the environment has become an international problem. The new challenges include: man's impact as one of the factors influencing the climate of our planet and its variability; the biological impoverishment of the planet and the need to preserve the genetic pool of both "wild" and "humanized" nature; the process of desertification and deforestation induced by man; protection of the natural environment of the oceans, and other "transnational" water systems; action to prevent the degradation of major

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biocenoses and landscape systems shared by several States; and a host of other ecological problems of an international nature.

Since the whole planet has become exposed to environmental damage, the challenges concern mankind as a whole; they can only be met through integrated or co-ordinated national and international efforts by all countries of the world, regardless of their social systems and levels of economic development. The many difficulties involved in organizing such a division of labour among States stem from the specific features of genuine international co-operation in the field of the environment and the extreme sensitivity of such co-operation to the general political climate.

Depending on their objectives, programmes of international co-operation in the field of the environment usually fall into one of two categories. One involves co-operation designed to provide assistance to participating States in dealing effectively with national or transboundary ecological problems. Another, more complex type of co-operation involves programmes to solve global ecological problems. In practice it is often difficult to draw a dividing line, as these two types of co-operation are usually intertwined and mutually supporting.

Multilateral co-operation to protect the environment requires the marriage of national and international interests in pursuit not only of individual gains, but also of positive results for mankind as a whole; it therefore involves a highly complex international division of labour. Such co-operation must have, as its ultimate goal - and accordingly as the final criterion in judging its effectiveness - the joint management of the Earth's natural resources. The key elements of the system would be:

(a) The establishment of international, multilevel integrated planning of joint programmes and the organization of support for their implementation in terms of material supplies, technology, information and finance;

(b) Co-ordination of national environmental protection policies; international co-operation to make the protection of the ecosphere an integral part of economic development in the individual countries, and adaptation of the development process to universal ecological goals;

(c) Promotion of an international division of labour by use of all forms and methods of scientific, technical, commercial, economic, industrial, inter-State and non-governmental co-operation;

(d) Co-ordination of co-operative efforts in the field of the environment with efforts to solve other global problems of world development.

It is clear from the foregoing that international co-operation in the field of the environment falls in a category of a fairly advanced division of labour, which sometimes requires integrated approaches. The question naturally arises of whether, in the interest of protecting the ecosphere, mankind can cope with the task of organizing a division of labour that would effectively correspond to collective management of the natural system.

Both the theory and the practice of international relations show that countries with similar socio-political systems encounter no major problems in organizing close environmental co-operation, although the specific features of the social setting may have a tangible influence on its effectiveness. Proof is provided by the efforts of the Council for Mutual Economic Assistance, the European Economic Community, the Organisation for Economic Co-operation and Development and other co-operative bodies.

There is obviously some doubt about the ability of countries with different social systems to mount a new type of co-operation capable of meeting the global ecological challenge, even though in the past decade numerous co-operation mechanisms have been successfully established at different levels. In view of the great complexity of the problem at hand, some researchers are inclined to be pessimistic about the prospects of such co-operation, or to suggest various types of models and formulae that entail severe constraints on State sovereignty. Such approaches do not stand the test of objective criticism and practical experience.

Real progress towards advanced forms of the international division of labour for nature protection among countries with different social systems could probably be achieved if there were greater credibility in their relations. Further improvement in such relations could follow from efforts to consolidate international security, promote the policy of détente and limit and discontinue the arms race.

## II. Restructuring of international relations - the key to the global problem of the environment

The present situation, in which ecological conflicts take on a global dimension, is the result of a wide variety of factors. Contemporary ecological problems are to a certain extent the outcome of evolving processes, such as the quantitative and qualitative growth of the productive forces, urbanization and a growing tendency towards the independent development of science and technology, which at times may have unpredictable ecological consequences. To a significant degree, the acuteness of ecological conflicts will depend on the dominant pattern of social relations in a given country or group of countries.

Existing ecological problems are largely the result of world politics. The "cold war," punctuated by a series of "hot wars" in different parts of the world, the rampant and devastating arms race, the climate of extreme tension in the relations between countries belonging to different political and ideological systems - all have contributed to the emergence of ecological conflicts at a global level by the late 1960s. Yet towards the end of that period there were encouraging signs of a certain improvement in the international situation.

On the European continent, the process of détente culminated in the Conference on Security and Co-operation in Europe, one of the specific results of which was the drawing up of a European co-operation programme in the field of environmental protection, and a decision to hold a high-level meeting to deal with these issues.

Détente has also made possible broad political support for a new international economic order, whose role will be to promote socio-economic progress and sustainable development on a healthy ecological basis in formerly colonized countries.

Thanks to détente, agreement has been reached on some measures to curb the arms race, especially in respect of nuclear, geophysical and other weapons which have a direct and immediate impact on the state of the environment, and plans have been drawn up for joint State efforts to solve the ecological problem.

The policy of détente has been essential for the successful establishment of qualitatively new intergovernmental systems for co-operation in the field of environmental protection. Within an extremely short time it has been possible to

build up a broadly ramified network of co-operation at all levels ranging from the United Nations system with its specialized agencies to international non-governmental programmes.

The creation, in the early 1970s, of numerous mechanisms for international co-operation in the field of the environment, which had been made possible by the relaxation of international tension, should not hide the presence of many important problems of co-operation yet to be resolved. This applies first and foremost to the content of joint action programmes. There are vast untapped possibilities for enhancing co-operation between countries with different social systems and for involving the young African, Asian and Latin American States in collective efforts to protect the world's environment.

In this respect, attention must be drawn to the fact that some political conflicts have a clearly delaying effect in respect of co-operation in nature conservation programmes and large projects that involve concerted action by States to protect the environment and make more rational use of the natural resources on a world scale. In particular, the implementation of the European co-operation programme established by the Conference on Security and Co-operation in Europe has been slowed down as a result of a "low ebb" in the policy of détente and pressure for a return to the "cold war". Discussion of a constructive proposal to convene a high-level intergovernmental meeting to remedy the situation and get real concrete projects of environmental protection under way took four long years.

Failure to bring about détente, coupled with the continuing arms race and material preparations for war, raises serious and dangerous obstacles to genuine and comprehensive co-operation for the protection of the environment on the scale required by the present ecological situation.

### III. Protection of the environment and the arms race: an irreconcilable conflict

Despite some desultory successes in curbing the arms race, the means of warfare continue to grow in quantity and quality and spread all over the world.

The arms race presents an imminent danger to life on Earth, to man himself and to his natural environment:

(a) The arms race brings with it the danger of war breaking out and perhaps causing global nuclear disaster. In the post-war period the world has experienced about 100 wars, including some 10 major ones. The vast expansion of military and technological means of destruction and mass annihilation of people is opening the way for applications of the "scorched earth policy" as a means of achieving military goals.

(b) The arms race poisons the international political climate and sows the seeds of suspicion, mistrust and enmity among States. This is a factor that prevents co-operation at a proper level, let alone the development of comprehensive programmes to protect the ecosphere and its individual components that would require the harmonization of national and international interests.

(c) The arms race represents a hazardous and unattractive form of using, or abusing, the vast financial, material and intellectual resources of mankind. It produces a very real shortage of resources which could otherwise be used to cope with many national socio-economic problems and the global problem of world development which obviously demands control over the quality of the environment.

(d) The arms race and military preparations cause grave - sometimes irreparable - damage to man's natural environment and also to the human macro-environment. The war industry and the material production necessary for maintaining armed forces, military manoeuvres, military personnel training and weapon tests, military bases on other countries' territories and a whole range of other military activities are all activities accompanied by multiple forms of aggression against the environment. Disturbance of the thermal balance of the planet, destruction of the ozone layer as a result of supersonic flights, pollution of the seas and oceans by radio-active wastes and petrochemical products are just a few examples which illustrate the ominous "contribution" of military activities to man's interference with the integrity of natural systems.

There is every reason to believe that the relative magnitude of damage to the environment as a consequence of war activities is far greater than its share in the gross national product. The production supporting the manufacture of arms is intimately linked with the worst-polluting heavy industries, such as mining and processing of fossil fuels and primary ores, ferrous and non-ferrous metallurgy and chemical and petrochemical industries. As a rule, the armed forces and military activities fall outside the scope of national and international rules and regulations for ecological control. Serious estimates put the "contribution" of war efforts to total pollution and other forms of interference with the integrity of the environment at 40 per cent.

All of the foregoing invites the conclusion that, should the arms race persist in its present scope and form, it is likely to reduce to naught the still clearly insufficient efforts towards environmental protection now under way at the national and international levels, and will in future become the prime factor in the destruction of natural conditions on Earth.

The arms race brings with it many adverse socio-economic effects. It increases the danger of a nuclear holocaust. This is the view of the majority of mankind. The widely deleterious impact of the arms race on the environment is becoming increasingly obvious. It is clear, moreover, that the continued escalation of military might all over the world is killing any hope of dealing with acute ecological conflicts. Allegations that the arms race imparts strength to international security through the so-called "balance of fear" are invalidated by the ecological imperative. The spectre of ecological disaster is the only possible outcome of unrestrained development of the world's potential for military destruction. If life on Earth is to be safeguarded, there is no alternative to a policy of peace, limitation and reduction of armaments, real disarmament and the curtailment and dismantling of the material apparatus of war.

INTERDEPENDANCE ENTRE ENVIRONNEMENT  
ET DEVELOPPEMENT

Rapport transmis par l'Organisation de coopération  
et de développement économiques (OCDE)

Cette présentation vise à analyser d'une part les changements récents dans les attitudes et d'autre part les changements dans le contexte économique. Ces changements sont en effet essentiels: les demandes venant des populations et les conditions économiques ne déterminent-elles pas très largement les politiques relatives à l'environnement des prochaines années et donc l'état de l'environnement lui-même?

Pendant la décennie qui s'est terminée en 1975, la plupart des pays de l'OCDE ont connu une croissance économique rapide et des changements structurels: par exemple l'utilisation de l'énergie s'est accrue de 46% dans l'ensemble des pays de l'OCDE, le nombre des voitures en circulation a augmenté de 75%, les valeurs des productions agricoles et industrielles de 23 à 42% respectivement; la population urbaine a aussi augmenté d'environ 20%. De lourdes pressions se sont exercées sur l'environnement en raison de cette expansion des activités humaines. Constatant les dommages causés, l'opinion publique a été amenée à prendre de plus en plus conscience des problèmes relatifs à l'environnement, et il en est résulté des demandes pressantes pour l'amélioration de celui-ci. Les gouvernements ont réagi en légiférant et en mettant en place de nouvelles institutions destinées à contrôler la pollution, gérer les ressources naturelles et améliorer les conditions de vie urbaine. Dans de nombreux cas les entreprises à leur tour ont créé des processus de production plus propres et intensifié leurs efforts afin de préserver les ressources.

En réalité, l'action et l'interaction des citoyens, des gouvernements et des entreprises ont été plus complexes encore, mais il ne fait pas de doute qu'ils ont fait face à ce défi. Le rapport de l'OCDE sur l'état de l'environnement (1) a ainsi constaté que des progrès significatifs ont été enregistrés en ce qui concerne le traitement des problèmes d'environnement qui furent identifiés comme étant les plus importants et qui firent l'objet d'un effort soutenu pendant les dernières années de la décennie 1960 et les premières années de la décennie 1970. Toutefois, ce même rapport a aussi précisé les formes de dommages à l'environnement qui se sont aggravées, ayant moins retenu l'attention et fait l'objet de politiques difficiles à définir.

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(1) Organisation de coopération et de développement économiques (1979), "L'état de l'environnement dans les pays de l'OCDE", Paris.

## CHANGEMENTS DE VALEURS

La préoccupation pour la qualité de la vie s'est accrue parmi le public et a été de plus reconnue par les gouvernements dans les années récentes. Ainsi la demande pour la protection de l'environnement s'exprime sous de multiples formes: plaintes relatives à la dégradation de l'environnement (70,000 par an au Japon), création d'associations pour la protection de l'environnement (au moins 20,000 en Europe), actions contre les pollueurs, entreprises tant par les individus que par des groupes, présentation de candidats "écologiques" aux élections nationales, régionales, ou municipales (par exemple en France, en Allemagne, ou Nouvelle-Zélande).

Des enquêtes d'opinion effectuées en Amérique du Nord et dans un certain nombre de pays européens ont comparé les attitudes du public à l'égard de l'environnement par rapport à d'autres préoccupations. Ces enquêtes montrent que, dans le contexte économique actuel, les mesures visant à améliorer l'environnement continuent à bénéficier d'un niveau élevé de soutien et qu'elles viennent au troisième rang après la lutte contre l'inflation et le chômage. De récentes enquêtes menées aux Etats-Unis et au Canada indiquent qu'une majorité de personnes serait prête à payer des prix et des impôts plus élevés pour maintenir un environnement de haute qualité, plutôt que de disposer de revenus plus élevés et de vivre dans un environnement plus médiocre. Des résultats similaires ont été observés au Japon.

Ces demandes et ces attitudes s'inscrivent dans le cadre plus général des changements de valeurs qui malgré la difficulté de leur analyse doivent être étudiés. Certes ces valeurs varient avec le pays, certes des groupes spécifiques ont des valeurs spécifiques, certes des aspirations conflictuelles se retrouvent dans un même individu, certes ces valeurs sont liées à diverses autres forces sociales et économiques. Toutefois, le rapport de l'OCDE "Face aux Futurs" (2) a mis en évidence la "révolution silencieuse" post-matérialiste qui semble en cours en Europe, aux Etats-Unis, et au Japon: non seulement les valeurs correspondantes, et notamment favorables à l'environnement, sont plus particulièrement portées par les générations jeunes, mais encore elles sont largement acceptées par le centre majoritaire ("middle majority" ou "middle class").

Certaines informations montrent que la relation entre consommation de ressources et production s'améliore. Ceci paraît dû à la fois aux effets du marché et aux changements d'attitudes concernant la gestion des ressources et la récupération des déchets de la part des gouvernements, de l'industrie et du public. Il est particulièrement clair que la consommation de ressources par rapport au produit intérieur brut a été réduite dans le cas de l'énergie; cela commence aussi à apparaître dans les procédés industriels où des normes ressources-efficacité ont été définies, où les matériaux sont recyclés et où les produits sont récupérés et réutilisés.

Il apparaît que ces changements couplés à d'autres changements économiques et sociaux ont des implications majeures pour l'environnement. Parmi eux on peut citer la progression soutenue des revenus, de la mobilité, des loisirs et les tendances à l'expansion suburbaine, au développement des résidences secondaires; tous ces changements tendent à renforcer les demandes d'espace et d'énergie. Mais, ces mutations associées à l'élévation des niveaux d'instruction peuvent à

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(2) Organisation de coopération et de développement économiques (1979), "Face aux Futurs: Pour une maîtrise du vraisemblable et une question de l'imprévisible", Paris.



leur tour accroître le soutien du public pour les mesures concernant l'environnement.

#### CHANGEMENTS ECONOMIQUES

Il est aujourd'hui un autre facteur dominant: l'évolution de la situation économique. Les tendances économiques prévues jusqu'en 1985 suscitent des préoccupations et elles offrent un contexte nouveau et difficile pour les politiques de l'environnement.

La justification économique autant que sociale et écologique des politiques d'environnement est de mieux en mieux perçue. Les études nationales, qui se fondent maintenant sur plusieurs années d'expérience, laissent penser que la somme des avantages est bien supérieure au coût total des mesures de lutte contre la pollution. En fait, la situation actuelle, dans laquelle les dépenses de lutte contre la pollution représentent de 1 à 2% du PNB alors que les dommages dûs à la pollution représentent de 3 à 5% du PNB, entraîne une perte au niveau du bien-être et justifie un accroissement des dépenses afférentes à l'environnement.

Les conséquences que la croissance économique prévue pour les années à venir aura sur l'environnement, seront loin d'être négligeables, même si cette croissance reste plus lente que par le passé. Le total des émissions de pollution dans un certain nombre de secteurs, sur la base des normes de qualité et des techniques actuelles, pourrait augmenter de 30% ou davantage entre 1978 et 1985. Si les normes actuelles en matière d'environnement ne sont pas atteintes, une détérioration appréciable de la qualité de l'environnement pourrait en résulter au niveau local, régional et international. Si les mesures relatives à l'environnement étaient assouplies, la détérioration s'accentuerait. Face à la croissance, fût-elle lente, seul un renforcement des mesures permettra de maintenir et d'améliorer progressivement la qualité de l'environnement.

Ces résultats seront difficiles à obtenir. Le ralentissement de la croissance, accompagné par un taux plus lent de remplacement de capital, risque de réduire le rythme selon lequel des procédés nouveaux et moins polluants sont mis en place. Les entreprises marginales ou celles qui doivent faire face à une concurrence intense rencontreront peut-être des difficultés pour opérer un transfert d'investissements en faveur des mesures de lutte contre la pollution. Les grandes réorientations structurelles et sectorielles, ainsi que la modification des schémas des relations économiques internationales peuvent toucher des régions entières et influencer sur leur aptitude à appliquer des programmes de défense de l'environnement. Le ralentissement de la croissance des dépenses publiques risque d'accentuer la concurrence qui s'exerce en vue d'obtenir l'aide du gouvernement au titre des mesures de protection de l'environnement.

Fait également significatif, le ralentissement de la croissance accompagné d'un taux d'inflation qui est supérieur au niveau acceptable rend crédibles les arguments selon lesquels les mesures de protection de l'environnement ont une incidence sévère sur les coûts. Toutefois, les études effectuées depuis 1970 montrent clairement que tel n'est pas le cas: en effet, l'incidence à l'échelon global des mesures de protection de l'environnement sur l'inflation, l'emploi, la productivité, l'investissement et la balance des paiements, est négligeable et n'est pas toujours négative.

Cependant, on peut s'attendre à ce que les nouvelles mesures proposées dans le domaine de l'environnement soient examinées de plus près en fonction non seulement de leurs effets économiques et sociaux possibles, mais aussi de leur efficacité notamment par rapport aux coûts.

Face à ces changements dans les valeurs et dans les conditions économiques, les politiques d'environnement ont commencé à être adaptées et devront l'être plus encore, notamment par:

- une meilleure prévention des conséquences significatives sur l'environnement;
- une meilleure intégration des politiques d'environnement aux politiques d'autres secteurs;
- des encouragements à des modèles de développement économes en ressources et en énergie, et protégeant ou améliorant l'environnement;
- une participation du public lors de la préparation des décisions ayant des conséquences significatives sur l'environnement, et une meilleure information relative à l'état de l'environnement.

Cette évolution, qui a été au centre des discussions lors de la réunion des Ministres de l'Environnement au printemps 1980 à l'OCDE appelle à des efforts importants pour répondre à des demandes pressantes concernant l'environnement dans des conditions économiques en mutation.

LES POLITIQUES D'AMENAGEMENT DU TEMPS EN FRANCE  
DE LA LUTTE CONTRE LE GASPILLAGE A LA QUALITE DE LA VIE

Rapport transmis par le Gouvernement de la France  
Préparé par M. K. SACHS\*

Summary - It is now more than 20 years since the authorities in France became interested in time management as a policy instrument. Practical experience has proved its usefulness and the field of application has been continuously widening.

Concern with time management was originally based on economic considerations. Towards the end of the 1950s it had become quite obvious that rigid time schedules of work and other activities, leading to unbalanced use of infrastructure facilities, particularly in urban areas, involved a considerable waste of resources. Today, time management is an integral part of the over-all environmental policy centred on the "quality of life". Government action for the next five years has been outlined in a specific programme adopted in 1978.

A rather unique feature of the solution in France is that the initiative regarding time management policy came from the central administration without any particular pressure from organized social groups. The official promoters of the policy were nevertheless very sensitive to the needs and aspirations of society at large. The increasing dissatisfaction of citizens with constraints, inconveniences and nuisances resulting from institutionally imposed time use was expressed in various ways: for many people, life seemed to consist in no more than "métro-boulot-dodo", i.e. underground travel, work and sleep.

Time management, which was at first regarded as a means of improving the organization of social activities now has a much broader horizon. The basic objective of time management policy is to promote a civilization where human beings are free to decide on their time use, i.e. where they have more cultural autonomy.

This paper describes the various stages in the development of time management policy in France: the activities of the National Committee for Time Management from 1958 to 1961; the Committee for Study of Working Hours in the Paris region; the work of various ministerial groups concerning, for example, the timing of holidays (1971), "flexi-time" (1972) and "time management" (1975); the special "Mission" established for dealing with time management (1976-1978) and the "Delegation for the Quality of Life" (from 1978).

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\*Délégation à la Qualité de la Vie; rapport actualisé en décembre 1980

The second part of this paper analyses the basic concepts of time management policy in France. Examples of practical experience with time management in different areas, relating to traffic and working hours, administrative services dealing with the general public, and recreation and leisure, are given in three annexes.

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Il y a une vingtaine d'années, les pouvoirs publics ont engagé les politiques d'aménagement du temps, poursuivies depuis à un rythme irrégulier. Parties de préoccupations fondamentalement économiques de la lutte contre le gaspillage, elles s'intègrent aujourd'hui dans une politique globale de la qualité de la vie. L'aménagement du temps est en effet une des pièces maîtresses de la Charte de la qualité de la vie, guide d'action du Gouvernement dans ce domaine pour les cinq prochaines années, comportant une centaine de mesures d'ordres très divers.

L'aménagement du temps, en France, est un domaine où les innovations et les impulsions d'action sont venues, pour une large part, de l'administration centrale, sans qu'elles soient précédées par une revendication sociale organisée. Néanmoins, les auteurs de ces politiques ont pressenti un certain nombre de besoins et d'aspirations de la société, exprimé d'une manière diffuse, par exemple par le rejet par les jeunes, d'un rythme de vie imagé par l'expression "métro, boulot, dodo".

Né d'un souci de mieux organiser les activités, l'aménagement du temps s'inscrit de plus en plus dans une vision beaucoup plus large de l'aménagement des rythmes de vie ayant pour ambition de promouvoir "une civilisation du temps maîtrisé" (1) où les hommes augmenteront sensiblement leur liberté par rapport au temps, mesure de l'autonomie culturelle.

Tracer l'évolution de ces politiques, cerner les problématiques d'aménagement du temps, présenter quelques exemples d'action, voilà les objectifs de la présente note.

## I. AMENAGEMENT DU TEMPS - UNE PROBLEMATIQUE VIEILLE DE 20 ANS

C'est en 1958, que les responsables municipaux et les milieux industriels ont commencé à soulever "le problème de "pointes" et à dénoncer la synchronisation des activités dans le temps; celle-ci entraîne des déséquilibres dans les transports et dans la production d'énergie où il faut prévoir des investissements coûteux, alors qu'un meilleur étalement de la demande permettrait l'utilisation plus rationnelle, donc plus rentable des équipements (2).

En réponse à cette préoccupation, les pouvoirs publics et, plus précisément, le Ministère des Travaux Publics et des Transports mettent en place le Comité National pour l'Aménagement des Horaires de Travail (CNAT), à l'actif duquel il faut inscrire de nombreuses mesures législatives et des actions concrètes favorisant l'étalement des activités; c'est par exemple de cette époque que date le "tarif vert" EDF qui a entraîné une baisse de 5% de la consommation d'électricité au moment de la forte demande, l'instauration de la journée

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(1) M. PEUCHMAURD "Pour une civilisation du temps maîtrisé", Economie et humanisme, n° 246, mars-avril 1979.

(2) PATURLE C. "L'aménagement du temps en France", Revue 2000 n° 43, La Documentation Française, Paris, 1978.

continue et des deux jours de repos en fin de semaine. Des expériences globales de décalage des horaires ont été menées dans plusieurs villes de province (Dijon, Metz, Strasbourg). Des actions par secteurs géographiques ont été lancées dans la Région parisienne (3).

Ainsi, en 1958, est née, en France, la politique de l'aménagement du temps. Elle est poursuivie depuis avec un rythme assez irrégulier.

## II. L'ACTION DU "CATRAL" EN REGION ILE DE FRANCE (4)

Au début des années soixante, le CNAT perd un peu en notoriété et en efficacité. Par contre, la situation réelle s'aggrave: les pointes quotidiennes et annuelles augmentent, du fait de l'urbanisation accélérée de l'agglomération parisienne et du nombre croissant des vacanciers. En 1966, le district de la Région parisienne prend l'initiative de la création d'un Comité pour l'étude et l'aménagement des horaires de travail et des temps de loisirs de la Région parisienne (CATRAL). Le CATRAL présente une double particularité:

1. être un organisme paritaire, composé de représentants de l'administration, d'élus et de représentants d'organismes socio-professionnels, ce qui doit, en principe, favoriser une large concertation;
2. avoir une compétence sur un territoire bien délimité, la Région parisienne.

Le CATRAL, parallèlement à une réflexion générale sur l'étalement des congés ou l'horaire variable, par exemple, s'est attaqué essentiellement aux problèmes de circulation avec quatre actions importantes:

1. Opération "mieux vivre" menée entre 1967 et 1969 dans les secteurs Opéra et Châtelet. Après de nombreuses études sur le transport, sur la motivation des salariés et des chefs d'entreprise en matière des horaires de travail et des conditions du trajet quotidien, le CATRAL a proposé un décalage d'horaires de travail visant à neutraliser les sortis entre 17 H 30 et 18 H 30. La réduction de la pointe était estimée à 10% (chiffre probablement exagéré).
2. Campagne d'information et d'assistance technique pour généraliser l'adoption de l'horaire variable, dans les entreprises localisées dans la Tour Montparnasse, rendue nécessaire pour permettre le bon fonctionnement des ascenseurs.
3. Campagne "mieux vivre en Ile de France - aménageons nos horaires de travail pour de meilleures conditions de transport", menée en 1978, avec le concours de la RATP, SNCF et de la délégation à la Qualité de la Vie. Il s'agissait de l'envoi d'une brochure, informant les chefs et les comités d'entreprises sur les pointes quotidiennes dans les transports.
4. Campagne "pour mieux vivre - l'assouplissement des horaires de travail", conjointement avec la Délégation à la Qualité de la Vie, destinée aux chefs et comités d'entreprises de la Région Ile de France.

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(3) Pour les détails de l'historique de l'aménagement du temps en France, voir PATURLE, C. avec la collaboration de BLAIS, J.P. Le temps de l'aménagement, contrat de recherche SAEI (Ministère de l'Equipement), Janvier 1977.

(4) la "Région Ile de France" comprend Paris et l'agglomération parisienne dans un rayon de 30 à 50 km de Paris. Elle représente 2% du territoire français, 20% de la population et plus de 20 % des activités du pays.

Cette campagne, lancée en février 1980 et destinée à durer deux ans, comporte l'envoi d'une brochure de sensibilisation sur les horaires variables, l'organisation de réunions d'information, avec la collaboration des organismes relais, (comme les chambres syndicales, les unions patronales, les collectivités locales, syndicats des salariés et les associations) et la mise en place d'une assistance technique gratuite sous forme d'expertise, à la demande des chefs ou comités d'entreprises, par les experts mis à la disposition des intéressés par le CATRAL.

### III. L'AMENAGEMENT DU TEMPS: VERS LA PROBLEMATIQUE DE LA QUALITE DE LA VIE

La troisième étape importante se dessine à partir de 1970. Elle était inspirée par les travaux de M. Jacques de CHALENDAR, Inspecteur des Finances (5) qui préside deux groupes de travail, réunis par le gouvernement pour faire le point sur l'horaire variable. Cet effort se traduit par l'adoption de la loi sur l'horaire variable en 1973.

La troisième étape, dans la politique de l'aménagement du temps, est caractérisée par l'introduction des préoccupations nouvelles par rapport aux travaux du CNAT qui sont: la qualité de la vie, la personnalisation du temps de travail, la liberté accrue des salariés, etc. (6).

Les "inspirations" d'ordre divers ont ainsi contribué au lancement d'une nouvelle politique d'aménagement du temps, en particulier:

- les travaux du CNAT et ceux de J. de CHALENDAR;
- la reconnaissance de la politique d'aménagement du temps en tant qu'une partie intégrante d'une politique de l'environnement (7);
- "les bouchons" lors des départs en congés à la fin du mois de juillet et au début du mois d'août en 1975.

A l'initiative du Ministère de la Qualité de la Vie, le Premier Ministre réunit, avant les congés d'été 1975, un Groupe de Travail Interministériel, (8) pour "passer au stade des propositions concrètes d'actions". Trois axes d'action sont fixés:

(5) de CHALENDAR J. - Vers un nouvel aménagement de l'année, Documentation Française, Paris 1970; L'aménagement du temps, édition Desclée de Bronwer, Paris 1971.

(6) Cette tendance à s'occuper du qualitatif est bien illustrée par le titre du dernier ouvrage de J. de CHALENDAR, réalisé en collaboration avec Ph. LAMOUR: "Prendre le temps de vivre", Seuil, Paris, 1974.

(7) La nécessité d'une politique d'aménagement du temps est soulignée dans deux rapports étant à la base de la politique de l'environnement en France, de 1970 à 1978: "Cent mesures pour l'environnement", Documentation Française, Paris, 1971, et "La Lutte contre le gaspillage", Documentation Française, Paris, 1974. Elaboration de ces deux rapports et la création du Groupe de Travail Interministériel sur l'aménagement du temps sont des initiatives de M. S. ANTOINE, Chef de la Mission Etudes et Recherches du Ministère de l'Environnement et du Cadre de Vie.

(8) Président du Groupe: Bernard LABRUSSE, Conseiller Référendaire à la Cour des Comptes; Rapporteur Général: Christian MAURIN; Chargé de Mission: F. CAMUSET.

(a) l'extension des horaires variables dans les entreprises du secteur public ou privé;

(b) l'organisation, par des moyens renforcés, de l'étalement des vacances, de manière à éviter, en particulier, les encombrements et assurer un meilleur plein emploi aux équipements d'accueil et de loisirs;

(c) la décentralisation, au niveau des agglomérations, des décisions qui peuvent être prises par les collectivités, administrations et partenaires sociaux; des "comités locaux d'aménagement du temps" seront créés dans dix agglomérations.

Le Groupe Interministériel a résumé ses propositions dans un rapport intitulé "L'Aménagement du temps" en proposant une centaine de mesures. Une vingtaine de ces propositions seulement ont été retenues par le Gouvernement; parmi celles-ci: la création de la Mission pour l'Aménagement du Temps et de comités locaux dans 14 villes pilotes. Tel qu'il est présenté, ce rapport constitue un premier pas vers l'élaboration d'une politique globale d'aménagement du temps (9).

#### IV. L'ACTION DE LA MISSION POUR L'AMENAGEMENT DU TEMPS

La quatrième étape engagée depuis 1976, avait trois objectifs essentiels:

- réduire le gaspillage au niveau des transports et des équipements collectifs, notamment en diminuant les pointes et les encombrements;
- donner une plus grande liberté aux Français dans l'aménagement de leur rythme de vie personnel et familial;
- améliorer la qualité de la vie collective (temps pour les rencontres, la culture, les loisirs, etc...).

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(9) Le rapport, présenté en 1976, est composé de trois parties et comporte une centaine de propositions d'actions. Dans la première partie - aménagement du calendrier - le rapport présente une série de mesures concernant l'aménagement de l'année et notamment des incitations pour l'étalement des congés des entreprises, la modification des rythmes scolaires, des incitations pour l'étalement par la modulation tarifaire des transports et des mesures d'ordre psychologique (par exemple le maintien des réunions du Conseil des Ministres durant le mois d'août). La deuxième partie concerne l'aménagement de la semaine et de la journée. En ce qui concerne l'aménagement de la semaine, le rapport dresse essentiellement le constat de la situation existante, soulignant le caractère irréversible de la semaine de travail de cinq jours, et préconisant l'étalement des week-ends sur trois jours (samedi-dimanche ou dimanche-lundi). L'aménagement de la journée est largement évoqué; l'accent est mis sur le rôle de l'information, de l'accueil dans les services publics et sur l'évolution nécessaire des mentalités. La troisième partie est consacrée à l'aménagement du temps de travail. Le Groupe a fait le recensement des lois qui régissent la durée du travail, l'amplitude de la journée, la répartition dans la semaine. En ce qui concerne les formes de l'aménagement du temps de travail, le Groupe se prononçait pour le développement du travail à temps partiel et pour l'extension de l'horaire variable. Le travail continu et le travail tributaire d'une clientèle sont également évoqués. L'aménagement de l'existence: le Groupe de travail a décidé de différer l'étude de ces problèmes. Le rapport propose, et c'est peut-être l'action la plus importante, le lancement de comités locaux d'Aménagement du Temps, jugeant que "le cadre de l'agglomération permet de mieux connaître les souhaits des citoyens et les difficultés à y répondre".

Pour répondre à ces objectifs, deux types d'actions ont été engagés:

- l'étalement des congés;
- les actions locales d'aménagement du temps dans quatorze villes pilotes.

Pour les réaliser, on a créé une Mission pour l'Aménagement du Temps qui fut attachée à la Délégation à la Qualité de la Vie en février 1978.

## V. L'ETALEMENT DES VACANCES

La généralisation des congés payés, l'augmentation régulière du nombre des vacanciers (en 1978, 53% des Français sont partis en congés d'été, contre 43,6% en 1964; 92% partent en voiture), posent de redoutables problèmes de départs, d'aménagement de l'accueil dans les zones touristiques et de graves atteintes à l'environnement naturel et social.

Les congés payés sont une grande conquête sociale de 1936, où, à la suite des accords de Matignon, les salariés ont obtenu deux semaines de congés au mois d'août. La troisième semaine a été accordée en 1956 et la quatrième en 1968. La cinquième semaine concerne au moins 15,3% de la population active, c'est-à-dire, la fonction publique (1 625 300 salariés), les professions libérales et cadres supérieurs (994 700), les banques (392 000), les assurances (127 000) et constitue actuellement une revendication syndicale majeure pour l'ensemble des salariés.

Progressivement, une partie des vacanciers partent en juillet et même en juin ou septembre. Mais, le mois d'août concentre encore plus de la moitié des séjours. Face à cette situation, cinq types d'actions ont été engagés:

### 1. L'octroi des congés supplémentaires en échange de fractionnement de ceux-ci

Ainsi, dans les banques, les assurances, l'industrie agro-alimentaire, dans les établissements travaillant en grande partie pour l'exportation (comme l'électronique), dans le secteur d'énergie (EDF, GDF, etc...), des chefs d'entreprises ont joué à fond la carte de l'étalement en accordant le bonus de deux jours supplémentaires pour le fractionnement, ou une 5ème semaine de congés payés... Dans les banques, les employés bénéficient de six semaines, à condition de ne pas prendre plus de trois semaines à la fois.

### 2. Etalement des départs

L'étalement des départs, des horaires et des journées, mené par la Direction des Routes au Ministère des Transports, est une action désormais périodique. Connu par le grand public sous le nom de "bison futé" qui donne des conseils aux automobilistes sur les heures de départs à éviter et sur les itinéraires à emprunter, il a donné des résultats très satisfaisants au niveau de la circulation routière, sans pour autant résoudre le problème de l'étalement des séjours.

### 3. Etalement des séjours

Pour obtenir les résultats dans ce domaine, il était nécessaire d'engager des négociations par branche industrielle. En effet, les tentatives de l'étalement des vacances, menées par un groupe industriel, comme par exemple, les établissements Renault en 1965, se sont soldées par l'échec du fait de l'absence de coordination avec les autres groupes, ce qui a posé des problèmes



inextricables pour les sous-traitants, les familles des salariés et au niveau de la commercialisation.

Dès 1976, la Mission pour l'Aménagement du Temps a engagé des négociations avec les groupes de l'industrie automobile. Ce secteur représente 600 000 salariés, y compris l'industrie de sous-traitance, soit environ 2 millions de personnes si on compte les familles.

L'action d'étalement des congés dans l'industrie automobile, menée en 1977, a permis par la négociation avec les responsables des entreprises automobiles, d'obtenir un décalage de la fermeture d'une semaine par rapport au 1er août, ce qui a donné un résultat très positif au niveau de l'ensemble du réseau de transport (circulation routière, ferroviaire et transport aérien). Les résultats obtenus ont permis de convaincre, pour ce type d'action, un certain nombre des responsables, à commencer par les industriels eux-mêmes. Pour l'été 1978, les dates de fermeture annuelle différenciées ont été arrêtées pour chaque groupe et certains ont échelonné les départs sur l'ensemble de juillet et d'août. Ainsi, par exemple la Régie Renault a mis en congé à Billancourt, 11 700 personnes en août.

En 1979, la Délégation à la Qualité de la Vie a enrichi l'action des négociations directes avec les industriels, par l'envoi d'une brochure d'information sur l'étalement des congés aux chefs et aux comités d'entreprises de plus de 50 salariés dans l'ensemble de la France.

Pour l'été 1980, des nouvelles négociations seront engagées avec deux nouveaux secteurs industriels et une nouvelle brochure sera envoyée.

Les actions engagées depuis 1976 visent l'étalement des séjours par les déplacements des dates de congés d'un ou plusieurs secteurs industriels. A terme, la Délégation à la Qualité de la Vie souhaite accroître la liberté des choix des familles en développant le système de roulement des congés.

#### 4. Aménagement des congés scolaires

Les congés scolaires d'été ont été uniformes pour l'ensemble du pays jusqu'à l'été 1979. Cette situation aggravait la concentration des départs et des séjours en mettant simultanément plusieurs millions d'écoliers et de familles sur des routes et des lieux de vacances. Cette situation ne se justifie pas en France, car les conditions climatiques et les habitudes locales font qu'il serait envisageable d'étaler les vacances scolaires de juin à la fin du mois de septembre.

En 1979, un progrès a été enregistré en ce qui concerne l'aménagement des rythmes scolaires. Pour la première fois, sur la proposition du Délégué à la Qualité de la Vie, le Ministre à la Jeunesse, aux Sports et aux Loisirs a associé, au dernier trimestre 1978, les élus régionaux à une consultation sur le calendrier scolaire. Faisant suite à cette demande, le Conseil des Ministres a décidé, pour l'été 1980, cinq zones de départ. A partir de la même année, le calendrier scolaire sera connu trois ans à l'avance et arrêté d'après les recommandations des Recteurs qui consulteront les élus régionaux avant de faire des propositions au Ministre de l'Education.

Ainsi, outre l'étalement des vacances, un pas important vient d'être franchi vers la prise en compte des particularités culturelles, économiques, sociales et climatiques de chaque région.

## 5. Etude économique sur l'étalement des vacances

En 1977, les Ministères de l'Environnement, de l'Industrie et de l'Economie et Finances, engagent une étude de rationalisation du choix budgétaire (10) sur l'étalement des congés. Les conclusions de cette étude démontrent l'intérêt économique que la collectivité peut tirer d'une meilleure répartition des congés dans le temps, surtout au niveau de la meilleure utilisation de l'infrastructure touristique.

Voici, très brièvement décrite, la politique développée depuis 1976, en matière d'étalement des vacances. Elle s'attache à réduire le gaspillage, par l'écrêtement des pointes sur les réseaux de transport et sur les lieux de séjours. Elle est résolument interministérielle et basée exclusivement sur la concertation. Elle tend vers la prise en compte des aspirations sociales et culturelles, notamment celles qui s'expriment à travers les particularités régionales.

Le deuxième volet de la politique de l'aménagement du temps a été le lancement des expériences locales.

## VI. LES ACTIONS LOCALES D'AMENAGEMENT DU TEMPS

Les différentes études sur l'aménagement du temps ont démontré qu'une grande partie des décisions devait se prendre sur le plan local et sous la responsabilité des élus. La commune a été retenue comme cadre d'action. La conduite des actions d'aménagement du temps revient aux responsables locaux (élus, représentants des chambres consulaires, des associations, des représentants de l'administration) rassemblés dans le groupe local d'aménagement du temps sous la présidence du maire. Les groupes locaux bénéficient de l'appui technique de la Mission pour l'aménagement du temps. 14 villes ont participé au lancement de l'opération en 1976 (Arras, Agen, Angers, Annecy, Besançon, le Creusot-Montceau les Mines, Dijon, Grenoble, Metz, Montpellier, Rouen, Rennes, Strasbourg, Tulle).

En juin 1978, la Délégation à la Qualité de la Vie, qui, désormais, a la charge de réaliser les actions dans le domaine de l'aménagement du temps, a lancé douze nouvelles opérations locales, dont 10 dans les villes: Ajaccio, Angoulême, Cambrai, Charleville-Mézières, Chartres, Laon, Nancy, Narbonne, Rodez et Vesoul et deux dans les secteurs ruraux: le Pays de Largantière Joyeuse dans l'Ardèche et le Parc Naturel Régional du Morvan.

Par ailleurs, la délégation a décidé d'amplifier la politique d'aménagement du temps au niveau de la Région Ile de France, en liaison avec le CATRAL.

Trois objectifs essentiels ont été à la base des expériences locales:

- la réduction du gaspillage, notamment au niveau de la circulation et de l'utilisation des équipements collectifs;
- l'enrichissement du temps "libre", par des actions d'ensemble au niveau des loisirs, par l'adaptation du rythme d'activité aux conditions climatiques et par la modification des heures d'ouverture des équipements culturels;
- l'association des citoyens à la politique d'aménagement du temps, notamment par la mise en place des structures décrites auparavant.

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(10) R.C.B. sur l'aménagement du temps

Evoquer toutes les actions locales d'aménagement du temps serait trop long et fastidieux. Quelques exemples peuvent illustrer la démarche de la Délégation à la Qualité de la Vie dans trois domaines:

1. la lutte contre le gaspillage par l'aménagement des horaires de travail pour rendre la circulation plus fluide (annexe 1);
2. la réduction du temps perdu par une meilleure adaptation des horaires d'accueil dans les activités des services (annexe 2);
3. l'enrichissement du temps libre par les actions d'animation permettant une meilleure utilisation des équipements collectifs (annexe 3).

Les expériences locales engagées en France représentent une démarche originale et inédite dans l'action gouvernementale. La tentative de mener une politique qui s'attaque à la fois à l'aménagement du temps et à celui de l'espace, basée essentiellement sur la concertation, constitue un trait original de la politique de la qualité de la vie.

#### VII. AMENAGEMENT DES RYTHMES DE VIE. - L'ACTION DE LA DELEGATION A LA QUALITE DE LA VIE

En février 1978, paraît la Charte de la Qualité de la Vie (11) qui est une "charte sociale du cadre de vie quotidien" (...). Cette Charte est un "guide d'action pour les cinq prochaines années". Elle considère que "l'aménagement du temps, en réduisant les gaspillages et les encombrements, a une incidence économique bénéfique; il améliore simultanément la qualité de la vie en facilitant la liberté du choix personnel pour l'emploi du temps et en accroissant le temps disponible.

La Charte préconise huit mesures dans le domaine de l'aménagement du temps:

- Faire élaborer, en priorité, par la Délégation à la Qualité de la Vie, un plan d'action cohérent et complet d'aménagement du temps.
- Créer, dans les villes, des comités locaux d'aménagement du temps, chargés d'élaborer et de mettre en oeuvre des plans d'aménagement du temps.
- Favoriser, par des campagnes d'information systématiques, un meilleur étalement des loisirs dans le temps et dans l'espace.
- Aménager les rythmes scolaires pour étaler les départs.
- Elaborer des conventions d'étalement des fermetures d'été des entreprises dans les secteurs industriels les plus importants.
- Apporter un encouragement de l'Etat pour la négociation de conventions entre syndicats et employeurs, portant sur l'amélioration du cadre et des conditions de vie dans le travail et tendant notamment à la multiplication par trois du nombre de salariés pouvant bénéficier de l'horaire souple.
- Lancer des plans de développement de l'horaire variable dans toutes les administrations de l'Etat.
- Créer, chaque année, 10 000 emplois à temps partiel.

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(11) "Charte de la Qualité de la Vie", Service d'Information et de Diffusion (S.I.D.) Paris, février 1978.

La Charte confirme donc cette double approche de l'aménagement du temps en tant que moyen de lutte contre le gaspillage et facteur d'amélioration de la qualité de la vie.

Par ailleurs, pour la première fois dans ce domaine, le Gouvernement se fixe un délai de cinq ans, donc relativement long, pour atteindre les objectifs recherchés.

Pour coordonner l'application des mesures prévues par la Charte de la Qualité de la Vie, on a créé une structure administrative dite de "mission" (c'est-à-dire dégagée de souci de gestion), la Délégation à la Qualité de la Vie, qui a absorbé, entre autres, la Mission pour l'Aménagement du Temps. Le Délégué à la Qualité de la Vie assure la fonction du Secrétaire Général du Comité Interministériel de la Qualité de la Vie, présidé par le Premier Ministre, et du Groupe Interministériel pour l'Aménagement du Temps, présidé par le Ministre à la Jeunesse, aux Sports et aux Loisirs.

Comme cela a été signalé plus haut, la Délégation à la Qualité de la Vie continue, en les élargissant, les politiques de promotion de l'étalement des départs en vacances et d'aménagement du temps au niveau local. Notons qu'à l'occasion de l'Année Internationale de l'Enfant, une trentaine de villes a participé à des opérations d'animation dans le domaine d'aménagement du temps.

L'intégration de la Mission pour l'Aménagement du Temps dans la Délégation à la Qualité de la Vie, a permis, en outre d'accroître les moyens en hommes et en crédit, d'intégrer l'aménagement du temps dans une politique plus vaste de l'amélioration de la qualité et des rythmes de vie.

#### VIII. LA PROBLEMATIQUE DE L'AMENAGEMENT DU TEMPS

L'aménagement du temps peut donc être abordé de deux points de vue différents: d'une part, comme un moyen de lutte contre le gaspillage des ressources économiques (y compris de l'espace et du temps) et d'une rationalisation des dépenses publiques et privées et d'autre part, comme l'objectif de base du développement social, le temps étant considéré comme une valeur essentielle dans la vie humaine, un bien non renouvelable qu'on voudrait utiliser de la façon la plus riche. Les deux approches s'insèrent différemment dans la problématique de l'aménagement de l'espace et de la planification urbaine.

Comme il a été dit, l'aménagement du temps en tant que moyen de lutte contre le gaspillage et le surdimensionnement des équipements publics, était à la base de la politique développée par le CNAT de 1958 à 1961. En effet, les promoteurs de cette politique considéraient qu'à l'origine de chacun des problèmes posés par l'économie moderne existe une rupture d'équilibre, soit dans le temps, soit dans l'espace" (12).

Si les travaux et les actions de J. de CHALENDAR ont pris également comme point de départ les problèmes de la réduction des pointes (notamment au niveau des congés annuels), des remèdes préconisés témoignent d'une approche aux antipodes de la logique soumise aux impératifs économiques.

En effet, "la seule solution socialement acceptable au problème économique des pointes de trafic, c'est finalement le roulement". Or, qui dit roulement, dit variété des options offertes, c'est-à-dire l'apparition d'une certaine liberté de choix, qui dans la meilleure des hypothèses, ne serait plus limitée que par

(12) R. VILLARDIER, "Le temps et l'espace, facteurs d'harmonie économique", des Carnets des Praticiens de l'Economie, Janvier 1960.

le respect de la liberté des autres. L'horaire flexible ou variable offrirait même une liberté supplémentaire, chacun pouvant, à l'intérieur des plages mobiles, choisir son heure, et choisir aussi de travailler plus ou moins d'heures tel jour ou telle semaine.

Toutes les propositions doivent être subordonnées à l'objectif de la maîtrise et le libre aménagement du temps (temps scolaire, de travail, de loisirs, etc..) par l'individu. Maîtrise qui ne peut venir qu'à partir d'une concertation, "au niveau le plus proche possible de la base: celui de l'atelier ou du service et non plus de la Direction Générale de la grande entreprise: celui de la région et de la ville et non plus celui de l'Etat" (13).

Les politiques menées dans les villes pilotes dans le domaine de l'aménagement du temps essayent de faire la synthèse des deux démarches, en développant les actions dans le domaine de la réduction du gaspillage et visant la revalorisation du temps libre. Elles essayent également de mener de pair l'aménagement du temps et l'aménagement de l'espace.

Ainsi, "dans les CLAT (Comités Locaux d'Aménagement du Temps) la liaison entre les deux types d'aménagement est étroite au point que les promoteurs ne les distinguent pas. La question n'est plus de faire la part du rôle entre les aménageurs du temps et ceux de l'espace. Il n'y a pas une politique de l'espace, et par ailleurs, une politique de temps mais, une politique globale de la ville, de la fonction urbaine". Dans les nouvelles actions "ce qui devient important, ce sont les activités appréhendées comme caractéristiques du mode de vie, mode de vie dont le contenu est aménagé à travers ses cadres spatio-temporels" (14).

En effet, "l'uniformité, artificielle, est devenue un des facteurs du déséquilibre de la société industrialisée et urbaine, où la lutte contre la montre, au nom de la rentabilité économique à court terme, a fini par trahir son objectif avoué de progrès. D'où la nécessité, désormais, d'aménager le temps au lieu de se borner à le comptabiliser" (15).

Mais, les expériences montrent que les actions qui globalement s'inscrivent dans le cadre de la politique de réduction du gaspillage, jusqu'à maintenant, n'interviennent qu'en tant que mesures correctives, pour pallier les déséquilibres existants. Comment introduire la dimension du temps au niveau de l'aménagement urbain (par exemple lors de la création d'une zone industrielle), comment peut-on anticiper le choix d'une forme d'aménagement du temps de travail?

L'intégration de l'aménagement du temps dans la planification, exige-t-elle un changement institutionnel dans le processus de la planification? Peut-on concevoir une véritable politique d'aménagement du temps sans une mise en place d'un processus de participation et de concertation?

Ces questions amènent vers un autre volet de la problématique qui est d'analyser dans quelle mesure les actions locales d'aménagement du temps influencent les comportements des citoyens et contribuent-elles à façonner les nouveaux styles de vie?

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(13) J. De CHALENDAR, "Le temps auto-géré", Revue 2000 n° 43, Paris, 1978.

(14) Claude PATURLE, "Le temps de l'aménagement", (analyse de l'aménagement du temps en milieu urbain) SAEI (Ministère de l'Équipement), janvier 1977

(15) Jean Claude Colli, L'aménagement du temps, valeur ajoutée en société, contribution aux Assises Nationales du Carrefour Social Démocrate, Paris, Octobre 1979.

"Les aménagements du temps, de la production et de l'espace constituent, désormais, trois facettes d'un même processus de façonnage conscient "des styles de vie" au sein d'une société civile qui reprend ses droits, à la fois sur la société économique et sur la société politique; elle se cherche à travers l'expérimentation sociale à la base, qui pointe ici et là, sous la carapace des institutions établies" (16).

Les actions locales d'aménagement du temps constituent-elles un exemple d'une expérimentation sociale? Ont-elles contribué à encourager l'initiative à la base ou au contraire cherchent-elles à récupérer au profit des institutions établies, des actions spontanées?

Voilà quelques questions qui sont posées et auxquelles il est difficile encore d'apporter des réponses claires, les expériences étant trop nouvelles.

Des réponses à ces questions, la Délégation à la Qualité de la Vie, les recherchera sur le terrain. En effet, "la reconquête de la maîtrise du temps par l'individu passe par des innovations dans ce domaine". La valeur de ces innovations proviendra moins de négociations lourdes entre les corps constitués, quels qu'ils soient, que des expériences vécues, liées au contexte spécifique de chaque activité et de chaque région. C'est pourquoi la Délégation à la Qualité de la Vie a opté pour une politique d'expérimentation et de "démonstration en vraie grandeur", visant à la "contagion par l'exemple" (17).

#### IX. EN GUISE DE CONCLUSION

La démarche de la Délégation, voulant obtenir des résultats par des expérimentations concrètes, correspond à une recherche d'un consensus. En effet, dans les pages précédentes sont retracées les diverses politiques des pouvoirs publics en matière d'aménagement du temps en liaison avec l'aménagement de l'espace et l'expérimentation des nouveaux styles de vie. Il est nécessaire de relativiser l'importance de l'action des pouvoirs publics dans ce domaine. Il est intéressant de noter qu'en France des transformations importantes, en particulier dans le domaine d'aménagement du temps de travail, ont souvent précédé les législateurs. Par exemple, les horaires variables ont été pratiqués avant que la loi l'autorise en 1973. Faute d'un consensus social, l'innovation en matière d'aménagement du temps de travail ou des rythmes scolaires, se heurtent à des blocages institutionnels considérables, parfois insurmontables.

Par contre, au niveau local, autour des problèmes précis, le dialogue s'avère possible entre les pouvoirs publics et les collectivités locales, entre les Unions Patronales et les Chambres de Commerce et d'Industrie, d'une part, et les Syndicalistes et le monde associatif, d'autre part. Pour cela, même si les actions engagées paraissent mineures, elles permettent néanmoins de démontrer la faisabilité d'une politique résolument décentralisée et basée sur la concertation.

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(16) Ignacy SACHS, "Styles de vie et prospective, aménagement du temps, de la production, de l'espace", Revue 2000 n° 43

(17) J.C. Colli, l'aménagement du temps, valeur ajoutée en société, op. cit.

ANNEXE 1

L'aménagement des horaires de travail pour rendre la circulation plus fluide

Quelle que soit la taille de l'agglomération, le phénomène de la pointe journalière est présent. Son ampleur dépend de la taille de l'agglomération, des modes de transport utilisés par les habitants et des conditions géographiques (relief, concentration du centre, etc.). Ces éléments amplifient les effets négatifs de la pointe, jusqu'à entraver la circulation urbaine, obligeant alors la collectivité à entreprendre des mesures contraignantes pour résoudre le problème, au risque de voir le centre ville déserté par les habitants et par les entreprises.

La pointe journalière (dans le cas d'une grande métropole) ou la pointe de fin de semaine, nécessitent des investissements qui ne sont utilisés que pendant un laps de temps très court. Le phénomène est bien connu dans les grandes métropoles. Il se pose également dans les villes moyennes, où il augmente en particulier les coûts d'investissement et de fonctionnement des transports en commun. La ville est, en effet, obligée d'acheter et de mettre en service un nombre considérable de bus pendant les heures de pointe qui sont ensuite inutilisés le reste du temps.

Par conséquent, une action prioritaire en matière d'aménagement du temps est l'écrêtement de la pointe.

Plusieurs moyens peuvent être mis en oeuvre, mais ils doivent être précédés d'un certain nombre d'études visant à bien cerner l'amplitude de la pointe et à identifier les "points noirs" de la circulation. Deux types de mesures peuvent être mis en oeuvre: la désynchronisation et l'individualisation des horaires.

Pour le premier type de mesures, il faut établir un plan de désynchronisation des entrées et des sorties, soit entre les différents types d'activités (par exemple, séparer le transport scolaire et la circulation banale en décalant les horaires scolaires par rapport aux horaires de travail des entreprises) soit entre plusieurs entreprises. Ces deux démarches peuvent, d'ailleurs, être cumulées.

On peut aussi individualiser les horaires de travail. En effet, chacun peut aspirer à un rythme de travail personnalisé.

Cette phase d'études est nécessaire, mais elle doit rester légère pour être efficace. Une nouvelle lecture de certains documents existants, comme, par exemple, le plan de circulation ou le dossier d'agglomération, suffit souvent à apporter les premiers éléments nécessaires au démarrage d'une action.

Par exemple, les enquêtes menées à Angoulême (ville moyenne de 100 000 habitants) engagée dans l'action locale depuis 1978, ont démontré que sur une zone industrielle, 80% des salariés s'arrêtent de travailler à 12 heures. D'une manière générale, l'enquête auprès des entreprises a pu montrer une persistance de la pointe de 8 heures, celles de 12 H et 14 H, par contre, un étalement en soirée, dû aux différences qui peuvent exister entre les entreprises en ce qui concerne la durée du temps de travail journalier.

La pointe de 8 H est accentuée dans une ville comme Angoulême par 8 000 élèves du secondaire qui commence les classes à cette heure.

Par conséquent, les propositions d'actions formulées par la Délégation à la Qualité de la Vie et la Ville d'Angoulême, comporte une série de mesures visant à désynchroniser les horaires de travail entre les entreprises des zones industrielles, à accentuer l'information sur l'horaire variable, à adapter les horaires des transports en commun aux horaires de travail, enfin, à décaler les entrées et sorties des classes du secondaire d'un quart d'heure par rapport aux pointes de 8 H et 12 H.

## ANNEXE 2

### Réduire le temps perdu

Un autre exemple des actions menées dans les villes pilotes et s'inscrivant dans la politique de la lutte contre le gaspillage, plus particulièrement du gaspillage du temps, est l'aménagement des heures d'ouverture des guichets des administrations. Il s'agit d'assurer l'accueil en dehors des heures de travail habituelles de la population active de la cité et même de la région. En effet, que ce soit dans les administrations, dans les banques, dans de nombreux équipements collectifs (musées, bibliothèques...) et, de plus en plus souvent, dans le commerce, les heures et les jours d'ouverture sont fonction des heures de travail du personnel, qui désire qu'elles ne diffèrent pas de celles pratiquées par la majorité de la population active. Ainsi, on s'achemine inévitablement vers une situation où le secteur des services cesse de remplir sa fonction dans la mesure où ses heures d'ouverture le rendent difficilement accessible.

Mais, peut-on postuler à la fois une liberté dans l'organisation des rythmes de vie et astreindre une partie de la population active à travailler à des heures mal commodes? Le paradoxe n'est qu'apparent. En effet, il n'y pas de commune mesure entre le nombre de travailleurs ayant des heures de travail "normales" et ceux qui sont censés travailler pendant que les autres se reposent. De plus, l'expérience le démontre, c'est, avant tout, un problème d'organisation: quand on fixe de nouveaux horaires d'accueil dans les services administratifs, il ne s'agit pas de demander à tous les fonctionnaires de changer leurs horaires de travail. Cette mesure concerne, au grand maximum, 10% des agents, pendant une ou deux journées par semaine. Une organisation du travail judicieuse, une nouvelle redistribution des tâches à l'intérieur du service, permettraient donc de réduire à quelques jours par an la servitude des horaires inhabituels pour chaque salarié de l'administration concernée. En outre, le développement souhaitable du travail à temps partiel ouvre de nouvelles possibilités pour organiser le fonctionnement des équipements de manière plus satisfaisant pour la majorité de la population. Il n'est pas nécessaire de décider à priori pour chaque individu, mais de lever les obstacles empêchant d'employer des salariés à temps partiel. Cette formule correspond en effet aux désirs d'un nombre croissant d'employés; elle facilite le fonctionnement des équipements collectifs et la mise en place des actions d'animation dans tous les domaines de la vie culturelle et sociale.

Par exemple, Arras est un "chef lieu de département" et, à ce titre, la fonction publique joue un rôle prépondérant au niveau de l'emploi (22 000 salariés) et au niveau des motivations de déplacement des populations avoisinant la ville.

Pour cela, il est apparu au Groupe Local d'Aménagement du Temps (GLAT), qu'il serait souhaitable de modifier les horaires d'accueil dans les administrations, et d'ouvrir celles-ci en dehors des heures de travail de la population active.

L'opération est menée par la Municipalité avec l'appui du Préfet du département. Après une enquête auprès de tous les services, il est apparu que:



- en grande majorité, les administrations sont fermées entre 12 H ou 12 H 30 et 14 H et après 17 H;
- il y a 14% des salariés de la fonction publique qui travaillent dans des services en rapport constant avec le public;
- les guichets peuvent être ouverts avec 156 agents, soit 3% des effectifs de la fonction publique.

L'action menée visait, d'une part, une harmonisation des horaires d'accueil dans les guichets des services administratifs et, d'autre part, une ouverture accrue le mercredi, jour du marché.

### ANNEXE 3

#### L'enrichissement du temps libre

Deux opérations illustrent la démarche de la Délégation à la Qualité de la Vie dans ce domaine:

#### 1. - Opération "rue du mercredi"

Il s'agit de poursuivre un triple objectif: accroître l'offre de loisir du mercredi, qui est actuellement insuffisante dans les villes ou les quartiers démunis d'espaces verts et de terrains de jeux; réaliser quelque chose en faveur d'une des catégories les plus délaissées, les adolescents; et démontrer em même temps aux adultes que l'enfant peut trouver sa place dans la ville.

La réalisation de l'opération est simple. Elle consiste à fermer à la circulation une ou plusieurs rues pour les mettre à la disposition des enfants et des jeunes, afin qu'ils puissent y exercer des activités diverses. Il peut s'agir d'activités spontanées comme les patins ou la planche à roulettes, la marelle, la bicyclette, une foire de collectionneurs ou de la peinture en plein air. Mais, on peut imaginer également des activités à caractère plus éducatif. Dans ce cas, il faut, bien sûr, une animation. Les maisons de jeunes ou les associations existantes s'avèrent tout à fait qualifiées pour la fournir; il faut par conséquent solliciter leur participation.

Une dizaine de villes ont mené cette opération en offrant aux enfants une cinquantaine de rues.

#### 2. - Opération "vacances pour ceux qui restent".

Près de la moitié des Français ne partent pas en vacances. Parmi ceux qui partent, nombreux sont ceux qui s'absentent pour trois ou quatre semaines et restent sur le lieu du domicile une partie de l'été. Il reste donc dans les villes une population importante, composée de ceux qui ne partent jamais en vacances, de ceux qui sont revenus ou de ceux qui partiront plus tard.

Or, un nombre non négligeable des équipements culturels, sportifs, commerciaux et sociaux ferment ou travaillent au ralenti, ce qui pénalisent en particulier deux catégories sociales: le troisième âge et les jeunes.

Le but des opérations "vacances pour ceux qui restent" est donc pour les municipalités de mener des actions pour que cette période de l'année prenne aussi un air de vacances pour cette population.

En 1978, la Délégation à la Qualité de la Vie a soutenu 12 initiatives locales, en allouant 600 000 F. de subventions aux villes.

En 1979, 22 municipalités ont renouvelé ou lancé l'opération "vacances pour ceux qui restent" avec le concours technique et financier de la Délégation à la Qualité de la Vie, bénéficiant de plus de 1 000 000 F. de subvention.

ENVIRONMENT AND ECONOMIC DEVELOPMENT POLICY

Paper transmitted by the Government of the  
German Democratic Republic  
Prepared by Mr. H. SCHIEFERDECKER - Mr. H. SCHINDLER  
and Mr. H. KROSKE\*

Summary

Increase the living standards in accordance with the aspirations of socialist countries will depend on growth and efficiency of economic development, which hitherto has led to intensified use of natural resources with adverse consequences on the ecosystems. Planners and economists are gradually becoming aware that in the long run, development must be subjected to the limits set by these systems. Planning and management of the national economy will, to an increasing extent, take the ecological conditions into account and certain basic rules are being defined in what has been called a "planning ecology". Within this new framework, modern industry is conceived as an operational part of a complex economic-ecological system.

Profound changes in technology will be indispensable in order to master the environmental problems. Consideration of ecological principles in the economic development process is not only a matter of management, but also one of the most urgent duties of science and technology. Rational use of nature in the contemporary world requires, first of all, appropriate ecological thinking among scientists, technicians, and experts in all spheres of human activities. The maintenance of the equilibrium of natural ecosystems and rational use and restoration of natural resources will increasingly become a basic requirement for the development of production activities. Before introducing new technological processes into the different sectors of the national economy, they should be assessed for their comprehensive effects. Important work is being carried out to elaborate methods for integrated control of the socio-economic and ecological consequences of development action. Of particular relevance in this context are the methods for environmental impact assessment, presently being developed by governments in the ECE region, both at national levels and within the framework of international organizations. Environmental impact assessment is primarily a method to prepare decision-making on proposed development action by indentifying, interpreting and communicating information of the effects on the environment.

Promotion of new thinking about the relationship between environment and development at the international level is becoming increasingly important. More than a hundred years ago, it was pointed out by Karl Marx that neither a society

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or a nation, nor all societies together, could be owners of the planet Earth, they are only users and managers and should hand it over to the coming generations like good family fathers. Today it has become necessary to establish new relations between man and nature and internationally to strive for joint management of natural resources and their global use in accordance with the real needs of the peoples in different regions and those of the whole world.

TRAINING OF PROCESS ENGINEERS FOR ENVIRONMENTAL  
PROTECTION AND RATIONAL USE OF NATURAL RESOURCES

Report transmitted by the Government of the  
German Democratic Republic  
Prepared by Mr. M. SCHUBERT and Mr. P. LÖTZSCH\*

Summary

The basic argument of this paper is that environmental protection policy cannot be effective unless the impact of development action is being treated on a par with other criteria in initial planning and decision-making. It is therefore considered extremely important that all participants in the working process, in particular those in leading technical positions, acquire knowledge of the problem area at the highest scientific and technical level.

In the German Democratic Republic a comprehensive programme for education and training in environmental protection has been elaborated. The paper describes the main features of this programme, as it relates to graduate studies in process engineering for all sectors of the national economy where the use of current technology implies potential environmental hazards. The programme includes courses on causes and effects of pollution, methods and techniques for detection, identification and prevention of environmental damage, special attention being given to problems of air and water protection and in this connexion, the disposal of wastes and the development of appropriate technology.

In order to make environmental protection an integral part of national economic planning and management, great emphasis is also being placed on post-graduate training and special courses for engineers and technicians already involved in complex regional development programmes.

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ENVIRONMENTAL FACTORS AND THE CHANGING INTERNATIONAL  
RELATIONS OF THE DEVELOPING COUNTRIES\*

Background paper prepared by  
Osvaldo SUNKEL and Luciano TOMASSINI

at the request of the UNEP and ECE secretariats

Summary and excerpts

One of the contributions of Latin American thought to the understanding of development problems has been the analysis of changes in the international relations of the developing countries - first, in the light of the "centre - periphery" concept, and later in terms of the so-called "transnationalization" process, viewed as the dominant feature of the contemporary international system. The emergence, at the international level, of concern about the environmental impact of various economic, political and social factors has further modified the context in which development occurs in the third world countries and the terms on which they participate in the international economy. This new situation is the object of analysis in the paper. The following excerpts from the complete text would seem to be of particular relevance to the Ljubljana seminar.

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The analysis of centre - periphery relations

"By shedding light on the structure of economic relations between the industrialized countries and the developing countries, the centre - periphery approach helped to reveal the close link between the development of the centres and the stagnation of the periphery. It thus opened up a rich field of study.

"Naturally, some of the propositions were open to debate and the explanation of certain points was left in abeyance. For instance, the existence of a trend towards deterioration in the terms of trade has been questioned more than once on the basis of empirical evidence; others have held it to be valid not so much in terms of actual prices of primary commodities as in terms of expectations in developing countries. Furthermore, key factors for the analysis of the international economic relations between industrialized and developing countries, such as the nature of financial links, method for the transfer of technology and the role of transnational corporations, were introduced into the approach somewhat later. Finally, it was not properly understood in the early stages that the influence exerted by the centres on the economic development of

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\*The original study submitted to the seminar was based on research conducted during the preparations for the UNEP/ECLA Seminar on Alternative Patterns of Development and Lifestyles in Latin America.

the periphery was not purely exogenous, but rather endogenous, in so far as the gradual emergence of a transnational economy, global in scope, meant that the peripheral countries - or selected segments of their economies - came to form part of the economic frontier of the centres. Moreover, the strategies of industrialization to substitute for imports did not really change the position of these countries in the international division of labour and, above all, did not lead to autonomous or self-sustained growth or noticeably reduce traditional dependence on the external sector.

"Whatever the future of the national State in the long term, the emergent transnational economy is penetrating national economies and calls for increasing co-ordination of national policy between different countries, developed as well as developing. The creation of a kind of transnational community, whose members are recruited on the basis of technical expertise, executive ability and global vision, and the development of an equally transnational culture, consisting of a set of values, objectives, consumption patterns, status symbols and behavioural patterns, is a prerequisite for the consolidation of this system.

"The rapid integration of the developing countries into this system reinforces the domestic "dual economy" consisting of "transnationalized" and marginal sectors. In these countries, the transnational nuclei - which aim at reproducing locally the living conditions, productive structures and institutions needed to ensure their prosperity, and in a manner identical to that of other transnational groups in the system - play a very important role. These local groups, and their interests, have a decisive influence on the formulation of national strategies, which are expected to promote the integration of these countries into the emergent transnational system. The need to adapt these strategies to the requirements of the system is beginning increasingly to determine the styles of development of the periphery countries.

"Although it is based on a perception of the existence of a global economic system in which centre and periphery are becoming more and more closely integrated, this study presupposes a high level of asymmetry between the various components of the system as well as within the adhering peripheral countries - an asymmetry leading to dependence and conflict.

"The extraordinary period of expansion experienced by the major industrial centres in the two preceding decades unquestionably formed the backdrop to the formation of this system and, more particularly, the gradual integration of the developing countries into the international economy. The declining expansion in the centres during the 1970s with the aftermath of chronic instability, recession and inflation, did not change the direction of the process; only its conditions were modified. The perception of limits to growth and external vulnerability in the centres has brought home the understanding that all countries of the world are interdependent. Thus, "interdependence" is no longer a phenomenon restricted to the industrialized countries. In this new development, the need for the rational use of natural resources and protection of ecosystems at national and world level has been of special importance.

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#### Transnational systems and interdependence

"The awareness of having reached certain limits of economic growth, which has temporarily made the economic negotiations between developed and developing countries more difficult, may in the longer term incline the former to accept

structural change in the present system of relations. The developed countries need the natural resources of the developing countries in order to pursue their industrialization process; they need the cheap export products of the developing countries to control inflation; they need the conditions offered by the developing countries for certain productive activities so as to protect their own environment and rationalize the allocation of resources; they need the capacity of the developing countries to use financial resources, import capital goods and intermediate products and absorb new investment. In other words, awareness of this interdependence might well bring recognition that a new structure of comparative advantages and a new international division of labour is coming into being.

"In short, the elements of interdependence are ensuring that the transnationalization process is ceasing to be a one-way street leading to ever-growing dependence for the countries of the periphery and their gradual pauperization; it is becoming a means for the redistribution of capacities and economic activities and, potentially, for concomitant benefits, and may help the developing countries to achieve a better negotiating position than in the past.

"In the final analysis, the developing countries should not adopt a passive attitude to this process, but should devise strategies which will enable them to control and select the forms of participation and integration into the system that will permit them to promote patterns of development which are in keeping with their own objectives, interests and values. For instance, the environmental impact of the patterns prevailing in the industrialized countries presents a risk for the developing countries in the case of direct transfer. The challenge facing these countries is to achieve a proper balance between the costs of measures to prevent ecological damage and the benefits to be derived from new opportunities for economic activity. The balance can be established only within the framework of a thorough review of the potential of each country, and will depend on the terms on which its economy is integrated into the international system.

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#### Principal alternatives for the developing countries

"In this study it is maintained that centre - periphery relations have undergone significant change throughout the 1970s as a result of the appearance of a set of global problems which have stimulated the "transnationalization" of the world economy and accentuated interdependence between all countries of the world. Environmental problems have played an important part in this evolution. By making apparent the existence of limits to economic growth at the centre, this process has contributed to increasing awareness that interdependence is global. In consequence, improvement of the relations between the two groups of countries is now being viewed within the framework of the development of the international economy as a whole. Accordingly, it does not depend solely on the specific international co-operation programmes operated by the industrialized countries. It depends also, and primarily, on the structural changes in the system that these countries will concede with a view to opening the way to ecologically balanced development and an international division of labour which is more consistent with the emerging new structure of international comparative advantages.



"The study suggests that the changes that are taking place in centre - periphery relations not only involve risks and disadvantages for the developing countries; they also offer the challenge of new opportunities. The choices of these countries in planning their external strategies should not be restricted to the alternatives of joining or boycotting new forms of transnationalization. After careful consideration of the costs and benefits of various forms of integration into the transnational system, including the impact on the use of domestic natural resources and the environment, the peripheral countries ought to search for methods of selective participation.

REDEPLOIEMENT ECONOMIQUE ET ENVIRONNEMENT

Rapport transmis par le Gouvernement de la France

Préparé par M. J. THEYS\*

REDEPLOIEMENT ECONOMIQUE ET NAISSANCE D'UNE NOUVELLE GENERATION DE POLITIQUE DE L'ENVIRONNEMENT: DEUX ELEMENTS NOUVEAUX DU DEBAT SUR LA CROISSANCE

Le contexte national et international radicalement nouveau dans lequel la France se trouve aujourd'hui placée nécessite que soit repris sur des bases totalement différentes le débat sur les rapports entre croissance et environnement.

Ce débat, engagé dans une période de fort développement et de faible sensibilisation aux problèmes du cadre de vie et des ressources, s'est en effet enlisé dans des échanges assez stériles entre les partisans d'une stabilisation de la croissance et ceux d'une restriction des dépenses d'environnement envisagées uniquement comme des surcoûts imposés à l'appareil productif.

Aujourd'hui l'économie française, comme les politiques de l'environnement, sont à un tournant:

- après 25 ans de croissance continue, l'économie française, qui doit faire face à une crise durable, est à la recherche de nouvelles orientations;
- dans une telle situation, la place et la nature des politiques de l'environnement sont mises en question.

On pourrait craindre dans un contexte dominé par les difficultés économiques et les échéances immédiates, les efforts entrepris depuis près de 10 ans pour améliorer l'environnement et le cadre de vie dussent être réduits.

Mais la crise actuelle, outre qu'elle n'a pas fait disparaître les interrogations sur les effets à court et long terme d'une dégradation du milieu et des conditions de vie, contribue aussi activement à orienter la réflexion sur les types alternatifs de croissance dans un sens beaucoup plus concret qu'auparavant, comme en témoignent, par exemple, les politiques anti-gaspillage.

Au débat sans issue entre deux conceptions antinomiques se substitue la double interrogation suivante:

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- dans quelle mesure les choix qui seront faits en matière de redéploiement économique et spatial auront-ils une incidence sur le cadre de vie, le patrimoine et les ressources? Et comment devront-ils en tenir compte?
- quelles pourraient être les grandes lignes d'une politique de l'environnement qui puisse satisfaire à la fois aux conditions futures du développement économique et social et à une intensification prévisible des besoins qualitatifs?

Cette réflexion a pour objet de montrer en quoi ces deux questions sont complémentaires. Elle s'appuiera sur des informations récentes permettant de préciser simultanément:

- les conséquences des formes de croissance sur le milieu naturel, les ressources et les conditions de vie;
- les incidences sur l'économie de différentes politiques de l'environnement.

I. LES POLITIQUES DE CROISSANCE NE SONT PAS NEUTRES VIS A VIS DE L'ENVIRONNEMENT

De nombreuses analyses ont déjà été faites sur les incidences de la croissance. Un premier bilan général a été en particulier tenté en France à l'occasion de la préparation du VIIème Plan. 1/

Des études récentes permettent aujourd'hui d'actualiser et de préciser le constat:

- en apportant des données quantitatives sur l'ampleur des dégradations;
- en mettant mieux en évidence la responsabilité des formes et styles de croissance là où auparavant l'accent avait été mis sur les rythmes et quantités de production.

1. LA CROISSANCE ENTRAINE DES DEGRADATIONS DE L'ENVIRONNEMENT QUI NE PEUVENT ETRE NEGLIGÉES

Ce n'est ici le lieu de faire ni un inventaire, ni un diagnostic de l'ensemble des problèmes d'environnement liés à l'activité économique. La classification qui est jointe page suivante (tableau I) indique que ceux-ci sont très diversifiés et qu'ils se situent sur des échelles de temps et d'espace extrêmement larges.

Trois exemples suffiront à caractériser l'ampleur de ces incidences:

- l'importance des dommages causés par la pollution;
- l'aggravation des inégalités écologiques;
- la dégradation du patrimoine.

(a) Importance des dommages causés par la pollution

D'une évaluation des dommages causés par la pollution en 1970 et 1978 2/ il résulte:

TABLEAU n° I - Classification de quelques problèmes d'environnement selon le niveau et le terme où ils se posent.

Niveau	Terme	Domaine des systèmes d'alerte et de contrôle à court et très court terme (de quelques heures à quelques mois)	Domaine de prévision à moyen terme (de 1 à 10 ans)	Domaine de la prospective
<p><u>International</u> (mondial, un continent, un groupe de pays)</p>	<p>Pollution maritime par les tankers (nappes de mazout). Contrôle des explosions nucléaires.</p>	<p>Etablissement de normes et de textes réglementaires concernant certaines pollutions et nuisances. Pollution permanente des espaces communs (océans par exemple).</p>	<p>Effets sur la santé humaine et l'environnement naturel de l'exposition permanente à des doses moyennes ou faibles de polluants. Grands équilibres écologiques (océans, forêts, air, flore et faune). Gestion des déchets atomiques. Approvisionnement en énergie. Alimentation de "n" milliards d'humains.</p>	
<p><u>National</u></p>	<p>Toxicité accidentelle de produits alimentaires ou domestiques. Encombrement des réseaux de transport (routiers, ferroviaires) dû aux grandes migrations périodiques (départs et retours de vacances par exemple).</p>	<p>Choix des actions de lutte anti-pollution (priorités, cadre juridique, moyens). Élaboremens de normes et de textes réglementaires concernant l'ensemble des pollutions et nuisances. Gestion de l'espace national (aménagement du territoire). Pollution et accès au littoral maritime.</p>	<p>Compatibilité des objectifs de croissance et de protection de l'environnement. Gestion des réserves nationales en eau. Effets de l'agriculture chimique sur les aliments, la flore, la faune et les sols.</p>	
<p><u>Régional</u> (Essin, région, département)</p>	<p>Toxicité des eaux continentales par déversement accidentel d'une grande quantité de polluants. Incendies de forêts.</p>	<p>Pollution des eaux continentales territoriales. Approvisionnement en eau des grandes communautés urbaines et des centres industriels.</p>	<p>Équilibre entre espace urbain et espace rural au sein de chacune des régions.</p>	
<p><u>Local</u> (Ville, commune, quartier, usine)</p>	<p>Contrôle de la pollution atmosphérique d'une zone critique (en relation avec les conditions météorologiques instantanées). Saturation des moyens de transport urbains aux heures de pointe.</p>	<p>Encombrement des villes (transports, constructions). Aménagements urbains (espaces verts). Traitement des déchets solides. Problème des zones excessivement bruyantes. Conservation des sites et du patrimoine "historique" des villes.</p>	<p>Développement des grandes communautés urbaines.</p>	

Tableau II

ESTIMATION DES DOMMAGES EN FRANCS 1978,  
PAR POLLUANT ET GROUPE DE POLLUANTS

. Population exposée en 1978 : 53 Millions  
. Unité : Millions de Francs 1978

Polluants	Hypothèse basse	Hypothèse haute	% du dommage total
Particules	3950	4690	
Monoxyde de carbone	390	480	
Oxydes d'azote+oxydants	2650	3550	
Oxydes de soufre, sulfates	4470	5590	
Hydrocarbures (air)	1750	2190	
Fluor	640	800	
Chlore et composés	300	380	
<u>Sous-Total (air)</u>	<u>14150</u>	<u>17680</u>	20,3 %
Cuivre, chrome	1200	1500	
Cadmium, Beryllium, Thallium	1530	1910	
Plomb	1550	1940	
Mercure	420	520	
Amiante			
<u>Sous-Total (Métaux lourds)</u>	<u>4700</u>	<u>5870</u>	6,6 %
Radiations (+tritium...) et déchets radio actifs (Rad. ionisantes et non ionisantes)	2920	3650	
Pollution thermique	2700	3380	
<u>Sous-Total</u>	<u>5620</u>	<u>7030</u>	8,0 %
Matières oxydables	4820	5930	
Matières en suspension	1900	2370	
Hydrocarbures (eau, mer)	2230	2800	
Cyanures, Arsonic	210	270	
Phénol, solvants et autres substances organiques	990	1230	
Coliformes-virus	non-estimé	non estimé	
<u>Sous-Total (eau)</u>	<u>10150</u>	<u>12600</u>	14,3 %
Nitrates-engrais	4170	5330	
Phosphates (engrais, détergents)	3210	4010	
Pesticides	3400	4250	
<u>Sous-Total</u>	<u>10780</u>	<u>13590</u>	15,4 %
Déchets solides	7480	9360	10,6 %
Additifs et colorants	non estimé	non estimé	
Bruit	17530	21840	24,8 %
Encombrement	non estimé	non estimé	
<b>TOTAL</b> F. 1978	<b>70410</b>	<b>87970</b>	100,00 %

- que le coût des dommages dus aux pollutions (24 polluants) se situe en 1978 entre 70 et 90 milliards de francs, ce qui représente 3,4% à 4,2% du PIB soit 1300 à 1700 francs par habitant, ou enfin environ 3 à 4 fois les dépenses consacrées à l'environnement (et plus précisément 5 à 7 fois les dépenses consacrées à la dépollution).
- que ce coût est néanmoins passé entre 1970 et 1978 d'un pourcentage du PIB comprise entre 4 et 5 à un pourcentage se situant entre 3,4 et 4,2% ce qui représente une diminution de 15% par franc produit:
- que finalement le coût par habitant a augmenté de 10% pendant la même période (pour une production en accroissement de 38%).

Même si ces chiffres doivent être interprétés avec la plus extrême prudence, ils indiquent que la pollution est loin d'avoir des effets négligeables non seulement sur la santé et le patrimoine naturel mais aussi sur l'économie (corrosion des matériaux, baisse des rendements agricoles, baisse de la productivité, absentéisme, baisse de la valeur des terrains...).

(b) L'aggravation des inégalités écologiques (cf. tableau III)

Ces inégalités écologiques résultent en grande partie de l'inégale répartition des activités sur le territoire et du double phénomène de concentration des populations dans les villes et de désertification des zones rurales:

- six régions (sur 23) regroupent en 1978 55% de la population et 60% des emplois industriels;
- l'éventail des densités sur le territoire est extrêmement ouvert, allant de 6 habitants au km<sup>2</sup> pour les zones rurales des Alpes de Haute Provence à 41.000 pour le 11ème arrondissement de Paris en passant par des moyennes de 340 hbs/km<sup>2</sup> pour la frange littorale et de plus de 700 pour les zones urbaines; les 4/5 du territoire français connaissent des densités de moins de 30 habitants par km<sup>2</sup>, alors que près de 38 millions de citadins se partagent moins de 10% de l'espace national;
- la croissance ne fait qu'accélérer ces tendances à la polarisation en favorisant notamment l'exode des agriculteurs; le phénomène de désertification, qui paraissait n'être qu'un problème localisé, risque de devenir d'ici 10 à 15 ans un phénomène général sous l'effet d'un véritable effondrement démographique des populations agricoles.

Les incidences de tels déséquilibres sur le cadre de vie sont considérables:

- la Région Parisienne est, en 1978, et de très loin, la région la plus exposée aux pollutions et aux nuisances, suivie par le Nord, l'Alsace, la Lorraine, la Haute Normandie, les régions Rhône-Alpes et Provence-Côte d'Azur, la région Alpes-Côte-d'Azur, la Picardie;
- les effets de la concentration urbaine: encombrements, pertes de temps, ségrégation, accumulation de nuisances difficilement tolérables (bruit...), appauvrissement de la vie sociale, perturbations psychosociologiques, accumulation de déchets dépassant les capacités d'assimilation du milieu... conduisent à une insatisfaction croissante des urbains vis à vis de leur cadre de vie et à la multiplication de conflits localisés;

- à l'inverse, la sous-densification des zones rurales se traduit par un appauvrissement considérable des modes de vie et des potentialités d'occupation du temps qui entraînent à terme à la fois l'exode vers les villes et l'abandon de toute forme d'entretien du milieu naturel.
- Ces quelques appréciations générales rendent d'ailleurs assez mal compte de l'importance des disparités locales ou individuelles qui peuvent exister en matière de cadre de vie, inégalités qui résultent notamment de la ségrégation de l'habitat, des différences de condition de déplacement ou d'emploi, des limitations d'accès aux biens naturels ou de l'accumulation sur certains individus des risques d'exposition à la pollution. 3/

TABLEAU III  
INEGALITES DES SITUATIONS ENVIRONNEMENTALES

INEGALITES DES DENSITES

La densité moyenne au km<sup>2</sup> est de 35 dans la France rurale et de 700 dans la France urbaine: soit 20 fois plus. Certaines zones sont désertes (2 habitants au km<sup>2</sup> dans les Causses), d'autres surpeuplées (25.000 habitants au km<sup>2</sup> à Paris).

Chaque rural "dispose" de 26.000 m<sup>2</sup>, chaque citadin de 1400 m<sup>2</sup> et chaque Parisien de 40 m<sup>2</sup> dont un peu plus d'un m<sup>2</sup> d'espace vert et ceci ne constitue que des moyennes "

Désertification et surpopulation s'accompagnent de deux types de conséquences: insuffisance des équipements collectifs dans les deux cas; "surpollution" liée à la densité excessive; sous-équipement lié à une densité insuffisante (25% des ruraux n'ont pas encore d'adduction d'eau; 30% ont un logement défectueux).

INEGALITE DE L'ACCES A LA NATURE

30% des cadres supérieurs et des professions libérales possèdent une résidence secondaire contre 5% des ouvriers et 10% des employés.

Le nombre de m<sup>2</sup> d'espace vert par habitant dans les principales villes de France va de 0,5 à 13 - soit 26 fois plus.

En conséquence, la fréquentation des espaces verts témoigne des difficultés à satisfaire les besoins considérables à proximité des grandes villes. On peut ainsi dresser l'échelle suivante de fréquentation par an et par hectare:

1 visiteur/an/ha dans le parc naturel de la Vanoise  
300 visiteurs/an/ha dans la forêt de Rambouillet  
1800 visiteurs/an/ha dans la forêt de Meudon  
7000 visiteurs/an/ha dans le bois de Boulogne  
25000 visiteurs/an/ha dans le parc Montsouris.

INEGALITE DEVANT LES POLLUTIONS

Les classes sociales les plus défavorisées habitant les grandes villes ou cités industrielles subissent les dommages les plus considérables sans pouvoir s'en prémunir (possibilité de vacances réduites...)

(c) La dégradation du patrimoine naturel et la raréfaction des ressources

C'est un aspect essentiel du patrimoine naturel que de constituer "une infrastructure de base pour l'organisation générale du territoire et le développement; comme pour l'implantation et le fonctionnement des activités" ce qui justifie, d'un strict point de vue économique, que ses capacités de reproduction soient au minimum sauvegardées (problème posé notamment pour l'espace rural à usage agricole. 4/

Les incidences de la croissance sur des éléments du patrimoine qui n'ont pas directement de valeur économique ne doivent pas cependant être sous-estimées, qu'il s'agisse d'éléments fondamentaux nécessaires à la vie biologique ou à l'équilibre à long terme de la biosphère (teneur en CO<sub>2</sub> de l'air, cycles biochimiques, humus...) ou d'éléments du patrimoine intéressants pour leur qualité ou leur rareté (faune et flore, paysages, sites naturels ou construits, monuments historiques...).

Ce sont eux en effet qui risquent d'être le moins bien pris en compte dans les choix de développement à moyen et long terme.

On reprendra pour caractériser ces deux types d'effets économiques et non-économiques les éléments d'une synthèse récente réalisée par le Ministère de l'Environnement et du Cadre de Vie, à la demande du Commissaire Général au Plan 5/ qui met l'accent simultanément sur deux types de problèmes: la raréfaction des ressources et la dépendance croissante de la France pour l'approvisionnement en énergie et en matières premières.

"Une raréfaction des ressources"

Les pressions qui se sont exercées jusqu'à présent sur les ressources naturelles en France ont conduit à une situation que l'on peut sommairement caractériser de la façon suivante:

- un épuisement progressif de certaines des ressources naturelles: bauxite (15 ans de réserves), fluorine et soufre (12 ans de réserves), potasse et fer (réserves en voie d'extinction rapide)...;
- une raréfaction ou une disparition de certaines espèces végétales et animales, terrestres et aquatiques, sauvages mais aussi cultivées ou élevées; en ce qui concerne la flore, par exemple, on estime qu'à l'heure actuelle 12% des espèces sont menacées de disparition et 30 à 40% d'entre elles sont en régression sensible; on sait aujourd'hui qu'un tel appauvrissement des écosystèmes peut avoir des conséquences multiples et considérables sur les activités humaines (agriculture, pêche maritime, loisirs...);
- un problème d'approvisionnement en eau; la situation d'ensemble de la France à cet égard est relativement bonne: ses ressources moyennes globales sont largement supérieures aux besoins et paraissent suffisantes pour le long terme; quelques grands problèmes se posent cependant soit localement, mais d'une façon cruciale, tel l'approvisionnement en eau des grands centres urbains et industriels (Région Parisienne et Basse-Seine, zone urbaine du Nord de la France, Métropole Lorraine, agglomération marseillaise), soit d'une façon générale pour certaines activités: en matière de production d'énergie thermique, les projets de centrales nucléaires dès à présent prévus utilisent la totalité de la capacité d'échauffement des fleuves à grand débit; en agriculture, le manque d'eau à des fins d'irrigation est évident dans certaines zones du Sud et du Sud-Ouest et risque de s'étendre



au Centre-Ouest et au Bassin parisien si l'on souhaite y accroître les rendements;

- des conflits de plus en plus aigus pour l'utilisation de l'espace dans les zones littorales, et, à l'inverse, un abandon progressif de terres soustraites à la culture dans les zones montagneuses et accidentées (on estime que plus de 40,000 ha sont ainsi abandonnés chaque année).

### "Une dépendance pour l'approvisionnement en énergie et en matières premières"

"Les importations françaises en produits énergétiques ont été de 71 milliards de francs en 1976 (dont 80% pour le pétrole) représentant 23% du total des importations. Le taux de dépendance (importations/consommation) s'est accru de 40% en 1960 à 77% en 1975".

La France s'approvisionne en matières minérales pour 55% par des importations. Le solde déficitaire occasionné par les importations de matières premières en général représente de l'ordre de 20 à 25 milliards de francs. Les postes les plus déficitaires étant les suivants: "bois, pâtes et papier" (3,5 milliards) et "cuivre" (2,5 milliards) puis dans l'ordre: "coton", "phosphates", "laine", "zinc"...

Le degré d'autonomie de la France (rapport entre ses disponibilités, y compris le recyclage, et sa consommation globale) est faible ou moyen pour la plupart des métaux non ferreux, nul pour les métaux spéciaux, les phosphates et le manganèse".

On peut en conclusion de cette partie ajouter que les dégradations de l'environnement sont d'autant moins négligeables qu'elles entraînent à terme des coûts économiques importants pour la collectivité, sous forme de dépenses d'épuration, de réparation ou compensation des dommages, et finalement de réduction des potentialités de croissance. 6/

C'est ce qu'évoquait en 1974 le Conseil Economique et Social 7/ dans les termes suivants:

"D'ici la fin du siècle, selon les prévisions les plus sérieuses, la production industrielle comme celle de l'énergie auront, selon les secteurs, triplé à décuplé. Si donc l'environnement n'est pas valablement et complètement pris en compte dès maintenant, son coût, dans une politique de perpétuelle improvisation, ne serait ni supportable pour l'économie ni suffisamment efficace pour permettre une constante amélioration de la qualité de la vie accompagnant les péripiéties inévitables d'une croissance souhaitable".

## 2. L'ETAT DE L'ENVIRONNEMENT EST TRES SENSIBLE AUX FORMES ET AUX STYLES DE CROISSANCE

Plus qu'une corrélation stricte entre croissance et état du milieu et du cadre de vie, ce sont des formes de croissance bien définies, plus gaspilleuses et polluantes que d'autres, qui sont en cause.

Une croissance forte pourra, à la limite, permettre de financer des dépenses élevées d'épuration et donc d'améliorer le cadre de vie, alors qu'inversement, une croissance faible sans effort de protection ou de prévention et sans modification technologique pourra accélérer la détérioration de l'état de l'environnement...

Cette sensibilité au contenu de la croissance est confirmée par des travaux récents portant:

- sur les conséquences de différents scénarios de développement économique en matière de pollution à l'horizon 1995;
- sur l'analyse des déterminants principaux de la demande de ressources naturelles.

(a) Sensibilité de la pollution à différents scénarios de croissance: une exposition à la pollution en 1995 allant de 1 à 4 selon le scénario de croissance suivi et la politique d'épuration mise en oeuvre

La sensibilité de pollution aux formes de croissance apparaît clairement dans le tableau IV qui résume les incidences de onze scénarios socio-économiques sur un indice représentatif de la pollution globale à l'horizon 1995. 8/

Les émissions de polluants qui y sont représentées résultent de la combinaison de quatre niveaux d'effort croissant d'épuration (0,1,2,3) avec chacun de ces scénarios, eux-mêmes dérivés de trois grandes familles: des scénarios tendanciels avec une croissance forte (A), des scénarios tendanciels avec une croissance modérée et des économies d'énergie (B), et enfin des scénarios non tendanciels (I). 9/

On peut tirer de cette simulation les trois conclusions suivantes:

- selon le scénario et le niveau d'épuration réalisé, la pollution mesurée sur 17 polluants, devrait passer de l'indice 100 en 1970 à un indice se situant entre 60 (hypothèse la plus favorable) et 245 (hypothèse la moins favorable); les styles de croissance autant que les politiques spécifiques de l'environnement devraient déterminer par ailleurs la structure des polluants émis et les régions les plus exposées;
- le passage d'un scénario tendanciel à un scénario non tendanciel aurait globalement la même efficacité que le passage d'une épuration faible (niveau 1) à une épuration très forte (niveau 3);
- l'incidence du taux de croissance du PIB sur le niveau global des pollutions est relativement secondaire; en revanche les choix technologiques et énergétiques, les structures et comportements de production et de consommation, les échanges internationaux, la localisation des activités et des populations sur le territoire ont une influence déterminante.

(b) Sensibilité de la demande de ressources naturelles aux modes de croissance

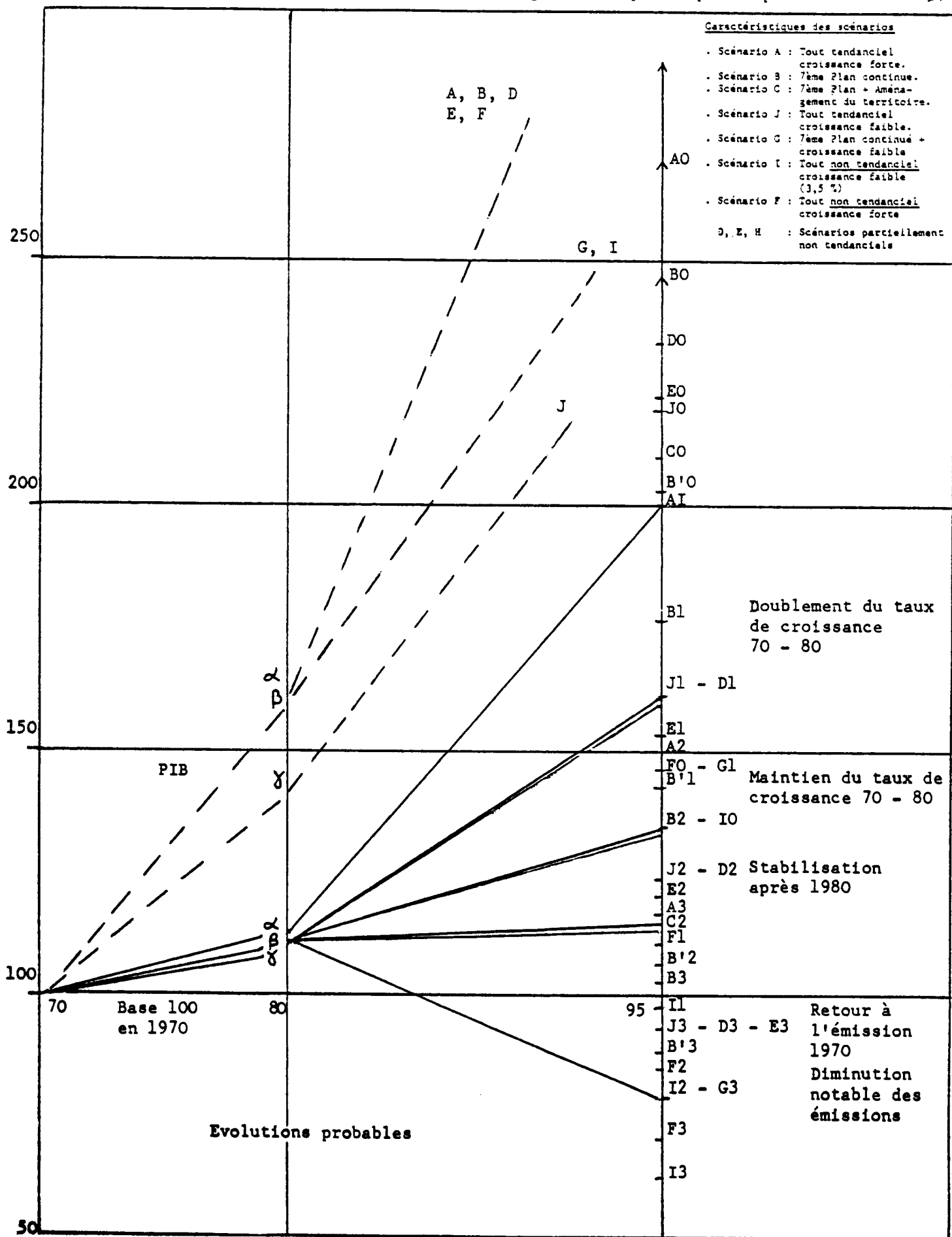
L'incidence des formes de croissance sur l'utilisation des ressources minérales et énergétiques classiques a été suffisamment mise en évidence pour qu'on ne s'y attarde pas. L'extrême diversité des consommations énergétiques par unité de production qui subsiste entre les différentes économies (écarts allant de 1 à 10) en est un exemple significatif.

La richesse et la variété des substitutions entre matériaux, les possibilités de redéploiement vers des productions moins consommatrices de ressources (électronique, informatique, chimie de synthèse, services et produits à forte valeur ajoutée...), la faculté de mieux maîtriser les échanges internationaux et finalement les potentialités non négligeables d'utilisation plus rationnelle et complexe des matières premières (par des actions sur la durée de vie, le taux de recyclage, la récupération, les modes d'usage des ressources...) laissent dans

TABLEAU IV

Niveau d'émission national, tous polluants pour  
39 simulations, en 1980 et 1995

(le numéro inscrit après la lettre de code scénario-politique à la génération, indique le degré de la politique d'épuration de 0 à 3)



ce domaine une latitude certaine pour des orientations multiples qui ne seront pas sans conséquence sur l'environnement.

On peut estimer, avant même de disposer des données quantifiées qu'apporteraient une comptabilité patrimoniale ou un modèle, que l'influence des choix de croissance est tout aussi déterminante sur les ressources naturelles à usage non exclusivement économique.

C'est la conclusion que l'on peut du moins tirer d'une étude récente 10/ dont l'objet était de faire un premier tri et classement des variables qui conditionnent la demande de ces ressources. Ressortent en effet de cet essai de hiérarchisation effectué sur 120 variables initiales les quelques éléments mis en évidence dans le tableau V.

TABLEAU V

LES ELEMENTS AUXQUELS LES RESSOURCES D'ENVIRONNEMENT SONT LES PLUS SENSIBLES

FACTEURS MACRO-ECONOMIQUES	<ul style="list-style-type: none"><li>- la rationalité économique (prise en compte dans le calcul économique des effets externes des irréversibilités, des valeurs d'usage et de patrimoine, souci de rentabilité immédiate)</li><li>- le rythme de croissance,</li><li>- la structure des productions,</li><li>- le développement et la structure des échanges internationaux,</li><li>- le prix relatif des ressources naturelles et de l'énergie,</li></ul>
ELEMENTS LIES A L'URBANISATION ET A L'AMENAGEMENT DU TERRITOIRE	<ul style="list-style-type: none"><li>- le rythme d'urbanisation,</li><li>- la concentration et l'extension urbaine,</li><li>- le développement des infrastructures de transport et les coûts de déplacement,</li><li>- la répartition des activités sur le territoire,</li><li>- les besoins d'évasion et l'image des biens naturels pour les urbains,</li></ul>
ELEMENTS LIES AUX MODES DE VIE	<ul style="list-style-type: none"><li>- les structures et modes de consommation,</li><li>- les formes et localisations du tourisme et des loisirs</li><li>- les formes d'habitat (concentré-dispersé) et le développement des résidences secondaires;</li></ul>

La fréquence d'apparition de variables globales en tête de ce classement confirme qu'il existe des relations privilégiées entre les grandes orientations économiques ou d'aménagement du territoire et de l'environnement.

Ceci justifie qu'on s'interroge sur les possibilités de concilier redéploiement économique et politique de cadre de vie.

II. LES PERSPECTIVES DE REDEPLOIEMENT, TOUT EN MODIFIANT LE CONTEXTE DES POLITIQUES DE L'ENVIRONNEMENT, OUVRONT DE NOUVELLES POSSIBILITES DE CONCILIER LES OBJECTIFS DE CROISSANCE, DE PROTECTION DU PATRIMOINE ET D'AMELIORATION DU CADRE DE VIE

"Peut-on et doit-on faire un effort pour le patrimoine naturel et le cadre de vie en période de crise"? Posée au cours de la préparation du VIIème Plan dans le rapport sur le patrimoine naturel la question conserve la même acuité qu'il y a 4 ans.

La nécessité de faire face aux difficultés économiques amène les pouvoirs publics à rechercher les solutions aux problèmes d'environnement, dans le cadre d'une croissance modérée et à privilégier les actions qui favorisent une économie de ressources primaires, une réduction du taux d'inflation, une amélioration de l'emploi et de l'équipement du commerce extérieur.

Ceci ne conduit pas nécessairement à renoncer à une politique ambitieuse du cadre de vie qui seule permettrait de satisfaire les énormes besoins qui se sont développés depuis 1965 en matière de conditions de vie et de travail, de qualité de l'habitat, de loisirs, de participation et de protection du patrimoine naturel.

Ce sont les formes du redéploiement qui détermineront le degré de conciliation entre objectif économique et objectif d'environnement. Cette conciliation est possible; elle est nécessaire; elle suppose néanmoins la réalisation d'un minimum de conditions.

1. LA CONCILIATION ENTRE CROISSANCE ET ENVIRONNEMENT EST POSSIBLE DANS LE CONTEXTE ACTUEL DE REDEPLOIEMENT

Cette conciliation est rendue possible:

- parce que les options en matière de redéploiement restent ouvertes,
- parce qu'il existe des convergences susceptibles d'être exploitées entre les objectifs de croissance et ceux d'environnement,
- parce qu'enfin certaines des conséquences directes du nouvel ordre économique international vont dans le sens d'une amélioration du cadre de vie.

(a) Les options en matière de redéploiement restent ouvertes

A. Pour faire face à la crise économique plusieurs hypothèses de redéploiement ont été envisagées;

- un scénario de repli où, pour diminuer sa dépendance vis à vis des pays détenteurs de ressources, la France s'efforcerait de généraliser la mise en place de technologies de substitution ou de lutte contre le gaspillage et de valoriser ses ressources propres. Le renforcement du potentiel

nucléaire ou l'exploitation des énergies nouvelles peuvent être interprétés comme l'un des éléments d'une telle stratégie;

- une accentuation de la spécialisation internationale, où la France chercherait à acquitter le coût de ses importations en ressources primaires ou en produits à faible valeur ajoutée par une augmentation de ses exportations dans les domaines où elle est concurrentielle; l'agriculture, les biens d'équipement, l'automobile, les pneumatiques, l'aéronautique, les métaux non ferreux, les produits de luxe, le tourisme et les services... ainsi que dans certaines activités de sous-traitance (informatique ...);
- une délocalisation des produits de base vers les pays du tiers monde (sidérurgie, chimie, non ferreux...) compensée par une spécialisation dans les technologies avancées et la vente des services;
- la recherche d'une certaine autonomie dans le cadre de l'Europe ou de la Méditerranée.

(B) Il est clair que le choix d'une de ces options aura des conséquences déterminantes sur la nature et la localisation des problèmes d'environnement futurs, d'autant que l'adaptation à ces différentes stratégies suppose des orientations qui concernent:

- la croissance des différentes branches de production (plus ou moins polluantes) et la localisation des activités (concentration dans la région parisienne et la frange Est, sur le littoral; ou décentralisation dans l'Ouest...),
- l'orientation des investissements (vers la construction, l'industrie, les équipements collectifs...) et du budget (affectation au cadre de vie d'un certain pourcentage des ressources publiques...)
- la politique des ressources: choix énergétiques, orientations agricoles, développement plus ou moins rapide des économies d'énergie...
- la politique de l'emploi: modulation de la durée de travail, aménagement des budgets temps, orientation vers des emplois plus ou moins qualifiés et vers une plus ou moins grande mobilité de l'emploi...
- et finalement le choix d'une certaine conception de l'équilibre des activités en fonction d'options à la fois économiques, culturelles et internationales: rôle des activités anciennes par rapport aux activités nouvelles, des services par rapport au secteur non marchand, des collectivités locales par rapport à l'état...

Même si certains scénarios paraissent aujourd'hui plus réalistes que d'autres, il semble que beaucoup d'options restent encore ouvertes, ce qui sauvegarde la possibilité de tenir compte d'objectifs qualitatifs dans les choix à moyen terme.

(b) Des convergences entre les objectifs de croissance et ceux d'amélioration de l'environnement sont susceptibles d'être exploitées

Les convergences existent dans de nombreux domaines et concernent notamment:

- la lutte anti-gaspillage et la valorisation des ressources nationales renouvelables,

- le développement d'emplois qualitatifs et la création de nouveaux marchés liés à la gestion du cadre de vie et des ressources patrimoniales,
- l'amélioration de la qualité du travail et la réduction des pertes de temps (politiques d'aménagement du temps et des conditions de travail)
- l'équilibre des consommations marchandes et non marchandes,
- l'amélioration de la qualité des produits et le renforcement du rôle des associations de consommateurs,
- le développement de l'usage des services publics,
- l'équilibre spatial des activités (ralentissement de la concentration des populations dans les grandes villes et de la désertification des zones rurales); l'arrêt de la tendance au gigantisme,
- la création d'un nouveau secteur d'innovation (lié aux technologies propres, à l'énergie solaire, à l'océanographie....),
- la décentralisation des décisions et l'amélioration des formes de participation.

Ces différents points sont concrétisés par quelques illustrations rassemblées dans le tableau VI. Un exemple parmi d'autres, celui de l'emploi, montre assez bien que ces convergences sont réelles:

- l'ensemble des activités de l'antipollution et de la récupération, représentant un chiffre d'affaires de 19 milliards de francs et un solde net du commerce extérieur de 3 milliards de francs, a fourni en 1975 du travail à 170.000 personnes;
- les perspectives de développement de l'emploi dans le domaine de la qualité de la vie sont encore plus considérables 11/;
- la hausse du prix relatif des ressources naturelles accroît l'avantage lié à la création de nouveaux emplois.

L'existence de ces convergences, souvent encore potentielles, invite à rassembler les efforts et les réflexions pour qu'elles se matérialisent. Elle n'exclut pas qu'à côté de ces complémentarités subsistent des points de conflit.

(c) Certaines des conséquences directes d'un nouvel ordre économique international pourraient aller dans le sens d'une amélioration du cadre de vie.

L'accentuation de la spécialisation internationale, combinée avec un effort de réduction des importations de matières premières et d'énergie devraient avoir les conséquences favorables suivantes:

- une diminution des pollutions émises par la sidérurgie, la pétrochimie et les sources de combustion (centrales thermiques, chauffage, automobile...),
- une diminution du bruit due à une meilleure isolation des logements et à une réduction relative des déplacements (économies d'énergie),

Tableau VI

QUELQUES ILLUSTRATIONS DE LA NOTION DE CONVERGENCE

DOMAINES DE CONVERGENCE	ELEMENTS DE POLITIQUES
LUTTE ANTI GASPILLAGE	<ul style="list-style-type: none"> <li>. Politique de recyclage et de récupération des matières premières.</li> <li>. Economies d'énergie (dont récupération des chaleurs perdues, isolation thermique, substitution des transports collectifs aux transports privés, substitution des communications aux déplacements...)</li> <li>. Substitution des ressources renouvelables aux ressources non renouvelables.</li> <li>. Allègement des biens et équipements.</li> <li>. Allongement de la durée de vie des produits.</li> <li>. Comptabilité patrimoniale. Bilan matière-énergie</li> </ul>
VALORISATION DES RESSOURCES NATIONALES RENOUVELABLES	<ul style="list-style-type: none"> <li>. Développement d'une agriculture à valeur biologique ajoutée maximale.</li> <li>. Intensification de l'exploitation forestière</li> <li>. Utilisation des ressources marines (aquaculture, nodules...)</li> <li>. Utilisation des déchets (compostage)</li> <li>. Exploitation d'énergies renouvelables (solaire, vent, bioconversion, hydroélectricité...)</li> </ul>
DEVELOPPEMENT DES EMPLOIS QUALITATIFS ET CREATION DE NOUVEAUX MARCHES LIES A LA GESTION DU CADRE DE VIE	<ul style="list-style-type: none"> <li>. Développement de l'industrie anti pollution (170 000 emplois en 1970)</li> <li>. Développement des métiers de l'entretien et de la réparation, des spécialistes des économies d'énergie, des professions de la récupération.</li> <li>. Développement des emplois liés à la protection ou à l'entretien de la nature : gardes forestiers, animateurs de parcs, animateurs en zone rurale défavorisée.</li> <li>. Développement des métiers du cadre de vie : bâtiment et construction, animateurs des bases de loisirs et de plein air, animateurs urbains, emplois collectifs d'immeubles...</li> <li>. Développement des emplois de la qualité de la vie : animateurs de la vie associative, aide au domicile, aide ménagère, assistante sociale rurale, bureau d'aide aux consommateurs, animateurs de crèches...</li> </ul>
AMELIORATION DE LA QUALITE DU TRAVAIL	<ul style="list-style-type: none"> <li>. Aménagement du temps de travail (horaires à la carte...)</li> <li>. Réduction de la mobilité géographique (travailler au pays)</li> <li>. Diminution des nuisances ou milieu de travail (bruit, pollution atmosphérique).</li> <li>. Amélioration de la participation dans l'entreprise</li> </ul>



DOMAINE DE CONVERGENCE	ELEMENTS DE POLITIQUES
REDUCTION DES PERTES DE TEMPS	<ul style="list-style-type: none"> <li>• Etalement des vacances et des horaires de travail.</li> <li>• Autres éléments d'une politique d'aménagement du temps</li> </ul>
EQUILIBRE DES CONSOMMATIONS AMELIORATION DE LA QUALITE DES PRODUITS ET RENFORCEMENT DU ROLE DES ASSOCIATIONS DE CONSOM- MATEUR	<ul style="list-style-type: none"> <li>• Développement des consommations collectives à un rythme plus rapide que celui des consommations marchandes.</li> <li>• Développement d'une économie de dons</li> <li>• Formation des consommateurs favorisant un meilleur usage des produits.</li> <li>• Action en faveur de la production de produits de qualité (Label...)</li> <li>• Renforcement des moyens des associations de consommateurs et du service de repression des fraudes.</li> </ul>
DEVELOPPEMENT DE L'USAGE DES SERVICES PUBLICS ET DES BIENS DURABLES	<ul style="list-style-type: none"> <li>• Rééquilibrage des dépenses publiques en faveur du fonctionnement.</li> <li>• Adaptation des heures d'ouverture à la demande</li> <li>• Développement de la location.</li> <li>• Développement de l'usage collectif des biens durables (par immeubles)</li> </ul>
EQUILIBRE SPATIAL DES ACTIVITES	<ul style="list-style-type: none"> <li>• Amélioration du cadre de vie rural (maintien des services publics). Création d'activités diversifiées en zone rurale de faible densité. Politique de lutte contre la désertification. Politique des parcs régionaux.</li> <li>• Développement des villes moyennes et amélioration de leur cadre de vie.</li> <li>• Frein à la concentration des activités sur le littoral ou dans les régions à forte concentration humaine.</li> <li>• Prise en compte des risques écologiques dans l'aménagement du territoire. Lutte contre la monofonctionnalisation des espaces.</li> </ul>
CREATION D'UN NOUVEAU SECTEUR D'INNOVATION	<ul style="list-style-type: none"> <li>• Développement des recherches et aides à l'innovation dans les domaines des énergies douces, de la bioconversion, du recyclage, de l'agriculture biologique, le l'océanographie, des télécommunications des matériaux renouvelables, du véhicule électrique, de l'habitat...</li> </ul>
ARRÊT DE LA TENDANCE AU GIGANTISME	<ul style="list-style-type: none"> <li>• Actions en faveur des petites et moyennes entreprises, des équipements légers...</li> </ul>
DECENTRALISATION DES DECISIONS ET A AMELIORATION DES AMELIORATION DES FORMES DE PARTICIPATION	<ul style="list-style-type: none"> <li>• Augmentation des moyens et des compétences des communes, des cantons au départements ou régions.</li> <li>• Accroissement du rôle des associations...</li> </ul>

- un moindre encombrement par les transports et une moindre utilisation du sol par les infrastructures,
- une réduction globale de la pollution par franc de production due au renouvellement accéléré de l'appareil de production et à un renforcement des activités de service et de l'informatique,
- une meilleure valorisation du capital naturel et en particulier du patrimoine forestier et des ressources marines.

Des études plus fines seront nécessaires pour préciser ces quelques hypothèses fragmentaires. Un diagnostic plus global devrait permettre d'évaluer dans quelle mesure ces avantages équilibrent ou non les risques d'aggravation de l'état de l'environnement dans d'autres domaines (incidence des nouvelles sources d'énergie et de l'intensification de l'agriculture, risques de réduction des efforts d'épuration, accentuation des pressions sur le littoral....)

## 2. LA CONCILIATION ENTRE LES OBJECTIFS DU REDEPLOIEMENT ECONOMIQUE ET LES OBJECTIFS D'AMELIORATION DE L'ENVIRONNEMENT EST NECESSAIRE

On n'insistera pas sur le caractère impératif de l'adaptation des politiques d'environnement au nouveau contexte économique, préoccupation sous-jacente à l'ensemble de ce travail.

Au-delà de cette première raison, la conciliation est nécessaire:

- parce que la bonne gestion du patrimoine et l'amélioration du cadre de vie conditionnent dans certains domaines la réussite du redéploiement économique;
- parce que réciproquement, la poursuite d'objectifs ambitieux en matière de qualité de la vie suppose désormais des orientations bien définies en matière de croissance (politique préventive de l'environnement et modification des structures ou comportements économiques étant liées);
- parce qu'enfin la recherche d'un minimum de qualité du cadre de vie paraît être devenue, aujourd'hui, un nouvel impératif du développement.

(a) La bonne gestion du patrimoine et l'amélioration du cadre de vie conditionnent dans certains domaines la réussite du redéploiement économique.

Quatre exemples permettent d'illustrer cette proposition:

- dans le domaine de l'énergie, les objectifs de réduction de la dépendance vis à vis de l'extérieur (moins de 60% d'importations en 1985...) ne pourront être satisfaits sans d'importantes économies d'énergie (de l'ordre de 40 millions de TEP en 1985), la récupération des chaleurs perdues (3 millions de TEP en 1985) et à plus long terme le développement des énergies renouvelables (énergie solaire, bioconversion, géothermie...); il en est de même pour les matières premières;
- dans le domaine de l'agriculture, un rapport de l'Institut National de la Recherche Agronomique (le rapport POLY) a montré que l'augmentation des capacités d'exportation était moins liée à l'intensification de la mécanisation et de l'utilisation d'engrais (coûteuses en énergie) qu'à l'orientation vers une agriculture à "valeur biologique ajoutée maximale";

les mêmes conclusions peuvent être tirées en ce qui concerne la gestion et l'exploitation du patrimoine forestier de la forêt française à l'horizon 2030);

- dans le domaine de l'aménagement du territoire, il apparaît acquis que dans une situation de réduction des surplus économiques et démographiques, "la matière première du développement régional résidera dans la mise en valeur des ressources locales": valorisation des hommes, de l'habitat, du patrimoine immobilier, du capital naturel; cette mise en valeur devrait en outre seule permettre une réduction notable de l'exode rural;
- dans le domaine de l'emploi, enfin, on commence à penser qu'une politique du cadre de vie et de l'amélioration de la qualité pourrait contribuer à créer un assez grand nombre d'emplois en s'appuyant notamment sur l'artisanat et les entreprises de taille moyenne; on cite pour le seul secteur du bâtiment et des travaux publics un chiffre de création nette de 100 à 150.000 emplois nouveaux. 12/

(b) La poursuite d'objectifs ambitieux en matière de qualité de la vie suppose une harmonisation des politiques de l'environnement et des orientations en matière de croissance.

Les résultats de l'étude de prospective des pollutions, évoquée précédemment, indiquent que la stratégie d'harmonisation ou d'orientation vers une politique préventive de l'environnement, c'est à dire vers une redéfinition du contenu de la croissance est à long terme la seule qui permette dans le contexte actuel d'atteindre des objectifs ambitieux d'amélioration du cadre de vie.

Trois stratégies sont en effet envisageables:

1. Si l'objectif choisi est une simple modération de l'augmentation du niveau global des émissions annuelles de polluants dans l'environnement (taux de croissance des émissions de l'ordre de 2%/an), on peut mettre en oeuvre une politique d'épuration efficace, en prolongeant, ou accentuant, l'effort des années 1970-1975 dans ce domaine.

Trois raisons cependant obligent à s'interroger sur l'adéquation des moyens proposés à l'objectif envisagé, pourtant assez modeste:

- si la croissance du PIB est faible (de l'ordre de 3,5% par an sur longue période), le coût annuel d'une telle politique peut devenir insupportable: pour retrouver en 1995 le niveau des émissions de 1970, il faudrait consentir en 1995 un pourcentage du PNB voisin de 2% dans le scénario tendanciel;
- en second lieu, la structure de pollution correspondante à moyen terme peut ne pas être jugée satisfaisante;
- enfin, la marge de manoeuvre pour définir une nouvelle politique qui s'avérerait éventuellement nécessaire plus tard, se réduit avec le temps à cause de la très grande inertie de choix technologiques, de modes de consommation et de comportements qui auraient été faits dans l'optique de la pollution exclusive d'épuration; bref, le "coût d'option" d'une telle politique est certainement très élevée.

2. Si l'objectif choisi est la stabilisation des émissions nettes annuelles et le retour, à terme, au niveau d'émissions de 1970, une politique d'épuration est alors insuffisante, quel que soit le taux de croissance du PIB et quel que soit le taux d'effort consenti pour la politique d'épuration.

Pour atteindre cet objectif, il est nécessaire de mettre en oeuvre une politique de réduction qui combine une politique d'épuration "raisonnable" et une politique visant la génération des polluants, c'est-à-dire une politique intégrée concernant:

- le secteur énergie et la production d'électricité,
- les secteurs transports (y compris l'automobile), consommation des ménages, production de biens intermédiaires et agriculture,
- l'évolution de l'appareil productif et des technologies; la capacité d'investissement par branche, le remplacement du capital,
- le redéploiement industriel dans le cadre de la nouvelle distribution internationale des activités,
- l'aménagement du temps,
- l'orientation des investissements publics.

Les coûts de mise en oeuvre d'une telle politique préventive sont difficiles à évaluer globalement; on peut néanmoins calculer les sommes économisées par rapport à une politique d'épuration, et celles économisées par l'augmentation des rendements matière et énergie. Les premières estimations montrent qu'il s'agit de sommes considérables (2 à 3% du PIB au total annuel).

Il semble donc qu'il y ait une marge de dépenses possibles assez importante pour la mise en place d'une politique structurelle.

3.- Si l'objectif choisi était d'obtenir en 1995 une diminution très nette des émissions par rapport à 1970 (de l'ordre de 50%), il serait alors nécessaire d'accentuer la politique structurelle et la politique d'épuration. Cet objectif plus sévère supposerait un effort accru à l'épuration par rapport à 1978, le redéploiement complet de l'appareil de production ainsi que des contraintes importantes sur les consommations. Ces hypothèses sont peu plausibles et constitueraient des ruptures dans l'évolution.

En conclusion, seule la mise en place d'une politique active de prévention devrait conduire à une réduction sensible des impacts de la pollution à l'horizon 1995 (diminution de 20% par rapport à 1970) à un coût supportable par l'économie (0,6% du PIB).

C. La recherche d'un minimum de qualité du cadre de vie est devenue un impératif de la croissance.

Les politiques de croissance pourront désormais difficilement éviter de prendre en compte des seuils physiques, physiologiques ou psycho-sociologiques en deçà desquels la dégradation du patrimoine naturel, les coûts sociaux du développement ou l'insatisfaction des besoins en matière de cadre de vie deviendront intolérables.

TABLEAU VII - DEUX POINTS DE REPÈRE SUR L'ECONOMIE DE LA LUTTE CONTRE LES POLLUTIONS POUR 1975 et 1995

I. DONNÉES ECONOMIQUE SUR L'ANTIPOLLUTION EN 1975

1. Pourcentage du PNB consacré à la dépollution en 1975 (Investissement et fonctionnement)	0,7 %
2. Nombre d'emplois dans le secteur antipollution	130.000
3. Pourcentage de l'investissement consacré aux équipements antipollution par rapport aux investissements totaux	1,70 %

II. TROIS PERSPECTIVES POUR 1995

Scénario B ; 7ème plan continue + économies d'énergie

Scénario J : Croissance faible (3,5%) sans modifications structurelles

Scénario I : Scénario non tendanciel avec modifications structurelles.

1. Taux d'effort à l'épuration nécessaire sur la période 1975-1995 pour retrouver en 1995 le niveau d'émission de 1970

Scénario	Taux d'effort	cout total annuel en % du PIB	Coût d'investissement annuel en % de l'investissement productif
B		2,2 %	4,1 %
J		2,1 %	7,4 %
I		0,5 %	1,3 %

2. Niveau d'émissions atteint en 1995 pour un taux d'effort constant à l'épuration, sur la période 1975-1995 (environ 1 % du PNB)

Scénario	Niveau d'émission		Taux d'effort constant par rapport	
			au PIB	à l'investissement productif
B-J	150 - 160		150 - 160	150 - 170
I	80		80	80

**SEUILS PHYSIQUES:** il s'agit des seuils en deçà desquels les systèmes écologiques ne peuvent plus fonctionner ou assumer leur reproduction ou au-delà desquels les risques de catastrophe ou d'évolution irréversible sont considérablement accrus: artificialisation des sols, érosion, eutrophisation, disparition d'espèces... Un essai de classement des régions françaises en fonction de leur exposition à certains de ces risques a été présenté.

**SEUILS PHYSIOLOGIQUES:** il s'agit des seuils en deçà desquels les besoins physiologiques ou les conditions de développement de l'organisme ne sont plus assurés entraînant soit une dégradation lente mais continue des individus, soit des mutations génétiques, soit enfin un accroissement des risques d'accident grave: c'est le cas par exemple lorsque les niveaux de bruit dépassent 80 décibels sur une longue période ou lorsque les normes fixées en matière de concentration de pollution sont fréquemment dépassées...

**SEUILS PSYCHOSOCIOLOGIQUES:** il s'agit des minima socialement acceptés, à un moment donné, en matière de cadre de vie. Ces minima évoluent naturellement avec le temps, la situation économique des individus, l'accroissement du niveau culturel.

Ces différents seuils peuvent être considérés comme les objectifs d'une politique de croissance ayant intégré les préoccupations d'environnement.

Le schéma joint page suivante permet symétriquement de décider dans quelle mesure les objectifs d'une politique de l'environnement peuvent s'insérer dans une conception plus globale du développement (l'exemple choisi étant celui de la lutte contre les pollutions).

Il est certain que les revendications portant sur la qualité de l'environnement croissent avec le niveau de développement économique.

C'est ce que traduit la tendance qui s'est manifestée de manière continue depuis 10 ans vers une recherche croissante de qualité de l'habitat, du travail, des loisirs, des produits.

Témoignage confusément de ce besoin:

- la participation croissante des individus à des associations de protection de la nature et du cadre de vie (20.000 associations se sont ainsi créées en 1976)...
- le développement de la fréquentation des forêts, parcs naturels, espaces verts...
- l'orientation des demandes d'emploi vers des zones géographiques bénéficiant d'un cadre de vie satisfaisant et, parallèlement, la volonté de "vivre et travailler au pays",
- le développement des résidences secondaires, du temps de loisir, des activités de chasse, de pêche...
- la sensibilisation croissante de l'opinion publique à l'environnement. Les 3/4 des Français considèrent le cadre de vie comme très important 13/. Dès 1965 des enquêtes révélaient que, parmi les principaux atouts d'une région, la valeur des forêts ou des paysages était placée avant le potentiel industriel ou l'accessibilité. En 1973 un autre sondage montrait

TRADUCTION DES OBJECTIFS SPECIFIQUES EN OBJECTIFS RELATIFS A LA GESTION DES POLLUTIONS		OBJECTIFS SPECIFIQUES		OBJECTIFS GLOBAUX	
TECHNOLOGIES NOUVELLES	/	AUGMENTATION DE LA PIB	/	CROISSANCE	
LUTTE CONTRE LES POLLUTIONS PROVOCANT DES DOMMAGES ECONOMIQUES IMPORTANTS		EQUILIBRE DE LA BALANCE DES PAIEMENTS		/	ECONOMIQUE
DEVELOPPEMENT D'UNE INDUSTRIE ANTI-POLLUTION		MENAGEMENT DES RESSOURCES			/
EXPORTATION DE TECHNIQUES ANTI-POLLUTION		PROTECTION DU PATRIMOINE ECOLOGIQUE	/	STABILITE	
ECONOMIES D'ENERGIE ET DE MATIERES PREMIERES		MAINTIEN DES CONDITIONS DE SURVIE DE L'ESPECE HUMAINE		/	GLOBALE
LUTTE CONTRE LES POLLUANTS AYANT DES IMPACTS IRREVERSIBLES SUR LA QUALITE DES DIFFERENTS MILIEUX		AMELIORATION DES CONDITIONS DE TRAVAIL			/
LUTTE CONTRE LES POLLUANTS DESTRUCTEURS DE LA FAUNE ET DE LA FLORE		AMELIORATION DU CADRE DE VIE	/	L'ECOSYSTEME	
LUTTE CONTRE LES POLLUANTS AYANT UNE DIFFUSION ET DES EFFETS PLANETAIRES		SANTÉ		/	AMELIORATION
LUTTE CONTRE LES POLLUANTS AYANT DES EFFETS MUTAGENES		REDUCTION DES INEGALITES ENTRE GROUPEES SOCIAUX			/
LUTTE CONTRE LES NUISANCES EN MILIEU DE TRAVAIL		REDUCTION DES INEGALITES ENTRE REGIONS ET LIEUX D'HABITAT	/	CONDITIONS	
LUTTE CONTRE LES NUISANCES		INDEPENDANCE NATIONALE		/	DE VIE
REDUCTION DES POLLUANTS AYANT DES IMPACTS SUR LA SANTE		COOPERATION INTERNATIONALE	/		REDUCTION
REDUCTION DE L'EXPOSITION A LA POLLUTION DES GROUPEES SOCIAUX LES PLUS EXPOSEES		MAINTIEN DE LIEUX POUR OBSERVATIONS ET EXPERIMENTATION		/	DES
REDUCTION DE LA POLLUTION DANS LES ZONES LES PLUS POLLUEES			/		INEGALITES
LUTTE CONTRE LE GASPILLAGE				/	QUALITE
CONTROLE DES IMPORTATIONS DE POLLUTION		/	DES		
CONTROLE DES EXPORTATIONS DE POLLUTIONS			/	RELATIONS	
MAINTIEN DE L'INTEGRITE DE CERTAINES ZONES		/		INTERNATIONALES	
				CONNAISSANCE SCIENTIFIQUE	

UNE STRUCTURE D'OBJECTIFS POUR LA LUTTE CONTRE LES POLLUTIONS.

que 56% des Parisiens et 64% des banlieusards souhaiteraient vivre en dehors de l'agglomération parisienne.

Il est difficile de déterminer dans quelle mesure la crise a accéléré ou freiné cette évolution. Elle devrait constituer, semble-t-il, quoi qu'il en soit, une donnée de base du redéploiement en cours.

3. L'HARMONISATION SOUHAITEE ENTRE LES FORMES DU REDEPLOIEMENT ET LES OBJECTIFS D'ENVIRONNEMENT NE SERA POSSIBLE QU'A CERTAINES CONDITIONS

Quatre de ces conditions semblent être déterminantes:

- une plus grande rigueur dans l'évaluation des conséquences économiques des politiques du cadre de vie;
- le développement d'outils permettant d'apprécier les incidences sur l'environnement des stratégies de croissance;
- la définition de politiques préventives, ou anticipatoires, de l'environnement;
- la mise en place de procédures ou le renforcement de structures permettant concrètement une réflexion commune sur les objectifs de croissance et ceux d'environnement et facilitant l'harmonisation ou les arbitrages éventuels.

(a) Evaluer avec une plus grande rigueur les conséquences économiques des politiques d'environnement

Les évaluations faites à l'étranger indiquent que les répercussions des politiques de l'environnement sont globalement peu importantes mais que des problèmes peuvent se révéler à un niveau plus sectoriel en raison notamment d'une modification des conditions de compétitivité. Un modèle macro-économique est en cours d'élaboration pour tester ces hypothèses.

La recherche d'une plus grande rigueur, facilitée par l'élaboration de bilans écologiques d'entreprise, de comptes satellites de l'environnement et d'un budget de programme, devrait conduire à favoriser les actions peu coûteuses ayant un impact important ou à hiérarchiser les interventions publiques.

(b) Développer les outils d'analyse des incidences sur l'environnement des stratégies de croissance

Il est nécessaire de construire, au niveau des politiques nationales, un ensemble d'outils qui pourraient jouer le rôle, au niveau local, des études d'impact.

L'étude sur la prospective des pollutions constitue un premier pas dans ce sens, mais il manque encore des éléments équivalents de diagnostic pour les ressources naturelles, le cadre de vie, les budgets temps.

Un travail d'analyse approfondi devrait prendre comme hypothèse de départ les taux de croissance par branche et les localisations probables des activités qui sont envisagés dans les réflexions engagées sur le problème du redéploiement.

(c) Définir et favoriser des politiques préventives, ou anticipatoires d'environnement



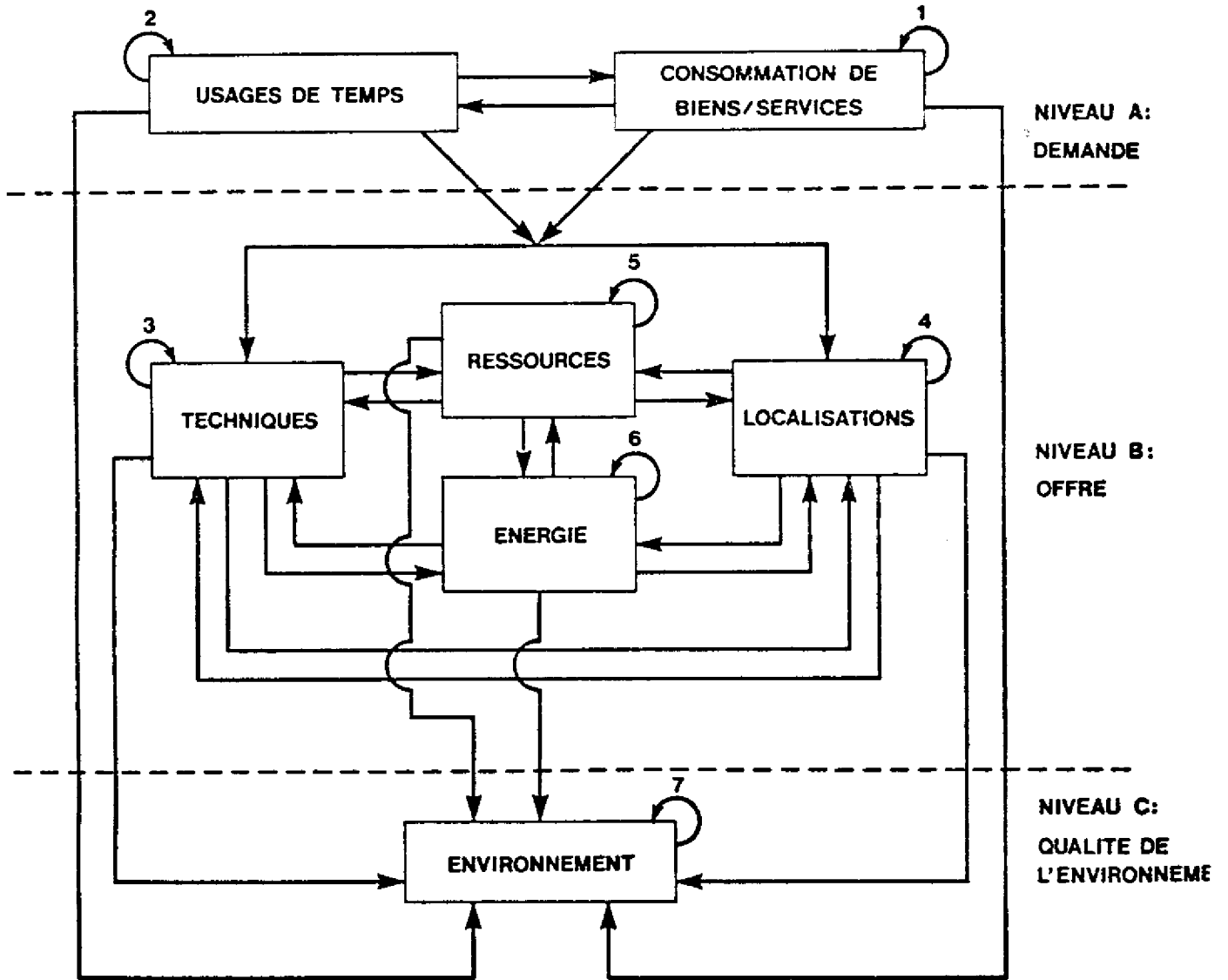
La finalité de ces politiques sera d'éviter que n'apparaissent des dégradations du cadre de vie, et donc de limiter les coûts de réparation des dommages futurs.

(A) Les instruments ou moyens d'une telle politique existent. Il s'agit de les mettre en oeuvre progressivement dans le cadre d'un projet à la fois économique et "environnemental" (ou qualitatif).

Citons notamment:

- l'amélioration des outils de prise en compte du risque et d'évaluation technologique;
  - le développement de l'information, de l'éducation et de la participation du public;
  - l'extension des politiques contractuelles (multiplication des contrats "cadre de vie, aménagement du temps"...);
  - l'émergence d'un droit de l'environnement;
  - la généralisation des systèmes économiques de contrôle de l'environnement (extension du principe pollueur-payeur, taxe à la pollution ajoutée ou à la surconsommation de ressources, valeurs d'options, système de prix fictif des ressources naturelles patrimoniales...);
  - la planification écologique et les études d'impact;
  - un contrôle plus efficace des utilisations du sol et des droits d'usage;
  - la systématisation des technologies en circuit fermé et de toutes formes de recyclage;
  - la décentralisation des décisions qui concernent des problèmes locaux;
  - l'internationalisation des réflexions et décisions qui concernent des problèmes régionaux ou mondiaux;
- (B) Trois conditions sont néanmoins indispensables pour qu'une telle politique préventive puisse émerger:
- la prise en compte du temps (allongement des perspectives),
  - la réalisation des principaux programmes de rattrapage engagés depuis 10 ans (notamment dans le domaine de l'eau),
  - la formalisation d'un projet cohérent sur le plan à la fois de l'environnement et des évolutions économiques (voir en annexe 1 un exemple de scénario favorable à l'amélioration à long terme de l'environnement). Seule la formalisation d'un tel projet devrait en effet permettre de tirer les conséquences pratiques de l'étroite imbrication qui existe entre le comportement des consommateurs, les emplois du temps ou modes de vie, les choix technologiques, les politiques énergétiques et industrielles, les politiques d'aménagement de l'espace et de localisation, d'une part, la gestion des ressources ou de l'environnement, de l'autre. Les interdépendances, schématisées dans la figure 2 de la page suivante, sont à la base de toute stratégie prospective ayant pour objectif l'intégration de la dimension environnement dans le développement.

# LES VARIABLES DE L'HARMONISATION ENTRE OBJECTIFS ECONOMIQUES ET D'ENVIRONNEMENT



Source : Ignacy SACHS ; environnement et développement : nouveaux concepts pour la formulation de politiques nationales et de coopération internationale. Environnement Canada et Agence Canadienne de développement international. Ottawa 1977.

ANNEXE I

UN EXEMPLE DE SCENARIO DE REDEPLOIEMENT  
INTEGRANT LES PREOCCUPATIONS D'ENVIRONNEMENT

LE SCENARIO I: CROISSANCE MOYENNE,  
STRUCTURE DE PRODUCTION DE CONSOMMATION  
ET D'ECHANGES NON TENDANCIELLES, SCENARIO CONTRASTE 14/

Caractéristiques d'ensemble

C'est le scénario "contrasté". Il se définit par la mise en oeuvre résolue de politiques multisectorielles telles que les économies d'énergie, les modifications technologiques, la réorientation des modes de consommation et la modification de la structure des échanges avec l'extérieur. Ces politiques conduisent entre autre, car c'est là un de leurs objectifs, à une diminution de la génération des polluants. La politique de réduction des nuisances n'est plus alors un élément isolé; elle est au contraire intégrée à la poursuite des autres objectifs du développement social et économique. Ce type de croissance se caractérise en 1995 par les aspects suivants:

- une stabilisation après 1980 des importations de produits pétroliers aux alentours de 120 Mtep par an,
- des modes de consommation modifiés dans le sens d'une augmentation de la part des consommations sociales et collectives, notamment en ce qui concerne les transports et d'une limitation de l'artificialisation des consommations (notamment alimentaires),
- des modes de production modifiés dans le sens d'une amélioration systématique des bilans matière et énergie par l'évolution des technologies et la mise en place de politiques de recyclage,
- une modification de la structure des échanges extérieurs dans le sens d'une amélioration du solde des biens d'équipement et des services,
- moins de 45 tranches nucléaires en fonctionnement en 1995, 15/
- une augmentation relative du tertiaire, des transports, des constructions électrique et automobile,
- une augmentation relative des consommations de télécommunication, transports collectifs, radio-photo et hygiène,
- la mise en place d'une certaine redistribution des activités au profit notamment de l'ouest et du sud-ouest; une croissance rapide des villes moyennes et petites.
- une légère augmentation (relative) de la consommation des ménages au détriment notamment de la FBCF productive.

Caractéristiques macro-économique

	Taux de croissance annuel moyen %
Consommation:	
- ménages	3,6
- administrations	0,0
- institutions financières	3,6
Emplois	
- ménages	2,2
- entreprises	3,1
- administrations	7,0
- institutions financières	
Exportations	5,8
Importations	5,8
Ressources	
P.I.B.	3,5

- 
- Les branches suivantes progressent de plus de 4,5% par an: tertiaire, constructions électrique, mécanique et automobile, transport,
  - On notera que la diminution très notable du nombre de tranches nucléaires en 1995 (45 au lieu de 80) permet de réaliser des investissements productifs dans d'autres secteurs de l'économie.

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- 1/ Voir le rapport sur la gestion du patrimoine naturel du 7ème Plan (Documentation française).
  - 2/ Voir la synthèse "Données économiques sur l'environnement en 1978" Ministère de l'Environnement et du Cadre de Vie - Délégation à la Qualité de la Vie, Septembre 1978.
  - 3/ Une des inégalités écologiques la plus importante résulte de la possibilité ou de l'impossibilité pour les individus de choisir leur lieu d'habitat et de travail.
  - 4/ Chaque année 50 à 100.000 hectares de terres agricoles sont utilisées pour les extensions urbaines ou les infrastructures.
  - 5/ M. AVIAM. Gestion des ressources naturelles et développement économique et social en France. Dans "Environnement et Réorientation de la croissance". Ministère de l'Environnement et du Cadre de Vie, Septembre 1978.
  - 6/ En 1978 environ 1% du PIB est consacré directement à l'amélioration et à la protection de l'environnement.

- 7/ Source: Avis sur la prise en compte de la politique de l'environnement dans les travaux d'élaboration du VIIème Plan. Séance du 9 et 10 Avril 1974, Journal Officiel du 28 mai 1974.
- 8/ Source: Politiques de gestion à long terme des pollutions. Ministère de la Culture et de l'Environnement - Sous-Direction des Programmes et des Etudes Economique, Décembre 1977. (R. BARRE, J.P. BORDET, A. DRACH, P. MIRENOWICZ, J. THEYS)
- 9/ Voir exemple, annexe I
- 10/ Etude des déterminants de la demande de ressources naturelles. Ministère de l'Environnement et du Cadre de Vie. Délégation à la Qualité de la Vie, ESP, (M. GODET, M. R. BARRE, M. J. THEYS)
- 11/ Voir le rapport du Haut Comité à l'Environnement sur les emplois qualitatifs (Ministère de l'Environnement et du Cadre de Vie, 1978)
- 12/ Source: B. LATARGET. Les dispositifs d'organisation du Cadre de Vie Rural. Assises Nationales de l'Habitat Rural, 15 décembre 1977 (PARIS).
- 13/ Source: Sondage de l'IFOP. (1977)
- 14/ Ce chiffre pourrait être réduit si on suppose un développement significatif de certaines énergies nouvelles en 1995.
- 15/ Source: Politiques de gestion à long terme des pollutions; op. cit.

## DISARMAMENT AND DEVELOPMENT

Report transmitted by the Government of Sweden

Prepared by Ms. Inga THORSSON\*

With the world's military expenditure approaching \$450 billion this year, it would be difficult in a discussion of alternative patterns of development to ignore the effects of the armament process. These effects reach far beyond resource implications. The armament process has a profound impact on the fabric of the societies within which it takes place. It leads eventually to what may be labelled an "armaments culture" and seriously distorted values. In the present situation, where annihilation of the adversary population as a concept plays an important part in the strategic thinking of the two super-powers, the individual is bound to develop feelings of helplessness that may result in general contempt for politics and, ultimately, reactionary societal attitudes.

It is evident that the present threats to industrialized societies, in the form of unemployment and inflation, are to a considerable extent related to the armament economy and its negative effects. With increasing speed, the armaments culture is spreading to the developing world. In this paper, the case will be made that the industrialized countries and the developing world have a common interest in the disarmament process.

Half the world's scientists and engineers are devoting themselves to further perfection of military machinery already capable of extinguishing mankind several times over. Expenditure on military research and development in the public sector alone is estimated at some \$30 billion. More public research funds are allocated to research in the military and space sectors than to all other social problems and concerns combined. The world's budget for military research is more than six times the size of its budget for the vitally important research in the field of energy. Behind these cold figures stands an elite of scientific, analytic and creative capacity, a capacity desperately needed for constructive purposes. 1/

With regard to "conventional" weapons, the proportion of world military spending that falls on the countries of the third world is expanding at an alarming rate. In constant 1975 dollars, the arms trade with the developing countries has increased from \$1.5 billion in 1960 to more than \$15 billion in 1978. During this period, in fixed prices, military spending increased fourteenfold in the Middle East, sixfold in Africa, fourfold in South Asia and threefold in the

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Far East. During the 1970s, the Middle East has been the largest regional purchaser of major weapons in the world, accounting for more than half of the total imported. 2/

Such are the priorities of the world, in spite of the fact that the world's military budget already equals the annual income of the poorer half of the population of the planet. It is more and more obvious that we are buying ourselves "greater and greater insecurity at a higher price". The armaments culture is nourished by economic activities to support this bad bargain.

A number of researchers have provided ample evidence of the effects in the United States of what they call "a long enduring war economy". 3/ For working people in general, inflation and unemployment have more than offset the income and employment gains in the military sector. These findings have been confirmed by a number of European researchers and research groups. 4/ The studies indicate that, in the United States, the diversion of research and development and capital resources from the civilian economy to the military sector has caused industries to fall behind in product design and production methods, as well as in productivity of labour and capital. However, 60 per cent of the United States population live in states which suffer a net loss of jobs every time the military budget expands. It is people working in service industries, teaching and other State and local government sectors, and even construction and non-durable goods production, who lose jobs when allocations for military purposes increase. On the basis of detailed statistical calculations it has been found that, in the early 1970s, the net annual average number of jobs lost as a result of the impact of military spending was 907,000 for the United States as a whole. 5/

Parallel to the effects on employment, the "war economy" also exerts pressure on costs and prices that is directly inflationary because of the practices of military procurement and the competitive nature of many military goods. A number of researchers have pursued this line of thinking. Even more costly, inflationary and potentially catastrophic is the continued escalation of the armaments race. 6/ The general view of economists is that military spending feeds the inflationary spiral in the economy.

It is often argued that the industrialized countries and the developing world have a common interest in the restructuring of the world economic order. The same is true in respect of disarmament, although the subject is as yet little explored and controversial.

The concept of national security is a pivotal point in the general disarmament discussion, and it takes on particular significance in the framework of North-South relations.

The arms race in all regions of the world is closely related to the East-West conflict in Europe. The continuous arms race between the two military blocs is a threat to civilization in the western hemisphere. At the same time the fabulous cost of this arms race constitute one of the main obstacles to giving sufficient attention to the problems of development in the third world. Although a direct link between disarmament and development may sometimes be hard to prove, it is presumably right to contend that defence spending represents the only reserve available for solving development as well as other economic problems in the world. 7/ But not until the East-West conflict has been considerably de-escalated will the industrialized world be able to consider North-South relations and the development needs of the third world on their merits. National security is not a goal in itself. Its ultimate purpose is to secure the

independence and sovereignty of the national State, the freedom of its citizens to develop economically, socially and culturally, and a life of dignity and well-being for all world citizens. 8/

In the 1970s it has become increasingly evident that national security cannot be equated with military power. The national States of the world are today facing entirely new kinds of challenges. Survival is no longer dependent only on war and peace; there are many other latent threats to national existence, such as the failing supply of energy and raw materials, disorder in economic and financial systems, environmental disasters and the spread of mass poverty. In the new world of interdependence, global security is the only way to ensure national security.

The tightening interrelationship between economic and ecological factors in industrialized as well as developing countries is becoming increasingly evident. It has also been noted that the threat to security in the imminent future may arise less from the relationship of nation to nation, and more from the relationship of man to nature. 9/

In the search for solutions to all these problems there is clearly a community of interest between North and South. It is rarely recognized in political practice, however. The relations between industrialized and developing countries clearly suffer from the supposed opposition of interests, as reflected in the North-South dialogue. Continued failure to organize a more equitable distribution of the economic resources of the world may result in worsening political tension and very real threats to the productive systems of the industrialized countries.

There were hopes that last year's special session of the United Nations General Assembly on disarmament would provide a basis for efforts by the world community to rectify the present abnormal situation. It turned out that the relationship between disarmament and development was one of the few areas in which the session could agree on a programme for action in the immediate future and the Assembly endorsed the framework and terms of reference for a study. Over the years, much valuable research has been carried out, within the framework of the United Nations, on the economic and social consequences of both the arms race and disarmament. Results so far have confirmed the need for further study and analysis with the aim of formulating practical political recommendations of direct concern to the Governments of the United Nations Member States.

The guidelines for the new study underline that it is important to define the role of disarmament in the establishment of a new international economic order. The study is further required to be forward-looking and policy-oriented and place special weight on the desirability and feasibility of a reallocation of resources to the benefit of the developing countries. The findings are to serve as a basis for decisions on concrete action by governments in connexion with the release of resources now being used for military purposes. The development of a comprehensive and reliable data base will be a prerequisite for the analysis of realistic options for the future.

Three main areas will be investigated:

(a) The present use of real resources, such as labour and scientific and industrial research and development capabilities; production facilities and raw materials used for military purposes; and, in particular, the opportunity costs of current resource allocation;



(b) The effects of a continuing arms race on the supply of, and demand for, those resources; and the effects of the implementation of disarmament measures on economic and social development, e.g. in terms of needs and supply of research and development capacity, employment and production in general; and

(c) Problems associated with the reallocation of real resources released through disarmament measures for purposes directly related to economic and social development, including practical methods for the transfer of resources to the developing countries. In this context, immediate questions of readjustment in employment and the structure of demand for resources will have to be considered. And with regard to the actual transfer of resources, the study of time factors will play an important role.

The research group will report on its three years of work to the General Assembly in 1981 through the Secretary-General.

Many factors have contributed to the present predicament. In a comprehensive approach to the problems it should be clearly spelled out that the countries of the industrialized world have set a bad example, which has led to the spread of the armaments culture world-wide. Alternative development patterns and lifestyles must provide for a drastic change in the concept of "security" and a change in views on how to safeguard national and global security, i.e. the survival of mankind. This is in the mutual interest of all.

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- 1/ Indicated in a survey of World Military and Social Expenditures by Ruth Leger Sivard.
  - 2/ Ibid.
  - 3/ Notably Seymour Melman, of Columbia University, New York, and Marion Anderson, of the Public Interest Research Group in Michigan.
  - 4/ Ulrich Albrecht, of the Freie Universität Berlin, Federal Republic of Germany, and a number of European researchers and research groups.
  - 5/ Marion Anderson, of the Public Interest Research Group in Michigan.
  - 6/ R. Triffin, Partners in Tomorrow (Dutton, 1978).
  - 7/ V. Leontief.
  - 8/ "Reshaping the international order," report submitted to the Club of Rome, October 1976.
  - 9/ Lester Brown, "Redefining national security", paper published by the Worldwatch Institute, Washington.

THE NORTH-SOUTH DIALOGUE AND ITS RELEVANCE TO  
DEVELOPMENT ALTERNATIVES IN THE ECE REGION

Paper prepared by the secretariat of the  
UNITED NATIONS CONFERENCE ON TRADE AND DEVELOPMENT

Summary

I. INTRODUCTION

As Governments in the ECE region grapple with the short-run political repercussions of the growing malaise in their national economies, problems of international inequality and under-development are in danger of being shunted aside. It has been widely agreed, however, that a relationship exists between the current economic crisis in developed countries and the issues that form the subject of the North-South dialogue. This paper considers some of the ways in which these issues relate to development alternatives and environmental constraints in the ECE region.

II. RESTRUCTURING THE WORLD ECONOMY

The distinguishing feature of the fifth session of UNCTAD was that it provided the first forum for discussion of proposals for action to bring about structural change in international relations within the framework of the Declaration and Programme of Action for the Establishment of a New International Economic Order and the International Development Strategy for the 1980s. The concept of structural change is founded on the belief of developing countries that the development process requires not simply the transfer of resources but also changes in some of the mechanisms and systems that now govern international economic relations. Structural change is being discussed in particular in the context of commodity markets and commodity trade, industrialization and trade in manufactures, the international monetary and financial systems, the transfer and development of technology and collective self-reliance.

III. IMPLICATIONS FOR DEVELOPMENT ALTERNATIVES IN ECE COUNTRIES

As a means of clarifying the development options for Governments in the ECE region, the following paragraphs suggest four different ways of looking at the hypothetical impact of restructuring, along the lines advocated by the Group of 77.

A. "Zero-sum" versus "non-zero-sum" effects

All proposed reforms that have been considered in the continuing North-South dialogue are obviously intended in some sense to make developing countries better off. Opposition on the part of many governments of developed countries stems from their perception of a "zero-sum" situation, in which the impact of

the reforms will necessarily be adverse for their own countries.

It is true that the notion of redistribution, i.e. the transfer of income, political power, access to resources, etc. from rich to poor countries, is at least implicit in such objectives as the improvement of the terms of trade of developing countries, an increase in their voting rights in the IMF and strengthening of their bargaining power in technology transfer transactions. The response of the developing countries is that some types of redistribution bring with them benefits to the developed countries - a point which is developed in section C below - and that a significant number of the structural changes in the world economy will clearly result in direct advantages for both the North and the South, as a result of increasing economic interdependence in the world. An example is furnished by the agreements on stabilization of commodity prices around the market trend, which protects both supplying and consuming countries from the adverse effects of sudden fluctuations. Other examples are the measures proposed for reform of the international monetary and financial systems. This reform has the following objectives: to curb inflation in both developed and developing countries; to assure the necessary finance for maintaining the flow of international trade; and to minimize or prevent the universally destabilizing effects of defaults by developing countries on servicing their external debt.

Redeployment of industry from developed to developing countries, as a result of the restructuring of international trade and technological relations, tends to diminish the adverse effects of environmental pollution in the developed countries without a commensurate increase in such effects in developing countries, because of the generally greater absorption capacity of an environment that has not yet experienced industrialization. A shift back from synthetics to natural, renewable raw material sources will also have favourable implications.

#### B. Short-term versus long-term effects

Governments of developed countries, in particular market economy countries, are usually sensitive to the potential domestic political repercussions of the reduction in foreign exchange receipts and the industrial dislocation and job displacement that would result from implementation of the proposals for restructuring put forward by the developing countries. Developing country spokesmen argue, however, that these are short-run or temporary costs which will be offset by corresponding benefits to their own economies; and that the costs in question could be mitigated by proper staging of the necessary structural changes combined with retraining of labour and other measures designed to ease the adjustment process.

In the long-term perspective, the economic case for restructuring rests on the argument that the whole world would benefit from the higher real output and reduced inflationary pressures that would result from a shift in productive resources from less efficient to more efficient sectors in the developed countries, and from the shift of productive capacity from developed to developing countries in specific activities where the latter have a comparative advantage. In a more dynamic sense, structural adaptation is consistent with a development strategy which gives high priority to economic growth in the ECE countries. This is in contrast with the present defensive strategy of some governments of developed countries, which are adopting neo-protectionist and other measures to combat temporary unemployment and prolong the life of obsolete industries. It is also in contrast with the neo-Malthusian strategy that deliberately seeks to slow down or halt growth in the developed countries in order to protect their own environment and "quality of life", forgetting about the rest of the world. The weakness of such approaches is that they tend to

ignore existing world economic interdependence, i.e. the dependence of developing countries on access to ECE markets for their manufactured exports and the dependence of ECE countries on access to sources of raw materials in developing countries. In the long run, the high growth model appears to be the most viable one, provided that adjustments are made to moderate the increases in real costs of energy, raw materials and environmental protection.

#### C. Direct versus indirect effects

Even if the redistribution effects of the structural change in international relations proposed by the developing countries failed to materialize, there would be indirect effects that would be highly favourable to development in the already developed countries. The acceleration of economic growth in developing countries that would be part of the redistribution policy is a prerequisite for expanding the markets for exports from developed countries. There is evidence that these markets are becoming increasingly important for the functioning of the ECE market economy countries. For example, intensified economic co-operation among developing countries based on the principle of collective self-reliance will strengthen mutual relations and divert trade from the rest of the world. However, to the extent that this intensified co-operation accelerates growth and leads to specialization and economies of scale in new economic activities, it will have the indirect long-term effect of expanding trade opportunities between developing and developed countries.

#### D. Micro-economic versus macro-economic effects

A fourth and final way of looking at the impact of the international restructuring is to compare its implications for individual firms, industries or other interest groups with those for the country as a whole. The establishment of a new international economic order will have effect on countries within the ECE region, particularly short-run effects, that are specific to individual sectors or subsectors of their economies. Certain industries, such as steel, footwear, textiles, clothing, shipbuilding, etc., are more vulnerable to exports from developing countries than others. Sectors producing capital goods for the consumer goods industry might be adversely affected by the desire of developing countries to build their own manufacturing equipment and thus strengthen their technological self-reliance. The history of industrialization in the developed countries has demonstrated, however, that economic growth is accompanied by increased diversification and specialization and that two countries will often export and import products belonging to the same subsector. The same thing is likely to happen within the framework of North-South relations.

In the long run, the largest benefits from a more open economy in the countries of the ECE region will go to the citizens in their capacity of consumers. But consumers are generally under-represented in the political process. There are, however, an increasing number of scattered non-governmental organizations (NGOs) - representing students, religious groups, women's liberation movements, associations for peace and environmental protection, etc. - which have demonstrated keen awareness of the need to question existing patterns of development in the developed world and develop greater understanding for the aspirations of third world citizens. The ability of NGOs to get a sound grasp of the major issues in the North-South dialogue should not be underestimated. They can inform public opinion about the relevance of these issues to the continuing debate in ECE countries on the long-term compatibility between economic and social development and improvement in environmental quality. In this context, there is a need for measures that would permit more active participation of NGOs in the political process at both the national and international levels.

## THE ECOLOGICAL RELEVANCE OF CONSUMPTION STYLE

Report transmitted by the  
Scientific Committee of Problems of the Environment (SCOPE)  
of the International Council of Scientific Unions (ICSU)

Prepared by Ms. L. UUSITALO

### I. INTRODUCTION

In theoretical writing on environmental policy, the reader is generally confronted with two opposite approaches. The one relies basically on the ability of economic incentives, in particular the price system, to channel behaviour in the direction desired (cf. Baumol and Oates, 1979). The other tends to stress the possibilities of promoting change in preferences and behaviour through persuasion and socio-psychological group processes. 1/ The present paper attempts to relate the ecological problems of consumption to a third, more basic element: the structural properties of society, e.g. its economic, technological and cultural development. Because of the special character of the variable examined, interest is focused on the analysis and interpretation of phenomena that could provide a basis for forecasting and control.

In the literature of different disciplines a rather confused impression emerges of terms like "environment", "ecological", etc. This paper will consider environmental or ecological problems solely from a "human welfare" point of view, and the terms "environmental" and "ecological" will be treated as synonymous, both referring to the physical surroundings of people.

### II. THE PROBLEM AREA: RELATING PRIVATE CONSUMPTION TO ECOLOGICAL PROBLEMS

Research in the field of consumer behaviour has long been dominated by interest in consumer's market behaviour, that is, in their buying of products and services. The focus was on how to increase total demand (the level of material satisfaction) or specific product choices. This line of research was consistent with the ideology of economic growth; it was encouraged primarily by the need of production and marketing agents in the private sector of the economy to better predict and control buying behaviour.

The first impulses for change came from social scientists, who critically examined the values of the growth ideology and the narrow scope of material welfare goals. Mass marketing and mass consumption, with all their negative consequences, were even more rigorously examined by the consumer movement. Within the framework of consumer policy, some regulatory interventions in marketing practices were developed in most countries. The independence of individual consumers was further stressed by concentrating the policy measures on the provision of more adequate information to consumers. However, there has been much discussion of ways to define the content of this information which

could range from simple descriptions of products to the extensive dissemination of knowledge on social values and goals and how they relate to consumer behaviour. This touches on a totally new problem area in consumption research, namely the role of private consumption, or individual consumers, as a factor with impact on the physical environment. Research in this area has grown along with the recognition of limits to economic growth. Stimuli for research now come mainly from government agencies that are responsible for long-term economic planning and welfare development.

As many aspects of consumer behaviour are now considered harmful and have to be changed, research is no longer restricted to market behaviour, but also pays attention to the consequences of that behaviour for the environment. The differences in ultimate goals between consumer policy and environmental policy and resource planning arise mainly from differences in time horizons. Consumer policy is interested in increasing the economic rationality of individual consumer decisions, whereas environmental policy also has to take collective welfare into account. Consumer policy research has already questioned the assumptions underlying the notion of rational individual choice; it will now have to question "rational" individual utility maximizing behaviour as a whole.

There are many problems connected with the ecological impact of private consumption that call for research. Although it is generally admitted that environmentally relevant consumer behaviour is conditioned by many structural factors (e.g. technological, social and ideological), the relation of these factors to individual or group behaviour has not been clarified. Furthermore, it is believed that attitudes at the personal level - such as awareness of environmental problems and belief in the possibility of changing the situation - are important factors when planning for change.

The analysis of environmentally relevant ("positive" or "negative") behaviour, and the development of alternative strategies to modify it, presuppose that the content of that behaviour is clear. The interdependences in the area of consumption make it necessary to study not only specific choices or activities but also total patterns of behaviour and their relevance from an environmental point of view.

### III. THEORETICAL FRAMEWORK FOR STUDYING THE ENVIRONMENTAL IMPACT OF CONSUMPTION

#### A. Problems of a pure economic approach

##### 1 Consumption externalities and economic incentives

Environmental effects caused by production or consumption are usually treated in economic literature as so-called external economies or diseconomies. By "externalities" are meant social benefits and costs which do not affect the economic outcome of decisions and therefore are not taken into account in the calculations of decision makers.

Normally, no market (i.e., no economic reason) exists for measures contributing to the conservation of the environment. However, this kind of market can be created - at least on the production side - by means of effluent charges (taxes) on undesirable behaviour like pollution or subsidies for avoiding such behaviour. The environmental tax will be treated like any other cost by the firm. In the case of subsidies the firm has a new "product", non-polluting behaviour, which it "sells" on the market. Of course, legislative measures can be used more directly, for example by setting standards for, or prohibiting,

certain kinds of behaviour. 2/ Usually a combination of methods is suggested, such as setting certain minimum standards and also creating a market for discharge permits.

In principle, similar measures can be applied in the case of consumption "externalities", if a parallel is drawn between the decision-making of a firm and that of a household. However, as the following examples show, creating a market for "externalities" is not very simple. Usually problems will arise in defining property rights. For instance, the use of subsidies implies that the polluter has exclusive rights to, for instance, land, water and air, whereas taxation measures imply that they are effectively society's property. However, in many cases, the long-term existence of, say, an industrial plant at a lake has made the agent behave as if he really had property rights to the water. In the case of land-owning farmers, the lack of well-defined property rights has often caused serious conflict between farmers and environmentalists. The argument may centre, for instance, on the land owner's alleged right to drain a moor or deforest an area which has been declared nationally important because of its rich and precious fauna and flora. Unfortunately, the ideas of an individual property owner rarely converge with those of public opinion. In making a decision the farmer may consider environmental effects as "externalities" and try to secure only his own private economic interests. Another example is the damage to the livelihoods of local fishermen caused by power plants. In this case, however, there are rather clearly defined interests and, in principle, it is possible to reach agreement, e.g., by compensating the weaker party for its losses.

When environmental problems arise, property rights have usually not been defined. If there are only a few interest groups, the property rights may be established or distributed between them so that an environmentally favourable solution can be reached by collective agreement. However, this is not always the case. It is usually difficult to define the distribution of environmental costs and benefits among the various interests. Society's property rights are fairly obvious in the case of free commodities, but how can environmental deterioration be apportioned to different types of consumption activities for taxation purposes? To build up a control system also seems a complicated and costly task.

Consumers usually treat collective goods as if they had exclusive property rights to them. For example, a car owner often extends his property rights over the car to include the right to do whatever he likes with his property. At the same time "air" is treated as a collective good and the costs of pollution caused by automobile emissions are regarded as external to individual consumption decisions. Even if the consumer is aware of the environmental problem connected with a given commodity - which is not always the case - he would probably consider his own activities as marginal to the solution of the problem and, for the sake of private convenience, would continue his former behaviour. 3/

Even if a proper charge (such as tax) for all types of environmentally relevant consumption activities could be imposed, the effectiveness of economic incentives would depend on the price elasticity of the commodities in question. Furthermore, the use of price increases requires that consumers should be price-conscious in respect of these commodities. Numerous consumption items account for such a small share of the household budget that consumers ignore minor price changes. In fact, deliberate product differentiation by means of brand advertising has become such a dominant marketing practice that, in many cases, consumers are no longer able to compare prices effectively. Often, strong brand

loyalty has also developed, thus simplifying the decision-making of consumers but impeding changes of brand even where desirable. Continuous inflation can also lessen the price consciousness of consumers.

The more a commodity is considered a "necessity", the less demand will be affected by price increases. This also holds true when economic incentives are used in the form of subsidies (e.g. loans, premiums, refunds) in order to encourage environmentally sound behaviour. It can be argued, for example, that many household durables, and in some countries even the car, have become "necessities" in the eyes of most families, and that price increases, are therefore politically impractical, because they have an impact on use only in the lowest income groups. In other groups, in the short term, price increases lead only to a re-allocation of household expenditure.

In addition to the problem of the effectiveness of economic incentives, which depends on price elasticities and price consciousness, another problem arises. Environmental taxes in the form of price increases will have distributional effects which are often regressive (cf. Schnaiberg, 1975; Stucker, 1977). More restrictive measures such as rationing of a supply of the commodity, have of course a similar effect. Nevertheless, environmental problems cannot be discussed without taking into account the social problem of equity.

## 2. Interdependent preferences

Equality issues can play an important role through the consumers' perception of who benefits from environmental conservation, although such a perception may not be the main factor determining people's willingness to contribute. If the fruits of "environmentally responsible" behaviour will be enjoyed by the same classes as before, less privileged people will hardly see any reason to save energy or natural beauty for either present or future generations (Stretton, 1976). In this way, for example, the social acceptability of so-called "planned scarcity" should be greatest in a society where recent income distribution policy has been most progressive (Schnaiberg, 1975). In comparative international studies, it has been found that people are subjectively more satisfied, even with a comparatively low level of consumption, in societies with equal income distribution than in societies where income differences are large and comparison between different groups is easy (Strümpel, 1976).

Consumers' perception of fair distribution of the costs of environmental conservation is also important; the idea is mostly that "solving environmental problems requires government measures" (Helgesen, 1976). Consumers feel that government intervention is needed to influence the business sector, which is to be blamed for environmental deterioration because of its high energy use, its neglect of environmental aspects in the design of products and its handling of polluting by-products.

When environmentally responsible behaviour requires the consumer to make a sacrifice, he usually wants to be sure that others will change their behaviour too. It is felt, therefore, that some common control is needed. This is a basic dilemma of economic choice theory - often expressed as the "prisoners' dilemma" - which stresses the interdependence of people's choices and discredits the individualistic rational calculus. <sup>4/</sup> A "rational" choice, in respect of the maximization of the self-interest of an individual, may thus lead to a worse outcome from the viewpoint of a person's true preferences than a "non-rational" choice (cf. Sen, 1973). The "prisoners' dilemma" concept has often served to show that mutual, collective contracts are necessary.



The "prisoners' dilemma" can also be applied to the analysis of externalities. The behavioural pattern that would serve each party best in terms of his true preferences is not the same as the behavioural pattern that would reveal those preferences. Thus, the philosophy of the revealed preference approach essentially underplays the fact that man is a social being and that his choices are not rigidly bound to his own preferences. Consequently, the "as if" preference (derived from behaviour) cannot be interpreted as pointing in the direction of individual welfare. In particular, basing normative criteria on these "as if" preferences gives rise to difficulties (Sen, 1973, p. 254). This has to be taken into account when deriving normative criteria for environmental behaviour.

The problem may also be viewed from a positive angle: the possibility of seeking other means to influence human behaviour than economic incentives. These means may be more substantial than is typically assumed in economic literature. There are concrete examples of externalities of consumption behaviour which show the difficulty of interpreting individual preferences on the basis of observations of behaviour (Sen, 1973, p. 254). Let us suppose there are strong environmental reasons for using glass bottles (rather than steel cans) and for persuading consumers to return the bottles. Small financial incentives may be inadequate if the consumers neither worry about the environment nor need the deposit money. From the point of view of any individual, the harm to the environment is minimal. Being generally interested in the environment, but too lazy to return bottles, the individual is best off if everyone but him returns the bottles; he is next best off if everyone returns the bottles, including himself; he is in the third best position if no one returns them; and he is worst off if he alone does so. If others feel the same, a prisoners' dilemma situation arises in which people will not return bottles but at the same time prefer that everyone should return bottles rather than no one.

To solve the problem, people may be persuaded by means of legislative measures or ethical and moral rhetoric to believe that non-returning is highly irresponsible. Additional incentives may be used, such as penalizing non-return and rewarding return. However, where it is very difficult to control people's behaviour, as in the case of littering, the use of direct incentives is not practicable.

If people really return bottles, the interpretation of "underlying" preferences is not so simple either. There may be several reasons for this behaviour: the person uses returnable bottles simply because he likes glass, and not for environmental reasons (see, e.g., Helgesen, 1976); he is worried about the welfare of others; he recognizes that non-returning is "wrong" and is afraid of social sanctions; he feels morally better off acting in a socially responsible way (subjective personal norm).

### 3. Summary

The following conclusions can be drawn from the study of consumption externalities. It is difficult to create "markets" for environmental concern by using only economic incentives: either no clear property rights can be established or, if they are established (e.g., by government), violation is still difficult to control. Economic incentives may also prove insufficient, when price elasticity is low or no clear price consciousness exists. Furthermore, it is often undesirable to use economic incentives because of their regressive distributional effects. It seems, however, that policies based on economic incentives do not fully take advantage of other measures which could be

used to establish environmentally important norms of behaviour. The economic theory of externalities therefore needs to be supplemented with a theory of the interdependences between people's choices and the social and institutional influences affecting them.

It has been shown that people's welfare goals do not always tally with the preferences revealed by their behaviour. By rational, utility-maximizing individual behaviour, people may well act against their own welfare, as exemplified by the "prisoners" dilemma". Therefore normative criteria cannot be derived from prevailing behavioural patterns. The study of actual behaviour has to be combined with the study of attitudes in what is known as a "way of life" approach. This means that each society has to define objective "normative" welfare criteria which go beyond what people themselves express. In such goal-setting, welfare should be interpreted in a broad sense and include indicators of environmental quality. There is also a need to study the extent to which such components can compensate or substitute for other aspects of welfare.

## B. Proposing a "way of life" approach

### 1. Cultural and social influences on behaviour

In contrast to the economic models, the "way of life" approaches place more emphasis on social and cultural constraints on behaviour. They also tend to underline the "wholeness" of human activities and needs. The interdependence of human actions is stressed in two ways: interdependence with the behaviour of other people, via similar cultural values and norms; and interdependence of various sets of activities in different spheres of life, such as work, consumption, family and friends, etc.

The concept of "way of life" is broadly defined as comprising the "whole" of the activities and interests of a group of persons exposed to specific living conditions. It is thus assumed that systematic differences in activities and interests forming different ways of life are related to people's living conditions; the latter, in turn, are determined by the structural properties of society (e.g., the stage of economic and technological development, economic relations and dominant social values) (see figure 1).

In the "way of life" approach, it is also possible to emphasize changes in living conditions and structural properties of society which take place as a result of the activities of people themselves (feed back loops in figure 1). The model is not to be understood as a "deterministic" model, but rather as a model of continuous emancipatory change.

The category of "activity" is very central, because activity is assumed to have a mediating, subsuming role between objective and subjective elements of behaviour. It is assumed that activity is the natural link between the observed conditions of the person and his true subjective views. Thus, in a "way of life" approach, the focus is not only on the prerequisites of people's well-being (resources, welfare indicators), but also on how people act and in which way their activities constitute their well-being (see Roos, 1978).

Research in this area has concentrated on the study of differences and changes in the way of life and their structural causes (e.g., Eskola, Krotteinen and Roos, 1978; Roos and Roos, 1978; Haranne and Sicinski, 1978; Uusitalo, 1977, a and b; Zetterberg, 1977). Findings of previous research on similar problems can

Figure 1 Way of life and its formation

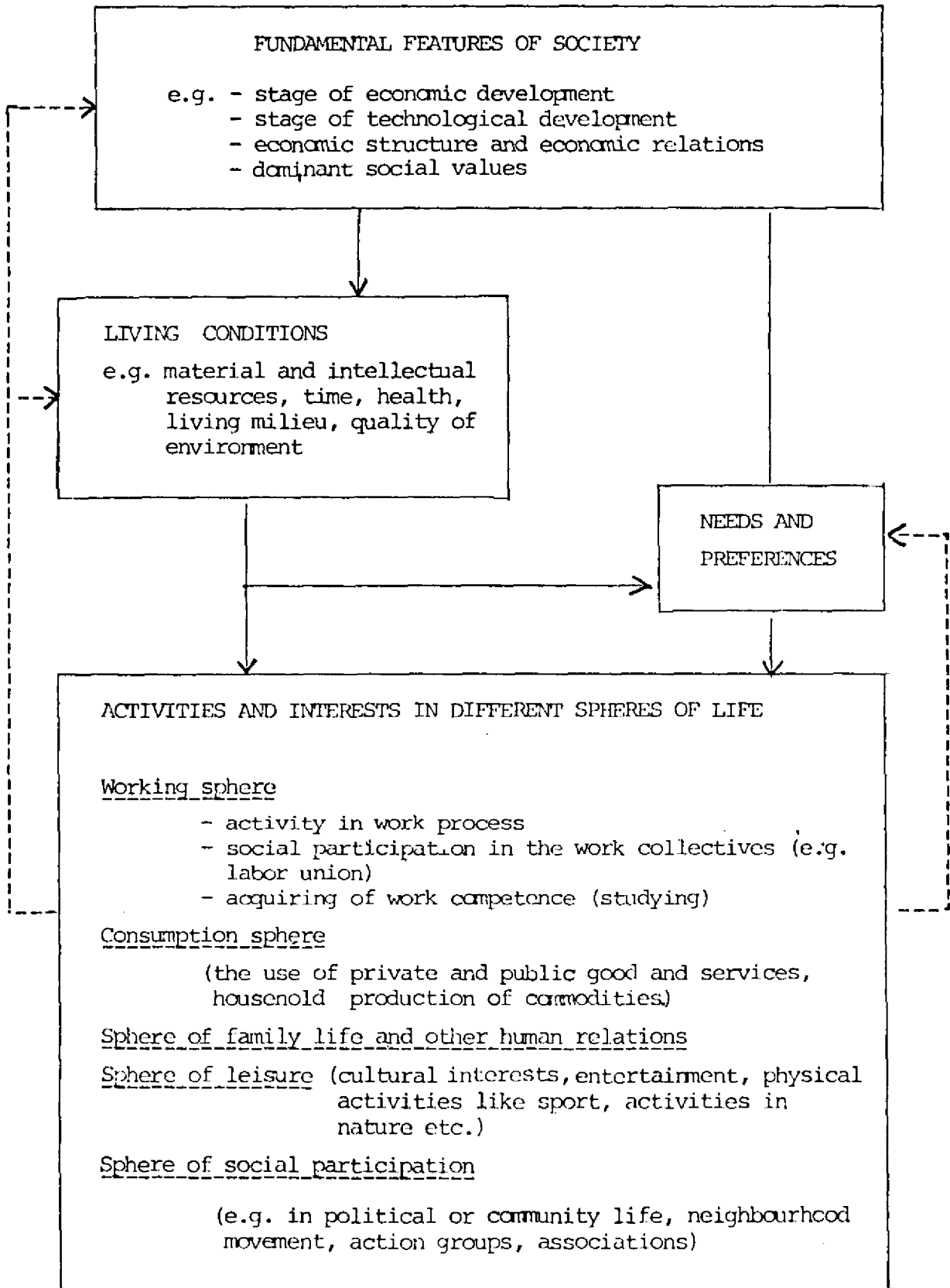


Figure 1  
Way of life and its formation

FUNDAMENTAL FEATURES OF SOCIETY

- e.g. - stage of economic development  
- stage of technological development  
- economic structure and economic relations  
- dominant social values

LIVING CONDITIONS

- e.g. material and intellectual  
resources, time, health,  
social and physical surroundings  
quality of environment

NEEDS AND  
PREFERENCES

ACTIVITIES AND INTERESTS IN DIFFERENT SPHERES OF LIFE

Working sphere

- activity in work process
- social participation in the work collectives (e.g. labour union)
- acquiring work competence (study)

Consumption sphere

(the use of private and public goods and services,  
household production of commodities)

Sphere of family life and other human relations

Sphere of leisure (cultural interests, entertainment, physical  
activities like sports, nature related  
activities, etc.)

Sphere of social participation

(e.g. in political or community life, neighbourhood  
movements, action groups, associations)

be found in comparative studies of welfare (e.g. Allardt, 1976) or time use (e.g., Szalai, 1972). An ideal "way of life" concept may be used for a critique of existing ways of life or for constructing ideal models of behaviour (e.g., Lefebvre, 1976).

Ideal models usually concentrate on people's relations to "self" and society, trying to show the relationship between social processes and alienation. Man's relationship with nature is a less discussed subject, but it is a component in some welfare concepts used for studying "quality of life" based on contacts with other people, society and nature.

2. The relevance of the study of consumption as one expression of the "way of life"

The study of consumption may furnish some insight into the total way of life because it is connected with so many activities in other spheres, such as leisure and family life; this subconcept may be called consumption style. Consumption fulfils many functions both at the social and at the individual level, including symbolic functions. It is the most important sphere of life from the viewpoint of environmental protection, because most related activities have a direct effect on the quality of the environment.

The usual practice is to study how people's activities are influenced by their living conditions. However, it is equally possible to reverse the scheme in figure 1 and study how people's living conditions - in this case, the quality of the environment - are influenced by their activities in different spheres of life:

WAY OF LIFE	LIVING CONDITIONS
e.g., consumption style	e.g., quality of environment

It is equally possible to emphasize the emancipatory aspects, as shown in the figure below:

Figure 2  
An "emancipatory" model of way of life

CHANGES IN THE WAY OF LIFE, e.g.,	FUNDAMENTAL FEATURES OF SOCIETY, e.g.,
- changes in consumption style	changes in technological development and dominant values
- increased social participation in environmental programmes	
- changes in labour union goals	
- changes in leisure interests	
- changes in the emphasis on human and social relations as opposed to material welfare	
	LIVING CONDITIONS, e.g.,
	changes in the quality of the environment

From a policy point of view, there are also good reasons for connecting the study of environmental problems with models of way of life and consumption style. This approach makes it easier to understand why certain measures, like economic incentives, do not always work as expected. Policy measures are often directed only to one aspect of a behavioural pattern, whereas the whole pattern should be the target of change. It can thus be asked whether it is realistic to believe that consumers can be prevented from buying and using certain

environmentally harmful products as long as the existing consumption values and ways of life prevail.

Even if only one specific element of consumption (type of activity) were a target of change, its role in the total way of life must be understood, before it can be replaced by some other kind of activity which serves the same function for the consumer. This refers to the interconnexion between activities in different life spheres.

From the policy viewpoint, it is also important to relate people's behavioural patterns to the background of their living conditions and cultural and social surroundings. This calls in question the real possibility of changing consumption patterns, e.g., by means of information, without simultaneous change in the planning, production and marketing of environmentally "bad" commodities.

It is probably true that there are few instrumental variables that could be changed rapidly in order to produce immediate effects on environmentally relevant consumption behaviour (unless strongly restrictive measures were used). However, for long-term environmental planning, it is necessary to establish the causal relationships between changes in technology, cultural values and living conditions, on the one hand, and environmentally relevant changes in consumption patterns, on the other.

As economic theory makes clear, most products include both positive and negative utility. Similarly, all consumption styles probably include both environmentally detrimental and favourable (or neutral) aspects. This explains why the search for a special type of consumer, that is, an "ecologically responsible" consumer and his social characteristics has been rather frustrating.

The above-mentioned research has usually been conducted in respect of environmental concerns where it is easier to find positive relationships, e.g. between ecological attitudes and such demographic factors as age and educational level, even if the results are sometimes controversial. (see Ester, 1978). On the whole, however, demographic factors are not very useful in explaining differences in environmental concern (Van Liere and Dunlap, 1979).

Even fewer studies have been able to establish a satisfactory correlation between environmentally sound behaviour and background factors. It is probably difficult to find a statistical correlation because this kind of behaviour, even in a narrow sense, is still incidental rather than broadly adopted by consumers (Ester, 1978).

Psychological rather than socio-demographic variables have been found to be good predictors, in the case of both ecological attitudes and ecologically responsible behaviour. "Awareness of ecological problems", "perceived consumer effectiveness" and "acceptance of own responsibility" have been stated as necessary prerequisites for socially and ecologically responsible behaviour. Separately none of them seems to be sufficient in order to promote behavioural change, however. (See Van Raaij, 1978, a review of related studies).

From a consumer policy viewpoint, it is important to note that the consumer cannot be made aware of ecological problems or feel personally responsible for them if he thinks that his own activities are of marginal importance as long as other people do not change their behaviour. In other words, it is again a "prisoners' dilemma".

### 3. Summary

The discussion above prompts to the following considerations:

Ecologically relevant behaviour seem to be determined by the dominant social and cultural patterns of behaviour - ways of life, consumption styles - rather than by independent, individual choices of consumers. The ecologically relevant elements of these patterns should therefore be identified and either strengthened or replaced by other types of behaviour.

Economic incentives alone will probably not be sufficient to stimulate change, especially if certain patterns of behaviour have gained symbolic significance. The whole value system behind the behavioural patterns must therefore be examined in conjunction with the supporting social and technological conditions. Changes in the patterns often presuppose a change in the supply of products as well as in technological, institutional and legal arrangements.

The "way of life" approach gives an insight into the reasons for certain behavioural patterns and also provides opportunities for study of the feedback influences of different activities on living conditions, e.g. the impact of consumption style on the quality of the individual's environment. It thus permits the construction of models of emancipatory change.

#### IV. THE ECOLOGICAL RELEVANCE OF CONSUMPTION STYLE

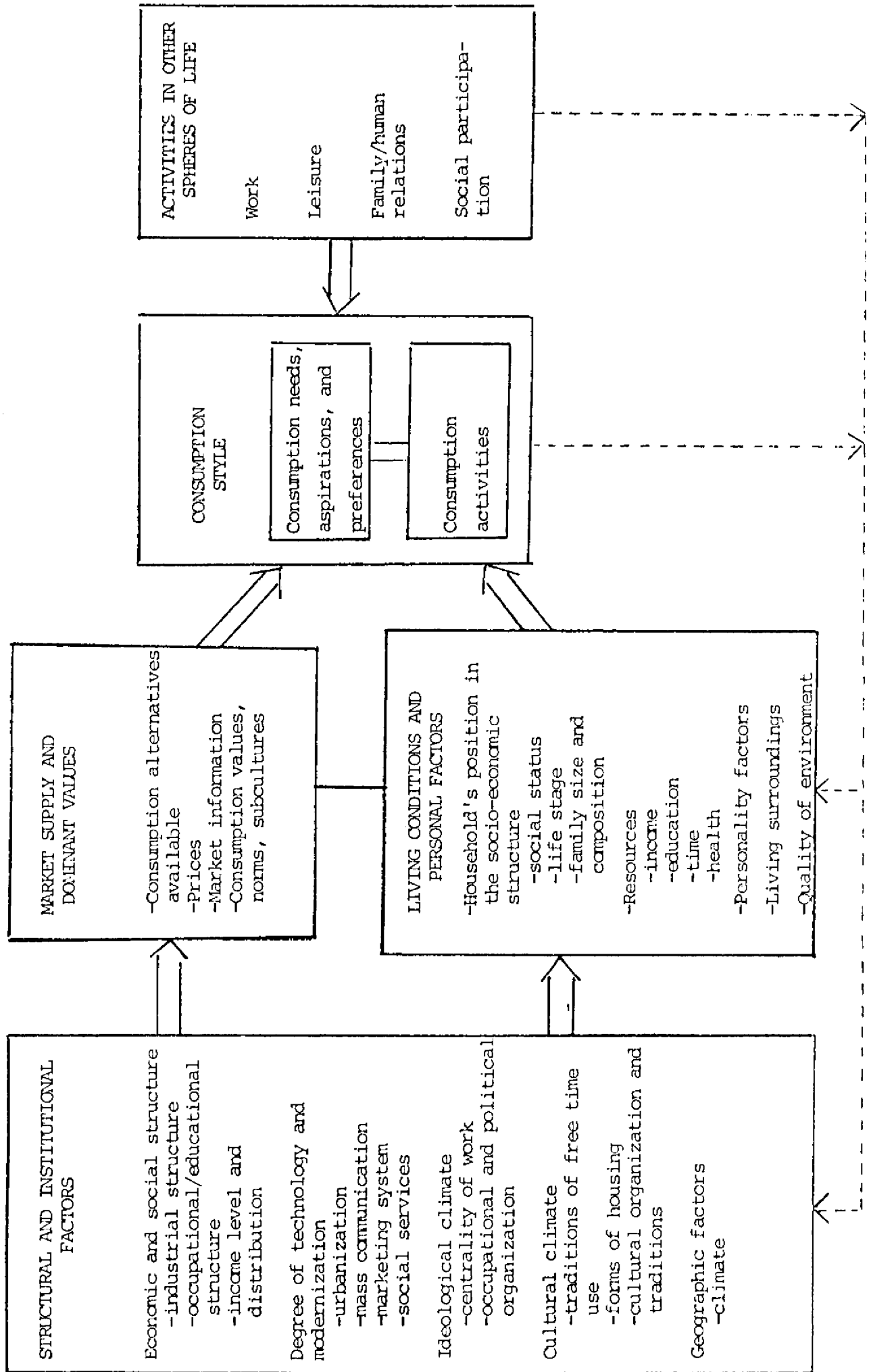
##### A. The concept

Because consumption is the most relevant sphere for the study of environmental impact, a close analysis of the dependence of consumption style on different categories of variables would seem appropriate. The term consumption style is taken to mean - by analogy with the definition of the way of life - "the whole" of the consumption-related activities and interests of an individual or group of individuals in certain living conditions (or the main characteristics of this "whole"). As in the case of the total way of life, it is assumed here that differences in consumption activities and interests are related to people's living conditions as well as to their personal characteristics. Furthermore, consumption style is also dependent on activities in other spheres of life: work, family, leisure and social participation. The variables affecting consumption style have been classified in figure 3. A few comments on each category are made below.

##### 1. Structural and institutional factors affecting consumption style

On a general level, the influence of structural and institutional factors on consumption style has been extensively analysed by social scientists of different "institutional" and Marxist schools which primarily relate consumption style to stages of economic development and economic structure (e.g., Veblen, Weber, C. Wright Mills, Marcuse, Galbraith, Parsons and Smelser, Habermas, Ottomeyer, Haug). This vast literature will not be reviewed here; it is mentioned only to illustrate one way of viewing this relationship. For instance, the stages of economic development can be used as a background for analysis of the changing significance of consumption (e.g., Wiswede, 1972). A structural approach often means an inquiry into either the social functions or the class dependence of consumption.

Figure 3 Factors affecting consumption style





In an agrarian society, where the interaction between different groups of people is limited, consumption is directed by tradition. The separation of production and consumption occurs when a transition takes place from a traditional culture to the work-intensive culture of industrial society. Since the early stage of industrialization, lower-income consumers have been able to follow the consumption patterns of the higher groups, even if it was in the form of cheaper mass products. However, it is often assumed that, at the beginning of this period, consumption aspirations were restricted by the "spirit of capitalism" which was based on the protestant ethic propagating the absolute value of work and ascetic standards of consumption (Weber, 1930). It has further been suggested that the idea of the individual having a duty to increase his capital also functioned, independently of religious motives, in favour of savings and capital accumulation, not consumption. 5/

Veblen's analysis of "leisure class" consumption (1899) relates to the early stage of industrialism. The role of socio-economic structure is emphasized in the study of the idle upper class which transferred the "deserve principle" to consumption; that is, consumption, rather than work, became its main activity and symbol of social status.

It has been proposed that consumption fulfils a similar symbolic status and prestige function in highly industrialized societies. However, this may depend less on social class structure, than on the gradually decreasing autonomy of the individual, who is subordinated to various organizations (foremost as an employee) instead of "mastering his own fate". Several former functions of the family, such as that of providing social security, have also been taken over by the public sector. In a way, consumption thus remains the only sphere where private autonomy can be exercised, even if this autonomy is more apparent than real (Habermas, 1962). In the consumption ideology of the industrialized capitalistic societies, emphasis is typically placed on the value of "individuality", "personal success" and "free choice", concepts which were formerly connected mainly with work, not consumption (Dubois, 1969). It has also been suggested that over-emphasis on material consumption is partly due to the fact that people no longer have collective goals as in earlier times (e.g., when fighting for democratic rights, founding co-operative movements, etc.) (Daun, 1976).

In developed capitalism ("consumer society", "mass consumption society") asceticism and abstinence from consumption has clearly become a dysfunctional element: both the qualitative and the quantitative expansion of consumption now plays a central role in the economic growth process. Not until this stage does it become obvious that one function of consumption in this process is to create conditions conducive to the continuous expansion of production. Technical innovation, differentiation of products and effective marketing constitute supporting factors.

The privacy of consumption in a mass consumption society is mostly superficial. Owing to urbanization and the development of mass communication, elements of consumption with high public visibility easily become dominant. The increase in leisure and opportunities for comparing consumption patterns contributes to enhancement of the "visible" aspects of consumption (Riesman, 1956). According to the theory of semiotics, consumers' use of commodities and the symbolic meanings assigned to them can well be regarded as a communication process in itself (Eco, 1966). This behaviour undoubtedly serves to enlarge the basis for new production. It also integrates family units into different subgroups of society as a whole. The structure of social norms within a society governs the consumption patterns of the various subgroups as well as the learning of these patterns, i.e. the process of socialization into consumption.

The differentiation of consumption patterns in a society would then depend on the degree of social stratification as well as on the degree of social control in the form of positive or negative sanctions that guide or strengthen the normative behaviour. Depending on the writer, either a "pluralistic" or a more "class-dependent" view of the "socialization into consumption patterns" is emphasized. Unfortunately, analysis of the significance of consumption at different levels of economic development usually stops at the level of high-private-consumption culture. For instance, only a few efforts have been made to establish the role of consumption at subsequent stages, for instance, in situations where: the public share of consumption strongly increases; identical multinational products get a dominant position on the market; and energy or other restrictions on consumption become inevitable.

Although empirical evidence is rare, it may be assumed that, at high levels of material consumption, the significance of consumption and consumption-related values will diminish and interest will be directed to other areas of well-being, e.g. better working conditions or better quality of the environment. Thus, material consumption would only to a certain degree compensate for deficiencies in other spheres of life. In such a situation, additional possibilities of consumption are still utilized by individuals, but they are experienced essentially as outside phenomena (Ahrne, 1976).

## 2. The mediating factors: market supply and dominant values, living conditions of households

The structural and institutional factors influencing consumption styles are rather difficult to manage in policies aiming at change in consumption styles, but those connected with market supply and consumption values and norms can be used as instrumental variables. Available consumption alternatives and their prices as well as market information can perform the function of change parameters. Consumption values and norms can, to a certain extent, be influenced by legislation and/or by support of certain subcultural phenomena that serve as alternatives to the dominant consumption styles. These alternatives are usually socially conditioned and connected with other activities, and should thus be developed in a larger framework of alternative ways of life (see below).

All the structural and institutional factors are reflected in the living conditions of the households. At the individual or household level, living conditions should be interpreted in terms of different resources available (including income, education, health and time), physical surroundings (living area) and social position (social class, occupation).

## C. Consumption and activities in other spheres of life

There is interdependence between consumption and other activities. The interdependence of work and consumption, for instance, is stressed by the time allocation theory, which incorporates time as a constraint on consumption behaviour (Becker, 1965; Muth, 1966). Implicitly, this theory postulates that consumption needs affect income, and not only that income affects consumption, as is usually assumed. In other words, activity in the labour market can be increased in order to improve the income level and the consumption level of the family, but in turn, the growing participation of women in the labour market also has an effect on the environment, e.g., by increasing the need for convenience goods and time-saving practices.

Work can also strongly influence the physical and mental capacity to enjoy free time and consumption activities outside work. One hypothesis is that people compensate for dull work by meaningful free time activities, for example,

fishing, sailing, hiking and skiing. However, it has been found that dull, monotonous work is often reflected in passive use of free time, whereas interesting and stimulating work and leisure are associated with each other (see, e.g., Eskola, Kortteinen and Roos, 1978). Both active and passive leisure models may have environmental impact, for instance by causing noise pollution or energy waste.

The interdependence of family life and consumption is obvious. Usually the institutionalized family system leads to a relatively fixed standard package of durables. In some cases, a high number of products may even compensate for lack of social relationships between the family members. Family life can hardly be separated from leisure activities, because many of them are connected with family togetherness.

While cultural and leisure activities are strongly related to consumption of both private and public goods and services, participation in political and community life has only minor effects on consumption. However, engagement in political activity for environmental protection seems to be connected with concern about consistent consumption behaviour.

B. Dimensions of consumption style - results of an empirical study measuring differences in consumption style by household budget allocations and leisure activities

Consumption has generally been classified into two broad categories: consumption of "necessities" and "discretionary" consumption. The share of total food expenditure usually serves as an indicator of consumption of necessities; and it is assumed that the lower this share, the greater the possibilities for meeting other types of needs, which actually means more options for different lifestyles. For several reasons this division is too loose and does not explain the choice of consumption alternatives. Moreover, it is linked only to one background variable, namely the income level; existing differences in consumption styles should be studied using other indicators.

In order to develop such indicators, an empirical study based on budget data from about 2,000 households in Finland was carried out. Systematic differences were then identified and explained in relation to the living conditions of the households. (For data, variable selection and analysis of the data, see Uusitalo 1979a). The empirical study of the main differences in existing consumption patterns (i.e. in the relative shares of different consumption outlays) produced the following three main dimensions: MODERNITY (modern versus traditional consumption), VARIETY (many-sided versus one-sided content of consumption) and MOBILITY (centrality of the motor car). These dimensions and their ecological implications will be discussed in the following sections 6/.

1. Modern versus traditional consumption (MODERNITY)

The degree of modernity of consumption is the most important dimension. Households are divided into two groups: those devoting a relatively large share of their budget to services and industrially manufactured (mass-produced) goods; and those with an expenditure allocation showing a high level of home production.

The best indicators of modernized consumption are high expenditure shares for items like "other goods and services", restaurant services, alcoholic beverages and processed convenience food, e.g., pre-cooked food and (manufactured) bread. High relative shares for milk products, flour and grain, butter and sugar - all suggesting a high degree of production activity in the household itself - are indicators of traditional consumption. Not surprisingly, modernized consumption

was found to be correlated with such free-time activities as visits to bars, restaurants and cinemas, and traditional consumption with the wife's total devotion to household work at home.

Living conditions, as a dimension of consumption, were related to socio-economic status, age and surroundings; farmers and older age groups were more traditional in their consumption style and young families in urban surroundings, independently of occupation, were the most modern. Furthermore, a wife with employment outside the home is most frequently found in young families.

Urbanization together with continuous innovation in mass production and service industries increases the tendency to consume fully "processed" commodities requiring no work input by the household. Commodity-intensive consumption is enhanced in urban surroundings because of higher available per capita income and higher exposure to advertising (see, e.g., Johnson and Mueller, 1973). In addition, the supply of different services (e.g., restaurant services) is naturally greater. However, independently of other factors, the difference in modernization between the youngest generation (in our study, under 30 years) and other age groups remains. This indicates that basic differences exist between the values of different generations.

External factors do not automatically determine the choice between commodity-intensive and time-intensive consumption, since there is also individual variation. Moreover, better distribution systems for rural areas and mass communication via television have substantially levelled the differences between rural settings with a high degree of modernization and urban families showing a kind of "return" to the old close-to-nature way of life (although now supported by modern housing and other equipment). The latter deliberately prefer home production of food, outdoor activities and activities centred on their own house and family ("new traditionality").

If this dimension of consumption style is examined from an ecological point of view, no straightforward conclusion can be drawn. It is true that modernized consumption with its intensive use of highly processed mass products may, in many aspects, be ecologically more harmful than "home-production-centred" and close-to-nature consumption, because it utilizes more energy and resources and causes more waste. The use of services of modernized consumption can either be ecologically relevant (e.g., tourism) or rather neutral (alcohol consumption, restaurant services, physical care services). 7/

Traditional consumption and recreation are "labour-intensive", replacing production technology by human energy. However, consumers' interest in a traditional, home-centred way of life brings with it a tendency towards a housing model which requires single-family dwellings. Through increased heating and transport needs, this may lead to higher energy use. 8/ On the whole, the traditional consumption style and way of life are in ecological terms probably a better alternative. However, they can have some negative social effects, such as "overprivatization" of the nuclear family, a double burden for a working wife unless the division of household work is democratized, and in some cases, a decreasing interest in cultural activities and social participation. Moreover, urban planning does not usually meet the wishes of a more close-to-nature way of life or any forms of "self-supporting" household production, and therefore makes it difficult to promote this way of life.

## 2. Many-sided versus poor commodity basket (VARIETY)

A second important dimension that emerges from the household budget data is the relative amount spent on enrichment of consumption. High variety in consumption is indicated by high relative shares of recreation, education and culture, other types of food than "necessities" (i.e., specialities, sweets, etc.), fresh fruit, vegetables, household furniture, recreational items and clothing. Low variety is indicated by a high budget share for "necessities" (food, newspaper subscription, television licence, heating and lighting, tobacco).

A high standard of housing, a large stock of household durables, ownership of a car and a holiday house are correlated with high variety in consumption patterns. As far as free-time occupations are concerned, all cultural activities as well as sports and team activities correlate with a consumption basket indicating a rich "way of life" in aspects other than consumption.

The best predictors of high variety in consumption and use of free time were socio-economic status and income. It seems that with increasing income and education levels, the variety of consumption will increase. The relevance of this dimension from the ecological point of view has been shown in the analysis of "externalities". A large stock of consumer durables, considerable living space per person and second homes are features that tend to exert pressure on the environment. On the other hand, high variety can also mean a high standard of equipment that may assist environmental conservation.

The study shows that many-sided consumption accompanies many-sided and active leisure activities. However, different combinations of commodities and leisure activities can provide a similar level of variety. This provides scope for replacing energy-intensive activities by others (e.g., cultural activities, sport, etc.) requiring less energy consumption or energy consuming equipment.

### C. Centrality of car (MOBILITY)

In the empirical study the third dimension of differences between households was found to be the expenditure on transport - i.e. expenditure on the private car, because it accounts for the major part of transport costs. The opposite pole of the dimension contains either "necessities" or housing expenditure. For instance, those whose share of food expenditure is high (low-income households) have low mobility. Households that spend a large proportion of their budget on their own dwelling cannot simultaneously afford to spend a lot on the car.

In the case of MODERNITY and VARIETY of consumption, a considerable part of the variation (30-40 per cent) could be related to living condition variables. However, in the case of MOBILITY, only a small part can be so explained: (5 per cent). The decision to have a car seems to be independent of all other living conditions except income. Even income is not a very good predictor of car use or car ownership. There were no remarkable differences within this dimension between the socio-economic groups or age groups, or groups living in different surroundings. (However, the fact of belonging to the youngest group (under 30) seemed somewhat to increase the eagerness to spend on a car.) Neither does car use correlate with leisure activities. This shows that the same symbolic importance is given to the car in all population groups, and there does not seem to be any symbolic behaviour in other activities that could substitute for it. On the other hand, the influence of high car expenditure on other aspects of consumption is very much dependent on the income level. In low-income and middle-income families, expenditure in all categories except food and beverages has been reduced in favour of the car. In high-income families, car expenditure does not preclude high expenditure on other kinds of consumption.

From the ecological point of view, car use is extremely relevant. It seems to be one of the main symbols of the perceived "free choice" and even "personal freedom" of our Western societies. Because car use is more closely connected to common values than to living conditions, change is dependent on both. The study of consumption patterns shows that consumers are now willing to give up many other aspects of consumption in favour of the car. Increases in car and petrol prices without any effort to change the underlying common values are therefore likely to affect the other aspects of consumption more than car use itself.

The motor-car does not belong to the "necessities" of the household in the same sense as food, heating and lighting. From the viewpoint of lower-income households, the increase in heating costs is the most "regressive" of the measures which could be introduced to restrict consumption. However, because of the "emotional necessity" 9/ of car use, increases in petrol prices will in practice have similar effects. It is possible that, on the average, these "regressive" effects will have greater bearing on middle-income households than on low-income households, many of which do not possess a car.

### C. Conclusions

#### 1. Some hypotheses concerning the ecological effects of consumption style

There is an obvious need for study of the relationships between structural changes in consumption and environmental problems. Substantial progress in environmental problem solving in the consumer section can be achieved only if a large proportion of consumers change their behaviour to lessen its external impact. This change in behaviour must cover many aspects of consumption simultaneously, not only some isolated activities.

A number of working hypotheses for empirical research can be formulated in accordance with this basic approach. They concern mainly the environmental effects - measured in terms of waste generation or use of energy and material resources - resulting from increased "modernization" and "variety" of consumption and increased "mobility" because of the "central" position accorded to the private car in the consumption pattern.

Some assumptions about relationships between consumption patterns and environmental problems are summarized in figure 4.

The environmental effects of the third consumption style, characterized by high mobility through car use, are most straightforward and have been fairly well documented in previous research. The association of the two other dimensions with environmental deterioration is more difficult to establish. Not all aspects of either "modernization" or "variety" are relevant from the environmental point of view. It is important, therefore, to study separate indicators of "modernization" and "variety" in order to specify their effects.

Attempts have been made in previous research on the basis of a way of life approach, to connect the differences in consumption style with people's living conditions. From this relationship some conclusions may be drawn about the impact of structural and institutional changes in society on consumption style. For example, "modernization" was associated with socio-economic status (i.e. not being a farmer), social surroundings and age. Female participation in the labour market was also associated with the aforementioned factors. It seems, therefore, that changes in industrial/occupational structure (declining share of agriculture), urbanization, structural changes in the labour market and changes in the values of different generations are closely connected with the "modernization" of consumption.

Figure 4 Summary of the ecological relevance of consumption style

Pattern dimension	Negative environmental effects	Positive environmental effects
MODERNITY	<p>I Modern Consumption</p> <ul style="list-style-type: none"> <li>-High commodity (far-processed goods)- intensity</li> <li>-High use of processed convenience food (high amount of wastes)</li> <li>-Secondary environmental costs of high alcohol use</li> </ul>	<ul style="list-style-type: none"> <li>-Use of many <b>labour-intensive</b> services that are not ecologically relevant</li> <li>-Economics of scale advantages in housing and energy use, possibility to utilize public transport</li> </ul>
	<p>Traditional consumption</p> <ul style="list-style-type: none"> <li>-High energy costs caused by privatized way of life in rural or suburban settings</li> </ul>	<ul style="list-style-type: none"> <li>-High <b>labour intensity in consumption</b> (household's own work input)</li> <li>-Family centred human- and nature-related leisure time</li> </ul>
VARIOSITY	<p>II Various consumption</p> <ul style="list-style-type: none"> <li>-Externalities of overconsumption</li> <li>-High stock of convenience (energy-intensive) durables</li> <li>-High energy costs per person (large living space)</li> <li>-Summer house tradition</li> <li>-Leisure activities connected with large recreational items</li> </ul>	<ul style="list-style-type: none"> <li>-High satisfaction from many cultural, social, and sport activities which are not harmful for the environment</li> </ul>
	<p>One-sided consumption</p> <ul style="list-style-type: none"> <li>-Poor leisure activities (TV, radio) which therefore cannot compensate for losses of material consumption</li> </ul>	<ul style="list-style-type: none"> <li>-Modest ("ascetic") consumption model, energy-saving household (small space per person), heating with renewable energy sources (in the country), e.g., wood</li> </ul>
MOBILITY	<p>III High expenditure share for private car</p> <ul style="list-style-type: none"> <li>-Car ownership</li> <li>-High gasoline use</li> <li>-High use of resort areas</li> <li>-Secondary costs of increased car driving</li> </ul>	<ul style="list-style-type: none"> <li>-Possibility for higher mobility for isolated rural families (preserving country-side residence) and lessening the pressure towards concentration in big urban centres</li> </ul>
	<p>High expenditure share for necessities or dwelling</p>	<ul style="list-style-type: none"> <li>-Low total consumption or high saving (for dwelling)</li> <li>-Use of public transport</li> </ul>

Figure 4

Summary of the ecological relevance of consumption style

Pattern dimension	Negative environmental effects	Positive environmental effects
Modern consumption	-High commodity (far-processed goods)-intensity	-Use of many labour-intensive services that are not ecologically relevant
I MODERNITY	-High use of processed convenience food (high amount of wastes)  -Secondary environmental costs of high alcohol use	-Economics of scale advantages in housing and energy use,  possibility to utilize public transport
Traditional consumption	-High energy costs caused by privatized way of life in rural or suburban settings	-High labour intensity in consumption (household's own work input)  -Family centred human- and nature-related leisure time
Various consumption	-Externalities of overconsumption -High stock of convenience (energy-intensive) durables -High energy costs per person (large-living space) -Summer house tradition -Leisure activities connected with large recreational items	-High satisfaction from many cultural, social, and sport activities which are not harmful for the environment
II VARIETY		
One-sided consumption	-Poor leisure activities (TV, radio) which therefore cannot compensate for losses of material consumption	-Modest ("ascetic") consumption model, energy-saving household (small space per person), heating with renewable energy sources (in the country), e.g., wood
High expenditure share private car	-Car ownership -High gasoline use -High use of resort areas -Secondary cost of increased car driving	-Possibility for higher mobility for isolated rural families (preserving countryside residence) and lessening the pressure towards concentration in big urban centres
III MOBILITY		
High expenditure share for necessities or dwelling		-Low total consumption or high saving (for dwelling) -Use of public transport



High "variety" of consumption was, in turn, associated with high (white-collar) occupational/educational status, high income, (high standard of housing and ownership of consumer durables. Changes in the occupational and income structure appear to be of greatest importance in explaining variety.

The high "centrality" of the car seemed to be a universal phenomenon across society, and thus primarily connected with general changes in values and income.

Of course, changes in the supply and quality of goods are either necessary prerequisites or lend support to all the above-mentioned structural changes in consumption and their environmental effects run in parallel. It would be useful to study empirically how certain social, institutional and cultural factors explain, or are associated with, differences in consumption style that have proved to be of environmental relevance.

There are very few studies concerning the effect of various structural factors on environmentally relevant aspects of consumption style. In cross-sectional analysis, the explanatory factors are usually selected to describe the living conditions of different households in a society. In a comparative study of several societies, a wider choice of explanatory social, institutional and cultural factors can be utilized, assuming a variation in these factors between the countries compared. It would be especially interesting to study how differences in environmental law and policy practices influence consumption styles.

In order to identify the relationships between such policy-related factors and the ecological effects of consumption style, it might also be possible to develop a research design where the selected societies would have similar levels of "modernization", "variety" and "car use", but where the environmental consequences of these consumption patterns would be different.

## 2. Strategy alternatives and target groups

On the basis of the "way of life" approach, there are several strategies that can be used separately or simultaneously in order to change consumption styles; they are differentiated here on the basis of their relative impact on current lifestyles and consumption.

It would be possible, for instance:

(a) To take advantage of current patterns and "way of life" trends by emphasizing those aspects which are "ecologically favourable" (e.g., certain large-scale benefits of modernized consumption, low use of mass-produced items, low waste of traditional consumption, etc.);

(b) To replace some minor elements of each consumption style by other elements, while accepting the total pattern as given (e.g., to replace the product-centred and energy-intensive "variety" of consumption by free-time activities that are ecologically positive or neutral); and

(c) To create more radical changes in the total pattern (e.g., changing the existing values concerning the symbolic importance of car ownership and use).

The arguments in favour of new lifestyles (e.g., those of "environmentalists") have so far been more "emotional" than "rational". Knowledge is poor, and few studies have been made of the real economic and conservation effects of these alternative ways of life, except for those on energy saving (e.g., Carr and Macleod, 1973; Mazur and Rosa, 1974; Schipper and Lichtenberg, 1976). It has

been difficult to introduce new ways of life without sufficient public awareness of these alternatives. One may therefore ask whether ecological values should be "marketed" using the same effective practices as those hitherto used to promote consumption values.

This paper has tried to study trends in the dominant consumption styles and not total alternative ways of life. Most experiments with so-called "alternative way-of-life groups" are carried out by young people and represent a "counter-culture fashion" rather than a real alternative for the masses (Schipper, Van Otterloo and Ester, 1979). Nostalgia notwithstanding, there is probably no way back to the small farming communities and living from small-scale handicraft for the total population. Even thinking about such a "Utopia", people must realize that it might possibly bring with it quite unexpected changes in the political system, such as oligarchic tendencies, as Stretton (1976) has pointed out.

At all events, some collective action on the part of consumers is needed in order to modify existing ways of life. Why such collective action does not come about - why people continue to pursue their "rational", private self-interest and maintain their convenient habits - is a separate research question.

The identification of a target group for study of change in consumption style depends on the particular consumption style to which the behaviour to be changed is related. If it is essentially connected with "modernity" of consumption, the target group will consist mainly of young people in urban settings, regardless of their occupation. If it is connected with "variety" of consumption (e.g., over-consumption, high use of energy), the target groups are, above all, the white-collar and high-income groups in both urban and rural settings. And finally, if it is connected with car use, the target group is the entire population, with the exception of low-income families who have no access to private transport.

It is quite surprising to find that the social group which - according to empirical studies - shows the highest concern about the environment, i.e., young and well-educated people, belongs - according to the analysis of consumer budgets - to the group that in all consumption categories ranks clearly above the average: highly modernized, with a large commodity basket and high car expenditure (Uusitalo, 1979b). Possibly this group shows ecological concern in some activities (e.g., recycling) but on the whole its "way of life" has greater impact on the environment than that of any other group.

#### NOTES

- 1/ An extreme theoretical position in favour of economic factors has been presented by Stigler and Becker (1977); with the help of household production theory, they replace the terminology of different "tastes" and "preferences" by that of "standard economic logic" (i.e., prices, incomes, etc.). An opposite approach of interdependent preferences is presented in several writings of Pollack (1976 and 1978).
- 2/ Concerning externalities and economic measures, see, e.g., Pigou 1962; Ayers and Kneese, 1969; Senega and Taussig, 1974; Edel, 1973; Mäler, 1974; Nijkamp, 1977; and Anderson, 1977. For a review of environmental economics, see Fisher and Peterson, 1976.

- 3/ The pursuit of "convenience" and "comfort" in everyday life has been stressed as one of the main features of present consumption (e.g., Scitovsky, 1976). It has also been found, by empirical analyses, to be the main obstacle to energy-saving (Phillips and Nelson, 1976). On the other hand, if well informed, the consumer may consent for example, to install pollution preventing equipment in his/her car, provided that it does not cause any significant extra effort or costs.
- 4/ "The prisoners' dilemma" can be presented in a pay-off matrix indicating the number of years each prisoner would lose depending on his own and the other prisoner's choice between confessing or not confessing.
- 5/ In countries where the change from an agrarian to a highly industrialized society has been very abrupt, these ascetic consumption ideas are possibly still functioning. Furthermore, historical events, such as war-time scarcity, may have had an influence on consumption values in different countries. In some cases, the war had a restraining effect on consumption for many years afterwards, although economic development would have allowed a greater increase in consumption (see e.g., Katona, Strümpel and Zahn, 1971). The question remains open whether "smaller" crises (e.g., the energy crisis) could have similar persistent effects on people's behavioural patterns.
- 6/ The study was based on the hypothesis that systematic differences in households' consumption and time use patterns exist, and that living conditions are good indicators of these differences. These assumptions and the relevance of the framework concept of consumption style were empirically explored with the help of data on household budget allocation, time use and living conditions. The data consisted of a cross-sectional nation-wide consumer budget survey, representing the whole population of Finland. After excluding the economically inactive and one-person households, the final size of the sample was 1,908. Two hundred and twenty consumption items were selected from the eight main expenditure groups of the statistical survey. The relative amount spent on each consumption item was used as the value of the variable. Further restriction of the variables was based on the correlations between them. Time-use variables were constructed from the information reported by individual household members. For each household, an average figure was calculated to express the activity level of the household. The original set of explanatory variables of living condition was restricted by principal component analysis and by selecting one variable from each component in order to avoid intercorrelation between the explanatory variables. For some types of analysis, dummy variables were constructed; in other types, the original variables could be used after some operations of reclassification. Consumer style differences were identified first for three subgroups of variables and then for a final group of variables representing the total consumption. A factor-analytic model was used to test the variation in consumers' relative expenditures on different items. In the final analysis, three main dimensions were found which met the criteria and were easy to interpret. These three factors accounted for 32 per cent of the variance in the final set of 20 selected variables representing various subareas of consumption. The three main dimensions were interpreted as MODERNITY, VARIETY, and MOBILITY. All three dimensions had two poles, but were labelled according to one pole in order to simplify the presentation. The results were validated in different subsamples of the data (based on the social and physical income, age and socio-economic strata) which all gave identical main dimensions. The average time use of the household members was

examined separately and then compared with the dimensions found for expenditure allocation. The next step in the research was to find the living condition variables that have the greatest impact on the scale of the household in respect of MODERNITY, VARIETY, and MOBILITY. This problem was approached by means of three different methods, which all gave very consistent results as far as the best predictors and the direction of their influence were concerned. For research results (e.g., concerning socio-economic group differences, consumer typology and analysis of the different consumer segments) see Uusitalo, 1979.

- 7/ However, physical care services (hairdressing, etc.) may be relevant in the form of intensified energy consumption, and high alcohol consumption has social consequences which may be relevant for the "aesthetic" environment (littering) or health (e.g., car accidents) and therefore may have an indirect influence.
- 8/ On the basis of empirical studies, it has also been found that there is no difference between per capita housing and energy use of families in urban block houses and small houses, because of the larger family size in the latter (Hirst et al., 1976).
- 9/ Of course, in countries or areas where public transport systems are very poor the "emotional need" of a car is in accordance with the external situation and has, so to speak, created its own basis for preservation.

#### REFERENCES

- AHRNE, Göran. Den gyllene kedjan - studier i arbete och konsumtion. Falköping, Prisma, 1976.
- ALLARDT, Erik. Hyvinvoinnin ulottuvuuksia (Dimensions of welfare). Porvoo/Helsinki, WSOY, 1976.
- ANDERSON, F.R., et al., Environmental Improvement through Economic Incentives. Baltimore, John Hopkins Universtiy Press, 1977.
- ANDERSON, W.T. "Identifying the convenience-oriented consumer" Journal of Marketing Research, vol. 8 (May 1971), 179-183.
- AYERS, R.U. and A.V. Kneese. "Production, consumption and externalities" American Economic Review, Vol. 59, No. 3, (1969), 282-297.
- BAUMOL and Oates. Economics, Environment and Quality of Life. Englewood Cliffs, Prentice Hall, 1979.
- BECKER, G.S. "A theory of the allocation of time" Economic Journal, (September 1965).
- CORR, M. and D. Macleod. "Home energy consumption as a function of life style". In Commoner, et al., Energy and Human Welfare - A Critical Analysis, Vol. III (1973), 119-141.
- DAUN, Ake. "Växande brottsligheten och livets mening". (1976) Unpublished.
- DUBOIS, C. "The dominant value profile of American culture" In P. Hollander (ed.) American and Soviet Society - A Reading in Comparative Sociology and Perception. Englewood Cliffs, Prentice Hall, 1969.

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#### REFERENCES

- AHRNE, Göran. Den gyllene kedjan - studier i arbete och konsumtion. Falköping, Prisma, 1976.
- ALLARDT, Erik. Hyvinvoinnin ulottuvuuksia (Dimensions of welfare). Porvoo/Helsinki, WSOY, 1976.
- ANDERSON, F.R., et al., Environmental Improvement through Economic Incentives. Baltimore, John Hopkins Universtiy Press, 1977.
- ANDERSON, W.T. "Identifying the convenience-oriented consumer" Journal of Marketing Research, vol. 8 (May 1971), 179-183.
- AYERS, R.U. and A.V. Kneese. "Production, consumption and externalities" American Economic Review, Vol. 59, No. 3, (1969), 282-297.
- BAUMOL and Oates. Economics, Environment and Quality of Life. Englewood Cliffs, Prentice Hall, 1979.
- BECKER, G.S. "A theory of the allocation of time" Economic Journal, (September 1965).
- CORR, M. and D. Macleod. "Home energy consumption as a function of life style". In Commoner, et al., Energy and Human Welfare - A Critical Analysis, Vol. III (1973), 119-141.
- DAUN, Ake. "Växande brottslighet och livets mening". (1976) Unpublished.
- DUBOIS, C. "The dominant value profile of American culture" In P. Hollander (ed.) Americal and Soviet Society - A Reading in Comparative Sociology and Perception. Englewood Cliffs, Prentice Hall, 1969.

- ECO, U. Den fr̄nvarande Strukturen. Lund, Berlinska Tryckeriet, 1971.
- EDEL, M. Economies and Environment. Englewood Cliffs, 1973,
- ESKOLA, K. and M. Kortteinen and J.P. Roos. "The way of life and cultural activities in the Finnish family", University of Joensuu/Academy of Finland Reports, No. 4 (1973)
- ESTER, P. "Attitudes of the Dutch population on alternative life-styles and environmental deterioration" (1978). Unpublished.
- FISHER, A.C. and F.M. Peterson. "The environment in economics: A Survey", Journal of Economic Literature, Vol. 14(1) (1976), 1-33.
- FISK, G. Marketing and Ecological Crisis. New York, Harper & Row, 1974.
- GRONAU, R. "The intrafamily allocation of time: The value of Housewife's time", American Economic Review, Vol. 63 (1973), 634-5.
- HABERMAS J. Strukturwandel der Öffentlichkeit, Darmstadt, Luchterhand, 1962.
- HARANNE, M. and A. Sicinski. "Changes of life-styles in Finland and Poland", University of Joensuu/Academy of Finland Reports, No. 3 (1978).
- HELGESEN, T. Forbrukernes roller i miljøpolitiken, Oslo, 1976.
- HIRST, E. and W. Liu and J. Cape. "A residential energy use model sensitive to demographic, economic and technological factors", Quarterly Review of Economics and Business, Vol. 17, No. 2, 7-22.
- JOHNSON, B. and A. Müller, "Interactions of consumption and metropolitan growth", Swedish Journal of Economics, Vol. 75, No. 3 (1973), 278-288.
- KATONA, G. and B. Strümpel and E. Zahn: Aspirations and Affluence, New York, McGraw-Hill, 1971.
- LEFEVBRE, H. Kritik des Alltagslebens, München, Reihe Hanser, 1976.
- LIERE, K.D. van and R.E. Dunlap, "The social bases of environmental concern: A review of hypotheses, explanations and empirical evidence", Paper presented at the annual meeting of the Southern Sociological Society, Atlanta, Georgia, 1979.
- MAZUR, A. and E. Rosa. "Energy and life style", Science, Vol. 186, (1974), 607-9.
- MUTH, R.F. "Household production and consumer demand function", Econometrica, Vol. 34 (1966).
- MÄLER, K.-G., Environmental Economics - A Theoretical Inquiry. Baltimore/London, John Hopkins University Press, 1974.
- NIJKAMP, P., Theory and Application of Environmental Economics, Amsterdam, North-Holland Publishing Company, 1979.
- PHILIPS, N. and E. Nelson. "Households - An integrated research programme", Journal of the Market Research Society, Vol. 18(4) (1976), 180-200.

- PIGOU, A.C., The Economics of Welfare, New York, St. Martin's, 1962.
- POLLAK, R.A., "Endogenous tastes in demand and welfare analysis", American Economic Association, Vol. 68, No. 2 (1978), 374-379.
- POLLAK, R.A., "Interdependent preferences", American Economic Review (66), No. 3 (1976), pp. 309ff.
- RAAIJ, W.F. van., "Ecological concern and consumption", Katholieke Hogeschool Tilburg, 1978. Working paper.
- RIESMAN, David, The lonely Crowd. New Haven/London, Yale University Press, 1961.
- ROOS, J.P., "Subjective and objective welfare", Research Group for Comparative Sociology, University of Helsinki, No. 18 (1978).
- ROOS, J.P. "Ways of life in Finland: A preliminary discussion", Working paper, University of Joensuu, Research Reports, No. 2 (1978).
- ROOS, J.P., "Comparative analysis of the way of life. An attempt at a typology", Research Reports, No. 1 (1977).
- SCHNAIBERG, A., "Social synthesis of the societal-environmental dialectics: The role of distribution impacts", Social Science Quarterly, (June 1975), 5-20.
- SCHIPPER, L. and A. Lichtenberg, "Efficient energy use and well-being: The Swedish example", Science, Vol. 194 (1976), 1001-1013.
- SCHIPPER V., A. Otterloo and P. Ester., "Some notes on alternative ways of life in the Netherlands", University of Amsterdam, (1976). Unpublished.
- SCITOVSKY, T., The Joyless Economy. New York, 1976.
- SEN, A., "Behaviour and the concept of preference", Economica (40), No. 159 (1973), 241-259.
- SENEGA, J. and M. Taussig, Environmental Economics, Englewood Cliffs, New Jersey, Prentice Hall, 1974.
- STILGER, G.J. and G.S. Becker, "De gustibus non est disputandum. Role of tastes in economic theory", American Economic Review (67), No. 2 (1977), 76-90.
- STRETTON, H., Capitalism, Socialism and the Environment, Cambridge, Cambridge University Press, 1976.
- STROBER M.H., "Wife's labour force behaviour and family consumption patterns", American Economic Review (67), No. 1 (1977), 410-417.
- STRÜMPPEL, B., Economic Means for Human Needs. Social Indicators of Well-Being and Discontent, Ann Arbor, 1976.
- STUCKER, J., "The distributional implications of a tax on gasoline", Policy Analysis, Vol. 3, No.2 (1977), 171-186.

SZALAI, A. (ed.), The Use of Time. Daily Activities of Urban and Suburban Populations in Twelve Countries, Haag, 1972.

UUSITALO, L. "Konsumtionsstilen som en del av levnadssättet", Publications of Helsinki School of Economics, D:22 (1977a).

UUSITALO, L. "Kulutuksen eriytymisestä eri sosioekonomisissa ryhmissä" (Socio-economic group differences in consumption pattern), The Helsinki School of Economics (1977b). Unpublished.

UUSITALO, L. "Consumption style and way of life. An empirical identification and explanation of consumption style dimensions", Publications of the Helsinki School of Economics, A:27 (1979a).

UUSITALO, L. "Unga familjers konsumtionsstil" (The consumption style of young families), Nordic Workshop of Consumer policy, Oslo, September 1979 (1979b).

VEBLEN, T., The Theory of the Leisure Class, London, MacMillan, 1965 (1899).

WEBER, M., The Protestant Ethic and the Spirit of Capitalism, London, Unwin University Books, 1967 (1930).

WINSWEDE, G., Soziologie des Verbraucherverhaltens, Stuttgart, Ferdinand Enke Verlag, 1972.

ZETTERBERG, H.L., Arbete, Livsstil och Motivation, SAF: Kungl. Tryckeri AB, 1977.



## THE VULNERABLE SOCIETY

Paper transmitted by the Government of Sweden  
Prepared by Ms. A.K. WINTZEL

### I. INTRODUCTION

Discussions of the vulnerability of society have become frequent in the industrialized world. The theme is being treated by politicians and social debaters, mass media, books and films. It seems that the Western world fears a great collapse; this fear is putting its stamp on the spirit of the age.

How did this uneasiness come about? On what is it based? Is it rational? One reason for the new interest in vulnerability may be that in the course of the 1970s, a series of events drew attention to the frailty of ecological and social systems. Another reason was the oil crisis of 1973-1974. The sudden realization that the Western world is vulnerable to a shortage of oil came as a shock; political, technical and economic systems were all threatened. A further cause for the general feeling of insecurity is the rapid growth of cities and the concomitant large population movements. New and strange urban environments, where old values and traditions no longer prevail, generate uneasiness and alienation.

### II. A PROPHECY OF DOOM TO BE TAKEN SERIOUSLY

In 1976 the theme of the "vulnerable society" was brought up for discussion at the Secretariat for Future Studies. The debate initially revolved around certain technical systems. One source of inspiration was a new analysis of society and its technical systems from the point of view of systems management 1/. In this study a number of arguments were brought to the fore to show that modern Western society is heading for disaster if present trends continue. Vulnerability is regarded as a built-in quality of the great techno-economic systems that permeate the whole of society and affect everybody's daily life - for example, the electricity, transport, food distribution, water supply and sewerage systems. The more extensive and complicated the systems become, the more difficult it will be to direct and control them. The various systems also interlock in such a way as to make them unstable. Vulnerability first makes itself felt in the form of minor disturbances. There may be temporary power cuts, extensive traffic jams, water shortages or shortages of certain goods. After some time these disturbances occur more frequently and become all the more difficult to counteract. They are also readily propagated from one system to another and may snowball. More and more resources are required for their control.

The basic theory of the study was that the extensive man-made technological systems function as "time bombs". Major breakdowns could start in the large cities of the United States or Japan some time in the 1980s or 1990s, and the

process would then spread to Europe. Mass death and a rapid decrease in population would follow. According to the study, Sweden had good prospects of escaping lightly in the catastrophe. A high level of technology, systems of reasonable size, organizational ability and low population density were factors that might contribute to stability. The harsh climate would also deter homeless people from invading the country. It is difficult to share this forecast of Sweden's future fully, but the vulnerability study has revealed similar apprehensions among many technicians, biologists and sociologists.

### III. A BROADER PERSPECTIVE

In 1977 the Secretariat for Future Studies decided to launch a study on the theme "The Vulnerable Society". It was decided to broaden the perspective and to include social and psychological systems in the analysis. Military and economic systems were omitted on practical grounds.

The procedure adopted was that 10 researchers, each within his or her own speciality and from his or her own starting point, would write essays about the vulnerable society. These essays would then be reviewed by a researcher in another field. In this way, source material, admittedly heterogeneous but rich in ideas and theories, was compiled. The material has been considered from different angles at a number of seminars. A clear-cut definition of vulnerability has not been sought. An attempt is made below, however, to clarify the concepts.

### IV. WHAT IS "VULNERABILITY"?

Different "systems" have been used as a starting point for this study of vulnerability. Such systems may be technical-administrative (data processing systems), ecological (the Baltic Sea being a good example) or social (a local population or linguistic minority). Systems have definable "functions". Data processing systems, for instance, fulfil the function of storing and processing information according to specific routines. If part of the information falls out of the memory or is incorrectly or incompletely processed, there has been a disturbance of the function: the system has proved vulnerable. In a similar way, a linguistic minority may be said to have emotional, cultural and social functions. If its relationship to society at large is changed (for instance through reduced opportunities for children to be taught in their native tongue), disturbances arise that may threaten the whole system (the linguistic group). If the system can withstand disturbances (e.g. through solidarity among members of the group), the threat may be averted. Otherwise the minority group will slowly disintegrate: a "system breakdown" or "collapse" occurs. The emotional, cultural and social functions maintained by the system cease.

A disturbance of one system may readily cause reactions in others. Extending the previous example, the assumption could be made that, in a computerized population register used to estimate the need for native language teaching, the data for this minority group were incompletely or inaccurately recorded. With a faulty basis for their decisions, the authorities might discontinue the teaching of that language. Disturbance of one system (data processing) would have had repercussions in another system (the minority group).

When analysing the vulnerability of society, it is important to concentrate on systems that are needed for the existence and continuity of society, i.e. those systems that have direct life-sustaining functions. Among these are water, food and energy supply systems. Society is also dependent on a number of social

systems that, through upbringing and control, make people co-operate. The performance of the functions of the aggregate social system may be termed "social production".

Vulnerability in social production is just as important as vulnerability in the production of physical utilities like food and water. But such vulnerability is often evident in a less dramatic way, through slower processes (increases in hooliganism, alcoholism, divorce rates, etc.). However, all system breakdowns are not necessarily undesirable. If an inefficient system collapses and is quickly replaced by another that is more efficient, no great harm has been done. Sometimes a system breakdown may even be beneficial, e.g. when a military dictatorship collapses and is replaced by a democratic political system.

Further clarification of what is meant by a vulnerable society may be in order. A society is vulnerable when it consists of systems that, if disturbed, give rise to harmful short-term or long-term consequences for large groups of people. Vulnerability has no direct connexion with the "risk frequency" of such disturbances, which only indicates that a possibility of extensive damage exists, i.e. that society in some respect is unprotected against extensive damage, crisis or catastrophe. The problem also involves analysis of the threats or factors that may initiate a harmful course of events.

#### V. AN EXAMPLE OF THE VULNERABILITY OF SOCIETY

The data processing system of the National Social Insurance Board is an aid in the management of health insurance, child, housing and other allowances, and pensions. This system constitutes the basis of Swedish social welfare. Social insurance offices all over the country are connected to the system via thousands of terminals. A considerable proportion of the system's resources are used to produce advices of postal payments and other communications. The central computer of the system is located in the town of Sundsvall in central Sweden. During the busiest days of the month the computer performs about half a million operations. The number of communications dispatched to the public exceeds 50 million a year (Sweden's population is about 8 million). If the central computer in Sundsvall became inoperative, this would affect large numbers of people, chiefly those with low social and economic protection. Threats to the central computer (apart from military threats) might include terrorism for political purposes, fire or water damage. Even a lengthy power cut might have serious repercussions. Other critical situations might arise, for instance, from an industrial dispute involving personnel working at the computer.

#### VI. SOME PRINCIPAL POINTS IN THE STUDY

This summary report cannot do justice to all the material developed by the study project. An attempt will be made instead to highlight some of the thoughts and problems that recur in several of the essays referred to above. Names in parentheses are those of the researchers contributing to the study. The annex lists the publications and their authors.

##### A. Dependence and control

The vulnerability of a system can be described as a relation of dependence. If you are dependent you are also vulnerable. Therefore analysis of a society's vulnerability is concerned with its dependence on the operation of its internal systems and functions and the maintenance of necessary external relations.

Swedish agriculture is dependent on external factors; consequently the whole system of Swedish food supply is vulnerable. In the computer field there is also a high degree of dependence on the outside world. Swedish industrial production, administration and research are vulnerable to any disturbance in foreign relations that affect computers.

Gains in social welfare have often been achieved at the cost of increased vulnerability. In the striving for ever greater efficiency, a number of stabilizing and self-regulating functions in society have ceased to operate, but have not been replaced by new ones. For instance, acts of "neighbourly kindness" have been replaced by monetary allowances from central or local government, which cannot fulfil all the regulating functions that solidarity among a small group of people used to provide. The self-regulating function that "internal control" or informal control among people plays in the society is thus diminished. Other factors that weaken internal control are the impediments to emotionally based social relations which modern society creates. Because children largely mould their own personalities by learning from models and through identification, it is important for society that their models, i.e. parents and other educators, should be content with their own lives, feel secure, enjoy self-esteem and have a purpose in life. If the parents lack self-esteem; if they are uprooted (e.g. by having been displaced from a familiar environment, by being unemployed, or by being unable to meet the demands made on them by society), then the next generation will tend to be more vulnerable than the preceding one. In the last few decades hundreds of thousands of people in Sweden have been forced to leave their homes and seek work in completely new surroundings. The modern residential areas in which these people usually find themselves encourage a lifestyle that makes it impossible for any informal control to evolve. Society must then increasingly resort to "formal control", i.e. the police, the courts, social welfare and penal institutions (cf. Svenson, Friberg). This reliance on formal control carries with it a risk for a further increase in social vulnerability among broad strata of the population (cf. Svenson). When society's ability to solve its problems fails, the individual's resources are put to the test. Members of marginalized groups in society are hardest hit; they have no reserves to fall back on in a crisis.

Increasing vulnerability may thus be viewed as a side effect of development in a society that in many respects has improved its lot. It can also be regarded as a change in vulnerability, as much of the driving force behind the process of development has arisen from a wish to make people more secure and less vulnerable. The nature and degree of vulnerability to be accepted is a political question.

#### B. Social systems

When speaking of society's ability to withstand disturbances, it is possible to make a distinction between "stability" and "viability" (cf. Friberg). The "stability" of a system can be defined as its ability to resist qualitative changes resulting from disturbances, regardless of whether the changes result in a better or worse system. The concept of "viability" is linked with the people who sustain the system.

When large numbers of people cease to identify with the aims of society, the vulnerability of society as a whole in a crisis situation increases. The changes in society resulting from increased computerization, for instance, give rise to a need for readjustment; new job opportunities in the public health and services sectors may have to replace jobs made unnecessary by the computer systems (cf. Palme). The same holds true for every sector and branch of industry. If adjustment does not occur and unemployment increases, the result will be even

less confidence in society (cf. Wallensteen), less self-reliance among people, and more mistrust of politicians (cf. Svenson). The unemployed, like other groups, must have their interests represented by some "trade union" bodies within a democratic framework, if they are not to present a threat to society. In international terms, the unemployed in Sweden are well educated and make substantial demands on life. If they suddenly begin to solve their problems in their own way, a threatening situation may arise. Subcultures can affect society in different ways in the event of an external threat. They may offer strength, because their cultural tradition helps them to withstand pressures better than people in general. When an extensive power failure occurred in New York, for instance, Puerto Ricans responded to the situation better than others. Various groups might also constitute a threat to society in a crisis, partly through aggression against one another, partly because the norms and values of subcultures are in conflict with those of the society as a whole (cf. Svensson, Persson, Friberg). In the extreme case, very large sections of the population may form a group that directly challenges those who uphold the authority of the state (cf. Gutiérrez), with the result that the society collapses.

### C. Ecological systems

In its quest for increased efficiency, society has generally affected the quality of ecosystems by causing a decline in the numbers of species. Ecosystems with a high degree of diversity break down and are replaced by less complex systems. In cereal farming and forestry, man has deliberately introduced extensive monoculture based on a simplified ecosystem. To make these systems work demands large amounts of labour, energy, chemicals, irrigation, etc. The economy is to a large extent dependent on the smooth functioning of farming and forestry. How vulnerable these systems are is shown in the report on ecosystems (cf. Jansson) and agriculture (cf. Göransson). Threats in this field include disturbances in foreign trade, temporary climatic changes, extensive damage by insects, etc.

Unintentionally, society affects natural ecosystems through pollution, so that a few species gain the upper hand while others are eliminated. The consequences of environmental stress can be studied around cities and industrial areas. There is a uniform pattern - a few species of plants and animals predominate: willow-herb, thistles, pigeons, rats and sparrows. These unintentionally created systems are relatively stable. Disturbances in natural ecosystems seldom constitute an immediate threat to society, but in the long run they may prove a considerable strain.

Ecological systems like the Baltic Sea are at risk from air and water pollution, which threaten to cause a dramatic decline in fishing yields. Sweden's sewage plants are dependent on imported chemicals; a halt in imports would mean the collapse of ecosystems in a considerable number of lakes (cf. Jansson). With increasing total energy conversion per unit of area there is increasing environmental stress, and consequently the number of species diminishes and the ecosystems become more vulnerable (cf. Jansson). The growing incidence of cancer, allergies or other illnesses caused by technical systems might further overload the public health apparatus. What will happen to society then?

A collapse of the natural ecosystems might occur relatively quickly if the environmental protection measures which have been accumulating were to be withdrawn. Their costs to society are not insignificant and there is a risk that, in an economic crisis, environmental considerations would carry too little weight; this might lead to catastrophe. A profound economic crisis is regarded as one of the most serious potential threats to the environment (cf. Jansson).

## VII. SUBSTITUTION OF ONE TYPE OF VULNERABILITY FOR ANOTHER

When a system or an organization is restructured, it usually becomes less vulnerable because one type of vulnerability is substituted for another which is considered less serious, at least in the short term. For instance, biological threats from infection that might spread through rotten foods and poor sanitary conditions have largely been eliminated; but they have been replaced by chemical threats which, in the short term, have proved less damaging than the biological threats. There is no plague in Sweden nowadays, but cancer and allergies from food additives are more prevalent. It is too early to make predictions about long-term vulnerability through the increased use of chemicals, since any negative consequences will appear only after a number of years (in the form of higher incidence of cancer and allergies, etc.).

Within the energy production system there are examples of the exchange of one type of vulnerability for another. One reason invoked for extending the use of nuclear power in Sweden has been the country's dependence on oil in energy production, which in turn has been considered to involve an unacceptably high level of dependence on the outside world. Nuclear power is regarded as a way of reducing this dependence. On closer inspection of the nuclear fuel cycle, however, it is evident that Sweden will for a long time be dependent on imports of nuclear fuel, and will have to export nuclear waste for reprocessing. To change these conditions takes time and calls for considerable investment; at present it also appears politically impossible. Vulnerability has changed its nature, but vulnerability remains (cf. "Solar versus nuclear Sweden: two energy futures", Secretariat for Future Studies).

In a similar way, through computerization, companies and organizations have made themselves less vulnerable to negative reactions from employees (cf. Palme). Instead, they have become more vulnerable to threats either from small groups of experts, such as systems analysts and programmers, or the dangers inherent in increased dependence on imports. Attempts are now being made to differentiate work on computer systems so that dependence on a small group of experts will be reduced. A redistribution of dependence among a larger number of people is probably being pursued in many companies and organizations (cf. Palme). But which vulnerability is replaced by which? That ought to be one of the most important questions to discuss.

## VIII. THREATS TO DEMOCRACY FROM FUTURE DEVELOPMENTS

Notions of democracy play a central role in our value system, and threats to democracy are therefore perceived as threats to society as a whole. Even though the different forms of democracy are constantly discussed, there is broad general agreement concerning the great importance of the concept of democracy. In this study project a number of authors have directly or indirectly expressed their concern at the growing threats to democracy in the expected future society.

The last few years of economic crisis have made the future look increasingly insecure, and this may lead to less confidence in present society (cf. Wallensteen, Svenson). The people who generally represent and symbolize society and its general direction are the politicians. There is a risk that their repute and trustworthiness will decrease if society develops in such a way that people feel insecure with regard to the future. If politicians sense mistrust in their relations with fellow citizens, their instinct for self-preservation will lead them to reduce still further their contacts with people who do not respond in positive terms. However, in their daily acts all human beings, including politicians, need some psychological support from some quarter. In a democracy it is important that the politicians should receive such

support at least in part from ordinary citizens. If psychological support, in the form of trust and esteem, is not forthcoming, politicians will increasingly look to other psychological support groups ("we politicians"; "we party members"; "we intellectuals", etc.) in order to avoid a decline in self-confidence. Lack of self-confidence is a serious handicap when confidence in others, i.e. those you lead, is essential (cf. Svenson). Politicians may also remain aloof from the people they must guide and represent, aggravating public mistrust. The vicious circle is thus closed.

Another way of acquiring a feeling of self-reliance is to achieve concrete results in one's work or to feel that one has control over it. The creation of larger and more complex administrative and technical systems may be one result of man's search for self-esteem. However, in such systems the risk of losing total vision is great; this may result in increased rigidity, which in turn leads to an increased transfer of power from politicians to experts (cf. Palme). Large technical systems require heavy investment and long-term planning with a longer time horizon than politicians work with. Many important decisions have to be taken by technicians and company executives. The conclusion must be that an increase in scale generates problems for politicians and for democracy. Where a large amount of the total monetary flow is outside the control of the politicians, economic crime may increase drastically. If that happens, the power of the politicians will further decrease and, most importantly, people's attitudes to tax evasion, black market transactions, etc. will increasingly clash with the rules the politicians have to uphold. Such double standards may constitute a threat to democracy.

Increased international integration adds to national vulnerability (cf. the study "Sweden in the world", prepared by the Secretariat for Future Studies). If the population holds politicians responsible for decisions they have not made, whose negative impact is due to outside factors (business cycles, for instance), people's trust in democracy will be in jeopardy. The politicians will feel powerless and the citizens will lose confidence in their ability.

#### IX. THE VULNERABILITY OF SOCIETY IS A POLITICAL ISSUE

For whom or for what unit of society should vulnerability be discussed? Is it the vulnerability of the individual, the family, marginalized groups, the village, a national region, Sweden, the Nordic countries, western Europe, the capitalist States, the world? Vulnerability exists on different levels, and in every discussion different conclusions will be reached, depending on specific priorities; lessened vulnerability in one unit may mean an increase in another. Vulnerability also exists in different sectors: industry and technology, school and communal life, agriculture, etc. The decision concerning which type of vulnerability ought to be avoided is a political one. Opinions about the likelihood that certain threats will materialize also influence the choice of focus for actual policy measures. If a profound economic recession is regarded as an improbable threat, for instance, then no action will be taken to diminish economic vulnerability. Cultural threats (against the national identity, for example) should not be overlooked, if it is the nation that should be safeguarded, despite the fact that such a debate may not be very opportune.

Whom to protect and which threats to accept are matters for political decision-making. If uranium is preferred to oil as the basis for an energy system, this will cause new and multidimensional dependence and consequent vulnerability. Whether material vulnerability caused by technology should be exchanged for social and ecological vulnerability stemming from that technological system is also a political decision.

ANNEX

BASIC REPORTS\*

- 1 A frame of reference for the study - Ola Svenson

Part 1 Psychological and social aspects

- 2 Comments on psychological forces working for the resilience of society - Ola Svenson
- 3 The Swedes and their chiefs: concerning trust and vulnerability in Swedish society - Peter Wallensteen
- 4 The social vulnerability of the industrial society: some principles from systems theory and their applications - Mats Friberg
- 5 Human judgement and decision-making in a complex society: concerning our biases and general ability to make optimal decisions - Maj-Lene Hedenborg and Ola Svenson
- 6 Crime, politics of crime, and the future: a vulnerable society? - Leif Persson
- 7 Uruguay: a vulnerable welfare state - Carlos Marià Gutiérrez

Part 2 Ecological and technical aspects

- 8 The vulnerability of ecological systems - Ann Mari Jansson
9. Östergårda, is it vulnerable?: a study of the vulnerability of a farm in the south of Sweden - Gert Göransson
10. The vulnerability of the farming sector - Kjell Arman
11. Technological development and vulnerability - Leif Andersson
12. The vulnerability of the industrial society - Erik Sundström
13. Computers and vulnerability - Jacob Palme
14. The vulnerability of small communities - Gösta Carlestam

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\*The complete set of reports were published in Swedish in Ola Svenson and Ann-Kristen Wintzel eds., "The vulnerable society" (Stockholm, Swedish Secretariat for Future Studies, 1978).



THE SCOPE FOR A VOLUNTARY REDUCTION  
IN PRIVATE CONSUMPTION

Paper transmitted by the Government of Norway

Prepared by Torlaf EKEKUND\*

Summary

The paper contains a preliminary assessment of material collected in 1978 at the Bergen School of Economics and Business Administration, Norway, for an empirical study of a rather unusual problem: to what extent are private households capable of voluntarily changing their consumption habits in the direction of a more frugal lifestyle, if one or several members are motivated to do so? The popular movement "Fremtiden i våre hender" (The future in our hands) was selected as a social experimental group; the investigation was further designed in such a way that it would be possible, on the basis of the annual consumption surveys conducted by the Norwegian Central Bureau of Statistics, to use the average Norwegian population as a reference group.

"Fremtiden i våre hender" is a popular movement concerned with global justice in the world, which considers that solutions to the problems of the poor countries must meet three basic conditions: (i) the rich countries must introduce new patterns of development and lifestyles which attach more importance to human than to material values; (ii) rich countries should reduce their level of consumption and, internally, strive for more equal distribution; and (iii) members of the movement must actively participate in this process of change.

The study was conducted four years after the foundation of the movement. Membership then stood at 20,000, a high figure for Norway, which has a total population of four million. The movement has since spread to Denmark and Sweden. It is independent of all other groups, organizations, political parties and authorities. However, the information centre of the movement receives financial support from the Government, which in 1978 amounted to some 12 per cent of total membership subscriptions. Through the information centre a questionnaire was sent to some 1,200 members seeking their personal evaluations of possible areas and measures for change in lifestyles.

As a background to the analysis of the replies, the study contains an examination of the motives for choosing a "new lifestyle" as an instrument for change:

(a) In the long run, most people would like to emancipate themselves from a one-sided, materialistic lifestyle characterized by competition for goods and displacement of real values of life by artificial substitutes.

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\*Norwegian Council for Industrial and Scientific Research. The views expressed do not necessarily represent those of the Government of Norway.

(b) Reducing consumption by adopting an alternative lifestyle can release resources for transfer to the poorest countries. This does not imply a belief in a positive or automatic relationship between reduced consumption in the rich countries and an improvement of conditions in the poor countries, but rather in the possibility of creating such a relationship.

(c) Attempts to create a new lifestyle within a social movement with well defined objectives permit the combination of theory and practice.

(d) Actual efforts to bring about change furnish knowledge of the social conditions that impede such change.

(e) Trends in patterns of consumption can function as signals to politicians.

(f) Last but not least, changes in consumption patterns represent important strategic variables for the future of a society based on industrial growth.

On the basis of the investigation, it seems that the areas offering greatest freedom for changes in lifestyle are: food, repairs in the home ("do-it-yourself"), transport and recreation. Success was generally achieved in energy saving. Many members of the movement had already changed jobs or altered their working hours and activities so as to be able to pursue their own lifestyles. Others intended to do so. One of the general conclusions was that the prime supporters of change were persons with strong resources in respect of income and education, who have historically been the guardians of traditional values. Part of the explanation seems to be that the middle class has become quite large under the Welfare State, but shattered illusions about the effects of material growth also played a role. The present development trend will not permit traditional values to be preserved. As a movement "Fremtiden i våre hender" is considered to have a value-conserving character, while at the same time it represents a revolutionary force in the Welfare State. As regards prospects of achieving the objectives of the movement, the members mostly feel that as long as the majority of people in the rich countries consider increases in material living standards as their prime aim, no political change in favour of the poor countries will occur. It is therefore important that policies aiming at the creation of new development patterns should take the need for changes in value priorities into account.

It is recommended that other experiments of this type should be conducted to prepare the ground for the formulation of policies and strategies for purposeful social change.

OUTLINE OF AN ECODEVELOPMENT PROJECT IN A SMALL  
RURAL COMMUNITY IN SOUTHERN SWEDEN

Report transmitted by the Government of Sweden  
Prepared by Mr. S. NORDSTRÖM

I. BACKGROUND

In January 1978, the Swedish Government appointed a committee to draw up general guidelines for a coherent policy with regard to natural resources and the environment. One of the tasks was to explore how and to what extent an ecological approach to development would affect social conditions. The approach was defined in the terms of reference of the committee, the aim being to guarantee that the satisfaction of present human needs does not jeopardize physical and biological conditions for human activities in the future. One way of assessing the demands that an ecological approach might place on society is to carry out pilot projects within well-defined geographical limits. Projects of this kind were considered by the committee.

Views have been expressed in various United Nations forums concerning the need for ecodevelopment projects at the local and regional level. For example, the Cocoyoc Declaration states:

"Concrete experiments in the field are also necessary. We consider that the present efforts of the United Nations Environment Programme to design strategies and assist projects for ecologically sound socio-economic development (ecodevelopment) at the local and regional level constitute an important contribution to this task. Conditions should be created for people to learn by themselves through practice how to make the best possible use of the specific resources of the ecosystem in which they live, how to design appropriate technologies, how to organize and educate themselves to this end."

Various Swedish research agencies, including the Natural Resources Committee of the Co-ordinating Board of the Swedish Research Councils, have also pointed out the need for regional research and development projects.

In the course of its enquiries to determine current interest in socio-economic experiments with an ecological approach, this Committee contacted the University of Jönköping. This is the only university in Sweden offering courses in natural resources management; and it had already been contemplating interdisciplinary projects of this type in its search for appropriate fields of academic investigation. Efforts were initiated to define the area of research and to create the conditions necessary for an ecodevelopment project. The purpose was to combine the pursuit of national goals with the demands arising from an

ecological approach. In August 1978, these efforts had advanced to the point where a general meeting of the inhabitants of a selected district in the Vetlanda municipality in southern Sweden unanimously decided to co-operate in an ecocodevelopment project.

## II. RESEARCH AREA

The research area comprises the parishes of Bäckaby, Ramkvilla and South Solberga in the south-west part of Vetlanda municipality. One of the reasons for selecting these three parishes was that the area is rich in land and forests which, to a certain extent, can be regarded as not fully utilized: many of the owners do not live on their properties. Another reason for the choice was that no large urban community dominates the area. The inhabitants are also keenly interested in further local development in order to halt the flight from the land and the consequent deterioration in services. An additional justification for focus on this specific area was that Ramkvilla and South Solberga formed part of a district for which Vetlanda municipality and the Agricultural Board of the county of Jönköping had set up an economic plan. These areas thus benefit from State assistance to agricultural enterprises in sparsely populated areas. The Environment Division of the Jönköping Country Administrative Board had also carried out an extensive natural resources inventory in the Ramkvilla parish. A further important factor was that the local authority promised to support the project. This area in southern Sweden is known for its natural beauty; it is a varied landscape of hills and valleys, forests and farming country interspersed with lakes and waterways. With the exception of a sawmill and a bus company, the main sources of employment are agriculture and forestry.

In the course of time, the population structure had undergone radical changes. Around 1870, nearly 4,000 people lived in the area; in 1950 this number had been halved, and by 1978 the population was down to about 1,100. The local authority expects that the number of inhabitants will continue to diminish up to 1990. The proportion of old-age pensioners in this area is higher than in the municipality as a whole. About a third of the active population commutes to work places outside the project area. As the population has decreased, services have gradually deteriorated. The inhabitants feel that this development, which is typical of rural areas today, happened regardless of their wishes, and even without their knowledge.

## III. THE AIM OF THE PROJECT

The aim of the project is twofold: to promote the development of the community within the limits imposed by the ecological approach, and to study the effects of the development process.

The term "ecological approach" is seldom clearly defined, although it has become increasingly synonymous with the thrifty management of natural resources. But the definition of terms is not very important to this project; the essential point is how people in the pilot project area interpret the concept. So far, the generally accepted principle is that the present generation must adjust its demands on nature so that future generations will be able to enjoy a quality of life as good as its own. The population of the project area assumes that it is possible to combine such an objective with a higher quality of life for those now living there; this expectation would involve, for example, increased employment opportunities.

Development focused on the achievement of socio-economic goals at present considered essential, within the context of an ecological approach, is generally defined as "ecocodevelopment". Because little is known about the practical

implications of such development, the project will give priority to measures which are likely to fall within the framework of the term "ecodevelopment" as usually understood. The rate of ecodevelopment will thus be adjusted to the rate at which the general corpus of knowledge increases.

#### IV. THE PHASING OF THE PROJECT

As the project is both complex and of long duration, it has been divided into the following phases:

- (a) Preparatory work      Identification of certain basic prerequisites for carrying out the project. (August 1978 to April 1979)
- (b) Planning              Design of project structure. Identification of subprojects. Scheduling of project on the basis of data concerning staff, resources, time and costs. Organization and financing of project (May 1979 to December 1979)
- (c) Implementation      Implementation of different subprojects following specific individual time schedules. Follow-up of projects at appropriate intervals.
- (d) Evaluation            Final summing up, including analysis and evaluation of results, as well as writing of reports on projects implemented.

#### V. THE PREPARATORY PHASE

A working group responsible for the project was formed with representatives from the parish councils in the three parishes taking part in the project, the municipality, the University of Jönköping and the Ministry of Agriculture. This working group gathered ideas, provided information, made contacts with the authorities, initiated planning, etc., in order to create a sound basis for the project. In addition, the parish councils and the Vetlanda municipality collected data so that the situation in the project area could be correctly described from the outset. Preliminary contacts were also established with various authorities which were likely to be interested in participating. Information on the project created a certain curiosity even at this early stage. The preparatory phase is now considered terminated, and the project can therefore proceed to the planning phase.

#### VI. THE PLANNING PHASE

The major tasks in the planning phase are the following:

- To decide upon the actual form and context of the various proposals put forward;
- To devise an adequate structure for the project as a whole;
- To organize the project in order to facilitate future work;
- To create the economic conditions necessary for different subprojects;
- To ensure that the structure of the project is scientifically acceptable.

The planning phase will gradually merge into the project phase as conditions necessary for the commencement of the different subprojects are created.

#### VII. THE STRUCTURE OF THE PROJECT

The project will address a number of major societal functions. A coherent programme is to be drawn up for each principal function; describing the specific subject areas for study in the different subprojects. The areas so far identified are:

- Natural resources planning
- Energy supplies
- Small enterprises
- Waste recycling
- Education

A general administration will be responsible for questions concerning the project as a whole, such as organization, planning, financing, co-ordination, follow-up and information. The subprojects to be carried out in each programme area will be financed in various ways; links will be established with research institutions or equivalent bodies. Research will be interdisciplinary and, in the first place, will take the form of so-called action research, i.e. research in parallel to, and in close association with, field work. In this way, each research worker will be directly involved in the development process and have an opportunity to influence the change, study its effects and benefit from new knowledge and experience gained in research work within a framework of continuously interacting phenomena. Project work can include activities in the area which are run on an idealistic basis. This type of activity is particularly important for stimulating and engaging the interest of the local population in the development process.

The implementation of an ecodevelopment project should be perfectly possible on the basis of existing knowledge. The inhabitants of the project area should themselves decide on the projects to be carried out, with subsequent approval by the municipality. In cases where ecologically justified measures run counter to existing rules and regulations, it should be possible to waive them.

#### VIII. PROGRAMME AREAS

##### Natural resources planning

The aim in this programme area is to devise a planning method which is more oriented than hitherto towards the thrifty management of natural resources. The objectives of natural resources plans are determined by three quality requirements: environmental quality, quality of life and quality of socio-economic conditions.

The work is expected to result in:

- An inventory of the natural resources of the area and a description of how these resources are used today;
- An account of conflicting interests and of the experience gained with the working methods applied;
- Different proposals for the future use of the resources of the area;
- A draft model for future natural resources plans;

- A comparison with traditional community planning.

#### IX. ENERGY SUPPLIES

Work in this programme area will comprise an investigation of how energy flows within the area could be changed so as to permit better use of local natural flows, while simultaneously meeting the requirements for ecological balance and the attainment of socio-economic goals.

The following subprojects have been identified:

- Mapping of existing sources of energy within the project area;
- Mapping of the present energy flows within the area;
- Identification of criteria for the design of an optimum energy system;
- Design of an optimum energy system based on the wishes of the local population, on the use of existing local sources of energy and on existing ecological, technical and economic conditions;
- A plan for the transition to an optimum energy system.

#### X. SMALL ENTERPRISES

Taking into account the natural resources of the area, as well as the needs, qualifications and ideas of the inhabitants, a study is to be made of the scope for setting up small enterprises and handicraft industries in order to increase employment in the area. A preliminary analysis will define the present structure of small enterprise operations and describe previous types of activities in the area, identify remaining skills and qualifications and collect current ideas about suitable development projects.

On the basis of the analysis, it should be possible to arrive at some economically sound projects for implementation. The following aspects should be taken into account: marketing prospects, profitability, financing, manpower and local needs.

#### XI. RECYCLING OF WASTES

The aim of the activities in this area will be to develop alternative systems for future waste handling in the project area, with a view to promoting recycling. Special attention will be given to the potential contribution of individual households. The present and likely future structure of wastes will be studied within the framework of the natural resources plans. Alternative waste management systems will be examined from the point of view of consequences as well as possible obstacles to their introduction.

#### XII. EDUCATION

Work in this area is expected to set in motion a continuous process for training the inhabitants in project-oriented subjects. Study circles running in parallel to participation in various project activities will help to increase knowledge and promote involvement in the ecodevelopment project.

A detailed study of the project is expected to be published in mid-1981 by Chalmers Technical Institute, Gothenburg, Sweden.

STYLES DE VIE ET DE DEVELOPPEMENT DANS LE MONDE  
OCCIDENTAL: EXPERIENCES ET EXPERIMENTATIONS 1/

Rapport préparé par M. M. SCHIRAY\*

à la demande des secrétariats du PNUE et de la CEE

Summary - The French text below on "Civil Society and social experiments" is the second part of a paper originally prepared by Ignacy SACHS and Michel SCHIRAY. The first part contained an analysis of the chief parameters of the economic, social and cultural crisis facing Western societies: standardization of lifestyles; cultural and social alienation; social inequalities and even poverty; growing unemployment and labour market problems; failure of the welfare systems; and so on. Attention is also drawn to the environmental dimension: unbalanced use of space with excessive urbanization, on the one hand, and desertification of extensive rural areas, on the other; waste of resources and growing exploitation of energy and raw materials of third world countries, resulting in an unbalanced distribution of resources at world level; pollution of urban and rural environments and destruction of basic material assets; and socio-cultural aspects of the environment problem within the framework of the United Nations Conference on the Human Environment.

In the search for alternative patterns of development and lifestyles the industrialized societies would seem to have relatively wide freedom of manoeuvre at the domestic level, given their economic wealth. Much emphasis is placed on various alternatives for time use by society, e.g. the choice between a bigger economic surplus or more time available for non-economic activities; more adequate distribution of work and leisure within society as a whole and for individuals, both during the day and over the life span; and the development of informal economic activities to produce goods and services of direct use.

In choosing alternatives, the industrialized societies also have an international responsibility, in particular vis-à-vis third world countries. With reference to current policy approaches in such important fields as the environment, energy resources, regional planning, quality of life, consumption and public participation, attention is drawn to the very limited effects of action by States. One of the conclusions is that institutional factors play a decisive role in social change, and that new patterns of development and lifestyles will depend to a large extent on the prospects of transforming the power relations between the State, market forces and the "civil society" (defined in the text as "all social actors or formal or informal organizations which are neither the product of market forces nor agents of the State").

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(CIRED), Paris.



The "civil society" generates multiple forms of opposition to the dominance of the market and the State over development patterns and lifestyles. Examples of group action to demonstrate new solutions to problems of daily life and of social innovation and experiments developed locally by the "civil society" are to be found in all countries. The study presented below centres on observation and analysis of economic and social change at this local level; it examines a wide range of experience related to human settlements, rural and urban development, communal life, consumption, health, appropriate technology, quality of working life, education and training.

Within the context of new patterns of development and lifestyles, the interest of these local initiatives lies in their capacity to generate genuine social dynamism that may lead to structural change and the redistribution of power in favour of the "civil society". Governments and public institutions might support the development of such initiatives; they are already doing so in several ECE countries, International organizations could also assist in spreading the message of this concrete experience in different countries and thus promote a broad debate on development alternatives and new lifestyles.

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#### NOTE LIMINAIRE

Devant l'ampleur du sujet, il ne saurait être question de prétendre aller au-delà de l'identification de quelques tendances lourdes, qui caractérisent le développement et les styles de vie des sociétés industrialisées et la sélection de quelques expériences et expérimentations récentes.

Il existe, en effet, une extrême variété de situations entre les différents pays et à l'intérieur de chacun d'entre eux. Il est difficile d'englober dans un même discours des pays aussi différents, par exemple, que les Etats-Unis, la Suède, le Danemark, l'Allemagne, la Suisse, dont les revenus par habitant, les plus élevés du monde occidental, sont pourtant comparables. Les limites du produit national brut par tête comme indicateur du développement sont trop connues pour s'y étendre.

Il conviendrait plutôt, de notre point de vue, d'insister sur les différences écologiques, culturelles et institutionnelles, en particulier sur les manières diverses dont s'articulent les rapports entre le marché, l'Etat et la société civile. (Le concept de société civile est utilisé dans ce texte d'une manière très large, et recouvre l'ensemble des acteurs sociaux ou des organisations formelles ou informelles qui ne sont ni issus des forces du marché ni ne sont des agents de l'Etat).

Il est cependant possible, si l'on devait résumer l'évolution de la période de l'après-guerre, de dégager certaines tendances communes:

- une croissance rapide, fondée sur l'industrialisation et le développement des services marchands et publics, "la tertiarisation", a été partagée par l'ensemble des pays;
- la transformation des structures de production s'est accompagnée de changement profonds dans l'aménagement du territoire avec une très forte poussée de l'urbanisation, la croissance démesurée des zones métropolitaines et, comme contrepartie, un abandon progressif des campagnes;

- la croissance a certainement conduit à une très forte élévation du revenu disponible par habitant et, donc, du niveau de vie, défini par la consommation matérielle et de services. Mais, dans cette conception restrictive, le niveau de vie n'est pas synonyme de qualité de la vie;

(A des fins analytiques, il convient, en effet, de distinguer le niveau de vie, auquel correspondent des indicateurs précis de consommation, le mode ou le style de vie qui peuvent être partiellement décrits en complétant les aspects quantitatifs par certains indicateurs qualitatifs, et la qualité de la vie qui implique forcément des jugements de valeur, donc des éléments de subjectivité. La croissance a permis une généralisation importante de certains biens comme la voiture, le matériel électro-domestique ou la télévision).

- tous les pays ont connu une poussée considérable de l'éducation, de la santé ou de la sécurité sociale.

(La plupart d'entre eux ont vu la généralisation du modèle du "Welfare State", c'est-à-dire la prise en charge par l'Etat d'un ensemble de services sociaux et, à travers des systèmes de redistribution divers, de la retraite, des allocations familiales et du chômage. L'existence de l'alternative socialiste des pays de l'Est n'est certainement pas étrangère à cette situation, comme au souci de plein emploi qui a été très présent dans les politiques des Etats. Ainsi, jusqu'au début des années soixante-dix, la croissance s'est réalisée avec un coefficient très élevé d'emploi de la population active et un recours massif, dans les pays les plus industrialisés, à la main d'oeuvre étrangère, appelée surtout à assurer les tâches les plus pénibles).

...

#### SOCIETE CIVILE ET EXPERIMENTATIONS SOCIALES

Ce n'est pas par hasard que l'on assiste aujourd'hui, face à l'engrenage lourd et uniformisant de la civilisation industrielle, à un véritable foisonnement de la vie associative, même si elle recouvre des réalités très diverses et contradictoires. Cette poussée est un fait qui a conduit la plupart des gouvernements à proclamer et à mettre en oeuvre, à des degrés divers, des politiques d'ouverture à la participation comme antidote à l'emprise croissante des entreprises géantes et à la bureaucratisation des structures étatiques. Cet élargissement des espaces autonomes est à la base des expérimentations sociales les plus fécondes, qui traduisent un changement dans les rapports de force de la société civile avec le marché et/ou l'Etat, même si parfois l'Etat peut l'appuyer. C'est ce que nous tenterons de présenter à partir d'exemples où des expériences "en vraie grandeur" ont été engagées.

Il ne s'agit pas de prétendre dresser un inventaire des expérimentations sociales, qui sont à la fois trop nombreuses et mal connues. On s'attachera surtout à procéder à une illustration en ordonnant certains exemples en fonction de la prise en charge des différents domaines de la qualité de la vie, pour montrer le champ, non des possibles, mais des réels (1).

Attachés à ne retenir que des cas qui paraissent les plus porteurs d'avenir, on a délibérément laissé de côté les expériences qui cèdent au mirage de l'éclatement de la société industrielle complexe en un archipel de communautés autosuffisantes, renfermées sur elles-mêmes. Les mouvements de contre culture et les expériences de repli communautaire restent cependant un phénomène important de notre temps. Les sociétés pluralistes se doivent de leur laisser une place.

Mais ceci ne signifie nullement qu'ils offrent des solutions généralisables, même si l'on ne doit pas négliger la diffusion idéologique de nouvelles valeurs qu'ils peuvent avoir sur l'ensemble de la société.

Il nous semble, en effet, qu'un changement durable passe par l'instauration d'une dynamique institutionnelle nouvelle qui change les rapports de force entre le marché, l'Etat, et la société civile au profit de la dernière.

Quelques remarques préliminaires de définition s'avèrent cependant nécessaires. Devant les significations et les discours multiples, voire contradictoires, que le terme d'expérimentation sociale prend aujourd'hui, il semble important d'apporter quelques critères de démarcation, en particulier concernant, d'un côté, la différence entre innovation et expérimentation et, de l'autre, entre expérimentation et mouvement social (2).

Les expérimentations sociales peuvent être définies comme des actions menées par des groupes ayant une emprise sur une situation relativement délimitée pour apporter des solutions propres à leurs problèmes, en modifiant simultanément leurs rapports avec le marché et/ou l'Etat. Dans cette première approximation, nous voulons souligner deux composantes de l'expérimentation sociale: la proposition et/ou la mise en oeuvre de solutions nouvelles, d'une part, et la transformation des rapports sociaux ou institutionnels, d'autre part. Ceci découle de notre démarche qui situe la recherche de réponses alternatives dans des sociétés caractérisées par l'appropriation croissante des pouvoirs de décision par les forces du marché et de l'Etat, sur des sphères de plus en plus larges de l'activité sociale. Les expériences qui nous intéressent sont celles visant une créativité sociale en même temps qu'elles permettent à des groupes d'individus (la société civile) de se réappropriier le contrôle sur des aspects de leur vie. Cette réappropriation va forcément de pair, de façon parfois conflictuelle, avec une mise en cause des pouvoirs du marché et/ou de l'Etat.

L'expérimentation sociale implique donc, sans s'y limiter, la mise en oeuvre de solutions nouvelles, qui constituent le versant innovation sociale. L'innovation sociale peut concourir à l'amélioration de la qualité de la vie mais elle ne vise pas per se des processus de changement des rapports sociaux. On doit aussi se démarquer des positions qui considèreraient l'expérimentation sociale comme la forme la plus appropriée de changement social, au moins pour deux raisons.

D'un côté, l'expérimentation sociale n'existe que par rapport à un contexte donné, concernant un groupe social particulier et n'intégrant pas de manière évidente des dimensions d'intérêt plus large. Sa dimension forcément ponctuelle ou locale pose de façon accrue ce qui est partagé par toute forme de changement social, à savoir l'harmonisation entre l'ensemble des objectifs sociaux perçus à des niveaux spécifiques et à un niveau général. Ceci exprime les aspects toujours contradictoires de chaque expérience isolée.

De l'autre, l'expérimentation sociale implique un ensemble d'individus qui acquiert un accès aux ressources nécessaires pour mettre en oeuvre des projets, généralement précis, délimités dans l'espace et qui contournent la logique de fonctionnement du système. Il s'agit d'une mobilisation pour apporter des solutions novatrices. Ce qui fait sa richesse en constitue en même temps ses limites, à savoir celles de son champ d'intervention. C'est justement cette capacité de réalisation plus ou moins immédiate sans changements importants préalables dans la société qui différencie l'expérimentation sociale de mouvements qui ont des objectifs à plus long terme ou plus globaux ou qui visent explicitement la transformation d'institutions existantes. Les enjeux sociaux dans ce dernier cas sont en effet d'une autre envergure et se placent à un niveau qui dépasse la capacité de mise en oeuvre de réponses alternatives

concrètes, si riches soient-elles, propres à l'expérimentation sociale. Pour cela, le changement social ne peut provenir que de mouvements sociaux de contestation à plus grande échelle. Le mouvement nucléaire en constitue certainement un des exemples actuels. Le mouvement norvégien, "The future in our hands", qui s'étend aujourd'hui en Scandinavie, en posant à l'opinion publique le débat sur les choix de styles de vie et de développement dans leur ensemble, en est certainement un des plus nouveaux.

Une deuxième série de remarques concerne le rôle de l'Etat dans le développement de l'expérimentation sociale. Les initiatives de la société civile s'opposent souvent à l'intervention des institutions publiques. Pourtant, face aux pouvoirs du marché, il appartient largement, selon nous, au planificateur de permettre à la société civile de s'organiser et de développer des actions collectives pour prendre en charge, au niveau local, la résolution d'un ensemble de ses besoins et de définir des styles de vie propres. Ceci appelle des dispositions institutionnelles et financières appropriées.

L'action de l'Etat nous semble pouvoir se discuter et se situer entre deux pôles de risques: d'un côté, le risque de la "récupération" qu'on assimilera davantage à l'étouffement" des expérimentations sociales plutôt qu'à leur "intégration" dans les institutions de l'Etat et, de l'autre, celui de se décharger, sur les populations concernées, d'un ensemble de charges qui lui incomberaient. Ceci n'est pas une discussion abstraite. Dans les exemples qui suivent, on a tenté de mettre chaque fois en évidence le rôle de l'Etat. L'intervention publique se manifeste de façon très diverse: par un soutien, parfois même par l'impulsion, quand il ne s'agissait pas d'un conflit sans issue.

S'il est vrai que la plupart des cas sélectionnés expriment un renforcement des groupes concernés par rapport aux pouvoirs publics, on peut remarquer que l'Etat n'est pas un bloc monolithique. Des divergences d'attitudes, voire des contradictions, existent à l'intérieur de l'Etat central, et, de surcroît, si l'on considère de façon la plus large la notion d'Etat, ces divergences sont souvent très marquées aux différents échelons nationaux, régionaux et locaux, les municipalités apparaissant souvent comme les plus favorables à l'expérimentation sociale à la base (3).

Ainsi, à travers les exemples décrits, on peut voir se dessiner, dans beaucoup de pays, et même au niveau central, des éléments de politique favorable aux actions collectives de la Société civile. C'est ce que nous reprendrons rapidement à la fin.

La diversité et le dynamisme des expérimentations sociales rendent malaisé, voire arbitraire, l'effort de classification. Processus de réappropriation par les groupes concernés du contrôle et du choix sur leur style de vie, l'expérimentation sociale, selon le niveau auquel elle est engagée et les contraintes externes rencontrées, peut toucher des domaines extrêmement variés, hors de la production ou dans la production.

Ainsi à côté des expériences radicales de changement de styles de vie, le plus souvent en marge du système économique et social, et qui peuvent toucher l'ensemble des aspects de la vie, on peut observer un foisonnement d'initiatives touchant aux champs les plus divers: l'habitat, l'aménagement régional, rural ou urbain, la consommation, la santé, la formation, l'information, les techniques appropriées et qui peuvent concerner en même temps la gestion de l'environnement et des ressources, l'emploi, la qualité de la vie au travail ou la qualité de la vie en général.

Nous présenterons cependant les diverses expériences selon différentes approches:

- par l'habitat, comme approche globale prenant en compte l'ensemble des aspects des styles de vie et de la production ou de l'aménagement régional;
- par l'habitat et l'aménagement urbain;
- par la consommation;
- par les techniques appropriées;
- par la qualité de la vie au travail;
- par l'éducation et la formation.

(a) Habitat, approche globale de l'expérimentation sociale

L'approche par l'habitat, au sens le plus large, apparaît pertinente pour aborder l'expérimentation sociale en permettant de préciser le cadre territorial et la collectivité concrète qu'elle implique. Elles concernent en effet, des groupes donnés, visant, sur un territoire donné, un contrôle de l'organisation de multiples aspects de leur vie qui peuvent toucher tout à la fois les champs de la production, de la consommation, de l'environnement et du cadre de vie.

L'unité territoriale, par ses caractéristiques propres, définit à elle seule des champs de l'expérimentation sociale en fonction de son degré d'intégration dans un ensemble plus vaste qui lui impose des contraintes physiques, sociales, institutionnelles et économiques. Ainsi n'est-il pas étonnant que les expériences les plus poussées de recherche d'alternatives soient étroitement associées à l'occupation parfois illégale d'espaces territoriaux et que l'on peut rappeler brièvement.

En milieu rural, à côté de nombreuses et anciennes tentatives communautaires qui ont opté pour l'autosuffisance relative et la marginalisation, on assiste à des expériences collectives dans lesquelles une rupture profonde dans les modes de vie associée souvent à des productions autonomes, n'excluent pas l'échange avec l'extérieur. C'est le cas, par exemple, dans le large mouvement de coopératives agricoles, en Italie, créées par de jeunes chômeurs sur des terres abandonnées. Beaucoup d'entre elles s'efforcent de développer de nouvelles productions, tout en instaurant des rapports, y compris commerciaux, avec certains groupes sociaux urbains. Une des expériences sans doute les plus marquantes, en Europe, concerne à cet égard le mouvement des coopératives de LONGO MAI (4) qui coordonne aujourd'hui sept exploitations rurales dans divers pays et seize entreprises ouvrières de production. A la recherche de styles de vie radicalement différents, ce mouvement associe l'effort de développer des réseaux d'échanges propres extrêmement larges, très fortement ouverts en particulier aux pays du Tiers Monde.

En milieu urbain, certaines expériences d'occupation de logements dans les actions de "squattting" - ont permis de pousser très loin la recherche collective pour de nouveaux modes de vie. La plus connue est certainement, en Europe, CHRISTIANIA à Copenhague (5), au Danemark, où depuis plusieurs années, dans un vaste espace occupé, proche de la ville, s'expérimentent de nouvelles formes de vie collective. Tolérée jusqu'à présent par la municipalité, l'expérience semble cependant plutôt se marginaliser, sans avoir pu engager un processus de développement durable et une dynamique institutionnelle qui puisse s'imposer aux autorités. L'impact extérieur, ne serait-ce qu'au plan idéologique, ne saurait être sous-estimé.

Indépendamment d'autres dimensions, ces actions posent comme préalable à tout changement l'accès et le contrôle de la ressource la plus élémentaire: un lieu (lieu d'habitation d'abord et lieu de production ensuite).

On peut leur opposer toutes les actions collectives qui se définissent à l'intérieur d'un espace territorial donné et qui visent à une plus grande maîtrise d'une communauté sur ses conditions de vie à partir d'une transformation des rapports sociaux qui les régissent, à commencer par leur rapport avec les forces du marché et les institutions de l'Etat. Ces actions se situent à des niveaux très différents selon la taille des groupes qu'elles engagent et la communauté d'intérêt autour de laquelle ils se forment.

Le domaine de l'habitat, du cadre de vie et du développement urbain, est sans doute le plus riche d'expériences les plus diverses. Le plus souvent ponctuelles autour d'un problème particulier, qu'il s'agisse d'actions sur des logements, sur des problèmes d'environnement ou pour apporter des solutions à des problèmes particuliers, comme la garderie d'enfants, beaucoup de ces expériences ont pénétré des champs de la vie extrêmement larges. La diversité des contextes et des dynamiques créées a également donné lieu à des formes d'organisation les plus variées.

On examinera d'abord un groupe de trois expériences qui touchent largement au développement régional et donc à l'aménagement du territoire, c'est-à-dire à l'habitat au sens le plus large. Dans la première, l'ampleur du processus de participation des habitants conduit à orienter la croissance même de la ville. Dans la deuxième, il s'agit d'une action contre le déperissement économique d'une ville moyenne. La dernière enfin concerne une intervention contre le dépeuplement de petites régions économiquement marginalisées.

Un exemple certainement très privilégié est celui de la ville de PAVIE, non loin de Milan, dans le Nord de l'Italie, que certainement beaucoup connaissent (6).

L'expérience a atteint un seuil de développement tel que, malgré les quelques réserves que certaines pourraient formuler, elle constitue, pour notre approche, une référence essentielle, ne serait-ce que par le degré d'organisation institutionnelle très décentralisée atteint, le caractère durable de l'expérience, l'ampleur du champ couvert, sans négliger l'impact sur le développement régional, dès lors que la population a acquis une certaine maîtrise sur l'orientation de la croissance de la ville.

C'est sur la base d'un très large mouvement populaire impulsé dans les années 1968-69, que les habitants de cette ville de près de 100,000 habitants, se dotant d'organisations volontaires dans les quartiers, ont mis en échec un pouvoir municipal très traditionnel pour élire une équipe très favorable à leur mouvement. La nouvelle municipalité instituait, dès son arrivée, des comités de quartier, élus par les résidents, et dotés d'attributions sur les grandes orientations de la vie quotidienne et bientôt sur la gestion quotidienne du quartier, en particulier de certains équipements collectifs.

Les comités ont ainsi été les instruments de la participation des habitants - dont le taux enregistré a été particulièrement élevé - à l'élaboration du Plan régulateur général de Pavie. Ce plan constituait une rupture totale avec le plan retenu par l'ancienne municipalité: par exemple, le niveau de croissance, prévu à 250,000 habitants pour 1985, était ramené à 102,000, de façon à privilégier la construction des équipements collectifs, limiter la spéculation foncière et maintenir sur place les industries existantes.

La participation des habitants s'est progressivement élargie du champ de l'habitat à l'ensemble des aspects de la vie urbaine: la production, avec la mise en place de conseils d'usine et comités d'entreprise, de sections créant ainsi le lien entre comités de quartier et syndicats; la consommation, avec la lutte contre la vie chère impulsée par la municipalité. Ce dernier champ d'action a donné lieu, d'abord, à la mise en place d'un local de vente municipal pour concurrencer les commerçants, puis, à la création de deux coopératives associant certains commerçants à des producteurs et soumises au contrôle de prix et de qualité par la municipalité. Ces actions ont finalement persuadé les commerçants de la ville de négocier avec la municipalité le contrôle de prix de certains produits alimentaires.

Il est certain que l'ampleur de l'expérience de Pavie tient beaucoup à la venue au pouvoir d'une municipalité largement favorable au mouvement initialement engagé. L'alliance, parfois conflictuelle, entre la population, à travers les comités de quartier et les élus, a permis une avancée considérable de la démocratie locale et une maîtrise accrue de la population sur la plupart des aspects de la vie quotidienne et du développement urbain.

C'est une expérience, à maints égards, opposée qu'a connue JAMESTOWN (7). Cette ville moyenne de l'Etat de New-York, aux Etats-Unis, connaissait un déclin très net depuis la dernière guerre mondiale. Début 1970, une des plus grandes entreprises locales ferme, d'autres s'en vont. Le chômage atteint un niveau élevé. Résultats et causes, les rapports de travail sont particulièrement tendus dans les entreprises, entre travailleurs, syndicats et dirigeants.

Ici, c'est à travers une mobilisation et une concertation de l'ensemble des partenaires sociaux, municipalité, dirigeants de certaines entreprises et syndicats, que s'engage en 1971 un processus de développement local global ("comprehensive economic development"). Des structures sont créées: un Comité d'organisation du travail de la région de Jamestown (Jamestown Area Labour Management Committee) au niveau de la ville, puis progressivement à l'intérieur de certaines entreprises. L'objectif est d'assurer une "rénovation" de la production des entreprises en créant de nouveaux rapports de travail.

Des actions sont menées à l'intérieur des entreprises, d'autres au niveau de la collectivité pour soutenir les premières. Les résultats sont édifiants: modernisation très poussée de certaines unités, relance de quelques autres. Le climat à l'intérieur des entreprises s'est considérablement amélioré grâce à la participation des travailleurs et l'amélioration de la qualité de la vie au travail. La situation favorable a même permis d'attirer une nouvelle entreprise en créant plus de 2,000 emplois.

Désormais, les rapports entre la municipalité, les dirigeants et les travailleurs se sont modifiés. Leur coopération se développe au niveau municipal sur des champs nouveaux: programmes de formation, actions d'urbanisme, au niveau des transports, de l'information, domaines qui appartenaient auparavant aux prérogatives exclusives du secteur privé.

L'expérience déborde aujourd'hui de son cadre local. Dès 1973, elle recevait un appui de l'administration fédérale sous la forme d'une subvention de l'Administration de développement économique (Economic Development Administration). Aujourd'hui, un projet plus vaste de création d'un réseau (Project Network) pour soutenir et mettre en relation des expérimentations voisines, bénéficie du concours d'agences fédérales: plus de 100 projets ont déjà été dénombrés.

L'expérience qu'a connu un groupe de petites îles de 800 habitants sur la côte nord-ouest de la Norvège, et connue sous le nom de Projet de ROST, illustre une action de formation centrée sur le développement de petites communautés, dont la seule ressource est la pêche et qui se dépeuple très rapidement. Le seul avenir qui se dessine est la transformation en un îlot de tourisme (8).

L'initiative en revient, en 1972, au responsable local de l'enseignement qui propose une mobilisation de la population à partir d'une formation professionnelle. Les locaux scolaires sont utilisés pour développer des cours techniques pour adultes. Bientôt, l'enseignement débouche sur l'action. Un processus de diversification des activités locales est engagé. Tenant compte des conditions spécifiques locales, en particulier maritimes, cinq projets sont élaborés: atelier de réparation d'équipements électroniques, un atelier de mécanique, des services collectifs divers, aquaculture et des activités de contrôle sur le tourisme. une Société de développement local est constituée à l'initiative de la population.

A partir de là, l'expérience bénéficie de conditions exceptionnelles. Réticent au début, l'Etat se montre, à l'égard de cette mobilisation et l'intérêt des projets, particulièrement bienveillant en débloquent des moyens très importants (plus de deux millions de dollars).

Malgré la réserve de certains sur ce déversement de capitaux qui peut certainement changer la nature de l'expérience, ce qui nous semble important c'est comment une action de formation autonome, à la base, entreprise dans des cadres inhabituels, peut libérer la capacité d'initiatives d'une population victime de la défaillance du secteur privé et de l'absence d'initiatives publiques, et ainsi renforcer la recherche d'un nouvel équilibre dans l'aménagement du territoire.

Nombreux sont les exemples d'efforts collectifs de la société civile, souvent avec l'aide des collectivités locales, pour lutter contre la désertification du monde rural et en particulier de régions progressivement marginalisées. Il nous semble qu'à côté des expériences locales de communautés menacées, il ne convient pas de sous-estimer certaines tentatives de remises en valeur de terres agricoles abandonnées par des groupes de personnes venant du milieu urbain.

Ce mouvement de "retour à la terre" évoqué précédemment peut être très divers. A côté des très nombreuses expériences communautaires de repli sur soi ou d'organisation de circuits totalement ou largement parallèles au marché et aux institutions existantes que l'on peut interpréter avec prudence, certaines de ces communautés, très sensibles à l'expérimentation sociale, peuvent parfois être des agents actifs de développement local, dès lors qu'elles s'ouvrent sur le monde extérieur et, en premier lieu, les sociétés dans lesquelles elles s'installent.

#### (b) L'approche par l'habitat et l'aménagement urbain

En milieu urbain, au niveau des quartiers, les actions initiées par les populations sont particulièrement nombreuses. La majorité cependant concernent des opérations de défense et d'opposition à tel aspect des logements et du cadre de vie, animées par d'innombrables associations. Il ne convient pas de les sous-estimer. Elles ont, dans de très nombreux lieux, imposé certains choix et ont certainement concouru à l'amélioration du cadre et des conditions de vie des habitants, soit en empêchant la réalisation de certains projets, soit au contraire en favorisant d'autres.



Nous privilégierons pourtant certaines d'entre elles où, passant du stade défensif à un stade plus offensif, les populations se sont organisées pour construire et réaliser leurs propres projets, apportant ainsi des solutions propres à leurs besoins.

Nous présenterons, en premier lieu, un processus de développement local par les habitants dans un quartier, puis une lutte de quartier au cours de laquelle les habitants se sont transformés collectivement en urbanistes. Enfin, nous évoquerons rapidement quelques tentatives à plus petite échelle.

GRAIGMILLAR est un quartier pauvre d'Edimbourg, en Ecosse, de 25,000 habitants. Il y a 16 ans, des résidents prennent l'initiative de créer un festival populaire des arts pour le quartier, en réaction au Festival International des Arts d'Edimbourg (9). Ils créent la Société du Festival de Craigmillar. Fondée sur une large participation de la population, cette opération prouvait la capacité des habitants à s'organiser dans un domaine dont ils étaient jusqu'alors exclus.

Progressivement, l'expérience va déborder pour intervenir sur l'ensemble des besoins du quartier et couvrir, avec les différents groupes qui lui sont liés, la plupart des aspects de la vie locale.

La Société du Festival de Craigmillar est aujourd'hui une organisation de développement de quartier, disposant d'un centre communautaire et d'un établissement d'enseignement supérieur. Elle fonctionne avec une petite équipe permanente et une large participation de bénévoles y consacrant une partie de leur temps libre. Elle a su, à travers un double processus d'apprentissage et de recherche de solutions appropriées, développer ses propres compétences qui se sont très vite imposées aux autorités locales. Elle a ainsi bénéficié de subventions locales, puis nationales.

Elle a, en effet, prouvé sa capacité de travail avec l'administration et les actions entreprises se sont avérées efficaces et très économiques, ce qui n'était évidemment pas indifférent pour les autorités. Par exemple, les activités pour les personnes âgées ont réduit les dépenses publiques d'hospitalisation; les actions auprès des jeunes ont réduit la délinquance. Mais, par ailleurs, dans un contexte où 20 à 30% des adultes masculins étaient touchés par le chômage, la société développait un programme de création d'emplois (Employment Working Party) portant sur plus de 100 emplois nouveaux en 1976.

Notons qu'à côté d'emplois rémunérés, s'inscrivant dans une économie de marché, étaient également développées des activités "hors marché" reposant sur l'utilisation du temps libre de certains et améliorant la qualité de la vie des habitants du quartier.

L'activité de la société s'est récemment élargie du domaine des services à celui des activités industrielles. Elle a en particulier obtenu qu'un terrain proche soit converti à l'usage industriel pour implanter une industrie et promouvoir des activités de restauration et de recyclage. Une assistance a été fournie par l'industrie et une banque.

En novembre 1978, la société produisait un plan global de développement du quartier (Craigmillar Comprehensive Action Plan) qui sera négocié avec l'ensemble des autorités concernées. Le plan vise à rompre, par les intéressés eux-mêmes, le cycle de dénuement multiple de la communauté.

En prenant en charge les besoins non satisfaits de la population, en apportant des solutions propres, la communauté a ainsi profondément transformé ses rapports avec la municipalité, l'Etat et le marché. C'est un nouveau partage des pouvoirs qui s'est opéré. Mais il est certain qu'un tel processus accroît l'efficacité de l'intervention des pouvoirs publics, pour l'amélioration de la qualité de la vie des habitants.

L'expérience est aujourd'hui un symbole, encore peu connu, à l'échelle de l'Europe. Récemment, la Commission des Communautés Européennes, elle-même, a apporté son appui.

A ROUBAIX, en France, c'est dans le cadre très conflictuel d'une lutte contre l'expulsion des habitants d'un quartier très dégradé et menacé par un projet de rénovation urbaine que s'organise une action collective de la population (10).

ALMA-GARE est un quartier composé d'une population essentiellement ouvrière dont près de la moitié de travailleurs immigrés. Il regroupe, après un très fort dépeuplement au cours des dernières années, 2,500 personnes en 1978. La lutte est engagée en 1966 et se poursuit pendant plusieurs années à travers de multiples actions collectives de défense contre la rénovation du quartier et l'expulsion. Au cours des années 1973/74, un tournant est amorcé pour prendre un caractère plus offensif.

A l'initiative de la population du quartier, un Atelier populaire d'urbanisme est créé, soutenu par un groupe d'architectes, pour définir techniquement la conception propre d'aménagement des habitants.

Un concours financier du Ministère de l'Equipement est obtenu. Dès lors, le processus est engagé. Il s'appuie sur une participation très active de la population regroupée par commissions. Un inventaire minutieux des maisons est réalisé, des "fiches de santé" établies. Finalement, un projet détaillé est élaboré qui donne notamment une option marquée en faveur d'une réhabilitation de l'ensemble des maisons susceptibles de l'être, garantie du maintien sur place des occupants, tout en prévoyant constructions neuves et équipements collectifs.

L'ampleur du mouvement a été telle que, lors de sa révision, le schéma directeur d'aménagement du quartier, adopté en octobre 1977 par la municipalité, après avoir été revu et corrigé par les habitants, reprend le principe de la réhabilitation et d'autres propositions du projet réalisé à l'Atelier populaire d'urbanisme. L'engagement de reloger sur place l'ensemble de la population a été pris par la municipalité.

La dynamique de l'action collective s'ouvre aujourd'hui vers de nouveaux domaines d'activités. A côté de l'apparition de certains services collectifs, une coopérative est en cours de constitution, pour fournir de l'emploi à des chômeurs du quartier, en participant en particulier à la réhabilitation des maisons.

Ces deux exemples, très différents dans leur histoire et leur contexte, ne sont pas isolés. Tous deux participent, à l'extérieur, d'une dynamique institutionnelle réelle à travers d'autres expériences, et en contribuant à modifier l'attitude de l'Etat. Craigmillar a révélé aux autorités britanniques et même au niveau de la Commission des Communautés Européennes l'intérêt de ce type de développement local. L'Alma-Gare à Roubaix, qui déjà a bénéficié des acquis d'une expérience proche dans le quartier des Marolles à Bruxelles a, à son tour, un effet dynamique pour plusieurs tentatives de création d'Ateliers populaires d'urbanisme dans plusieurs villes de France.

Des organisations, à vocation nationale, comme la Confédération syndicale du cadre de vie, dont des membres locaux ont participé à l'action favorisent cette diffusion. A l'encontre des politiques de participation des habitants à l'élaboration de leur cadre de vie initiées par les pouvoirs publics, dont on sait le caractère le plus souvent formel ou très limité, (11) l'expérience de Roubaix constitue, aujourd'hui, un véritable défi.

La volonté de groupes d'habitants de s'organiser collectivement pour élaborer un cadre de vie et rechercher des modes de vie propres, a pu s'exprimer dans des formes les plus variées. A des degrés divers, les tentatives d'autogestion communales sont nombreuses. Elles semblent cependant les plus poussées dans les communes de petite taille, comme c'est le cas, en France, dans la ville de VANDONCOURT.

Dans tous les cas, elles supposent une volonté délibérée de la municipalité. A l'autre extrême, comme on l'a déjà évoqué, c'est sous une forme illégale que de nombreuses actions d'occupation, plus connues sous le terme de "squattings", d'un espace urbain vacant, qu'il s'agisse d'un immeuble, ou même d'un quartier, ont pu donner lieu à des expériences d'une certaine ampleur.

Entre ces deux extrêmes, on peut signaler les expériences plus ponctuelles "d'habitats autogérés" dans lesquelles un groupe de ménages parfois assez important se réunit pour concevoir et réaliser de nouvelles formes d'habitat susceptibles de fonder des styles de vie propres, privilégiant l'organisation collective des espaces, des activités et de divers services. (12) Cependant, au risque d'être limitées aux catégories sociales relativement aisées, ces expériences appellent un plus large accès à l'espace et au financement de la construction pour l'ensemble des populations.

#### (c) L'approche par la consommation

Sur le champ de la consommation, le mouvement consumériste a certainement occupé le devant de la scène dans la plupart des pays. Le rôle des grandes associations de consommation visant davantage à accroître la rationalité des choix à l'intérieur du marché, plutôt qu'à s'interroger sur les styles de la consommation marchande, a déjà été évoquée.

Mais une remarque générale s'impose si, comme nous le recommandons, on considère de façon la plus large la consommation, incluant l'ensemble des biens et services marchands et celui lié aux activités hors marché, domestiques ou collectives; toutes les expérimentations sociales touchant aux différents aspects des styles de vie et de développement, qu'il s'agisse des technologies, de l'habitat ou des services collectifs, affectent les styles de consommation et sont ainsi, à des niveaux divers, agents de leur transformation.

A côté des mouvements de "simplicité volontaire", importants aux Etats-Unis, mais qui concernent l'ensemble des pays à travers des processus variés, des changements volontaires de styles de consommation ont pu s'exprimer à un niveau domestique comme collectif, à des degrés et dans des domaines divers. Sur le plan alimentaire, on peut rappeler le développement déjà signalé des jardins familiaux ou communautaires, aux Etats-Unis (13) comme dans d'autres pays (14).

Nombreuses sont cependant les actions collectives à la base sur la consommation strictement marchande, en particulier pour les produits alimentaires. Parmi l'ensemble des pays qui ont connu des exemples semblables, on peut se référer plus spécialement aux Etats-Unis, où une gamme d'actions peut être observée. On peut les regrouper en deux catégories: la création des réseaux de distribution et les actions sur les prix entreprises à l'échelle locale (15).

C'est sous des formes diverses que des groupes locaux en de nombreux endroits se sont dotés de structures d'approvisionnement et de vente leur permettant à la fois de contrôler directement leur alimentation, sur le plan qualitatif - notamment en faveur des produits naturels - ou leurs sources d'approvisionnement, et de réduire les prix de vente globaux de leurs produits, abusivement gonflés par les supermarchés: qu'il s'agisse du plus simple ou plus complexe, des clubs d'achat (preorder coops) réunissant plusieurs ménages pour bénéficier de prix de gros; des ententes de consommateurs (food conspiracies) qui constituent de véritables groupes d'actions locaux, réunissant de 100 à 150 personnes, pour agir localement dans les domaines divers économiques, politiques et sociaux, en se "finançant" à partir des réductions de prix obtenues par l'organisation d'un approvisionnement collectif de produits de consommation; les magasins coopératifs (food coops) restent cependant la forme la plus élaborée. Ils regroupent jusqu'à 3,000 personnes. Tout acheteur est à la fois propriétaire et doit y consacrer un temps de travail, en moyenne trois heures par mois. Le personnel permanent est réduit au minimum. A ce niveau, ces institutions sont à même de fournir l'ensemble des produits vendus dans les supermarchés et leur sont réellement concurrentes, leur prix moyen correspondant au prix de gros plus 10 pour cent. Achetés pour la plupart en vrac, les coops en assurent l'emballage.

Le magasin coopératif local s'ouvre très souvent à d'autres activités pour devenir un véritable centre communautaire, où se développent aussi bien des services collectifs comme la garde d'enfants, que des activités culturelles ou des programmes de formation en matière de nutrition, beaucoup plus féconds pour maîtriser son style de consommation que les grandes campagnes nationales à la télévision.

De surcroît, elles se sont élargies, pour beaucoup, en s'organisant en fédérations qui rassemblent de multiples coopératives alimentaires avec des producteurs eux-mêmes organisés en coopératives (petits producteurs agricoles, fermiers, artisans...). Ces fédérations peuvent prendre en charge des achats massifs de certains produits et établir en même temps des contrats à moyen et long terme avec les producteurs.

Plus spécifiquement sur les prix des produits, l'opération récente "Les consommateurs opposés à l'inflation pour les produits de première nécessité" (COIN : Consumers opposed to inflation in the necessities) apparaît un type d'action entreprise à la base et d'envergure nationale (16). Cette action est menée en opposition au plan anti-inflation du Gouvernement, pour montrer que les responsabilités de l'inflation n'incombent pas à la demande ou aux hausses de salaires mais plutôt à la pratique des grandes corporations. L'opération vise à multiplier les mobilisations locales à partir d'enquêtes, d'information et de larges débats publics pour inciter l'Etat à assurer un contrôle des prix sur quatre catégories de produits essentiels: le logement, la nourriture, l'énergie et la santé.

#### (d) L'approche par la santé

La santé apparaît comme un domaine très privilégié de la consommation. Toutefois, le secteur de la santé ne relève que partiellement, et à des degrés divers selon le pays, du marché, davantage des services publics. En même temps, il est un secteur privilégié de la qualité de la vie.

Il est important d'observer qu'alors que le débat sur de nouvelles politiques de la santé semble, au niveau international, porter davantage sur les pays du Tiers Monde, la critique des systèmes de santé est fortement engagée dans la plupart des pays occidentaux, qu'il s'agisse de la dénonciation de la pratique des

trusts médicamenteux et de l'abus des médicaments, ou bien de la pratique médicale en général qui privilégie notamment l'action curative à la prévention.

La situation est, bien sûr, très différente selon les pays, la Suède ou la Grande-Bretagne semblant bénéficier des systèmes de santé les plus avancés. Les Etats-Unis dont le système apparaît sans doute le plus coûteux, étant sans doute un des plus inégalitaires dans ce domaine.

Cependant, dans presque tous les pays, se développent des expériences locales très intéressantes pour la recherche de nouvelles formes d'organisation de la santé, axées sur les actions préventives, qui convergent vers une meilleure prise en charge individuelle et collective et dont les maîtres-mots semblent être la "déprofessionalisation", la "désectorialisation" et le "démédicalisation" des problèmes de santé.

Ces expériences traversent le milieu médical mais elles impliquent très largement les groupes d'usagers, "les consommateurs".

La France elle-même, où la rigidité du corps médical et du système institutionnel de santé est pourtant connue, voit se multiplier les expérimentations sociales, pour promouvoir la médecine de quartier axée sur la prévention à l'intérieur de certaines institutions médicales ou à l'extérieur. Le Centre Mutualiste de Santé de Grenoble a certainement joué un rôle pilote. Depuis, selon les contextes, c'est sous les formes les plus variées que se développent des initiatives locales sous la forme de maisons de santé, de boutiques de santé, de centres communautaires, d'unités de santé de base (USB) ou, plus simplement, de cabinets médicaux. Certaines d'entre elles ne font pas de prestations médicales, uniquement de l'information.

Aux Etats-Unis, la santé a certainement été un champ privilégié d'expérimentations sociales, comme en témoigne la multiplication des "cliniques libres" (free clinics) ou de "centres de soin de quartier" (neighbourhood health centers) créés par des groupes locaux (17), avec comme objectif de développer l'action préventive et de détection en se rendant accessibles à tous, financièrement et géographiquement, mais aussi aux personnes répugnant au recours au système traditionnel de santé, comme les drogués. Autonomes, ces institutions travaillent cependant en liaison avec les hôpitaux pour les soins graves. Elles sont composées d'une faible proportion de médecins et d'une majorité de bénévoles formés "paramédicaux". Autogérées et gratuites pour la majorité des usagers, elles restent forcément tributaires, pour leur financement, de fondations privées.

Malgré leur développement au niveau local, les efforts pour organiser une stratégie nationale des "cliniques libres" pour réformer, au niveau national, le système médical américain, se heurtent cependant à une structure très rigide de la profession et de l'administration fédérale.

Deux expériences paraissent, à des niveaux différents, particulièrement riches: la première concerne une action de médecine préventive fondée sur une participation des habitants, dont les résultats mesurés se sont avérés particulièrement probants. Dans la deuxième, l'approche préventive de la santé a permis d'engager un processus de développement d'une communauté au-delà du champ de la santé.

Peuplée de 180,000 habitants, la province de KARELIE du Nord, Finlande, connaissait un taux exceptionnellement élevé de crises cardiaques (18). A l'initiative de la population, un projet est mis en oeuvre en 1972, avec un soutien du gouvernement. Une première phase d'études mettait en évidence trois

facteurs: l'hypertension, le tabac et un taux élevé de cholestérol dans le sang. Trois campagnes spécifiques furent engagées. L'hypertension a été le mal le plus facilement réglé, de manière curative, par une réorganisation décentralisée des services publics de santé. Le plus grand succès semble avoir été obtenu à travers la campagne contre le tabac, qui a appelé une participation très active de la population.

La question qui s'avérait la plus délicate concernait le cholestérol. Il résultait, en effet, d'un mode de consommation local très dépendant d'une forte spécialisation de la région sur les produits laitiers. Une transformation de la diète alimentaire risquait de bouleverser les structures de production, ce qui n'est évidemment ni simple ni forcément avantageux du point de vue économique.

C'est pour cette action que s'avérait surtout nécessaire le recours aux organisations locales pour mener une action en profondeur à la base. L'Association des Ménagères de MARTHA, en particulier, qui regroupe environ 10,000 femmes à travers 276 associations locales, a mené une campagne, village par village, pour changer les habitudes alimentaires. Aidées par le Gouvernement, les femmes ont également pris en charge une action de formation pour développer une certaine diversification des cultures, notamment en faveur des légumes et des compositions culinaires compensatoires.

Les résultats de cette vaste action de prévention ont été assez immédiats. On observait, entre 1972 et 1977, une baisse très nette du nombre de crises cardiaques et plus généralement une diminution de la mortalité dont le taux passait de 11.9 0/00 en 1973 à 10.6 0/00 en 1977. Les économies réalisées sur les soins classiques dépassaient dès cette période, l'ensemble des coûts, pourtant élevés, du projet.

La santé peut aussi constituer un champ privilégié de pénétration pour engager un processus de développement local fondé sur la participation de la population et promouvoir une action politique prenant en charge les multiples aspects de dénuement des habitants. C'est ce qu'illustre l'expérience d'un quartier pauvre de l'ouest de CHICAGO (19).

Elle concerne une communauté noire de 60,000 habitants qui vit, pour une grande part, de l'assistance publique. Au cours des années 1960, une action avait consisté à ouvrir l'accès des deux hôpitaux qui existaient dans le quartier, à la communauté qui en était exclue. Elle fut victorieuse. Pourtant, plusieurs années plus tard, on constatait que la santé des habitants n'était pas pour autant améliorée.

Mettant en question la médicalisation de la santé, l'organisation de la communauté s'engageait dans l'identification des causes d'hospitalisation. Sept causes principales étaient décelées, contre lesquelles sont progressivement engagées certaines actions de base. D'abord, la plus simple, le ramassage des chiens errants pour freiner les morsures. Une deuxième apparaît très spectaculaire et concerne l'action contre les accidents automobiles. Après une difficile enquête, il apparaît qu'une des causes importantes des accidents, mais aussi des agressions, réside dans le fait qu'une fonction de passage du centre ville à la banlieue a été donnée aux principales voies de circulation du quartier. Une action difficile est alors menée avec le soutien d'organisations extérieures à la communauté, pour modifier le système de circulation de la ville et donner aux voies du quartier une priorité aux relations de voisinage.

Une autre action concernait l'alimentation qui, dans beaucoup de familles, était défectueuse, en particulier en raison d'un manque, saisonnier ou permanent, de fruits et légumes. Sur des maisons disposant de toits plats, furent installés

des potagers. Cette solution est très favorable sur le plan de la gestion des ressources puisqu'elle profitait d'un espace disponible mais aussi de l'énergie des maisons, qui comme on le sait, s'échappe toujours pour l'essentiel par le toit. Motivée pour des raisons de santé, cette activité devenait une production économique, vendue. De plus, la communauté s'organisa pour associer les personnes âgées à cette tâche; les rendant productifs, elles renforçaient leur fonction sociale à l'intérieur du groupe.

Les résultats sur le plan de la santé sont très nets, en particulier dans la diminution des coûts d'hospitalisation pour la communauté. Mais ces actions à partir de la santé ont surtout permis à la communauté de se doter d'une organisation capable d'apporter des solutions nouvelles aux problèmes sociaux, économiques et politiques des habitants.

(e) L'approche par les technologies appropriées

L'expérimentation sociale dans le développement des techniques appropriées offre en partie une réponse aux limites des politiques de l'environnement en matière de développement technique que nous avons évoquées précédemment, qu'il s'agisse de techniques non polluantes, moins intensive en énergie et matières premières et valorisant les ressources abondantes ou plus généralement des techniques génératrices d'emplois, améliorant la qualité de la vie au travail, maîtrisables à un niveau décentralisé et correspondant mieux aux besoins sociaux.

Dans tous les cas décrits ci-après, les technologies appropriées ont été identifiées ou développées à travers des actions collectives à l'initiative de la société civile, qu'il s'agisse de syndicats et de travailleurs ou de groupes de personnes réunies autour d'un projet. Les processus et les biais par lesquels ils se sont engagés sont totalement différents: dans un cas, il s'agit d'abord de la défense de l'emploi; dans un deuxième, d'une recherche de nouvelles formes d'éducation liées à la recherche de nouveaux styles de vie; mais il peut s'agir simplement d'une recherche d'économies.

L'expérience récente des travailleurs de l'entreprise LUCAS AEROSPACE nous semble tout à fait favorable pour introduire notre propos (20); une des raisons, qui n'est pas des moindres, est qu'elle se passe dans une des plus grandes firmes britanniques de l'aéronautique appartenant au groupe multinational LUCAS INDUSTRIES, c'est-à-dire dans un système complexe où les rapports de pouvoir sont particulièrement solides.

La lutte contre les licenciements constitue le point de départ de l'action. Les treize syndicats de l'entreprise commencent par se regrouper au sein d'un comité, le "Combine Shop Steward Committee", pour renforcer leur pouvoir à l'égard de la direction. L'action défensive s'avère inefficace face à la liquidation en cours de secteurs entiers d'activité. Le Comité engage alors un processus offensif, d'élaboration d'un plan pour définir de nouvelles activités à l'entreprise, le CORPORATE PLAN, publié en janvier 1976.

Après une phase de consultations auprès d'organismes extérieurs spécialisés qui se reconnaissent finalement incapables de définir une reconversion globale de l'entreprise, l'initiative est prise d'engager le travail à l'intérieur de l'entreprise. Une vaste enquête auprès de 14,000 travailleurs répartis dans les 17 unités de production, pour connaître et maîtriser l'appareil de production et son aptitude à fabriquer de nouveaux produits introduit un débat interne. A l'issue de dix-huit mois, le Plan est élaboré. Il retient en particulier une douzaine des 150 suggestions de produits nouveaux, concernant des domaines aussi variés que des techniques de valorisation des ressources de l'Océan, pour l'agriculture marine en particulier, des systèmes économiques et alternatifs de

transport, les énergies renouvelables, comme le solaire, et leur application à des secteurs nouveaux comme les transports.

D'emblée, a été posé l'objectif de définir des produits "socialement utiles". Les critères privilégiés concernaient, en particulier, l'économie d'énergie, technologies non polluantes, une durabilité accrue des biens et, si possible, l'aptitude à être maîtrisé par les utilisateurs, en particulier pour en faciliter l'entretien.

En même temps, au cours de l'élaboration du Plan, pour le choix de produits, de techniques et d'organisation de la production, étaient pris en compte, non seulement la création d'emplois, objectif initial, mais aussi l'ensemble des aspects de la qualité de la vie au travail. De nouvelles formes d'organisation du travail sont proposées, à commencer par l'éclatement des systèmes de production existants en unités plus décentralisées et plus autogérées.

Quelle a été l'issue du plan? A première vue, relativement à l'ampleur de l'enjeu d'une transformation profonde à la fois des rapports de pouvoirs internes à l'entreprise avec une participation active des travailleurs à l'élaboration de la politique générale de l'entreprise et à la fois de la logique même de l'entreprise en privilégiant l'emploi, la qualité de la vie au travail et l'utilité sociale de la production à la recherche de profits maximaux à court terme, le bilan de ce mouvement peut s'avérer modeste. Il n'a abouti qu'à permettre le redémarrage de deux unités de production à partir de certaines des propositions du plan.

La force de cette expérimentation sociale ne peut être mesurée seulement ainsi. En démontrant la capacité d'intervention des travailleurs, elle a entraîné une dynamique nouvelle au-delà même de l'entreprise. Des expériences semblables se sont amorcées récemment, dans d'autres firmes, chez Rolls Royce, BAC (à Preston), Chrysler, Clarke Chapman, Vickers et d'autres.

A l'initiative du Comité de travailleurs de la Lucas Aerospace et à l'aide d'un don d'une institution charitable, a été constitué, en février 1978, un centre de recherche (21) pour promouvoir le développement et l'application de produits "socialement utiles" et l'assistance pour la formation d'industries coopératives. Ce centre bénéficie évidemment de l'appui des syndicats, mais aussi d'autres groupes et même du Parlement.

A une toute autre échelle, n'est-il pas étonnant qu'à l'époque de la "crise de l'énergie" et de la "crise de l'environnement", où des moyens considérables sont mis en oeuvre, par les Etats et les plus grandes firmes transnationales, pour le développement de sources d'énergie alternatives au pétrole, que c'est à TVIND petite localité du Danemark, où est tentée une expérience inédite d'enseignement, qu'a été réalisé un des plus grands moulins à vent du monde (22).

Les responsables de l'expérience démontraient en outre que 20% de l'énergie nécessaire au pays pouvaient être produits par un millier d'éoliennes de ce type, ce qui constitue un véritable défi aux choix énergétiques du Gouvernement.

La portée de cette expérience doit être cependant mesurée par rapport à son contexte que l'on peut rappeler rapidement.

C'est en 1970 qu'un instituteur en chômage et cinq professeurs se rassemblent pour fonder une Ecole Populaire Itinérante et rompre avec un système d'enseignement clos en développant une formation ouverte à la vie et au monde extérieur. L'objectif est de développer une vie collective où toutes les tâches sont réalisées par l'ensemble des professeurs et étudiants, à la fois maçons,



ingénieurs, agriculteurs, marins, ouvriers, mécaniciens ou cuisiniers. Le travail manuel y occupe une place aussi importante que le travail intellectuel.

Débuté avec 40 étudiants, le groupe s'est élargi en créant une école normale d'instituteurs et un cours complémentaire pour des jeunes exclus du système d'enseignement traditionnel et comprend aujourd'hui 800 étudiants.

Alors qu'il n'y avait au début qu'une vieille ferme, la trentaine de bâtiments, tous les ateliers et équipements ont été construits par les étudiants et professeurs. La construction de capteurs solaires et les deux moulins à vent devaient permettre, non seulement de couvrir l'ensemble de la consommation énergétique du groupe, mais même de dégager un surplus pour le vendre au réseau régional d'électricité.

Il n'est, par ailleurs, pas indifférent de rappeler que l'école prépare en même temps aux examens officiels et ses résultats sont très bons. C'est pourquoi le Parlement danois apporte un soutien financier au Centre, à concurrence d'une partie seulement des coûts de fonctionnement.

L'Ecole Populaire Itinérante est très ouverte. Elle accueille des étudiants étrangers et organise, pour une part importante de l'enseignement, des voyages d'études à l'étranger, à l'aide de vieux autobus aménagés, en Europe et même en Asie, en Afrique et en Amérique Latine.

C'est aussi à travers des processus beaucoup moins exceptionnels que des groupes de population prennent l'initiative de développer des techniques nouvelles, liées en particulier à une meilleure gestion de l'environnement ou mieux maîtrisables, comme celles concernant les énergies renouvelables, pour laquelle nous ne citerons qu'un cas parmi les innombrables qui se sont réalisés dans pratiquement tous les pays.

Dans le pays de CEDAR (CEDAR COUNTY), une des régions les plus pauvres du Nebraska, c'est essentiellement pour des raisons d'économie sur les coûts qu'un groupe social a mis au point, à partir de l'énergie solaire et éolienne, des systèmes permettant aux petites fermes d'accroître leur autonomie énergétique (23).

Cette initiative, qui a provoqué un intérêt certain au niveau local, mais s'est heurtée à l'hostilité de certaines administrations, comme le Ministère de l'Agriculture, peu intéressé par les petites exploitations agricoles, a finalement obtenu un soutien d'un organisme fédéral (Community Service Administration) pour entreprendre, à travers le "Projet sur l'énergie pour petites fermes (Small Farm Energy Project)", une action de diffusion des techniques mises au point. Le groupe publie aujourd'hui un manuel d'initiation largement répandu.

Il existe ainsi dans la société civile un mouvement croissant d'initiatives locales pour développer des systèmes de production à petite échelle, décentralisée, moins intensives en capital et demandant plus de travail, mais un travail qui s'effectue certainement dans des conditions qualitativement meilleures (24).

Les expériences restent souvent isolées ou ponctuelles. Aussi le projet SUDBURY 2001 concernant une communauté de 170,000 habitants dans l'Ontario au Canada, apparaît-il particulièrement encourageant. C'est à travers une concertation entre les différents partenaires sociaux qu'a été conçue une stratégie de diversification économique à partir d'une recherche explicite de techniques appropriées pour réagir contre la dépendance à l'égard d'une

spécialisation marquée dans les activités d'extraction minière. Cette stratégie dite des 3 "S" est fondée sur l'import/substitution sélective, la souveraineté technologique et l'écodéveloppement (25).

(f) L'approche par la qualité de vie au travail

Nombreuses et diverses sont les expériences d'amélioration de la qualité de la vie au travail à l'intérieur des entreprises, qu'elles aient été initiées par les syndicats ou même souvent par les dirigeants d'entreprise.

Plusieurs travaux ont depuis longtemps montré l'importance de la qualité de la vie au travail pour l'efficacité de l'entreprise (26). Certains gouvernements ont très fortement appuyé ces actions (27).

Cependant, comme on l'a noté, la plupart de ces expériences reste inscrite dans des rapports de pouvoirs donnés et étroitement contrôlés par les dirigeants des entreprises, elle n'implique la participation des salariés que sur certains aspects de la vie de l'entreprise.

Certaines expériences apparaissent cependant très poussées. Pour n'en rappeler qu'une seule, dans l'usine BEROL KEMI, la mise en place d'équipes autonomes de production, sous l'impulsion de la base syndicale, a poussé extrêmement loin l'auto-gestion des travailleurs dans la production (28). L'amélioration très nette de la qualité de la vie du travail est unanimement reconnue. Les dirigeants mettent de leur côté en avant tous les avantages issus de l'expérience pour le climat et la productivité de l'entreprise.

L'exemple cité, à Jamestown, d'une coopération dirigeants-travailleurs au niveau d'une ville même, montre que la participation peut, dans certaines situations, être poussée et que l'amélioration de la qualité de la vie au travail peut être associée à un processus de relance de la production et donc de développement local.

Pourtant les processus propres et endogènes des travailleurs pour transformer l'organisation de la production pour une meilleure qualité de la vie au travail est difficilement dissociable des autres aspects de la vie de l'entreprise comme les orientations générales de la production. Il est intéressant de noter que pour l'exemple décrit de la LUCAS AEROSPACE, la réorganisation de la production n'est qu'un aspect de l'effort global des salariés pour réorienter la production de l'entreprise. Ce processus endogène s'est heurté au pouvoir des dirigeants et à la logique de l'entreprise.

Il n'est donc pas étonnant que les expériences les plus riches d'amélioration de la qualité de la vie au travail soient associées à celles concernant le contrôle des entreprises par les travailleurs, coopératives ou entreprises autogérées.

Nombreuses et anciennes sont les expériences d'organisation collective de travailleurs pour contrôler leur outil et leur production, dans les différents pays et sous des formes diverses.

Le tissu coopératif a largement servi de cadre à ce type d'expériences. MONDRAGON, dans le pays basque espagnol, qui regroupe un ensemble de 65 coopératives, constitue un exemple de viabilité durable, dans une économie de marché, de ce type d'organisation et une référence pour de nombreux observateurs de tous les pays (29). Dans la plupart des pays existent des expériences déjà anciennes et probantes: en France, les chantiers de Roquebrune, regroupant une

centaine de membres, datent de la fin de la deuxième guerre; aux Etats-Unis les usines de contre-plaqué du Nord-Ouest des Etats-Unis remontent aux années 1920-1930 (30).

Notons cependant que pour quelques exemples très significatifs, la plupart des coopératives ouvrières sont restées très classiques dans leur forme d'organisation du travail et même dans les systèmes de pouvoir interne. Le poids du marché dans lequel elles s'inscrivent est certainement une cause essentielle dans la reproduction de système hiérarchisé mais il n'est pas la seule cause (31).

A côté de coopératives qui peuvent regrouper plusieurs centaines d'employés, nombreuses sont également les expériences de création de collectifs de travail qui sous des formes variées regroupent un plus petit nombre de personnes (32).

Une grande diversité de groupements de production de biens ou de services ont en effet renoué avec les aspects les plus novateurs des vieilles utopies coopératives.

Ce foisonnement n'est pas étranger aux effets de la restructuration de la vie économique et sociale liée à la crise des secteurs de production et aussi de certaines professions. Très souvent, en effet, l'impossibilité de maintenir des formes traditionnelles d'activités individuelles et le refus de s'insérer dans des unités plus larges donne lieu à des organisations communautaires. La petite taille de ces unités favorise certainement des conduites de rupture très poussées par rapport à la division sociale qui s'exerce dans les rapports de travail d'une part (désécialisation des rôles, rotation des tâches, gestion collective du temps de travail et des rémunérations...) et par rapport à l'institutionnalisation des rôles sociaux, avec la recherche d'une distribution de produits et de services différents. Ainsi, voit-on apparaître de nombreux collectifs d'avocats, d'architectes, de médecins, d'éducateurs, d'éditeurs ou de libraires à côté de groupements de production agricole ou artisanale ou développant des technologies alternatives.

L'homogénéité professionnelle et idéologique des membres, d'une part, le niveau requis de division technique du travail, d'autre part, limitent évidemment le champ d'action de ces unités.

Mais une problématique semblable traverse, dans le contexte de crise, le renouveau des formes d'organisation coopérative liées au contrôle ouvrier. Les coopératives, quand elles n'étaient pas vidées de leur sens originel, avaient acquis une place spécifique dans le système de production, quoique marginale. Il semble qu'elles soient appelées à jouer un rôle beaucoup plus fonctionnel dans la restructuration en cours. En effet, il apparaît démontré que dans de très nombreux cas, la reprise par les travailleurs de leur unité de production constitue une réponse économiquement viable, au moins de façon transitoire, à la fermeture d'usines, aux licenciements, ou plus généralement, à la crise de rentabilité de certains secteurs. Assurant une fonctionnalité économique en permettant de sauvegarder des activités nécessaires à tout ou partie de l'appareil de production, ce renouveau pourrait répondre à une fonctionnalité sociale en limitant le chômage et les conséquences les plus explosives de la crise.

On peut ainsi formuler l'hypothèse d'un développement d'un dualisme à l'intérieur du système de production marchand avec un secteur à haute rentabilité coexistant avec un secteur coopératif - qui pourrait être fortement autogéré - dont la rentabilité reposerait sur les avantages de l'organisation et la responsabilité collectives (33).

La plupart des pays est confrontée à ce type de situations. En France, l'exemple de LIP en est un symbole vivant, à l'échelle nationale, où après l'échec d'une reprise de l'entreprise par la médiation de l'Etat, les travailleurs ont pris en charge la reconstruction de l'appareil de production.

L'expérience, qui a connu une très forte mobilisation externe, a bénéficié d'un soutien de groupes divers pour redémarrer sous une forme coopérative.

Aux Etats-Unis où ce processus apparaît se multiplier, il semblerait même que se dessinent des politiques délibérées pour soutenir ce type d'expériences.

La prise en charge par les travailleurs de leur outil de travail semble en effet s'affirmer comme une réponse viable face à la défaillance des dirigeants pour lutter contre la fermeture d'usines et la préservation de l'emploi (34).

Ceci, non pas tant en raison des marges de profit moindres qu'acceptent les nouveaux propriétaires des entreprises par rapport aux grandes corporations mais surtout, parce que la propriété collective accroît, dans bien des cas, la productivité de l'entreprise, parfois dans des proportions considérables.

Un exemple connu de transfert de propriété aux travailleurs est, parmi d'autres, celui de VERMONT ASBESTOS GROUP dont 178 mineurs sont aujourd'hui propriétaires.

Mais ceci ne concerne pas seulement des entreprises moyennes. Un exemple récent concernait la ville de YOUNGSTONE où une usine d'acier employant 5,000 ouvriers, après avoir fermé, devait être rachetée par les salariés appuyés par une coalition de membres du clergé de confessions diverses. Un soutien technique avait été apporté par le Ministère du Développement Urbain et de l'Habitat pour montrer la viabilité du projet. Une action avait été engagée pour trouver le financement nécessaire (35).

Certes le contrôle des entreprises par les travailleurs n'est pas forcément synonyme d'autogestion. Des exemples montrent qu'il peut y avoir reproduction des formes traditionnelles d'organisation du travail et une barrière entre certains groupes de salariés. Toutefois, c'est dans ce champ d'expérience qu'existent les formes les plus poussées de participation des travailleurs à la vie de l'entreprise et les expériences les plus riches d'amélioration de la qualité de la vie au travail.

#### (g) L'approche par l'éducation et la formation

L'éducation et la formation constituent enfin un champ très privilégié de l'expérimentation sociale. Nous nous contenterons ici de citer quelques exemples pour rappeler leur diversité. Nombreuses ont été les tentatives existantes de nouvelles formes d'éducation des enfants, pour changer les rapports enseignants/enfants, ouvrir davantage les enfants à des activités de création, à la responsabilité, et plus généralement à la vie concrète. Variant selon les contextes institutionnels propres à chaque pays, ces initiatives ont donné lieu par exemple en France à ce que l'on dénomme des "écoles parallèles". Exemple est à cet égard le Lycée expérimental d'Oslo, en Norvège, où a été tentée une organisation autogérée des élèves (36). Aux Etats-Unis, on dénombre en 1973, 800 "écoles libres" (free schools) (37), donnant la plus grande place à l'organisation collective de l'enseignement.

Nombreuses sont également les tentatives pour ouvrir l'enseignement universitaire que ce soit au niveau de l'ouverture sociale, comme dans les expériences d'université ouverte, notamment en Angleterre, comme la Milton Keynes Open University à BUCHS, ou même sur le plan de l'ouverture géographique,

par la création d'universités itinérantes. C'est par exemple le sens de l'opération de l'Université de Printemps à l'initiative du Collège coopératif a Paris (France) qui organise ses sessions par rotation dans différentes parties du monde.

On a déjà cité la tentative de Tvind, au Danemark, où l'expérience d'enseignement est directement couplée à une recherche globale de nouveaux styles de vie et de production.

Enfin, à travers ce rappel très partiel, on peut citer comme innovation institutionnelle particulièrement intéressante la loi sur les 150 heures en Italie qui prévoit non seulement l'octroi d'un temps de formation disponible pour les travailleurs mais en délègue la gestion aux syndicats, ce qui constitue une ouverture considérable pour une plus grande maîtrise par la société civile, de la formation, pilier de la recherche de nouveaux styles de vie et de développement.

#### En guise de conclusions

Au terme de ces quelques illustrations, on peut faire un double constat global: d'une part, l'existence d'une réelle dynamique de la société civile, à travers des expériences les plus variées et, d'autre part, l'amorce, dans de nombreux pays, d'éléments de politique de l'Etat favorable à l'expérimentation sociale.

La dynamique de la société civile se développe notamment à travers la multiplication de réseaux dans les champs les plus divers, au niveau national et international, qu'il s'agisse des technologies appropriées, des mouvements écologiques, des mouvements coopératifs, des mouvements de quartiers et de cadre de vie, des initiateurs d'expériences autogestionnaires, pour n'en citer que quelques-unes. Tous ces réseaux mettent en commun les acquis de l'ensemble de ces expériences et se renforcent. Des institutions nouvelles se créent, formelles ou informelles. Un "dynamique institutionnelle" existe.

La multiplicité et la force des expériences ont, en effet, infléchi l'attitude des Etats, dans beaucoup de pays qui, sans que l'on puisse parler de véritables politiques, ont développé des programmes divers, souvent d'ailleurs, pour faire face à des situations de crise.

On a vu, à travers les exemples cités, la diversité des programmes intervenant aux Etats-Unis. Dans le domaine de l'habitat et au-delà des mesures en faveur de la participation de la population, comme les "Model Cities and Community Action Programs" des années 60 et des "Environmental Impact Statements", prévoyant la consultation des habitants pour tout projet ayant un impact sur l'environnement, certaines autorités locales ont pu encourager la réalisation de projets d'urbanisme par les habitants (à travers "l'advocacy planning"), comme à Boston, grâce à un programme d'aide spécifique (Urban Planning Aid). Divers sont également les programmes pour encourager des activités locales comme la "Community Service Administration" qui est intervenue dans plusieurs exemples.

Au sein du Département du Commerce, l'Administration de Développement Economique (Economic Development Administration) s'est engagée au cours des années 70, dans des actions locales de préservation d'emplois, en encourageant les expériences de propriété des travailleurs.

Les pays scandinaves, en particulier, montrent également une grande diversité de dispositions.

Le Canada, dès 1971/72, est apparu très novateur, lorsque pour lutter contre le chômage, il lançait les Programmes d'initiatives locales (PIL) qui prévoyaient l'octroi d'une subvention salariale à tout projet d'emplois à caractère innovateur, répondant à des besoins d'utilité locale dans des domaines très variés - mais à condition qu'ils ne soient pas concurrents du secteur privé - et présentés soit par des collectivités locales, des associations ou de simples particuliers. Ce programme était très important puisque, dans les années 1975/76, il touchait près de 100,000 emplois nouveaux.

Bien que ce programme ait été abandonné, depuis divers pays ont pu s'en inspirer pour promouvoir ce type d'action sous des formes diverses d'aide. La création d'emplois collectifs, récemment mise en place en France, concerne 5,000 emplois.

Un système voisin a été mis en place il y a deux ans en Belgique, à l'initiative du Ministre socialiste du travail, M. SPITAEELS. Après un an, le nombre d'emplois ainsi créés aurait atteint un nombre de l'ordre de 50,000.

Ceci n'est évidemment que très fragmentaire. Il resterait à faire un inventaire beaucoup plus systématique et concevoir des politiques globales touchant à l'ensemble des aspects de la qualité de la vie et susceptibles de soutenir les efforts entrepris, à la base, par la société civile dans la recherche de nouveaux styles de vie et d'un autre développement.

L'économiste ou le planificateur, centrés sur l'approche quantitative, aura beau jeu d'expliquer que ces expériences, aussi nombreuses soient-elles, sont finalement des phénomènes isolés, voire marginaux, et voués à l'éphémère. L'on peut cependant dire que ce qui manque sans doute le plus aux sociétés occidentales, c'est précisément l'effort d'imagination sociale concrète.

L'enjeu consiste surtout, à notre avis, à constater si ces phénomènes isolés au départ n'instaurent pas une dynamique sociale nouvelle. Cet aspect qualitatif prévaut sur l'aspect quantitatif. Sans verser dans le romantisme ou le spontanéisme à la base et sans optimisme excessif, il nous semble que, par rapport à l'ensemble des enjeux auxquels est confronté le monde occidental, l'expérimentation sociale concrète à la base apporte des éléments importants pour les solutions futures. La crise actuelle montre que le dynamisme conservateur des institutions formellement appelées à l'assumer les pousse à s'engager dans une fuite en avant en essayant de répéter, dans des conditions beaucoup plus difficiles, les principaux objectifs du passé.

Les sociétés occidentales apparaissent, en effet, à ce point, bloquées qu'il est aujourd'hui permis, dans une large mesure, d'appliquer à leur expérience le concept de maldéveloppement (38) plutôt que celui de développement. La maximisation des espaces pour des décisions autonomes apparaît un objectif capital pour engager une transition vers un développement authentique. Mais ceci ne sera possible que si l'Etat innove au niveau des grandes politiques d'aménagement du territoire, du temps, d'utilisation des ressources, en premier lieu de l'énergie, et de contrôle social sur les directions de la recherche scientifique et technique. Le but de ces politiques est triple: harmoniser les intérêts locaux et collectifs, infléchir contextuellement les décisions locales et assumer le long terme dans l'esprit d'une solidarité diachronique avec les générations futures (38).

Dans la recherche collective et nationale de stratégies de transition vers un développement harmonisant durablement les objectifs sociaux, économiques et écologiques, à côté des efforts d'ajustements globaux entre les pays et des échanges d'expériences de planification macro-économique, il nous semble que les organisations internationales pourraient avoir un rôle important à assumer pour

prendre en compte et appuyer les actions entreprises à la base, dans les domaines les plus variés, dans les différents pays.

Les questions qui semblent, en effet, prioritaires sont les suivantes:

- réunir une information permanente sur les innovations et expérimentations sociales en cours dans les différents pays;
- diffuser de la manière la plus large ces informations et développer les échanges entre les groupes engagés et les institutions ou personnes intéressées;
- encourager la constitution de réseaux internationaux par domaines d'action;
- appuyer, directement ou indirectement des expérimentations sociales en cours dans certains domaines privilégiés;
- favoriser, enfin, les échanges d'expériences de politiques nationales en faveur de l'innovation et l'expérimentation sociale.

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NOTES

1. Ce travail a été entrepris avec la Fondation Internationale Pour un Autre Développement (IFDA) Nyon, Suisse, dans le cadre du projet Demain-Aujourd'hui: expérimentations sociales et changement de styles de vie et de développement, réalisé à la Maison des Sciences de l'Homme à Paris.
2. Cette analyse a été développée dans l'article de Silvia SIGAL et Michel SCHIRAY "Demain-Aujourd'hui: expérimentations sociales et changement de styles de vie", IFDA Dossier n° 14, IFDA, Nyon, Suisse.
3. On peut observer, à ce propos, que, dans un pays dont la tendance à la centralisation est connue, comme la France, l'importance des interventions de certaines municipalités dans le domaine économique, pour préserver l'emploi ou en créer, pour développer certaines activités défaillantes au niveau local, est telle qu'elle inquiète aujourd'hui les pouvoirs publics. BIPE, Les interventions économiques locales récentes dans neuf villes françaises, rapport à la DATAR, 1978.
4. Une présentation d'ensemble a été récemment donnée dans le journal français Le Monde Dimanche, 14 oct. 1979, et Autrement-magazine n° 10, oct. 1979.
5. L'expérience a en particulier été analysée par Monica WEMEGAH et Johan GALTUNG dans le cadre du projet "Goals, processes and indicators of development" à l'Université des Nations Unies à Genève.
6. Parmi l'abondante littérature suscitée par l'expérience, suggérons, en langue française, l'interview récente du Maire de PAVIE, M. Elio VELTRI, qui présente un exposé d'ensemble dans Metropolis, vol. III, 1978.

7. Eric TRIST, de l'Université de Pennsylvania (USA), nous a transmis une communication sur cette expérience à laquelle il participe. Voir également: Commitment at work: the five years report of the Jamestown Area Labour Management Committee, City Hall, Jamestown NY 14701; Eric TRIST, New direction of hope: Recent innovations interconnecting organisation, industrial, community and personal development, Communication présentée à la John Madge Memorial Lecture, Glasgow University, 1978.
8. Cette expérience intéresse un professeur indien, pour illustrer un processus de recherche-action: NITTISH R. DE, "Action Research as a learning strategy", Human Futures, New Delhi, Spring 1978.
9. Communication de M.S. BURGESS et E. TRIST, Multiple deprivation: a human and economic approach, A Scottish Innovation and Community Development at Craigmillar, Edimbourg, 1977; E. TRIST, op. cit.
10. Outre les différents numéros de l'Atelier, journal de l'Atelier Populaire d'Urbanisme et de la Confédération Syndicale du Cadre de Vie, voir par exemple, "La participation conflictuelle des habitants du quartier Alma-Gare à Roubaix", La Correspondance Municipale, n° 182/183, Novembre-Décembre 1977.
11. Ceci n'est pas particulier à la France. Aux Etats-Unis, nombreuses ont été les expériences de participation des habitants encouragées par le pouvoir fédéral ou des municipalités. Le bilan est assez voisin. La participation est le plus souvent le fait de certaines associations peu représentatives et consiste surtout à donner un avis sur des projets préétablis. Les expériences d'"avocacy planning", menées par exemple à Cambridge, devraient garantir une participation réelle des habitants, en dotant la communauté concernée d'un architecte "avocat" pour élaborer son propre projet. Elles se sont malheureusement heurtées au pouvoir que prenait l'architecte et ne connaissent plus, semble-t-il, la vogue qu'on pouvait attendre.
12. En France, les expériences connues peuvent regrouper de 10 à 20 ménages. Une Charte de l'Habitat Auto-géré a été récemment établie par les initiateurs d'une de ces expériences, pour en diffuser l'idée.
13. Voir Bruce STOKES, op. cit.
14. En France, D. YON dans "Jardins familiaux et l'environnement", Nouvelles de l'Ecodéveloppement n° 9, juin 1979, Paris, indique que les associations de jardins familiaux en milieu urbain regroupent actuellement 1 million et demi d'adhérents.
15. Voir en particulier: Anne CHARREYON-PERCHET, Expérimentations sociales et changement de styles de vie aux Etats-Unis, IFDA DOSSIER, IFDA, Nyon Suisse.
16. D'après divers documents de travail communiqués par Gar ALPEROVITZ, Exploratory Project for Economic Alternatives, Washington, qui participe à cette action.
17. Voir Anne CHARREYON-PERCHET, op. cit.



18. Voir Iain GUEST, "Preventing heart disease through Community Action: The North Karelia Project, Development Dialogue, 1978; 1, Dag Hammarskjöld Foundation, Uppsala, Suède.
19. Voir John L. Mc KNIGHT, "Community health in a Chicago Slum", Development Dialogue, 1978; 1, Dag Hammarskjöld Foundation, Uppsala, Suède.
20. Voir Dave ELLIOT, The Lucas aerospace workers campaign, Fabian Society, London, 1978; Institute for worker's control Lucas: An Alternative Plan, Nottingham, 1978. Cette expérience a également été décrite dans l'étude du CIRED, Politique de l'environnement et stratégies d'adaptation industrielle, op. cit.
21. Voir la présentation du "Centre for Alternative technological and industrial systems" dans Science for People n° 39, Spring 1978.
22. Voir notamment Don HINRICHSEN: Spin-off from the world's biggest wind-mill could change Denmark's energy program, New Scientist, London, vol. 77, n° 1086, 19 January. Environment, St Louis, Missouri, March-April 1978. Le Nouvel Observateur, n° 702, Paris, avril 1978.
23. J. BELDEN, "Cutting energy costs in Nebraska", Working Papers for a New Society, Sept.-Oct. 1978.
24. Voir par exemple, pour ce mouvement aux Etats Unis, Hazel HENDERSON, "The big new small is beautiful movement", Business and Society Review, Fall 1977. En ce qui concerne une stratégie globale de l'emploi privilégiant en particulier les techniques moins intensives en capital, voir W. BIERTER et E. Von. WEIZSACKER, "Stratégies contre le chômage", Esprit, Oct. 1977, Paris.
25. Voir Narasim KATARY, "Economy development in Sudbury: the triple "S" strategy", et Cathy STARRS, "Development alternatives - Some Canadian signposts", IFDA Dossier n° 12, oct. 1979, IFDA, Nyon, Suisse.
26. Au premier rang desquels il faut rappeler les travaux déjà anciens réalisés au TAVISTOCK INSTITUTE, en Angleterre: voir F.E. EMERY et E.L. TRIST, "Socio-technical systems" dans C.W. Churchman et M. Verhulst (editors), Management Science and Techniques, vol. II, Pergamon, 1960. Ces travaux ont été à l'origine de nombreuses expériences concrètes particulièrement poussées et significatives.
27. Il faut citer en premier lieu, la Norvège, qui entre 1962 et 1970 a développé un programme de démocratie industrielle qui prévoyait un appui à toute une série d'expériences d'innovations sociales dans le travail et leur diffusion. Ceci constitue une référence importante. Aujourd'hui la plupart des Etats ont des politiques explicites dans ce domaine.
28. Pour une description de l'expérience voir Berit HARD, "A better quality of working life should be accessible to all", IFDA Dossier n° 12, oct. 1979, IFDA, Nyon, Suisse. L'article décrit une autre expérience très avancée aux usines SAAB-SCANIA à Trollhättan, Suède, impulsée cette fois par les cadres de l'entreprise.
29. Par exemple, NITTISH R. DE, "Action research as a learning strategy", Human Futures, New Delhi, Spring 1978, JOHNSON Ana et W.F. WHYTE, The Mondragon system of worker production cooperative, Industrial and Labour Relations Review, vol. 31, n° 1, oct. 1977.

30. K. BERMAN, "Les coopératives ouvrières dans l'industrie du contreplaqué", Autogestion et socialisme, novembre 1975.
31. Parmi les nombreux travaux sur le sujet et au-delà des seules coopératives, suggérons par exemple: Joyce ROTHSCHILD-WHITT, "Resistance to bureaucracy: the emergence of collectivist democratic work organisation in the US", Cornell University, Ithaca, New York, Communication présentée au Neuvième Congrès Mondial de Sociologie, Uppsala, Suède, août 1978.
32. Une enquête aux Etats-Unis dénombrait de 3 à 24 membres pour ce type d'organisation ("Grassroots collectives"). Pour une typologie des expériences de contrôle des entreprises par les travailleurs, voir notamment Willian Foote WHYTE, Cornell University, "Worker Participation: ownership and control", Communication présentée au Neuvième Congrès Mondial de Sociologie, Uppsala, Suède, août 1978.
33. Cette "fonctionnalité" de l'autogestion de la production dans une économie libérale a été mise en relief à travers la présentation de 3 scénarios autogestionnaires pour la France par Olivier CORPET, "L'autogestion en France? Esquisses et figures possibles", IFDA Dossier n° 12, oct. 1979, IFDA, Nyon, Suisse.
34. Ceci constitue un enjeu essentiel des sociétés occidentales quand on songe qu'aux Etats-Unis, par exemple, les 200 premières entreprises qui regroupent 60% des actifs industriels en 1972 n'ont participé que pour moins de 75,000 emplois nouveaux des 9.5 millions créés entre 1969 et 1976. Voir William Foote WHYTE, Cornell University, "The voluntary job preservation and community stabilization", Communication présentée au Neuvième Congrès Mondial de Sociologie, Uppsala, Suède, août 1978.
35. D'après divers documents transmis par Monsieur Gar ALPEROVITZ de l'"Exploratory Project for Economic Alternatives" qui participe à cette action.
36. Voir JORGENSEN, Un lycée aux lycéens, Ed. du Cerf, Paris, 1975.
37. Cité par Joyce ROTHSCHILD-WHITT, op. cit.
38. Voir, pour l'élaboration et l'application de ce concept utilisé pour la première fois par des auteurs suisses, Ignacy SACHS, "Crises of Maldevelopment in the North: a way out", IFDA Dossier n° 2, IFDA, Nyon, Suisse.
39. Voir Ignacy SACHS, "How do we get there", IFDA Dossier n° 3, 1979, op. cit.

DEVELOPMENT ALTERNATIVES: SOME CANADIAN SIGNPOSTS

Summary of a report transmitted by the  
Government of Canada

Prepared by Ms. C. STARRS\*

This paper has been written at the request of the International Foundation for Development Alternatives to present a synthesis of the major findings of a project that set out, in the early months of 1979, to compile an inventory of development alternatives under way in Canada, and to pattern and interpret those initiatives and what they suggest for the future. (1)

The project is a first attempt at drawing together, from various regions of the country and from various perspectives, explorations into "another kind of development" in Canada. It was initiated in the belief that there is considerable activity under way which, while not widely known in Canada or outside, is leading to an alternative vision of development, a vision that is consistent with the limits and uncertainties now confronting the physical and social environment and with the opportunities that many Canadians are now discovering, or rediscovering, for themselves. The process of uncovering the nature and extent of these initiatives was seen as serving a number of purposes. It would assist in informing Canadian contributions both to the United Nations Development Strategy for the 1980s and beyond, through IFDA's "Third System" project, and to other international forums concerned with alternative patterns of development and lifestyles. It would also serve in assisting governments in Canada to respond to these alternative visions emerging, and so avoid the rising social turbulence that will almost surely follow continued pursuit of conventional development. And, further, it might well permit opportunities for cross-fertilization and enable those Canadians nurturing the alternative seedlings against the winds of the dominant paradigm to see the forest that is emerging.

The project was undertaken for IFDA and Environment Canada. (2) It had two phases (inventory and interpretation), and an advisory panel (3) composed of persons directly involved in the project who subscribed to the need to secure another kind of development than that which we have been following in Canada.

The process

The design of the inventory process had to confront the fact that "development alternatives" is not a phrase in common parlance in Canada. Two options were raised for consideration by the advisory panel. Would the panel wish to set out some broad definitions or key characteristics governing what might fall within

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"development alternatives"? Or alternatively should that phrase deliberately be contentless, at the outset at least, the project objectives then including the collection of meanings it conveyed to those approached, as well as specific illustrations?

After considering these and other questions, the panel decided not to adopt any of the present definitions, recognizing that such a course would risk imposing a standard model on what was as yet unknown. Whether by accident or design, this decision meant that the project would adapt in a Canadian context IFDA's admonition to listen attentively to "the often unheard voices of the people" and only then attempt to "make sense" of what those voices were saying.

That decided, there remained the question of with whom to start. After canvassing a number of possibilities (limited only by project time and resources), it was decided to approach a group of Canadians who in January 1978 had authored a statement entitled "Canada as a conserver society: Agenda for action - a statement of concerned citizens". While not a "representative sample", these 26 persons came from across Canada and from diverse life experiences: community innovators, free-thinkers, academics, government officials, people from business and churches. Their collective statement suggested sensitivity to the need for alternatives, their diversity of backgrounds held promise that a canvas of their knowledge of activities under way in their own communities or fields of interest might quickly point to interesting examples of alternatives.

Members of this group were contacted by telephone, the purpose of the project was explained and two broad questions put: "What does the notion of development alternatives convey to you - what key characteristics does it conjure up in your mind?" And "What specific examples are you aware of that you might term development alternatives?"

Out of responses to these questions fell an array of tentative definitions and long lists of specific examples, as well as many suggestions of other Canadians to whom the same questions might usefully be put. In each case followed up the same query was raised about the image of development alternatives, and details were sought of the specific initiative, its history, rationale, objectives, activities, structure and the like.

It quickly became evident that there were far more initiatives identified through this process than even the most optimistic had perceived, certainly far more than could be contacted in the course of this project. Yet the representatives of its sponsors and other members of the advisory panel did not wish to impose a narrowing of focus, preferring instead as varied a sample as possible. Thus, the inventory as it has emerged stands as something of a pilot project, without pretensions to completeness. The specific initiatives reported serve only as illustrations of the unfolding story of the search for development alternatives under way in Canada.

#### Development alternatives - a challenging concept

What meanings did the Canadians approached in the course of this project attach to "development alternatives"? Some preferred to avoid the question altogether, responding only to the second query. Other answers reflected impatience with the ambiguity of the expression: "development of what? by whom? alternatives to what?" From some came substituted phrases: - "conserver society", "familial society", "an ecological society" - shorthand expressions seen as pointing more clearly to departures from the dominant characteristics of modern Canadian society, with its consumption ethic, its materialism, its uncaring waste of

human and natural resources, its destructive impact on the natural and the social environment, and its injustices.

Others, challenged by the phrase itself, were moved to elaborate on its emerging or hoped-for characteristics:

"From initially thinking of alternative patterns of development in terms of a necessary emphasis on conserving, recycling and a shift to renewables, I find I have shifted my focus. I have come to realize that what is at issue is a new belief system - one that allows possibilities for securing sources of human satisfaction that don't mean merely material consumption".

"What is at issue is the blurring of lines between big and small, centralized and decentralized - the finding of ways in which both can exist in some kind of human harmony".

"To be an alternative, developments must be culture- and site-specific, and this involves careful consideration of design - the kind of design that consciously attends to local climate, local resources and local cultural preferences".

"As an alternative to our present quantitative development, it means people seeking developments that improve the quality of their lives and the lives of future generations".

"It means the antithesis of centralized, high-technology development strategies... Development alternatives are regional - based on local resources; they provide solutions to regional problems and create employment within a community; they tend to be less capital-intensive than centralized strategies, and they can be integrated within traditional employment patterns and social structures".

"For too long North American society has emphasized the development of technology, science and material well-being as the goals to be pursued. The implication, the underlying and often unspoken assumption, has been that this would automatically translate into human well-being. This seemed to be true at an earlier time in history, but the situation has changed. It is now imperative that human well-being be placed at the centre of attention, not as a by-product or spin-off but as the primary focus of development efforts".

"... creative alternatives to present economic, political, social and institutional structures which impede the development of humanity's potential".

"It is important to see development alternatives as being formal (to some extent institutionalized) and informal; as intentional (e.g., voluntary simplicity) and unintentional (inasmuch as people adopt new attitudes and activities, discovering implications for themselves); as traditional, things we've known before (practical skills that have gone into disuse or been downgraded) and as innovative, arising more spontaneously out of people's needs, resources and interests".

"Development alternatives imply a different relationship between people and their institutions".

" ... alternative organizational forms for economic development and for the provision of social services; inherent in these alternative forms are notions such as no growth or selective growth, renewable resources, participatory democracy, decentralization ... "

" ... survival for our children".

"In its broadest sense, 'development alternatives' involves the reconceptualization of the human condition".

Some offered regionally specific comments, often staking out their region as "where the alternative movement is at" in Canada. A few residents of Prince Edward Island, British Columbia and Quebec each proclaimed their province as being in the forefront of Canadian development alternatives - statements equally firmly denied by others from the same region. A few suggested that the major explorations were taking place in "hinterland" rural communities and the north; others advised concerted mapping in urban centres on the grounds that, in a democratic society, it would be these large populations that would ultimately determine future directions for Canadian society. And not a few refused to respond, at least initially, asserting suspicions as to the intent of the sponsors. This suspicion was grounded in part in reservations surrounding IFDA'S "Third System" project; if the catch-all label, intended to include everything outside international governmental forums and the transnational corporations, had been the "First System", then (frequent comments suggested) IFDA's intent would have been "more credible, more trustworthy". But much the larger source of these suspicions was past experience with governments undertaking community surveys - experience that had led, all too frequently, to the take-over, if not the total smothering, of community initiatives.

These varied meanings attached to the concept of development alternatives, more fully set out in the inventory report, (4) put an end to any slim hope that from this first question would emerge some commonly held definitions, some clarifying framework.

Some examples suggested: an over-all impression

The task of identifying development alternatives seemed to warrant more energy consumption than the supposedly easier task of developing categories appropriate to an inventory of alternatives. Many described their group initiatives with reference to a subject area in language differing little from conventional usage. At the same time, however, there were repeated expressions of discontent with the verbal descriptions. This suggested difficulty in giving expression to the interrelated, holistic nature of many of the initiatives. A similar message was conveyed when draft write-ups of individual initiatives, sent to each group directly involved and accompanied by a tentative listing of groupings, were returned with indications that many saw their activities as falling within more than one cluster.

The categories, or more accurately the clusters, of alternative initiatives, as they appear in the illustrative inventory are:

- "Conserver society" initiatives
- Conservation and recycling initiatives
- Alternative technological design
- Alternative economic development
- The co-operative movement - recent developments
- The alternative lifestyles movement
- Alternative consultative processes

Alternative institutional arrangements  
Alternative relationships with other countries  
Societal reconstruction: alternatives to "the industrial nation State"  
Personal initiatives

The inventory report elaborates on each of these clusters by describing in some detail the initiatives identified; it also deliberately takes into account, in weaving together the story that is to be told by these illustrations, the fact that many of them cross several clusters. For the purposes of this paper, a few examples will suffice to illustrate not the import of specific clusters so much as the context in which explorations into alternatives are being undertaken and understood.

Initiatives surrounding the energy debate in Canada serve to illuminate the interrelations and convergence that are appearing; so too does the "conserver society" theme.

#### The conserver society

It would not be unfair to state that, from the broadest perspective, each of the initiatives identified warrants inclusion under the first cluster - that of "conserver society" initiatives. This term was first invented by the Science Council of Canada and used to identify a major research project the Council launched in June 1973; the theme was immediately incorporated into the work of Environment Canada's Advanced Concepts Centre. It has since become widely known across Canada, and is today perhaps the most readily identifiable rallying point around which researchers on alternatives tend to gather. To summarize the characteristics with which the Science Council initially endowed the concept: a "conserver society" is opposed to waste; promotes economy of design - "doing more with less"; favours reuse and recycling and, wherever possible, reduction at source; questions the ever-growing demand for consumer goods and marketing techniques used to manipulate wants; and supports the diversity of systems.

From this base, the "conserver society" concept has earned the attention and energies of countless citizens' groups. In this process, it has been placed in a continuously broadening context. The need to redesign public policies in the areas of resource use, science and technologies has come to tie in with concern for the waste of human resources and a call for societal and institutional transformation from the present focus on system objectives to a focus on human community growth and development in the context of a sustainable human society.

This evolutionary process has also prompted the invention of other labels, since some Canadians have come to regard the "conserver society" title as inadequate or inappropriately limiting. (5) Whatever the label, the process of social invention is under way and this discussion is infusing all aspects of Canadian life, including values and lifestyles, aspects governments find difficult to address.

#### The energy debate

Many of the initiatives identified focus on the energy issue directly or indirectly; many were prompted into action or underwent a shift in focus as a result of the shock waves by the 1973 actions of the OPEC nations. The sudden realization that Canada's energy resources were not as abundant as had been previously assumed, and that further energy development would certainly not be inexpensive, accelerated the discussion of alternatives. The Iranian situation served to further this shift in consciousness, and most Canadians today are aware that critical decisions must be made now.

Supporters of "alternative energy" have been warring for some time now with the advocates of conventional energy development, particularly nuclear energy. (6) If one examines both what is being said and what is not being said in the energy debate in Canada, it becomes apparent that at its root lie two opposing concepts of development, and two correspondingly different lifestyles. These different concepts are rarely coherently articulated and addressed in public discourse. When they do arise, they are rapidly drowned among charges and counter-charges of irrationality, impracticality, Luddism technocratic approaches. The much more fundamental issues are lost in the increasingly adversarial din over the issues of safety, containment, degrees of acceptable risk, centralizing advanced technologies or less vulnerable, decentralized technologies amenable to community rather than institutional control, and statistics relating to energy demand and supply, proven and unproven.

As experts on both sides wage war on one another and attempt to elicit greater public involvement, large segments of the populace remain on the side-lines, cursing both sides. Yet at the same time, consciousness is growing that the choice of Canada's energy future is a choice about what kind of society and what kind of development Canadians want for ourselves and for our children. In the ears of many, each side is making its own statement in response to these unarticulated questions. (7)

The advocates of nuclear energy, to take the dominant stand of the conventional energy forces, are invoking a concept of development that equates development with economic development. Within this framework human well-being (personal, family and community growth and development) becomes secondary to an overriding concern to keep the economic machinery functioning. This is based on the implicit view that the securing of material well-being is a prior condition for the attainment of other aspects of human and societal well-being. In this way, the risks and the degree of surveillance entailed by further proliferation of nuclear-powered energy stations is an acceptable price to pay. Because of the attendant security requirements, the underlying societal image unintentionally evoked by this development paradigm is increasingly that of a police State.

The advocates of "alternative" or "soft" energy, on the other hand, are embracing a concept of development that has at its core a focus on community growth and development. In this context, economic growth is an important but not dominant component and environmental limits are more consciously attended to, as for example in discussions about the need to limit the use of fossil fuels so as to avoid disruptions from climatic change. This concept is framed within a set of principles that are discernible within and across other examples of development alternatives.

#### The emerging concept of development

Characteristic of this alternative concept of development are:

(a) Respect for human qualities and capacities, and for all life-supporting systems on the planet;

(b) Acceptance of diversity - the diversity of the human species, of cultures, of different ways of perceiving reality, the variety necessary to sustain a healthy society and a healthy environment;

(c) Recognition of and respect for limits - the limits of nature, of social institutions and of social structures;



(d) Recognition that material prosperity, without attention to these limits, may fail to lead to improvement;

(e) A concern for the non-material needs required to support human well-being;

(f) An unwillingness to accept without question the notion of trade-offs so ingrained in the economic development concept (inflation/employment, economic growth/environmental degradation, producer interests/consumer concerns, and so on); and, above all,

(g) The fostering of personal and institutional responsibility and responsiveness, self-reliance and interdependence, rather than rugged individualism and independence.

No one cluster of explorations into development alternatives encompasses all of these characteristics, much less any one initiative. But they are there nonetheless. They emerge in probing beneath the surface for the rationale underlying the seemingly confused replies to questions about the meaning of "development alternatives", and they emerge in the patterning of the illustrated examples. They are to be found within the understandings of some governmentally sponsored activities, as well as within those engaged in by community groups. While they appear more frequently in family or community discourse, they do emerge from time to time in official statements and public forums.

At the moment in Canada, each concept of development has its own particular style of discourse. Several of the development alternatives illustrated in the inventory were "conversations about work, justice, the future" - convened to permit freer discussion among members of the Canadian community than obtains in public forums generally.

The public discourse is dominated by the concept of development as economic growth, and the necessities of an industrial society. Thus it tends to draw on expertise from specialized disciplines, grounded in institutional authority, and is usually ill-humoured and adversarial. It rules out of order, if not out of the forum, those who would raise issues deemed to fall outside the ambit of the specialized discipline within which the issue is being addressed, those who would question the institutional authority and its implicit assumptions. It is clothed in objective measures and tolerates only the linear logic of scientific rationalism and immediate felt needs for solutions to problems. Thus it is intolerant of expressions of concern and other approaches to knowledge that emanate from feelings and intuition, from human concern for the growth and development of a human community.

The human concept of development is more discernible in family and community gatherings, formally or informally convened. Its style is conversational and respectful; a formal framework seems inappropriate to a discussion of values and inner needs in the context of social issues. It admits of the diversity with which persons in the community construct their own views of reality, while seeking from each other the wisdom drawn from life experience, rather than the objective knowledge drawn from institutions and disciplines. Credentials of expertise give way to a predominant focus on the lessons of experience. It seeks the common ground of community and welcomes a much richer range of expertise in that context.

It is almost impossible to discern the different concepts of development by attending only to the public discourse and observed collective behaviour. The concept of human development appears less amenable to articulation by means of verbal or written language, now so thoroughly imbued with the understandings of

the economic and the scientific. Indeed, it is often hard to distinguish the advocates of this alternative development concept from those upholding the conventional. "We keep sounding the same" is a not infrequent comment, and one laden with frustration. It is only when one listens attentively for the context that the fundamental distinctions become apparent.

Thus descriptions of specific development alternatives, their activities and their rationale do not adequately reveal the alternative concept of development in which they are grounded. They serve only as signposts of a reality whose visible emanation can be but partially glimpsed through the spoken and the written word.

#### Development alternatives - some examples

What follows is a selection of some examples from among the many signposts pointing to another kind of development in Canada.

The Ark in Prince Edward Island is easily the best-known illustration both inside Canada and abroad. The Ark is engaged in the demonstration and continuous research of technology supporting a closed-system bioshelter. It is an integrated ecologically designed structure, producing and recycling its energy and food requirements in continuous circuitry, thus achieving a high degree of self-sufficiency through reduced dependence on external sources. The structure is heated by solar, biomass and wood energy, and windmill techniques are being tested. A solar greenhouse, organic gardens and aquaculture tanks supply most of its food. It is both a research station and living quarters for many of its staff, a feature which enables its scientists to attend to facts that would escape attention in an insulated laboratory environment. It is a public information and demonstration centre, and not infrequently the Ark's staff have profited by suggestions made by visitors. It is symbolic of other, perhaps less sophisticated, explorations into practical applications of "soft" energy and of what some have termed "the third generation" of environmental concerns in Canada. (8)

Paradoxically, whereas the Ark was launched with the active support of the federal Government and varied expressions of interest from islanders, and in the face of some scepticism from the public at large, trained to think that Canada's cold climate would not permit effective use of solar energy, attitudes to it are now being reversed. As Canadians from other parts of the country continue to flock to the Ark, federal support is wavering. This is attributable to a number of factors, perhaps most succinctly to the dominance of the economic development paradigm in federal institutions, and to the structure of government that is based upon specialization in pursuit of an institutionalized economic imperative. With this concept so built into the structure, it is understandable that, in present times of government spending restraint, integrated programmes that do not fit neatly within the vertical structure or operating mandates of a single department are most in jeopardy. The output orientation within and among departments, the need to be seen to be doing, so inherent in all institutions designed under the economic development model, often means that fighting oil spills, passing laws that impose more pollution controls and more energy conservation regulations take priority over activities that move in the direction of eliminating the need for such defensive measures.

Sudbury 2001 is another illustration of the explorations into alternatives under way in Canada. In Northern Ontario, community leaders from among the 170,000 inhabitants of the city of Sudbury and its surrounding municipalities have initiated an experiment in community economic development. Since its founding almost 100 years ago, this community has developed an economic base dependent

upon the extraction of its natural resource wealth - nickel and copper. It stands today as "Canada in microcosm" - disillusioned with long years of trading off its resource wealth for rising standards of living. Today Sudbury's average wages are among the highest in Canada, and it is dominated by its multinational corporate citizens, and by a towering smoke-stack, a "technological advance" that is reversing much of the degradation of the region's natural environment caused by sulphur gases, though its acid rain now causes havoc elsewhere. Impatient with long years of exploitation by corporate interests and the failure of economic policies promising regional diversity, Sudbury remains today a one-industry community, albeit with the infrastructure of a modern city. Reaction against provincial development plans for the region and increasing attention to its declining natural resource wealth prompted the community to take action to diversify its economic base by the turn of the century.

The community experiment as it has evolved in the one year of its existence has adopted a three-pronged set of principles through which to accomplish this goal. It is uniquely all-embracing in its structure and its decision-making processes: the Executive Council that comprises its administrative arm includes representatives from all institutions located in the community - multinationals and small local businesses, labour unions and the labour council, its Mayor and the Chairman of its regional government, its federal and provincial politicians, and the heads of the university and the community college. Moreover, it is based on principles of self-reliance - outside human and financial resources are used only to supplement and support community resources: and it is exploring appropriate technology as the principle under which economic diversification is to take place. Sudbury 2001 is advocating a strategy for economic development referred to as the "Triple S" strategy - selective import substitution, selective technological sovereignty and substantive ecodevelopment (a term, briefly put, suggesting development based on ecological approaches, concern for the social and physical environment and economy of design).

The recent conclusion of a prolonged strike which affected a third of its labour force and shut down its largest multinational employer served to reinforce the conviction and commitment to Sudbury 2001's goals. A mohair industrial complex is to be opened shortly, based upon grazing and breeding of angora goats and small industries using the by-products of milk, meat and mohair. With similar kinds of industry in the future, the residents of the region hope to maintain their community in the face of diminishing mineral resources, to restore the natural environment and to foster community growth and development in the context of a lifestyle that permits a blend of urban and rural advantages. As those actively involved in this "highland" Canadian experiment well know, the continual problem confronting this search for alternatives is not that of convincing its residents that economic diversification can be achieved, but rather that of containing unrealistic expectations of instant results.

Some of the initiatives identified seemed at first blush to fall between the two concepts of development. Only when the rationale underlying their initiation was probed did it become clear that they properly belonged with other explorations into an alternative development model.

Recycling activities are often of this kind. People engaged in them are frequently asked whether conservation and recycling do not serve merely to perpetuate the consumption ethic rather than significantly transform it. Five Foundation, an organization active in this field in metropolitan Toronto which, together with the Recycling Council of British Columbia, sparked the formation of a Canada-wide network of recycling operations, responded vigorously to this criticism. From the outset, its sponsorship and design of community recycling projects has been framed within an insistence on a high proportion of at-source

sorting of paper, cans, bottles and the like, so as to awaken the consciousness of individual householders to the sheer volume of home-generated waste. This stemmed from a conviction that this kind of involvement would in turn lead to a significant reduction in waste, and hence to shifts to more conserving lifestyles. The Foundation's largest recycling project has now produced evidence of a dramatic drop in volume collected, and it is hoping to document, by way of a household survey, the underlying changes in attitudes and behaviour.

Le Monde à Bicyclette in Montreal poses a similar perceptual point. On the surface, one might assume that members of this community group are seeking only ways and means of allowing consumers of bicycles freer use of their vehicles in the urban core. But again such a reading would mask the intent of its designers. Underlying their activities is a coherent sense of the linkages between bicycles as a transport option and the consequent impact on pollution reduction, energy conservation, land use and enhanced human health.

Conversations About Justice speaks to a recurring theme running through many explorations into development alternatives: community responsibility for institutions. It also speaks to the mode of discourse in which all Canadians can, through dialogue, best come to understand the need for institutional reform and the role of the community in its achievement.

This initiative was the title first given to a gathering of 50 residents of the Atlantic region who met for two days in Pugwash, Nova Scotia, in 1978 to have a "conversation about justice". It was convened under the auspices of the Canadian Institute for the Administration of Justice in order to give expression to community notions of justice, rather than attending solely, as do various law reform commissions, to institutionalized concepts and the concerns of professionals engaged in the administration of the formal justice system. The conversation ranged widely over a number of topics of Canadian life, many not within the purview of the formal system. Participants quickly came to the realization that the problems confronting the formal system had to do fundamentally with society's values and with excessive demands on the formal system. Participants concluded that the community was ready to assume, or re-assume, its responsibilities for the formal system and as well to secure alternative, community-rooted forms for the humane resolution of human conflict.

#### Future possibilities

In the concepts of "conservation" and "the Canadian community" lie much fertile ground that needs nurturing if the explorations into alternatives in Canada are to take root more widely and lead necessary and desirable societal change.

As a collectivity, Canadians have been unable or unwilling to discover a compelling ideology through which to bind together all members of our society. Canada was formed out of a desire to cherish certain institutions brought to this country by both founding European cultures: parliamentary democracy and due process (the law). This heritage of respect for institutions has led us to vest in them increased responsibility and authority for the resolution of societal issues, a tendency reinforced by the tradition of compartmentalized expertise characteristic of the economic development paradigm. Within the understandings of that paradigm, Canada can be viewed, in concert with other industrial nation States, as populated by institutions established to support and reinforce economic development within a framework of democracy and the law.

Yet it is also the case that the alternative development concept - the concept of community growth and development - is also present, and has an even longer tradition. This tradition embraces the belief systems and the simpler structures

of the Inuit and the Eskimo, and the respect for nature bred of cold climate pioneers and their survivors. Further, given the heritage of respect for institutions (but not subservience towards them), it is not unusual in Canada to find governments playing a leadership role, albeit intermittently, in pursuing this concept of development, the momentum generated by the "conserver society" theme being one striking example.

The alternative development model would see Canada as a human community with human-oriented institutions, and there is mounting evidence that Canadians are seeking this expression of themselves. For example, at a recent conference on the public evaluation of government spending, the keynote speaker outlined the different perspective which would be brought to this issue were it addressed from the stance of "members of the Canadian community". (9) In that context, issues never attended to by professional evaluators, government officials and others, such as the role of government in the public life of the community, would come to the foreground. So too would many other questions insistently being asked by Canadians of their governments today, and so too would possibilities of relieving governments of many of the responsibilities now thrust upon them. A similar stance is reflected in one of the initiatives identified. New Canada Projects is a concept opening up ground on which any Canadian can stand, with other members of the Canadian community, as designers, proprietors and managers, of community institutions, with responsibility for them.

#### New Canada - one Canadian's view

Were the "national unity" debate in Canada to free itself from its current preoccupation with jurisdictional sovereignty, constitutional reform, language rights and other accoutrements of a nation State and to move to the foreground the issues of human community, it is this Canadian's belief that we would very quickly give meaning and importance to "unity in diversity". In this process, many more Canadians, English-speaking and French-speaking alike, would join together, not necessarily in full understanding of the cultural diversities that characterize this country, but in a fuller appreciation of the richness of that diversity. We would then unite in rediscovering what we have in common: respect for the land, and for the diversity of our natural and multicultural environment, balancing material and non-material sources of human well-being, and appreciating different views of reality. The role of "moral exemplar" which Canada has played from time to time on the world stage in the past would more deeply infuse all Canadians, re-awakening the innate Canadian sense of responsible stewardship, and of social justice for all members of the "global village".

The 1980s will undoubtedly pose these and other questions for Canadians in a very forceful manner. The energy decisions we will have made by the end of the decade, and the processes by which we make them, will tell the tale. The explorations of development alternatives now under way in so many aspects of Canadian life testify to what others would remind us of: that the humanizing forces for societal change in liberal democracies come not from governments and other institutions, but rather from the creative voluntary energies of the people.

Were we able to look back from the perspective of the twenty-first century on Canada in 1979, what would we see of the history we are writing? Will the historians of the next era tell of new beginnings or of opportunities tossed aside? Will the fragile plantings of development alternatives be rooted out by those shrinking, albeit powerful, numbers of defenders of the economic development paradigm, or will they have grown strong in the formation of another kind of development - a new Canada?

Whatever the 1980s bring in response to these questions, two conclusions seem clear. First, the array of development alternatives now being explored have the potential to produce long-term change, a move away from the mounting turbulence, if not suicidal tendencies, inherent in present development toward a development capable of sustaining the life support systems of the planet and the creative energies of its peoples. Secondly, as time grows ever shorter, we may be panicked into taking decisions on the basis of the familiar and ingrained industrial world mind-set, locking us further into pathways promising still more controls and thus limiting possibilities for creative human existence. Yet this project serves to illuminate opportunities open now that promise to avoid that bleak prospect.

What is clearly indicated in taking advantage of these opportunities for effecting voluntary change is to foster decision-making processes based on "minimum regret" and community responsibility. Our institutions would do well to listen attentively to the voices of Canadians so often unattended from within the barriers of institutional walls, and to join with them as members of the Canadian community exploring in common cause the merits and the limits of the two models of development.

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1. The second phase of this inquiry - the interpretative phase, of which this paper is a product - was undertaken for the International Foundation for Development Alternatives. IFDA is at present devoting a good deal of its energies to the "Third System" project; with the aim of infusing United Nations discussions of development strategies for the next decade with the views and aspirations of the peoples - individuals and non-governmental groups - of both the industrial countries and the third world. Within the over-all project, this paper formed IFDA subproject No. 123: "Alternative development initiatives in Canada". Dr. Charles Jeanneret, Vice-Dean for Research in the Faculty of Social Science of the University of Ottawa, is acting as co-ordinator of subproject No. 123.
  2. Environment Canada sponsored the first phase - the inventory compilation. Its sponsorship is a reflection of its on-going interest in such "development alternative" themes as the "conservation society", "appropriate technology" and "ecodevelopment". The second or interpretive phase has been undertaken for IFDA subproject No. 123. The inquiry is also seen as a follow-up to "Canadians in conversation about the future", a report on a project, again under the sponsorship of Environment Canada, in which the author of this paper undertook a series of conversations with some "thoughtful Canadians" in 1974-1975.
  3. Members of the advisory panel were: Dr. Charles Jeanneret, University of Ottawa; Dr. R.W. Durie, Senior Policy Advisor (Energy and Development), Environment Canada, and Project Authority for the inventory phase; Dr. H.F. Fletcher, Guelph-Western Research; Dr. R.W. Jackson, Centre for International Affairs, Carleton University; and Mr. Jonathan Cloud of the Alternative Growth Institute. Members of the advisory panel assisted in the first phase of this project only; while their insights and advice in the course of designing and compiling the illustrative inventory helped infuse and inform the patterning that emerged, responsibility for this interpretative paper is the author's alone.
  4. The report on the inventory phase, entitled "Exploring development alternatives: Canada 1979" was published by Environment Canada at the end of 1979.

5. In Quebec particularly, one hears little mention of the "conserver society"; rather, expressions that take into account energy and environmental concerns, such as the "ecological society" or "the alternative society", are more commonly used.
6. On a point of language, many find it amusing, if not absurd, that nuclear energy is seen to be a form of "conventional energy" while solar and wind energy fall into the "alternatives" category.
7. The statements may often be seen, as somewhat schizophrenic, when they emanate from the same source, as with federal support for the Candu reactor side by side with its significantly increased level of support for solar energy (though the scales are still tilted in favour of conventional energy).
8. The three generations seen by many as marking the evolutionary phases of environmental concerns are: in the first phase, a focus on the direct effects of pollution, resulting in pollution control measures; in the second, recognition of the interdependence of energy, resource management and the maintenance of environmental quality; and in the third and newest phase, environmental perception based on the growing knowledge that man's continued existence on this earth will increasingly depend on his ability to learn to live in harmony with the environment - it presumes as a starting point a change from a "consuming society" to a "conserving society".
9. See "The public monitoring of public expenditure", notes for a keynote address by Harold A. Renouf to the Conference on Methods and Forums for the Public Evaluation of Government Spending, Ottawa, 19 October 1978, available from the Institute for Research on Public Policy.

IMPACT OF THE FOOD SYSTEMS OF INDUSTRIALIZED  
COUNTRIES ON SOCIETY AND THE ENVIRONMENT  
IN DEVELOPING COUNTRIES

Background paper prepared by  
Ms. S. George\*  
at the request of the UNEP and ECE secretariats

I. CULTURE, ECONOMICS, POLITICS AND FOOD SYSTEMS

Every food system - defined as the totality of tangible and intangible means employed by a given human community for the production, conservation, distribution and consumption of food - has profound effects on the environment. This environment in turn has been shaped by the cultural perceptions, economic arrangements and political confrontations of human beings in their efforts to assure themselves of basic food. Food systems cannot be considered as closed and static entities. They are being transformed (and with them, the environment) by dynamic historical processes within each society, and interactions between food systems in different parts of the globe are taking place with increasing frequency and intensity. The result is that in most parts of the world, these systems are today wide open. As the preparatory meeting for this seminar noted :

"Countries of the world are closely linked through the mechanisms of international economic, political, scientific-technological and cultural relations and exchange, as well as through the environment. Events in and actions by one country ... have repercussions and impacts on others, on the international community as a whole, and on the biosphere." 1/

This is nowhere more true than in the realm of food; but in order to understand the full magnitude of the impact of changes in food systems today, we would do well to examine first some of the processes which have shaped our food systems and environment in the past. In particular, an attempt will be made briefly to justify the contention that it is not merely physical factors but culture, economics and politics that are the prime determinants of food systems and the environment in which they exist, before proceeding to an examination of today's dominant food systems (those of the industrialized countries) and their impact on the third world 2/ in the late twentieth century. Such an approach, may help us, as citizens of industrialized countries, to be more cautious and less prone to prescribe solutions to the problems of hunger and rural under-development based on our own necessarily limited historical and cultural experience.

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A. Cultural impact on the environment

Ecologists study patterns of plant and animal species development; some take into account the impact of human farming techniques on these patterns, but few note that the way people use their environment for subsistence is dictated not only by the physical capacity of that environment to sustain certain kinds of plants or animals but also by the Weltanschauung the community has of its own nature and its relationship to the rest of the universe. Diets in fact represent a cultural - even ethical - choice among the range of foods that are physically feasible in a given environment. 3/

It is impossible to account for the ecological differences between southern Spain and northern Morocco without contrasting Catholicism and Islam. The original ecosystems of these areas were virtually identical from a "natural" point of view, and yet they were utterly transformed by people who, if they were Moslems, needed large numbers of sacrificial sheep, but did not eat, and therefore hunt, wild boar any more than they drank wine. Catholics, on the other hand, terraced their hillsides with vineyards and raised a variety of animals (eating a variety of plants) and hunted the wild boar to near-extinction. 4/ Quite evidently flora and fauna are not the whole story.

Our physical surroundings, the aspect of our landscapes can thus be "decoded" as incarnations of culture. But the above examples of the impact of food/cultural systems on the environment are still relatively simple because they have been confined to specific geographic areas and self-contained human communities where the pace of historical transformation and conflict was relatively slow.

B. Economic and political pressures on food systems

In contrast, prolonged or intense interaction with outside food systems will accelerate the processes of history; changes wrought in a community's original food system may have unforeseeable consequences to the point where that community may lose all control over its own environment. These changes may involve the use of superior force to oblige one group to devote its land and labour to satisfying the needs of another (agricultural tribute, colonization); or they may be introduced peacefully and yet have violent consequences.

The effects of introducing a single hitherto unknown plant or animal species in a new environment can be immeasurable. Could Philip Miller, Curator of London's Chelsea Physic Garden in the eighteenth century, know that he would lay the foundations for a whole new mode of life (and, as has been submitted, for a Civil War) when he sent the first packet of cotton seeds to the recently founded American colony of Georgia? 5/ When Christopher Columbus took the first specimens of sugar cane to the Antilles in 1493, who would have predicted that great maritime and commercial empires would be based on the sugar trade and that Africa would be ravaged to provide slaves for Caribbean plantations? Ships carrying slaves out to provide labour for sugar or cotton economies, furthermore, brought back new plants from the Americas on the return voyage - among them ground-nuts, maize, sweet potatoes and cassava - all still mainstays of African diets. 6/

In our own time, the introduction of large-scale commercial soya bean cultivation in Brazil since the 1960s has, in a remarkably short period, altered land use patterns over vast areas. This has reduced the availability and raised the prices of staple foods for the average Brazilian and had important, generally negative, consequences not only for nutrition but for small business and levels of employment. Black beans, once the staple protein source for poor Brazilians, have recently been in such short supply due to preferential land use

for soya cultivation, that riots have occurred at city supermarkets; municipal elections in Rio de Janeiro produced a huge write-in vote for "feijos". 7/

The use of superior force to alter food systems to one's own advantage is a more straightforward case, whether such force is exerted by the dominant class in a particular society or by outsiders over another country. Recurrent problems for governments everywhere are feeding the populations of the cities and, secondly, acquiring enough cash for national treasuries to maintain civil and military bureaucracies. The countryside must therefore be controlled and the peasantry kept in line lest it refuse to provide the surplus necessary to these ends. Needless to say, this "surplus" is rarely perceived as such by peasants themselves, who are always the first to go hungry. Thus it is not surprising that food was routinely exported from pre-revolutionary France, even in times of famine, or that agricultural exports from the Sahel actually increased during the recent severe drought and food crisis. Economic and political (and, where necessary, military) pressures brought to bear on one class by another are thus vital determinants of food production and distribution. 8/

### C. Colonization: from abundance to scarcity

Superior force is also exerted at the international level; the most obvious case is that of colonialism. Empires throughout history have commandeered other people's food supplies (e.g. the Roman use, and eventual exhaustion, of North Africa as a granary). The colonial empires of modern times ushered in a new phase, however, by using colonies to furnish the "cash crops" that fuelled their own industrial development; they thus became architects of radically different food systems and environmental transformers on a huge scale.

It is important to point out that in pre-colonial times societies where food shortage are now endemic were, on the whole, food-abundant societies in spite of the occasional shortfall. Dr. Moises Behar has, for example, shown that the Mayans, prior to the Spanish Conquest, had no serious nutritional problems. They ate maize, beans, fruits, vegetables and game meat; they cleared land, farmed it briefly then let it revert to jungle, thus preserving the ecological balance and soil fertility. 9/ With the conquest came malnutrition - not only because the Spaniards took over the crops and sold them back to the Indians for gold, but also because they forced them to clear land for cotton, sugar and coffee.

European travellers to Africa in the sixteenth, seventeenth and eighteenth centuries often noted the prosperous agrarian life. One of them recorded the response of an Ethiopian peasant to his amazement at the abundance of food: "Honoured guest, do not be amazed ... If it were not for the multitude of locusts and hail ... we should not sow the half of what we sow, because so much remains that it cannot be believed ... (Even if all these plagues came at once, there would still be food reserves) ... We have no scarcity." 10/

Closer to our time, we have the word of a French colonial inspector who wrote to his Government in 1932 on his mission to famine-stricken Upper Volta:

"One can only wonder how it happens that populations ... who always had on hand three harvests in reserve and to whom it was socially unacceptable to eat grain that had spent less than three years in the granary have suddenly become improvident. They managed to get through the terrible drought-induced famine of 1914 without hardship. ... (Although their stocks were depleted, they were soon able to reconstitute them, at least until 1926) ..., a good year for cotton but a bad one for millet. Since then these people, once accustomed to food abundance, are now living from hand to mouth ... I feel morally bound to point out that the intensification of the policy giving

priority to industrial products has coincided with an increase in the frequency of food shortages." 11/

The inspector has here put his finger on the causes of hunger: not drought, hail or locusts - environmental hazards which peasants took into account and had learned to cope with - but enforced cash crop production for metropolitan countries. Just as the early Spanish colonizers in search of cash crop products pushed American Indians on to soil-poor and easily eroded hillsides where their descendants still live, so was much subsequent dislocation in previously efficient food systems directly induced by commercial interests backed by national ones - the ancestors, one might say, of today's transnational corporations (TNCs). A few examples of such dislocation follow.

In the first decade of this century, the British Peruvian Amazon Company recruited hundreds of employees to "organize the collection and portage of rubber to river stations by thousands of natives ... The means of coercion used against them included the withholding of food by driving them from their subsistence plots and thus rendering them dependent upon food-stuffs imported by the Company ... possibly thousands lost their lives from hunger and murder". 12/

Similar events occurred in the Belgian Congo on a larger scale: "Since the conquest, difficulties in recruiting workers hampered colonization: it was necessary ... violently to expropriate the peasants from their collective landholdings ... Mercilessly crushing the old African agrarian system, the finance companies proceeded to make gigantic expropriations, seizing millions of hectares, burning villages ... forcing (the people) to gather plantation crops at gunpoint". 13/

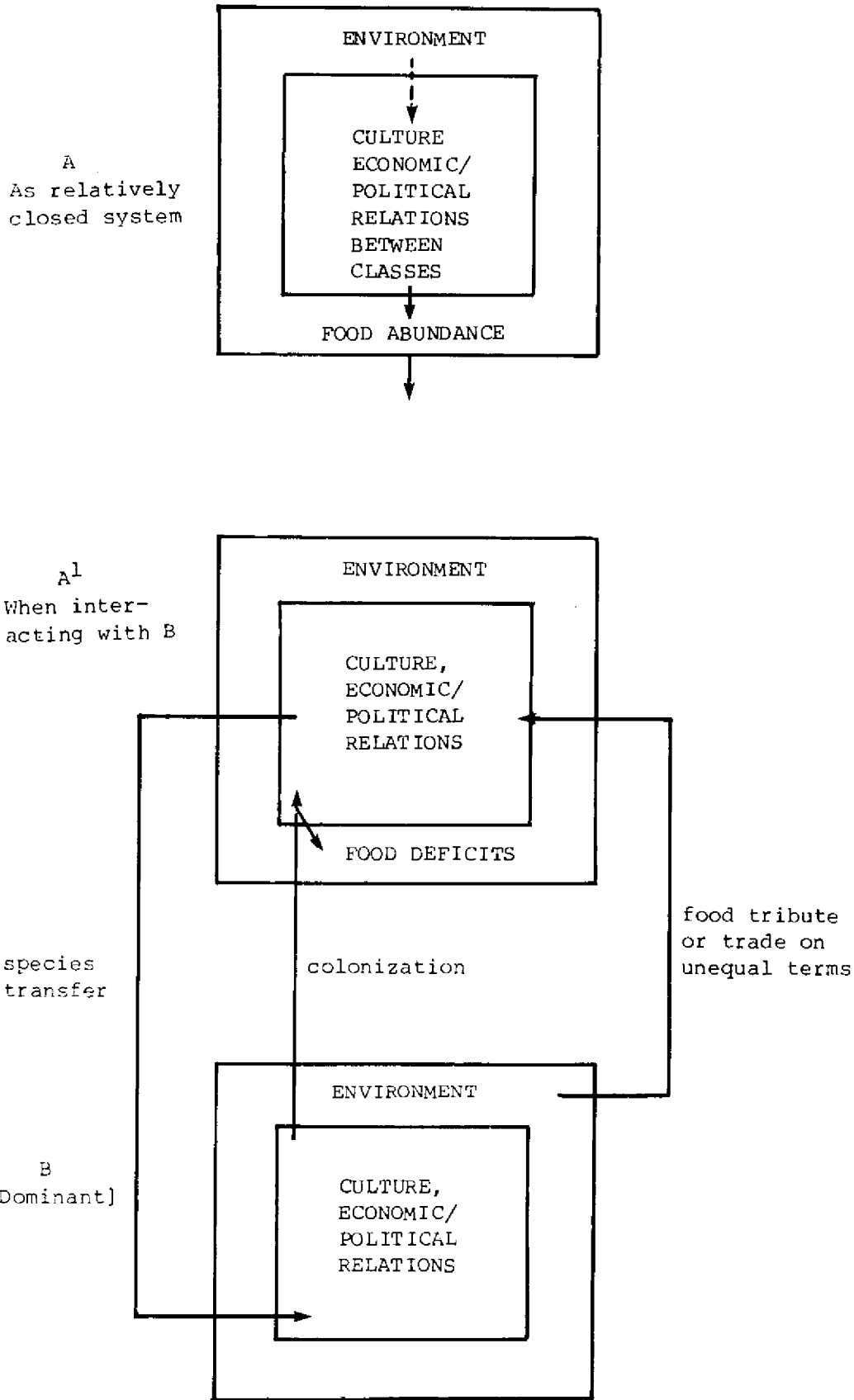
French methods were sometimes more subtle, but had the same destructive results for local food systems. Taxation was the chief coercive instrument employed; it gave peasants no choice but to produce ground-nuts or cotton for sale to French companies. Taxes were demanded even in periods of acute famine (itself engendered by cash crops, as seen above). As the French Governor of the Niger said to a subordinate who had informed him that there was neither money nor food in his district in the famine year 1931: "I wish you to be less lenient - indeed, I expect you to hasten the collection of taxes owed by those under your jurisdiction." 14/

The cultural, economic and political factors affecting food systems may be graphically summarized as in Figure 1.

The historical framework created by the first interventions of industrialized countries in third world food systems has been set out above. It is the setting in which, willy-nilly, today's development efforts must take place. An analysis of the contemporary situation requires that a further dimension be added, as it is now recognized that our planet is a global system and that there is no chance of third world food systems reverting to relative self-sufficiency. They must try to evolve towards a new, different, yet viable equilibrium starting from a historical situation basically unfavourable to them.

## 2. "AUTHENTIC" FOOD SYSTEMS VERSUS THE DOMINANT MODEL

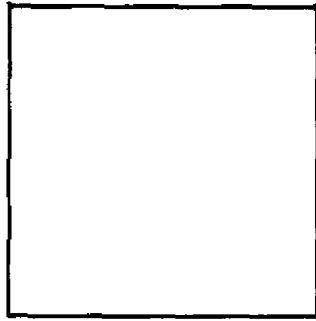
One goal of any national development policy should be to arrive at a food system which: (a) is environment-enhancing and ecologically sustainable; (b) provides a nutritionally balanced diet at reasonable cost to the entire population; while remaining consonant with its cultural preferences; and (c) ensures sufficient quantities for national self-sufficiency, as a guarantee against outside political manipulation through food aid or exports.



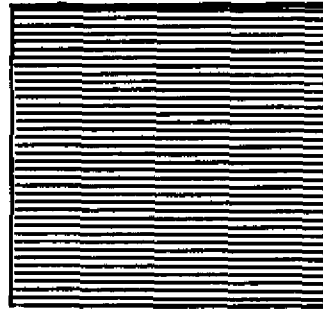
\_\_\_\_\_ = Impact    A = Third World country    B = Industrialized country

Figure 1

AUTHENTICITY

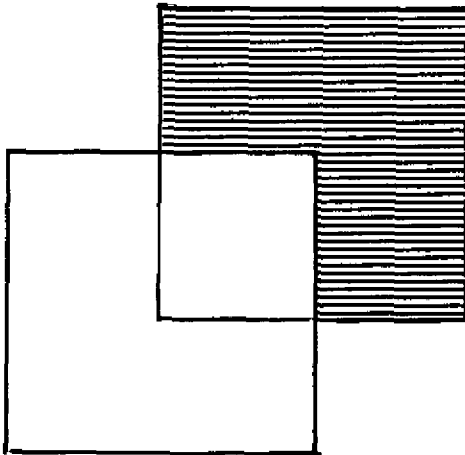


A



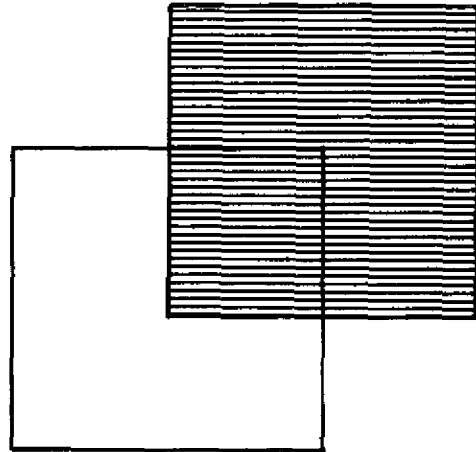
B

both authentic  
food systems



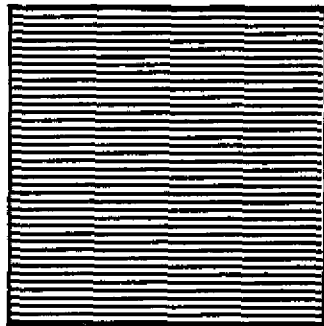
A gains control  
over part of B,  
A remains  
authentic

or

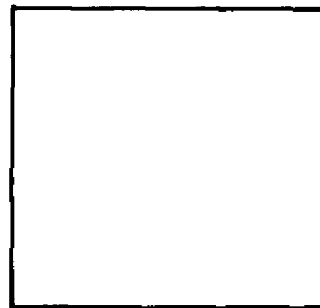


B gains control  
over part of A,  
B remains  
authentic

INAUTHENTICITY



A has  
been  
absorbed  
by B



B has  
been  
absorbed  
by A

Figure 2

Let us call such an ideal food system "authentic", drawing etymologically on authentés/authentikos, the Greek for "one who does anything by his own hand". An "inauthentic" system would, therefore, be one directed by outside hands; usually such a system cannot satisfactorily feed its own people. The hypothesis of this paper is that, in the contemporary world, there is competition between food systems, and that the model of the industrialized countries is now dominant and is being exported as a solution to development problems in the third world. However, food system models are in fact non-exportable: any successful development of authentic food systems will have to be based on local bioregions and local solutions, on a cultural renaissance and a scientific upgrading and enrichment of locally accumulated knowledge and techniques. Figure 2 summarizes visually what appears to be taking place, though it should be recalled that the circles are concentric: when an apparently technical model is transferred, cultural values go with it just as the economic/political balance of forces will also change.

There are naturally many gradations along a continuum of authenticity/unauthenticity; cases (1) and (3) are two extreme hypothetical poles, for, as we have seen, no system is totally closed and none totally permeable. What is taking place in (2) as it moves towards (3) is an economic, political and psychological struggle. One system can remain authentic in the process of incorporating elements from another only when it does so on its own terms. Unfortunately, there are few historical or contemporary examples where both A and B profit through mutual, beneficial incorporation. Note that the authentic food system has been defined as one serving the entire population. It is, of course, quite possible that the dominant class of A or of B may have something to gain from either self-reliance or inauthenticity. The physical resources of all but the smallest third world countries (and perhaps even these) are sufficient for attaining authenticity. The obstacle is, rather, the permeable nature of their food systems and their vulnerability to outside pressures.

While outright imperial violence is now rarely used to alter a developing country's food system, detrimental forces are still at work. To make clear the nature of these forces, and in support of the proposition that the industrialized countries' dominant model is being exported, we must see how and why this model itself developed. The point of the exercise is to show its costs and, if possible, to relativize it and diminish its prestige - a prestige which gives this model a psychological advantage directly influencing decisions made in the third world. Countries though nominally independent, may still be colonized both economically and intellectually. This state of affairs is often promoted by industrialized countries which have a short-term interest in keeping the third world dependent on their agricultural methods, processes and products, and in maintaining an international division of labour in which the southern hemisphere continues to supply northern markets with cheap traditional cash crops as well as, increasingly, luxury agricultural products. They may also, consciously or unconsciously, regard their own achievements as the only viable solutions for problems posed elsewhere.

This combination of forces creates a three-fold and self-sustaining dependency. (a) Southern countries accept and practice an imported food system model, requiring expensive inputs, as a supposed avenue towards development. (b) This model proves incapable of solving their food problem, and thus fosters increased food imports. (c) To pay for these imports, agricultural production for export (again using costly imported techniques) must be increased, thus reducing resources devoted to the attainment of an authentic national food system. And so on, in a vicious spiral.

What, then, is the nature of the dominant model? For the sake of clarity, a food system can be shown as a line composed of three segments:

INPUTS	AGRICULTURAL PRODUCTION	POST-HARVEST ACTIVITIES
including physical inputs, research and financial credit		including storage, processing and distribution

These categories are, of course, amenable to considerable refinement; they nevertheless apply to the means employed by any human community for feeding itself. In the now developed countries, the first and last segments of the line have come entirely under the control of industry (often called "agribusiness").

This development has made it meaningless to speak in classic economic terms of the primary (agricultural), secondary (industrial) and tertiary (services) sectors at a time when agriculture has itself become entirely dependent on industrial products and on services (like bank credit and transport) both up-stream and down-stream from the farm.

#### A. Historical development of the dominant model

The historical conditions of countries where the high-technology (HT) food production and distribution system developed made it an entirely rational and effective response to the problems posed in those societies. In the United States, for instance, vast land areas coupled with limited manpower made early mechanization imperative - indeed agricultural productivity in the United States has always been measured in terms of output per man, not per unit of land. By the 1850s, tens of thousands of machines were already being used in the United States. Harvesters were most popular because they insured the farmer against disaster and helped him spread his risks. With a harvester, he could reap crops on as much land as he could sow - which was impossible if he relied on hand cutting. An explosion of invention in agricultural technology - all of it labour saving - took place in the nineteenth century: steel-share mould-board ploughs, drill planters, mechanical screws for land clearing, barbed wire allowing enclosure of much larger areas in a shorter time, and grain binders, were a few of the items, besides harvesters, enjoying widespread use in the latter half of the century. The Civil War, which took so many men away from farming, the emancipation of slaves and the burgeoning industrial development creating demand for factory workers, all strengthened the trend towards HT agriculture.

The desired results were soon manifest: in 1800, 373 man-hours were needed to produce 100 bushels of wheat and 344 man-hours for the same amount of corn. By 1900, the figures had been reduced respectively to 108 and 147. But by 1959, the man-hours required were only 18 and 22. 15/ The first agricultural revolution in the now industrialized countries consisted in a shift from human to animal/mechanical power. The second revolution, which has taken place especially since the Second World War, is based on scientific innovation and automotive power. It has reduced labour inputs even more drastically through the use of self-propelled machinery, genetically improved varieties and much greater amounts of fertilizers and pesticides.

The HT model is today capable of feeding 220 million Americans through the efforts of fewer than 2.5 million farmers, and producing millions of tons for export besides. This model is generally regarded throughout the world as the

most "modern" and "efficient" ever devised. This is true enough - but only for those countries whose specific needs are met by it. The United States was land-rich and labour-poor. Nearly all today's developing countries are land-poor and labour-rich. A production system entirely conceived to economize on labour and spare workers for other tasks will have exactly the same consequences when used in countries whose chief unresolved dilemma is to give productive employment to the great majority of the population that lives in rural areas yet cannot find a livelihood there. Countries which adopt such a model must, therefore, expect it to contribute to labour displacement and to encourage out-migration towards already unmanageable cities, where few jobs in industry or services are available. On these grounds alone, there is reason to question both the "modernity" and the "efficiency" of the HT model when applied to the third world.

#### B. Costs of the high technology model

There are other serious costs - economic, social and environmental - inherent in this model. It is so expensive to use that only the most competitive farms stay in business: just after the Second World War, United States farmers spent half their gross incomes on production expenses; the figure is now 80 per cent and rising. Farm supplies are a \$90 billion annual business, and borrowing to purchase them has resulted in \$120 billion of agricultural credit outstanding. To sustain the cost/price squeeze, farmers must try to expand at the expense of their less fortunate neighbours. Four and a half million family farms have been eliminated since the 1930s today and, a third of all food produce is supplied by a mere 2 per cent of United States farmers, each grossing over \$200,000 yearly, while the top 20 per cent raise 80 per cent of all crops and animals. 16/ Land concentration is expected to continue: one United States Department of Agriculture scenario predicts that by 1985, over 60 per cent of all farmers working in 1975 will have disappeared. 17/ It now costs about \$400,000 to create a single job in agriculture, approximately 10 times the cost of an average job in industry.

The struggle to survive imposes a goal of maximum yields today - whatever the long-term costs. Monoculture and economies of scale become the only answer: a farmer cannot afford to leave space for trees, hedges, pastures, fallow fields or "low-value" crops. A detailed description, impossible here, of the ecological damage wrought by this system would include the increased use of fertilizers with rapidly diminishing returns; disastrous pest outbreaks (e.g. the cotton boll-worm,) created by pesticide use which destroys natural predators, and the pollution of land, water and the rest of the food chain by these chemicals. Non-renewable energy to keep this system functioning amounts to 1,400 litres of oil per American per year. If one attempted to feed the world's 4,000 million people an American diet using United States agricultural production technologies (assuming oil were the only energy source) all known petroleum reserves would be exhausted within 11 years. Underground water reserves are being "mined" for irrigation to the point that one reservoir, currently supplying seven States, will at present rates have disappeared by the year 2000. A third of the topsoil in the United States has already been irrevocably lost. 18/

Perhaps most alarming of all is the narrowing of the genetic base of North American crops. The devastating United States maize blight in 1970 prompted a study by the National Academy of Sciences which concluded that North American crops are "impressively uniform genetically and impressively vulnerable". A mere six varieties of maize account for nearly three quarters of all production, two varieties of peas for 96 per cent, four Canadian bread wheats for 75 per cent of all harvests, etc. 19/



When we examine the post-harvest segment of this "modern" and "efficient" food system, we find that it is incapable of providing a balanced diet to the entire population at a reasonable cost. The negative health aspects of the so-called "affluent diet" are too well documented to need elaboration here. 20/ What is perhaps less well known is that malnutrition and outright starvation were so prevalent in the United States in the late 1960s that a federal crash programme of food assistance was initiated. Its present cost to taxpayers is close to \$10 billion annually, and it might be argued that the United States could not long sustain a post-harvest system subservient to a highly concentrated food processing industry without subsidizing the poorest consumers. About three quarters of all profits realized in this sector accrue to some 50 companies; which benefit both from the sale of highly elaborated products to the majority of consumers and from food assistance programmes. The latter are "backed by the American food industry which is strengthened by a substantial boost in purchasing power". Even so, several million hungry and poorly nourished Americans, especially in rural areas, do not receive the food assistance for which they are theoretically eligible. 21/ A similar analysis of European food systems (themselves much imbricated in that of the United States) would yield similar conclusions.

We have then a food system which is neither environment enhancing nor ecologically sustainable, which is costly yet incapable of providing a nutritious diet for all the citizens of one of the wealthiest countries on earth. Its production system may - for the moment - be effective, but it is also scientifically crude and linear, relying on industrial techniques to yield an end-product (the system's only goal) that will fetch the best price on national and international markets. It is based on the survival of the fittest and the elimination of all but the largest producers. Yet this is the system that more and more third world countries are adopting - or attempting to adopt - because their dominant classes see it as more remunerative for themselves; or, to give them the benefit of the doubt, because they mistakenly equate "Western" with "productive" and "superior". The prestige of the HT model has grown highest in the developing countries at the very time that significant numbers of knowledgeable Americans and Europeans are questioning the economic, social and ecological relevance of their own systems to national needs, and questioning particularly the oligopolistic control agribusiness exerts over them.

### III THE INTERFACE OF THE HIGH TECHNOLOGY MODEL AND THIRD WORLD FOOD SYSTEMS

We have described the HT model, for convenience' sake, as if it were closed, but we have already seen that no food system (even, or especially, a dominant one) is self-contained. The industrialized countries' system could not function without substantial inputs from the third world - in fact, we shall see that luxury supplements to northern diets are more than ever provided by countries that themselves have a serious food problem.

Among possible objections to the above analysis are these three:

(a) At the factual level, one might argue that the third world is not adopting the dominant food system model, nor is it continuing to supply outside food systems, along colonial lines, on unfavourable terms.

(b) Assuming that developing countries are adopting the dominant model, the negative consequences described have only recently become serious. Forewarned is forearmed: these negative aspects can be foreseen, counteracted and mastered. In any event, the only way to conquer hunger is to increase food production, and

the only way to do that is to modernize agriculture in ways that have proved effective in the north.

(c) The role of bilateral and multilateral assistance is to help third world governments attain the development objectives they have themselves defined, and modernization along dominant model lines is what they want. It is not in the province of donor governments or agencies to contradict them.

Concerning the first objection, an attempt has been made elsewhere 22/ to show in some detail that the third world is in fact adopting the dominant model, as well as supplying its supplementary food needs on unequal terms. Suffice it here to summarize some major points.

A. The third world as a market for the HT model

The "green revolution" strategy is a textbook case of the industrial input-intensive method of agricultural production. It should have been clear from the outset that only the better-off third world farmers with access to credit would be able to adopt it and that small producers would find themselves at an immediate competitive disadvantage. This is exactly what has happened. Competition for land has increased as agriculture has become a profitable investment, and rural dispossession has intensified as a result. The outcome is that while food production has indeed increased (although less than is often claimed), fewer people proportionally are able to buy it and millions have been deprived of the means of producing food for themselves. 23/ Such effects were perhaps not intentional, but this commercialization of agriculture was certainly encouraged, as one United States planner noted:

"The agricultural modernization (the Green Revolution) could be the seed-bed of new market economies in the world's low-income countries ... [Green Revolution farms must] make economic ties to a wide array of agribusinesses - manufacturers of agricultural equipment and chemicals, storage and warehousing operations, processing firms and distributing organizations ... Businessmen from the more developed economies and international lending agencies are all engaged in efforts to ... spread the use of the new technologies." 24/

Mechanization is not, strictly speaking, necessary to "green revolution" husbandry, but it is often perceived by larger landholders as an effective means of social control and preferable to dealing with potentially restive agricultural labourers. Many governments' policies, particularly in Latin America, have directly encouraged mechanization, with the result that two and a half million jobs had been lost on that continent alone by 1972, according to a "conservative estimate" by an FAO expert. 25/

The "green revolution" has also had the effect of drastically reducing the genetic variety of cultivated species in the third world - thus increasing vulnerability to disease and eliminating part of the germ-plasm resources upon which all countries must rely for genetic improvements in the future. 26/

Large, centralized storage and processing facilities for cereals and oil-seeds on the industrialized country pattern are increasingly favoured by lending agencies and transnational corporations. An FAO expert paints this picture:

"Piles of rice bran rot in a government rice mill. Ground-nut mills set up as outlets for farmers' crops stand idle because of lack of supplies. A grain marketing board operating grain stocks ... finds that it must add 100 per cent to its purchasing price to cover all costs and losses incurred. Another board sends soldiers to induce farmers to sell their grain ... Further examples could be cited in the livestock, meat and dairy sectors. Most of these operations were initiated and implemented in developing countries with the assistance ... of bilateral or international expertise ... What went wrong?" 27/

His answer is essentially that the realities of local economies are not considered; post harvest losses increase (in transport or through quick-spreading infestations) while the cost added by centralized storage and processing is at least 20 per cent. Family or village storage and processing is far less wasteful and less costly.

But foreign food processing firms typically gain returns on investment averaging 14 to 16 per cent in Latin America (doubtless more in Africa and Asia) as compared to 4 to 6 per cent in developed countries. 28/ This gives them an obvious incentive to produce in the poorer countries, where labour is cheap and generally unprotected by trade unions. They then tend to siphon off local raw materials for processing the same kinds of high-value-added products they manufacture in rich countries. The promotion of baby formulas, bringing increased infant mortality and malnutrition in their wake, is one of the best-known examples, 29/ but processors of soft-drinks, breakfast cereals, snack foods and other products have all found lucrative markets in the third world. The role of TNC advertising firms is crucial in this regard. 30/ Animals are increasingly fed with grain suitable for human beings, i.e. with feed grown on land previously devoted to food crops. Hatcheries, ranches and even beef cattle feed lots are now among the preferred investments of TNCs. 31/

B. The third world as supplier of northern food systems in a context of uncertainty

On the supply side, developing countries are now providing industrialized country markets not only with traditional tropical cash crops but more and more with luxury goods like meat, fish, off-season fruits or vegetables, flowers and even pet foods. Traditional third world exports are declining in relative importance and value. Taking 1967 as a base year with an index of 100, United States imports of tropical products reached all of 101 in 1977. But the United States index for "supplementary" imports (i.e. animal or vegetable production that can also be raised in temperate-zone countries) was 165 in 1977. Total United States imports of "supplementary" products were valued at more than \$6 billion in 1977, and over 50 per cent of these products came from developing countries. Poorer nations of Latin America or Asia now supply 20 per cent of United States meat imports and over 70 per cent of the imported vegetable products. 32/ Similar trends are apparent in Europe, for which Africa is the chief supplier of off-season luxury produce, frequently grown by peasants under contract to TNCs. 33/

Meanwhile, agribusiness TNCs are developing strategies for reducing their own dependence on tropical products from the third world. Substitutes for jute and cotton are already widely used, while the industrial use of sugar is gradually giving way to high-fructose maize syrup. It is now even possible to produce coffee and cocoa substitutes from plentiful temperate country crops like soya or barley. A shrub which gives natural latex as good as the hevea's is being grown experimentally. Higher prices for tropical crops (negotiated in forums like

UNCTAD) will encourage recourse to substitutes, so that exporting countries will have no guarantee they can sell the same quantities as before, even if they gain concessions on prices. 35/

The third world is more than ever a supplier of food products at prices it does not control, and a purchaser of staple foods (70 million tons last year) also at prices it does not control. A bushel of United States wheat which cost \$3.12 in late August 1978 sold for \$4.03 in September 1979. As a whole, the third world now buys about 30 per cent of all United States agricultural exports - and up to 60 per cent of that part of the United States wheat crop which is sold abroad. 35/ "Comparative advantage" as a doctrine for development seems to have become bankrupt - except for the rich countries.

C. Increasing production: a solution?

Let us take the second possible objection - that one can guard against the harmful effects of the dominant food system model, while production must, in any case, be increased. The relevant question here is "Production for whom?". In our present system, production is indeed being increased, but much of it is going to the already well fed, because purchasing power is the magnet that draws food, both nationally and internationally. Through the dominant model, income and capital are concentrated in the North and in the hands of a third world minority. It might be possible to guard against negative trends; what is evident is that such precautions have not been taken to date. Agrarian reform has made little progress; land ceiling legislation is not applied, while "the market", i.e. competition, allocates access not only to food but also to food-producing resources, including land.

Powerful commercial interests have a stake in promulgating the dominant model, either to sell agricultural product and expertise or to produce exportable agricultural goods more cheaply than they can in rich countries. These interests are frequently aided by governments and by the United Nations system itself. Tied aid is one mechanism encouraging dependence on an imported model. The largest bilateral donor (the United States) ties 73 per cent of its aid, while the countries of the OECD Development Assistance Committee as a group tie over half theirs.

United States food aid is legally conditional on the recipients' acceptance of "green revolution"-type techniques, while the European Development Fund gives over half its agricultural assistance to cash crop, not food crop projects. 36/ The United States Government's Overseas Private Investment Corporation supplies loans and political risk insurance to agribusiness companies' projects in the third world, generally producing for export or for the monied élites of poor countries. Until recently over 100 TNC agribusinesses were involved in FAO's work through the "Industry Co-operative Programme". 37/ Although the Director-General of FAO disbanded the Programme in 1978, these agribusinesses have regrouped and obtained consultative status with the United Nations Development Programme. Notwithstanding such State and international agency support, no evidence has yet been supplied that TNCs contribute to authentic food systems.

D. Has the third world had a real choice of food systems?

The third possible objection - "this is what the developing countries want" - brings us back to the problems of economic and intellectual colonization and to the responsibilities of developed countries. Decades of interference and technology transfer have resulted not only in economic dependence but in a transfer of values and attitudes as well. The dominant model is what the third

world "wants" - or may have been obliged to accept - because no one, with the exception of a few imaginative non-governmental organizations with no stake in dependent development, is offering anything else.

Northern governments and multilateral donors tend to finance the kinds of projects they understand (based, necessarily, on their own food systems) and those which will bring an immediate tangible return (in the form of traditional or luxury cash crops or purchases of inputs and expertise). This is, however, an extremely short-sighted policy on the part of donors whose own economic and political futures will be partly determined by the nature of the development process in poorer countries. The Iranian revolution was, for example, partly a violent reaction against the foreign take-over and large-scale destruction of a national food system which had resulted in the forcible displacement of several hundred thousand rural people and annual food imports costing half a billion dollars (from the United States alone) - this in a country which had once been self-sufficient.

#### IV. IS THERE A REALISTIC DEVELOPMENT POLICY ALTERNATIVE FOR ECE GOVERNMENTS?

Assuming that ECE member countries are interested in lessening third world dependence, how might they help food systems in the southern hemisphere evolve towards greater authenticity?

##### A. A re-examination of industrialized countries' consumption patterns

First of all, industrialized countries should take a critical look at the way their own consumption patterns influence land use and investment in the third world. They should try particularly to discourage the relatively recent, and so less entrenched, production of luxury foods (off-season vegetable products, meat, fish and pet foods) on some of the third world's best agricultural land; which contributes only marginally to the well-being of developed country citizens. This might be done by placing heavy import taxes on such items.

A new international economic order (NIEO), particularly as it concerns fairer and more stable prices for tropical commodities, would not of itself create authentic development. Efforts to establish such an order should nevertheless be supported, because it would provide the only means available for third world governments to plan land and resource use more rationally. At present, huge areas and heavy investment are devoted to cash crops because "boom and bust" cycles make this structurally necessary. That is to say, when the price of commodity X rises, producing countries (which have no mechanisms for consultations among themselves) try to grow more of that crop to take advantage of the higher price. When these unconcerted actions result in a glut - as they eventually do - the producing countries still try to grow more so as to keep their revenues stable in the face of falling prices. One feature of a properly organized new international economic order might be a reduction in the area used for cash crops, which are today more a part of the problem than a part of the solution.

##### B. Food aid policy

Since direct food assistance represents a high proportion of the aid furnished by ECE governments, the impact of past policies should be thoroughly examined. Stepped-up food aid in the Sahel, for example, has had a number of negative consequences. It has led to changes in tastes, prompting huge increases in wheat and maize demand (+234 per cent and +207 per cent respectively between 1965-1967 and 1975-1977), whereas local wheat production covers only 2 per cent of

requirements. In a recent report to an intergovernmental conference called by the Club du Sahel and the Permanent Inter-State Committee on Drought in the Sahel (CILSS), an FAO expert spoke of the "desire for bread" and pointed out that:

"Due to changes in feeding habits, the outlets available to traditional cereals remain limited and the incentives to increase production are small. In such a context, food assistance appears to be an easy solution, enabling urban populations - or privileged groups - to be supplied at relatively low prices, but failing by this very fact to achieve self-sufficiency in the matter of food supplies ... Whereas Sahel States have granted, since the sixties, priority to the extension of ... ground-nuts and cotton and have sometimes achieved spectacular success ... it cannot be said that any real cereals policies have been implemented so far." 38/

Much the same could be said for other major food aid recipients like Bangladesh, where donations rarely reach the people most in need, but whose sale to the better-off provides a substantial part of the national budget. Food assistance has frequently been specifically geared to increasing subsequent cash sales (for example, this objective figures in the text of the United States 'Food for Peace' law). Industrialized countries must determine whether they choose to aid themselves (by getting rid of surplus or increasing commercial food exports), political/military 'clients' (who will in turn sell the food aid to their own clientele), or populations which are truly at risk. If authentic food systems are the goal, policies stressing short-term, disaster-related food aid and direct relief for the poorest would be much more beneficial than the present long-term institutionalized programmes. Low cost food imports should never be allowed to compete with local food production and thus destroy incentive. 39/

### C. The case for a temporary reduction in development aid funding

The suggestion of a temporary reduction in development aid is perhaps the ultimate heresy, and as such would doubtless be seen by Northern governments as a political liability and by Southern ones as another proof of "first world" selfishness. But there is ample evidence that present levels of aid are actually accelerating rural polarization, especially landlessness and loss of employment, because so much of it accrues to the higher strata of third world societies.

Even conclusive evidence that certain development projects would cost less and have a much greater positive impact on poor local people will not prevent the adoption of their exact opposites. Comparative cost/income calculations showed in 1974, for example, that for oil palm development schemes in Nigeria, "based on village processing units, growers' family incomes would be approximately 50 per cent higher and over-all investment in transport and processing facilities 75 per cent lower than in a large-scale industrial scheme." 40/ The World Bank nonetheless made loans in 1975 and 1978 totalling \$95 million - for large-scale, centralized industrial oil palm development in Nigeria. 41/

The cynical view of such activities is that agencies dominated by "first world" governments will encourage dependence by promoting projects relying on equipment procurable only from industrialized countries. A more charitable opinion would be that lending agencies are permanent institutions and thus obliged to spend huge sums of money because budgeting procedures demand it, even if they worsen the position of the poor. A moratorium on aid combined with much higher spending on research and a commitment to accept the policy implications of that research, might be recommended. A brief hiatus could institute much longer time scales for project implementation. There is now much talk of "local participation", but few agencies are willing to allocate the necessary time for detailed research and

necessarily complex consultations. Real participation would even entail, in many cases, the building up of rural organizations in order that their members might speak out without fear of reprisal from powerful local interests. Despite their crucial role in food production and processing (and sometimes marketing), rural third world women are the most forgotten group of all. Unfortunately schemes that do not take women's specific skill and problems into account sometimes "succeed" by making women's lives even harder. <sup>42/</sup> Time "lost" in securing popular participation, including participation by the lowest social strata and by women, would be made up in time gained in effective project implementation. If the rural poor are convinced they have something to gain from a project, they will act as fast as any agency could wish, but they will quite properly resist "modernization" from which only the better-off groups (or only men) stand to benefit.

Lower cost projects, relying on high labour content, are furthermore the only one that stand a chance of replication throughout the country. It may be possible to create developed "pockets" by saturating a small area with capital and personnel, but such islands have little significance for the economy of the country as a whole and merely increase inequalities because they are too costly to generalize.

#### D. Recognizing the relativity of food systems in the ECE area

This is a complex recommendation because it runs counter not only to entrenched interests but also to entrenched mentalities. ECE countries should examine the cultural, economic and environmental relativity of their own food systems, rather than think of them as panaceas for radically different societies. If the industrialized countries could view their own systems not as universally applicable, but as local solutions to local problems and conditions, this would simultaneously have an effect on decision makers in poorer countries - helping to rehabilitate the prestige of local solutions in these countries as well.

The introduction of the dominant food system has pushed third world countries towards the kind of homogeneity which now prevails in industrialized countries, e.g. hyper-specialized monoculture and reduced genetic variety, and commercially induced food habits encouraging the consumption of identical products throughout the world (bread where no wheat is raised, soft drinks, infants' formula, etc.). The structural homogeneity of the developed countries' food systems is masked by an end product exhibiting great commercial pseudo-variety (one observer recently counted 85 different kinds of bottled salad dressing in an American supermarket). But this variety is spurious and controlled in reality by a very few firms using diverse labels made "different" through advertising.

Traditional third world food systems may, in contrast, be characterized by relative monotony of diet (broken by festivals and feasts) but be based on wide genetic and species heterogeneity. For example, one Philippine tribe practising shifting cultivation is able, to identify and use 1,600 different plants. In one part of Tanzania, peasants cultivate 24 different kinds of rice; many other examples of this empirical knowledge of species could be cited. <sup>43/</sup> Traditional cultivation systems are also founded on heterogeneity - mixed cropping of trees, bushes, standing plants, and even certain "weeds" which play a positive protective role. Such techniques are time-tested responses to risk: homogeneity is vulnerable, but diversity is resistant and risk-spreading. Systems breakdowns are far more likely in conditions of structural homogeneity (blights over large areas, as have occurred in the Philippines and Indonesia - not to mention the Irish potato famine or the United States maize blight). Monoculture is linear,

seeking a single product year after year and paying the price in industrial inputs. Traditional systems are circular, and return to the land what has been taken from it.

Peasants, left to themselves and given enough physical space, are environment improvers. The first farmers did not follow Ricardo's principles by using the best land first (it was beyond the physical capacity of the farming group, mostly women, to clear it) but the more easily worked terrain. As Professor Cépède notes, "fertility is progressively built up on naturally poor land." 44/ Even today, in poorer countries, small plots worked by peasants have proved up to 13 times as productive as large mechanized holdings 45/, although this is no longer possible when the resources available to them are drastically reduced. Then they are accused of "overcultivating" and "overgrazing" the little that has been left them - as indeed they must if they hope to ensure immediate survival.

Even if we take a country like Tanzania, generally regarded as striving for autonomous development, we find peasant knowledge neglected and significant inroads made by the dominant model. "Maize plantations as monocultures are considered a symbol of progress. In reality they present a great danger to soil fertility." 46/ No one is studying the agricultural practices of the Tanzanian peasants who cultivate 24 varieties of rice, although grants can be obtained for work on imported rice hybrids. Limestone powder from the major cement works is thrown away, whereas it could make excellent fertilizer - and chemical fertilizers are imported. As a Heidelberg university team working on improved agricultural methods reports on Tanzania:

"Until now, there has been nothing available except the strategy of high-yield varieties, fertilizers, pesticides and mechanization ... A country like Tanzania which has decided to obtain independence even with economic disadvantages should be interested in alternative "ecofarming" methods. This is not yet the case; the influence of foreign advisers supporting the ideas of the "green revolution", considering only the interests of industrial countries, is still too strong." 47/

Local practices in some areas have been all but out and absorbed by colonial or post-colonial cash crop production. In such areas, their resurrection would demand a veritable archaeology of rural traditions. Elsewhere, there are better possibilities to collect, collate and codify local knowledge, but few local or outside agencies and institutions take an interest in such activities.

This is not to advocate a "Garden of Eden" approach. Peasant practices represent very real knowledge - not always easily accessible to outsiders - which has ensured food supplies for generations. But they are not perfect: they should be regarded as perfectible. Inputs from other food systems can be beneficially incorporated in these practices, but it should be the community itself which decides how and when. Mechanization, for example, can cause unemployment, but in a different social context it can also increase employment when used (as in China) to raise the number of possible yearly plantings, clear new land, etc. Whether outside elements are beneficial or harmful will greatly depend on the balance of social forces - and thus ultimately on the structure of power.

Isolated, generally ill-funded scientific work is being undertaken on the best "mixes" of peasant empirical knowledge and Western scientific techniques, but the creation of a new body of knowledge combining the two is still in its infancy. However, it can now be shown scientifically that indigenous cropping systems use labour more efficiently, give more stable yields from year to year and are intrinsically higher yielding than monoculture. The subsistence farmer has developed a highly sophisticated system based on good economic sense. 48/



Only such systems, based on a high labour input, could employ the many willing hands now idle in the third world. They alone could serve as a basis for authentic food systems at the national level because they are less costly, are replicable and maintain ecological balance. Unfortunately - and this is a crucial drawback - they contribute very little to anyone's immediate profits - except for the local communities that employ them.

E. The real interests of ECE governments

ECE government would seem to have much to gain, even commercially, from more progressive policies, aiming beyond short-term economic interests. Mahbub ul Haq of the World Bank explains this vividly:

"The new international economic order is not a one-way street of benefit only to the developing countries. Any new deal, whether it is negotiated nationally or internationally, ultimately must ensure the viability of the entire society ... My own favourite parallel is the comparison with the New Deal in the United States in the 1930s. What it did was to elevate the working classes from their status of dependence and uncertainty to a status of greater partnership in management by arranging a more equitable sharing of profits ... I am sure that at the time, the people who ran corporations in the United States thought that President Roosevelt was a raving maniac and that the New Deal spelt the demise of capitalism. But with hindsight, one can see that it was an act of unparalleled leadership which saved the American system from its inner contradictions." 49/

Such arguments also apply to the help industrialized countries could give third world governments in progressing towards authentic food systems. Improving rural prosperity for all would increase demand for all kinds of goods. A distinguished American economist has shown, for example, that more stable prices for third world commodities instituted 10 years ago would have resulted in economic gains for the United States of \$15 billion over the decade in prevented unemployment and GNP loss. 50/

Northern governments could also promote mutually beneficial trade by writing off third world public debt. In some cases, up to a third of export revenues returns immediately Northward as annual debt service. Debt reduction could be an alternative to direct funding of projects.

If ECE governments took the lead in necessary economic restructuring, pointing out the intrinsic value of local food systems, third world governments might begin to take renewed pride in their own cultural inheritance. If aid cadres and scientists were trained to start from and build upon the local situation, rather than to alter it along industrialized-country lines, local cadres and scientists might begin to see their own peasantries as a precious resource rather than as an obstacle to development.

There will be formidable pressures against "first world" co-operation in the development of authentic third world food systems. Some pressures will come from within - from the interests that have a financial or ideological stake in dependence. Some will come from without - from elements among third world élites desirous of maintaining systems that cater to their needs or whims at the expense of their poorer compatriots. Yet a politics of vision should look towards a farther horizon; towards that diversity and authenticity - cultural and agricultural - upon which depends our common prosperity and survival.

NOTES

- 1/ ECE/SEM.11/PM/R.1, para. 10.
- 2/ The terms "third world" and "first world" are used throughout as convenient shorthand and imply no value judgements.
- 3/ An example of culture and ethics determining dietary practice is to be found in the Jewish dietary laws. See Jean Soler, "The dietary prohibitions of the Hebrews", New York Review of Books, 14 June 1979, pp. 24-30, and Mary Douglas, Purity and Danger (London, Routledge and Kegan Paul, 1966), chap. 3.
- 4/ Philip Stewart, "Human ecology: a new kind of knowledge?" Paper presented at the symposium "Homme biologique et homme social", Centre Royaumont pour une Science de l'Homme, December 1978 (mimeograph). The example of the impact of Hindu beliefs on the Indian environment is almost too obvious to be mentioned.
- 5/ Lesley Gordon, Green Magic (London, Ebury Press), 1977, p. 87, and, for the connexion between cotton and the Civil War, Gavin Wright, The Political Economy of the Cotton South (New York, Norton, 1978), chap. 5.
- 6/ Pierre Spitz, "Notes sur l'histoire des transferts de techniques dans le domaine de la production végétale", paper presented at the OECD Seminar "Science, Technology and Development in a changing World" (DSTI/SPR 74.45), April 1975.
- 7/ Centre Francais du Commerce Extérieur, Le développement de la production du soja au Brésil, collection 'Enquêtes à l'étranger', November 1973, pp. 49 et seq. See also UPI dispatches 'Rio beans shortage causes disorders' and 'Black beans the write-in choice of thousands who voted in Rio' in the International Herald Tribune, 13 October 1976 and 22 November 1976.
- 8/ Pierre Spitz has discussed this question at length in "Silent violence: famine and inequality", International Social Science Journal, vol. XXX, No. 4 (1978). (Also in French, "Violence silencieuse: famine et inégalités", ibid.)
- 9/ Dr. Moises Behar, "Nutrition of Mayan children before the Conquest and now", Clinical Pediatrics, vol. 9 (1970), pp. 187-188.
- 10/ Addis Hiwet, "Ethiopia: from autocracy to revolution", Occasional Paper No. 1, Review of African Political Economy (London), 1975, cited in Nicole Ball, "Understanding the causes of African famine", Journal of Modern African Studies, vol. 14, No. 3 (1976), p. 522.
- 11/ From French colonial archives quoted in Laurence Wilhelm, "Le rôle et la dynamique de l'Etat à travers les crises de subsistance", unpublished Mémoire de thèse, cited in Spitz, "Silent violence ...", loc. cit.
- 12/ Andrew Pearse, The Latin American Peasant (London, Frank Cass, 1975), p.9.
- 13/ M. Merlier, Le Congo de la colonisation belge à l'indépendance (Paris, Maspéro, 1963, cited in M.K.K. Kabala Kabunda, "Multinational corporations and the installation of externally oriented economic structures in Africa", (Carl Widstrand, ed.) Multinational Firms in Africa (Uppsala, 1975), p. 305-306.

- 14/ Gouverneur Blacher to the Administrateur du Cercle de Dosso, Niger, 16 June 1931, cited in J. Egg and others, Analyse descriptive de la famine des années 30 au Niger et implications méthodologiques (Paris, Institute National de la Recherche Agronomique, July 1975), mimeo, p. 37. Jean Suret-Canale in his Afrique noire (vol. II, L'ère coloniale) discusses the use of taxation in detail.
- 15/ Various aspects of the development of the United States model will be found in Alan Olmstead, "The mechanisation of reaping and mowing in American agriculture 1833-1870", The Journal of Economic History, No. 35: (June 1975), pp. 327-352 and vol. XXII, No. 4, (1962) a special issue on the 100th anniversary of the founding of the United States Department of Agriculture. In the latter see especially Wayne D. Rasmussen (chief historian of the USDA), "The impact of technological change on American agriculture 1862-1962, pp. 578-591, and Martin Primack, "Land clearing under nineteenth-century techniques", pp. 484-497.
- 16/ United States General Accounting Office, The Changing Character and Structure of American Agriculture: An Overview, (Report CED-7-178), (Washington, December 1978), p. iii, and John E. Lee, "Agricultural finance: situation and issues", USDA 1978 Food and Agricultural Outlook Conference, Proceedings (Washington, USDA, November 1977).
- 17/ Alternative Futures for US Agriculture: A progress report, prepared for the Committee on Agriculture and Forestry of the United States Senate by the USDA Office of Planning and Evaluation (Washington, USDA, September 1975).
- 18/ Some sources on the environmental impact of the high technology system are: Robert van den Bosch, The Pesticide Conspiracy (Garden City, N.Y., Doubleday, 1978), notably the preface by Paul Ehrlich; Farmers' use of pesticides (in 1964, 1971 and 1976), USDA Agricultural Economics Reports Nos. 145, 268, 418; David and Marcia Pimentel, Food, Energy and Society, Resources and Environmental Science Series, (London, Edward Arnold, 1979), especially pp. 137-139; Gerald Leach, Energy and Food Production (Guildford, Surrey, IPC Science and Technology Press 1976); and Nicole Ball, "Deserts bloom ... and wither", Ecologist Quarterly, Spring 1978.
- 19/ Genetic Vulnerability of Major Crops (Washington, National Academy of Sciences, 1972), p. 1. The best comprehensive report on reduction of seed variety, future germ-plasm resources and the danger of industrial take-over of seeds is Pat R. Mooney, Seeds of the Earth: A Private or Public Resource? (London, International Coalition for Development Action), specially prepared for the UNCSTD Conference, Vienna 1979.
- 20/ Cf. Erik Eckholm and Frank Record, The two faces of malnutrition, World-watch Institute Paper No. 9 (Washington, 1976), or the hearings before the United States Senate Select Committee on Nutrition and Human Needs, held in Washington in March, April and May 1973 (published in four parts).
- 21/ Nick Kotz, Hunger in America: the Federal Response (New York, Field Foundation, 1979), p. 23.
- 22/ Susan George, Feeding the Few: Corporate Control of Food (Washington and Amsterdam, Institute for Policy Studies/Transnational Institute, 1979).

- 23/ Andrew Pearse, "Technology and peasant production: reflections on a global study", Development and Change, 8 (1977). All the UNRISD Studies on the "green revolution", directed by Pearse, are of relevance to this subject. Definitive conclusions will be published under the title Seeds of Plenty, Seeds of Want (Oxford University Press), but preliminary conclusions and a large number of country studies have already appeared in UNRISD editions.
- 24/ Martin Kreisberg, "Miracle seeds and market economies", Columbia Journal of World Business, March/April 1969. Kreisberg is now the Co-ordinator for International Organization Affairs of the Economic Research Service, USDA. His more recent volume, International Organizations and Agricultural Development, Foreign Agricultural Economic Report No. 131, (USDA, May 1977) is a compendium showing that donor agency aid goes to implementing the dominant model: "IBRD and IDB have put major emphasis on projects ... to purchase needed production inputs, particularly machinery" (p. vii).
- 25/ K.C. Abercrombie, "Agricultural employment in Latin America", International Labour Organisation Review, July 1972. See also S. Barraclough and J. Schatan, "Technological change and agricultural development", Land Economics (University of Wisconsin), May 1973.
- 26/ Garrison Wilkes, "The world's crop plant germ plasm: an endangered resource", The Bulletin of the Atomic Scientists, February 1977; and Mooney (see above, note 19).
- 27/ E. Reuss, "Economic and marketing aspects of post harvest systems in small-farmer economies", FAO Monthly Bulletin of Agricultural Economics and Statistics (a two-part article), vol. 25, Nos. 9 and 10 (September October 1976).
- 28/ Multinational corporations in Brazil and Mexico: structural sources of economic and non-economic power, Report to the Sub-Committee on Multinational Corporations of the United States Senate Committee on Foreign Relations (usually referred to as the "Church Report" from the name of the Committee Chairman) (Washington, August 1975), appendix A, table 7.
- 29/ See Susan George, "Nestlé Alimentaria, S.A.: the limits to public relations", Economic and Political Weekly (Bombay), vol. XIII, No. 37, (16 September 1978).
- 30/ Details in Charles Medawar, Insult or Injury? ("An enquiry into the marketing and advertising of British food and drug products in the third world") (London, Social Audit, 1979).
- 31/ Robert Ledogar, Hungry for Profits: US food and drug multinationals in Latin America, (New York, IDOC, 1976, especially chapter 6, and Overseas Private Investment Corporation, Annual Reports, 1973 to 1978.
- 32/ Taken directly or calculated from data in US Foreign Agricultural Trade Statistical Report, Calendar Year 1977 (Washington, USDA, June 1978).
- 33/ Maureen McKintosh, "Fruit and vegetables as an international commodity", Food Policy, November 1977.

- 34/ Cf. Susan George, Feeding the Few ..., op. cit. (Part 1) and, by the same author, "Le tiers-monde face à ses riches clients", Le Monde diplomatique, March 1979.
- 35/ "Untying of aid proves to be a slow process", Ceres (FAO), vol. 12, No. 3 (May-June 1979), pp. 4-5.
- 36/ See the annual reports prepared concerning the implementation of United States Public Law 480 (the Food for peace law), and Development co-operation, Annual Report of the DAC Chairman (Paris, OECD, 1975), p. 94. This volume concerns the second and third European Development Fund commitments. In subsequent DAC reports the contribution to industrial versus food crops are not broken down, so the situation may have changed since 1975.
- 37/ Further details on the Industry Co-operative Programme in Susan George, How the Other Half Dies, Penguin, 1976 ch.9.
- 38/ Robert Hirsch, "Some thoughts on the situation regarding food supplies in the Sahel countries and on the prospects on the horizon for the year 2000" (mimeo), prepared for the Nouakchott Colloquium, organized by CILSS and the Club du Sahel, in July 1979. See in particular pp. 20-22, 33 and 38.
- 39/ The effects of United States food aid are discussed in Susan George's How the Other Half Dies, op. cit., chap.8. A case study on how the cancellation of food aid immediately improved the nutritional situation in one country appears in Thomas Marchione, "Food and nutrition in self-reliant national development: the impact on child nutrition of Jamaican government policy", Medical Anthropology, vol. I, No. 1, (winter 1977). See also Paul Isenman and Hans Singer, "Food aid, disincentive effects and their policy implications", Economic Development and Cultural Change, vol. 25 No. 2 (January 1977).
- 40/ "A case for community based oil extraction units in small-farmer oil palm rehabilitation schemes versus the large-scale central milling approach in Nigeria" in Proceedings of the West African Seminar on Agricultural Planning, Zaria, 1974 (Ife, Nigerian Institute of Public Administration). The quote appears in E. Reusse, op. cit. (see above, note 27), Part 2, and the study is apparently also by Reusse, of FAO, since no other author is cited.
- 41/ World Bank, Annual Report, 1975, p. 55 and Annual Report, 1978, p. 77.
- 42/ For a number of examples, see Khadija Haq, ed., Equality of Opportunity Within and Among Nations Special Studies series, (New York and London, Praeger, 1977), Part IV ("Women and equality of opportunity").
- 43/ Bo Bengtsson, ed., Rural Development Research: The Role of Power Relations, SAREC (Swedish Agency for Research Co-operation with Developing Countries) Report R4/1979, p. 38, and a personal communication from Adolfo Mascarenhas, Director of the Bureau of Resources and Land Use Planning (BRALUP), Tanzania.
- 44/ Michel Cépède, "Acculturation 'aristophanique' des communautés rurales et groupes 'hésiodiques' dans les sociétés industrialisées", paper presented at the World Congress of Sociology, Uppsala, 1978, p. 3.

- 45/ Land Reform, Rural Development Series (World Bank), table 2.2.
- 46/ K. Egger (and team), Agro-technological Alternatives for Agriculture in the Usambara Mountains, (Heidelberg, Botanisches Institut der Universität Heidelberg, December 1976), mimeograph, p. 22.
- 47/ Ibid., p. 5.
- 48/ E.F.I. Baker and Y. Yusuf, "Mixed cropping research at the Institute for Agricultural Research, Samaru, Nigeria", in Intercropping in Semi-arid Areas, Report of a Symposium, (Ottawa, International Development Research Centre, 1976), p. 17.
- 49/ Mahbub ul Haq, "Toward a just society", International Development Review (Society for International Development), 1976, No. 4, p. 4.
- 50/ Jere R. Behrman, International Commodity Agreements: An Evaluation of the UNCTAD Integrated Commodity Programme, Monograph No. 9, (Washington, Overseas Development Council, 1977).

ALTERNATIVE PATTERNS OF RURAL DEVELOPMENT  
A CASE STUDY OF THE NETHERLANDS

Paper transmitted by the Government of the Netherlands

Prepared by Mr. E.W.J. FORD\*

Summary

The rural areas of the Netherlands have been shaped almost entirely by man; their appearance is, to a large extent, determined by agriculture, including animal husbandry, horticulture and forestry.

Since the beginning of the 1950s, the combination of labour, land and capital in the production process has been under continuous scrutiny with a view to raising production per man and per hectare. During the same period urban areas and other areas used by industry, transport and other infrastructure have expanded rapidly, mainly at the expense of agricultural land.

These developments have had wide repercussions in the rural areas: they have created socio-economic problems and adversely affected the quality of the soil, surface and ground water, the air and the appearance and character of the landscape. In this context, modern agriculture, the essential economic activity in rural areas, has played a major role. With more restricted types of land use, ecosystem variety is declining. The breaking of new land, control of the ground water level, intensive grazing, the diversion of streams and brooks and the use of chemical fertilizers, pesticides and herbicides, have all had a decisive impact.

Over the last two decades, the Government has been devoting increased attention to the formulation of a policy to reduce the ecological effects of certain types of human activities in an attempt to strike a balance between continued economic growth - with a further increase in material prosperity - and the preservation of the quality of the natural environment. This represents a "cautious" development alternative which would allow certain current trends to proceed unchecked. More "radical" alternatives have been proposed by numerous individuals and social groups, who severely criticize both the process and the products of modern large-scale agriculture.

An example of an early "cautious" alternative in the Netherlands is the land use policy in rural areas, which is implemented under the 1962 Town and Country Planning Act and has been clarified in various later official documents. A classification of rural areas is contained in a special section of the Third Memorandum on Physical Planning, dating from 1977. On the basis of an integrated approach to the various functions of the countryside, ranging from agriculture proper to nature conservation, it identifies five types of areas.

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\*Ministry of Agriculture and Fisheries, the Netherlands. The views expressed in this paper are not necessarily those of the Netherlands Government.

Until recently agriculture was the main function of the countryside, and this was clearly set out in laws and regulations. These are increasingly being felt to hamper the solution of problems arising from conflicting claims on land use.

Present thinking on the utilization and functions of rural areas requires a new approach to the allocation of land for different purposes. This approach is embodied in the so-called "Land Division Bill", which is currently in the final stage of preparation. The Bill is the result of concern about the effect of modern agriculture on cultivated landscapes that are important from the point of view of landscape conservation. It outlines a policy for cultivated areas which is designed to preserve their ecological and aesthetic qualities while allowing farming to continue in a modified form. In a way it defines the farmer's position as a food producer and a keeper of nature and the landscape.

Since the late 1960s there has been growing interest in "alternative" farming methods in the Netherlands and other industrialized countries as a result of criticism against many aspects of modern farming: (i) disapproval of many current practices (development of specialized farm types and minimum crop rotation, emphasis on mechanical tillage, high level of use of mineral fertilizers and chemical products to control diseases, pests and weeds); (ii) concern for the quality of nature and the environment (decline in soil fertility, accumulation of pesticides, herbicides etc. and other dangerous substances such as heavy metals in the environment, water pollution, etc.); (iii) the growing shortage of raw materials and energy; and (iv) objections against the quality of the products supplied by normal modern farming.

It is not easy to give an unequivocal definition of "alternative agriculture", but the various methods involved represent an effort to find solutions to the above deficiencies.

The two approaches discussed in this paper illustrate some important stages in a transition to alternative patterns of development and lifestyles in rural areas.

The first stage is the recognition, by groups of forward-looking people in society, that present technologies and behavioural patterns have adverse consequences for the natural environment. The groups resist the developments, and advocate more or less radical changes.

The subsequent stage would be to make large sections of the community aware of the effects of present patterns of development and lifestyles. In this context the Government should play a significant role, accepting that no measures can be effectively implemented against the wishes of a substantial part of society.



URBAN AGRICULTURE: A CUSTOMARY FEATURE OF LIFESTYLES  
IN DEVELOPING COUNTRIES, A POSSIBLE COMPLEMENT  
TO THOSE OF ECE COUNTRIES

Paper transmitted by the Government of France

Prepared by Yona FRIEDMAN\*

1. WHAT IS A LIFESTYLE?

Lifestyle means a certain behavioural routine, a routine which determines the tacit rules of everyday life. Such a routine, however tacit, governs people's behaviour more powerfully than any laws, regulations or government directives.

The establishment of a social routine is a slow process that may require three or four generations. It is amazing how long it takes for social revolutions to replace the old routine with the one they propagate. Time is required until a routine is accepted, or, more exactly, until people adapt the elements of a new routine to existing rules. However, impulses external to the social organization, such as natural catastrophes, shortages or crises, may provoke quite rapid changes in the routine we call lifestyle.

The current lifestyle in industrial countries is largely based on a certain "image", or a certain concept of "quality of life". The image generally contains some material features (such as the possession of many objects), some features of an ethical character (such as the idea that everybody has the right to possess many objects, and that everybody should have the same initial chance to obtain them) and, finally, a value scale (such as is used for the comparison of the social status of different individuals or groups). The particular avenues that are supposed to lead to the materialization of this "image" determine the feasibility of a particular lifestyle.

In spite of the noble image it endeavours to project, the lifestyle characteristic of industrial civilization, is losing its credibility. There are doubts about the practicability of the promises expressed by this image. People begin to mistrust big empty words, such as "just sharing", "solidarity" etc. Not that these words are erroneous (the doubters believe in the same ideals as people who use such words), but the acts involved are contrary to current social routine and thus cannot be implemented. The list below sets out some possibilities of conciliating feasibility with ethical values:

(a) The model of a new lifestyle should be based on the moral principle that the basic needs of all human beings in terms of food, shelter, health and information should be satisfied. The most basic of these needs, to which all the others are subordinated, is food.

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\*The views expressed are not necessarily those of the Government of France.

(b) Satisfaction of basic needs has to be assured in the far distant future too. Thus, any way of satisfying today's needs that makes the actual ecosystem less appropriate for human survival must be identified and rejected.

(c) Satisfaction of basic needs (particularly food) within the new lifestyle should not involve disproportionate investment and effort, either human or technological. A living being is characterized by the effort it accepts in order to satisfy different needs. This threshold is known for most species. There is no reason why the human species should toil more for its food than is absolutely necessary. Having to work hard for one's livelihood is generally the result of asymmetrical social relations (exploitation), rather than adverse natural conditions.

(d) The labour required to procure one's livelihood should be as equally shared by all humans as possible. Unemployment (paid or unpaid) should be avoided.

It is evident that the formulation and implementation of new lifestyles will call for purposeful policies and strategies.

## II. RESEARCH AS A PREPARATION FOR A "LIFESTYLE POLICY"

The criteria defining the image of a lifestyle give no hint about means of implementation. In order to test whether such an image is really feasible the decisive technical, sociological and historical factors must first be investigated.

Detailed analysis of these factors is outside the scope of this paper, but some operative measures which are compatible with the existing social routine - and thus feasible - will be considered.

In respect of technical and scientific factors, it will be necessary to establish priorities for research that could assist in the preparation of a lifestyle policy. For instance, in agricultural research changes would be required as follows:

(a) Less emphasis should be laid on high-yield plants than on varieties requiring little care for a medium-sized crop.

(b) Instead of searching for varieties with one peak harvest period, efforts should be centred on the development of varieties yielding crops over an extended period.

(c) Instead of concentrating on crops that fit current consumption habits, emphasis should be laid on ways of making now rejected parts of food plants fit for human consumption. Too much of the plant biomass is today thrown away as non-edible; a reconsideration of human diets might lead to better adaptation of economy to ecology. With appropriate techniques, for example, heat waste from cities could be partially recovered for use in food production (hothouses, etc.).

(d) Technical possibilities for locating food production as near to the place of consumption as possible should be investigated. Cities are the main food consumers, but food is generally produced far away from them, and this involves high secondary costs for transport, storage and retail distribution. Certain intensive techniques could assist in making food production a part-time urban occupation.

Urban agriculture could be a counterbalance to over-specialization in food production and help to reduce the danger of political blackmail that uses food supply as a means to create dependence.

A move to assign priority to research in areas such as those mentioned above might prove to be important for the emergence of new, feasible lifestyles in accordance with the basic criteria.

### III. SOME OF THE PRINCIPAL SOCIAL FACTORS DETERMINING THE FEASIBILITY OF A LIFESTYLE

If a lifestyle is not adaptable to current social routine it will remain a Utopia and will not be accepted by society. Consideration must therefore be given to whether a proposed lifestyle can coexist with important elements of the current routine.

Feasible lifestyles, like all other behavioural routines, are based on certain leading principles which determine the supporting image. Such leading principles are not always stated explicitly, as they might be far less attractive than the image itself: the image can be glamorous, the leading principle is always brutal and intolerant. Thus, while the image of the currently dominating society is rather a noble one, the leading principles in the background are for all intents and purposes conceived so as to defend the interests of a ruling élite. When the image refers to "equality", the criteria of equality, as defined by the leading principles, take the form of rules working towards increasing discrimination.

The main leading principles of industrial civilization, both in capitalist and in socialist societies, are the following:

- Undervaluation of agricultural work.
- Undervaluation of physical (blue-collar) work, which is in general associated with low status.
- Overvaluation of tertiary occupations (white-collar activities), which are associated with high status.
- General agreement that cash income should be the effective measure of real wealth and real social status.

These leading principles are basically antisocial. Indeed, they are an unconscious formulation of the rules which govern a slave-holding society that seeks the agreement of the slaves. Such leading principles give rise to continuous artificial scarcity and an unjust distribution of commodities, by manipulating status and rules of exchange. How can a just international economic order be advocated when the internal order of nations is still so unfair?

Strangely enough, once artificial scarcity becomes a real shortage, certain leading principles are temporarily suspended, and society develops a process of self-defence. A feasible lifestyle policy would stand its best chance of implementation in periods when the leading principles are weakening and the process of self-defence has been initiated.

The process of self-defence starts with the formation of "survival guerrillas", working in groups trying to ensure survival outside the framework defined by the leading principles. Such groups consider that their own survival is more important than the leading principles of a social organization. If they are few,

in number, they will be persecuted; if they are numerous, it will be they who define the new leading principles.

Some of the phenomena characteristic of such a situation are familiar, both from the Second World War (in industrialized countries) and from many countries of the developing world. Indeed, if general famine did not actually occur in these cases and people succeeded in surviving, this was because the rules implied in the leading principles had been abandoned.

The following are some typical phenomena of a lifestyle centred on survival:

(a) Tertiary activities (particularly administrative ones) are down-graded in comparison with really productive activities;

(b) Cash loses its purchasing power, and the exchange of commodities tends to be based on payments in kind instead of cash;

(c) The "informal" economic sectors gain in importance, particularly the activities of the so-called "quaternary sector" (i.e. all socially useful activities which are not included in GNP or are not remunerated in cash: work by housewives, neighbourhood services, subsistence gardening, certain handicrafts and repairs, etc. The "quaternary sector" is less a sector than a parallel economy to that of the market; it includes activities parallel to each economic sector. Subsistence gardening represents its "primary" sector; craftsmanship and self-help building the "secondary"; and housekeeping, child care, repairs, etc. the "tertiary" sector. The "quaternary sector" is a typical grass-roots invention: the response of small people to the failures of the mainstream economy.

The emergence of the quaternary sector is an indication that society is open to a new lifestyle; and it is, at the same time the first step in this direction. It is triggered by scarcity: a society expecting shortages will immediately develop a quaternary sector. This sector weakens the power of the ruling élite, who will do anything in their power to stop quaternary self-organization. The dilemma of those in power in our industrialized countries is either to avoid shortages, or else to achieve a "peaceful coexistence" with quaternary practices.

These days it seems impossible to avoid shortages. The great public disappointment with the industrialization approach is largely motivated by the unfulfilled promise that it would eliminate scarcity. Consequently, only the second alternative seems to be feasible: if our social organization is to survive, it has to make peace with quaternary practices.

Quaternary practice should be recognized in law and in the rules which govern society, and should be granted respectable social status. Education and training should be provided, in the same way as is being done today for tertiary activities (it is the ambition of practically all our schools to have curricula under which labour can be trained for the tertiary sector).

Obviously, a new economy cannot be modelled exclusively on the quaternary sector. It is a complementary pattern. But in the near future this sector could become as important as it is now in many developing countries.

As food is considered the main basic need, food production can be considered the main quaternary activity. A quest for new policies cannot be realistic if it ignores quaternary practices. Land use, administration, decision-making processes, and so on have to be adapted to the organization of quaternary

practices which are always based on small groups, on self-administration or on non-hierarchical organization.

There is much to learn in this respect from the experience (often unnoticed) of many so-called developing countries; a large proportion of people in these countries survive, through activities which are outside the official economic system but are tolerated by the administration. The question is how to help and how to support the quaternary sector.

#### IV. PILOT EXPERIMENTS

Any new social policy line ought to be checked against existing pilot experiments. The policy outlined above can be illustrated by reference to some current grass-roots initiatives:

(a) "Urban agriculture", i.e. quaternary food production in urban areas, exists in many large cities in developing countries and elsewhere, mostly in order to supplement low incomes or "no incomes" with income in kind in the form of self-produced food.

(b) Quaternary food production passes largely unnoticed in developing countries, where it ensures material survival for a large part of the population. In contrast, it attracts much notice in industrialized countries when pursued for ideological reasons (but even in these countries quaternary food production originating from need - as practiced by the unemployed, for instance - is ignored).

(c) Agriculture in conditions of rather high urban population density (for example, 3,000 habitants per square kilometre) is perfectly possible: food production is not necessarily a rural activity.

(d) Appropriate technical infrastructure for such agriculture (e.g. multistorey agriculture) can be provided within proper economic limits.

#### V. DISSEMINATION AND EDUCATION

A policy is meaningless if the behavioural pattern required for its implementation cannot be propagated, or is negated by current social routine. All industrialized countries have very efficient machinery for dissemination with considerable impact on social routine: the network of primary schools.

To make use of this network for a lifestyles policy, certain steps will have to be taken:

(a) A "science of survival" will have to be outlined;

(b) Appropriate and easily readable "manuals" will have to be prepared for use by the "man in the street" and the primary school-teacher;

(c) Popular education for survival has to be based on a "dialogue": such education has to encourage people to invent their own "quaternary technologies", and the inventions should be fed back into the education and information systems. A practical example of such a programme is the current project "L'Unesco pour tous" (see, for example, Y. Friedman, "Research and direct education", Impact of science on society (UNESCO), vol. 29, No. 3. (July-September 1979)).

DEVELOPPEMENT DE L'AGRICULTURE ET PROTECTION  
DE L'ENVIRONNEMENT EN FRANCE

Rapport transmis par le Gouvernement de la France

Préparé par M. D. d'OLLONE\*

Extraits

INTRODUCTION

"Les différentes activités humaines agissent de manière différentielle sur l'environnement naturel et humain par les prélèvements directs sur les ressources qu'elles effectuent, par la disparition de biotopes qu'elles provoquent et par les pollutions et nuisances qu'elles émettent.

Cependant l'agriculture se distingue particulièrement des autres activités de production car d'une part elle reste très dépendante du cadre naturel dans lequel elle s'exerce - l'agriculture est la seule activité humaine génératrice de richesse renouvelable et les potentialités des sols, les données agrométéorologiques et les ressources en eau sont autant de paramètres avec lesquels elle doit compter - et d'autre part elle inscrit, en retour, de manière très nette sa marque sur le patrimoine naturel.

"Ces étroites liaisons que l'agriculture entretient - par nature - avec l'environnement ne suffiraient à justifier une réflexion sur ces rapports, si l'agriculture française ne s'interrogeait aujourd'hui sur son avenir. De nombreux exemples illustrent l'actualité du débat sur l'agriculture:

- le Président de la République a récemment exposé les objectifs à long terme de l'agriculture française (1),
- un projet de loi d'orientation agricole est en cours de discussion au Parlement,
- des travaux prospectifs impliquant plus ou moins directement l'agriculture ont récemment vu le jour, traitant de l'avenir de la recherche agronomique (2) ou des conséquences économiques et sociales du développement de la biologie (3),
- l'avenir du marché commun agricole est l'objet d'un débat politique, d'autant plus tendu que de nouveaux pays méditerranéens frappent à la porte de la Communauté Européenne.

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Cette actualité est le produit d'une longue dynamique qui a abouti à la situation actuelle.

"L'histoire de l'agriculture est celle de la domestication des écosystèmes naturels qui vise à concentrer la productivité de l'écosystème sur quelques plantes utiles à l'homme.

- Depuis le XIII<sup>ème</sup> siècle et jusqu'au XIX<sup>ème</sup> siècle, l'agriculture est restée très extensive, c'est-à-dire qu'elle n'utilisait presque exclusivement que des mécanismes naturels (reconstitution des sols par jachère). Les progrès agricoles étaient plus liés à l'extension des surfaces utilisés qu'à une intensification des productions.
- A partir du XIX<sup>ème</sup> siècle on constate un changement majeur d'attitude des paysans vis-à-vis du milieu, du fait de leur plus grande maîtrise des éléments naturels.
- Une autre étape a été franchie depuis la seconde Guerre Mondiale avec l'expansion urbaine et industrielle: il fallait que l'agriculture produise et donc qu'elle participe à l'effort d'industrialisation de la France en développant sa productivité; elle a dû notamment se libérer d'une main-d'oeuvre importante pour minimiser ses coûts.
- Enfin, depuis quelques années les conditions ont à nouveau changé. Les ressources énergétiques sur lesquelles se sont appuyées les transformations de l'agriculture - mais aussi les autres facteurs de production tels que les machines, la main-d'oeuvre, la terre - sont devenus de plus en plus chers. Bien que l'agriculture soit le secteur où les gains de productivité ont été les plus élevés, elle n'a pas profité de ces gains: le maintien des prix agricoles bas a servi la croissance industrielle. Endettée, elle est devenue vulnérable non seulement aux aléas climatiques mais aussi aux aléas du contexte politico-économique national et international (la crise de la sécheresse a révélé cette vulnérabilité).

"Par ailleurs, les Français sont de plus en plus vigilants sur les problèmes de pollutions et nuisances et de dégradations des écosystèmes, et l'espace qu'entretient l'agriculteur est redevenu un élément majeur du cadre de vie des Français, comme en témoignent par exemple la multiplication des résidences secondaires (plus de 2 000 000) et le développement des loisirs de nature.

"Ainsi l'agriculture, désorientée, est aujourd'hui à la recherche d'un nouveau projet, un projet qui rendrait aux variables écologiques la place qu'elles avaient momentanément perdue.

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Avant d'aborder la question des Perspectives des rapports agriculture-environnement (le chapitre reproduit ci-dessous), le texte original examine les mutations de l'agriculture française qui ont modifié ses rapports avec l'environnement en mettant l'accent sur le bilan spatial, le bilan énergétique et l'impact de la modernisation sur les milieux, le patrimoine biologique et le cadre de vie.

La question est ensuite posée concernant les convergences possibles entre les intérêts de l'agriculture et ceux de l'environnement. D'un examen approfondi il ressort que certains choix de politique agricole sont favorables à l'environnement. La politique de protection de l'espace agricole est indiquée à titre d'exemple d'une politique convergente déjà engagée.

## PERSPECTIVES DES RAPPORTS AGRICULTURE-ENVIRONNEMENT

"On s'interroge aujourd'hui sur l'avenir de l'agriculture française car cet avenir n'est pas figé. Nous avons caractérisé un type d'agriculture à promouvoir, plus conforme aux multiples exigences d'environnement, une agriculture de convergence qui minimise les conflits. Mais les conditions sont-elles réunies pour que l'agriculture opère une reconversion à la mesure de la crise économique et sociale actuelle? Certes, les nécessités économiques (économies d'énergie, valorisation des déchets, valorisation des emplois,...) et le développement de certaines aspirations (qualité des produits, qualité du cadre de vie et des paysages) sont de nature à favoriser cette mutation. La maximisation de l'intensification ne peut plus être aujourd'hui un objectif raisonnable.

"Cependant ce changement qu'appellent ces conditions nouvelles ne peut s'amorcer en profondeur que s'il est soutenu par des forces sociales et institutionnelles puissantes.

"Présentons d'abord schématiquement les alternatives "extrémistes" pour mieux situer la voie dans laquelle doit s'engager l'agriculture française. Nous évoquerons ensuite les facteurs favorables et défavorables à cette transformation avant de montrer un domaine privilégié où celle-ci pourrait s'effectuer.

### 1. Deux situations extrêmes

"Une agriculture exclusivement productiviste (le "pétrole vert" de la France) viserait, en étendant son marché vers l'exportation, à maximiser sa production, ce qui conduirait à des coûts de production élevés, et corrélativement à un sous-emploi des zones agricoles défavorisées dans la mesure où interviendrait le critère de rentabilité monétaire.

"A l'opposé, la généralisation d'une agriculture dite "biologique" aurait des conséquences désastreuses sur l'économie agricole car elle ne permettrait pas une exploitation optimale des terres les plus favorables, bien que là où elle est pratiquée actuellement ses résultats soient, grossièrement, comparables à ceux des exploitations conventionnelles de même catégorie, surtout quand des circuits commerciaux spécifiques facilitent la valorisation des produits.

### 2. Les principaux moteurs du changement

"Poser la question des conditions du développement d'un modèle technologique nouveau différent du modèle dominant, amène à s'interroger sur le rôle que peuvent et devraient jouer les différentes forces du système social: d'abord les agriculteurs eux-mêmes et leurs organisations, mais aussi la recherche, les Administrations, les consommateurs, etc. Examinons quelques unes de ces forces.

#### - Le courant de l'agriculture biologique

Ce courant représente 4 à 5,000 personnes, soit moins de 1 pour-cent des agriculteurs et moins de 1 pour-cent du territoire agricole (100 000 ha). Il pèse donc assez peu dans la dynamique actuelle de l'agriculture française, d'autant plus que ses adhérents sont dispersés, divisés sur le plan doctrinal, et manquent de capitaux. Des adhésions massives sont peu probables tant que l'empirisme, voire l'idéologie, guideront les pratiques, c'est-à-dire tant que la technologie ne sera pas mieux fondée scientifiquement. Cependant ce courant joue un rôle de catalyseur, d'expérimentation sociale, de "minorité agissante", rôle qui est appelé à s'affirmer dans la mesure où ce courant devient moins radical en se rapprochant des nouvelles conceptions de la recherche agronomique.



- Le courant de la recherche agronomique

Alors qu'après la guerre la recherche agronomique a mis l'accent sur la fertilisation et la mécanisation pour répondre aux exigences de l'époque, elle oriente de plus en plus ses travaux vers la promotion d'une agriculture plus économe, plus écologique: par exemple dans les zones défavorisées, elle s'efforce plutôt de redécouvrir les races adaptées aux milieux existants que d'adapter les milieux à une race de plus en plus performante mais exigeante. Ce courant joue un rôle de premier plan pour l'avenir mais il pèse encore assez peu dans la dynamique à court et moyen terme de l'agriculture.

- L'évolution du comportement des agriculteurs

L'augmentation des coûts de production accule les agriculteurs à une adaptation de leurs comportements à court et moyen terme. Par exemple, ils surveillent de plus près leur consommation d'engrais. Cependant ces adaptations du comportement (à effets immédiats) ne remettent pas en cause les systèmes d'exploitations.

3. Les obstacles au processus de transformation

"Ces courants porteurs de transformations se heurtent à des résistances ou simplement à des inerties: d'une part, le système industriel et commercial d'amont voit d'un mauvais oeil la transformation des besoins de l'agriculture. D'autre part il faudra un temps d'adaptation pour entraîner les organisations agricoles et les instituts techniques qui ne sont pas encore suffisamment sensibilisés aux impératifs de gestion patrimoniale de la nature. Qu'en est-il des exploitants agricoles? Un changement réel demandera aussi un délai. Les exploitants engagés dans des systèmes industrialisés (1 sur 3 ou 4) seront réticents pour changer radicalement leur façon de produire. Les exploitants âgés (1 sur 5) et a fortiori sans successeurs ainsi que les exploitants ayant une activité secondaire non agricole (1 sur 5) ne seront pas non plus portés à modifier leurs habitudes. C'est donc plutôt parmi les petites et moyennes exploitations agricoles (2 à 300 000) que le changement sera le plus perceptible (et plus particulièrement, en outre, les exploitations reprises par des jeunes qui s'installent).

"Le problème particulier de la valorisation des sous-produits rencontre des obstacles divers. Les obstacles techniques se situent notamment au niveau de la collecte et de la transformation. Mais il y a surtout des obstacles économiques qui tiennent notamment à la variabilité de la disponibilité, à l'organisation de la collecte, du marché, du stockage, des transports. Hormis les consommations sur place pour les animaux, peu de solutions techniques valables résistent actuellement au contexte économique actuel. Ni les agriculteurs (pour qui la valorisation des sous-produits représente des revenus marginaux) ni les industriels sont enclins à s'engager dans cette agro-récupération. Enfin à tout cela s'ajoutent encore des obstacles de nature juridique et socio-politique.

4. Les zones défavorisées: comme champ d'expérimentation privilégié

"Dans quelles régions ce changement sera-t-il plus perceptible? Dans le cadre de la nouvelle philosophie de l'activité agricole (moins adapter le milieu que s'adapter au milieu), un rapide examen des perspectives de l'agriculture française ne peut omettre de considérer - très schématiquement - deux catégories de territoires agricoles: d'un côté, ceux qui se prêtent "naturellement" à la culture céréalière à haut rendement (une gestion optimale demande un degré relativement élevé d'intensification), de l'autre côté, ceux qui ne s'y prêtent pas, c'est-à-dire ceux où l'activité agricole y est moins rentable: zones de montagne essentiellement, mais aussi zones de pente, zones humides, zones interstitielles,...

"Aujourd'hui, l'acquis de 40 années de recherches permet de répondre sans difficultés à la question: comment intensifier?, mais on ne sait pas comment valoriser ces espaces "défavorisés". Ce sont donc ces derniers territoires qui doivent faire l'objet d'une attention nouvelle de la part des pouvoirs publics, des scientifiques, des agriculteurs, ces territoires où à la fonction productive vient s'ajouter la fonction d'entretien d'un patrimoine.

"A cet égard la réflexion doit s'appuyer sur un effort d'imagination à tous les niveaux pour être en mesure de répondre à des questions multiples:

- quelles vocations pour ces espaces?: élevage extensif, microproduction diverses,...
- quels agriculteurs pour gérer ces espaces?: valorisation sociale de cette activité; un créneau pour l'agriculture à temps partiel (artisanat, tourisme, usine,...),...
- quels débouchés pour ces produits?: générer une demande urbaine qui différencie les goûts des divers produits locaux par des campagnes auprès des consommateurs,...

"Ainsi l'avenir de ces zones de "seconde classe" ne peut se résumer à un seul problème de crédits: il est aussi un problème humain, institutionnel (insertion dans la profession agricole) et même socio-culturel. Ces zones constituent une base privilégiée pour un style alternatif de développement.

"L'agriculture française est donc habitée par différents courants qui se complètent (depuis les petites solutions techniques jusqu'aux grandes options de recherche) ou s'opposent, qui oeuvrent à court ou à long terme (de toutes façons une période de transition est inévitable avant de retrouver un nouvel équilibre), dans une région ou dans une autre, freinant ou accélérant le nouveau mouvement de transformation de l'agriculture qu'annonce le contexte économique et social à venir.

#### CONCLUSION

"Il y a des perspectives de changement profond dans le système technique agricole français, notamment du fait des nouvelles orientations de la recherche agronomique, un changement qui placera la biologie loin devant la mécanique et la chimie. L'ampleur de ce changement dépendra en grande partie de l'évolution du système économique dans son ensemble.

"Aujourd'hui est le temps de la prise de conscience et de l'interrogation, de la recherche et de l'expérimentation, et aussi des premières réalisations.

Le nouvel effort demandé à l'agriculture doit lui permettre d'emprunter le sentier qui d'une part la protégera des tentations exclusivement productivistes (qui ne prendraient en compte ni les dommages subis par le patrimoine naturel ni les aspirations nouvelles des populations et qui sous-emploierait une partie des potentialités naturelles et humaines du territoire) et qui d'autre part lui épargnera un isolement qui l'empêcherait de tenir pleinement le rôle qu'elle est pourtant en mesure de jouer dans la résolution de la crise actuelle de l'économie et de la société.

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- (1) Perspectives pour l'agriculture française. Giscard d'Estaing, 1977.
- (2) Réalités et perspectives. POLY, INRA, 1977. Pour une agriculture plus économe et plus autonome. POLY, INRA, 1978.
- (3) Sciences de la vie et société. GROS, JACOB et ROYER, 1979.

FOOD, ENERGY AND THE ENVIRONMENT:  
ALTERNATIVES FOR NEW LIFESTYLES

Background Paper prepared by  
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I. INTRODUCTION

The present world population of 4.3 billion ( $4.3 \times 10^9$ ) is projected to reach more than 6 billion by the turn of the century. This growth is expected to continue and to reach anywhere from 10 to 16 billion around the year 2100. A population of this magnitude can be expected to strain the capacity of the world's resources to provide adequate food and other essentials for society. Competition for land and water will be intensified, as will demand for fossil energy which is vital to agriculture, public health, industry and other sectors of human society.

Before attempting to find answers to these vast supply/demand problems of vital resources, the interdependences of food, land, water and energy in the entire world ecosystem must be understood. Discussions based only on energy needs or only on land needs in the food system are not effective because all are functionally interrelated components of what is called the human ecosystem.

Energy use in the agriculture sector, especially in industrialized nations, is increasing more rapidly than in any other sector of the economy. In agricultural systems, energy is employed to produce fertilizers, pesticides and farm machinery, and is used directly in the operation of the machinery. In addition, the raising of crop and livestock yields through intensive management practices has led to serious environmental pollution and degradation of land and water resources. Indeed, soil erosion is a serious problem throughout the world and continues to be responsible for significant reductions in productivity (Eckholm; Pimentel, and others, 1976).

Also of concern is the fact that water resources are being mined extensively in many parts of the world (Dunne and Leopold). Current irrigation practices have been causing salinization and waterlogging of agricultural soils (Eckholm; Pimentel and Pimentel). Both conditions reduce the productivity of the soil. The widespread use of fertilizers and pesticides to increase yields is causing pollution of the natural environment, including vital water resources. In some areas, agricultural chemicals have become a serious hazard to public health and threaten valuable fish, birds and insects (NAS, 1977).

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Human society can no longer afford to waste energy and degrade land and water resources while producing its food supply. If society expects to meet its future food needs, it must start now to modify present practices and develop alternatives and new strategies of agricultural production. This paper will examine the current use of energy, land and water resources in the food systems of industrialized societies and analyse alternative technologies that have the potential to help create an ecologically sound food system with a conservative energy input.

## II. ENERGY USE IN THE AGRICULTURAL AND FOOD SYSTEM OF THE UNITED STATES

### A. Crop and livestock production

In industrialized nations, fossil energy has become as vital a resource for crop and livestock production as land and water. Yearly, each American consumes as food the equivalent of 1500 litres of oil, representing about 17 per cent of all the fossil energy used in the United States (Pimentel and Pimentel). The energy inputs for the food system in Europe are similar. The United Kingdom uses 16 per cent for its food system, while Sweden uses 10-20 per cent for production and distribution alone (Leach; Olsson). In the United States, actual agricultural production uses about 6 per cent of the total; in the United Kingdom the figure is about 5 per cent (Leach). The remainder goes to food processing, packaging, transport, storage and home preparation.

The major uses of energy in agricultural production are for fuel to run farm machinery and for the production of fertilizers and pesticides (table 1). Pesticides are made primarily from petroleum, while nitrogen fertilizers are produced primarily from natural gas.

Food crops vary as to the amount of energy used in their production. Indian corn, a fairly typical grain crop, requires about 600 litres of petrol equivalent per hectare. This amounts to about one calorie of fossil energy expended for three calories of Indian corn produced (table 1). Most grains produced in Europe and the United States yield from two to three calories of grain per fossil energy calorie expended (table 2) (Leach).

Producing other types of food crops, however, is not as energy-efficient as grain production. For example, in apple and orange production, about two calories of fossil energy are expended for every calorie of fruit produced (table 2). Vegetables require from one to five calories of energy input per calorie produced (table 2). Data are similar for Europe (Leach).

Although fruit and vegetables require larger energy inputs per food calorie than grain, neither consumes so much energy in production as animal protein: from 10 to 90 kcal of fossil energy are required to produce 1 kcal of animal protein (tables 2 and 3). The major reason is that forage and grain crops first have to be grown, harvested and fed to the animals. The forage and feed to maintain the breeding herd represent additional energy costs. For example, about 1.3 head of breeding cattle must be kept to produce one calf per year (Pimentel, and others, 1975). It is also of importance that many of the grains fed to animals are fully suitable for human consumption. In the industrialized nations, about 90 per cent of the grain produced is cycled through livestock to produce milk, eggs and meat. Plant protein production per hectare, especially in the case of legume crops like soya beans, contrasts greatly with animal protein production. For example, about 20 times more protein is produced by raising soya beans than by producing pork (tables 2 and 3). It should also be noted that energy inputs for soya bean protein are about 5 per cent of those for pork protein production.

## B. Food processing and packaging

Once food is produced it is usually packaged to facilitate wide distribution in the market-place. In addition, the large harvest yields of perishable foods like fruit and vegetables are frequently processed for use later in seasons when fresh crops are not available. In the industrialized nations, the fossil energy inputs are substantial for packaging and also for preserving and processing foods and then placing them in suitable storage (Leach; Pimentel and Pimentel). For example, producing Indian corn on the farm uses only about 10 per cent of the total energy required to produce, process, market and cook a one-kilogram tin of Indian corn (figure 1). Most of the approximately 2,785 kcal that are expended in processing go to make the steel tin. Specifically, the heat processing and canning of the corn requires only 575 kcal, while the production of the steel tin itself requires about 2,210 kcal.

The fossil energy inputs for processing by freezing are significantly greater than processing by canning, averaging 1815 kcal/kg for frozen food compared with only 575 kcal/kg for tinned food (figures 1 and 2). This is because canning requires only heating and packaging, while freezing may require brief heating (blanching) followed by cooling, packaging and then freezing at  $-18^{\circ}\text{C}$  or lower. Furthermore, tinned foods once processed may be stored at room temperature, whereas frozen food must be kept at temperatures of  $-18^{\circ}\text{C}$  or lower. Maintaining such a low temperature requires about 265 kcal/kg per month of storage (USBC). Since frozen foods are usually stored for about six months, this energy cost must be added to the freezing cost, thus making the total energy input for frozen food much greater than that for tinned food (figures 1 and 2). Fortunately, however, the moisture-resistant plastic and paper containers used for frozen foods require less energy to manufacture than the metal tins or glass jars used for tinned food. Another important consideration is that the over-all nutritive value and palatability of frozen foods, especially vegetables, are superior to those of canned foods.

Drying is another way of preserving foods. Drying in fossil fuel ovens, is expensive; with drying by the sun, the external energy cost is eliminated. In suitable climates, solar drying of food on simple wooden racks is one of the least costly processes for preserving fruit, vegetables and meat. Salting of vegetables and meat for safe storage is also one of the least energy-intensive methods of processing foods. It requires only 23 kcal per kilogram of meat processed (Pimentel and Pimentel) but has some disadvantages; including reduced palatability and the ultimate salt content of the rehydrated food; and for some individuals the high residual sodium content of such foods may pose a health problem.

Two of the most energy-intensive methods of processing foods are freeze-drying and smoking. Freeze-drying requires about 450 kcal per kilogram of food processed. Smoking uses about 4,500 kcal from wood per kilogram of food smoked (Casper; Pimentel and Pimentel).

## C. Transport of food

Movement of food from farm to home is an essential part of the food system. In the United States it is estimated that about 60 per cent of food products are transported by truck and about 40 per cent by rail (Pimentel and Pimentel). Using data on the energy requirements of truck and rail transport, the energy required to move 1 kg of food product has been calculated at approximately 0.5 kcal per kilometre. If 640 km is the average distance that foods are moved, then the energy input per kilogram moved is about 350 kcal. This is an average figure. Much greater energy inputs are frequently required for transporting

foods to the market. Consider the journey of a 0.5-kg head of lettuce that has a food energy value of only about 50 kcal. When this lettuce is transported by truck, for example, across the continent from California to New York, a distance of 4,827 km, about 1,800 kcal of fossil energy is expended. This means that for transport alone, about 36 kcal of fossil energy are expended per kcal of food energy in the lettuce.

#### D. Cooking and preparing foods

Foods for human consumption are cooked, heated and/or cooled; all of these operations require the expenditure of energy. In industrialized nations an estimated 9,000 kcal of fossil energy are used per person per day just for home refrigeration and cooking of foods by gas or electricity (Leach; Pimentel and Pimentel). About 5,000 kcal are required, in addition, for washing and for the paper products used in serving. Since the per capita consumption of food is 3,300 kcal per day, more than 4 calories of energy are expended to prepare and serve each calorie of food consumed.

Cooking over an open wood fire requires even more energy than either gas or electricity. Heating food over an open wood fire is only 8 to 10 per cent efficient in transferring heat to food (Stanford) - an inefficient and costly use of wood fuel. In contrast the electric stove is 20 per cent efficient, when the production of electricity itself is taken into account (Pimentel and Pimentel). Gas stoves are the best, with an efficiency of 33 per cent. Thus both the kind of fuel available and the equipment used will influence the amount of energy needed to heat-process a given amount of food.

#### E. Environmental impact

In addition to consuming large amounts of fossil energy, the industrialized agricultural production system is causing serious environmental problems. Vast land areas are devoted to crops and pastures; much of this is exposed to agricultural chemicals such as pesticides and fertilizers. While these chemicals are helpful in increasing crop yields, they also find their way into the environment, where they create problems. For example, each year in the United States, pesticides cause damage worth a minimum of \$1 billion to the environment and public health (Pimentel, and others, 1979b). There is concern about the 45,000 Americans who are poisoned each year with pesticides, 200 of whom die. Other major problems caused by pesticides include livestock poisoning; increased control expenses resulting from pesticide resistance and the destruction of natural enemies; crop pollination problems and honey-bee losses; crop losses; fish and wildlife losses; and various governmental outgoings required to reduce the environmental and social costs resulting from widespread pesticide use (Pimentel, and others, 1979b).

Nitrogen fertilizer, another major agricultural chemical, often leaches into the ground water. As a result, the contamination of drinking water with nitrates and nitrites can rise to levels high enough to be hazardous to humans, especially young children (PSAC). Moreover, the addition of nitrogen to lakes and streams may result in increased eutrophication (PSAC; Beasley).

Not only do agricultural chemicals cause environmental problems; soils are eroded from agricultural land and washed into streams, reservoirs and lakes. The soil sediments have many diverse environmental effects. Sediments deposited into the bodies of water impede water flow, and then have to be removed. In the United States dredging costs about \$500 million a year (Nelson), without counting the large energy inputs needed to power the dredging apparatus.

Extensive sedimentation reduces the depth to which light penetrates into the water and thereby may reduce or limit phytoplankton growth and affect the subsequent productivity of the aquatic system. Soil sediments may also have a detrimental effect upon many kinds of fish (Beasley).

The most far-reaching effect is that each year an estimated 3 billion ( $3 \times 10^9$ ) metric tons of soil are washed from United States agricultural lands alone (Pimentel, and others, 1976). In fact, agricultural land is the major source of the sediments washed into aquatic systems in the United States and Europe.

A recent estimate is that United States agricultural land has lost about a third of its topsoil (NAS, 1970). The soil erosion problem in European agriculture appears to be equally serious. The annual loss of soil from row crops such as Indian corn in the United States is about 45 metric tons per hectare (Pimentel, and others, 1976). The significant fact is the decline in the productivity of the land. In the case of Indian corn, with a soil depth of less than 30 cm, each 2.5 cm loss of soil reduces yields by more than 250 kg/ha (Pimentel, and others, 1976). To offset this loss of topsoil and reduced productivity, more fertilizers and other energy-related inputs are needed to maintain yields. Indeed, to compensate for present deterioration, about 47 litres of petrol equivalent has to be applied to the crop in the form of fertilizers and other inputs just to maintain current high yields (Pimentel, and others, 1976).

The extent of soil erosion is directly related to rapid water run-off from agricultural lands. Water run-off not only carries with it soil, fertilizers and pesticides, but also has other far-reaching effects on agriculture and society. First, the water that runs off the land is no longer available for crop production, and so potential yields for that location are reduced (Pimentel, and others, 1976). Secondly, too rapid water run-off often results in flooding of other crops located in lower areas. It is estimated that United States agriculture loses several million dollars in crops annually through such run-off (USDA, 1965). At times, water run-off contributes to serious flooding problems in rural and urban areas in certain regions of the nation.

In addition to all the environmental effects associated with agriculture that have been discussed so far, there are other problems too. In the United States as much water is used for irrigation as for all other uses combined. One study reports that agriculture consumes about 83 per cent of all water withdrawn from streams and lakes each year (NWC). With this large and increasing demand, agriculture will increasingly compete for water with other sectors of society.

In addition, the clearing of land for crop and livestock production has a detrimental effect on the natural biota. This is because the number and kinds of species that survive in an agricultural system are much fewer than is possible with natural vegetation.

### III. ALTERNATIVES FOR AN ENERGY-WISE AND ENVIRONMENTALLY SOUND AGRICULTURE AND FOOD SYSTEM

Although individual farmers in various nations produce food crops according to ecologically sound principles, no energy-conserving and environmentally sound agriculture and food system has been adopted by any nation. The approach in this report will therefore be to examine various alternative technologies that could contribute to the development of such systems. A highly productive system for the future must be one that would not only conserve land, water and energy resources but would also have minimal environmental impact on natural biota and human health.



The prime focus in this section will be on various aspects of agricultural production, because this is the segment of the food system that uses the largest quantity of land, water and energy resources and causes the severest environmental problems compared with food processing, packaging, transport, cooking and preparation.

A. Trade-offs among energy, land, water and labour resources in agricultural production

Land, water and energy resources, the essential components of crop production, can be substituted for one another within limits. For example, the yield of Indian corn from two hectares of land, with energy inputs of about 2.2 million kcal per hectare, is about 2,500 kg per hectare, or a total of 5,000 kg (Pimentel and Pimentel). If the aim were to produce 5,000 kg of Indian corn on one hectare of land, then the energy inputs would have to be increased to about 6.5 million kcal (Pimentel, 1980). Thus to reduce the land area by half and maintain total yield, about three times as much fossil energy must be expended.

A more basic problem concerns what is happening to the supply of arable land throughout the world. As the world population grows, much valuable crop land is being removed from production for urbanization and other human activities. In the United States between 1945 and 1975, for example, about 18 million hectares of agricultural land were removed from production as highways were built and urban areas expanded. This "blacktopping" of agricultural land covered an area equivalent to the entire state of Nebraska (Pimentel, and others, 1976).

To compensate for this loss of agricultural land, greater energy inputs were required to maintain high levels of food and fibre production from the remaining agricultural land. Unfortunately, this problem is not confined to industrialized countries but is occurring throughout the world. Sound land use policies to protect and preserve agricultural land for food production are urgently needed.

Water is another essential resource in crop production that may be substituted to a limited extent for energy and/or land area. For example, because of the limited rainfall in some wheat-growing regions of the world, the land must be left fallow every other year so that it can accumulate sufficient moisture to grow a wheat crop. As a result, two hectares of land must be available in order to grow one hectare of wheat per year. In contrast, with normal rainfall, as in most of Europe, a wheat crop can be harvested every year. Irrigation of land is an example of increasing energy inputs to offset low rainfall. Unfortunately, the pumping of water from a ground-water store is energy-intensive. For instance, to irrigate a hectare of Indian corn in an arid region for one growing season as much as 2,100 litres of fuel may be required, or about three times the total energy inputs necessary with normal rainfall (Pimentel, 1980).

In addition to replacing water or land, energy is often used to replace manpower by machinery. For example, when Indian corn is produced by hand, nearly 1,200 hours of labour are needed per hectare (table 4). With mechanized systems, however, it can be produced with an input of only 12 hours per hectare (table 1).

Indeed, a United States gallon (3.79 litres) of petrol, which contains 31,000 kilocalories of energy, has tremendous power potential. For instance, when one gallon of petrol is used to operate a mechanical engine, which is about 20 per cent efficient in converting heat energy into mechanical energy, the equivalent of 6,200 kcal of work is produced. This is equal to about 9.7 hph of work, or the work equivalent of one horse working at capacity for nearly a 10-hour day.

Since man produces only 0.1 hph working at capacity, the gallon of petrol is equivalent to 97 man-hours of work, or one man working eight hours a day, five days a week for 2.5 weeks.

Clearly the use of fossil fuel drastically cuts the input of manpower or horsepower needed in agricultural production. As long as fuel supplies are abundant and cheap, this can continue to be an effective trade-off. However, the use of fossil fuels in mechanized agriculture has had little effect on crop yield per hectare, although it facilitates the timing and raises the speed of planting and harvesting. In areas where growing seasons are short, this may be a distinct advantage.

#### B. Land and water conservation for productive agriculture

In addition to legal measures to protect agricultural land from encroachment by highways and urbanization, agricultural management strategies that conserve soil and water to permit sustained agriculture should be implemented. Technology is now available and immediate action can be taken to conserve soil and prevent rapid run-off.

Both crop rotation and strip cropping are effective in reducing soil erosion and water run-off and thus protect land from degradation. For example, by planting Indian corn along contours and employing a rotation of corn-corn-oats-meadow-meadow, soil erosion can be reduced to about 5 metric tons per hectare compared with about 45 tonnes per hectare for conventional continuous Indian corn production (Pimentel, and others, 1976). Using crop rotation and strip cropping along the contour requires only a small additional investment of about \$5 per hectare per year (Swanson and Harshbarger; Harshbarger and Swanson).

Another useful technique is planting a cover crop of grass or a legume after the major crop is harvested. The cover crop holds the topsoil and thus protects the land from erosion during the often long (up to eight months) no-growing season typical of the temperate regions. Although the cover crop may reduce soil erosion by 50 per cent during the winter months and, if it is a legume, may add nutrients to the soil (Moldenhauer), there are small additional costs associated with its use. These include purchasing cover crop seed and seeding the crop area. Moreover, the cover crop must be ploughed under in the spring prior to planting the major crop. This is an additional task and might somewhat slow spring planting.

In some areas and with some crops, "no-till" and minimum tillage technologies have proved to be valuable practices for conserving soil and water (Pimentel and others, 1976). For example, one study reported that soil erosion averaged about 8 tonnes per hectare for "no-till" planting, compared with a soil loss of 24 tonnes per hectare for a "plough-disc-harrow" planting system (Moldenhauer and Amemiya). In other experiments, soil erosion for "no-till" Indian corn averaged a hundredth of that for conventionally grown corn (Harrold).

Although the reduction of soil erosion and water run-off are significant benefits associated with "no-till" crop culture, there are also costs. "No-till" methods require two to four times as much pesticide as regular cultivation, because of increased pest problems. Most of the increased treatment is herbicide, for weed control, but other pest problems caused by insects, slugs and pathogens often require use of additional insecticides, fungicides and molluscicides (Pimentel and others, 1976). Furthermore, at the start of the spring growing season the cover crop keeps soil temperatures relatively low, and this may slow seed germination and initial growth. Often the result is a thinner crop stand that must be offset by planting more seed than usual.

In extremely hilly areas, terracing has been effective in protecting valuable topsoil (Pimentel and others, 1976). Initially a substantial energy input is required to build the terraces, but once in place they are fairly permanent and easily maintained.

Fortunately, all the techniques mentioned for conserving and protecting topsoil also reduce the rate of water run-off and conserve water for crop use. An additional means of conserving water is the use of water catchments and basins (NAS, 1974). Again, this technology is not new but has been used successfully in many regions of the world for centuries. Initially a limited amount of labour and capital is necessary in order to conserve surplus rain-water in this way.

At first glance irrigation would seem to hold great promise as a way to use the vast arid lands of the world for agricultural production. An important and costly factor associated with irrigation is the relatively high energy input required. For example, to irrigate Indian corn in an arid region requires nearly three times as much energy as in a rain-fed region (Pimentel, 1980). Associated with irrigation are serious environmental problems such as salinization and waterlogging of the soil that may develop. Although technologies exist for controlling salinization and waterlogging, all require added energy inputs. The new drip irrigation reduces water demand by 20-80 per cent compared with sprinkler and surface irrigation (Halevy and others, but it is far more costly to install because more equipment is needed (FAO). Specifically, the energy input for drip irrigation is 15 to 30 per cent greater than for sprinkler irrigation (Stanhill). At present, for some crops such as fruit, the relatively high capital cost for drip irrigation can be recouped within a few years.

### C. Efficient use of energy in agricultural and food systems

#### (a) Agriculture

Practical alternative technologies are currently available and could be employed more widely in crop and livestock production to reduce energy inputs while maintaining yields. Some of the benefits and costs of these technologies are analysed below.

The labour input for most crops that are produced with intensive mechanization is relatively small; the 12-hour input per hectare for Indian corn is fairly typical for major grain crops (Pimentel, 1980). Some tasks could be carried out with a small increase in labour, yet would significantly increase energy efficiency. For example, to apply herbicide to a hectare of land by hand sprayer requires about 900 kcal, whereas the same task carried out with a 50-hp tractor requires 52,000 kcal (Pimentel and Pimentel). If the weeds were relatively sparse, so that only "spot treating" was necessary, the energy input by man would be even less. In certain economic conditions such as a tenfold increase in fuel over labour costs, spot treating of weeds by hand might be a profitable alternative even in industrialized countries.

Because one of the largest energy inputs in crop production is that required to produce farm machinery and the fuel to run it, this segment of production needs special consideration (table 1). One viable alternative would be to use machinery more precisely scaled to its job, and then to operate it at the most efficient speed (Johnson and Lamp). Although extremely large tractors (175 hp) will do more work per unit of time than smaller (50 hp) models, this advantage is more than offset by their much greater fuel requirements during operation. Another strategy would be to increase the acreage tended by a single tractor or other type of farm machinery. In the United States one tractor currently tends about 30 hectares (USDA, 1978) but this easily could be increased to 40

hectares. The use of diesel fuel would provide yet another increase in total efficiency, because diesel fuel is about 12 per cent more efficient than gasoline (CAST, 1974).

For a majority of crops, the single largest energy input is for fertilizer. Taking Indian corn as an example of a typical grain crop, energy in the form of fertilizer is the largest single energy input with nitrogen fertilizer applied at a rate of about 130 kg/ha/yr (table 1). The same amount of nitrogen, however, can be obtained from manure produced during one year: by 2.5 dairy cows; 5 young fattening beef cattle; 23 hogs; or 210 chickens (Benne, and others; Dyal; Loehr and Asce; McEachron and others; Surbrook, and others). The use of manure also adds phosphorus and potassium to the soil. In addition to valuable nutrients, manure contributes organic matter and thus increases the number of beneficial bacteria and fungi in the soil, makes ploughing easier, improves the water-holding and percolation capacity of the soil, reduces soil erosion and improves the ratio of carbon to nitrogen in the soil (Andrews; Cook; Tisdale and Nelson).

At present, livestock manure is seldom effectively utilized, despite the fact that about 90 per cent is applied to agricultural land. Conservative estimates are that about 50 per cent of the nutrients, particularly nitrogen, are lost because the manure is spread directly from the barn and feed lot onto the land (Slipher). Then, during the eight-month fallow season typical of the temperate zones, rain and snow leach the nitrogen from the manure and wash it into streams and lakes. This constitutes a loss of nutrients from the soil and contributes to serious water pollution. Livestock manure can and should be used more effectively. This would require the construction of small ponds or holding tanks lined with plastic to store the manure and urine during the non-growing season. There are two major costs associated with this technology: the cost of constructing a holding tank of appropriate size; and the cost of spreading the manure in early spring when the farmer is busy with cultivating and planting. Balanced against high fossil energy costs, the benefits in energy saving may well be worth the extra effort required to use manure more effectively.

The energy cost of storing manure and urine in a holding tank is relatively small. The major energy costs in using manure are associated with hauling and spreading (Pimentel, and others, 1973). Although to hauling the manure from 2.5 dairy cows to one hectare of land and spreading it requires about 1 million kcal, about 2 million kcal in equivalent fertilizer nutrients are present in the manure. Thus, a saving of 1 million kcal per hectare is possible when the manure source is nearby.

Nitrogen fertilizer inputs can also be reduced by planting legumes or other alternate crops in rotation with Indian corn. For example, planting sweet clover in the autumn and ploughing it under one year later will add about 170 kg of nitrogen per hectare to the soil - the equivalent of 2.5 million kcal in fertilizer (Willard). Rotating Indian corn with a legume would also effectively control the corn rootworm (Robinson) and would reduce corn disease problems (Pearson) and weed problems (NAS, 1968). When rotation is not feasible, legumes can be planted between corn rows in late August and then ploughed under in early spring. Several studies have demonstrated that seeding corn acreage to winter vetch in late August and ploughing the vetch under in late April can yield about 130 kg of nitrogen per hectare (Mitchell and Teel). A cover crop also protects the soil from wind and water erosion during the winter and, like manure, adds organic matter to the soil. A small energy cost for seeds and planting is associated with the interplanting of legumes in Indian corn and other row crops.

An additional problem is the need to plough the green manure under in early spring instead of employing autumn ploughing; as with animal manure, this added task might delay spring planting.

Weeds can be controlled effectively and economically by either mechanical cultivation or herbicides, or a combination of both. In comparison with fossil energy expenditure, herbicidal weed control requires about the same amount of energy as mechanical cultivation. This includes the energy used for herbicide production, packaging and transport to the farm (Pimentel and Pimentel). Rotating row crops with legumes and small grains may significantly reduce weed problems while reducing energy inputs.

An expansion of plant breeding programmes holds promise for reducing energy inputs in crop production. Breeding Indian corn for insect, disease and bird resistance would in itself reduce the energy inputs associated with pesticide use. Numerous other non-chemical pest controls are available, and most of them are significantly more energy-efficient than pesticides (Pimentel, 1979). In addition, less energy would be needed for production if new crop varieties could be developed to mature faster, to have less moisture content, to use water more efficiently and to respond better to fertilizers.

Irrigation, as has been mentioned, is an energy-intensive system. As the price of energy continues to rise in relation to the value of crops, some crops will no longer be profitably produced under irrigation. This has already happened in Arizona, where it is no longer economic in some regions to produce alfalfa under irrigation because alfalfa is a relatively low value crop (Larson and Fangmeier). In the future, irrigation will be used primarily for high-value crops, and also for emergency use in the usual rain-fed regions, where application of water during a dry spell may significantly increase yields, or even save the crop during a critical period.

Yet another way to conserve energy in agriculture is to raise plants and animals that require a low investment in fuel. Although this may not be practical or acceptable for all regions or cultures, much can be learned by examining the different energy uses that exist among various types of crops and livestock (tables 2 and 3). A comparison of energy inputs and food energy shows that grains are generally more energy-efficient than either vegetables or fruit.

Of course many nutrients other than calories are essential for human health and their presence in a food must also be considered. For example, vitamin C is an essential nutrient found in both oranges and fresh tomatoes. Although there is about twice as much vitamin C per unit of weight in oranges, about 1 million kcal of energy is required to produce one metric ton of oranges, whereas only 0.3 million kcal is required to produce one metric ton of tomatoes. Thus, nearly twice as much vitamin C can be produced by growing tomatoes as by growing oranges, using the same amount of energy. Tomatoes have the added advantage of being suitable for production in both tropical and temperate zones.

Significant differences exist between livestock species in the energy efficiencies of producing animal protein (table 3) (Leach). Anywhere from 10 to 90 calories are required to produce one calorie of animal protein, depending on the production system. Milk, eggs and broilers are some of the most efficiently produced forms of animal protein, but this assumes that some grain is available in addition to forage (table 3). Without grain, however, milk production is the most efficient in terms of protein energy produced per calorie of energy input.

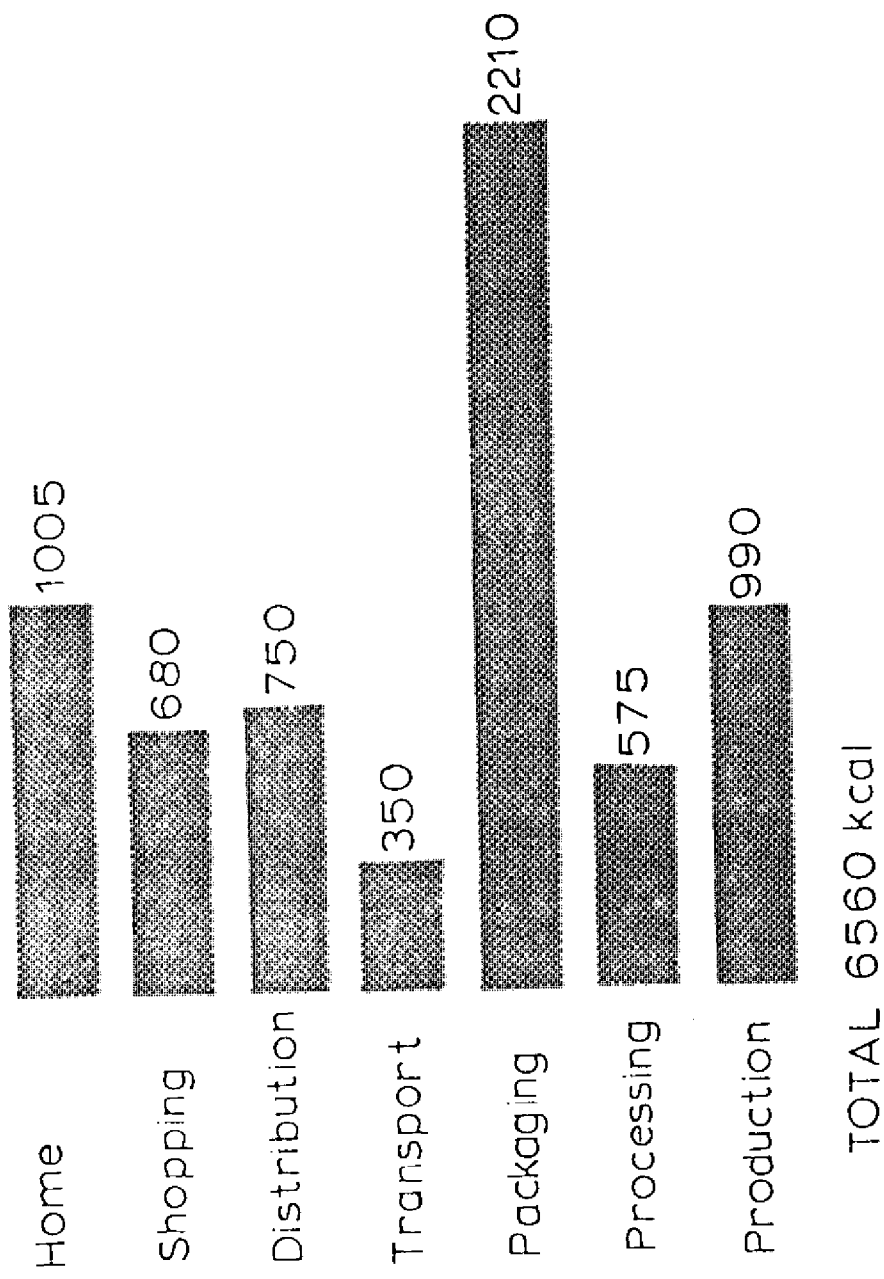


Figure 1, Energy inputs for a 1 kg can of sweet corn. (Note, distribution includes storage and home includes refrigeration, cooking, preparation and washing. One kilogram of corn contains 825 kcal of food energy.)

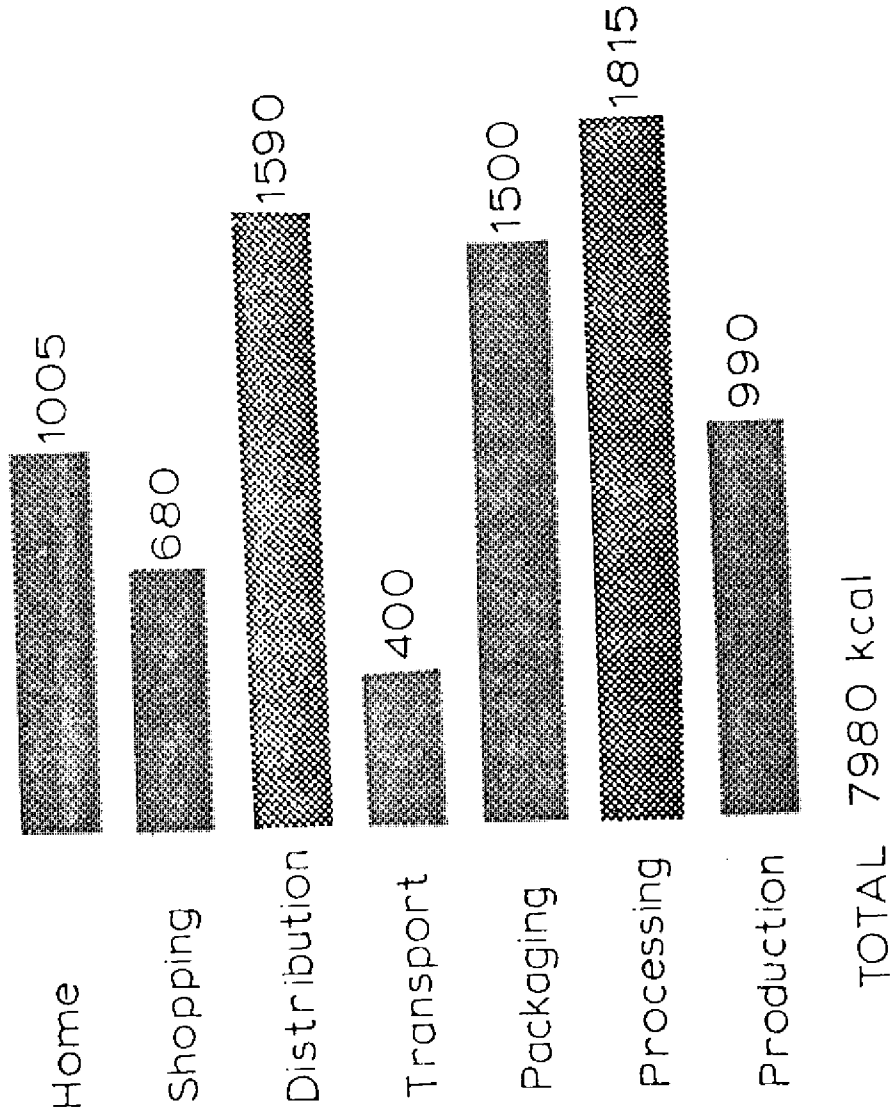


Figure 2. Energy inputs for 1 kg frozen package of sweet corn. (Note, distribution includes storage and home includes refrigeration, cooking, preparation and washing. One kilogram of corn contains 825 kcal of food energy.)

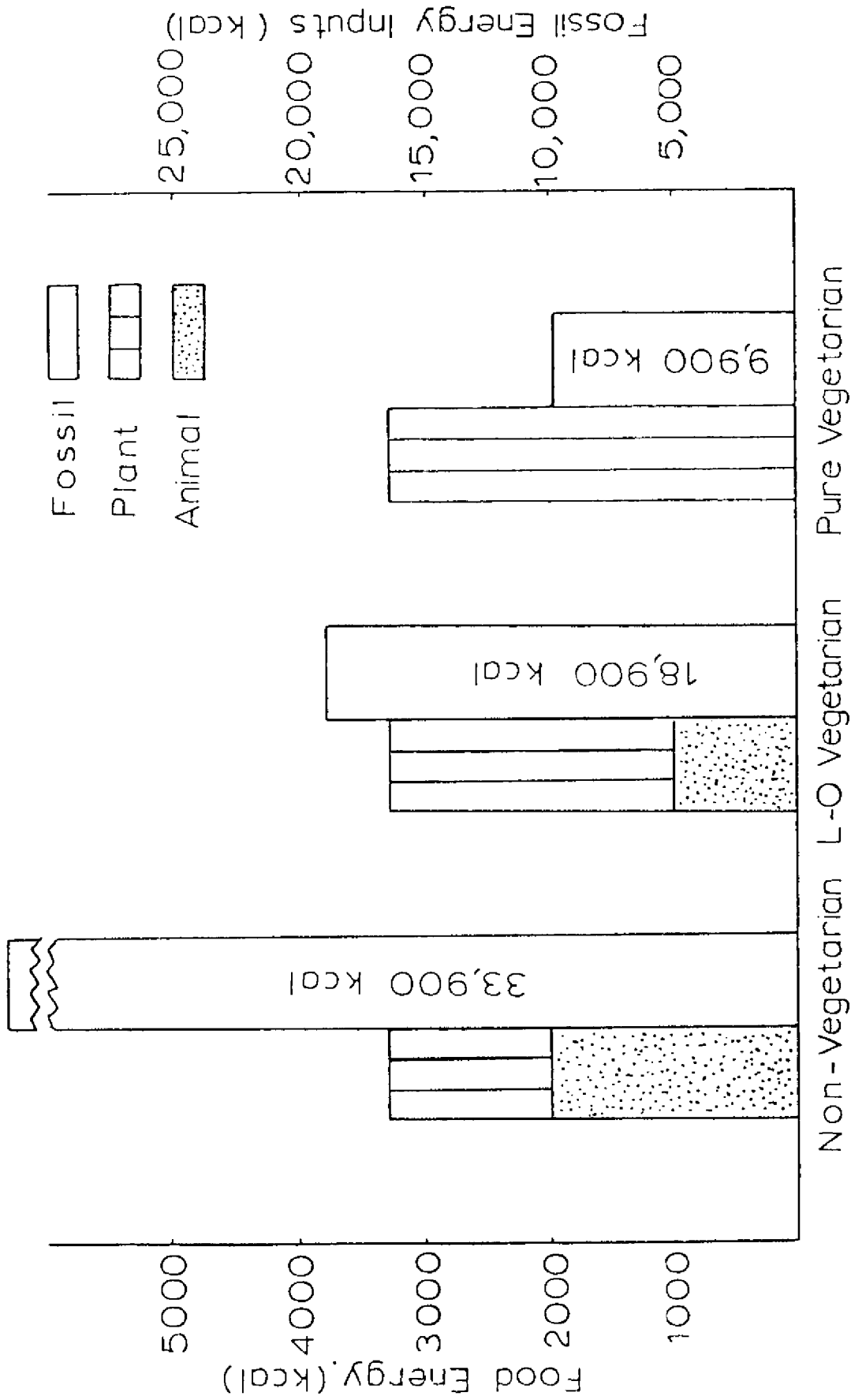


Figure 3. Daily food energy intake of pure vegetarians, L-O (lacto-ovo)

vegetarians and nonvegetarians and the calculated fossil

energy inputs to produce these diets under U.S. conditions.



Overall, most plant proteins are significantly less costly in terms of energy to produce than animal proteins (tables 2 and 3). They can be produced for about a tenth of the energy cost of animal protein. Although plant proteins may be low in one or two essential amino acids, this deficiency can be made up by mixing consumption of appropriate legumes and grains.

(b) Food processing and packaging

Food processing techniques employed in the future will have to be based more on energy efficiency than mere convenience or maintenance of desired palatability characteristics. Certainly the safe preservation of bountiful harvests for future use will continue to be the aim of food processing. Canning is less energy-intensive than freezing fruit and vegetables, and because of this may become more advantageous as energy costs rise (figures 3 and 4). Although freeze-drying is one of the most energy-intensive methods of food preservation, it does have the advantage that the food is extremely light in weight, can be transported cheaply, requires little space for storage and can be stored without refrigeration. The least costly method of preserving some fruit and vegetables is solar drying; for preserving meats, salting. As has already been mentioned, both technologies, have obvious disadvantages as well as advantages, and these will have to be evaluated for each kind of food.

Food packaging is a facet of the food system where substantial energy savings appear to be possible. A quick survey of supermarkets reveals many examples where the energy content of the packaging is higher than the energy value of the food. The individual wrapping of fruit and vegetables with plastic and the making of boxes of breakfast cereal containing individual servings are energy-costly technologies that could be eliminated without any adverse effect on food quality or supply. In addition to energy costs, this excessive packaging contributes to environmental pollution. Another dramatic example of costly packaging is a certain slimmers' soft drink, which has only 1 kcal itself, but is packaged in a can made of aluminium that required 1,600 kcal of energy to produce and another 600 kcal to process. Hence, a total input of 2,200 kcal is required to produce a soft drink containing 1 kcal. Substituting sugar for a non-caloric sweetener would result in an improved input/output energy ratio, but the drink itself, if consumed in large quantities, would be harmful to teeth, to say nothing of the contribution of sugared soft drinks to the total caloric intake of an individual.

Energy inputs in packaging can be reduced and environmental quality improved by employing reusable glass or metal containers. All milk, for example, was once purchased in reusable containers; however, in many industrialized countries much of the milk is now delivered in disposable, energy-costly plastic and paper containers. Although some inconvenience is associated with rinsing, collecting and returning reusable containers, the energy and environmental benefits are significant.

(c) Transport of food

About 60 per cent of all food in industrialized nations is transported by truck, and only 40 per cent by railway. Railways, however, are five times more energy-efficient in transporting foods per tonne/kilometre than trucks (Pimentel and Pimentel). Thus, significant energy savings would be possible if more food goods were moved by train than by truck. Water transport is more efficient still, but it cannot be employed as widely as trains. There are areas, however, where the use of water transport could be augmented and thus save significant

amounts of energy. Another alternative would be to relocate production sites closer to consumer outlets and thus decrease the volume of transport. This would also lead to a reduction in losses of perishable foods.

(d) Food preparation and cooking

Because large amounts of energy are expended in all countries for cooking foods, more attention should be given to common household cooking methods and types of equipment that best conserve energy. Cooking fuels vary greatly in their efficiency and consumers should be made aware of these differences. Research is needed to develop equipment that efficiently transfers heat from fuel to food. Individuals will then have to be educated to use both the fuels and the equipment; even now they do not understand the principles of efficient heat transfer and use of equipment. The variation in energy used by different cooks has been found to be as high as 50 per cent (Fechter and Porter). Education programmes would help individuals to cut waste of high-cost fuels and prepare foods at home more efficiently.

IV. LIFESTYLES AND DIETARY REGIMES

Diets in the United States and Europe are characterized by high calorie and high protein content. In the United States, for instance, daily per capita food energy consumed totals about 3,300 kcal (USDA, 1978). The recommended daily allowance is about 2,350 kcal, or 2,700 for males and 2,000 for females (NAS, 1979). The 3,300 kcal intake is one factor contributing to obesity, a major health problem in the United States (United States Senate). In the United States about 70 grams of animal protein are consumed per head per day, in addition to about 32 grams of plant protein. The total daily intake is as high as 102 grams (USDA, 1977). This contrasts with an FAO recommendation which lays down that 41 grams per day is an adequate level of protein intake (FAO). The average total protein consumption in the United States and Europe is more than double this recommended level.

To supply the large quantity of animal protein consumed in the United States over 3 billion livestock are maintained; these animals outnumber the human population of the United States more than four to one (Pimentel and others, 1975). In addition to a large amount of forage, the livestock population annually consumes 60 to 90 per cent of the total amount of grain used in industrialized nations (United Kingdom, USDA, 1977). Providing feed for these animals requires land. In the United States and Europe several million hectares of land are used just to grow forage and grains for livestock. At present in the United States about 130 million tonnes of grain, or 605 kg of grain per person, are fed to animals to provide meat and other animal products for the high-animal-protein diets.

The total amount of fossil energy expended to maintain the United States livestock population is  $413 \times 10^{12}$  kcal. This figure includes the cost of maintaining land for pasture and grain production and livestock husbandry (Pimentel and others, 1979a), and stands in sharp contrast with that for all other crops produced in the United States, which use an average of  $700 \times 10^{12}$  kcal of energy. In total this represents a significant quantity of energy expended just for production. When the energy costs of processing, transport, preparation and cooking are included, the total increases to about  $3.3 \times 10^{15}$  kcal per year. This amounts to about 17 per cent of the total energy economy of the United States; the situation is similar for Europe. A reduction in the amount of meat and other animal products in the diets of industrialized nations, while possibly improving human health, would certainly significantly reduce the land and energy inputs required in the food system.

With this in mind it is of interest to consider what would happen if the United States moved from a grain/grass-fed livestock system to a grass-fed system. Analyses show that the total amount of animal protein that could be produced would be reduced by nearly half (Pimentel and others, 1979a). As a result, daily per capita protein consumption in the United States under this system would be reduced from 102 grams to about 70 grams per day (Pimentel and others, 1979a). It should be noted that 70 grams per day is still significantly higher than the 41 gram level recommended by FAO. A change to a grass-fed livestock system would release 130 million tonnes of grain for direct human consumption, and reduce the energy input in production by 60 per cent (Pimentel and others, 1979a). This amount of grain could feed about 400 million humans, or nearly twice the current population of the United States.

Indeed, cycling plant protein through animals is costly in both land and energy and is an inefficient way to produce protein. In all probability, a drastic change in production patterns will not be necessary, but if land and energy resources become scarce in the United States and Europe, some modification of present protein production methods will need to be considered.

A comparison of the amounts of energy required to produce a high-plant-protein diet and a high-animal-protein diet provides a helpful insight into some of the differences. High-plant-protein diets or vegetarian diets are usually of two major types: the "lacto-ovo" diet that also includes eggs, milk and milk products, and the complete vegetarian diet that includes only plant proteins. The following example illustrates some of the differences in these dietary regimes in terms of fossil fuel requirements for production. For these calculations the average daily food calorie intake of 3,300 kcal is held constant for the three diets. The amount of protein is over 100 g per day in the high-animal-protein diet, and about 80 g in the all-vegetarian diet. Nearly twice as much fossil energy is expended for food production in a "lacto-ovo" vegetarian diet as for the complete vegetarian one (figure 3). For the high-animal-protein diet the fossil energy input is more than three times that of the complete vegetarian diet.

These sample calculations indicate that the complete vegetarian diet is the most economical in terms of fossil energy. However, energy expenditure is not the only factor to be considered when dietary choices are made. Personal choices are often based on social and cultural attitudes as well as on palatability characteristics. There can also be significant nutritional differences between the pure vegetarian diet and diets that include animal products. This is because vitamin B<sub>12</sub>, an essential nutrient, is lacking in pure vegetarian diets and must be taken as a dietary supplement. Furthermore, the quality of the protein consumed may not be adequate, depending on the combination of plant proteins. When the essential amino acids of plant foods are complemented, then the protein quality of a vegetarian diet will be satisfactory. An exclusive diet of plant foods is usually of greater volume and bulk, making it difficult for young children and women to consume the quantities necessary to meet all nutritional needs. In addition, infants, rapidly growing adolescents, pregnant and lactating women and other nutritionally vulnerable groups, when consuming purely vegetarian diets, may need nutritional supplements of vitamins A and D and iodine.

Although these examples are based on limited data, they suggest that significant reductions in energy as well as land and water resources are possible if diets and eating patterns are modified. Further improvements are possible if the total caloric intake of the population is reduced from 3,300 kcal to something less

than 2,500 kcal. It should be noted that the optimum calorie intake for an individual is based on his or her basal metabolic rate, physical activity and the effect of food consumed (Guthries).

How much fossil energy could be saved in the food systems of industrialized nations? One estimate is that as much as 50 per cent could be saved, while maintaining high crop yields and environmental quality. Although specific energy savings will vary with individual crops and in different growing regions, substantial reductions in fossil energy inputs can be achieved if the following changes or modifications are initiated:

- (a) A reduction of a half in animal protein consumption and an increase in the quantities of grains, legumes and other vegetables consumed by the population;
- (b) Improvement of cooking and food preparation techniques in the home;
- (c) A reduction of a half in the number of shopping trips; if possible, other means of transport should be used instead of motor-cars;
- (d) A drop in the number of individually packaged foods, and an increase in the use of reusable containers;
- (e) When nutrient retention is adequate, canning should be preferred to freezing for preserving and storing food;
- (f) The choice of livestock and crops should be based both on nutrient content and on the energy efficiency of production;
- (g) When possible food production sites should be relocated closer to consumer markets;
- (h) Farm machinery suited to the task and acreage should be used;
- (i) The effective use of livestock and green manures should be increased;
- (j) Non-chemical biological and cultural pest controls should be used instead of pesticides where possible;
- (k) Soil erosion and water run-off should be controlled by using: crop rotation, contour planting, terracing and cover crops, and leaving crop residues on the surface;
- (l) Land use policies should be introduced that take account of the vital importance of agricultural land;
- (m) Crop production on naturally rain-fed land should be increased; when irrigation is absolutely necessary it should be used effectively.

From the above it is clear that there are many ways for industrialized nations to reduce energy inputs in their food systems. Along with energy savings would come extra dividends in the form of improved dietary régimes and the maintenance of environmental quality. In all probability, the cost of food will continue to rise along with the costs of other resources. With the above changes, however, agricultural production would be not only ecologically and energetically sound but would also be sustainable and capable of meeting the future food needs of the world population.

V. INTERDEPENDENCE OF AGRICULTURE AND OTHER ASPECTS OF SOCIETY

Energy shortages and high energy prices will have an impact on agricultural production, possibly reducing the supply of energy-intensive crops and certainly raising production costs for all crops. Transport and processing costs will also rise. All these increases in costs will be passed on to the consumer, who already spends a large percentage of his income on food. For example, in 1978, Americans with average incomes spent 18 per cent of their personal income on food; the figure for low-income households was about 40 per cent (USDA, 1979).

The expanding human population will put increasing pressure on land resources. The reallocation of crop land for urban development will be a major decision for society, as it becomes increasingly costly in terms of fossil energy to maintain the same crop yields on less land. Assuming yields can be maintained, the ultimate effect will be an increase in food production costs that will be passed on to the consumer. It is therefore, imperative that public authorities and governments should clearly recognize the interdependences between food, land, water and energy and begin now to develop sound land use policies.

Obviously, effective rural development depends on agricultural policies that support its needs. If land, water and energy resources are inadequate for a productive agriculture, the rural community will be adversely affected and food/fibre production will decline. Thus, government policies that protect and preserve crop land and stress careful management of water and energy resources also strengthen the entire agricultural system and in turn rural development.

CONCLUSION

The food being produced in the world today would be sufficient to feed everyone adequately if systems were effectively distributed. With land, water and energy resources already in short supply in many parts of the world, it may not be possible to feed everyone in the future. No longer can we afford to make ad hoc decisions affecting isolated sections of the world or even segments of society within a nation. The scope of the problems facing us now is all-encompassing and requires understanding of the interdependences between food production and supplies of arable land, water and energy and the carrying capacity of the earth's resources. We all have a stake in the way related decisions are made, for they will affect the quality of life and even the survival of the human species.

To sum up, the following changes in agriculture and the food system, which have the potential of reducing energy inputs by half while maintaining food supplies and improving the environment, could be recommended:

(a) National land use policies should be adopted to prevent valuable agricultural land from being destroyed by highway construction and urbanization;

(b) Known agricultural technologies that prevent soil erosion and the resulting environmental problems should be adopted immediately;

(c) Nations must examine the priorities to be given to water for food production and for other activities of society. At the same time water-conserving technologies should be adopted in crop and livestock management;

(d) Since mechanization is energy-intensive, primarily replaces labour but does little to increase crop and livestock yields, an appropriate balance between labour and mechanization should be sought;

(e) Energy inputs for fertilizers should be reduced through the effective use of livestock manures and legume plants as green manures, and by leaving crop residues on the land;

(f) Appropriately managed multiple cropping systems should be adopted to make more effective use of land, water and energy resources;

(g) Non-chemical biological and cultural pest controls should be adopted in crop and livestock production, where appropriate, and integrated pest control should be developed where possible;

(h) The nutritional needs of each nation should be examined so as to determine the priorities to be given to various crop and livestock types in the agricultural system;

(i) Processing methods and packaging technologies should be improved to minimize energy expenditure while maintaining safety standards;

(j) The most energy-efficient carriers should be used to transport food from farm to market-place and households;

(k) More careful selection of equipment and better use of fuels will decrease energy expenditure in food preparation and cooking;

(l) The high-calorie, high-protein diets (especially as regards animal protein) of some societies should be modified;

(m) Specific research is needed on: (i) how to integrate both crop and livestock production with other components of the ecosystem to reduce energy inputs while making them more ecologically sound; (ii) how to take decisions concerning which crop and livestock systems can best meet the nutritional needs of humans with minimum energy inputs, while maintaining a sustainable agricultural environment; (iii) how to produce agricultural products as close to consumers as possible in order to minimize the expenditure of energy on transport ; (iv) how to develop food processing and packaging systems that are energy-efficient; and (v) how to devise ways and means of conserving energy in home cooking and food preparation.

Table 1  
Energy inputs per hectare in United States  
Indian corn products in 1975

<u>Inputs</u>	<u>Quantity/ha</u>	<u>kcal/ha</u>
Labour	12 hrs	5,580
Machinery	31 kg	558,000
Diesel fuel	112 litres	1,278,368
Nitrogen	128 kg	1,881,600
Phosphorus	72 kg	216,000
Potassium	80 kg	128,000
Limestone	100 kg	31,500
Seeds	21 kg	525,000
Irrigation	780,000 kcal	780,000
Insecticides	1 kg	86,910
Herbicides	2 kg	199,820
Drying	426 341 kcal	426,341
Electricity	380 000 kcal	380,000
Transport	136 kg	34,952
Total		<u>6,532,071</u>
<u>Outputs</u>		
Indian corn yield	5,394 kg	19,148,700
Protein yield	485 kg	

Source: Pimental and Pimentel

Table 2

Energy inputs and returns per hectare for various food and feed crops produced in the United States

Crop	Crop yield (kg)	Yield in protein (kg)	Crop yield in food energy (10 <sup>6</sup> kcal)	Fossil energy input for production (10 <sup>6</sup> kcal)	Kcal food/feed output/kcal of fossil energy input	Labour input (man-hours)
Indian Corn	5,400	485	19.1	6.5	2.9	12
Wheat	2,060	247	6.8	2.8	2.4	7
Oats	1,730	242	6.7	2.2	3.1	6
Rice	6,160	462	22.4	14.4	1.6	17
Sorghum	3,030	344	10.5	5.4	2.0	12
Soybeans	1,880	640	7.6	1.8	4.2	10
Beans, dry	1,460	325	5.0	2.7	1.8	10
Peanuts	3,720	320	15.3	10.9	1.4	19
Apples	17,920	36	9.6	18.0	0.5	175
Oranges	19,040	193	6.8	18.3	0.4	173
Potatoes	34,380	722	19.7	16.0	1.2	35
Spinach	11,200	358	2.9	12.8	0.2	56
Tomatoes	49,620	496	9.9	16.6	0.6	165
Brussels sprouts	12,320	604	5.5	8.1	0.7	60
Alfalfa	6,830 (dry)	1,127	15.4	2.5	6.2	13
Tame hay	5,000 (dry)	200	8.6	1.7	5.0	16
Indian corn silage	31,020	393	25.3	6.3	4.0	15

Source: Pimentel and Pimentel



Table 3  
Energy inputs and returns per hectare for various livestock production systems in the United States

Livestock	Animal product yield (kg)	Yield in protein (kg)	Protein as kcal (10 <sup>3</sup> )	Fossil energy input for production (10 <sup>6</sup> kcal)	Kcal fossil energy input/kcal of protein output	Labour Input (man-hours)
Broilers	2,008	186	744	7.3	9.8	7
Eggs	910	104	416	7.4	17.8	19
Pork	490	35	140	6.0	42.9	11
Sheep (grass-fed)	7	0.2	0.8	0.07	87.5	0.2
Dairy cattle	3,270	114	457	5.4	11.8	51
Beef cattle	60	6	24	0.6	25.0	2
Dairy cattle (grass-fed)	3,260	114	457	3.3	7.2	50
Beef cattle (grass-fed)	54	5	20	0.5	25.0	2
Catfish	2,783	384	1,536	52.5	34.2	55

Source: Pimentel, 1980

Table 4.  
Energy inputs in Indian corn production in  
Mexico using manpower only

<u>Inputs</u>	<u>Quantity/ha</u>	<u>kcal/ha</u>
Labour	1,144 hrs	589,160
Axe + hoe	16,570 kcal	16,570
Seeds	10.4 kg	36,608
Total		<u>642,338</u>
<u>Outputs</u>		
Indian Corn yield	1,944 kg	6,901,200
kcal output/kcal input		10.74
Protein yield	175 kg	

Source: Pimentel and Pimentel

BIBLIOGRAPHY

- Andrews, N.B. The response of crops and soils to fertilizers and manures. 2nd Ed. Mississippi, State College, 1954. 463 p.
- Armstrong, D.L., J.K. Leasure and M.R. Corbin. "Economic comparison of mechanical and chemical weed control", Weed science 16:369-371, 1968.
- Beasley, R.P. Erosion and sediment pollution control. Ames, Iowa State University Press, 1972. 320 p.
- Benne, E.J. and others, animal manures: what are they worth today? Michigan Agricultural Experimental Station, 1961. 16 p. (Bulletin No. 231)
- Casper, M.E. ed. Energy-saving techniques for the food industry. Park Ridge, N.J., Noyes Data Corporation, 1977. 657 p.
- CAST. Potential for energy conservation in agricultural production. 6 February 1975 29 p. (Report (No. 40) prepared by the Council for Agricultural Science and Technology for the United States Senate Committee of Agriculture and Forestry)
- Cook, R.L. Soil management for conservation and production. New York, John Wiley, 1962. 527 p.
- Delroit, R.J. and H.L. Ahlgren. Crop production. Prentice-Hall, New York, 1953.
- Drew, J.S. and R.N. Van Arsdall, The economics of pre-emergence herbicides for controlling grass and weeds in corn production. Illinois agricultural economies 6:25-30, 1966.
- Dunne, T. and L.B. Leopold. Water in environment planning. San Francisco, W.H. Freeman, 1978. 818 p.
- Dyal, R.S. Agricultural value of poultry manure. In National Symposium on Poultry Industry Waste Management. Lincoln, Nebraska, Nebraska Center for Continuing Education, 1963.
- Eckholm, E.P. Losing ground. In Environmental stress and world food prospects. New York, Norton, 1976. 223 p.
- FAO. Energy and protein requirements. Rome, Food and Agriculture Organization of the United Nations, 1973. (Report of a Joint FAO/WHO Ad hoc Expert Committee; FAO Nutrition Meeting Report Series No. 52)
- Fechter, J.V. and L.G. Porter. Kitchen range energy consumption. Washington, D.C., National Bureau of Standards, United States Department of Commerce, 1979. 61 p. (NBSIR 7 1556)
- Guthrie, H.D. 1979. Introductory nutrition. 4th ed. St. Louis, Mo., C.V. Mosby, 1979.
- Halevy, I. and others, Trickle irrigation. In Trickle irrigation. Rome, Food and Agriculture Organization, 1973. p. 75-120. (Irrigation and Drainage Paper 14)

Harrold, L.L. Soil erosion by water as affected by reduced tillage systems. In Proceedings of No-tillage Systems Symposium, Ohio State University, Ohio. Chevron Chemical Co., Agricultural Resources Development Centre, 1972. p. 21-29.

Harshbarger, C.E. and E.R. Swanson. Soil loss tolerance and the economics of soil conservation on Swygert soils. Illinois agricultural economies 4(2): 18-29, 1964.

Hill, R.E., E. Hixon and M.H. Muma. Corn rootworm control tests with benzene hexachloride, DDT, nitrogen fertilizers and crop rotations. Journal of economic entomology 41:392-401, 1948.

Johnson, W.H. and B.J. Lamp. Principles, equipment, and systems for corn harvesting. Wooster, Ohio, Agriculture Consulting Association, 1966. 370 p.

Kamprath, E.J., W.V. Chandler and B.A. Krantz. Winter cover crops. North Carolina Agricultural Experimental Station bulletin 129, 1958.

Larson, D.L. and D.D. Fangmeier. Energy requirements for irrigated crop production. In R.A. Fazzolare and C.B. Smith, eds. Energy Use Management. New York, Pergamon Press, 1977. Vol. I. pp 743-750.

Leach, G. Energy and food production. Guilford, Surrey, IPC Science and Technology Press, 1976. 137 p.

Loehr, R.C. and M. Asce. "Animal waste - a national problem". Journal of sanitary engineering (American Society of Civil Engineers) 2:189-221, 1969.

McEachron, L.W., and others. Economic return from various land disposal systems for dairy cattle manure. In Animal waste management. Ithaca, N.Y., Cornell University, 1969. p. 393-400. (Report of a Conference on Agricultural Waste Management)

Metcalf, C.L., W.P. Flint and R.L. Metcalf. Destructive and useful insects. New York, McGraw-Hill, 1962. 1087 p.

Michael, P.W. Perennial and annual pasture species in the control of Silybum mariannum. Herbage abstract. 39 (1):59, 1969.

Mitchell, W.H. and M.R. Teel. Winter annual cover crops for no-tillage corn production. Agronomic journal 69:569-573, 1977.

Moldenhauer, W.C. Erosion control obtainable under conservation practices. pp. 33-43. In A.E. Peterson and J.B. Swann, eds. Universal soil loss equation: past, present, and future. Madison, Wisc., Soil Science Society America, 1979. p. 33-43. (Special Publication No. 8)

\_\_\_\_\_ and M. Amemiya. "Save tomorrow's soils - control erosion from row-cropping today". Iowa Farm science 21(10):3-6, 1967.

NAS. Weed control. In Principles of plant and animal pest control. Washington, D.C., National Academy of Sciences, 1968. 471 pp. vol. II. (Publication No. 1597)

\_\_\_\_ Biology and the future of man. ed. by P. Handler, Oxford, Oxford University Press, 1970.

\_\_\_\_ More water for arid lands. Washington, D.C., National Academy of Sciences, 1974. 153 p.

\_\_\_\_ World food and nutrition study: enhancement of food production for the U.S. Washington D.C., 1975. 174 p. (Report of the Board on Agriculture and Renewable Resources, Commission on Natural Resources, National Research Council, National Academy of Sciences)

\_\_\_\_ Supporting papers: world food and nutrition study. Washington, D.C., National Academy of Sciences, 1977.

\_\_\_\_ Recommended dietary allowances. 9th ed. Washington, D.C., National Academy of Sciences, 1979. Reproduced by permission.

Nelson, G. "United States resources - our air, land and water". In Food for billions. Madison, Wisconsin, American Society of Agronomists, 1968, p. 27-30. (Special Publication No. 11)

NWC. Water policies for the future. Final report to the President and to the Congress by the National Water Commission. 1973. 579 p.

Olsson, P. Energy consumption in food production. In Styrelsen för teknisk utveckling. Stockholm, 1978. 46 p.

Ortman, E.E. and P.J. Fitzgerald. Developments in corn rootworm research Proceedings of the Annual Hybrid Corn Industry Research Conference 19:38-45, 1964.

Pearson, L.C. Principles of agronomy. New York, Reinhold, 1967.

Pimentel, D. Energy use in plant protection: a global assessment. Paper presented at International Plant Protection Congress, 5-11- August 1979.

\_\_\_\_\_, ed. Handbook of energy utilization in agriculture. Boca Raton, Florida, CRC Press, 1980.

\_\_\_\_\_ and M. Pimentel. Food, energy and society. London, Edward Arnold, 1979. 165 p.

\_\_\_\_\_ and others. "Food production and the energy crisis". Science 182:443-449, 1973.

\_\_\_\_\_ and others. Energy and land constraints in food-protein production. Science 190:754-761, 1975.

\_\_\_\_\_ and others. Land degradation: effects on food and energy resources. Science 194:149-155. 1976.

\_\_\_\_\_ and others. Grass-fed livestock potential: resource constraints. Science. 1979 (in press).

\_\_\_\_\_ and others. Pesticides: environmental and social costs. In D. Pimentel and J.H. Perkins, eds. Pest control: cultural and environmental aspects. Boulder, Colorado, Westview Press, 1979. p. 99-158.

PSAC. (President's Science Advisory Committee). Restoring the quality of our environment. Washington D.C., White House, 1965. 317 p. (Report of the Environmental Pollution Panel)

Robinson, R.E. Sunflower-soybean and grain sorghum-corn rotations versus monoculture. Agronomic Journal. 58:475-477, 1966.

Slipher, J.A. Manure: its management in barn and field. Ohio State University Agriculture Extension Service bulletin. 262, 1945. 32 p.

Sprague, H.B. The value of winter green manure crops. New Jersey Agricultural Experimental Station bulletin 609, 1936. 19 pp.

Stanford, G. Energy conservation. Cedar Hill, Texas, Agro-City Inc., 1977. 1 p. (Mimeographed).

Stanhill, G. Efficiency of water, solar energy and fossil fuel use in crop production. Bet Dagan, Israel, Agricultural Research Organization, The Volcani Centre, 1979. (Report No. 134-E)

Surbrook, T.C., and others. Drying poultry waste. In Proceedings of the International Symposium on Livestock Wastes. St. Joseph, Michigan, American Society of Agricultural Engineers, 1971. 360 p.

Swanson, E.R. and C.E. Harshbarger. An economic analysis of effects of soil loss on crop yield. Journal of soil and water conservation 19(5):183-186, 1964.

Tate, H.D. and O.S. Bare. Corn rootworms. Nebraska Agricultural Experimental Station bulletin 381, 1946. 12 p.

Tisdale, S.L. and W.L. Nelson. Soil fertility and fertilizers. 2nd ed. New York, MacMillan, 1966. 694 p.

United Kingdom, Ministry of Agriculture, Fisheries and Food. Output and utilization of farm produce in the United Kingdom, 1968/69 to 1974/75. 1976. 46 p.

USBC. United States Bureau of the Census. Statistical abstract of the United States 1975. U.S. Dept. 96th ed. Washington, D.C., Government Printing Office, 1975.

USDA. Losses in agriculture. In Agricultural resources service handbook, No. 291. United States Department of Agriculture, 1965.

\_\_\_\_ National food situation. United States Department of Agriculture, Economic Research Service, 1976. 39 p. (NFS-158)

\_\_\_\_ Food and home notes, No. 7, 14 February 1977.

\_\_\_\_ Agricultural statistics 1978. Washington, D.C., United States Government Printing Office, 1978.

\_\_\_\_ World food expenditures. United States Department of Agriculture, Economic and Statistical Co-operation Service, 1979. (National Food Review, No. 7)

United States Senate. Select Committee on Nutrition and Human Needs. Dietary Goals for the United States. Washington, D.C., United States Government Printing Office, 1977. 79 p.

Willard, C.J. "An experimental study of sweet clover". Ohio Agricultural Experimental Station bulletin 405, 1927. 84 p.

THE IMPACT OF INDUSTRIALIZED COUNTRIES ON THIRD  
WORLD FOOD SYSTEMS AND ENVIRONMENT: PROSPECTS  
FOR CHANGE AND PROSPECTS FOR INFLUENCING  
THE DIRECTION OF CHANGE

Paper transmitted by the United Nations Research  
Institute for Social Development (UNRISD)\*

1. INTRODUCTION

The United Nations Research Institute for Social Development is engaged in a major study of "Food systems and society: Problems of food security in the modern world". The guiding hypotheses of this project 1/ would seem to constitute a convenient starting point for a discussion of the changing relations between food systems in industrialized countries and in the third world, and of prospects for channelling these changes toward alternative patterns of development and life styles. In essence, these hypotheses emphasize:

(a) The central importance of the disrupting or transforming influences of industrialized countries on third world food systems;

(b) The complex links between these influences and wider influences on societies and economies, and particularly on the processes of dependent industrialization, urbanization, "modernization" of consumption patterns, political competition and transformation of the functioning of the State;

(c) The irrelevance or danger of generalized policy prescriptions, given the wide differences between local problems as well as between national problems.

After a brief look at the past and present, the paper will focus on the future and on the possible roles of certain agents in shaping this future. The lessons of past experience for future interventions in third world food systems and peasant livelihood will also be examined.

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\*This paper was prepared by Marshall Wolfe, in consultation with the Director of UNRISD, Solon L. Barraclough, and Pierre Spitz. Comments were also received from other members of the staff of UNRISD.

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1/ A summary of the project is available in a leaflet published by UNRISD in June, 1979. The basic hypotheses are derived partly from earlier research by UNRISD on the so-called green revolution; the findings of this research are being published by Andrew Pearse under the title Seeds of Plenty, Seeds of Want (Oxford University Press, 1980).

## II. CHANGING IMPACT

It is not new for dominant societies to transform or disrupt the food systems and environments of dominated societies, nor for dominant classes within societies to do likewise in relation to a dominated peasantry. Examples include the Roman imposition of grain tributes from North Africa, incursions of predatory conquerors in regions of irrigated agriculture from Mesopotamia to Peru, and later systems that organized the supply of products in demand in Europe through displacement of basic food production, monoculture and forced labour on plantations or compulsory cultivation of export crops by peasants. Such policies and practices, along with other influences, have repeatedly changed the landscape and rural social relationships in much of the world, sometimes leading to different food systems, relatively stable and more productive (at least from the standpoint of the groups extracting a surplus from them) sometimes to devastating losses in the capacity of the land to support human life. Almost always they have had traumatic effects on the people forced to adjust their lives to changes imposed from outside or above.

For present purposes, it must be emphasized that we are not simply confronting recent disruptive impacts on stable, environmentally sound food systems which might in principle be protected or restored, but the periodic manifestations of disruptive changes that have been going on throughout history, from time to time straining to the limit the resilience of rural social systems as well as ecosystems. <sup>2/</sup> With this proviso, one can sum up the main features in the changing impact of the industrialized countries over the past half century as follows:

(a) Demand from the industrialized countries for high grade or non-essential speciality foods and beverages and for agricultural inputs to industry has continued to grow, but with continual market vicissitudes originating in the appearance of synthetic substitutes, the entry of additional producers for export, etc. The disappearance of direct colonial rule has deprived the industrialized countries of some earlier means to control production and marketing, but national governments eager for foreign exchange have sometimes resorted to comparable means of stimulating production for export and squeezing producers. Agribusinesses and importers for the industrialized countries have tried to control supplies and costs through direct production on large land holdings in the third world, or through production contracts, credits, technical advice and monopolized processing facilities that tie domestic producers to a single crop and a single market. The clearing of forests using heavy equipment has frequently provided an initial source of profit, and has also been a preliminary step to monoculture or cattle raising controlled from abroad. The consequences, as in the nineteenth century and earlier, have included several effects: considerable diversion of land and labour from production of foods for domestic consumption; "mining" of the land for quick returns; the swing of internal regions between boom and collapse, according to the state of the market for their product and the evolution of their costs of production (often determined by declining soil fertility or the rise of crop plagues intensified by monoculture); and continual pressures (sometimes amounting to State compulsion) on self provisioning cultivators to abandon their relative security for the risks of the market.

(b) The industrialized countries as a group have become capable not only of supplying their own demand for basic foods, but also of exporting a considerable

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<sup>2/</sup> The Food Systems and Society project in eastern India (Bihar, West Bengal and Orissa) has carried out an important study on the evolution of the ecosystems of the region since the middle of the nineteenth century.



surplus to the rest of the world. Until quite recently the availability and active promotion of relatively cheap imports or even donations of grain encouraged rapidly urbanizing countries to neglect incentives for domestic production and to support the specialization of their agriculture in other products for export.

(c) The lines of technological and managerial modernization of agriculture in the industrialized countries, highly successful in raising production with a continually shrinking share of the labour force, have been offered as a model and welcomed by the dominant forces in most third world countries. While this model has been promoted aggressively by transnational enterprises interested in third world markets, it must be emphasized that its basic suppositions have been shared by proponents of socialist as well as capitalist systems, who have agreed since the 1920s on the tractor as a symbol of all that is modern and progressive. While some variants of the model have favoured market oriented family farms, its dominant version, backed by real trends in the industrialized countries as well as by the interests of their exporters, have called for large-scale, highly capitalized operations. These have continually sought to incorporate additional land and to adopt the latest innovations in machinery, plant varieties, fertilizers, pesticides, etc., and have therefore been dependent on the technical advice offered with these innovations. The ability to transform or disrupt ecosystems through heavy moving equipment, chemicals, genetically uniform plant varieties, etc., and the ability to transform or disrupt patterns of land tenure and labour relations have accelerated pari passu.

(d) A transition from rural shortages of mobile labour (which motivated many governments in the past to institute more or less camouflaged systems of forced labour to ensure handling of export crops) to rural surpluses of such labour preceded or accompanied the introduction of the model sketched above. This can be attributed partly to rural population growth, partly to agricultural mechanization, and partly to the accelerating disintegration of self-provisioning peasant agriculture through varying combinations of expulsion from the land, declining soil fertility, increasing needs for cash, and decreasing willingness (particularly on the part of the younger generation) to put up with the privations of such a life. The main lines of agricultural modernization implied a negative evaluation of self-provisioning, labour-intensive peasant agriculture and peasant autonomy in production choices and techniques. In some cases, the official ideology was more sympathetic to the plight of the cultivator, but bureaucratized State efforts to transform his lot were often just as disruptive as the operations of large scale agricultural modernization.

(e) The processing and marketing of food in the cities of third world countries, and to an increasing extent also in the villages, have changed in ways that are too well known to require more than passing reference. Again, the new model has been disseminated not only through the prestigious example of the industrialized countries but also by the strategies of their food industries, making use of the new, ubiquitous mass communication media. Supermarkets have proliferated; international brands of packaged foods and beverages have entered into the diet of even the poorest classes; prepared baby foods have replaced breast-feeding, etc. The better-off urban strata have grown rapidly in numbers and upgraded their diet, particularly by eating more meat. With the increasing dependence on imports, the urban masses have often turned to wheat bread in countries in which the popular diet previously relied on other, domestically produced staples.

Up to the present, developmentalist, consumerist and modernizing ideologies have justified trends of this kind in the eyes of most governments, or at least provided excuses for their acceptance of what was forced upon them by the international and national distribution of economic power. National attempts to

promote alternative models through agrarian reforms, co-operativism, etc., have been fairly numerous, but for the most part they have been so half-hearted or ill conceived, or so easily sabotaged by the dominant economic and political forces, that their fate has strengthened the impression that the model preferred by the latter is unavoidable, at least in the absence of unlikely revolutionary changes both in the distribution of power and in values.

### III. CONTRADICTIONS

Although it cannot yet be answered with any degree of confidence, the next question to be asked is whether this model will dominate in the future or whether present contradictions, leading to declining viability in the food systems of industrialized countries as well as those of the third world, point to a quite different future. The contradictions include the following.

The ability to increase food production through technological innovation and intensified application of energy, machinery and chemicals seems to have reached a point of diminishing returns in the industrialized countries at the same time as the costs of these inputs are climbing very rapidly and environmental or resource conservation concerns are setting limits to their use. The future of the agricultural modernization model has become problematic even in its places of origin. While it may continue in most years to produce a surplus for export from the industrialized countries as a group, the exports will be traded at continually rising prices. The incentive to dispose of surpluses through subsidized exports or donations to poor countries will probably gradually disappear for ever.

The same factors of diminishing returns on innovations and rising costs of inputs affect the "modern" sectors of agriculture in the third world even more drastically. While specialized agriculture of this type, particularly that under the control of transnational enterprises, may improve its prospects for exports to industrialized countries, many third world countries will be threatened by their inability to produce enough basic food even to maintain their present low nutritional levels, in view of the disintegration of their previous food supply system and the concentration of modernized agriculture on other products and markets.

The environmental consequences of the model for agricultural modernization, applied to more fragile ecosystems and without even the limited controls exercised in its countries of origin, are also becoming visible, although concern over these is at an earlier stage than concern over food supply and displaced food producers. The large scale interventions thought of as solutions for these latter problems are already bearing bitter fruits: rapid soil destruction in tropical forest lands when cleared and cultivated, and the numerous, unwanted side effects of major dam construction and irrigation projects, have received most attention. The spreading of plant diseases through monoculture and genetic uniformity of high-yield seeds looms as a major menace for the future.

In short, a number of factors are combining to make the future viability of the main model for agricultural modernization and food supply offered by the industrialized countries to the third world increasingly doubtful. Some of these factors are already dramatic enough to have forced themselves upon the perceptions of political leaders and, in widely differing ways, those of various strata at the national level. The resulting perplexity is, of course, part of a much wider phenomenon of emerging mutations and contradictions in the styles of development current up to the present, of questioning the future viability as

well as the acceptability of these styles, and of attempts to formulate preferable alternatives.

International meetings have notoriously found it easier to draw up specifications for such alternatives than to identify politically practicable means of converting them into reality.

#### IV. IDEAL AND REALITY

The following propositions, contributed by UNRISD to discussions of an international development strategy for the 1980s, suggest the width of the gap between the ideal and the reality in the case of the impact of industrialized countries on third world food systems, as in other aspects of development:

"(a) Achievement of the 'ultimate objectives' of development requires enhancement of decision-making capacity at the national level, which cannot be confined to decision-making by the State. Organized and informed popular participation is essential, and such participation will entail tension with centralized technocratically oriented social as well as economic strategies. The proposition that the people must become subjects rather than objects of development is not new but its implications can no longer be evaded.

"(b) A truly international strategy must confront the ecological and international equity case for modifying patterns and levels of consumption in the high-income industrialized countries. Unless this happens market forces and the demonstration effect will continue to exert nefarious influences on the development of poor countries. The questioning of consumerist life styles by public opinion in these countries makes such a confrontation more practicable now than only a few years ago. The main legitimate objective of production is to meet the needs of all the population now and in the future. This means that international trade should be treated as an instrument rather than the main element in the formulation of an international development strategy.

"(c) The dethroning of imported and imitative 'consumer societies' for affluent minorities in the developing countries will also be a key component in any development strategy deserving the allegiance of the masses and capable of securing sufficient domestic capital accumulation. There is no way of achieving development goals within the constraints of present day technological knowledge, natural resource availabilities and organizational capabilities while at the same time meeting sophisticated consumerist demands of the rich countries and higher-income groups in the poor countries while also encouraging their spread to wider strata. ... Moreover, while consumption and production structures are co-determined, the former can be changed more quickly than the latter. To attempt to reach development goals on a global scale by merely augmenting production without changing both consumption and production structures in both rich and poor countries is foredoomed to be an exercise in futility. Achievement of such changes would require massive educational efforts at all levels in co-ordination with effective supportive national and international policies" 3/.

If this formidable agenda is justified - making allowances, of course, for the shortcomings of global prescriptions stressed in UNRISD's hypotheses for the study of food systems and society - and if the present confused and conflicting perceptions of crisis are eroding some of the social obstacles to action, it would be worth while to identify what specific agents could get to work on the implementation of these objectives and how they might proceed.

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3/ Social Development and the International Development Strategy, Report No. 79.2 (Geneva, UNRISD, 1979), pp. 12-13.

The UNRISD document quoted from above lists a series of reasons for divergence between real development trends and objectives, and concludes that "the accelerating historical process incorporating an ever increasing proportion of the world's population into societies organized around the imperatives of high-technology industrial and post-industrial economic systems can ... be influenced only marginally by planned international action." Such action, though, it asserts would be more influential if it could take the realities of contending social forces fully into account, and overcome the fallacious image of the nation State as a "consistently rational, unified and benevolent entity, capable of choosing and entitled to choose a style of development, so powerful but so unimaginative that it seeks generalized advice and then acts on it" (4).

In fact, the crises of food systems and the environment have imposed themselves on world attention at a time when the individual nation State and the international order made up of nation States are trapped between continually diversifying demands that they should "solve problems", or transform themselves so as to become able to solve problems. This is coupled with a combination of rising disillusionment at their incapacity to act coherently and rising resentment at the costliness and bureaucratic rigidity of the measures with which they try to respond to demands. In this respect, the State in the industrialized countries resembles the State in the third world more than one might have expected a few years ago. The 1970s have cruelly exposed the pretensions of the former to effective economic planning, administrative efficiency and equitable arbitration among the interests of citizens.

Ideally, food systems and the environment, affecting as they do practically all major aspects of lifestyles and productive activities, should form part of comprehensive plans. These plans should relate the multiple objective of national societies to some coherent image of a possible and acceptable future. In practice, advocates of reforms in these areas have to fight, even at the cost of intransigence and exaggeration, to keep their concerns from being submerged each time the State confronts a new crisis. As in trade union struggles, an accommodating approach risks neglect, manipulation and weakening of morale.

The State, in these conditions, is simultaneously a final arbiter and a conglomeration of bureaucracies, some of them linked to reform movements, others - almost always the stronger - linked to the forces trying to extend the transnational consumerist style of development. In the role of arbiter, the State may resort to authoritarian simplification and suppress any public expression of problems with which it is not prepared to deal (or simply assert that it has already solved them). The State may also respond by evading or postponing action until it is politically unavoidable, and then seek "satisfying" rather than "optimizing" solutions; that is, do just enough to relieve pressures and to keep the problem from reaching unmanageable dimensions.

The forces promoting the food production and marketing innovations described earlier, supported as they have been by the prestige of advanced technology, have naturally been in a better position to influence the State than the self-provisioning cultivators and rural workers whose livelihood has been at stake, while the rural ecosystems have until quite recently had no defenders of any weight. Once these problems have become too conspicuous to be ignored, the State may react through comprehensive and inapplicable plans, in reality a substitute for action, or through a series of piecemeal measures relieving the most immediate pressures on it. In practice, concern over the problems is likely to concentrate in certain parts of the State apparatus that may try to act

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4/ Ibid., pp. 9-10.

autonomously with whatever resources they can obtain, in line with the pressure from their particular clientèle and with their own scientific or ideological frame of reference concerning development, ecology and the organization of society. In other words, techno-bureaucrats will try to make policy.

#### V. TECHNO-BUREAUCRATIC PRESCRIPTIONS

The rise of "development" as a symbol for national aspirations and a focus for policy throughout the world has been accompanied not only by an increase in the responsibilities assumed by the State and in the demands made on the State, but also by a rise in the importance of specialists, particularly economists and engineers, claiming to be able to show the State how to bring about "development". Subsequent vicissitudes in this expertise need not be discussed here. In general, in national societies in which bureaucracies handling the traditional business of the State were in a formative stage, they have been pushed into the background by techno-bureaucracies with different conceptions of their roles, claiming authority on the basis of developmental expertise rather than mastery of procedures and precedents.

For present purposes, and in very simplified terms, one can distinguish two main groups among the techno-bureaucrats:

(a) The advocates of conventional growth-oriented strategies, whether relying on State capitalist planning or on private capitalism and the market, impatient with human welfare, social justice and participatory as well as environmental concerns, prepared to welcome whatever authoritarian controls and curtailments of national autonomy may be needed to make their strategies feasible.

(b) The reformers and planners who have convinced themselves of the need for major structural changes in their societies and who aspire to be agents of such changes. This category is internally heterogeneous, but for the most part its members feel that imitation of the paths to "development" followed by the now industrialized countries is neither practicable nor, in terms of values, desirable. In general, the members of this group look on themselves as spokesmen for the mass of the population; in principle they favour popular participation in developmental decision making - without, however, much inclination to listen to the masses, and with a predisposition to feel that, since their own prescriptions are correct, the masses will welcome them.

Shifting domestic configurations of power and differing links with the international order have determined which category has been in the foreground in specific countries and periods. The typical members of the second group reached their negative evaluations of current styles of development before the food system and environmental questions became prominent, and frequently as a result of frustrating struggles to shape national development from within the State, leading to their own exclusion and retreat to international organizations, universities or research institutes.

They constitute a natural entry point for new perceptions of these questions in the third world and their linking with the broader question of alternative styles of development. However, a major effort of self-analysis seems to be needed if these perceptions are not to be distorted, like the developmentalist outlook of the past, by misapprehensions concerning their capacity to plot the source of conflicting societal transformations. The reformist techno-bureaucrat has a bent toward centralized comprehensive planning, although this may be concealed within a vision of harmonious decentralization of responsibilities to the "community", and a bent toward standardized solutions for complex problems, including that of participation.

The prospects for such solutions guided by techno-bureaucrats have seemed relatively promising in new nation States with rudimentary class consciousness and organized interest groups, and with external dependence expressed through export enclaves rather than complex transnational ties. In these cases, however, the resources at the command of the State have been meagre, and the capacity of the political leadership inspired by the techno-bureaucratic vision to mobilize mainly rural masses has also proved weak.

As the apparent managing capacity of the State increases, it takes more conventional bureaucratic channels; the reality of over-regulation and manipulation of regulations by interest groups emerges at an early stage of growth of the State machinery. At the same time, the State and the national society become more enmeshed in an international order of "great Power" competition for political and military influence, penetration of the economy by transnational enterprises and internalization of the modernized consumer society for minorities. In these conditions, reformist techno-bureaucratic prescriptions, if applied at all, have outcomes quite different from those overtly intended. This is due to some extent to deliberate manipulation and to some extent to unwanted side effects with origins outside the range of vision of the techno-bureaucratic planners.

The area of rural development is particularly rich in examples of well-meaning and plausible policies that have had disastrous consequences for the weaker parts of the rural population or for rural ecosystems, or have failed to achieve any of their objectives (5). The preceding pages have suggested the unavoidability, for Governments in most of the third world, of policies giving higher priority to domestic production of basic foods using methods that are relatively labour-intensive and more sparing of energy and chemicals. Also discussed was the protection of self provisioning peasant agriculture from further disintegration along with control of environmental intervention. Such policies probably imply some economic and cultural disengagement from the models of the industrialized countries, but it would be absurd to generalize on this point. The industrialized countries, through their present crises and reactions to these crises, are already transmitting a different combination of influences to the rest of the world, and the contradictory nature of such messages can be expected to increase.

However, the techno-bureaucrats of the third world may be no better able to identify the social and political requisites for successful intervention in food systems and rural livelihood than others before them. The prospects for inputs into policy by the people who will suffer the consequences of the policy remain obscure.

## VI. PARTICIPATION AND THE ENVIRONMENT

Another major UNRISD research project, on participation, provides a convenient framework for thinking about this subject in relation to policies concerning the food system and the environment as well as other aspects of developmental policy-making. Participation is defined as organized efforts to increase control over resources and regulative institutions in given social situations, on the part of groups and movements of those hitherto excluded from such control (6).

5/ The UNRISD research projects on rural co-operatives and on the Green Revolution have provided abundant evidence to support this statement. See also René Dumont, Paysanneries aux abois: Ceylan, Tunisie, Sénégal (Paris, Collection esprit "Frontière ouverte", 1972).

6/ Andrew Pearse and Matthias Stiefel, Inquiry into Participation - A Research Approach, UNRISD, Geneva, May 1979.

In the research project participation is viewed in terms of an encounter, involving "many degrees and combinations of mutual adjustment, negotiation and conflict between the 'excluded' and those elements in the society which maintain or force exclusion"; in terms of movements and organizations of would-be participants; in terms of biography of would-be participants (that is, the emergence of perceptions of problems and tactics through experience); in terms of projects, programmes and national policies aimed by external forces at the excluded groups; and in terms of anti-participatory structures and ideologies.

Processes of change become problems leading to policy responses when a social force able to make itself heard perceives a threat to its immediate well-being, its hopes for the future or its values of human solidarity, and participates in direct action or presses the State to act. Changes in food systems and the environment have long been problems to scientists and to any groups suffering acutely from such changes, although in the eyes of the State and many social sectors they may be seen as mere processes to be ignored or endured. The extent to which changes are now perceived as entering into the survival strategies and efforts to "increase control" of the groups "hitherto excluded" is a question that is not yet resolved.

In many industrialized countries today environmental questions constitute one of the areas attracting more public participation in policy activities. Participation often takes the form of adversary procedures and competitive mobilization, as well as attempted reforms in personal lifestyles. The intensity of participation is undoubtedly very unevenly distributed by social class and educational level, but even the disadvantaged groups may have a say. Up to the present, environmental questions have figured very little in their organized movements and demands on the State, but perceptions of environmental changes for the worse are undoubtedly on the rise among rural as well as urban "excluded" groups, as these changes affect their livelihood, their physical health and their psychological security. Various studies have pointed out that cultivators may appreciate clearly the damage to the land from over-cultivations and over-grazing, but for their own survival may have no alternative but to continue these practices. Increasingly they have before their eyes the consequences of huge dams that have uprooted thousands of families, forced changes in farming techniques and destroyed the livelihood of fishermen, and of the indiscriminate use of dangerous chemicals. In some cases, environmentally damaging technologies have been used against them deliberately: landowners have forced small cultivators off holdings coveted for their own plans of expansion by spraying of pesticides from the air, and armies have used herbicides to deprive guerrillas of food and cover, incidentally uprooting peasants and tribal populations. It is probable that less tangible menaces are also entering popular consciousness through the transistor radio and by word of mouth (7).

The results, in the absence of other channels for perception and response, might well include mass rejection of technology and its carriers, or the stimulation of new messianic or cultural-nationalist movements. More generally, one can expect that the initial participation of such groups in environmental policy will be defensive. In a good many cases it will be directed against regulations that threaten ecologically damaging means of livelihood, such as goat grazing and wood cutting for fuel, or in defence of sources of employment in ecologically damaging "modern" activities. Their poverty and their need to

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7/ UNRISD, in co-operation with UNEP, is looking into various aspects of this matter of public perceptions through its project on "The role of perceptions, attitudes and values of people in relation to environmental and developmental measures and programmes".

exploit the few resources they can command for immediate subsistence make it unrealistic to expect them to take a long or broad view of the problem. The State can legitimately apply measures to protect the environment and the long-term productivity of the land that they find unwelcome and try to resist.

Two provisos are needed. First, unless the rural masses, particularly the formerly self-sustaining cultivators, achieve or recover some means of livelihood which is sustainable over the long term, acceptable to themselves and in harmony with the local ecosystem, any non-participatory environmental protection policy risks collapse in periods of unrest when the State is too weak to enforce it or a new régime has other preoccupations. Both the revolutionary downfall of landlords in parts of Europe and the end of colonialism provide abundant examples of the collapse of conservation policies serving narrow interests and hated by an excluded peasantry. Second, the State, the techno-bureaucrats and the entrepreneurs are in no position to condemn the defensive tactics of the rural masses as short-sighted and reactionary, in view of their own record of short-sightedness and disregard for the impact of their activities on the environment as well as on popular livelihoods.

The capacity for militant self-defence against the experts seems an essential component of authentic participation. Otherwise, one can expect that the functioning of the national power structures will continue to heap the costs of environmental as well as food system reforms on the weak, and divert most of the benefits elsewhere. The very regulative safeguards introduced from above into policy to ensure equity and prevent manipulation may divert the benefits (benefits in terms of power and employment opportunities, at least) to techno-bureaucrats and professional representatives of interest groups.

## VII. THE CENTRAL DILEMMA

This brings us back to the central dilemma or ambiguity confronting international discussions of alternative human futures. On the one side, the range and complexity of present menaces to human well-being and human survival, the requirement that remedies should take into account the global system and its interactions rather than separate problems, the counter-intuitive and scientifically recondite nature of many of the relevant measures, and the incompatibility of such measures with the expectations both of present power holders and of most of the world's population - all these factors seem to call for a comprehensively planned authoritarian new world order governed by a techno-bureaucratic élite, and for permanent curbs on human choices concerning lifestyles or the restriction of such choices to the élite. Various futurological thinkers have projected such a future world order with resignation or repulsion.

On the other side stand the claims that human well-being and probably human survival demand lifestyles in harmony with specific localized ecosystems, determined by autonomous communities small enough for a "human scale" of interaction. Humanity must reject the domination of large systems - whether capitalist or bureaucratic socialist - that follow their own logic of standardized modernization and growth.

The rise to prominence of the two broad problem areas discussed in this paper and the apparent inability of existing political systems to deal with these problems except in a piecemeal, incoherent and inequitable fashion has strengthened the case for either of these alternative futures, but has also posed additional questions concerning their compatibility with the ways human beings act in societies and the ways these societies act on one another.



For better or worse, it seems unlikely that the first kind of future is on the cards, except in localized and caricatured versions. The idea of any coherent power élite exerting effective control with foresight over the global system and somehow solving or suppressing its problems seems implausible, whether as a utopia or an anti-utopia. The preceding pages have suggested that the food system imposed by interests in the larger industrialized countries on the rest of the world with increasingly apparent success, may become less viable in the future because of rising costs and inherent contradictions.

Neither does the second future scenario seem within reach, if viewed as a global prescription. Even within the areas of food and environmental policy, participatory schemes that would transfer all decision making to "communities" within localized ecosystems are probably as illusory as the technocratic centralist schemes. However, if the proponents of this future treat it as a societal model which is to be striven for but is probably never capable of absolute attainment, and treat the quest as a political process, it becomes the more promising focus for policy. The prospect of diverse mutations in human societies, only intermittently and precariously modifiable by human rationality, admitting creativity and unmanipulated participation at the cost of conflict and the possibility of catastrophe, this area is closer to reality as well as to the values underlying proposals for alternative styles of development.

NEW PLANNING CONCEPTS FOR RESIDENTIAL  
ENVIRONMENT IN URBAN AREAS

Report transmitted by the Government of Norway

Prepared by Ms. A. BONESMO\*

Summary

Planning is a major instrument both for the creation of new residential environments and for the improvement of existing ones. As a result of research and practical experience, there is now a body of appropriate knowledge available on the major physical and social components of a well-functioning residential environment. This knowledge must be applied more effectively in the planning and development process than has usually been the case.

Many problems of residential environments can only be solved by: (a) more effectively co-ordinated municipal planning of new and existing areas; (b) more active participation of the local population in the planning process; and (c) a strengthening of local communities so that they can assume a greater share of responsibility. The goal should be to let the local population get involved, as far as possible, in the planning and management of community action programmes relevant to their environments. This presupposes healthy conditions of local democracy, where all population groups and local associations can co-operate in the establishment of community facilities for the local residential environment. It is also necessary to develop closer contact and co-operation between the local population and the administrative and political bodies of the municipality concerned, and to co-ordinate the work of different public agencies on residential environment issues. Equally important is the establishment of loan and subsidy schemes to promote the implementation of comprehensive residential environment policies, at both the local and national levels.

In most cases, the urban settlement structures which were developed after the Second World War make heavy demands on land, energy and other natural resources. Planning authorities in Norway today are giving priority to the development of structures that would be more economical in their use of such resources and, at the same time, take fully into account the environmental quality of residential environments.

In the future much greater emphasis will therefore be given to the role of local communities as planning units in urban settlements and cities. Co-ordination of different interests and sectoral measures at the local community level is the basis for developing harmonious residential environments. The Norwegian Government intends to stimulate the preparation of plans for individual local communities with the active participation of the local inhabitants. Current

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State subsidies for municipal and local residential environment planning are expected to increase from 1980 onwards.

In the period since the Second World War, major emphasis has been placed on the development of new residential areas. Approximately one million dwellings have been constructed in Norway during this period; today they represent about two thirds of the housing stock. The systematic protection, maintenance and renovation of older residential areas must now become a natural part of human settlements and environment policies. Improvements to existing residential environments will, in many places, entail not only the renovation of dwellings but also new traffic arrangements, protection against noise, provision of playgrounds and recreation areas, facilities for leisure and cultural activities and measures to preserve and protect the man-made environment. These needs are great in both urban areas and smaller settlements. As newly built-up areas gradually constitute a larger proportion of the physical surroundings, the importance of preserving older man-made environments of particular cultural value increases. It is a major goal of human settlements policy in Norway to preserve and develop the variety of rural and urban communities.

The Norwegian Government will stimulate and provide resources for systematic planning in the municipalities, with more emphasis on local residential environment needs and the interrelationships between physical surroundings and social and cultural conditions. Local improvement planning will be integrated into normal municipal planning. Several municipalities have already implemented such planning with favourable results.

State subsidies for the improvement of residential environments have led the municipalities, local housing associations, local environmental protection associations and other organizations to launch a number of specific programmes. The increased subsidies after 1980 and initiatives by the central authorities will contribute to further experimentation in and development of methods for local participation in the planning and improvement of local residential environments. The State will also provide economic assistance for the preparation of plans to preserve older buildings of particular value. Registration of cultural monuments will be the first step in order to permit the establishment of priorities for intervention. Steps have already been taken to ensure the maintenance of local building traditions and skills necessary for such preservation policies and the development of characteristic regional building styles.

ON THE QUALITY OF THE URBAN ENVIRONMENT:  
SOME EXPERIENCE IN THE NETHERLANDS

Paper transmitted by the Government of the Netherlands  
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INTRODUCTION

A quarter of a century ago practically all cities in the Netherlands were so compact that their inhabitants could easily reach the surrounding countryside on foot or by bicycle. This situation changed radically after the Second World War, with the population increasing from 10 million to 14 million. Migration to the cities accelerated, and 9 out of 10 inhabitants now live in urban areas. The material prosperity of the town dwellers developed rapidly, and the motor car became a popular means of transport. The number of dwellings in the Netherlands has nearly doubled since 1945, and the built-up area has increased threefold. Development spilled over the administrative boundaries of the old central municipalities and the close economic links between cities and surrounding rural areas were weakened. This fast and massive urbanization has led to numerous social, cultural and ecological problems.

PROBLEMS

The poor quality of newly built neighbourhoods

Generally speaking, the rapid, large-scale expansion of Dutch cities led to uniformity and drabness in the physical setting, and to a lack of quality in the social environment of the new neighbourhoods. Although the occupants usually appreciated the dwellings, they often suffered from noise and road traffic. The new neighbourhoods offered insufficient protection against wind and rain, an important consideration in the maritime climate of the Netherlands. Facilities for children to play were inadequate; the atmosphere was uncongenial and only essential shops were provided. The uniform layout of the neighbourhoods increased the feeling that life was dull and monotonous. Social contacts were difficult to establish; at the same time, living on one's own, or in a household separate from that of the traditional family, was often impossible. People felt they were not sufficiently involved in the management of the new residential environment, and more than 40 per cent apparently wanted to move away.

The complaints could be traced to the simple and speedy manner in which these new neighbourhoods were created. A fast-growing population had to be provided with a roof over its head urgently - a problem hitherto unknown to town planners. Building took place on whatever space was available, and construction was utilitarian and lacking in variety. Areas with different land use were separated from each other, thus simplifying both construction and management. As time between planning and construction was short, the experience of the users

could not be taken into account. The builder had to make a profit, and the Government was more concerned with the organizational arrangements than with the environment and the quality of life.

In such circumstances existing features of the landscape tended to be wiped out. In the west of the Netherlands, where the soil has a low carrying capacity, site levels were raised with sand, disregarding the effect on the environment. Water management in the new neighbourhoods was inappropriate; surplus rain-water was drained directly into the sewerage system together with street and domestic refuse. This led to waste and pollution. Interference with ground-water circulation added to the problems: previously impermeable soil layers were perforated by foundation piles; new impervious layers were created by raising the ground level, and up to 40 per cent of the total land area was paved for roads. As a result, open areas (also about 40 per cent of the total area) are very wet in winter and very dry in summer. Sometimes the ground water can no longer be replenished.

The new abiotic environment has restricted possibilities for planning greenery and increased the cost of maintenance. Multistorey buildings have caused wind turbulence, disturbed the microclimate and stunted the growth of trees and plants. At weekends the inhabitants leave these theoretically "green" neighbourhoods for recreational areas outside the city. Children have become dependent on such outings or on sports organized at club level. In their spare time, before and after school, they play in lifts, halls and staircases; noise and nuisance have led to aggressiveness among themselves or with adults. Children from such housing areas suffer emotional inhibition and retarded motor development.

Nothing much happens in these new neighbourhoods; life is confined exclusively to the routines of residential functions. Along endless rows of similar front doors, one searches in vain for a shop, a post-office or a workshop; these facilities have not been provided for by the house-building associations. Places of work are usually far away in the distant city.

The monotony is made worse by the homogeneous composition of the population. Single and elderly people are seldom encountered. The rent levels tend to attract middle-income people. There are few places for spontaneous social contacts; in multistorey buildings the corridors leading to the front doors are solely for access and do not provide a sheltered environment for people to meet, talk or play.

Road safety is inadequate. As in the the old city, the network of roads was laid out for slow-moving traffic because at the time of construction the massive shift to car transport had not been foreseen. When the roads were widened the motor car was able to move quickly, but no thought was given to safe crossing routes for cyclists or pedestrians.

Many neighbourhoods were built without provision for links to railway services. Public transport was provided only when demand had become sufficient to guarantee profitable operation. The new town of Zoetermeer (a satellite of The Hague), for example, had no railway connexion until the population had grown to 50,000; by then people had become accustomed to travelling by car. The residential environment had to be adapted to the car. Parking facilities were extended and road safety deteriorated, while fumes, noise and lead poisoning increased. Large public car parks and shopping centres tend to produce feelings of insecurity, because they are desolate at night and foster aggressiveness and vandalism.

As a reaction to the general discontent, most urban developments are now in the form of low buildings, and plans are under-way to improve the "first generation" new neighbourhoods.

#### Decay of the old inner-city areas

As one-sided attention was given to the new urban areas, the older inner-city areas tended to decay. Many inhabitants of older neighbourhoods have complained about the lack of maintenance and improvement of housing, but demolition cannot be a standard solution. Nine out of ten inhabitants draw attention to the absence of greenery and playing facilities for the young. People complain about noise, traffic and industry. Yet industrial establishments are perceived as a necessity to ensure employment. Shops and craft-based industry are also important because of their service function, and it is felt that children should have an opportunity to observe a variety of social activities.

The advantages of locating industrial establishments in residential neighbourhoods are offset by such disadvantages as odours, vibration, traffic, explosion hazards, demolition and visual dilapidation. In the past, municipal councils issued permits under the Nuisance Act rather too readily and permitted dwelling construction too close to industrial establishments. The serious consequences of this policy are now becoming evident. In a neighbourhood due for redevelopment on the left river bank in Rotterdam, more than 200 industrial establishments near the old docks are causing a nuisance to people living in the vicinity, directly as well as indirectly, by generating heavy motor traffic.

As a rule inner city inhabitants are very satisfied with their shops and schools. Another positive aspect often mentioned is that all kinds of facilities are easily accessible on foot. People are enthusiastic about the congenial atmosphere and opportunities for contacts, though a survey has revealed that most inhabitants consider that the influx of foreigners and young people causes too much change.

It is natural that older neighbourhoods in the inner city should be positively valued. Their original design involved craft-based building methods offering variety and attention to detail. Of necessity, builders in former days were concerned about soil and water management, leaving scope for nature to flourish despite high building density. Interesting wall vegetation and various species of birds are often to be found in inner city areas. The classic jointing of the city (busy streets, buildings, quiet courtyards) also contributes to a smooth interaction between public life and the private domain. Old neighbourhoods promoted close social community as expressed in clubs, associations, bands, local bars and other facilities which were frequented by both old and young; and the proximity of the activities gave rise to new small-scale initiatives. Low rents would permit old neighbourhoods to be places where the young could establish their independence and the elderly maintain their entrenched habits.

Such an environment has its drawbacks. Small businesses may expand into large, annoying establishments. The narrow streets are hardly suitable for motor traffic. Although the inhabitants themselves have no need for a car, traffic problems may arise owing to the presence of industry. In contrast to the suburbs, the paved area for traffic in the old neighbourhoods is not 40 but only 20 per cent of the total land area. Yet the inner city areas remain attractive to people dissatisfied with the new neighbourhoods and to tourists, artists and the intelligentsia, whose advent is used to advantage by building contractors, speculators, hotel operators and banks. The trend of the average house price in the old centre of Amsterdam (the Nieuwmarkt neighbourhood) illustrates the situation. Whereas the price of daily necessities of wage-earners has doubled

since 1970 and the national average price of freely available dwellings has more than tripled, the average value of premises in the Nieuwmarkt area has increased more than sevenfold.

In the large cities of the western Netherlands the favourable location of old neighbourhoods near the city centre also tempts suppliers of office accommodation. The municipal authorities offer scarcely any resistance to investors and developers; their machinery is overwhelmed by the size of the problems. Instruments for adequate land use policy are lacking (for example, there is no right of pre-emption by the authorities), but opportunities to impose conditions of use (via leaseholds, land use plans, etc.) are neglected. Financially strong pressure groups take advantage of this situation. As a result of movements out of the older new neighbourhoods, housing of inferior quality comes within the financial reach of large families from inner cities looking for more space. The old city consequently suffers from depopulation and its balanced population structure is destroyed. Schools lose pupils, shops lose customers; the bars are frequented primarily by students; only the least privileged groups (invalids, the unemployed, elderly people) remain. The lack of future prospects leads to neglect of buildings, public space and infrastructure. Immigrant workers move into the vacant houses - but these are often demolished later to make way for a new road, an underground railway or office or university building.

#### Waste, pollution and alienation

After the Second World War, when the Netherlands lost its colonies in the Far East, the national economy underwent drastic change. Industrial and seaport developments played an important role. Near Amsterdam and Rotterdam, large docks and industrial areas were created (e.g. the North Sea Canal, Rijnmond). The number of man-years worked in industry and services in the Netherlands has roughly doubled in the last 25 years, while the number of man-years worked in agriculture has been halved.

The growing services sector (offices, shopping centres, banks, hospitals, etc.) looked for building sites in the cities. In many cases the municipal authorities themselves drew up ambitious plans to provide sites, and through mergers the building companies developed the expertise to undertake major projects quickly and profitably. These concerns took the initiative away from the municipalities. They built blocks of flats, large hotels and buildings, offices in and around the cities. Building for the tertiary sector led to the demolition of residential areas, drastic clearance for new highways and car parks, and the construction of underground railways in Rotterdam and Amsterdam. A "second generation" of service centres emerged along the rapidly expanding motorways. Growing prosperity led to an explosive increase in car ownership. In 1960 1 out of 23 citizens had a car, as compared to 1 out of 3 today.

With an eye to the motor-car, large-scale development plans were made for recreation. "Recreational centres" were created some distance from the cities. Since 1960, the average annual mileage covered by "recreation traffic" has more than doubled. The drawbacks of this policy are now beginning to manifest themselves. The symptoms are a large number of roads, fragmentation of space and pollution of nature. People without access to individual transport are deprived of recreational opportunities, especially as no new parks are provided in the cities themselves.

Increased mobility also made suburbanization possible. Travelling large distances became a habit; in comparison with the deteriorating residential environments in the cities, semi-urban village developments seemed attractive. The new endless rows of single-family houses in a green setting, sometimes

referred to as "residential fields", appealed to the middle-income groups. The number of motor-car commuters rose from 50,000 to 733,000 between 1960 and 1976 (from 6.7 per cent to 47 per cent of the total number of commuters). The average annual mileage covered on journeys to and from work doubled in this period. Commuting has serious drawbacks: energy is wasted on extra travel; the former village or neighbourhood communities are upset; the landscape is affected by dispersed housing; and the environment is polluted by the motor traffic.

Many concealed costs are not being compensated at the right place; for example, the national network of roads is not paid for by the small commuter municipalities, whereas the large cities pay for their infrastructure themselves. Even within the boundaries of the large cities, costs are not properly allocated. The efficiency and economic justification of refuse disposal systems, police surveillance and the operation of public transport are factors often overlooked. Another neglected matter is whether there is any correlation between artificially low rents and expenditure patterns that lead to damage of the environment through extensive motor-car ownership. The average urban population density in the Netherlands has been steadily decreasing, from 59.7 inhabitants per hectare in the period 1866-1970 to 49.1 in 1971-1974. This threatens the economic justification for providing high-grade facilities in the cities. Municipal government policies seem unable to deal with these problems, and generally attend only to the direct demand for housing and industrial sites. Up to the end of the Second World War the cities and the surrounding countryside formed an interdependent economy in the Netherlands. Good drinking-water was available in the immediate vicinity (from rivers, dunes and ground water). Waste water from houses contained only organic substances. Now water consumption has increased; greater numbers of town dwellers use an excessively large volume of water (for the bath, the toilet, the dishwasher, the washing machine). The rate of circulation of water has become so high that the self-purifying capacity of surface water cannot keep pace with increasing pollution. Drinking-water sometimes contains measurable quantities of carcinogenic substances, and the hazardous substances which play an important part in the modern household (detergents, preservatives, packaging materials, food additives and the like) can adversely affect public health.

Some 25 years ago most houses in the Netherlands had a simple septic tank. A municipal service called from time to time to remove the faeces from the tank and spread them on the land as manure. The waste water (purified by anaerobic bacteria in the tank) flowed into the town sewer. With the introduction of chemical detergents, the septic tank could no longer be used, since the bacteria necessary for the decomposition process were killed. The tanks were therefore bypassed, and direct connexions were made with the municipal sewerage system, resulting in enormous water pollution. After some time central purification plants became necessary. In these plants a fermentation process is created by mechanical means. This requires energy; one wasteful system thus initiated another. In the Netherlands sewer water is still not fully purified. The so-called third stage (removal of phosphates and other oxygen-depleting substances) is almost invariably lacking. Disposal of the sludge from the installations, contaminated by heavy metals and similar pollutants, constitutes an additional problem; this sludge represents about a quarter of all solid waste produced annually.

The situation regarding other waste is similar. After the Second World War 90 per cent of the solid household refuse from the cities could still be organically processed. The Netherlands pioneered such waste disposal establishments, which were adopted by a growing number of municipalities. These establishments supplied compost to horticulture and agriculture. At present only 60 per cent of the refuse can still be processed. In spite of an increasing



volume of refuse sent for disposal (305 thousand tons in 1967; 590 thousand tons in 1973), the amount of compost produced decreased from 228 to 199 thousand tons in the same period. Moreover, the quality of the compost is deteriorating as a result of chemical pollution, and the market is declining.

The large volume of untreatable solid waste from the cities should not be overlooked. At present nearly half of the solid waste produced originates from the demolition of buildings, the breaking-up of roads and similar operations. More than in the past the building industry is using materials with poor decomposition properties (concrete, steel, plastics). In addition, there are the motor car dumps, which pollute the landscape in the vicinity of the cities.

Like other Western cities the residential centres of the Netherlands devour energy. About 35 per cent of national fuel consumption may be ascribed to the residential sector, and another 15 per cent to associated traffic. The amount for residential use divides into 20 per cent for space heating and 15 per cent for lighting (indoor and street) and domestic appliances. Energy consumption on such a scale should not be necessary. The efficiency of electric energy supply to the average Netherlands home is low; only a third is utilized, while two thirds are lost in generation and distribution. Apart from wasting fuel and raw materials, present energy use also creates unnecessary pollution in the form of heat islands over the cities.

The health of town dwellers is not optimal. A new problem has been caused by the choice of building materials. An example is the use of plasterboard, which sometimes gives rise to radio-active emissions. Houses are finished or renovated with chipboard, which contains formaldehyde; occupants of this type of housing have in a number of cases complained of breathing trouble, headache and fatigue. Further, floor coverings often contain carcinogenic asbestos fibres, and the use of various plastic materials tends to increase the health risks of the dwelling environment.

Today carcinogens are also encountered in drinking-water, food and the air. In the Netherlands, it is argued that 70 to 80 per cent of deaths from cancer can be traced back to environmental factors (in the broad sense). A number of industrial establishments in and around the cities cause unacceptable nuisances. A recent survey showed that, of the 316,000 companies officially subject to the Nuisance Act, 62 per cent operated without a permit and 14 per cent with an inadequate permit. This suggests that only a quarter of the establishments function safely and without nuisance. This has been demonstrated in practice; in the residential neighbourhoods near a metal company in Arnhem, for example, the blood of a large number of children was found to have an inadmissibly high lead content. In Tiel, trees were defoliated by emissions from a pesticide company. Children in districts near the Rijnmond area were found to suffer from respiratory trouble four and a half times as much as those in the cleaner province of Zeeland. In Amsterdam a quarter of the houses are subject to unacceptable noise, the standard being 65 dB(A). The inhabitants of the area around the North Sea Canal (Amsterdam and surroundings) and of Rijnmond (Rotterdam and surroundings) suffer significantly more from neurasthenia, irritability, eye trouble and headache than those in other residential centres. The inhabitants of these two urban agglomerations complain about serious deficiencies in their environment and are very inclined to move. The 1977 survey of living conditions by the Central Bureau of Statistics confirmed the results of earlier surveys. Satisfaction in the Netherlands is declining: every third person is now discontent with society.

In the three largest cities people have more health problems than in the rest of the country. All age groups experience greater stress, encounter more inconvenience from noise and air pollution, are more inclined to stay at home in the evenings for reasons of safety, and have fewer social contacts.

According to the above mentioned survey, many people feel powerless to influence the societal processes, despite (or perhaps because of) the increased institutionalization of social welfare. Traditional help from neighbours has given way to a complex pattern of activities by quasi-governmental bodies. Various welfare facilities have grown independently of each other, and are not properly related. The division of duties between different authorities is not ideal, and too little emphasis is placed on the individual responsibility of each town dweller. Even with regard to facilities of direct concern to the inhabitants of a given municipality, district or neighbourhood, it is often the central government that decides whether they should be provided or not.

For many years government policy has been based on economic growth and the wide distribution of associated material prosperity. Little recognition was given to the need in the cities for a culturally and ecologically sound basis of development. Attempts to make "the rest of the Netherlands" share in the material prosperity of the fast-urbanizing western part of the country (where the three large cities of Amsterdam, Rotterdam and The Hague are located) led to a spread of problems rather than to improvements in the quality of life.

In the Second Report on Physical Planning in the Netherlands (1966) it was proposed to create regionally associated systems of urban and suburban centres with combined employment and residential functions. This policy could not be implemented, however, because of problems of municipal autonomy and a lack of co-ordination at the central government level. Hardly any new policy instruments were introduced. Suburbanization and the segregation of functions continued, with the physical environment deteriorating still further.

Extensive environmental legislation has since been introduced to contain pollution: the Surface Water Pollution Act 1969, the Air Pollution Act 1970, the Pesticides Act 1975, the Chemical Waste Act 1976, the Hazardous Substances Act, the Excavations Act and the Waste Substances Act.

Within the framework of a system of permits, subsidies are available for redevelopment and innovation, but environment policy is chiefly concerned with checking actual situations to verify compliance with norms. In the Urbanization Report (Part 2 of the Third Report on Physical Planning in the Netherlands, 1976) the Government confined itself to designating "growth centres" in the west, and "growth towns" (with a residential function for the region) in the rest of the country. Efforts are made to achieve an "attractive residential environment" in the hope that improvements in quality will retain people in the city. In many "growth centres", new environmental techniques are being applied.

The "growth centres" receive government grants (under the Special Regional Welfare Policy) to create a satisfactory residential environment. This enables them to incur additional expenditure for educational and socio-cultural facilities and medical care. They are allowed to spend the money as they wish, but must draw up comprehensive welfare plans based on structured public participation.

Furthermore, the national policy aims at better planning of the old cities. Consultations are taking place concerning a possible Urban Renewal Act. It is undoubtedly because of the administrative set-up that there is no integrated policy for city development in the Netherlands. Urban municipalities are partly

dependent on centrally allocated sectoral grants, but the government has as yet no capacity to co-ordinate them. Studies of administrative reorganization (creating provinces partly coinciding with large urban areas) are in progress, but the draft Bill gives insufficient attention to the establishment of adequate territorial planning units.

What is needed is a bold policy for urban development. Our living communities are breaking up and society is becoming less diverse. There is a constant tendency to move, which impedes the formation of socially integrated settlements. Our cities are exposed to too much disturbance in too many places at once. The quality of the urban environment is deteriorating. Conglomerates of differentiated urban activities that were developed over long periods of time are disintegrating. An enormous amount of energy and time is being wasted in moving to and fro. This increase in urban dynamics is destroying our urban system. The resources of the community are being squandered, while the living environment makes people ill and gives them a sense of powerlessness.

#### ALTERNATIVES

##### A. Other forms of new construction

At the beginning of the 1970s unease about the living environment prompted various initiatives to improve the situation. The central government was chiefly concerned with new construction projects aiming at a higher quality of dwellings and dwelling complexes. However, the initiatives were unconnected instead of being integrated into an over-all town planning framework.

The basic conclusion drawn by a team that studied a new procedure for town planning and design was that quality has to be built in from the beginning. Mistakes are costly in terms of repair work or compensating measures at a later stage (e.g. repeated raising of ground levels to make up for earth subsidence, remedying the consequences of road accidents, providing psychiatric aid to people lacking healthy social contacts, establishing meeting centres, etc.). It need hardly be pointed out that the costs involved are borne by the community, albeit indirectly. This underscores the great importance of government involvement in the planning process.

Emmen in the north-east of the Netherlands was the first town - as far back as the 1960s - to take due account of the landscape in planning new construction. Emmen is now notable for its road safety policy, based on residential courtyards where only local traffic has access. Foot-paths and bicycle trails, separate from motor traffic, have been laid out through the green areas. As a result, the standard of road safety is relatively high. Emmen has also experimented with "buxis", which combine the services offered by a bus (operating on a fixed timetable) and those of a taxi (providing service from door to door). It is a flexible public transport system which has proved successful enough to be adopted in a number of rural municipalities in the province of North Holland. The Central Netherlands Bus Company provides the equipment and trains the drivers.

In the city of Delft, in the Randstad region, a development plan was drawn up by students of the University under which the existing landscape pattern of polders and ditches would be maintained. The level of the land was raised selectively for building, and a separate sewer system was laid out. Prior to construction certain fields were planted with young trees, so that small shady parks became available to the inhabitants immediately. A similar approach has now been adopted in other towns.

The Emmen residential courtyards and the experiments with street layout in Delft have been well received, and regulations have now been introduced to promote "residential precincts". Unfortunately, this solution runs the risk of becoming a misapplied cliché. Moreover, it may lead to a fragmented town structure of residential "islands". In the growth centre of Almere, in the South Flevolands polder near Amsterdam, where building started in 1970, an attempt has been made to avoid fragmentation by providing an arterial system for motor traffic. Almere is being built in stages on the basis of independently functioning residential centres. This has permitted gradual incorporation of previously gained experience; the planning of Almere has become both a learning and a growth process.

Efforts have been made in Almere and elsewhere to develop environmentally appropriate building techniques, e.g. by providing for separate sewer systems, natural banks of watercourses with vegetation to assist biological purification, and central town heating systems. In Nieuwegein, near Utrecht, an improved separate sewer has been constructed permitting polluted rain water to be purified before it flows on to the land. In Almere attempts are being made to achieve a differentiated social structure with the help of special measures which favour various groups, such as the elderly, families with children over the age of 12, low-income families, families of immigrant workers, single people and the handicapped.

An interesting movement has been initiated by people who place emphasis on self-help. For example, some years ago the inhabitants of a newly constructed neighbourhood in Delft took the initiative of turning the "decorative greenery" in front of their flats into a playground by using waste building materials. By placing obstacles in the road they forced drivers to drive more safely. A "wild garden" project became popular and today wild plants grow in quite a number of public gardens and along roadsides. A similar project was carried out in Utrecht.

Current thinking is that inhabitants should be given more freedom of action in town planning. Spontaneously formed foot-paths through undeveloped plots, for instance, are deliberately left unfinished, to be paved only when firmly established. It is no longer prohibited to light fires or to build huts. At the local level, people are involved in the management of public neighbourhood gardens. Schoolchildren work in the gardens in time provided for in the school curriculum. The traditional separation between playground and decorative greenery in the open spaces of the new neighbourhoods is gradually disappearing.

The National Building Association, KASKO, is an interesting self-help initiative. The aim of this association is to build or rebuild good-quality houses with the active participation of the future occupants (buyers). To this end some 50 families form a project group. Over a period of one or two years the project group decides collectively on all problems raised by its members concerning specific individual wishes as well as environmental and social aspects of the neighbourhood. The eventual occupants of the dwellings participate actively in the process, and the pattern of a ready-made home in a ready-made environment is thus avoided. Solutions are provided for alternative types of household. One of the results of co-operation in a KASKO association is that socio-cultural activities develop rapidly in the new neighbourhoods, as common interests have already been created.

After four years, KASKO has become active in more than 10 municipalities, and is usually instrumental in promoting environmentally sound building techniques. In the Netherlands a distinction is made between professional building and self-help building, which has developed gradually and has now become institutionalized. Self-help building generally involves restrictions on the use

of materials; the size and weight of the components must be such as to permit handling without heavy equipment. This immediately determines the building method. Wood construction can be regarded as a typical self-help building technique. Apart from self-help in building there are also movements, such as the Central Dwelling Movement (dating back to 1969), which wish to promote a more communal life. This sometimes leads to the creation of working communities.

What do alternative forms of housing involve? Roughly speaking, there are three elements that offer scope for alternatives: building, management and use.

(a) Building: use of materials requiring careful maintenance; search for designs corresponding to individual needs; use of materials which are not harmful to the environment; use of waste and second-hand materials; unconventional building methods;

(b) Management: less government responsibility; flexible regulations for modification of buildings; joint management of land; building and planning process managed by eventual occupants, who also decide when expert assistance is required; a house-building association can be set up for this purpose;

(c) Use: ways of living together other than one in which the family is both the smallest and largest unit; use of dwellings in a manner completely different from the norm imposed by government, (e.g. in groups in a collective dwelling with a large kitchen/living-room and no bedrooms, but small sleeping cubicles).

Such alternatives in building, management and use can have a favourable effect on the environment. More variation and originality in the design and use of materials can give greater character and identity to "ordinary" dwellings and residential environments. Existing building and housing regulations should be altered to provide wide choice and allow interaction between current and new models of construction.

#### B. Social action in older neighbourhoods

In recent years various initiatives have been taken to redevelop and renovate older neighbourhoods. A few examples illustrate the relevance of this work to community development. In 1969 the inhabitants of a neighbourhood in Leeuwarden (a provincial capital in the north) created the first urban renewal association in the Netherlands. In collaboration with students of planning and architecture and various social disciplines they succeeded in drawing up a land-use plan for their neighbourhood and thus preventing its proposed demolition.

In 1973 the National Urban Renewal Ombudsteam was founded; on the model of 'advocacy planning' it provides advice to some 100 neighbourhood groups. Nevertheless, urban renewal still exhibits many characteristics of crisis management. Plans developed by inhabitants are often financially prohibitive or impractical, and this often leads to disappointment and bitterness. Relations between citizens and the authorities can be established in various ways. There are committees officially appointed under the Municipality Act, but there are also committees of inhabitants claiming to be the only true representatives of the citizens. Urban renewal associations are now active with government support, pending a possible Urban Renewal Act.

Public participation in the creation or change of residential neighbourhoods has steadily become an integral part of urban building and renewal. Inhabitants are becoming aware that collectively they constitute a certain force, and are therefore less inclined to accept plans imposed from above.

The neighbourhood plan serves as a framework for the welfare plan, the housing plan and the industry plan. Government subsidies are available to create public gardens, for instance, through a scheme for the improvement of the residential environment in old urban neighbourhoods run by the Ministry of Culture, Recreation and Social Services. In Utrecht the site of a former gas-works was turned into a park on the initiative of the inhabitants with the aid of such grants. In Amsterdam small sites in a demolished area were spontaneously converted into neighbourhood gardens. In practically all the old inner-city areas throughout the country paving stones beside the exterior walls of buildings have been removed to make room for mini-gardens.

In the process of redeveloping "establishments tending to turn a residential neighbourhood into a slum area" attention is given to the possibilities offered by a normal permit under the Nuisance Act. On account of their location, such establishments are usually subjected to more stringent conditions than similar industrial establishments elsewhere. If a solution at the existing site proves impossible, the firm has to move, for example, to an industrial estate on the periphery of the town. The Ministry of Public Health and Environmental Hygiene is at present making a national survey of urgent cases for intervention in order to get a clear idea of the size of the problem. Implementation of the redevelopment project is expected to take some 10 years. An amount of 5 million guilders was made available for the year 1979. The cost of the over-all operation has been estimated at about 600 million guilders.

Redevelopment projects in the past have generally helped to strengthen medium-sized and small businesses. These businesses continue to be a vulnerable part of the economy, yet they offer excellent opportunities for improving the living environment. The lack of proper management and profitability are the weak spots in this sector, especially for the traditional entrepreneur. "Self-help" initiatives, such as repair associations, distribution points for biologically grown food products etc., are often successful in older neighbourhoods. The same is true for various initiatives by students and professional organizations to provide expert advice on social, technical and structural problems.

An unusual method of combating criminality has been developed in Amsterdam. On the basis of a neighbourhood-centred development plan, initiated by social workers, attempts are made to prevent criminality by identifying and removing its causes at an early stage. Whenever a person has been isolated from his group and environment under criminal law, he returns as a stranger. His deviant behavioural pattern tends to become entrenched and his environment is threatened by "contamination". A number of social workers from the Probation Institution have searched for means of preventing people from developing such patterns.

Education is also important to improvement of the social environment. In a project on "Education and old low-class neighbourhoods", run jointly by a number of Utrecht nursery and primary schools under the guidance of a school advisory centre in Utrecht, it has been possible to match schools more effectively to the living environment of working class children. Attention has been given in particular to four elements: orientation about the task; involvement of the parents in what happens at school; special attention for the children of foreigners; and co-operation between nursery and primary schools. The advisory service invariably takes the view that new initiatives must be supported by the schools. Furthermore, due allowance is made for the parents' needs, for instance by organizing refresher courses and constantly involving the parents in the school work of their children.

Until recently such schools enjoyed extra financial provision, but this "stimulation policy" is now being modified for political reasons. There is therefore a risk that schools with a high proportion of working class children will no longer be given special attention. Government policy is now concerned with basic structural change in education, but does not make sufficient allowance for the specific needs of working-class children. The "stimulation policy" should therefore be given a permanent function.

### C. A perspective for the cities

It is generally recognized that special solutions are required to adapt older cities to contemporary life. Formerly the houses in urban developments were usually grouped into "streets". For a number of reasons this arrangement has been abandoned without substituting anything having the same socially cohesive function.

A number of alternatives have been developed, including multifunctional neighbourhood centres providing school, doctor, bank, post-office, day-nursery, shops, market, bar, etc. under a common roof around a sheltered square where people can meet and establish contacts. In the inner-city area of Amsterdam a recently restored renaissance church is being converted along these lines. Moreover, there is a strong tendency to reclaim existing streets from the motor-car and give them a more social function. In a number of cities arrangements of this kind are referred to as "city precincts". Naturally, this requires modifications of traffic flow. Technical solutions can be adopted (e.g. obstacles), or streets can be closed to motor traffic enhancing safety for pedestrians and cyclists. In many cities, priority is increasingly being given to public transport, by allocating it special lanes or priority at traffic lights. Various initiatives to diversify transport have also been taken, such as neighbourhood buses, mini-freight transport, city delivery services, joint lorry and van ownership, water transport, neighbourhood service points for storage of purchases and luggage, special cycle routes to and from the inner-city area and bus-taxis. In the countryside the experimental neighbourhood bus driven by local inhabitants has proved to be a success, and has been transformed into a regular policy by the Ministry of Transport, Waterways and Public Works; general introduction of these buses in city traffic is under consideration.

In Delft and Groningen attractive alternatives have been devised for traffic arrangements and access to the inner city area. In Delft a plan for foot-paths and cycle tracks is being implemented in certain narrow bridges, alleys and lanes, and special small buses capable of negotiating the narrow streets and bridges are being introduced. Motor traffic can no longer pass right through the city; the inner-city area is divided into sectors and has a one-way traffic system. In Groningen a station for local and regional bus services has been provided in the old inner-city area. In this way a central public transport facility was restored after having been banished to the periphery of the city eight years before. An investigation has demonstrated that, after the implementation of the plan, pedestrian traffic in the shopping area increased, contrary to the expectations of shopkeepers who were initially strongly opposed to the change.

A shift in the relative importance of different modes of transport, as in Groningen and Delft, would generally seem desirable. A larger share of slow traffic and public transport and a smaller share of private car transport leads to reduced raw material and energy consumption and less pollution, as well as to an increase in safety, comfort and social equity. A shift in this direction requires a compact city, which can often be created by renewal of old inner-city areas and their surrounding shell of nineteenth-century buildings. The compact

city, where the road network, public transport and bicycles are the key elements of mobility, constitutes an important alternative to depopulation. A study of Amsterdam showed that a very large proportion of the housing lost through urban renewal (in the interests of residential hygiene some reduction in density is considered desirable in the old neighbourhoods) can be made good by compact housing construction in other places, such as on old industrial sites.

Such compact "first generation" new construction in the Delft-The Hague-Leiden area has provided a saving of 77 per cent in space needed for new housing: and a better residential environment has been achieved, with more visual stimuli, more social mixing and more effective shelter against wind. Finally, greater density can also be achieved through the use of smaller dwelling units. In the west of South Holland province (including the urban district of The Hague) one-person and two-person households make up nearly 50 per cent of the total, a figure which is expected to rise to 65 per cent.

Urban renewal is costly. It is more expensive than new construction outside the city. The additional cost relates to the design (which must blend with the environment), the limited project size (which imposes additional restrictions on standardization of building), the problems encountered in servicing the building land and special circumstances that impede construction on the building site, such as limited storage space, transport problems and the risk of damage to adjoining buildings, conduits and cables. Urban renewal may therefore be accompanied by a shift from energy-intensive to labour-intensive building, which is also desirable as a means of utilizing social and material resources. All this necessitates integrated planning. In Groningen plans for traffic, basic recreation, sports, educational and socio-cultural facilities have been subjected to co-ordinated review with apparent success.

The objectives laid down for the inner city area of Groningen in 1971/1972, and subsequent physical planning, demonstrate that an integrated approach to planning is useful and necessary. The most striking proof is the traffic plan, introduced in Groningen in 1977.

Integrated planning also involves the reorganization of schools and welfare services. In consultation with the welfare institutions subsidized by the municipalities (socio-cultural work, social services, including public health, aid for the elderly and the institution of social advisors) the services are made available as far as possible in the neighbourhoods themselves. At present the municipalities do not seem to have sufficient experience in planning of activities and facilities in the welfare sector.

A Specific Welfare Bill (General Act) was submitted to the Second Chamber of the States General in 1977. This Bill contains regulations for the implementation of a decentralized, democratic welfare policy. According to the Bill, provisions must be made for integrated planning of facilities at all administrative levels. Such planning should take the form of four-year plans and more detailed annual programmes, always incorporating information on the existing situation so as to permit balanced development of various facilities. The harmonization and decentralization of the welfare policy envisaged by the General Act will proceed gradually; a scheme of government grants will assist in achieving structural improvements.

Few alternatives have so far been implemented in the sphere of energy and environmental hygiene in and around residential areas. In this respect the Netherlands is lagging behind other European countries. In the Rijnmond area an extensive network for air pollution monitoring has been set up; it functions as



a warning system, but environmental management and energy plans are still lacking. Monitoring and warning are small steps considering that, according to current energy projections, the emission of sulphur dioxide in the Netherlands is expected to increase 4-7 times over the next 25 years.

Little attention is paid to building insulation, although it could easily be promoted in new neighbourhoods. The annual energy consumption of a standard dwelling in the Netherlands could be reduced from the present 64,000 kWh to 31,500 kWh if various recovery techniques were applied in addition to insulation. The village of Gasselte, in the province of Drenthe, has set an example; in a very brief period the inhabitants and the municipal council succeeded in halving energy consumption (as a "demonstration" against a project for storage of radio-active waste in the municipality proposed by the central government).

If Swedish insulation standards were applied, this would enable a quarter of the energy used for space heating to be saved. Similarly, the introduction of district heating in the major agglomerations, where much residual energy from industry is wasted, could certainly bring additional savings of 50 per cent. Careful location of work and residential areas, and of the centres of energy distribution, would cut energy requirements still further by reducing transport losses.

Environmental organizations in the Netherlands have jointly set up a Foundation for Energy Saving to provide advice to municipalities, industrial concerns and private individuals. It is often a matter of presenting alternatives to methods which serve the interests of the established public utility companies. There is also an Environmental Dwellings Foundation, which installs solar energy panels and applies similar techniques. A few closed-circuit dwellings and a number of dwellings with experimental solar energy heating have been built in the town of Boxtel in the province of North Brabant by the 'Small Earth' Foundation. There are exclusively solar-energy installations in separate building projects in some 20 municipalities.

Little experience has so far been gained with modern district heating, although Rotterdam and Utrecht have operated such systems for several decades and 11 municipalities have expressed interest in the matter. In two cities large-scale district heating is to be installed, which is expected to result in fuel economies of 50 per cent. This does nevertheless raise the question of how far such centralized thermal energy systems (using only a single energy source and involving energy transmission over great distances) are indeed efficient. One factor adversely affecting the energy economy is the vested financial interest of municipal institutions and public utility companies in high energy consumption. This constitutes a serious obstacle to the promotion of various kinds of small thermal energy stations. The large public utility companies enjoy a monopoly that conflicts with the interests and wishes of many consumers who display a strong interest in environmentally appropriate behaviour.

Initiatives have been launched for the separate collection of specific types of domestic refuse, such as glass containers. In the Netherlands more than a third of waste paper is returned to the mills with the help of voluntary collecting services. Although the rag-and-bone man has disappeared from the streets in the Netherlands, a reasonable volume of textile waste still finds its way to the rag paper industry or the second-hand clothing market via collecting points. Recovery of metals, plastics and rubber is more difficult. Two shredders were recently installed near Rotterdam and The Hague, which reduce to scrap abandoned motor-cars, refrigerators and other metal objects from these agglomerations.

(D) Evaluation

As society grows ever more complex, static planning is gradually changing into a dynamic process in which objectives and programmes can be adjusted to changing requirements. Process planning is sometimes regarded merely as an instrument of crisis management, which lets conflicts be absorbed by the driving forces in society; but as yet it offers insufficient scope for alternative development in urban society.

The question is how to develop our urban society. An obvious possibility would be to concentrate city activities on high-grade and differentiated industries and services. Small and varied organizations are more likely to innovate than large-scale organizations, which tend to become unwieldy and static. The government should have the courage to invest in new small-scale developments rather than concentrating on high-level technological research as at present. (For example, more than two thirds of the total research budget of the European Community is spent on nuclear energy.) Government support through loans, for example, should be given to smaller and weaker concerns, such as small contractors in urban renewal, small workshops where energy-saving products or new means of transport are designed, or small shops willing to sell environmentally benign products. Efforts to save energy and raw material will promote all kinds of new industry, and local initiatives should be encouraged by the government. Decentralization of decision-making and participation should be general.

The alternatives outlined above can be regarded as pieces of a jigsaw puzzle. Fitted together these fragmentary developments might furnish a basis for policy. In the Nieuwmarkt neighbourhood in Amsterdam, the people have captured the idea in a slogan on a wall: "We want a city with neighbourhoods where dwelling, playing, working, learning and shopping take place close together and in an interwoven pattern for young and old". This involves a renewal of welfare, physical planning, housing and traffic policy, as well as a long-term environment policy based on ecological norms and guidelines. Integration of sectoral planning and adequate funds are essential conditions for implementation of such policy. In this context, it is important to develop planning by team-work among technicians, administrators, owners of land and buildings, and the inhabitants.

Despite the many and varied experiments with citizen involvement and participation in the last 10 years, the rights of citizens have not yet been formally established at central government level. Public funds are available, however, for organizing such participation. Citizen participation was initially considered as a means of preventing delay and avoiding difficulties in connexion with project implementation; it is now held that the future occupants have an important contribution to make (democracy and emancipation). The planning and implementation process should be adapted so as to accommodate 'self-help' and 'grass-roots' initiatives.

Town planning techniques will also have to make due allowance for the landscape, and will have to stimulate users and give them freedom of action. The pace of building should be slowed down and more attention given to urban renewal. City planning will increasingly have to be based on ecological concepts; moves in this direction can already be observed in a number of places in the Netherlands. Further progress will require an extension of the time horizon of planning.

At present, the cities are incapable of adequately solving the problems within their own jurisdictional boundaries. The new small provinces - as an intermediary level of administration between central government and municipalities - are geographically more suitable units for the purpose. The provinces, however, still have insufficient resources and powers. To ensure a sound urban policy, general regional plans should be drawn up for integrated socio-economic development, environmental management, land use and welfare. Such general plans should take into account the findings of national long-term surveys of environmental quality, and indicate specific short-term and medium-term actions. Longer-term basic agreements between central government, provinces and municipalities, which would be subject to approval by the representative bodies, could make an important contribution by explicitly formulating socially well balanced goals and objectives.

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MASS TRANSPORT AND URBAN PLANNING IN POLAND

DEVELOPMENT CONCEPTS AND PRINCIPLES FOR THEIR IMPLEMENTATION

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At the request of the UNEP and ECE secretariats

INTRODUCTION

All over the world, transport systems seem to be incapable of responding adequately to rapidly growing traffic demand; this has adverse effects on the functioning of the cities, their environmental quality and the living conditions of urban citizens. The interdependence of urban structures and transport systems has been widely discussed, and it has become clear that the solution to escalating problems must be sought not within the transport systems themselves but rather in a comprehensive policy, including provisions for change in urban structures and land use patterns.

Problems of urban transport are common to all countries, but even if the symptoms are similar, the origin and nature of these problems may vary, depending on specific conditions. A case in point would be the specific problems of the two groups of ECE member countries with different socio-economic systems.

This paper will attempt to present the general approaches to urban transport planning in the east European region, taking Polish cities as examples. Attention is focused on the policy giving priority to mass transport, a policy that today appears a necessity in view of the energy shortage and the environmental problems.

A. Changes in the network of settlements and the development patterns of large cities

The urbanization process is still advancing strongly in most European socialist countries. In Poland, the urban population is expected to increase by five million between 1977 and 1990, placing heavy demands on urban mass transport systems. At the national level, the aim of long-term physical planning is a moderate concentration of the urban population in a polycentric, "band-node" pattern of urban settlements. The pattern will be characterized by several nodes of rapid urbanization, i.e. urban settlements designated for accelerated growth; all the nodes are to be connected by urbanized corridors, developing along the lines of the national transport network. One of the many advantages of such a development pattern is that excessive growth of existing large cities will be

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prevented. This will ease their transport problems and offer possibilities for the integration of national and urban transport systems, which is of vital importance for effective service in the urban agglomerations.

It is expected that, by the turn of the century, there will be about 20 large urban agglomerations in Poland, of which 10 are likely to contain more than one million inhabitants. These are the agglomerations where the main transport problems will arise. In a typical agglomeration three structural zones are to be distinguished:

(a) The core, usually the original inner city, containing the intensely developed urban centre;

(b) The urbanized areas, comprising the fringe areas of the original city and the suburban settlements;

(c) The areas in process of urbanization, spreading outwards into the countryside along the traditional transport routes, especially the railways.

The prevailing concept of urban physical development is based on the following principles:

(a) Growth of the urban core should be restricted, and in several cases prevented, to avoid an excessive concentration of development which is environmentally undesirable and poses difficult transport problems;

(b) Development in urbanized areas should be continuous and intensive along the main transport routes, but should allow deep wedges of open spaces to penetrate into the urban core;

(c) In the areas in process of urbanization, the spontaneous sprawl of semi-urban forms of development should be avoided and concentration of the population in urban settlements appropriately located along the main transport routes, railways and national or regional highways should be stimulated.

The projected pattern of development will result in significant enlargement of the territory subject to intense urbanization. This will happen not only because of population growth but also because of the current housing programme, which aims at providing a separate flat for each household and a radical improvement in dwelling standards in terms of size. This programme will cause the population of the core areas to decline; but that of the "urbanized areas" will increase. These changes in population density must be accompanied by parallel changes in the spatial distribution of employment opportunities and services. The area of intense interactions between different components of the urban fabric will thus increase, which means growth of traffic, both in terms of number and average length of trips.

#### B. The concept of integrated transport systems

To assist the implementation of the growing tasks, the planners in Poland and other east European socialist countries have developed the concept of integrated transport systems. In essence, this concept requires that all means of transport, whether belonging to State and municipal enterprises or to individuals, should be considered within the framework of a common comprehensive transport policy. This policy aims at providing transport services to all citizens at minimum social costs and at levels which would guarantee appropriate personal mobility and freedom of choice in respect of lifestyles.

### C. Basic assumptions and principles

The desire to travel will increase as an effect of over-all socio-economic progress. Higher income levels and shorter working hours, coupled with a desire to raise cultural and professional levels, will lead to more recreational travel and more trips to cultural and educational institutions. Improvements in the transport system and growth in car ownership will also generate more traffic of a non-essential nature, which is likely to grow faster than the number of work and shopping trips. (In the cities of the USSR, a 50 per cent increase in urban citizen mobility is expected within the period covered by the long-term plans.)

There will be a marked increase in the average length of trips, caused by the expansion of the urbanized area, the growing role of the centres of specialized activities, and the spatial segregation of activities that leads to environmentally conflicting land uses. An additional reason is that, with growing professional specialization and more diversified interests, the population is likely to use better transport to reach a wider choice of trip destinations.

Peak hour congestion in daily traffic is likely to decline in importance as a result of the decrease in the economically active population (at present 50 per cent of the total in many Polish cities), and better staggering of working hours in connexion with the shortening of working time.

Further rapid growth in individual car ownership is forecast in all eastern European countries. In the 1990s it is expected to reach the level of one car per three inhabitants in the German Democratic Republic and Czechoslovakia, one car per four inhabitants in Poland, and one car per six inhabitants in the USSR. In the large cities it will be necessary to allow for one car per family, on average.

No essentially new modes of transport are likely to be introduced on a massive scale in the urban network. A specific development might be the wider use of electric buses and cars, gas-propelled vans and taxis, mini-buses, etc., for transport in the central areas.

The above assumptions provided the basis for the long-term development plans. In the forecasts of the more distant future, the reversal of some current trends was considered possible. For example, increased local availability of more diversified goods and services could reduce the need for travel. Progress in telecommunication technology may have the same effect. Advanced production technology could possibly allow a larger part of the population to shift to activities that might be carried out at home.

The concept of integrated urban transport systems is based on the following principles:

- (a) More room should be provided for different types of mass and individual transport and their co-ordination;
- (b) Priority should generally be given to mass transport; the development of individual car traffic will depend on the cost of providing comparable service by one mode of transport or the other;

(c) Mass transport on the basis of one single mode is possible only in small and medium-sized cities. Large urban agglomerations require a complex mass transport system, relying on the best use of different types of regional and local transport means in accordance with their technical features and the structure of traffic demand.

(d) Even if social costs determine the modal split between mass and individual transport, mass transport services have to be provided for the whole urban area to satisfy travel demand from persons who, for various reasons, cannot drive or use a car. At the same time, minimum access for car traffic is necessary in areas where mass transport has definite priority;

(e) Growth of car traffic will be limited in areas where mass transport can provide adequate service at lower social cost. Control, balanced development of street networks and parking facilities and traffic engineering will be the main instruments for implementing this policy;

(f) Car traffic should not impede the smooth flow of mass transport, which is to be ensured by technical, legal and administrative measures and the provision of separate rights of way for mass transport vehicles in congested traffic areas;

(g) Absolute priority will be given to safe, undisturbed pedestrian traffic in residential areas, service centres and recreational zones;

(h) The mass transport enterprises should not compete with one another; their activities should be co-ordinated in the interest of the community as a whole.

The assumptions and principles presented above are in line with the recommendations of the thirty-seventh session of the CMEA (Council for Mutual Economic Assistance) Standing Commission on building, which met in Prague in 1974. The practical application of the principles, however, raises several basic questions, such as:

- How will the "social costs" of transport services be defined and evaluated?
- What is meant by "comparable service" of individual and mass transport?
- What is to be considered as a "minimum level of service" to be provided by mass transport and "minimum access" to an area for car traffic?

Whatever the replies, they will ultimately be related to the value system of a particular society.

In general terms, the approach adopted in the preparation of the transport development plans for Polish cities may be described as follows:

(a) Social costs cannot be limited to those borne by the transport system itself, even if the costs of time spent on travel are included. All the side effects of a certain type of transport service on the national economy, treated as a whole, should be evaluated with particular attention given to the impact on the environment, the use of natural resources, energy consumption, the preservation of the cultural heritage, and the beauty of the landscape. The safety and stability of existing communities must also be given high priority in any cost-benefit analysis.

(b) The level of service is considered comparable when the same degree of accessibility can be achieved by mass or individual transport, as measured by the number of persons carried and the average time spent on travel.

(c) The minimum level of service and comfort of travel to be provided by mass transport is defined in terms of normative standards.

(d) Minimum access to an area for cars must be defined in relation to the function of the area. In this context, the notion of so-called "essential traffic", introduced by C. Buchanan in his report "Traffic in Towns", has been adopted.

Social costs constitute the crucial factor in the design of a transport system. Many studies and long practice have proved that the general cost of a "unit of transport service" for a particular means of transport depends on the density of "trip-ends" in a particular area and on the concentration of traffic in transport corridors. For a well-balanced and co-ordinated system of mass transport the unit costs decrease in proportion to the growing density of "trip-ends". In the case of service based on cars, the costs at first decrease with the growing density of "trip-ends", but then rapidly increase.

This relationship between the costs of transport services and the density of "trip-ends" is the basis of a general model of a transport system in a typical urban agglomeration. This model divides the agglomeration into three concentric zones. The central zone (A) comprises the area of highest "trip-end" density; in this zone priority is given to mass transport and a well-developed network of streets. The outer zone (C) is characterized by low "trip-end" density", particularly in traffic within the zone. With the exception of the main traffic corridors, individual transport here usually involves lower costs than mass transport, and the street network can and should be developed to meet the potential demand for motor-car traffic. The intermediate zone (B) covers an area of moderate "trip-end" density but also the heavily loaded section of the main transport corridors; in this zone, the costs of services provided by individual and mass transport, respectively, are the same on average; both systems should therefore be properly developed, with priority to mass transport in the main traffic corridors.

In cities of 100,000 to 150,000 inhabitants, zone (A) would usually constitute only a small area of the very centre, while zone (C) would include most of the city. Cities with less than 100,000 inhabitants can and should provide a street network to accomodate potential car traffic, which should be limited only in the parts of the city where protection of the environment is desirable.

Because of the social costs of providing transport services, the modal split of traffic will have to be differentiated, not only territorially but also in respect of specific hours and purposes of travel. The reason is that "trip-end" density and the level of traffic concentration on particular routes vary during the day, being much higher at peak hours than at other times; work trips are also much more concentrated in space and in time than trips for other purposes. The costs of providing long-term parking space (connected with work trips) and the inconvenience of mass transport services for recreational trips are additional factors to be taken into account when decisions are taken on the desirable modal split. An integrated transport system would, therefore, promote a much higher share of mass transport in the peak-hour traffic of work trips than in the total daily traffic.



These interdependences are reflected in the guidelines for the development of the transport system in the cities of the German Democratic Republic. They specify that, in 1990, the shares of mass transport in urban traffic will be as follows:

In total traffic	45 to 55 per cent
For work trips in general	60 to 70 per cent
For work trips to city centres	80 to 90 per cent

The draft plan for the Greater-Warsaw transport system envisages the following shares of mass transport in urban traffic in the three specific zones in the year 2000:

	Zone A	Zone B (per cent)	Zone C
Work trips	80	70	63
Other trips	67	63	48
Total daily traffic	73	67	56

#### D. Impact on urban development patterns

Plans for integrated urban transport systems can be successfully implemented only if they are based on the same principles and concepts as the urban development patterns. In Poland the model for the development of the Polish urban agglomerations is in harmony with the plan for their transport systems.

It should be stressed that both total and unit costs of transport services depend to a considerable extent on land use patterns and on forms of development. The appropriate location of facilities generating and attracting traffic can reduce the average length of travel or extend the area accessible within the same period of travel time. In a situation where the unit costs of transport services decrease with mass transport, and sufficiently high "trip-end" density and traffic concentration prevail, it is up to those designing land use patterns and development forms to maximize the resulting benefits. However, the land use pattern has to be defined keeping in mind the capacity and the range of effective service of the planned mass transport system.

The following recommendations for land use planning in Polish cities have been drawn up on the basis of the above-described concept of integrated transport systems and an analysis of existing development:

(a) Urban development should consistently be concentrated along the existing and planned routes of mass transport (railways, underground railways and rapid tramways).

(b) The tendency towards rigid separation of work places, residential areas and zones of recreation must be partly reversed. A mixed structure would allow the creation of a certain number of work places close to the residential zones or even within them; these work places would not require a highly specialized labour force and could provide employment opportunities, especially for women.

(c) Low-rise development in the form of individual houses should not be permitted over large areas, but should be located at the fringes of the zones of high-rise residential development and provide convenient access to the mass transport routes.

(d) A system of subcentres should be developed to ease the pressure of traffic on the city centres and to improve access to specialized services.

(e) The area of the city centres should be reserved for the location of highly specialized functions characterized by a high ratio of users to employed persons. Institutions which have little direct contact with the public should not occupy areas in the city centre. On the other hand, it is desirable to retain a certain amount of residential buildings in the city centres.

#### E. Means of implementation

The strategy for implementing integrated transport systems should be developed individually for each particular city, taking into account such factors as:

(a) The structure of the urban fabric, the land use pattern and the position of the city in the regional settlement network;

(b) The nature of the main functions performed by the city;

(c) The nature and value of the natural and man-made environment;

(d) The stage of development of the urban and regional transport systems, including the level of car ownership;

(e) The patterns of travel behaviour and attitudes towards mass transport and individual modes of transport;

(f) The legal and institutional set-up;

(g) The economic constraints and opportunities.

The implementation strategy should result in co-ordinated programmes of planning, development and exploitation of the transport system, including necessary adaptation of the institutional and legal frameworks. Attention must be directed to measures which ensure that the public, pressure groups and authorities are favourably disposed towards the development concept.

Some elements of the strategy being developed for the Warsaw agglomeration are presented below:

(a) Planning of the land use pattern and the urban transport system has been integrated with long-term urban development planning.

(b) The territorial planning of socio-economic development aims at co-ordination of the programmes within the five-year plans.

(c) The Polish State Railways are developing a subsystem of rapid railway transport for the agglomeration. Separate tracks are being built for this subsystem along all railway lines leading to the city. These lines are interconnected by an underground line running through the "urbanized area". Numerous stations are being built in the existing and planned suburban areas and within the area of the original city.

(d) The State bus transport company provides bus connexions to the railway stations from the more distant settlements and villages, and also direct connexions between suburban zones and the city of Warsaw in the areas not served by the railway:

(e) The Municipal Transport Enterprise provides transport services within the area of the city of Warsaw. The main transport corridors are served by tramway lines, which have been given a separate right of way. Secondary lines are served by buses; buses also help to supplement the service provided by tramway lines along the main traffic corridors. A rapid bus service has been organized between the central area and the outskirts of the city.

(f) A system of urban highways is being developed to divert car traffic from the historic districts, which are to be served first and foremost by mass transport. Urban highways are being built tangentially to the corridors of intense urban development; they converge in an urban expressway, which encircles the core area (zone A), to which access for car traffic is limited. The proposed national motorways will not enter the intensely developed area (zone B).

(g) The construction of underground railway lines is expected to begin in the near future. A network of such lines will provide connexions between the city centre and large residential areas which, because of their size and location, cannot be adequately served by bus and tram lines.

(h) A special commission supervises the work of the state and municipal enterprises engaged in providing mass transport services to the agglomeration. Routes, time schedules and fares are being co-ordinated.

(i) Restrictions on car traffic are being introduced on streets and in areas where it would seriously disturb the movement of mass transport vehicles and pedestrians. Simultaneously, exclusively pedestrian zones are being created.

#### SUMMARY

Urban transport in the Polish cities has to date been based on mass transport, permitting rapid growth, high mobility and the improvement of living conditions and the environment. The principle of priority for mass transport will be retained in the future, in spite of expected high levels of car ownership. The policy will be implemented by adherence to the concept of integrated transport systems. This concept aims at providing transport at minimum social cost.

Within the proposed system, room is left for both mass and individual transport, but there will be controls on the way in which the private car can be used. Priority for mass transport has to be ensured in the areas where there is a high density of "trip-ends" and during peak hours.

The integrated transport system can meet its objectives only if the urban development pattern creates favourable conditions for the intensive use of mass transport. The implementation of integrated transport systems requires a comprehensive strategy which encompasses planning, development and exploitation of the systems, and must be given support by the legal and institutional framework.

It is advisable to develop a high level of mass transport services before permitting an increase in car ownership, so that trips by car, in the opinion of an urban citizen, represent only a possible option, and never a necessity.

MATERIAL AND CULTURAL STANDARDS OF LIFE AND THE  
DEVELOPMENT OF THE NATURAL ENVIRONMENT

Report transmitted by the Government of the  
German Democratic Republic

Prepared by Mr. C. GRAF

Summary

Material and cultural standards of living in the German Democratic Republic are not measured exclusively in terms of the volume and structure of consumption. Individual consumption, i.e. the consumption of consumer goods and services, is but one component of these standards, though a vital one.

Over the last few years it has been realized that environmental conditions are of great importance for the material and cultural living standards of the population. To ensure that the natural environment has a positive effect on man and enhances his quality of life is therefore one of the chief concerns of socialist society. This implies measures for the protection, management and improvement of the landscape and supporting natural ecosystems in the interest of the health of the population and its recreation and education. Environmental legislation in the German Democratic Republic is all-embracing in nature. Protection of the natural environment is embodied in the constitution. The Law on Systematic Implementation of Socialist Environmental Policy, the Landeskulturgesetz, together with subsidiary regulations, was adopted in 1970. There are also a number of other laws, decrees and ordinances governing the management and protection of natural assets.

The term Landeskultur in the German Democratic Republic covers all economic and social policy measures forming part of a long-term plan for the improvement and protection of the natural environment in order to enhance the quality of life of the population. Protection is an integral part of environmental policy, but its main concern is to exclude from the outset all harmful effects of development action on the environment. In its original sense, the term Landeskultur related to the natural environment: landscape, soil, water, air, flora, and fauna; because of the increasingly close relationship between the built-up and the natural environment however, it has been extended, to include the urbanized environment.

The authorities have introduced a programme to solve the housing problem. Between 1976 and 1990 almost 3 million flats will be built or modernized. One of the main tenets of this housing programme is that the apartment, the residential building and the living environment should be regarded as a whole. From the point of view of planning this will require the development of integrated approaches.

The living environment is always created by man. The landscape - farming areas, cultivated forests, nature parks and recreation areas - is thus a product of the process of social reproduction, since it includes elements of the built-up environment. In the same way the built-up environment - cities, settlements and housing areas - contains elements of the natural environment.

The measures necessary to establish sound relationships between the built-up and the natural environment and enhance the quality of life in residential areas may be summarized as follows:

- (a) Control of pollution and nuisances;
- (b) Consideration of climatic and geophysical factors in siting residential areas;
- (c) Development of specific features of the landscape, such as rivers, small lakes and topographic peculiarities, which emphasize the uniqueness of a settlement or residential area, and thereby make the inhabitants feel at home.

Greenery, lawns, trees and bushes are of crucial importance for the microclimate and for the sanitary conditions of residential areas, and therefore play a large part in determining the quality of life of the population. Current norms and standards for housing projects in the German Democratic Republic lay down that some 30 square metres of open space per inhabitant should be provided. Plans for residential neighbourhoods must take account of existing vegetation, and in some towns "regulations for the protection of trees" have been introduced to prevent ill-advised felling. For recreation in the residential areas, the so-called leisure park is gaining in importance. It is planned that areas of more than 16,000 inhabitants should have a leisure park covering at least 6 hectares. Separate sectors for entertainment, active recreation and passive leisure are usually provided.

Another important means of enhancing the quality of life is the development of the landscape for the health, recreation and education of the population. The landscape can be highly varied. It may be industrial or urban in character, or may be a natural area with mountains, lakes, rivers, fields and woods. The development of the national economy brings with it increasing occupation of the open landscape. Such projects as transport infrastructure, industrial plants, water reservoirs, etc. are a social necessity, but they must be integrated into the landscape in such a way that its beauty and recreational value is safeguarded and where possible, improved. The Pöhl reservoir in the Vogtland is an appropriate example. The area is systematically being turned into a recreation area through the construction of restaurants, camping sites and weekend settlements.

The German Democratic Republic furnishes important examples of how to enhance the recreational value of these landscapes. The centres of open-cast lignite mining are situated in regions that offer hardly any opportunity for meeting the increasing needs of the working population for recreation. However, through the systematic reclamation of abandoned strip-mining areas, an attractive natural environment is being provided for the local population, including a lake area covering more than 3,500 hectares.

Lake shores and river banks play an important part in the design of a high-quality environment. At present they are to a large extent occupied by buildings or are otherwise inaccessible to the population. New construction on shores and banks has now been heavily restricted by law. In cities situated on rivers, built-up and often neglected river banks are being renovated. The

remodelling of lake shores and river banks in Rostock, Berlin, Magdeburg and Potsdam provides positive examples of the spatial use of the landscape and its harmonious integration into the townscape.

Nature and wildlife reserves are part of the landscape. These areas are of great importance for the quality of life, as they offer opportunities for satisfying the cultural, aesthetic and educational needs of the citizens. These reserves, occupying 18 per cent of the country, consist mainly of regions of scenic beauty. Economic activities are not generally prohibited, but those responsible for them are expected to take the recreational value of the landscape into account.

A specific problem in connexion with the development of the natural environment and the quality of life of the population is the role of allotment gardens and weekend bungalows. Comprehensive measures are being introduced to encourage social forms of local recreation, but in big cities and industrial regions allotment gardens and individual weekend bungalows are gaining in importance. In 1978, the Association of Allotment Gardeners, Settlers and Small Livestock Breeders had one million members. New allotments must be located so as to avoid adverse impact on the landscape, and restaurants and other communal facilities must be open to citizens not possessing a garden. Many allotments near cities have already been developed into national recreation centres. Individual weekend bungalows pose similar problems. Increasingly severe conditions for construction are being introduced.

Because of the great importance attached to the natural environment as it affects the material, spiritual and cultural standards of living of the population, its development must be viewed as a complex economic and socio-political task to be included in planning for all time horizons and at all administrative levels.

Local authorities have full responsibility for the implementation of environmental policy measures within their jurisdiction, and are vested with comprehensive authority in the planning and development of the natural environment.

TRAFFIC AND TRANSPORT: CHALLENGES AND  
PROSPECTS IN THE NETHERLANDS

Report transmitted by the Government of the Netherlands

Prepared by Mr. J. HOEKWATER and Mr. G. HUPKES

Summary

An analysis of the present situation leads to the conclusion that the Netherlands is at present in the third stage of motorization - where the advantages of the motor-car to the individual are being increasingly outweighed by its collective disadvantages. The combination of high population density and mass motorization is causing problems, especially in and around the urban conglomerations.

The segregation of functions and the increasing use of available space that has been made possible by the motor car have had adverse consequences on other means of transport. Public mass transport services have deteriorated, and high operating costs impose an increasing financial burden on society. Bicycling, which remains an important means of transport in the Netherlands, accounting for 30 to 40 per cent of all trips, is also suffering from increasing distances, segregation of activities and sprawl; in addition, the vulnerability of the cyclist in dense traffic places a limit on the use of bicycles and mopeds.

Government policy still concentrates on adapting the transport infrastructure to the growth in the number of cars and the volume of motoring. Since the early 1970s, however, more and more individual residents, action groups and politicians have been pointing out the many collective drawbacks of mass motorization.

At the national level, the 1975 medium-term plan for passenger transport tried to incorporate both views on the traffic and transport problem when it formulated its principal objectives as follows:

"To meet the demand for passenger and goods transport, but only to the extent that a positive contribution is made to the welfare of society, i.e. so that :

- The creation of the desired physical structure is promoted;
- Harm to the natural environment and the countryside is avoided as far as possible;
- Road safety is promoted;

- Requirements for the quality of life and living conditions are met as fully as possible, for instance through control of nuisances caused by parking, air pollution and unsightliness;
- The required socio-cultural and economic advancement is achieved;
- The use of scarce materials is restricted;
- The demands upon government resources is limited".

There are inherent conflicts in this formulation, and it is difficult to draw up an appropriate strategy. Present government policy is giving priority to meeting the demand for transport and at the same time increasing road safety. At the national level, emphasis is placed on the clearing of congestion points in the motorway system. Urban policy, however, concentrates on alleviating the adverse effects of motor traffic. And here there arises a potential conflict between national and local objectives. Clearing of one congestion point invariably gives rise to others elsewhere, mostly in the cities. This policy thus provides no general solution to the problems of mass motorization, but rather leads to greater encroachment upon nature, the countryside and urban environment.

Two possible alternatives to the policy are analysed in this report. The first rests on assumptions about an over-all change in mentality among the population; the second on assumptions about energy shortages. The conclusions regarding their feasibility and ultimate effect are hardly optimistic. The general assessment of the situation is that economic and environmental developments will strongly influence transport policy.

The basic problems cannot be solved through the present strategy. The main reasons are that emphasis is still being placed on expansion, especially of the inter-city road system; and existing instruments (legal, technical, design, statutory) are not being properly used. At present there is no political incentive to do so, partly because of the apparent unwillingness of the population to accept restrictions or prohibitions (speed limits, no-parking regulations) which interfere with freedom of choice in respect of modes of transport. Measures that might be accepted consist of technical devices for control of noise, energy consumption and exhaust fumes of motor cars. Tax regulations, provided their impact is moderate, will be accepted. All measures encroaching upon the motor-car's direct utility value will be resisted. This means that, in the absence of extraneous pressures (energy crisis, economic crisis), it will be difficult to convert the present strategy into one based on an integrated approach.

Concerning the vulnerability of contemporary transport systems as a whole, reference is made to the specific role of the bicycle in present conditions in the Netherlands. The bicycle can probably respond comparatively easily to any crisis in the motoring system, especially as most journeys cover basically "cyclable" distances.



PATTERNS OF DEVELOPMENT AND LIFESTYLES IN RELATION  
TO THE CONSTRUCTION AND DEVELOPMENT OF  
URBAN AND RURAL SETTLEMENTS

Report transmitted by the Government of Yugoslavia

Prepared by Mr. V.B. MUSIC\*

Summary

The basic proposition of this paper is that solutions to contemporary problems of environment and development have to be sought in structural changes in social relations. The starting point is the local community, where people are exposed to the full impact of their immediate surroundings. In this context, human settlements, the physical shape of dwellings, houses and neighbourhoods and their spatial organization play an important role; they form the very basis for development patterns and lifestyles. However, a fundamental condition for the establishment of proper social relations is political decentralization and the direct involvement of the population in the socio-economic decision-making process.

Yugoslavia is an example of a nation-wide experiment in purposeful social change. In the development of economic, social and institutional structures over the past four decades, there has been a continuous search for new solutions on a decentralized and participatory basis.

Countries like Yugoslavia, a multinational, federally organized State with exceptionally heterogeneous cultural traditions within a relatively small area, will always constitute a challenge to planners and managers. The concept of decentralization has predominated from the outset and polycentric development is a typical feature which has resulted from an explicit policy of "deconcentration" of industrial capacity. Within strong federal units of political decision-making, emphasis has been placed on the strengthening of self-reliant smaller territorial units where the allocation of resources is principally decided upon by those who generate income and surplus value.

The social system in Yugoslavia, largely built upon communes and economic associations working under the principle of self-management, is considered to furnish a propitious framework for general agreement on the design and implementation of a development policy that incorporates environmental considerations.

Protection and improvement of the environment is conceived as an indispensable component of efforts to enhance the living conditions of the people. Implementation of purposeful structural change in social relations requires systematic approaches, however. In this context, the social planning system in Yugoslavia is an important instrument for mobilizing the active forces in society for the creation of appropriate patterns of development and lifestyles.

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## URBAN DEVELOPMENT AND TRANSPORTATION

Background Paper prepared by Mr. W. OWEN\*

at the request of the UNEP and ECE secretariats

The conflicts between urban transportation and the environment and between life styles and resources in the ECE region are creating a growing dilemma. Urbanization is closely associated with economic progress and rising incomes, but the motorization that accompanies these trends, and helps support them has brought levels of congestion and pollution that are destroying much of the quality of urban living. The resulting obsolescence of central cities and the flight to the suburbs are promoting lifestyles that are extremely wasteful of resources.

The ECE region has 8 out of every 10 motor vehicles in the world, and bears the major burden of resolving the conflicts that threaten the viability of cities. Some relief measures have already been attempted, with partial success. They include improvements in public transit, restraints on down-town use of the automobile, and pricing policies that favour collective transport. The need to conserve energy and other resources demands stronger measures, but many of the actions that would achieve this end and upgrade the physical environment could disrupt economic and social environments dependent on the motor vehicle industries and on the mobility and lifestyles nurtured by the private car.

What is involved is not merely the physical setting but the economic and social climate in which the progress of urban society will be determined. History tells us the underlying nature of the problem; transportation and urban environment have always been in conflict, regardless of the technology involved. The congestion and pollution of traffic at the turn of the century pre-dated the popularity of the automobile. The problem then was an undersupply of transportation. Communities made communication possible by keeping things close together to make them accessible on foot. Modern transport, and the automobile in particular, have introduced a new way of communicating by supplying mobility to overcome distance. In today's cities people can live farther apart yet be close enough, in terms of time, to be within convenient range.

These different approaches to providing communication have not worked well together. Where the high-density city has been preserved there is little room for the automobile, and where the city has adapted to the automobile the human scale has been lost and public transit has been difficult to maintain. The

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carless, and especially the young, the aged and the poor, have been disadvantaged in a setting that takes the use of a car for granted. The result is that all systems of communicating have been adversely affected: the community, the pedestrian, public transit and the automobile.

There are two lessons. Congestion and pollution were problems with horses and trams. They remain problems with automobiles and rapid transit. The reasons are the same: an excess of transportation demand over supply. In earlier times transport scarcity left no room for adjustment. Today transport abundance makes possible the balancing of demand and supply at acceptable levels of economic and social cost. Transportation should no longer be looked upon as an insoluble problem, but as a new and powerful instrument for furthering the development of satisfying communities.

#### AN AUTOMOBILE-TRANSIT COMPROMISE

Many cities in the region have begun to redress the balance between public and private means of moving by physical restrictions and financial constraints on down-town use of the automobile and by measures aimed at preferential treatment for pedestrians and public carriers. These policies provide the immediate remedies that can bring about a better balance between transportation supply and demand within the spatial limits of existing cities.

An underlying strategy is to increase the attractions of public transport and to persuade more motorists to leave their cars at home for use in other types of travel, such as shopping and household tasks outside the central area. So-called transportation system management has helped to achieve these ends through the designation of vehicle-free zones, the provision of walkways and bicycle paths, the reservation of kerb lanes for buses only, the reduction of down-town parking space, increased parking charges and subsidized transit fares.

Longer-range policies involve the combination of public transport and land use controls to promote consistency between city form and transportation. New commercial growth and high-density residential development are channelled into corridors along transit routes radiating from the centre. Interspersed areas can be reserved for agriculture and recreation, and satellite suburbs can be located along the transit corridors.

A major policy question is how the limited transportation system management efforts to date can now be extended and applied more rigorously to city-wide solutions. One possibility would be to designate entire networks of streets for transit only, thus extending the concept of the exclusive lane. (Cars owned by residents and goods vehicles serving local establishments would be exempt.) The all-transit network could be reinforced by increasing the number of vehicle-free zones, pedestrian ways and bicycle paths. Pricing policy, which has been used to a very small extent, could be applied to assess the motorist, who should pay the marginal social costs of driving down-town in rush hours, and to reward transit users for their limited use of street space.

Pricing policies might also include the supply of public transit free of charge. Transit capital investments are already financed through general revenues, and the percentage of operating costs recovered from the fare box continues to decline. The logical next step might be to eliminate fares altogether. While this would encourage some unnecessary travel, savings to the community through reduced congestion and environmental damage might more than cover the extra cost of expanded transit services.

Another possibility would be to ban the automobile from the city altogether. This solution has been proposed for New York, to include all of Manhattan Island. It would require substantial improvement of the Subway, and expansion of bus and taxi services. About 15 per cent of the street system would be reserved for the 9 million pedestrian trips taken daily in New York. The benefits of a car-free environment would include greater safety, cleaner air, reduced noise, speedier transit and lower costs for road construction and maintenance.

A further possibility is the adoption of policies to limit the ownership of cars by restricting imports and production. The USSR and centrally planned economies in the region have successfully controlled the rate of motorization and have only recently altered this policy. Even in countries with relatively few vehicles, however, their concentration in the largest cities may still result in heavy congestion. Thus the most effective policy in most cases may be to restrict the use rather than the ownership of vehicles. The possibilities have already been demonstrated by transportation system management techniques that focus on the third of automobile use that represents the work trip, and specifically the work trip to the centre. From the viewpoint of resources, however, two thirds of car use is attributable to social and recreational purposes and travel in support of household operations. What restrictions are to be imposed on these uses? At some point the economic and political realities must be taken into account, for they may impose greater limitations on what can be done.

#### MOBILITY AND THE ECONOMY

Public policies that place restraints on vehicle ownership or use may improve the physical environment, but they may also damage the economy. The ECE region has become so dependent on the automobile that any disruption of the system now requires alternative ways of maintaining essential mobility and providing jobs and incomes. Millions of people are employed in the production and maintenance of the automobile, and in a host of non-transport activities that are made possible by the automobile. The impact of the new mobility involves not simply the production, servicing and repair of the vehicle, but a vast complex of supporting economic activities. They include the production of petroleum, rubber, plastics, chemicals, metal products, machinery, electrical equipment, textiles, paper and glass. In addition, sales and service industries, hotels and resorts, tourism and many other economic activities are heavily dependent on motor vehicles and highways.

Throughout the world, rich countries are mobile and poor countries are immobile. Most nations with a per capita gross national product of \$4,000 or above have at least one motor-car every four persons (see table 1). The economic growth rates realized by the ECE region in the present century have been closely tied to the growth of motorization. Europe's economic expansion after 1945 has been paralleled by an increase in automobile ownership from 7 to 117 million vehicles. In the United States, where per capita income in 1900 was only \$450 (expressed in 1940 dollars), current prosperity has been closely linked to the expansion of car ownership from 8,000 to 116 million, and to an increase in per capita travel from 750 km a year to 16,000 km. Outside the region, the Japanese economy displays more recent evidence of the relation between affluence and mobility. Twenty years ago, Japan had few motor vehicles and no modern roads, but today, with an automotive fleet of 32 million vehicles and exports of 4 million units a year, Japanese income per capita has increased ten-fold. Without the vast industrial empire built around the automobile, it would be difficult to envisage Japan's economic miracle.

Table 1

Income, urbanization and motorization  
in selected countries

	<u>Per capita</u> 1976 US \$ GNP	Percentage of population living in urban areas	Persons per car
Sweden	8 670	78	2.8
United States of America	7 890	76	2.0
Denmark	7 450	82	3.7
Federal Republic of Germany	7 380	83	3.0
Belgium	6 780	72	3.4
France	6 550	76	3.1
Netherlands	6 200	79	3.5
United Kingdom	4 020	78	3.9
Portugal	1 690	29	23
Ecuador	640	42	183
Philippines	410	36	82
China	410	24	23 750
Nigeria	380	29	234
Indonesia	240	19	383
India	150	22	765

Sources: World Development Report, 1978 (Washington, D.C., World Bank, 1978), pp. 76, 77, 102 and 103; and Facts and Figures 1979 (Motor Vehicle Manufacturers Association), pp. 36-37.

The resource and environmental costs of these accomplishments have been heavy. Are past relationships between motorization and economic progress still valid, and even if they are, is there not some preferable path to prosperity, perhaps through housing construction and urban redevelopment? What are the priorities on which governments should be focusing? The questions become increasingly relevant with the mounting use of scarce and non-renewable resources by the transport sector. Centrally planned economies have achieved substantial levels of production with relatively moderate levels of motorization. Recently there has been an acceleration of motor vehicle production in these countries, but the combination of urban congestion and resource depletion is causing second thoughts. Greater reliance on motorization may no longer be consistent with economic and social progress.

The point at which the advantages of the automobile begin to be outweighed by the disadvantages needs to be assessed from two perspectives. The motor vehicle has an enormous appetite for resources, but it conserves time and human energy. Highways and vehicles absorb large areas of land, but they are also the means by which land is made accessible (granted that pollution results when land use controls are neglected). Motorization has destroyed natural beauty but has enabled millions of people who live in cities to enjoy the countryside and outdoor recreation. Transportation is a drain on household budgets, but it also creates jobs and incomes. But the choice of technology is a critical factor.

An assessment of the resource requirements of private and collective transportation shows that for a given amount of travel, a bus consumes about one quarter of the materials used by an automobile. Rapid transit and commuter railways use about a quarter as much material as the bus. The automobile uses an acre of land to produce 1,600 passenger-kilometres of travel; land used for commuter rail lines is only a third as much, for the bus a sixth, and for rapid transit a twentieth. Energy consumption for a given volume of travel is twice as high for the automobile as for bus transport, and the bus is generally more energy efficient than rapid transit.

Capital requirements for bus transit are much less than for rail systems, especially underground railways. San Francisco's Bay Area Rapid Transit system required \$1,500 of investment for every daily passenger-mile of travel delivered by the system. Public transit, in addition to its use of energy for operations, uses large amounts of energy in construction of lines and terminals. In terms of energy per passenger mile for operations, rapid transit is among the most energy-efficient modes. When all factors are considered, however, it is one of the least energy-efficient. 1/ But it depends on volume. Economy in the use of resources by different transport methods can be realized only to the extent that the capacity provided is actually used. A half-empty train or a little-used bus will obviously fail to realize the energy and material efficiencies for which they were designed. The automobile, under many circumstances, is more energy-efficient than public transit. The selection of transport method depends on what densities of land use are to be served, and what measures are taken to realize transit efficiency by increasing the number of users.

#### TRANSPORTATION AND URBAN DESIGN

The conditions for transport problem-solving imposed by economic and resource realities suggest that part of the remedy lies in the gradual redesign of urban communities and the improvement of neighbourhoods and amenities. New communities and large-scale urban redevelopment have demonstrated the desirability of organizing transportation more effectively and of reducing the number and length of trips by locating good housing within easy access of services and jobs. Designing pleasant urban environments can also eliminate many of the physical conditions that generate excessive travel. Planned communities around major European capitals and the new towns of the United Kingdom, the Soviet Union, France and other ECE nations have shown how transportation systems and the streets in particular can contribute to pleasant environments.

The essential idea is that being able to benefit from the city depends on ease of access to its advantages. This is accomplished in part by mobility and in part by the location and arrangement of urban structure and activities. The ability to move to a destination is important, but so is the convenience of the destination. Urban areas can be gradually redesigned with mixed land uses that reduce trip distances and with amenities that remove the reasons for escape. Pedestrian shopping centres and planned industrial estates can be created by altering street patterns, and neighbourhoods can be protected by excluding motorized traffic. The frequent location of recreation areas and green space, and community-wide networks of busways, bicycle ways and walking paths can also be featured in urban rehabilitation projects.

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1/ Urban Transportation and Energy, United States Congressional Budget Office, For the Senate Committee on Environment and Public Works, Serial No. 95-8 (United States Government Printing Office, 1977).

A substantial amount of automobile travel is being generated in the attempt to get away from obsolete housing and neighbourhoods and gain access to a better environment. The affluent upgrade the quality of their lives by moving out. An alternative course would be to clean up declining cities and upgrade their services, and to use part of the resources which would otherwise be devoted to transport to finance better housing and the amenities now available only to those who can reach them by car.

A programme of housing and neighbourhood redevelopment on a scale that would be decisive may also require a thinning out of population and the creation of additional urban settlements next to established cities or elsewhere in the region or the nation. National urban growth policies aimed at greater dispersal have been adopted in nearly all countries of the ECE region and can be linked to programmes for urban redevelopment.

Japanese development strategy suggests lessons applicable to other countries. Tokyo has practically exhausted the possibilities of adding to the capacity of public transit systems. Relief for commuters is now being sought through the building of satellite cities removed from critically congested areas. Tama New Town, some 40 km from central Tokyo, has been designed for 450,000 people. It is connected to the old city by non-stop rail services, but depends for local transportation primarily on the automobile and a community-wide system of pedestrian and bicycle ways. The planned suburbs offer modern apartments and town houses, complete separation of motor traffic from pedestrians, vehicle-free shopping areas and recreation space that covers a fifth of the land.

Tokyo has failed in many respects to create a more habitable city. Over-emphasis on transport has caused the neglect of housing and amenities, and actually increased congestion by promoting long commuter trips to an increasingly office-dominated centre. A national programme for the dispersal of population and employment is now to be carried out, aided by a nation-wide expansion of high-speed rail transportation and telecommunications.

Over-zealous efforts to provide public transportation and over-enthusiastic building of highways in urban areas can have much the same effect. Both can lead to the neglect of other elements of urban living. But urban redesign offers basic solutions. A survey of New York has shown that as the density of down-town and surrounding residential areas is increased, there is less travel by automobile but more use of public transit, more walking, and greater mobility for all members of the community. <sup>2/</sup> Transport solutions alone are not satisfactory. Improved transit and reduced fares increase the use of transit services, but they do not reduce car use very much; and restraints on car use, while causing some shift to transit, will be more likely to cause car trips to be foregone, thus reducing total mobility. Only increased density can cause a shift to public transit and at the same time maintain a high level of mobility for the community. However, higher densities are less favoured as more space per capita is demanded for both residential and office uses. Moreover, higher non-residential densities in down-town areas often create one-purpose centres that are unused in the evening and increase the volume and length of commuter journeys. But higher densities could be made more satisfying through vertical development, multiple use of buildings, and a mix of residential and non-residential uses in central cities. Whether cities of high densities are feasible, or lower densities are inevitable, depends on the nature of emerging lifestyles and the prospects for changes in consumer behaviour.

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<sup>2/</sup> New York Regional Plan Association, "Where transit works: urban densities for public transportation," New York Regional Plan News, No. 99 (August 1976), p. 1.

## LIFESTYLES AND VALUES

Changes in lifestyles and values could help extricate urban society from its current dilemma. The four-day week, flexible working hours, a concern for conservation, an effort to live closer to work, the rejection of suburban values and a growing sense of equity could all contribute to de-emphasizing mobility. But lifestyles based on the availability of the private car may also prove to be resistant to change. In highly motorized areas, political pressures may make it difficult to threaten the freedom and flexibility achieved through the private car.

The money budgets and time budgets of consumers may be the final arbiters. Rising costs associated with motor vehicles are particularly relevant. In the more affluent countries of the region, some 12 to 15 per cent of every consumer dollar already goes for transportation, most of it for the automobile. In other countries the allocation for transportation averages less, perhaps no more than 8 per cent of consumer outlays. Whatever the figure, these allocations are fairly inflexible at a given stage of economic development. It is likely that any substantial increase in transport outlays will come up against resistance to rising food costs and increasingly expensive housing. If the relative costs of transport should rise, this may turn out to be the most important factor limiting car ownership in the future.

Consumers also budget their time, and time constraints often favour the use of the car over public transport. Studies have shown that most people spend an average of about an hour a day in travel, and that this figure is fairly uniform over a wide range of cities in the ECE region. If transport is poor, people take fewer trips or travel shorter distances within the time allocated for transport. When travel conditions improve, they still spend the same amount of time but use it to travel longer distances or to make more trips. <sup>3/</sup> This explains why additions to transport capacity unaccompanied by land use controls or transportation system management generally fail to provide long-term relief of traffic congestion.

Automobile users, who enjoy higher average speeds than transit patrons, can accomplish much more within the normal travel time budget. This difference provides the underlying reason for preferring the car over public carriers except for commuting to crowded urban centres. An important policy question is whether a shift from automobile to transit on any major scale would so reduce the effective use of time as to inhibit the realization of economic and social goals. But a more workable balance between public and private transport that minimizes congestion or delay should maximize the use of travel time for the community as a whole.

Finally, a combination of resource pressures may force a shift to more conservative lifestyles. The trend toward living in smaller cities and rural areas in the United States suggests that more people may elect to live in environments where transportation problems and other aspects of big city life can be avoided. For them the automobile would be essential but would have fewer environmental impacts. For others, a movement back to the city centre may be the preferred solution, with greater reliance on public transit and walking. Many younger people, dissatisfied with suburban life styles, are attracted by the added fact that rehabilitation of older housing is less costly than new housing in the suburbs and that transportation in central cities is less costly. Public

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<sup>3/</sup> Jacov Zahavi, "Travel characteristics in cities of developing and developed countries." World Bank Staff Paper No. 230 (March 1976), p. 64.



policies that influence growth and redevelopment can help direct the trend toward more resource efficient lifestyles.

#### THE PROSPECTS FOR INNOVATION

Technological change is already under way that will further increase the fuel efficiency of the automobile, and such efforts, combined with development of synthetic fuels, will be important factors in the future of the automobile. The United States, which consumes 1.4 gallons of petroleum per capita per day compared to Europe's 0.75 gallon, is making substantial improvements in vehicle design to meet federally mandated efficiency standards, which require a doubling of average 1975 fuel-efficiency in 10 years. This effort and the further economies of the emerging "world cars" may neutralize much of the rise in fuel costs for automobile travel.

The problem of fuel availability remains. It appears that there will be continued dependence on petroleum-based fuels, derived in part from coal and oil shale. Fuel prices have now created a favourable economic climate for exploiting these higher-cost, but more plentiful, energy sources. Their extraction and processing, however, introduce new threats to the environment, and greater dependence on coal increases health hazards from mining operations and combustion.

While current activity in car design and in the development of synthetic fuels may ease the drain on scarce resources, the supply of essential energy needs for transportation also requires conservation outside the transport sector through building design, changes in heating and cooling systems and the conversion of industries and electric power plants to non-petroleum energy sources. Developments in solar power, biomass, and battery-powered electric cars may also alleviate the energy problems confronting transportation.

Innovations in public transit could also provide solutions for current transportation problems. City centres and high-density clusters may find promising possibilities in guideways for short-distance movement of large volumes of traffic, using electric-powered "people movers", which are being installed experimentally in St. Paul, Houston, Los Angeles and other American cities. Japan is conducting demonstrations in five cities, including Tokyo and Osaka. The results should indicate whether it will be possible to substitute this form of transportation (or more sophisticated personal rapid transit) for conventional transit and automobile use. One problem is the damage to the environment resulting from the construction of elevated guideways, which need to be an integral part of the buildings they serve if they are not to constitute an unwanted intrusion.

The future of urban passenger travel is also related to the technology of freight movement, especially since trucks share rights of way with passenger vehicles. For every additional dollar of gross national product in the ECE region, there will be between one and two additional ton-kilometres of materials to be moved. The figure is higher for large land masses such as the United States and the Soviet Union. The role of the motor truck in this freight mobility increases as income rises, and it is becoming an integral part of industrial production processes and scientific agriculture. The truck owes its economic viability in substantial measure to the automobile, which shares the overhead costs of the automotive industry and pays a substantial part of the cost of the highway system.

If passenger safety on highways is to be promoted and high levels of freight services maintained and improved, it may be necessary to reorient the entire transport system and to separate passenger and freight movements. New intermodal freight systems using containerized operations on automated guideways may be the long-run approach to decongesting the highways. Automation of road traffic may be another. Or reductions in automobile travel may be aided by providing alternative high-speed trains using electric and magnetically levitated vehicles already in the development stage. Separation of freight and passenger services would, of course, eliminate the economic advantage of jointly used facilities.

Still another technological factor in the urban future is the revolution in telecommunications. Many routine trips may be made unnecessary by computer-programmed data transmission and audio-visual communications. Some of the reasons for concentrating offices down-town may be undermined, and more work places may be dispersed in locations accessible to suburban living. Since commuting by automobile or transit consumes 10 to 25 times as much energy as telecommuting over the same distance, new patterns of urban development may emerge that substantially reduce daily commuter travel.

The potentialities of further innovation need to be explored through co-operative government-industry research and development that would accelerate the introduction of new transport technology. The agenda should include the demonstration of alternative urban designs and techniques for achieving a better balance between urban activity and mobility.

It is possible that technological advances may lead to safer, quieter, less polluting and more resource-conserving automobiles, in which case existing preferences will be reinforced. Or a technological breakthrough in public transit methods could alter the competitive balance between public and private transport in favour of public systems (see table 2). Whatever the outcome, the primary task of governments, aided by positive citizen participation, will be to reach agreement on goals for the urban future so that technology can be used to support desired living environments.

Table 2

Estimates of median energy requirements for transportation

<u>Transport mode</u>	<u>BTU per passenger-mile</u>
Automobile with single occupant	14 220
Average automobile	10 160
Car pool	5 450
Van pool	2 420
Dial-a-ride	17 230
Rail rapid transit (old)	3 990
Rail rapid transit (new)	6 580
Commuter rail	5 020
Light rail	5 060
Bus	3 070

Source: Congressional Budget Office, Urban Transportation and Energy: The Potential Savings of Different Modes, a study for the United States Senate Committee on Environment and Public Works (Washington, Government Printing Office, 1977), p. 35.

#### DEVELOPING COUNTRY PROBLEMS

Cities in Africa, Asia and Latin America face vastly greater urban problems than those of the ECE region. The 40 million motor vehicles in the developing countries may well exceed 100 million before the end of the century, and a billion more people may be crowding into already acutely congested cities. How can economically developing countries reap the benefits of modern transport yet avoid the destructive side effects? Hundreds of millions of city dwellers are too poor to dream of owning a car, and must walk long distances to work or rely on totally inadequate public transit. Their lot is continually worsened by the rising tide of motor traffic that obstructs the movement of buses.

Viewing the world as a whole, two diametrically opposite trends can be observed. In developed countries that have built big cities such as London and New York, a massive outflow of population is under way, while cities in the less developed countries are witnessing a massive inflow. Both trends are based on rational grounds. In developed countries increased space requirement resulting from growing affluence make it difficult to realize urban goals without moving beyond city boundaries into suburbia and exurbia. In the United States small towns and rural areas are now growing faster than metropolitan areas. The opposite flow of people into the largest cities of the developing world is also based on sound reasons. Big cities offer the hope of a job, an education and a better life. But inevitably the developing world will experience a reversal of current trends as major centres become increasingly unmanageable. At that point they will begin the same exodus process that has caused London and New York to lose population by the hundreds of thousands. The cost, disruption and environmental damage of such a sequence might be avoided by anticipating and planning for a different urban scenario. A number of cities have already shown, the way.

In 1960 Singapore, critically short of most resources and the scene of some of Asia's worst slums, rejected proposals for a rapid rail transit system, which it felt was beyond its means. Instead it opted for purchasing land on the urban periphery and building a series of planned communities away from city-centre congestion. Since then, half the population has moved out of the slums into a new and healthier environment. By putting the emphasis on housing and amenities instead of rail facilities it has been possible to provide low-income families with modern apartments and to provide jobs in construction and the building supply industries. The housing boom was accompanied by a tripling of real per capita income in 15 years. It was city building rather than automobile manufacture that helped achieve Singapore's transformation. When traffic became too heavy, a special fee was charged for all cars entering the city-centre in the morning rush hours which carried fewer than four passengers. The result has been a 75 per cent reduction in traffic, greater use of buses, and substantial revenues for the city to aid its massive redevelopment programme.

The combination of satellite suburbs, down-town renewal and reliance on bus transportation has also had notable success elsewhere. Curitiba in Brazil (metropolitan population 1 million) has accomplished an economically and socially sound compromise between transportation and the environment by creating a pedestrian city centre, a planned industrial city on the outskirts to accommodate expansion, and a unique bus system to supply the interconnexions. Large express buses operate on reserved space in the centre of major highways radiating from the centre. Parallel streets a block away on either side carry one-way traffic to and from the boundaries of a two-block wide commercial corridor. Since further commercial development in the centre has been ruled out, business expansion and high-density housing are accommodated in the express bus

zone. It was a private planning agency paid for by the city that integrated the building programme with transportation, and a subsidiary development corporation has carried out the joint development tasks.

Hong Kong, Seoul, Kuala Lumpur and other major cities have applied similar strategies in an effort to guide urban growth, redevelop obsolete centres, and economize on public transport solutions. There are lessons in the experience for both developed and developing countries.

#### STRATEGIES FOR URBAN MOBILITY

The problems of environment and resources associated with cities and transportation are formidable, but underlying them is a more fundamental concern. There is a conceptual misunderstanding of the role of transportation in urban environments. Transportation is not merely a way of moving people and goods. It is an integral part of the structure and functioning of the community, just as elevators, stairways and corridors are integral parts of buildings. Transportation is a subsystem of the urban system, and the two are interdependent. Transport facilities and services are ways of creating desirable living environments, and the refurbishing and rearranging of obsolete neighbourhoods and communities are ways of making transportation problems manageable.

The fostering of human aspirations and the meeting of basic needs in cities involve housing, jobs, environment, services, education, recreation and the enjoyment of attractive surroundings. The role of transportation is to support and facilitate these and other community goals. The design, location, technology and performance of the networks for mobility determine the safety, quiet, convenience, economy, habitability and opportunity afforded by the community. The social costs, the inequities and the waste of resources that typify movement in the cities today may be seen narrowly as transportation problems to be dealt with only by transportation experts. In reality, they are evidence of the failure to use transport technology in effective and imaginative ways as part of the process of re-creating the living environment.

It is only in the past few decades that mankind has been exposed to conditions of transport abundance. The vision of what this momentous change could mean for the cities is only beginning to emerge. What is required is a fresh initiative that will make transportation and transportation policy integral parts of broader programmes for upgrading the quality of urban life.

What are the major policies and actions that governments should now be supporting to bring immediate relief and initiate long-term remedies for the cities?

In central cities the most effective strategy will fall in the category of transportation system management. The techniques, if applied courageously where warranted, could make the automobile user responsive to the physical limits and environmental goals of the city and cause the charges for automobile use to reflect the social costs.

For the longer term, governments will need to be in the forefront of efforts to visualize possible urban futures, to focus on basic needs for housing and services and to use transportation investment to help advance neighbourhood and community goals.

To further both short-term and longer-run solutions, government support of research linking transportation to urban development might have a substantial pay-off. The agenda should include the development of performance standards for industry that would accelerate progress toward greater transportation safety, increased resource efficiency and a reduction of negative environmental impacts.

ECE should lead the way, within the United Nations, toward intensified efforts to forestall the destructive urban trends in developing countries. A basic approach would be to provide support, through existing international agencies, to help finance the advance acquisition of land for urbanization and for transportation rights of way. Increasing land values resulting from urban growth could be captured to help pay for community services, and would repay the initial land investment many times over. A nominal tax on the value of internationally traded petroleum and transport equipment might be an effective way to increase the resources of international development agencies engaged in land bank operations.

An additional government initiative should be to improve the effectiveness and coverage of systems for exchanging information and experience. While both formal and informal systems are in operation, the unnecessary repetition of mistakes in transport and urban development policies continues, and many of the key successes go unnoticed. There is too much information, it lacks analysis, and it is often incomplete, indigestible or irrelevant. ECE experience should be made meaningful and accessible through global telecommunications media that permit continuing audio-visual conduct of international workshops and conferences among urban officials.

The problems of the cities are global, but they are also international, just as problems of inflation and depression are international. The cities are creating the major pressures on world resources that must be shared. The viability of cities is essential to the conduct of world trade and to international business and travel. On a rapidly shrinking planet the cities are the international contact points in the global economic network. A sustained effort to deal internationally with the crisis of the cities could be the key to transforming the environment of human settlements everywhere.

#### REFERENCES

"Proceedings of the Second Seminar on the Role of Transportation in Urban Planning, Development and Environment, held in " Washington, D.C., 13-19 June 1976 (UN document ENV/SEM.5/3).

"World Development Report" 1978 (Washington D.C., World Bank, 1978).

New York Regional Plan Association, "Where transit works: urban densities for public transportation", Regional Plan News, No. 99 (August 1976).

Motor Vehicle Manufacturers Association, Motor Vehicle Facts and Figures, '79 (Detroit, July 1979).

"Travel characteristics in cities of developing and developed countries". World Bank Staff Paper No. 230 (March 1976).

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"Proceedings of the Second Seminar on the Role of Transportation in Urban Planning, Development and Environment, held in " Washington, D.C., 13-19 June 1976 (UN document ENV/SEM.5/3).

"World Development Report" 1978 (Washington D.C., World Bank, 1978).

New York Regional Plan Association, "Where transit works: urban densities for public transportation", Regional Plan News, No. 99 (August 1976).

Motor Vehicle Manufacturers Association, Motor Vehicle Facts and Figures, '79 (Detroit, July 1979).

"Travel characteristics in cities of developing and developed countries". World Bank Staff Paper No. 230 (March 1976).

Committee on Telecommunication", National Academy of Engineering, Communications Technology for Urban Improvement (June 1971). Also United States Congress, Office of Technology Assessment, The Feasibility and Value of Broad-band Communications in Rural Areas, A Preliminary Evaluation (April 1976).

Congressional Budget Office, Urban Transportation and Energy: The Potential Savings of Different Modes, Study for the United States Senate Committee on Environment and Public Works (Washington D.C., Government Printing Office, September 1977).

SPATIAL PATTERNS AND  
SOUND ENVIRONMENTAL DEVELOPMENT

Background paper prepared by Mr. J. PAJESTKA\*

at the request of the UNEP and ECE secretariats

1. SPATIAL DEVELOPMENT PATTERNS AND ENVIRONMENT: A HISTORICAL PERSPECTIVE

The causes of environmental deterioration and degradation are usually attributed to rapid demographic expansion connected with high growth rates of material production and consumption; inappropriate consumption patterns or lifestyles; and wasteful and polluting technology. Among these factors there are many linkages and feedbacks, which together can be considered as the environmental impact of a certain type of civilization. It should be noted however, that any civilization has its own pattern of spatial development, determining the geographical location of economic activities, transport facilities and human settlements. This location has a great impact on the environment, and it would therefore seem justified to approach the basic problem of its protection from the angle of spatial patterns.

In any complex system characterized by strong internal linkages and feedbacks, attempts to change its operation by acting only on one specific element are doomed to failure. In order to develop appropriate policy instruments taking spatial patterns as the point of departure, it is therefore necessary to consider them within a holistic environment/development context.

Throughout history, the geographical development patterns of human settlements and economic activities have been rather spontaneous in character. Little attention was given, even in scientific analysis, to their rationality in a long-term perspective. As long as human activities had a relatively minor impact on the ecosphere, the negative consequences were not obvious. In recent times, however, the situation has radically changed. It has become clear that geographical development patterns have considerable impact both on socio-economic conditions and on the environment. The adverse effects are already appreciable, and the situation is sure to worsen in the future. These prospects call for rational evaluation and direction of development processes at the national as well as the world level.

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In a capitalist socio-economic system, the principle of the profitability of individual firms and the market mechanism have led to processes of polarization, resulting in all kinds of gaps and inequalities in geographical development.

Polarization is at the origin of the well-known dichotomy of core and periphery that appears at all geographical levels, whether subnational, national, continental or world-wide. One particular feature of this polarization is the development of large urban-industrial agglomerations. It is within these agglomerations that the present dominant civilization pattern is created as a feedback effect of spatial concentration, lifestyles and technologies. Excessive spatial concentration is by itself a cause of high material consumption. It also brings about environmental pollution. More importantly, however, spatial concentration strongly promotes lifestyles and technologies involving high material consumption and pollution. Lifestyles characterized by high energy consumption, high transport costs and great wastage of various resources cannot be expected to change without a change in spatial patterns and technologies. The spatial patterns act as a solid backbone of the feedback effects in society; they also show great resistance to change and thus make for continuation of the current civilization pattern.

This civilization pattern has a strong tendency to spread and implant itself in socio-economic conditions different from those where it originated. It finds continuous support in the physical structures, social tendencies and economic "rules of the game" operating in international relations. The more interrelated the world, the greater the influence of the dominating civilization pattern. The whole world is thus facing similar problems.

Generally speaking, society needs a more conscious shaping of lifestyles, technologies and spatial patterns on the basis of far-sighted, humanistic and globally oriented criteria. Of course, nobody believes in the sudden and radical change of a civilization pattern, particularly its physical shape, but a change in dominant trends might be feasible.

While purposeful shaping of the development process is needed for all important factors discussed, the means of policy implementation will differ. This paper focuses on the instruments for changing spatial patterns.

## II SPATIAL ANALYSIS AND PROGRAMMING

In recent decades, a growing need has been felt for some direction of the spatial development process. Theories and programming methods and techniques have been developed for regional planning and policies. Experience with such planning in different socio-economic conditions at the national as well as the local level is instructive. Without going into detail, two cases are presented below:

A.- In the market economies, including various types of mixed economies, it has been realized that the play of market forces cannot bring about satisfactory solutions to current problems in such sectors as infrastructure, education and social services. Because of what economists call "externalities", these problems mostly have to be handled by the public administration and financed from budgetary sources. This often calls for spatial development analysis. The problem of regional development gaps, which mainly result from the polarizing forces of the market mechanism, has everywhere required action. Whenever regional disparities are connected with traditional societal differentiation of a national or religious character, the regional issue becomes acute, and requires economic intervention. Growing sensitivity to social justice has strengthened political pressures for more balanced

regional development, and the recent strong argument for environmental protection has added to the urge for more rational and harmonious spatial development patterns. Although public concern about the environment has been centred mainly on direct phenomena of environmental deterioration, it is bound to have a growing impact on analysis, programming and policy-making in the sphere of spatial development.

All the factors mentioned have led to direct or interventionist action by public authorities and concomitant institutional arrangements and, at the same time, to the application of spatial analysis and programming. In general it must be admitted, however, that intellectual capabilities for spatial analysis and programming have developed more rapidly than the real capabilities for putting spatial policies into effect. Though specific policies for environmental protection have brought some obvious results, hardly any structural change in spatial patterns in most countries may be observed. This seems to show that the resistance to change of the established structures has not been matched by the policy measures applied. In consequence, the feedbacks between lifestyle, technology and spatial patterns continue to operate. One may ask, however, whether and when the changing world situation and internal societal forces will strengthen the pressures for more efficacious spatial policies.

B.- The experience of countries relying on very active direction of the development process, and therefore on comprehensive planning, presents another case. To this group belong the socialist countries of eastern Europe, where spatial planning is an indispensable element of over-all planning and of the development strategy. Spatial planning relies on a multilevel framework comprising a country-wide development plan; regional development plans (for traditional regions or specially established programming regions); and local plans (city plans, etc.). The first two types of plan are considered to be parts of the corresponding socio-economic development plans, though they appear as separate technical documents. Strong arguments are being developed for co-ordinated planning, but measures in this direction have not yet been taken. The reason is probably that spatial planning relies on specific (i.e. different from those applied in socio-economic planning) methods and techniques, criteria, and skills which justify the maintenance of a separate planning system.

The main options in the field of spatial development patterns concern the allocation of resources. An active spatial development strategy presupposes the permission of guidance for decisions on allocation in order to ensure what is called "spatial socio-economic rationality". It is usually assumed that the concept of "rationality" is clear, and that the allocation mechanism is simple, because decisions can be taken within the framework of central planning. This seems to be a very simplistic view. Real experience shows that discovering what is rational in terms of spatial development patterns presents very complicated problems; and the allocation mechanism is not as straightforward as it at first appears.

Planning in the socialist countries is thus not simply a rationality-finding process; it is a fundamental socio-institutional process in which various agents are involved. The institutions participating in the planning and decision-making process contribute their own views, perspectives and interests, i.e. their own "rationality". Of course, this provides some guidance, but the conclusions may not always be easy to interpret. Regarding the allocation of resources there appear to be two tendencies resulting from the institutional setting: one presented by the productive organizations (and corresponding ministries) aiming at economic efficiency of relatively

limited scope and short-term range; and another, presented by the regional institutions, pressing for "balanced" benefits from the development process. It is against this complicated background that the role of spatial analysis and programming should be considered.

The system of spatial analysis and programming can then be seen as a set of methods, techniques, approaches and criteria which are applied by institutions whose task is to work out and influence the implementation of rational solutions, often against strong institutional tendencies of a sectoral type. It is not an uncontroversial system or one which is always successful in achieving its objectives. To strengthen it means to increase its over-all long-term socio-economic purposefulness and rationality.

It is important to emphasize the need to strengthen the role of spatial analysis and programming, particularly in the context of policies for the protection of the environment. This is an area where conceptual efforts, social activities and institutional support are required to bring more rationality into the development process. A survey of experience in Poland is presented below; it refers to some advanced solutions, which are not necessarily "model solutions" either from a conceptual or from a practical point of view, but which are still worthy of consideration.

### III. SPATIAL DEVELOPMENT PATTERNS AND ENVIRONMENT: THE POLISH EXPERIENCE

#### (a) Strategic concepts and policy measures

Spatial development strategy should always be studied in the context of an actual socio-economic setting and its inherited physical shape and historical development. Without going into extensive description of facts, a few points need to be stressed.

Within its new post-war frontiers, Poland became rather homogeneous in respect of social and ethnic features of the population. This homogeneity was further enhanced as a result of the large post-war migrations, which continued for many years in the form of rural-urban movements. The inherited physical shape consisted of urban agglomerations and other forms of human settlements, infrastructural networks and industrial complexes and establishments, and was characterized by great regional disparities and many short-comings in location. However, it had not yet developed petrified structures. Any historically inherited pattern is bound to influence future developments, but in the Polish case it was sufficiently flexible to allow modifications and transformations. A relatively wide range of options for programming a new spatial pattern existed, and this was probably the reason for the focus on a very active regional development policy from the very beginning.

Even if the policy was ready it took quite some time before the main strategic concepts crystallized and wide understanding of what was purposeful and rational in a long-term spatial development pattern emerged. Three phases in this historical process may be distinguished:

(a) During the first phase (corresponding to the first stage of intensive industrialization in the early 1950s), the development policy adopted a very ambitious, but rather simplistic, line of "equal" distribution of industrial activities throughout the country. This line was mainly justified by socio-political considerations, and rested on very optimistic views of the possibilities for radical and rapid transformation of the economic structure, in both social and spatial terms. Even though a number of decisions on development location derived from this line proved viable, the general line could not have

survived. It was impossible to promote new industrial ventures in all regions and cities of the country.

(b) In the second phase (the latter half of the 1950s and the 1960s) a reaction against the former experience led to emphasis on the "viability and efficiency" of development projects. This meant that spatial policy became less active and the location of development followed the formerly established geographical patterns. Significant modifications appeared, mainly in connexion with the exploitation of new mineral deposits, which led to the establishment of some new industrial centres. In the second half of the 1960s, the policies of the second phase encountered growing criticism from both intellectual and political circles, mainly on the grounds of a lack of far-sighted, active programming and strategy.

(c) The third phase (the 1970s) witnessed a rebirth of a long-term active spatial policy on the basis of extensive analysis and programming.

The main strategy of the long-term spatial development plan, covering the period up to 1990, can be described as follows:

- It is polycentric, i.e. it aims at a series of growth centres on the national territory in order to achieve better distribution of the benefits of the development process and better use of the resources and other assets of the various regions;
- It provides for a certain number of urban-industrial conglomerations so as to promote economic efficiency;
- It rejects excessively large agglomerations, putting emphasis on "moderate concentration" for the sake of a polycentric pattern, environmental protection and the economic viability of urban settlements;
- It emphasizes the "quality of life" aspects of the various spatial solutions.

The new long-term spatial strategy will not lead to a radical reshaping of existing patterns, but it will consciously guide the development process and gradually change the economic geography of the country by supporting certain trends and weakening or counteracting others. This is how this long-term spatial development plan should be understood; it is a framework for strategic guidance rather than a directly operational instrument.

A long-term spatial development programme in a way furnishes "terms of reference" for programming the development of infrastructure facilities and the location of large industrial complexes. Experience has shown that direct decision-making, although important, is not sufficient for effective implementation of a strategy, particularly if the decision-making system is influenced by socio-institutional factors. And this, as has been indicated before, is a characteristic feature of the planning systems of the socialist countries.

It has already been indicated that rational spatial development requires institutional support. Purposeful institution-building should therefore be considered an important policy measure. In this context, it seems worth mentioning that the political structure of the country is firmly based on the regional structure. The established regional districts (the "województwa") constitute an important factor in the planning and decision-making process. They bring in regional views, criteria and aspirations. The regional districts make extensive use of spatial analysis and programming in order to frame their

development strategy, to co-ordinate various development ventures in their actual geographical setting, and to design environmentally sound solutions.

A few years ago an important reform in the regional administrative structure took place. The three-tier structure was replaced by a two-tier structure, and at the same time the number of regional districts (województwa) increased. Although reforms of this type have many facets, this one was conducted with strong emphasis on the spatial implications of the new institutional setting. It was argued that the newly formed districts corresponded better than the old ones to the structure envisaged in the long-term spatial development plan, and constituted a support for the polycentric pattern. It is too early to judge the real impact of this change, but it is an example of an institutional rearrangement that has been undertaken with a view to assisting in the implementation of a programmed spatial development pattern.

Another solution through institutional change also merits attention. Administrative subdivisions of a country do not always provide the proper scope for spatial analysis and programming. The so-called "macroregions" in Poland have been set up in order to facilitate the solution of certain important spatial problems. In each macroregion a body for research and programming has been established; it works directly under the State Planning Commission. The macroregions should not be considered as elements of a "hierarchical" regional structure, however, they have no administrative functions or responsibilities, but are simply research and programming units. This institutional solution seems to have strengthened the over-all spatial development strategy.

Though important, the institutional solutions are but one facet of the policy measures needed for guidance to spatial development. Institutions are always strongly influenced by societal attitudes and tendencies. Spatial economic solutions which are not in harmony with societal tendencies may encounter great difficulties and even fail. This raises the problem of a certain necessary conformity between spatial development lines and socio-cultural patterns, and leads to the proposition that socio-cultural tendencies also need guidance. This must not be understood in the sense that society should be subjected to certain arbitrarily chosen spatial development patterns. Once selected on the basis of comprehensive social, economic, cultural and environmental criteria, the spatial development strategy should be accompanied by appropriate lines of action in all fields, including socio-cultural tendencies. This understanding is widely accepted in the socialist countries.

In other words, the development of regional and local socio-cultural activities is very important; these activities are connected with the wider context but are nevertheless self-reliant, and as such mesh with the feedbacks of the spatial economic patterns within the regional and local framework. Poland has had some experience in this field.

The tradition of careful reconstruction of historical monuments, and indeed of whole cities, dates back to the early post-war period when the reconstruction of Warsaw played a most important symbolic role for the nation. This activity has more recently spread throughout the country and has developed into an important socio-cultural movement. Though the original argument is still connected with historical traditions, what matters most is probably that this activity offers a means by which various localities and regions can express their identity. This is a prerequisite for local pride, which enhances social activities. This concern for the protection of the environment has been extended to encompass various attempts to beautify the surroundings. In combination with other types

of socio-cultural activities, the movement has furnished scope for social creativity and the shaping of new lifestyles. It goes without saying that these socio-cultural tendencies enhance the polycentric pattern.

(b) Environmental issues in spatial analysis and programming

For many years, environmental issues were only partially taken into account in spatial analysis and programming, though some attention was given to the use of certain natural resources and to certain aspects of nature conservation. Since the early 1970s the approach has changed. Environmental issues have come to form the core of the spatial analysis and programming of all the elements within the multilevel framework. One of the main purposes of spatial analysis and programming consists in:

- Rational utilization of natural resources at the national as well as the regional level;
- Protection of environmental assets;
- Conscious shaping of the environment in order to maintain harmony between society and nature and improve the quality of life.

It should be noted that this approach to environmental issues is broader than that of "environmental protection". At the same time, spatial analysis and programming has become a platform for environmental considerations and programming. It has proved particularly useful in comprehensive study of the various environmental problems in their specific geographical context. Systematic environmental studies will increasingly have to use spatial methods and techniques.

The broad approach indicated above has helped to integrate environmental concerns into sectoral planning, particularly in connexion with agricultural development and the siting of industrial plants, recreational areas and facilities, infrastructural networks, etc. It has been found useful always to present the programmed activities in their geographical setting with indications of its environmental characteristics.

LA PARTICIPATION DES CITADINS A LA PROGRAMMATION URBAINE  
L'EXPERIENCE DE PAVIE

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à la demande des secrétariats du PNUE et de la CEE

"Car on trouve presque partout des Scylles et des Celènes voraces, des Lestrigons mangeurs de peuples et semblables Harpies aussi cruelles qu'insatiables. Mais on ne trouve pas partout des Républiques dont les citoyens vivent ensemble selon des règles de la vraie sagesse."

(Thomas More, Utopie, livre I)

1. LA SCENE SOCIO-ECONOMIQUE NATIONALE

Toute analyse d'une intervention pratiquée au niveau social exige une étude rétrospective pour préciser les contours du champ d'investigation, en mettant en relief les grandes constantes et les variables dépendantes.

Il faut donc replacer l'expérience de Pavie dans le contexte de la politique socio-économique poursuivie en Italie à partir des années 60. Au début de la décennie 1960-1970, on assiste en Italie à un grand progrès des techniques de production et, par conséquence, à une maximisation des profits des entreprises. Le revenu moyen par habitant augmente ainsi que le volume de la consommation individuelle et sociale. En même temps, se propage sur les ondes de la culture de masse, le rêve d'une société de consommation où règne le bien-être. C'est alors que naît le mythe de la motorisation, de la résidence secondaire, des vacances et des week-ends: le rêve d'une société opulente sans conflits ni tensions de classe prend corps.

Il faut toutefois souligner que, malgré cette euphorie généralisée, l'Italie, aux alentours de 1965, fait un choix politico-économique qui orientera le marché vers des objectifs socialement rétrogrades, lesquels conduiront le pays à la stagnation économique et à un renversement de la tendance au développement.

En effet, alors que la production tend à décoller et à être compétitive sur le marché international, on encourage la rente foncière sur le plan économique interne, au-delà de toutes limites économiquement permises. Le capital destiné au soutien de la production, à la modernisation des installations, à la recherche technologique se trouve donc, à tous les niveaux, immobilisé dans les investissements fonciers. Dans quelle mesure cela répond à un désir de la classe politique dirigeante de conserver le pouvoir (n'oublions pas la bataille - perdue - sur l'expropriation des zones à bâtir) et dans quelle mesure il s'agit d'une perversion économique, c'est là un thème de réflexion qu'il n'est pas

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possible de développer ici. Le fait est qu'à cette époque, les opérations foncières, favorisées par les dégrèvements fiscaux et des profits supérieurs de 200 pour-cent et même de 300 pour-cent à ceux des investissements industriels, dominant le marché au détriment des secteurs productifs du pays, qui ne peuvent se développer par manque de ressources.

Cela entraîne des conséquences d'une portée considérable. Tout d'abord, les opérations foncières comportent des exigences immédiates qui excluent toute possibilité d'intervention programmée au niveau administratif, soit dans la réglementation de la construction (plans régulateurs) soit dans le domaine fiscal (révision des cadastres et de la valeur cadastrale). Parallèlement, les municipalités sont, en fait, contraintes à assumer dans leur propre budget le coût des aménagements (routes, égouts, éclairage, etc.) et le coût des services (écoles, assistance, etc.) et des infrastructures nécessaires aux nouvelles implantations urbaines; il s'ensuit une augmentation progressive, constante et irréversible de la dette publique. A côté des municipalités, l'Etat doit lui aussi prendre en charge des interventions onéreuses dans le domaine social, qui, effectuées sous la poussée de nécessités contingentes, ne font que provoquer un développement incontrôlé du secteur tertiaire, sans qu'il y ait rationalisation de ce dernier.

De plus, le "mécanisme diabolique" de l'investissement foncier, outre qu'il perturbe et paralyse l'administration de l'Etat et des communes, cause des dommages irréparables à l'aménagement territorial et urbain du pays. L'abominable massacre des grandes et petites agglomérations urbaines, l'invasion sauvage et aveugle du béton, la destruction d'équilibres urbains consolidés par les siècles, en sont une preuve tangible et incontestable. L'édification de quartiers-dortoirs pour la masse des ouvriers et des migrants se fait ainsi au détriment d'une expansion réglée et programmée alors que la construction de logements bourgeois altère le caractère du centre historique des villes et la composition de leur population.

De même, l'effet de l'urbanisation et de l'immobilisation foncière s'étend sur tout le territoire national. La construction de "résidences secondaires", d'équipements d'accueil et d'environnement. Dans les campagnes, dans les montagnes ou sur le bord de mer, des villages entiers sont convertis en centres résidentiels qui modifient l'équilibre séculaire existant entre la nature et l'agglomération.

A ces dommages graves découlant de l'hégémonie économique de la rente foncière, s'ajoutent des effets tout aussi néfastes sur le tissu social. En effet, le développement de la production et l'augmentation du niveau de vie stimulent, outre un accroissement des besoins satisfaits par le marché, un désir généralisé de transformations sociales. En somme, à la diversification des besoins correspond le besoin d'une diversification sociale des mécanismes de satisfaction.

La masse est peu à peu gagnée par le besoin de nouveaux modèles d'intégration sociale et de participation, qui touchent l'école, la ville, l'usine, la famille, la vie publique et privée. Ces aspirations, très répandues dans la société, et qui se présentent comme une demande impérative d'agrégation sociale ne trouvent pas de réponse. La conviction absurde selon laquelle le niveau de la production ne dépend pas de la conjoncture économique mais d'une orientation naturelle du marché est partagée aussi bien par les forces politiques du gouvernement et de l'opposition que par le gros capital, justifiant ainsi le prélèvement de ressources au bénéfice de la rente foncière et au détriment du développement productif.



Mais les conséquences sociales et cet absurde choix politique ne tardent pas à se faire sentir. La productivité est en baisse et la compétitivité sur le marché diminue; le secteur tertiaire se développe; il apparaît impossible de pratiquer une politique de transformations sociales sans comprimer la consommation ou changer radicalement la distribution des revenus.

Ces voies étant jugées non viables politiquement, il ne reste qu'à faire face au malaise de la population et surtout des jeunes, tantôt en recourant à la répression, tantôt en utilisant pour prévenir les conflits des interventions démagogiques ou corporatives. C'est ainsi que commence, à partir de 1968, la dégradation du tissu social.

Pour les grandes masses, qui désirent un changement de conditions sociales d'existence mais qui constatent que le système n'est pas en mesure d'en assumer le coût, c'est le début d'une crise de motivation, accompagné de défiance généralisée, d'individualisme et de marginalisation, avec tout ce que cela comporte: exclusion, isolement, terrorisme, résignation.

La désagrégation de la société et la destruction de l'environnement vont de pair. Les mornes zones périphériques des petites villes comme des grandes mégalo-poles en témoignent. Une apparente sociabilité voile l'indifférence, l'incommunicabilité, l'incompréhension et la peur.

#### 11. LA REALITE LOCALE

Cette situation se répercute au niveau d'une ville moyenne comme Pavie. Ses caractéristiques ne diffèrent pas de celles de nombreuses autres villes semblables en Italie. Chef-lieu de province, siège universitaire, non loin de Milan (environ 35 km), Pavie compte dans les années 1960-1970 87.000 habitants. Son économie traditionnellement agricole n'exclut pas une présence industrielle importante.

Cette présence industrielle se consolide peu à peu, absorbant la main-d'oeuvre agricole et parallèlement stimulant le développement de petites industries semi-artisanales. Cela entraîne une augmentation progressive du niveau de vie, qui toutefois n'altère pas les mécanismes de reproduction des schémas sociaux en oeuvre dans la ville. Influencée par le rythme de la vie agricole et prisonnière d'une certaine paresse provinciale, la ville suit une évolution lente. Le revenu agricole et le profit industriel cohabitent avec le minimum d'échanges ou d'interférences, tandis que la rente foncière se maintient à des niveaux moyens sans enregistrer de poussée. Dans ce cadre, tous les projets sont limités à l'essentiel et visent plus à la conservation de l'état des choses existant qu'à une amélioration. Parallèlement, le renforcement de l'activité industrielle est vue comme une variable étrangère à la vie citadine, qui est du ressort exclusif - presque privé - du capital. La preuve en est la passivité de la municipalité et le fait qu'elle ne prenne aucune part aux choix en matière de production.

La situation demeure inchangée même quand, suivant le rythme de l'expansion nationale et internationale du marché, le développement industriel s'intensifie progressivement.

Le chiffre d'affaires des principales industries locales (Necchi Vittorio, Necchi Camiglio, Vigorelli, etc.) est en progression et leur compétitivité augmente à tel point qu'elles atteignent des taux élevés de productivité et se font une place sur le marché international. La Necchi Vittorio S.P.A., par exemple, devient le chef de file des fabricants de machines-outils, suivie de près, par d'autres entreprises de Pavie, entreprises sidérurgiques et de transformation.

Cette expansion exige une quantité croissante de main-d'oeuvre, besoin que le traditionnel exode rural ne suffit à satisfaire. Il est dès lors indispensable de faire appel aux travailleurs immigrés. On assiste à Pavie à ce qui, à une bien plus grande échelle, se produira dans les grands centres urbains industrialisés.

Vers les années 60, l'accroissement de la productivité industrielle est à son apogée. Parallèlement, le nombre des entreprises s'est multiplié et a atteint un maximum, et il en va de même pour les profits. Cela étant, on constate à Pavie - comme d'ailleurs dans d'autres villes - une absence d'intervention au niveau des structures économiques et sociales à laquelle personne ne se préoccupe de remédier. En effet, l'expansion industrielle exige, pour avoir une valeur sur le plan social et pour maintenir sa compétitivité, un réinvestissement rapide des profits pour garantir l'indispensable modernisation technique et la capacité productive. Cela implique, au niveau local et national, une politique de soutien et de stimulation des crédits.

En même temps, il est indispensable que les pouvoirs publics interviennent pour coordonner et aplanir - sinon résoudre - les problèmes inhérents à l'expansion industrielle, le plus important étant celui des infrastructures fondamentales (services sociaux, travaux d'urbanisation). Cette fonction ne peut qu'être attribuée, en priorité, à l'administration locale en tant que centre de règlement amiable des conflits, de médiation et de formation des projets. A Pavie, au contraire, non seulement l'administration locale est complètement absente, mais encore, fidèle à une orientation idéologique traditionnellement agraire, elle refuse toute forme d'intervention en se bornant à sanctionner les décisions prises par les milieux industriels. Dès lors, suivant une tendance qui déjà s'impose au niveau national, le capital privé se substitue inévitablement à l'administration publique pour ce qui est de l'intervention en matière d'infrastructures, faisant passer la politique du profit avant l'intérêt social et, en premier lieu, l'urbanisation.

C'est ainsi que, sur la base d'une exigence concrète, le processus d'urbanisation de la ville se déclenche, favorisé par une politique bancaire d'ouverture des crédits et soutenu par une main-d'oeuvre à bas prix. L'opération est plus qu'avantageuse pour le capital: il s'agit, en un moment où la demande sur le marché est très forte et l'offre publique inexistante, d'investir des profits industriels dans la construction en en retirant dans de très brefs délais des superprofits. C'est le début d'une spéculation sauvage dans la construction, qui s'abattra sur la ville, à la fois paralysant le développement industriel et altérant le tissu urbain.

Cette opération financière, qui au début n'est le fait que des chefs d'entreprises et des banquiers, s'étend rapidement jusqu'à toucher cette partie de la bourgeoisie de Pavie qui traditionnellement préfère la rente agraire ou l'investissement en actions. Des médecins, des professeurs d'universités, des notaires, des membres des professions libérales constituent des sociétés, ouvrent, sous la couverture de prête-noms complaisants, des chantiers, des entreprises de construction. On voit naître les premiers quartiers pirates, les copropriétés abusives, tout cela en dehors des réglementations en vigueur (par ailleurs fort indulgentes), alors que des rues entières surgissent du néant, au mépris des conditions élémentaires d'aménagement sans lesquelles la construction ne devrait pas être autorisée. Le massacre touche, soit le centre historique dont on abat des îlots entiers, soit la périphérie de l'agglomération, qui de terrain agricole devient surface à bâtir, privée d'eau, de lumière et de tout-à-l'égout.

Grâce à l'indifférence complaisante de l'administration locale, on fait fi des limitations naturelles qu'impose le paysage tandis que les projets d'extensions du périmètre urbain se multiplient. C'est de ces années que date le projet d'agrandir la ville pour lui permettre d'abriter jusqu'à 200.000 habitants, c'est-à-dire de rejoindre la périphérie de Milan. Toujours dans cet esprit d'intervention spéculative, on utilise chaque zone verte disponible, détruisant potagers et jardins privés qui, depuis des siècles, garantissaient un échange biologique et social entre les citoyens et la nature. L'expulsion de certains habitants de la vieille ville - quand cela apparaît plus rentable - pour les confiner dans des quartiers périphériques, est monnaie courante. Même les organismes publics préfèrent abattre et reconstruire plutôt que de restaurer pour conserver. Au début des années 70, la physionomie de la ville est déjà profondément altérée.

Le développement industriel en est freiné sinon paralysé, la productivité est inférieure, proportionnellement, à celle des années 60 tandis que le niveau de l'emploi tend dangereusement à diminuer. Le fait d'avoir donné la préférence à l'investissement immobilier et à la rente foncière a ralenti l'économie locale, bloquant un processus de consolidation industrielle d'un intérêt et d'une importance extrêmes pour la ville. Les conséquences s'en feront sentir non seulement sur l'économie et l'environnement mais aussi sur le plan social.

### III. LE TISSU SOCIAL URBAIN

Le tissu social d'une ville de l'importance de Pavie et dotée des ressources correspondantes sur le plan de la production est, au début des années 60, hétérogène et fragmentaire.

D'un côté, le modèle de socialisation agricole (formation sociale, reproduction des classes, etc.) se reproduit, sans toutefois comporter toutes les caractéristiques d'une société agricole. Ce qui se traduit par une situation immobiliste et répétitive dans laquelle les tendances au regroupement social se révèlent rares et fortuites et ne se transforment pas en initiatives sociales et culturelles. Cela concerne soit la composante sociale représentée par les propriétaires terriens et les métayers (qui exercent leurs activités économiques à l'extérieur mais résident à Pavie), soit tous les entrepreneurs qui gravitent autour de l'agriculture (commerçants, artisans, intermédiaires, etc.). Ceux-ci se caractérisent par une tendance à vouloir maintenir les choses en l'état et par une faible mobilité sociale. Leur objectif au niveau local est le maintien d'une structure hiérarchique citadine, dont la seule ouverture tolérée est l'élévation culturelle vue comme un ennoblissement social. L'instrument privilégié en la matière est le mariage, un des piliers de la société rurale.

D'un autre côté, il existe un tissu social en voie de développement lié à la productivité industrielle. Sa composition est mixte: on trouve d'une part la composante classique qu'est la population prolétaire-ouvrière et d'autre part la main-d'oeuvre agricole convertie en force de travail industriel. Ce phénomène crée la possibilité d'une convergence certes difficile, mais réalisable, vers quelques objectifs de catégorie et de classe à l'intérieur de l'usine mais ne permet pas une homogénéité sociale dans la ville au point de contrebalancer l'hégémonie des classes de la moyenne bourgeoisie, dont l'activité est liée à la production agricole. La composante sociale de l'industrie est, en somme, tenue à l'écart de la vie citadine et maintenue dans un rôle d'opposition stérile, quand ce n'est de défense. C'est là un obstacle au développement d'une culture prolétaire, vivante et active, alors que le particularisme individualiste s'affirme.

Il convient de souligner aussi que la présence dans la ville d'une grande université n'influence ni ne modifie les processus de socialisation.

Il existe en effet depuis toujours une séparation très nette entre la vie universitaire et la société citadine, imputable à plusieurs facteurs dont le manque de rapports entre les organismes publics et l'université, l'absence de collaboration entre les organismes universitaires de recherche, l'industrie et l'agriculture (il suffit de penser qu'à Pavie il n'existe toujours pas de faculté d'agronomie) et le fait que l'université n'apporte aucune proposition à l'occasion des rares initiatives culturelles de la ville. Il faut encore ajouter l'attraction exercée sur le corps enseignant par la proximité de Milan où il tend à résider et l'institution bourgeoise des collèges universitaires destinés à créer des ghettos plutôt qu'à intégrer les étudiants dans la ville. La municipalité de son côté préfère agir en tant que représentante des classes agricoles et de la moyenne bourgeoisie qui la soutiennent, et elle se montre totalement indifférente aux problèmes sociaux naissants ou aux réalités de l'usine, dont elle se limite à prendre acte. La préoccupation dominante, typiquement bureaucratique, est de ne pas bouleverser, en le mettant en crise ou en y apportant des modifications, l'ordre politico-social établi. La devise de l'administration de ces années-là peut se résumer par la devise latine: "quieta non movere et motaquetare". Tout culmine en une absence totale de toute intervention sur le tissu urbain, aussi bien sur le plan de l'organisation que sur le plan de l'assistance ou de la culture.

Cet équilibre provincial et statique sur le plan social commence à se défaire lorsque le développement industriel, l'accroissement du volume de la main-d'oeuvre, l'émigration et l'augmentation du niveau de vie imposent des besoins sociaux nouveaux et différenciés. A Pavie, comme dans tous les pays, le désir d'une société différente où l'individu jouerait un rôle différent, commence à se manifester. Cette aspiration commune rapproche, pour la première fois, ouvriers, étudiants et citadins qui, par le passé, avaient adopté séparément des orientations sociales parallèles. Ce qu'ils souhaitent c'est un engagement au niveau local qui change les conditions sociales d'existence et unisse les aspirations sociales des classes productrices et intellectuelles sur lesquelles repose la réalité économique et sociale de la ville.

Voici ce qu'ils obtiennent en réponse: spéculation immobilière, désintéressement de l'administration locale, peur généralisée de la bourgeoisie rurale et industrielle, qui sent que son pouvoir sur la ville et, chose bien plus importante, sa sécurité financière sont menacés.

L'urbanisation et le conservatisme politique se fondent ainsi harmonieusement et se soutiennent l'un l'autre. On pense exorciser le mécontentement social, plus vif que jamais à Pavie, en le confinant dans les quartiers périphériques et en regroupant dans les zones centrales - action presque inconsciente de défense - les classes bourgeoises et les services essentiels. On crée de cette façon une coupure nette entre la ville des bourgeois (commerçants, agriculteurs, industriels et membres de professions libérales) et la ville des jeunes, des travailleurs, des immigrés. Le tissu social de la ville, tout comme sa physionomie, commence à se détériorer. Le danger est que le processus devenu irréversible transforme Pavie en ce que les villes industrielles dégradées sont en train de devenir.

#### IV. L'INSTRUMENT DE L'URBANISATION

Lorsqu'en 1972, se forme dans la ville une nouvelle majorité politique "social-communiste", le principal problème de la nouvelle municipalité de gauche (la première à Pavie et en Lombardie) sera d'intervenir énergiquement pour endiguer cette tendance à la destruction du tissu social et à l'effervescence permanente qui en est le résultat évident.

En l'occurrence, plusieurs modes d'intervention, multiples et différents, se présentent à la municipalité. Cependant, la tendance dominante est celle, correcte du point de vue méthodologie, que de ne pas intervenir indistinctement ou de façon générale, mais d'isoler avec précision le noyau central, force motrice de la société, et de concentrer tous les efforts. En urbanisme, ce noyau central est défini comme le lieu où les formations sociales et leurs incidences économiques se reproduisent. Par conséquent, le principal instrument d'intervention que l'on trouve dans la réglementation de la construction urbaine est le plan régulateur.

Il faut cependant souligner que le plan régulateur de la ville n'est pas conçu, dans la philosophie de la nouvelle administration, comme un fait technique de modernisation et de rationalisation, mais comme un stimulant politique et culturel. Concevoir ainsi la réglementation en matière d'urbanisation signifie dès lors donner la préférence aux projets de nature sociale plutôt qu'aux projets de génie civil.

Il s'agit, en dernière analyse, d'élaborer un très bon modèle de développement socio-économique et de l'appliquer en partant de ce qui en représente la base primaire: l'agencement de l'espace urbain. Ce dernier permet de remonter directement au tissu social par une intervention graduelle et sans à-coups, sans imposer de force des choix (fussent-ils corrects) mais en les provoquant naturellement.

Le point principal sur lequel est axé le plan régulateur de Pavie est le problème de son expansion urbaine. A l'extension inconsidérée ou aux projets absurdes de développement macroscopique, on oppose une proposition qui envisage une expansion programmée de la ville limitée à 105.000 unités en une décennie (c'est-à-dire jusqu'en 1985) Cela suppose au niveau économique une intervention rapide dans le sens d'une programmation équilibrée du développement industriel. Il s'agit de ne pas encourager le développement des industries de production qui requièrent une main-d'oeuvre d'immigration, ce qui remettrait donc en marche la machine de la spéculation immobilière.

Pareil choix ne signifie pas, évidemment, figer le développement de la production mais plutôt l'orienter de telle façon qu'il puisse garantir le maintien des infrastructures dès lors nécessaires. A cela se rattache le problème de la sauvegarde du site qu'un développement incontrôlé endommagerait de manière irréparable.

Parallèlement, le plan régulateur vise à promouvoir, de préférence à la grosse industrie (pour laquelle il prévoit toutefois une surface de développement ou de transfert de 134 hectares), l'implantation d'entreprises artisanales avec une zone d'expansion propre dotée des installations nécessaires (lumière, gaz, eau, téléphone, station d'épuration et des équipements subsidiaires, dispensaire, cantine, salles de réunion, centres commerciaux, bureaux administratifs). Les établissements prévus, à leur tour, devront répondre à certains critères préalablement fixés et propres à garantir les meilleures

conditions de production et de santé. L'espace réservé aux entreprises artisanales est intégré dans une zone agricole dont on a en même temps conservé le patrimoine écologique et les espaces verts.

L'autre secteur auquel le plan régulateur attribue une importance déterminante est l'intégration de l'université dans la ville. A cet effet, une convention entre la municipalité et l'université prévoit un programme de développement universitaire à l'intérieur même du plan régulateur. Ainsi, il est possible de prévoir des espaces verts, des installations sportives (piscines, courts de tennis, etc.) des services publics, des salles de réunions communes aux étudiants et aux citoyens, dispersées dans différents quartiers de la ville. A côté des nouveaux bâtiments universitaires (salles de cours et résidences pour les étudiants) on prévoit en outre des installations urbaines populaires afin de remédier à la séparation entre la recherche et l'étude, d'une part, et la vie sociale normale, de l'autre. L'intégration au niveau de l'espace pousse l'université à sortir de son isolement centenaire et à créer des rapports constants de collaboration, de recherche et de consultation avec la ville.

En ce qui concerne l'enseignement supérieur et secondaire, le plan régulateur prévoit un lien entre les établissements à construire (publics) et les zones urbaines et les quartiers universitaires afin d'en utiliser les services.

L'un des principaux objectifs du plan régulateur est ensuite de rétablir l'équilibre écologique détruit par la spéculation immobilière.

Au coeur du problème: les jardins publics et l'espace réservé aux services. Le plan régulateur prévoit une expansion considérable des espaces verts publics (qui passeront de 2 m<sup>2</sup> à 95,8 m<sup>2</sup> par habitant). Ils se trouveront à l'intérieur de la ville, reliant tous les autres espaces verts existants (jardins privés, potagers, parcs) dont une grande partie sera ouverte au public. En même temps, le plan prévoit la réalisation du parc du Tessin (comprenant un parc naturel et des zones équipées), du parc de la Vernavola (parc naturel de grandes dimensions dont le site présente un intérêt historique et écologique), et des parcs de la Sora, du Bosco Grande, de la Costa Caroliana.

Dans ces parcs, on conciliera, d'une part, la conservation du site et la sauvegarde du milieu agricole et, d'autre part, l'implantation d'installations sportives, d'équipements sociaux (en utilisant les bâtiments existants ayant un intérêt historique), d'écoles et d'espaces réservés à la libre initiative des jeunes, des personnes âgées et des citoyens en général. De même, à l'intérieur des parcs et des espaces verts publics, on étudiera (en collaboration avec l'université) la mise en place d'une végétation adéquate (en fonction des conditions de l'environnement) ainsi qu'un sauvetage du patrimoine naturel, tant en ce qui concerne les eaux, aujourd'hui polluées, que la faune, à présent inexistante. Le plan régulateur prévoit une série de chemins pédestres et de pistes cyclables reliant les diverses zones vertes et les parcs, afin de permettre déplacements et promenades en dehors de la circulation automobile urbaine. Enfin, pour résoudre les problèmes de la pollution des eaux, le plan régulateur prévoit la construction d'une station d'épuration en mesure de traiter les eaux usées de la ville et du territoire, ainsi que les cours d'eaux sillonnant le parc de la Vernavola, et les eaux usées des zones industrielles (après prétraitement). La station d'épuration est prévue comme un circuit fermé et intégré, c'est-à-dire qu'elle produira, par l'utilisation de biogaz, l'énergie suffisante à son fonctionnement.

Pour ce qui est de l'organisation des services, les auteurs du plan régulateur ont adopté une politique de décentralisation. Ainsi, outre les services traditionnellement centralisés, chacun des 9 quartiers peut disposer d'un

ensemble de services dans les divers secteurs d'intervention: instruction, sports, santé, culture, loisirs, rencontres. Pour cela, on prévoit la création, dans chaque quartier, d'une section crèche-école maternelle, la construction et la modernisation des établissements d'enseignement élémentaire, là où ils sont inexistantes ou insuffisants, d'enseignement secondaire obligatoire, dans le passé situés exclusivement dans le centre historique. Chaque édifice destiné à l'enseignement est équipé pour la récréation et le sport et est doté de vastes espaces verts. En ce qui concerne les activités sportives, chaque quartier peut utiliser des zones équipées entièrement ou en partie pour le sport d'équipe et le sport individuel, tout comme il peut profiter des installations sportives prévues à l'intérieur des zones vertes et des parcs. On renforce aussi les équipements pour la pratique de la natation avec la construction d'un ensemble de piscines (couvertes, découvertes et bassins pour les enfants) en plus de celles qui existent. En outre, chaque quartier est doté d'un centre social polyvalent, dans des locaux neufs ou restaurés (fermes, etc.) où trouveront leur juste place toutes les activités culturelles et de loisirs indispensables au regroupement social. Chaque centre devrait ainsi disposer d'une bibliothèque, d'un théâtre, d'une salle de gymnastique, (transformable en salle de réunions), d'une salle de concerts, de locaux réservés aux jeunes, de salles où se retrouveraient des personnes âgées et d'autres réservées à des associations existant sur le territoire.

De chaque centre social dépendent les établissements sanitaires locaux (aujourd'hui centres de consultations et dispensaires) ainsi que les services d'aide à domicile pour les personnes âgées et les invalides (services domestiques, assistance, etc...). Il devrait y avoir dans chaque centre social un animateur culturel en mesure de collaborer en tant qu'expert et organisateur des activités du centre. Toujours à l'intérieur du centre, on décentraliserait les services administratifs de la municipalité (état civil, délivrance de certificats) rigoureusement centralisés dans le passé et, de ce fait, considérés par le citoyen comme des lieux anonymes où accomplir des actes bureaucratiques.

Dans chaque quartier est insérée une zone réservée aux édifices consacrés au culte ou en tout cas à des activités religieuses.

De plus, à l'intérieur de chaque quartier, on délimite une zone (ou des zones) réservée au commerce et à la vente pour des magasins et des supermarchés communaux ou privés. Chaque quartier est doté de zones de stationnement, mais la modernisation des transports publics devra garantir des liaisons rapides et rationnelles allégeant la densité du trafic. Une attention toute particulière est réservée au centre historique et à sa sauvegarde.

Avant tout, le plan régulateur établit des normes strictes en ce qui concerne les constructions dans le centre historique et les actions de restauration. Un recensement rigoureux a permis de répertorier les différents types d'interventions (restauration scientifique, partielle, etc.) et les critères en vertu desquels seront attribués des permis de construire qui ne mettent pas en danger l'homogénéité du centre historique. En outre, le plan régulateur intervient contre l'expulsion du centre historique des classes moins aisées, en prenant à sa charge des travaux de rénovation, de conservation (près de 3.700 logements) et d'amélioration des conditions de logement (services sanitaires).

A l'intérieur du plan régulateur, il existe un plan de construction économique populaire (PEEP) qui prévoit la remise en état des logements vétustes et après la rénovation totale ou les travaux de conservation, la réintégration dans les lieux des anciens locataires. Pour ce faire, on a recours soit à l'expropriation, soit à des conventions entre propriétaires et municipalités. Dans ce cas, pour obtenir de la municipalité la restauration de l'édifice, le

propriétaire s'engage à ne pas dénoncer de baux contre le gré des locataires, à loger les locataires pendant les travaux de rénovation et d'assainissement, à les reloger dans l'appartement remis en état moyennant un loyer établi sur la base de normes équitables ou sur la base d'une convention de loyer social, établie en accord avec la municipalité, à payer une part réduite des travaux d'urbanisation secondaires.

Le régime de la convention est ensuite généralisé et c'est la condition nécessaire pour l'action de toute concession. En dernière analyse, l'entrepreneur ou l'organisme qui a l'intention de construire dans le centre historique doit non seulement respecter les normes établies par le plan régulateur (en retirant les avantages correspondants) mais aussi participer aux travaux d'urbanisation.

En outre, la sauvegarde du centre historique se trouve stimulée par la valorisation et l'utilisation à des fins publiques d'édifices qui ont une valeur historique et culturelle, ainsi que comme nous l'avons déjà souligné des espaces verts existants. Les édifices déjà découverts et acquis par expropriation seront utilisés comme centres de services culturels et de rencontres. Corrolaire indispensable de la sauvegarde du centre historique, sa fermeture à la circulation automobile. Le plan régulateur prévoit donc une zone réglementée (l'une des plus étendues d'Europe) qui, divisant le centre historique en zones, garantit un parcours aisé ainsi que l'accomplissement des activités normales de ceux qui y habitent et y exercent leur profession. Ce qui se concrétise par une intervention qui, en traçant des trajets particuliers pour les piétons, met en valeur les monuments historiques les plus remarquables, en dressant des itinéraires destinés à conduire le citadin comme l'éventuel visiteur à la découverte des lieux connus et moins connus, mais dans tous les cas, suggestifs et intéressants. Le choix d'une réglementation restrictive destinée à reconstituer dans son intégralité le tissu historique de la ville, a entraîné le développement des services publics de communication, et l'aménagement tout autour du centre historique de zones de stationnement pour les non-résidents; cela a également permis de promouvoir la réanimation de certains espaces sociaux (places, parvis etc...).

Le plan régulateur dans son ensemble s'inscrit dans une planification de la circulation et de la viabilité de l'agglomération. Outre la nécessité de rationaliser le réseau routier urbain négligé ou inexistant en reliant les divers quartiers de la ville, le problème se pose de dévier certaines routes à grande circulation qui traversent la ville.

On a donc prévu un système de routes de contournement qui, partant en amont de la ville, et passant par un pont sur le Tessin, relie le gros du trafic avec les bretelles d'autoroutes et avec les grandes routes nationales en aval de la ville, de manière à lui épargner les inconvénients d'un trafic intense et de permettre la liaison externe avec les quartiers périphériques, en allégeant ainsi la circulation interne. Le réseau routier sera entouré de zones vertes et étudié de façon à assurer la plus grande fluidité possible du trafic et à permettre un développement efficace des transports publics.

Il reste enfin à examiner les directives du plan régulateur en ce qui concerne le développement de la construction d'immeubles résidentiels. Avant tout, un recensement minutieux du patrimoine immobilier de Pavie a permis d'avoir une vue globale de l'état des immeubles habités. Il en ressort que la situation est particulièrement difficile. A une faible présence de la construction publique (8% en 1974) correspond une condition précaire des immeubles, surtout dans le centre historique (en 1971, 20% des logements sont dépourvus de salles de bain, 14% de WC, 37% d'installations de chauffage central ou individuel, alors que six



familles sur dix sont locataires). Sur la base de ces données, le plan régulateur désigne pour la rénovation ou la restructuration 8.000 pièces environ (soit 7,6% de celles qui existent) dont près de 3.700 dans le centre historique et 4.300 dans le reste de l'agglomération. A cela s'ajoute la nécessité de construire, en l'espace de 10 ans, environ 15.000 nouvelles pièces de façon à répondre au besoin d'expansion de la ville.

Pour ce qui est de la rénovation, et de la remise en état, les modalités exposées ci-dessus pour la rénovation du centre historique sont également applicables. En ce qui concerne la construction des 15.000 nouvelles pièces, on a choisi les zones de construction selon le critère qui vise à compléter les zones bâties déjà existantes et à développer les zones non encore bâties; 48% des nouvelles constructions seront situées dans ces dernières et 52% dans les zones d'expansion. Cette planification a été évidemment mise au point compte tenu du plan d'intervention général concernant les services, les quartiers, les espaces verts et la réglementation du trafic urbain.

Il est évident que la possibilité de construire est subordonnée aux normes restrictives du plan régulateur destinées à garantir la qualité de l'habitat, de l'environnement et du rapport zone bâtie/zone verte. De même, les coûts de l'urbanisation (particulièrement réduits pour la construction coopérative, publique ou en copropriété) sont fixés zone par zone compte tenu des travaux publics à réaliser.

L'exécution du plan régulateur en cours se fait au moyen de plans s'étendant sur plusieurs années, ce qui est nécessaire pour la planification des interventions et la réunion des fonds (crédits des budgets municipal, national, régional). Cela permet d'adapter continuellement la réalisation aux modifications sociales et de l'environnement et donc d'apporter les changements jugés opportuns au fur et à mesure.

#### V. LA METHODE DE LA PARTICIPATION

Définir l'urbanisme comme un domaine prioritaire d'intervention ne suffit pas pour assainir un tissu social dégradé et, surtout, toutes les interventions ne peuvent être le résultat d'initiatives prises au sommet. Même si l'on avait pu résoudre ainsi brillamment et de façon politiquement satisfaisante les problèmes concrets, on ne serait jamais allé dans la direction qui aurait satisfait les demandes et les exigences de transformation réelle d'abord avancées par le corps social, puis réprimées, mais toujours latentes.

Il fallait aller jusqu'à opérer une transformation des conditions d'existence urbaines qui repose sur la modification réelle de la vie de l'individu dans la ville. Ainsi seulement, l'utilisation des méthodes d'urbanisation pourrait avoir un sens.

Là encore, la méthode suivie consiste à dégager le noyau central unificateur des motivations et intérêts sociaux. Il s'agit de la volonté généralisée de lutter contre la dégradation de l'environnement, la spéculation sauvage, l'exclusion et la mise en ghetto de certaines catégories d'habitants et du désir éprouvé par chacun de donner une forme à sa propre présence dans la ville, de participer activement aux choix fondamentaux.

En un mot, les citoyens, surtout ceux qui appartiennent à la classe des travailleurs au sens large, veulent participer à la prise des décisions qui relèvent selon eux, à juste titre, de leur compétence. Ils revendiquent en somme le droit de participer à la vie de la ville en exerçant un contrôle direct par un engagement personnel qui ne se traduise pas seulement périodiquement par un

vote politique. C'est ainsi que naît à Pavie, dans la pratique et dans la définition préalable d'une théorie, la participation des habitants à l'administration de la ville. Cette participation prend son essor avec le plan régulateur, qui sera en même temps son premier banc d'essai et son principal instrument de maturation. Le plan régulateur, par son poids dans le développement de la ville et par ses caractéristiques particulières, est en effet discuté, modifié, intégré, au cours de réunions publiques rassemblant de simples groupes de citoyens, d'organismes, d'écoles et d'associations régionales.

A partir du moment où les habitants d'une zone se rencontrent pour discuter de l'espace où ils vivent, le quartier apparaît comme une entité réelle et non plus comme une unité juridique. Dans la confrontation et dans les conflits propres à la démocratie, naît la volonté des citoyens d'acquérir une autonomie de décision propre et la possibilité de l'appliquer à des choix concrets. La municipalité accueille immédiatement et avec courage ce stimulant spontané de la base, en l'adoptant et, non sans difficultés, en le rendant opérant. C'est ainsi que naissent des quartiers qui sont des unités administratives de gouvernement, aux côtés des formes traditionnelles de gestion communale.

Les nouveaux quartiers se dotent d'un conseil dont les membres sont élus parmi les habitants et qui a la mission, auparavant uniquement réservée au conseil municipal, de diriger la vie du quartier en se faisant l'interprète de ses exigences auprès de l'administration et en partie (de manière compatible avec les lois en vigueur) en intervenant directement, avec une autonomie de décision et une autonomie économique. De là naît une organisation des quartiers élaborée par le peuple et approuvée par l'administration. Elle consacre avec précision les modalités d'intervention du quartier sur le territoire, en déléguant au quartier lui-même quelques compétences autrefois centralisées. Là encore, le plan régulateur joue un rôle déterminant. Son approbation globale a eu lieu en 1976, après l'approbation préalable de tous les quartiers de la ville. En fait, cela permet, pour le cas particulier du développement urbain programmé, de déférer au quartier et à son conseil le pouvoir de décision et de proposition en matière de construction, de viabilité et d'action sociale. Cela signifie que le quartier (doté d'un siège propre et d'un secrétaire) assume un pouvoir réel qu'il exerce en collaboration avec les autres quartiers et avec l'administration en tant qu'élément de décision centralisé.

Le quartier a ainsi compétence pour prendre des décisions en matière de travaux de construction (concessions, permis de construire, expropriations etc..) ainsi qu'en matière d'interventions dans le domaine de la construction publique (construction d'établissements scolaires, de crèches, d'écoles maternelles) en veillant à la correcte application des normes. Ce qui signifie, étant donné les caractéristiques particulières du plan régulateur, que le quartier peut contrôler l'entière programmation urbaine et sociale de la ville.

Afin de mieux coordonner cette participation à l'intérieur des quartiers, on crée des commissions ouvertes à tous les habitants et qui reflètent les exigences réelles de la vie de quartier: santé, construction, écoles, culture, sport. Elles élaborent des propositions qui seront ensuite soumises à la décision du conseil de quartier et agissent en étroite collaboration avec les organes municipaux. Toujours dans le cadre du plan régulateur, le quartier commence à se doter d'espaces verts et de lieux de rencontres sociales. On crée des terrains de jeux et des installations sportives dont la gestion et l'organisation sont confiées, par l'intermédiaire du quartier, aux habitants.

De la même façon, on commence à décentraliser les organismes de santé et d'assistance. Dans presque tous les quartiers, on ouvre des centres de consultations pour le planning familial, ainsi que des dispensaires et des centres d'assistance aux personnes âgées. Ces centres sont autogérés par des assemblées d'habitants et coordonnés, au niveau central, par des commissions.

De même, on crée dans les quartiers des bibliothèques décentralisées dotées d'un personnel municipal (responsables culturels, bibliothécaires), elles aussi autogérées par des commissions élues et ouvertes à la participation de tous les citoyens. On confie à ces commissions, en union avec les commissions culturelles de quartier, une fonction de sensibilisation culturelle. Tous ces secteurs, ainsi que les espaces prévus pour des initiatives spontanées (jeunes, personnes âgées), sont alors réunis dans les centres civiques de chaque quartier (situés, comme nous l'avons dit, dans des édifices existants ou restaurés, ou construits spécialement) et gérés, ou plutôt autogérés, par un comité élu par tous les habitants du quartier.

Ainsi se crée, de façon concrète, un réseau d'organes d'auto-administration et d'autogestion s'étendant à tous les secteurs de la vie sociale qui dépendent du quartier. Qui plus est, par l'intermédiaire des commissions centralisées auxquelles participent tous les quartiers, il est possible d'étendre la présence des citoyens à des secteurs plus larges, indépendants de la vie propre du quartier. C'est ainsi qu'apparaissent les commissions et conseils visant à établir les lignes générales d'intervention dans les secteurs culturel, théâtral, musical, éducatif.

De même, les initiatives d'intérêt collectif qui en découlent sont portées devant tous les citoyens et les quartiers par une publication mensuelle qui, outre qu'elle donne des informations, offre matière à échanges de vues et discussions. De façon analogue, on publie les budgets de la municipalité, dont l'approbation préalable est soumise aux conseils de quartier. C'est de cette façon qu'ont été discutées jusqu'aux grandes décisions du plan régulateur, telles que la construction de la station d'épuration et des routes de contournement.

Indépendamment de ces formes désormais acquises de la participation de quartier, l'administration a cherché à accroître la participation d'autre manière.

Il existe, en effet, des rapports constants entre l'administration communale et tous les organismes et organisations sociales qui agissent sur le territoire, en particulier les organisations syndicales et les groupements professionnels et autres. Cette action en commun permet de poursuivre une oeuvre de collaboration fructueuse et d'engagement qui devient une garantie de croissance collective.

La protection de l'emploi à tous les niveaux et la productivité industrielle se posent alors, non comme des faits sectoriels et particuliers, mais comme un sujet de discussion pour la communauté urbaine toute entière. C'est la défaite de la politique qui fondait son hégémonie sur la séparation entre programmation industrielle et vie en communauté.

Il y a la même politique d'union des citoyens par la participation à tous secteurs et services dont l'administration s'occupe spontanément ou à la demande de la communauté urbaine. Citons par exemple la culture, l'un des secteurs sociaux où l'intervention est la plus difficile mais qui est aussi, pour la même raison, le meilleur des révélateurs. Grâce à une action de pénétration, la culture dans ses diverses manifestations (musicales, théâtrales, expérimentales, etc...) change de destinataires. Elle passe de la couche bourgeoise, dont elle était le symbole et l'apanage, à une très vaste audience populaire.

Pour la première fois dans son histoire, le théâtre sort de son rôle d'institution et se déploie sur les places, sur les parvis, dans le décor de la ville où, devant un public d'ouvriers, d'artisans, de retraités, de femmes, sont proposés des programmes de niveau national et international (ce sont les manifestations qui, traditionnellement, occupent tout le mois de septembre). La participation du public répond à toutes les espérances. Il y a une forte "présence" également en saison hivernale; au théâtre on atteint le record de 26.000 "présences" en trois mois. Par "présence", on entend une participation active, fertile en propositions et si nécessaire en critiques. Il en va de même de la bibliothèque décentralisée et coordonnée par un système urbain autogéré (par des parents, des jeunes étudiants, des responsables culturels et des représentants des quartiers), de l'école de musique (autogérée également et dont le nombre des inscrits est passé en 7 ans de 200 à 800), de l'atelier de communication, maison de jeunes autogérée. La preuve la plus évidente de la nouvelle orientation de la ville, ce sont ensuite les grandes fêtes populaires (au nouvel an, au printemps et au premier mai), où une "présence" populaire très dense (jusqu'à 30.000 personnes) démontre et confirme le désir des habitants de Pavie de se rencontrer, de se retrouver, de danser et plus simplement d'être ensemble. C'est la preuve évidente que le tissu social existe en dépit de toutes les difficultés inévitables que cela comporte et dont il est impossible de faire abstraction.

Tout ce qui a été dit jusqu'à présent représente le témoignage tangible d'un fait que le système capitaliste avancé s'efforce de dissimuler et que souvent les forces politiques, y compris celles de gauche, ont tendance à oublier facilement: la volonté du peuple d'être présent dans la société malgré toutes les manipulations et les contraintes. Ce n'est pas chose facile. Ce n'est pas facile pour la population, qui doit lutter contre le bureaucratisme de la vie en société, contre les formes de contrôle sophistiquées, contre les ruses de la politique, contre la poussée de l'individualisme de masse; ce n'est pas facile pour l'homme politique, souvent dépassé par une masse qui n'accepte pas ses règles et se révolte au nom des principes de participation - souvent oubliés - sur lesquels se fonde la démocratie; ce n'est pas chose facile pour la municipalité, qui ne dispose pas de ressources et d'un pouvoir de décision propres. Ce n'est pas chose facile enfin, pour la participation elle-même qui exige non seulement une adhésion de principe mais aussi un engagement personnel sincère.

C'est pourquoi les dangers sont multiples. Le premier et le plus inquiétant de tous est la bureaucratisation et la politisation, qui sont une forme de contrôle des choix. Par ailleurs, chaque enjeu comporte un risque et celui-ci plus que tout autre, parce que la participation et son développement peuvent faire surgir de la base une puissante poussée capable de modifier un modèle de société qui aujourd'hui suscite une profonde insatisfaction.

## ECONOMIC GROWTH AND THE ENERGY FUTURE

Background paper prepared by  
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at the request of the UNEP and ECE secretariats

### I. INTRODUCTION

The word "lifestyle" conveys a warning to sensible politicians. Most people who talk about lifestyles want to change them - in a way which the great mass of voters believes would be for the worse. The only kind of programme for changing lifestyles with any hope of electoral success is one which offers more wealth, more consumption and more employment.

"Low energy" rings other alarm bells. It smacks of frugality, deprivation and cold. For many people "low energy" is, in fact, the reality of their existence. The concern of practical politics is the elimination, not the dissemination of that kind of lifestyle.

Combine either or both of these proposals with advocacy of low economic growth and the package is infinitely resistible to any politician. At best, it will be seen as a manifestation of a quirky, middle-class puritanism; more probably it will be viewed with a deep and justifiable suspicion that it is a device for keeping the poor in their place. That is one reality.

The other reality is that there is a serious energy problem. Few now expect OPEC oil production to rise above its present level of around 30 million barrels a day. There are strong grounds to fear it may be less. A serious political upheaval in the Middle East would almost certainly cause oil production to fall severely and quickly. The Iranian revolution showed this clearly.

Oil, over the past 20 years, has supplied 80 per cent of the growth in energy consumption in the OECD region; in many of the developing countries it has provided virtually all the increase in commercial energy consumption over the same period. If it is not going to be available for such incremental growth in the future, then low growth, low energy and changed lifestyles may well be imposed, whether people or the politicians who represent them like the prospect or not.

The constraints on energy policy making can therefore be seen as two-fold. There are those imposed by external events, such as limitations in the supply of oil.

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There are also those which are imposed by what people are voluntarily prepared to accept or what governments feel it is politically possible for them to propose.

Within this tangle of apprehensions, prejudices and genuine dangers it is necessary for those engaged in energy planning to be as clear-sighted as humanly possible. The problems are great enough without compounding them with misapprehensions. One of the most persistent of these is that economic growth is necessarily tied in a regular way to increasing energy consumption. Some indeed feel that the proper, or natural, relationship between economic growth and energy consumption is unity, each percentage increment of growth in the one requiring an equal percentage increment in the other.

In the International Energy Agency's 1978 Review [1] it is said that the ratio between energy growth and GDP growth was about 0.4 for the period 1973-1977 but that "the 0.4 figure, because it reflects the impact of an economic recession, cannot be considered indicative of future trends; the ratio is expected to be about 0.84 for 1977-1985". No explanation is given for this assertion, but it clearly implies a direct linkage between economic growth and increased energy consumption.

A similar attitude is revealed in the European Economic Community. In a recent working paper [2] it is stated that: "Between 1973 and 1977, an unacceptably low rate of growth in GDP was nevertheless associated with a small reduction in gross energy requirements. Forecasts for 1985 and 1990 assume that in future, and with higher rates of economic growth, the link between economic growth and energy requirements will re-emerge". The energy ratio in 1973-1977 was, in fact, -0.4; that assumed for 1978-1990 is 0.79.

The above examples could be multiplied, but they suffice to illustrate the point. Despite the sophistication and detail of some of the best current energy forecasting methods, the results are too often presented as implying a simple linkage between growth in energy consumption and growth in (GDP). Since advocacy of restricted economic growth is politically unacceptable it follows, if there is a rigid link between energy consumption and economic growth, that low energy growth policies are equally unacceptable. The only politically safe energy policy becomes one which increases supply.

At present, the energy policy of practically every country in the world, except Sweden, is to increase the aggregate level of energy supply over the next decades. With increase in oil supply a receding possibility, it is highly unlikely that anything like the currently planned increases in supply will be achieved. Yet most governments feel them to be a political and economic necessity. There is in this a conflict between what prudence dictates - which is acceptance that a severe constraint on supply is probable - and what political reality allows to be said.

There is no simple way out. As usual, the truth is complicated.

Energy consumption and economic growth may be linked, or they may not be. Producing more goods at exactly the same average energy efficiency as today will obviously require more energy. But there is no reason why any particular increase in aggregate GDP should yield a mathematically predictable increase in energy consumption. Higher monetary output in the watch or electronics industry, for example, will require much less energy than a similar increase in monetary output from the iron and steel industry.

There are also numerous examples of possible changes which have no effect on GDP but which alter energy consumption. Improving the heating and ventilation controls in a factory or office block so that less energy is used to provide the same level of working comfort enables the same GDP to be produced with less energy. To take a much more homely example: hanging the curtains in front of the radiators beneath a window rather than behind them is an extremely common practice in some countries. Positioning the curtains behind the radiators so that more of the heat is directed out into the room rather than out through the window has no effect on GDP,\*\* but it saves energy and so increases the national energy efficiency with which GDP is produced. The potential for such changes is huge.

Approximately 40 per cent of the delivered energy in the United Kingdom is used for space and water heating in residential, commercial and industrial buildings. Fluctuations in the amount of energy consumed in this way have no effect on GDP. Hence any reduction in this energy consumption - by improved efficiency in use, or altered thermostat settings, or consumer resistance to higher prices - will not alter GDP. If the fear is that restrictions on energy consumption, such as have recently been imposed in Italy and Greece, may bring about a commensurate restriction on GDP, the room for manoeuvre is greater than many people think.

As for the 60 per cent or so of delivered energy which is used directly in the production of GDP, the linkage between the two is very flexible indeed. No industrial process is at its maximum theoretical energy efficiency; some efficiency levels stand at a mere fraction of what they would be in a thermodynamically ideal world. Hence all industrial production can be increased in energy efficiency without affecting GDP. Also, different products - bulk chemicals and electronic sound reproduction equipment, to take two extremes require vastly different quantities of energy per unit of their monetary contribution to GDP. In the United Kingdom, the energy intensity of the food, drink and tobacco sector, at 36 Petajoules/Ebillion, is just over a tenth of that of the iron and steel industry, which is 340 petajoules/Ebillion. The future mix of industrial products therefore bears heavily on the future energy intensity of GDP production. In addition, the proportion of GDP contributed by the services sector (at about 20 petajoules/Ebillion in the United Kingdom) will influence the energy intensity of the total GDP.

The conclusion must be that the apparent historical link between energy consumption and economic growth is one of accident rather than causality. This is well illustrated by the wide spread in the average energy efficiency with which GDP is produced in the different European countries, as shown in table 1. What has happened in the past is therefore not a reliable guide to what can, or will, happen in the future. This has serious implications for energy forecasting and its relationship with energy policy making.

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\*\*The contribution of the energy industries to GDP is fairly small - about 5 per cent in the United Kingdom - so that energy saving will not itself reduce GDP significantly, not will alterations in consumers' expenditure on energy.

Table 1

Primary energy consumption per unit of GDP in 1977  
In oil equivalent/1,000 European units of account

	Energy intensity of GDP		Energy intensity of GDP
Belgium	750	Italy	960
Denmark	560	Luxembourg	2,140
France	610	Netherlands	870
Federal Republic of Germany,	600	United Kingdom	1,120
Ireland	1,060	Community total	750

Source: Ref. 2

Energy forecasting is generally seen as a predictive exercise, and "may be defined as an attempt to determine energy factors (supply, consumption and so on) for a time some distance ahead (which may be 20 or 30 years or more) so as to decide whether the future should be influenced or modified and consequently what action needs to be taken at the present time". [3] The theory is that the forecaster makes a "prediction" of future demand, generally by analysing past trends. Supply is then expanded to meet this demand.

In practice, energy forecasting has generally been used to provide a basis for the ordering of electric power stations. Oil has been the major adjustable parameter within total energy demand, with supplies being adjusted upwards or downwards almost at will to accommodate unexpected deviations from the predictions. The penalties for a shortfall in electricity supply are high. The penalties for over-supply are much less severe - over-capacity can be designated a "planning margin" until demand picks up again - so the natural tendency of forecasters has been to "predict" demand on the high side, and to concentrate on electricity, leaving oil to take care of the balance of demand.

Clearly this is not good enough for the future. Oil can no longer be relied upon to deal with swings in demand. Moreover, its price has become a major element in determination of the level of macro-economic activity (e.g. GDP), from which energy demand is conventionally derived. The United States Department of Energy has recently suggested a possible rise to \$86 a barrel in the 1990s. Three years ago the authoritative WAES (World Alternative Energy Strategies) Study [4] took as the basis of its deliberations two oil price profiles through to the year 2000: a constant \$11.50 a barrel and a rise to \$17.25 a barrel. Ironically, there are also severe problems of over-capacity in electricity supply in many countries; and nuclear power is increasingly in question technically, economically and politically.



The question facing energy policy makers is no longer what will the future be, but rather what can be done to accommodate energy policy making to the political, economic, social and energy supply realities of the world as they are currently perceived. There is now a need to subsume energy forecasting into energy policy making at a level which considers both demand and supply and which breaks out of the illogicality of relying on accidental historical relationships as the basis for creating the future.

Before a rational energy policy can be formulated it is essential to have an understanding of the forces driving energy demand and how they vary, or can be made to vary, in changing circumstances. This was the motive force behind a comprehensive two-year study entitled "A Low-energy Strategy for the United Kingdom". [5] This is put within its national context and described in the next section of this paper.

## II. A LOW-ENERGY STRATEGY FOR THE UNITED KINGDOM

Before describing this study\*\*\*, it is useful to outline the background of official energy policy making and forecasting against which it was conducted.

Energy policy in the United Kingdom relies heavily on forecasts made by the Department of Energy. The method of making these has been described in detail [5]. While refinements have been made in recent years, the method is still largely based on an analysis of past trends in energy consumption and their projection forward, with some modifications to take account of rising prices and some fuel switching. The model divides energy consumption into four categories: industry, domestic, transport and other uses.

In the industry sector, future energy consumption is taken to be linearly proportional to the Index of Industrial Production. Household energy consumption increases almost linearly with household expenditure (though there is an allowance for the saturation effect which is occurring as the number of centrally heated homes increases towards the maximum possible). "Other uses" - essentially the services sector - are modelled as being linearly related to GDP. Only in transport is the forecast related to projections of actual energy-using activities based on forecasts of future levels of traffic. These projections of future energy use are then lowered by different amounts to allow for the effects of energy conservation. The reductions are based "entirely upon judgements of the possibilities for conservation and their expected timing". [6] The official model is thus one in which the essential driving parameter in energy consumption is GDP or one of its derivatives, such as the Index of Industrial Production or total household expenditure. This kind of model still appears to dominate official thinking about future energy demand in most countries.

The model for the IED "Low-energy Strategy" (LES) adopts a different approach. Instead of deriving energy consumption from macro-economic parameters, it endeavours to look at how energy consumption could actually occur at a physical level with a broad economic context defined by the future level of GDP. It has been described as a "bottom-up" approach as opposed to the "top-down" method used in official forecasts.

Two different rates of economic growth were selected as the framework within which the study would be conducted. They are almost identical with those used by the Department of Energy. The demographic projections made by the Office of Population Censuses and Surveys, and the forecasts of car ownership and traffic made by the Department of Transport, were also adopted.

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\*\*\*Unless otherwise stated all reference are to this study. Internal references within the study are not quoted here.

By taking the basic assumptions from such sources, a great deal of potential argument was avoided. The study says:

"One of our fundamental assumptions is that Britain's economy grows healthily along conventional lines: there is business as usual, but more of it. This may be dismaying to those who are opposed to such growth - there are strong feelings, for example, against large increases in car ownership on both social and environmental grounds.

"Our choice of a fairly high growth future deliberately avoids such issues. It is made because we want to keep the arguments focused on energy policies. In our choice of future growth rates we wanted to depart as little as possible from the basis on which official energy forecasts are made."

The allowances for economic growth are substantial: in 2025 GDP is treble that of 1976 in the High case, and double in the Low case. Within these broad projections, subprojections of energy-using activities within the economy were made. These in turn were broken down further to list the actual end uses and corresponding fuel consumption in 1976 (or 1975 in the case of the domestic sector).

The industry sector was divided into the eight subsectors used in national statistics of production. Within each of these sectors, energy use was divided into process energy for direct use; process energy in boilers; electrochemical energy; space and water heating; motive power; and other uses. These were further broken down into temperature bands, where appropriate, and allocated to the fuels actually used: liquid, solid, gas, electricity, etc. This matrix of actual energy use provided the starting point of the analysis. To assess the practical possibility for energy saving in each of these applications, a wide survey of literature and a canvassing of expert opinion within each sector was carried out to discover the best energy-conserving practice already in use, or considered economically and technically feasible. This provided a basis for estimating the energy conservation potential within each sector. It was assumed that this could be gradually realized by the implementation of these energy-conserving measures over the next 30 years - during which time a high proportion of industrial plant and buildings will be replaced in the course of normal renewal of capital equipment. The assumption requires no especially vigorous campaign of energy conservation. The percentage savings assumed are shown in the table below.

Table 2  
Energy intensities in 1976 and savings assumed in  
2010 for each industrial sector

	Energy intensity (PJ/£billion output)	Percentage Saving assumed in 2010
Iron and steel	340	30
Engineering and other metal trades	30	33
Chemicals and allied industries	138	24
Food, drink and tobacco	36	35
Textiles, leather and clothing	78	29
Paper, printing and stationery	49	22
Building materials	166	35
Other trades	29	32

As for industrial growth, a fall in the proportion of GDP provided by total industrial production from the present 36.2 per cent to 30 per cent in the Low case and to 27 per cent in the High case was assumed. This is in line with the tendency in the highly developed economies for a higher proportion of economic growth to be taken up in the services sector than in manufacturing. [7] Nevertheless, very substantial increases in the output of British industry were implied: 119 per cent in the High case and 68 per cent in the Low case. Further assumptions were made about the proportion of total industrial production which would be supplied by each industrial sector. These are indicated in table 3. While some of the heavy industries show a proportional decline, in accordance with common expectations, none shows an absolute decline: all industrial sectors are producing more in 2025 than in 1976.

Table 3  
Assumed shares of each industrial sector  
in total industrial production, 1976-2025

<u>Industrial sector</u>	<u>1976</u>	<u>1990</u>	<u>2000</u>	<u>2010</u>	<u>2025</u>
Iron and steel	4.9	4.5	4.2	3.9	3.5
Engineering, etc.	35.8	38.3	39.8	41.5	44.0
Chemicals	6.5	6.6	6.9	7.1	7.5
Food, drink, etc.	14.3	14.0	13.9	13.7	13.5
Textiles, etc.	4.3	4.2	4.2	4.1	4.0
Paper, printing, etc.	6.8	6.4	6.2	5.9	5.5
Building materials	3.4	3.3	3.1	3.0	3.0
Other trades	24.0	22.7	21.7	20.8	19.0

These two series of projections, energy saving and growth in output, were then combined to give the projections of industrial energy use which are shown in detail in table 4 for the High case, and summarized for the Low case. It can be seen that a certain amount of fuel switching has also been assumed to occur. Oil is removed from its replaceable uses, mainly on-site electricity generation and under-boiler use, and replaced by coal. A substantial residue of oil is, however, left in all cases.

Table 4  
Delivered energy projections for the industry sector  
High case (Low case in brackets)  
(petajoules)

	1976	1990	2000	2010	2025
High case					
Solids	684	1,010	1,253	1,500	1,641
Liquids	920	924	812	611	424
Gas	512	548	516	435	445
Electricity	296	363	392	404	407
<u>TOTAL</u>	<u>2,412</u>	<u>2,845</u>	<u>2,973</u>	<u>2,950</u>	<u>2,917</u>
Low case	(2,412)	(2,658)	(2,736)	(2,551)	(2,452)

In the domestic sector, a relatively stable population was assumed to continue the formation of new households (though at a declining rate). People were assumed to be housed in bigger, warmer and otherwise better dwellings. Energy use was considered under four headings: space and water heating, cooking, appliances and lighting. Four dwelling categories were used: pre-1975 flats and houses, and post-1975 flats and houses. The assumption was made that there would be a substantial increase in material possessions and comfort, and that this would be paralleled by an increase in the efficiency of energy use. In calculating space heating, for example, which used 64 per cent of delivered household energy in 1975, an increase in the average whole house temperature from the present 16°C to 18°C was assumed. At the same time, it was assumed that the Building Regulations would be successively changed so that additions to the housing stock would be provided at progressively higher standards of thermal performance. Taking 1975 as an index of 1.0, it was assumed that buildings started post-1980 would have a heat loss of 0.7, post-1985 a loss of 0.6 and post-1990 a loss of 0.5. The 1980 figure is close to what the Department of the Environment is widely believed to be considering; all are achievable within the present modest capacities of the British building industry. In fact, some local authorities as well as private builders are now producing housing which matches the performance assumed for the post-1990 housing. This is being done, in general, within a 10 per cent increase in building costs - which is the commonly accepted estimating error for building costs.

Similarly detailed analyses were carried out for water heating, lighting, cooking and appliances. Increasing use in each case was assumed to be matched by increasing efficiency. Allowance was also made for the surprisingly large effect of "free heat gains" from appliances and occupants, as insulation levels improve. This is a well-known effect in well-insulated commercial buildings, where the lights alone can sometimes provide all the heating required, but it is generally overlooked in analyses of domestic energy consumption.

Fuel switching was also assumed to occur. Liquid fuels are not used in post-1975 buildings, and their use disappears in pre-1975 dwellings by 2000. Electric heat pumps come into use in the 1980s; solar energy is not introduced until the late 1980s, and while it contributes 25 per cent to water heating by 2025, its contribution to space heating is negligible. Combined heat and power systems and district heating begin to play a part during the 1990s, but by 2010 are only supplying 10 per cent of the energy consumed in the sector. The projections of delivered energy for the High case, with a summary for the Low case, are shown in the table below.

Table 5  
Delivered energy projections for the domestic sector  
High Case (Low case summary in brackets)  
(petajoules)

	1975	1990	2000	2010	2025
Solids	458.7	194	120	147	156
Liquids	151.6	74	-	-	-
Gas	621.5	656	561	438	343
Electricity	319.0	326	271	273	271
Distributed heat	-	3	60	102	138
Solar	-	6	25	46	67
Other renewables	-	-	-	2	11
<b>TOTAL FUELS</b>	<b>1 550.8</b>	<b>1 250</b>	<b>952</b>	<b>858</b>	<b>770</b>
<b>TOTAL HEAT RENEWABLES</b>	<b>-</b>	<b>9</b>	<b>85</b>	<b>150</b>	<b>216</b>
<b>TOTAL DELIVERED ENERGY</b>	<b>1 550.8</b>	<b>1 259</b>	<b>1 037</b>	<b>1 008</b>	<b>986</b>
Low Case	(1 550.8)	(1 255)	(986)	(917)	(893)

A similar though not so detailed analysis of the much smaller commercial and institutional sector (11 per cent of United Kingdom delivered energy) provided the results shown in table 6. This sector, since it accounts for all the energy used in the production of services - apart from transport, which is dealt with separately - is, in effect, the energy model for the services sector of the total GDP. While its contribution to total energy consumption is small, it contributes around 50 per cent of the total GDP. This is a crucially important point.

Table 6  
Delivered energy projections, for the Commercial and institutional sector  
High case (Low case summary in brackets)  
(petajoules)

	1975	1990	2000	2010	2025
<b>HIGH CASE</b>					
Solids	72.8	102	147	122	120
Liquids	281.5	174	1	1	1
Gas	142.6	195	152	138	144
Electricity	147.1	147	123	122	128
<b>TOTAL FUELS</b>	<b>654.0</b>	<b>618</b>	<b>422</b>	<b>382</b>	<b>392</b>
Heat	-	-	24	52	59
Solar	-	10	26	51	77
<b>TOTAL DELIVERED ENERGY</b>	<b>654.0</b>	<b>628</b>	<b>472</b>	<b>485</b>	<b>528</b>
Low case	(654)	(611)	(445)	(445)	(473)

Transport energy consumption accounts for about 23 per cent of the United Kingdom delivered energy total. At present it is almost entirely in the form of oil. Road transport consumes 70 per cent of the total, with car and taxis using about 60 per cent of that. The transport model again used rising activity levels in all sectors coupled with increased efficiency in use. The greatest

improvement in efficiency is in the private motor car, where it was assumed that average fuel consumption reductions, compared with 1976, are 9 per cent in 1990; 34 per cent in 2000; 44 per cent in 2010 and 50 per cent in 2025. These are widely considered feasible within the motor industry and are, in fact, less than those assumed for 1990 and 2000 in the Department of Energy's 1978 forecast. [8] Table 7 shows the assumptions made for specific fuel consumption of the various types of vehicles considered. When these are combined with the assumptions made for traffic growth, the final delivered energy projections shown in table 8 were obtained.

Table 7  
Specific fuel consumption of average vehicles  
Index (1976 = 1)

	1990	2000	2010	2025
<u>Passenger</u>				
Car	0.91	0.66	0.56	0.5 <u>a/</u>
Bus and coach	0.95	0.85	0.85	0.85
Motor cycle	0.73	0.64	0.55	0.55
Rail (diesel and electric)	0.9	0.75	0.7	0.7 <u>b/</u>
<u>Freight</u>				
Light vans	0.91	0.74	0.65	0.59 <u>a/</u>
Lorries	0.95	0.9	0.81	0.73
Rail (diesel and electric)	0.96	0.93	0.9	0.85 <u>b/</u>
Ships (coastal and international)	1.0	0.96	0.93	0.93 <u>b/</u>
Air (all types)	0.9	0.8	0.7	0.5

a/ Substantial battery electrification after 2000

b/ Coal burning fluidized bed systems introduced after 2000

Table 8  
Delivered energy projections for the transport sector  
High case (Low case summary in brackets)  
(Petajoules)

	1976	1990	2000	2010	2020
Liquids	1,484	1,962	1,739	1,535	1,272
Solids	small	2	24	55	122
Electricity (stored)	10	15	38(22)	64(47)	83(66)
TOTAL: incl. Bunkers	1,494	1,979	1,801	1,654	1,477
TOTAL: excl. Bunkers	1,339	1,790	1,597	1,429	1,222
		(1,564)	(1,381)	(1,195)	(988)

Finally, all the projections were added together to produce a total delivered energy projection. This was then allocated between the sources of energy supply available to the United Kingdom. The results are startlingly different from current official perceptions of the United Kingdom's future energy needs. In the High case, for a GDP three times that of 1976, energy consumption need not

increase at all; in the Low case, where GDP doubles, energy consumption falls by 14 per cent. The range of total energy required, 330-360 million metric tons of coal equivalent, is far below the current Department of Energy forecasts of demand, which are in the range of 460-570 million metric tons of coal equivalent. [8].

The supply implications also run counter to most official thinking. Far from being an important issue, nuclear power need only expand to a small extent, if at all, and must then take away some of the market for coal. The Government's expansionist "Plan for Coal" heavily overstates demand for coal, since production need rise little above today's. The depletion rates for North Sea oil and gas can be lowered and still give full self-sufficiency to the United Kingdom in the immediate future, and prolong it until well into the next century. It will also be noted that none of this is critically dependent upon new, or renewable, energy sources. Their contribution is not assumed to be noticeable until the late 1990s, and remains small right up to 2025.

#### Discussion of results

There are two features of the IIED study which distinguish it from many others. It is based upon an extremely detailed and comprehensive body of practical data, but at the same time it is conceptually very simple. An explicit objective of the study was to present its assumptions and methods of calculation in such a way that anyone who disagreed with any of them, or wished to combine them in different ways, would be able to do so. Moreover, it is realistic in the sense that it makes no exceptional demands on technology, human nature or government intervention. Given a conviction that it should be done, there is no doubt that it could be done.

The original study limited itself to the range of economic growth projected by the Department of Energy; moreover, it stayed within a very conservative, and probably unrealistic, view of future society. In this way, controversy about matters other than energy policy was minimized and the response to the study has not been dispersed into arguments about the future nature of society.

Without departing from the ambition to keep the discussion primarily focused on energy, it is however worth exploring one further alternative: the effects of a much slower expansion in British industry than that envisaged in the LES, but at the same time an increase in the services sector. As an extreme case, let us suppose that industrial output remains constant and that expansion is concentrated entirely in the services sector up to the level envisaged in the High case. The results of such a development can be extracted readily from the LES by taking the total output of industry in 1976, but at its projected efficiency in 2025, and adding it to the projected energy consumption of the other sectors at the same time. The table below shows the results.

Table 9  
Delivered energy by principal sectors in  
2025 with constant (1976) industry output  
(Petajoules)

Sector	Energy consumption	Percentages
Industry	1,535	34.4
Domestic	986	36.3
Commercial	528	
Transport	1,222 (excluding bunkers)	29.3
	<hr/> 4,171	<hr/> 100.0

The proportional distribution of energy consumption is by no means implausible - it is almost the same as in the United States today - but the implications, assuming such a future is possible, are spectacular. The total GDP increases two and three quarter times but energy consumption falls by 30 per cent. It needs to be borne in mind that this includes an energy allowance for all the increased mobility in the transport sector as well as the improved living standards implicit in the domestic sector projections. It is not a deprived future.

Containing, as it does, such well-documented evidence for conclusions which are counter to many deeply held convictions, it is not surprising that the LES caused a considerable amount of argument when it was published in January 1979. Much of it, however, was based upon a misunderstanding of the purpose of the analysis.

Because the starting point had been the assumptions in the Department of Energy forecast it was wrongly supposed that the LES was presenting an alternative and "more likely" forecast. [9] Most of the critics alleged that the level of conservation assumed could not be achieved without politically impossible interference with civil liberties by the Government; moreover, because no explicit costs had been given for the conservation assumed, they imagined that it would probably be unjustifiably high. [10]

These critics failed to appreciate that the LES was not a forecast but a policy alternative, to be weighed for its desirability and feasibility against the other possible ways of ensuring that the United Kingdom continues to have reliable energy sources over the next 40 years. More importantly, they failed to see that the LES had exposed a major flaw in conventional forecasting methods. Its surprisingly low energy requirements for the future were not based on extremely optimistic levels of conservation, rather the contrary. What they revealed was that the extrapolative method of forecasting, carrying forward the very particular trends of the 1960s, with their free availability of oil at a falling price, rapid social and demographic change, as well as a major surge in the purchase of heavily energy-consuming goods (most notably cars), ignores the effects of saturation in demand and badly overstates the future need for energy within any particular projection of economic growth.

The results of overstating the future need for energy can be pernicious. Not only is the need for additional supply exaggerated, leading to a pressure for more electric power in the absence of increases in oil; but the importance and relevance of conservation is underestimated. The LES shows that in a context of moderate economic growth, moderate conservation can hold energy consumption



constant or even reduce it. Measured against a hypothetical rise in energy consumption, such as that projected by the Department of Energy, the conservation required to achieve zero growth in energy seems incredible and there is a reluctance to pursue it. Since the conservation measures incorporated in the LES analysis are undramatic and in many cases happening anyway, the argument about the financial burden they would place on the country loses much of its importance. Certainly a major and rapid programme of investment in conservation and re-equipment of the whole country would need to be costed. But that is not what is being suggested. Most of what is described is so simple and gradual, so much part of that normal process of the incubation and dissemination of technical ideas, that it is difficult to see how any cost can be put against it.

From the very beginnings of the Industrial Revolution up to the present day, technical change has tended to bring increased energy efficiency as a matter of course. Hardly any of these improvements in energy efficiency can be separated from other improvements and costed separately. Some indeed are negative, since the more energy-efficient devices are cheaper: witness the change to solid state electronics in a multitude of applications.

In the United Kingdom the energy intensity of steel manufacture fell by 17 per cent between 1960 and 1976; that of the building materials sector fell by 36 per cent in the decade 1966-1976. It is impossible to identify the cost element in such increases in energy efficiency. The LES projections actually imply a slowing, not an acceleration, in the rate of improvement in energy efficiency per unit of output in comparison with that which has been occurring throughout industry since 1966.

In the realm of building controls, there has been more than a century of intensive legislative action to upgrade standards of lighting, sanitation, means of escape, structural safety, watertightness and, more recently, thermal performance. The creation of a corpus of minimum standards for the quality of building in schools, dwellings, offices, shops and public buildings has been a function of social sensibilities rather than economic evaluation of the benefits. There is no objectively optimal level of expenditure on public or private buildings. In comparison with the buildings of 40 years ago the United Kingdom now builds to much higher standards of performance. Whether a regression to these which would reduce costs, or a progression to higher standards, which would cost more, is preferable is not an economic question but a social one.

This is not to say that conservation should not be subject to economic discipline, whenever possible, but merely to point to the difficulty of constructing a system of useful and consistent economic measurements of the costs of conservation. The best that can be expected is that, over a wide range, economic evaluation will be able to help choose between different ways of meeting the same goal. The comparison between installing a heat pump and treble glazing as a means of saving a given quantity of energy is valid and necessary. Whether both should be used to save even more is much more complicated. In addition to the difficulty of deciding what, at any particular time, is the optimum absolute standard of building insulation, there is also the problem of establishing what will be the costs of not conserving, either in money or in comfort forgone, if energy turns out to be dear or in scarce supply.

At an economic level, attempts to predict the future price of energy have been an almost total failure over the past decade. [11] There is, at present, no consensus on what the real price of nuclear power is, let alone what it will be; nor is the future price of coal discernible, with any certainty, in this shifting matrix. Neither does anyone know what will be the future price of oil.

Because of the unresolvable technical problems of separating conservation costs from those involved in technical progress in general, and producing a credible baseline against which costs and benefits could be measured, the LES relied instead on the empirical economic evidence of the market-place. If a conservation measure is currently being implemented in competitive conditions, or is widely believed to be capable of being so in the reasonably near future, then it was taken as being economically justifiable. Virtually all the conservation measures assumed fall within these categories. The impact of less well-understood or renewable energy resources was deliberately kept small and restricted to the later years of the projections.

The real danger is not that the LES study overstates the amount of conservation that is justifiable, taking all factors, including the importance of security of supply, into account, but that it badly understates the case. It therefore needs to be said that, against the marginal costs of supply, as they now appear to be turning out, a far higher level of conservation than that assumed would be justified. This then describes the rationale behind the LES, its main results, and some of the arguments that have been conducted around them. It has become clear that, far from demanding extraordinary amounts of conservation, it makes little demand on anything much beyond business as usual. The error lies in the official, extrapolative, forecasts which project energy demands far in excess of those ever likely to materialize.

Confirmation of this view is given by the way official forecasts of energy demand have in fact been falling in many countries. In Sweden, for example, official estimates of energy demand in 1990 have fallen to just over 40 per cent of what they were seven years ago. In 1972, the prognosis was that the country would need about 3,600 PJ (petajoules) of delivered energy in 1990. The latest figure, contained in the 1978 Energy Bill presented to the Swedish parliament, is in the range of 1,530-1,660 PJ. Actual consumption in 1978 was 1,537 PJ, as against 1,566 PJ in 1973. In other words, the official Swedish energy projection now is for virtually zero growth: 2.8 per cent a year for the whole economy, and 3.3 per cent for industrial production.

The United Kingdom, however, is in a unique position. It is the only major industrial power in the Western world which is self-sufficient in energy. Moreover, its economy is based on a well-diversified energy supply system. The question is whether any of the lessons learned from the study of such an economy can be applied to Europe.

III. FUTURE ENERGY DEMAND IN EUROPE

The starting point of the discussion about Europe must be recognition that the LES and the Swedish example are not "low-energy" in an absolute sense. They do not reject economic growth, nor do they demand changes in lifestyles or the structure and operation of society. They are only "low-energy" when compared with recent or present official projections. The question is whether the same can be said of Europe, where much policy is being formulated on the basis of postulated big increases in future energy demand (see table 10). Are these official projections of energy demand as grossly inflated as those in Britain? Unfortunately, the data requirements of a full-scale study of the LES type cannot yet be met anywhere in Europe.

Table 10  
Projected percentage growth rates in primary energy  
consumption in the European Economic Community 1978-1990

	1978-1980	1981-1985	1986-1990
Belgium	2.0	4.6	3.0
Denmark	1.2	1.2	2.7
France	4.5	3.2	3.3
Federal Republic of Germany	3.3	3.3	1.9
Ireland	7.8	6.7	6.5
Italy	4.6	4.5	4.0
Luxembourg	0.8/2.2	0.8/2.2	0.8/2.2
Netherlands	5.4	3.4	2.3
United Kingdom	2.0	1.6	1.9
Community	3.5/3.7	3.3/3.4	2.9/3.0

Source: See reference 2.

The St. Geour Report to the EEC Commission [12] in fact notes this lack of data and suggests that "studies of the same kind as the IIED study be undertaken in other countries, or, at least, that information on the potential for energy savings should be brought up to date and made comparable at the level of the Community". The report is based on a comparison of the IIED study with eight scenarios [13] prepared for the Commission using the MEDEE-2 computer simulation model developed at Grenoble University, and with the four published low-energy scenarios of the CONAES study in the United States. [14] The conclusion on the two IIED scenarios was that they "have international relevance and are not considered over-optimistic in their assumptions about the potential for energy conservation in the different sectors of energy consumption". This confirms the view, already widely accepted in the United Kingdom, that the technical levels of conservation in the LES are not extreme, and that they can be applied to Europe. It is clear, however, that if they were applied directly to the official forecasts of energy consumption in the EEC they would not yield the zero growth or declining energy consumption they revealed in the study itself.

The EEC Commission envisages that total energy consumption will rise from 954 million metric tonnes of oil equivalent (mtoe) in 1977 to 1,393 mtoe in 1990, a rise of 46 per cent: the moderate conservation assumptions of the LES would clearly not eliminate such growth. This is borne out by a study conducted by Roberts, in which his own estimates and those of a number of other European

studies on the potential for conservation in Europe are presented and summarized. [15] He suggests the following possible savings for the whole EEC by the year 2000: iron and steel 25 per cent; chemicals 20 per cent; aluminium 25 per cent; other industry 20-30 per cent. In households and commercial buildings the savings are estimated at 45 per cent, and in transport, against a base of 1973, the saving is 40 per cent. He also discusses possible savings through combined heat and power, and the use of district heating to permit a switch away from electricity generated by fossil fuels. None of the estimates differs greatly from those assumed in the LES.

In an effort to quantify the total savings attributable to conservation over the next 20 years, Roberts then used the conventional method - though not without clearly stated reservations - of projecting the amount of energy consumption that "would occur without conservation", and then subtracting his estimates of possible savings. He postulates a ratio of unity between energy growth and economic growth; and economic growth of 4 per cent up to 1985 and 3.75 per cent from then to the turn of the century. This calculation produces a figure of 2,300 mtoe for "traditional" demand by the year 2000, which, when reduced for conservation, comes to 1,533 mtoe, an increase of 77 per cent over the 1975 base year. Though somewhat lower than the official EEC figure, this still represents substantial growth in energy consumption.

Further confirmation, if it were needed, of the economic and technical feasibility of the kind of conservation measures assumed in the LES is provided by a Shell study on energy conservation. [16] This demonstrates an economic conservation potential of about 30 per cent in western Europe against 1978 prices; it would be higher against those of today.

The crucial question is thus not the plausibility of the LES conservation assumptions but whether its analytical method provides a reasonable basis for assessing the future levels of energy-using activities. Compared with this the argument about whether plus or minus another 5 per cent conservation is technically or economically feasible within any activity sector is trivial, and continually subject to revision as rising energy prices and improved technology open up new opportunities for conservation.

On the assumption that, at least in countries with a per capita GDP substantially higher than that of the United Kingdom, a disaggregated analysis such as that conducted in the LES, coupled with broadly similar conservation assumptions, would yield zero energy growth, the present official European energy projections are over-estimating future needs by around 400 million metric tonnes of oil equivalent by 1990. This is almost the total amount of oil currently being imported into the EEC. It is not a tolerable margin for error. There is an urgent need, not just for studies on conservation, but for a reappraisal of the problem of forecasting based upon a comprehensive and disaggregated analysis of energy consumption within each particular country.

#### IV. THE PROBLEM OF TRANSITION

In the United Kingdom, with its present and future self-sufficiency in oil, for however long it lasts, the problem of the transition to alternative sources is not seen as urgent. For the other countries in Europe, whether or not their future energy demand increases, their dependence on the international market for oil is a constant and growing concern.

In table 11 the percentage contribution by each fuel in each of the countries is shown for 1977. This illustrates clearly the predicament in which all countries find themselves but shows its particular acuteness in the case of Denmark and

Ireland. The problem is not just energy conservation, though that clearly helps, but a fundamental change in the structure of the energy economy to lessen dependence upon oil.

Table 11

Percentage contribution by fuels to total  
primary energy consumption 1977

	Coal solids	Oil	Natural gas	Nuclear	Hydro- power
Belgium	19.3	56.2	20.0	5.4	-
Denmark	16.6	82.7	-	-	0.7
France	15.9	62.3	9.9	2.1	9.7
Federal Republic of Germany	26.8	52.8	14.8	3.2	2.3
Ireland	23.6	73.7	-	-	2.7
Italy	6.8	67.6	15.5	0.5	9.6
Luxembourg	38.3	32.3	10.6	-	18.8
Netherlands	4.3	48.5	45.4	1.3	0.4
United Kingdom	34.2	43.8	16.8	4.7	0.5

Source: See reference 2.

This would seem obvious. Yet, apart from the United Kingdom, for evident reasons, and Denmark, all the countries are planning to increase their oil consumption by 1990, though the indications are that less oil will be available to Europe, because of the increase in demand from the rapidly industrializing countries as well as from the United States and Japan. Table 12 shows projected oil imports in 1990 compared with 1977 as a base year.

However, it is a main argument of this paper that official energy forecasting is overstating the future need for energy. If so, the oil position may not be as bad as it looks. But the present approach is ensuring that Europe gets the worst of all worlds. Projections of scarcity exacerbate tensions in international relations: they are profoundly destabilizing, induce price rises and militate against collaboration and collective action. If Europe is not going to need such an increase in oil it would be to the benefit of everyone if that were to be known.

Table 12  
Projected imports of oil by EEC countries  
in 1990 compared with imports in 1977

	Millions of tonnes	As index 1977=100
Belgium	25	130
Denmark	10	62
France	124	111
Federal Republic of Germany	157	115
Ireland	11	193
Italy	123	129
Luxembourg	2	121
Netherlands	63	175

Source: See reference 17.

The problem of reducing European oil consumption remains an urgent one. Conservation has a place in all rational energy policies, the only question is the amount possible. Almost all energy problems of the future will be reduced by conservation.

Fuel switching is the other option. Up until quite recently it was often assumed that nuclear power would provide a substitute for oil. Nuclear programmes were announced with that purpose. Nuclear power can rarely provide a substitute for oil, however, except in electricity generation, and quite often not even then. Nuclear power at present is used only to produce electricity. This cannot yet substitute for oil in transport. Development of satisfactory electric-powered vehicles is beyond the scope of today's battery technology, though there are promising signs. Neither can electricity be a substitute in a wide variety of industrial applications at present fuelled by oil, without a great deal of expense and difficulty. The unique quality of oil is its ability to store and deliver large quantities of energy cheaply, simply and easily. A petrol filling station with 20 pumps is equivalent to a 600 MW nuclear power station. Connecting the nuclear power station to the consumer requires a system of transmission lines, transformers, switches and fuses. The nuclear power station must produce its electricity at a virtually constant rate, day and night; oil pumps can be switched on and off at a moment's notice. The fact that electricity is available to the consumer at the touch of a switch conceals the elaborate, cumbersome, expensive and often very inflexible methods by which it is generated and distributed.

There are thus many uses where the practical difficulties or expense of using electricity will rule it out as a substitute for oil. In practice, electricity has rarely substituted for oil; it has fuelled different and additional uses, many of which are now rapidly reaching saturation point. Building nuclear power stations is, therefore, a far from obvious way of reducing oil consumption. Indeed, when built into the fairly small grid of a country such as Ireland, where one of 650 MW is now being planned, a nuclear power station needs additional oil-fired stations to provide the extra capacity and flexibility in the grid to enable it to absorb the output of the nuclear station.

A far more likely substitute for many common uses of oil is coal. Although it has disadvantages compared with oil, it still has advantages over electricity in many applications. Very little detailed work has been done on this problem, though information is vitally important in the formation of policy on fuel switching. The indication is that the limit of substitution of oil by electricity, and hence by nuclear power, may be a great deal lower than is currently assumed.

A further look at table 11 also raises doubts about nuclear power. Its contribution in comparison with coal is very small. The neglect of research, development and investment in the promotion of coal as an advantage to society rather than a social service to otherwise unemployed miners must now be a cause of regret to thoughtful energy policy makers. The experience certainly contains lessons for the future.

The fact that coal and nuclear power are usually advocated together to meet increasing energy demands also conceals the fact that the two are in reality in competition. For the future, coal and nuclear energy need to be compared directly. Coal brings problems but it is versatile, flexible, readily available, uses familiar technology and has a long history of technical development. Moreover, coal facilities can be built quickly and in small modules. For electricity generation, particularly where the existing grid is small, or when demand is uncertain, medium-sized coal-fired stations can be built quickly and cheaply.

Beyond the immediate choice of fuels there lies an area of much more difficult decision. This is concerned with the longer-term energy future, beyond the availability of oil in present quantities. Then the choice, in a very different society from today's, may be between solar and nuclear energy.

In Sweden a renewable energy system which would avoid many of the problems associated with centralized coal or nuclear power stations appears to be feasible. [18] It would permit continued economic growth but require zero energy growth, just as in the official Swedish energy forecast. Decisions being made now, however, are in danger of blocking the route towards that solution. In a related Swedish study the authors say:

"We can discern two clear-cut alternatives for energy supply in the twenty-first century. The one is the coal and/or breeder solution, the other the renewable energy sources. We now know too little to be able to reject or accept either alternative. The work must therefore concentrate on making sure that we do not get ourselves tied down unwittingly. And then to the coal and/or breeder reactor solution". [19]

When looking towards the longer term this question of choice becomes dominant. Not enough is known about the opportunities and constraints the future will bring. There is a real danger of locking society into a path of action which will destroy all flexibility of response.

Work on such long-range options is being carried out at the International Institute for Applied Systems Analysis in Austria. Some glimpses of the extremely high-energy nuclear future being considered there as a global scenario for the year 2030 have already been made public. [20] In a contrasting scenario of a decentralized and lower-energy Europe it has been stated:

"While we have witnessed in the past an overwhelming abundance of studies relating to high-energy futures, the surface of low-energy futures has only recently begun to be scratched, and the time is ripe for redressing the balance. It is above all a matter of choice, however. Political leadership, and behind it society at large, must be profoundly aware of the real alternatives for the long-term future as well as their implications not only for economic and living standards but also in regard to ethical values. It is only through the availability of complete and unfiltered information that society can make its choice. It is for this reason that the study of both high- and low-energy futures should be welcomed independently of our preferences. It is the comparison between these futures, which are all technically possible, that allows us to decide to what extent they are also socially and politically acceptable". [21]

This amply states the need for vision beyond the immediate future. The long-range results of present decisions are just beginning to be understood.

The discussion in this paper, however, has deliberately been limited to a much more specific and immediate theme. It has not speculated about what might be achieved by changes in lifestyle or industrial structure. Its focus has been very much in the present and on how energy forecasts and the policies based on them are made. Its purpose is an assessment and critique of the way in which the creation of the energy future is too often approached. If the long-range vision is murky and the short-range vision mistaken, there is little hope of getting anything right.

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#### References

1. International Energy Agency, Energy Policies and Programmes of IEA Countries (Paris, OECD, 1979).
2. Commission of the European Communities, Energy Objectives for 1990 and Member States' Programmes: Technical Annexes (January 1979).
3. P.G. Warner, Energy Options for the United Kingdom (Newcastle-upon-Tyne, NEI, March 1979).
4. Energy: Global Prospects 1985-2000, report of the Workshop on Alternative Technologies (New York, McGraw-Hill, 1977).
5. G. Leach, and others, A Low-energy Strategy for the United Kingdom (London, IIED, January 1979).
6. Department of Energy, Energy Forecasting Methodology, Energy Paper No. 29 (London, HMSO, 1978).



7. This assumption has been queried in correspondence and public debate about the LES. It is, however, consistent with trends in both the United Kingdom and other countries. Cf. C.J.F. Brown and T.D. Sheriff, Deindustrialisation in the UK: Background statistics (London, NIESR, 1979).
8. Department of Energy, Energy Policy: A Consultative Document (London, HMSO, 1978).
9. A particularly egregious example of this appears in reference 3 above.
10. L.G. Brookes, Atom UKAEA, London, March 1979
11. See for example R. Stobaugh, and D. Yergin, Energy Futures (New York Random House, 1979), appendix, "Limits to models".
12. In Favour of an Energy-Efficient Society (Brussels, Commission of the European Communities, June 1979).
13. Energy Scenarios for the Community in the Year 2000 (Brussels, Commission of the European Communities, June 1978).
14. Demand and Conservation Panel of the Committee on Nuclear and Alternative Energy Systems (CONAES), "US energy demand: Some low-energy futures", Science, 14, April 1978.
15. F. Roberts, "The scope for energy conservation in the EEC, Energy Policy, vol. 7, No. 2 (June 1979).
16. Energy Conservation: The Prospects of Improved Energy Efficiency (Shell International Petroleum Co., September 1978).
17. Energy Objectives for 1990 and Programmes of the Member States (Brussels, Commission of the European Communities, November 1978).
18. T.B. Johansson, and P. Steen, Solar Sweden (Strokhholm, Secretariat for Future Studies, 1977).
19. M. Lönnroth, P. Steen, and T.B. Johansson, Energy in Transition (Stockholm, Secretariat for Future Studies, 1977).
20. W. Hafele, A.M. Khan, and B.I. Spinrad, Nuclear Power in the Developing World (London, Royal Institution Forum, June 1979).
21. V. Colombo, and O. Bernardini, A Low-energy Growth Scenario for the Europe of the Nine (Commission of the European Communities, 1979).

ENERGY ACCOUNTS AND BUDGETS  
THE NORWEGIAN EXPERIENCE

Paper transmitted by the Government of Norway  
Prepared by Mr. A. HERVIK\*

INTRODUCTION

Norway's energy position is changing dramatically. In 1973, national energy production covered about two thirds of domestic requirements; by 1977 it exceeded demand, and by the early 1980s production will be about three times domestic needs, thus leaving about 50 mtoe for exports.

Through the 1980s, annual production from known oil and gas fields will be slightly in excess of 60 mtoe. In the 1990s the production level from these fields is expected to decrease sharply. A major factor in determining future Norwegian production potential will thus be the exploration of new areas, including areas north of the 62nd parallel; if successful, it will enable Norway to export substantial quantities of oil and gas far beyond 1990.

Electricity demand, which in 1977 represented about 54 per cent of total energy requirements, is met almost exclusively by hydropower. To supplement the Norwegian hydro system, the Danish, Norwegian, Swedish and USSR grids are interconnected so that electricity can be transferred. This allows electricity to be imported in dry years (e.g. 1977), when water levels in the reservoirs are low. At the same time, it allows exports of low-cost hydroelectricity when water flows exceed requirements. A number of controversial hydro development projects have provoked great public interest in electricity demand forecasting.

Cost-effective conservation plays an important role in Norway's energy policy, and a number of actions have been taken. Pricing is considered to be the most effective tool. Electricity prices are generally below the level supposed to reflect long-term marginal costs; other energy prices in Norway have generally been at or above world market prices. In 1978, the Norwegian economy was put under a comprehensive wage and price freeze which will be in effect until January 1980. This excludes further action concerning prices during this period.

A number of measures to conserve energy in the transport sector have already been introduced, though mostly for reasons other than energy conservation. These efforts include comparatively high taxes on petrol and diesel fuel, relatively low speed limits and high purchase taxes on motor-cars. Subsidies to public transport are substantial.

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\*Central Bureau of Statistics.

Loans and loan guarantees are provided for investment permitting more efficient use of energy in industry. Official credit can cover up to 40 per cent of direct investment.

Since July 1978, industry has been allowed to set aside tax-free funds for investment in equipment for waste heat recovery from production and ventilation plants, as well as the use of refuse or waste as fuel for heat production. To stimulate such action, energy produced by recovery plants and back-pressure plants is exempt from the electricity tax.

In the residential sector, the Building Code imposes thermal efficiency standards. In addition, an ambitious information programme and substantial financial allocations for energy conservation research are important features of the energy policy.

This paper outlines present work in Norway to develop a system for the supply and handling of data for energy planning. The project is run by the Central Bureau of Statistics at the request of several ministries in the context of general resources accounting. The paper does not contain official statements of Norwegian policy, and the figures presented are to be regarded as merely illustrative.

#### Purpose and concepts

The main purpose of energy budgeting is to integrate energy planning into the economic planning process and to make use of tools and routines already established. Energy accounts form the foundation of energy planning. The input of data from the energy accounts to the economic model MODIS transforms the Government's projection of economic development for the coming six years into an energy projection called the "reference path". The next step is the budgeting process. This means using the routines from the economic budgeting process to gather information from ministries, directorates and big firms about changes in energy technology and special decisions on energy policy, and integrating this information into the "reference path." MODIS can also be used to analyse the sensitivity of the "reference path" to the energy impact of changes in macro-economic figures.

Introducing this energy planning system will be a rational extension of the macro-economic planning system. Energy accounts are modified, and extended energy balances adapted to the national accounting system. The energy budgets are drawn up using macro-economic planning models and routines.

#### Energy accounts as a foundation for energy budgeting

The energy accounting system is part of the resources accounting system, which has been established in turn as a part of the national economic accounting system. The energy accounting system can be regarded as a new block in the SNA (System of National Accounts). It includes data on energy reserves and production, but it is the information on energy use, as shown in table 1, that constitutes the basis for the link to the macro-economic models. The close connexion between accounts and budgets is extremely important. It is thus possible to monitor and explain any discrepancy between planned and actual developments in the energy system.

Use of economic models for developing "reference paths" for energy

MODIS IV is an economic model used by the Ministry of Finance in developing economic budgets. It is an activity model with 150 different production sectors. Private consumption is modelled on the basis of income and price elasticities for 78 aggregated commodity groups, including electricity, solid fuels and petrol. The model has a price block and income is distributed between wage earners, entrepreneurs and pensioners. Taxes are also taken into account. The model has been used in practical economic planning since 1960.

It is of paramount importance to co-ordinate expected future energy use with expected or planned economic development. In times of great economic uncertainty such as the present, it is necessary to establish rational routines whereby the energy projections can be revised as soon as new information about economic development becomes available. This is exactly what is achieved by connecting the energy account to the economic model. The government plan or projection of economic development outlined by MODIS IV for the coming six years is transformed into an energy projection, the so-called "reference path", which is automatically revised on the basis of new information.

The fundamental purpose of the "reference path" is to make it possible to attach a set of fixed energy coefficients to each of the 150 production sectors in MODIS. These coefficients are obtained by disaggregating table 1 into 150 MODIS sectors and dividing each figure by the sector product.

Different assumptions concerning economic development will of course lead to different "reference paths". This is illustrated by table 2, which indicates the results of a test run. The "high" path corresponds to an optimistic view of the future, while the "low" path is derived from a more gloomy view of the growth potentials of the world economy.

Table 3 shows the derived energy balances. The plans for the energy sector are compared with the results of the "reference path" (the average between the high and low variants). The actual figures are provisional. The production of electricity in a "normal" year (1985) includes the output of new authorized hydropower plants. Tables 2 and 3 show the close formal connexion between energy accounts and energy budgets. Monitoring the development of the energy systems depends on arrangements whereby updated budgets can easily be compared with the accounts.

Table 1. Energy use outside the energy sectors, 1976

Industry	Coal	Coke	Gasolines	Petroleum	Light fuel oil, diesel oil etc.	Heavy fuel oil	Electricity
ISIC	1000 t	1000 t	1000 t	1000 t	1000 t	1000 t	GWh
<b>Total</b> .....	349	1 201	1 534	830	3 514	11 141	67 082
<b>Production sectors, enterprises:</b>							
1 Agriculture, forestry and fishing .....	-	-	20	13	448	34	707
11 Agriculture .....	-	-	11	1	150	34	707
12 Forestry .....	-	-	4	-	12	-	-
13 Fishing .....	-	-	5	12	286	-	-
2 Mining .....	7	-	1	2	40	48	876
23 Metal ore mining .....	7	-	-	2	20	47	743
29 Other mining .....	-	-	1	-	20	1	133
3 Manufacturing .....	325	1 171	242	6	462	1 459	37 093
31 Manufacture of provisions .....	-	-	8	1	113	252	1 445
32 Manufacture of textiles, leather and	-	-	-	-	-	-	-
33 leather products .....	-	-	3	1	30	23	294
341 Wood-processing .....	-	-	-	1	32	415	4 109
342 Printing, publishing etc. ....	-	-	2	1	10	1	216
351 Manufacture of industrial chemicals .	13	125	212	-	18	222	5 125
352,352 Manufacture of chemical products and	-	-	-	-	-	-	-
355,356 products of mineral oil, coal, rubber,	81	63	3	-	45	27	617
and plastic .....	-	2	-	-	6	288	352
3692 Manufacture of cement and lime .....	1	34	1	-	33	67	384
36*3692 Manufacture of other mineral products	-	293	4	-	14	6	2 144
37101 Manufacture of iron and steel .....	225	463	-	-	3	4	6 141
37102 Manufacture of ferro-alloys .....	3	5	-	-	8	2	246
37103 Iron and steel founding .....	1	160	-	1	18	30	11 606
37201 Manufacture of primary aluminium ....	-	24	-	-	2	69	1 752
37202 Manufacture of other metals .....	-	-	-	-	3	-	118
37203,37204 Rolling and founding,non-ferrous metals	-	-	-	-	-	-	-
38,39 Manufacture of workshop products,	-	2	7	-	109	39	2 006
other manufacturing industries ....	-	-	-	-	-	-	-
5 Construction .....	-	-	16	1	175	2	709
6 Wholesale and retail trade, restaurants	-	-	-	-	-	-	-
and hotels .....	-	-	203	26	285	9	2 382
61,62 Wholesale and retail trade .....	-	-	203	20	241	9	2 058
63 Operation of hotels and restaurants ...	-	-	-	6	44	-	324
7 Transport, storage and communication .....	-	-	56	440	1 192	9 561	760
7111, Rail transport etc. ....	-	-	-	-	17	-	554
71122 Scheduled bus transport .....	-	-	2	-	69	-	-
7113 Taxi and other unscheduled bus transport	-	-	16	-	17	-	-
7114,7116 Other transport by road .....	-	-	-	-	161	-	-
7121 Ocean transport .....	-	-	-	-	500	9 500	-
7122 Coastal and inland water transport ....	-	-	-	-	412	61	-
713 Air transport .....	-	-	3	438	-	-	-
7123,719 Services allied to transport .....	-	-	7	-	-	-	-
72 Communication .....	-	-	28	2	16	-	206
8 Financing, insurance, real estate and	-	-	-	-	-	-	-
business services .....	-	-	37	4	32	1	606
81,82 Bank and insurance .....	-	-	10	2	14	-	230
83 Real estate and business services .....	-	-	27	2	18	1	376
9 Other services .....	-	-	45	4	52	-	1 147
<b>Production sectors, public services</b> .....	-	-	100	28	346	11	4 003
91 Public administration .....	-	-	-	5	32	-	449
931,932 Educational and researching services ..	-	-	-	16	112	-	1 760
933,934 Health and veterinary services, social	-	-	-	7	65	1	1 061
care, etc. ....	-	-	100	-	137	10	733
Other sectors in public administration	-	-	-	-	-	-	-
<b>Households</b> .....	17	30	814	306	482	16	18 799

Table 2: Reference paths 1976 to 1985

ISIC	Solid fuels			Petroleum products			Electricity		
	1976	1985		1976	1985		1976	1985	
		1000 tonnes	high 1000 tonnes		low 1000 tonnes	1000 tonnes		high 1000 tonnes	low 1000 tonnes
11 12 Agriculture and forestry	0	0	0	212	294	293	0.7	0.8	0.8
13 Fishing	0	0	0	303	302	301	0	0	0
2.3 Manufacturing and mining	1,503	2,246	1,911	2,260	3,168	2,685	37.9	55.2	47.2
2 Mining	7	13	11	91	140	115	0.9	1.4	1.1
31 32 Provisions, clothing and footwear	0	0	0	407	428	406	1.7	2.1	1.9
341 Paper and paper products	0	0	0	448	581	539	4.1	5.9	5.4
3511,3512 Industrial chemicals	138	314	209	452	832	637	5.1	9.2	7.0
352,369 Mineral and chemical products	37	40	35	396	548	418	0.6	0.9	0.7
371,372 <sup>1)</sup> Basic metals	1,168	1,657	1,464	154	275	236	21.6	30.9	27.1
Other manufacturing	153	222	192	312	364	334	3.9	4.8	4.0
5 Construction	0	0	0	194	395	385	0.7	0.8	0.3
6 Trade etc.	0	0	0	523	668	561	2.4	3.1	2.8
7 Transport etc.	0	0	0	11,249	19,785	15,766	0.8	0.9	0.8
7121 Ocean transport	0	0	0	10,000	18,077	14,207	0	0	0
Other transport	0	0	0	1,249	1,708	1,559	0.8	0.9	0.2
8 9 Services	0	0	0	660	935	758	5.8	7.9	7.5
Personal households	47	55	50	1,618	2,094	1,807	18.8	24.0	22.0
Energy use outside energy sectors	1,550	2,301	1,961	17,019	27,645	22,556	67.1	92.7	81.9

1) Exclusive of 37103 and 37203

Table 3: Energy balances for 1976 and 1985

	Coal		Coke		Crude oil		Natural gas		Petroleum Products		Electricity	
	1976 1000 tonnes	1985 1000 tonnes	1976 1000 tonnes	1985 1000 tonnes	1976 1000 tonnes	1985 1000 tonnes	1976 million Sm <sup>3</sup>	1985 million Sm <sup>3</sup>	1976 1000 tonnes	1985 1000 tonnes	1976 TWh	1985 TWh
Energy use outside energy sectors	-349	-388 <sup>1)</sup>	-1201	-1744 <sup>1)</sup>	0	0	0	0	-17019	-25101 <sup>1)</sup>	-67.1	-87.3
Primary energy production	514	1500	0	0	13799	40000	0	20000	-46	-130	81.3	99.8 <sup>2)</sup>
Energy conversion												
Coke plants	-372	-515	283	392	0	0	0	0	-20	-27	-0.1	-0.1
Petroleum refineries	0	0	97	110	-8419	-9900	0	0	7741	9100	-0.2	-0.2
Miscellaneous	-96	-100	-24	-30	100	100	0	0	32	30	0.1	1.1
Transport and distribution losses	0	0	0	0	0	0	0	0	-52	-65	-7.4	-7.9
Net exports <sup>3)</sup>	-303	497	-845	-1272	5480	30200	0	20000	-9364	-16193	6.6	5.4

1) Average of high and low reference path.

2) Average year production of planned capacity.

3) Including stock changes, and direct purchases abroad.

Table 4  
Industrial consumption of power in Norway (except occasional power to electric boilers) 1977-78 compared with the reference path in 1978

	Electricity consumption		Reference path
	1977 Twh	1978 Twh	1978 Twh
Electricity intensive industries <sup>1)</sup>	25.2	26.5	26.8
Paper and paper products	2.9	3.2	2.9
Other manufacturing and mining	6.6	6.8	7.1
Other production sectors	10.3	10.6	10.4
Households	20.2	21.1	20.7
Losses in electricity intensive industries	0.8	0.8	0.8
Losses in other sectors	6.4	6.7	6.6
<b>Total consumption</b>	<b>72.4</b>	<b>75.7</b>	<b>75.3</b>

1) These industries contain sectors 351, 37 101, 37 102, 37 201 and 37 202 which are shown explicitly in Table 1.

Table 4 illustrates how the actual evolution of electricity consumption can be compared with the "reference path". Any discrepancy is explained largely by reference to developments in the private household sector. The end of the year 1978 was extremely cold, and the bulk of electricity for household use is destined for heating purposes. With allowance made for this fact, the actual evolution of electricity consumption is very close to the "reference path". This indicates that the macro-economic model has so far furnished a satisfactory explanation of developments in the field of electricity, and that the starting point of the "reference path" is close to reality.

#### The budgeting process

The "reference path" is only a first approximation to the budget. During the budgetary process the energy coefficients are adjusted by the appropriate authorities, so as to take political decisions as well as substitution effects and energy savings into account. The data needed are gathered using questionnaires addressed to the ministries responsible for the different sectors, asking them to provide information on changes expected in energy coefficients by 1985. As background information, the Ministry of Petroleum and Energy provides a survey of future energy policy, including price policy and price expectations. In this way, the different ministries and directorates become directly involved in a kind of indicative energy planning.

The above procedure for energy planning is normal practice in Norway today. For the sake of illustration, some cases where the "reference path" is adjusted are described below.

Let us take as an example a political decision that electricity-intensive industries will be penalised if they use more than 33 Twh (34 TWh including losses) in 1985. The "reference path" (see table 2) indicates 34.1 Twh and 40.1 Twh for the high and low economic growth alternatives, respectively. If the

Government wants production in these sectors to reach the high alternative in MODIS and still achieve 33 Twh in 1985, it will have to encourage changes in energy technology in these sectors. Information from questionnaires shows that planned technical improvements will save 3.8 and 3.2 Twh in the high and the low paths respectively. The mean of the two will be very close to the Government target (33.6 Twh). In table 5, the "reference path" is adjusted to comply with the Government decision.

At the same time, the government has indicated that the price of electricity might be raised to the level of long-term marginal costs. This will mean a reduction in electricity consumption in private households by 0.7 Twh, on the assumption of direct price elasticity of -0.25 (estimated for Norwegian households) and cross-price elasticity to oil of 0.05. The "reference path" will be further adjusted to take this political decision into account.

The substitution effects in the production sectors are partly taken care of by the price block of the MODIS model. This transforms the rise in the electricity price into differentiated price increases for the 48 consumption commodities on the basis of their direct and indirect electricity content. Subject to price elasticities, the consumption pattern will develop in a less energy intensive direction. But changes in sectoral production technologies are not taken care of directly by the model. This adjustment is the responsibility of the budgeting process. For instance, some changes are expected in sector 341, Paper and paper products, which will bring an adjustment of 0.3 Twh in the "reference path". This will apply to various other sectors as well. In the services sector electricity is expected to reduce oil, and this will change the energy coefficient, but the results here will not be available before the budgeting process is completed.

The "reference path" for oil products has been adjusted for changes in technology in the main industrial sectors. The recent rise in oil prices could cause dramatic substitution of hydroelectricity for oil products. Electricity can theoretically replace a quantity of oil equivalent to approximately 40 Twh for heating purposes. There is no way of supplying such an amount of electricity in the short run, and the only way to avoid rationing would be to raise the price of electricity. The "reference path" does not provide for any dramatic changes of relative prices between energy commodities.

In table 5, the "reference path" has been adjusted for the points mentioned above. The occasional use of power for electric boilers is easily replaced by oil, and is included in the "reference path" for petroleum products (1 Twh = 100,000 tonnes). As in table 3, the adjusted "reference path" corresponds to the mean value of the high and low alternatives of economic growth. For the hydropower system, primary energy production is adjusted to an absolute minimum (years with poor precipitation). The conclusion is that even with this high security margin for the supply system, Norway will have a positive export balance, if the Government intends to reach the adjusted target in the "reference path".



Table 5  
Energy balance. Adjusted reference path

	Electricity		Petroleum products	
	1976	1985	1976	1985
	Twh	Twh	1000 tonnes	1000 tonnes
Energy used outside energy sectors	-64.4	-79.1 <sup>1</sup>	-7269 <sup>2</sup>	-8890 <sup>2</sup>
Primary energy production	81.3	91.0 <sup>1</sup>	- 46	130
Energy conversion	- 0.1	- 0.1	- 20	- 27
Coke plants	- 0.1	0.1	- 20	- 27
Petroleum refineries	- 0.2	- 0.2	7774	9100
Miscellaneous	0.1	1.1	32	30
Transport and distribution losses	- 7.4	- 7.7	- 52	- 65
Net exports	- 9.1	5.0	419	18

1) The supply level that we will be quite certain not to get below even in extremely dry years.

2) Exclusive of ocean transport.

#### Feedback to the economic plans

In developing the "reference path" there is no mechanism for feedback to the economic plans. Short-term and medium term models showing how energy supply and demand influence the rest of the economy have not yet been developed. However, the models take into account the energy consequences of the economic plans.

The energy budgeting process generates important feedbacks to the economic plans, particularly for the allocation of investment. The energy budgets will provide the best information concerning decisions on investment in hydroelectric power plants. This will influence the allocation of capital as a whole and the development of other production sectors. The role of energy as a limiting factor for certain sectors, for example electricity in the electricity-intensive sectors, will also be spelled out more explicitly in the budgeting process, and this may influence the economic results. Certain other exogenous factors, for example energy prices, will probably also change in the course of the budgeting process.

#### Co-ordination of medium-term and long-term models

MODIS is used only for medium-term economic planning (six years), but we also need long-term forecasts. In economic planning, this is achieved by co-ordinating MODIS and the long-term MSG (Multi Sectoral Growth) model. The same procedure has been used for the energy forecasts. MSG starts where MODIS ends, in the year 1985. The long term forecasts are uncertain and depend very much upon political decisions made today. In the short run we cannot influence developments very much, but in the long run we can. The medium-term models will be very important as tools for reaching the long-term goal. Table 6 shows a forecast for the year 2000. The results are extremely uncertain, and a special version of this MSG model is being developed to improve the handling of long-term aspects.

MSG-E (MSG-energy) will handle the supply and demand of energy simultaneously, taking into account the capital needed in the energy sectors. In addition, the model permits substitution between energy, employment and capital in the production sectors. While simple models combined with sectoral information are adequate in the short and medium term, more sophisticated models are required to make long-term projections.

Table 6

Electricity consumption 1990-2000

	1990		2000	
	High Twh	Low Twh	High Twh	Low Twh
Agriculture and forestry	0.9	0.9	1.0	0.9
Manufacturing and mining 1)	14.7	11.9	17.6	12.9
Construction	1.1	0.9	1.5	1.3
Services	1.5	1.3	2.0	1.7
Transport	1.5	1.3	2.0	1.7
Private households	27.1	24.5	33.4	28.5
Net consumption	56.2	49.6	70.2	57.4
Losses	8.4	7.4	10.5	8.6
Power intensive industries 2)	34.0	34.0	34.0	34.0
Total consumption	98.6	91.0	114.7	100.0

1) Except the electricity-intensive industries

2) The government is likely to maintain its aim of allocating .34 Twh to the electricity-intensive sectors.

TABLES OF EFFECTS

"Tables of effects" are being used in the Norwegian economic planning process in order to study the impact of changing macro-economic variables (private consumption, public consumption etc.). Tables of effects show how endogenous variables are affected by changes in exogenous variables in the models, and may also be considered as results of sensitivity analyses. Tables of effects have been modified to include effects on energy use. Table 7 indicates the sensitivity of domestic energy consumption to changes in some macro-economic variables.

Table 7

Table of effects on energy use

Changes in the use of electricity and oil products	Electricity		Oil products
	Twh	1,000 tonnes	
Exogenous addition to:			
Private consumption	(10 <sup>9</sup> Nkr. = 0,9%)	0,31	37,7
Public consumption	(10 <sup>9</sup> Nkr. = 2,6%)	0,22	30,0
Investment	(10 <sup>9</sup> Nkr. = 2,3%)	0,17	23,6
Export <sup>1)</sup>	(10 <sup>9</sup> Nkr. = 2,3%)	0,63	40,1
- of raw material and intermediate products	(10 <sup>9</sup> Nkr. = 6,2%)	1,42	29,6
- of other goods and services <sup>1)</sup>	(10 <sup>9</sup> Nkr. = 3,5%)	0,17	34,8

1) Except shipping services and crude oil.

POLICIES FOR PROMOTING CONSUMER ENERGY CONSERVATION:  
AN AMERICAN-EUROPEAN PERSPECTIVE

Report transmitted by the Scientific Committee  
on Problems of the Environment (SCOPE) of the  
International Council of Scientific Unions (ICSU)

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I. THE PROBLEM OF CONSUMER ENERGY CONSERVATION

Although there are widely differing opinions concerning the size of the world's remaining oil and natural gas deposits, the inescapable fact is that these resources will be largely depleted within the lifetime of many people living today. Industrial nations that depend heavily on these fuels must - within a relatively brief period of time - develop technologies for using renewable energy sources and reduce their consumption of non-renewable fuels. If they fail in this endeavour they may face economic and political disaster (Hayes, 1977).

A. The importance of energy conservation

The imperative need to replace oil and natural gas as the main sources of energy cannot be ignored or minimized. While searching for alternatives, industrial nations can take action to reduce their current levels of consumption, so as to prolong the supply of non-renewable resources and gain additional time to develop alternative sources. Energy conservation is the cornerstone of the national energy policy of the United States; it is also inherent in the energy planning of the European Economic Community and has been proposed as basic policy for many individual ECE member countries.

In addition to being an aid in the transition from non-renewable to renewable energy sources, conservation can be viewed as a highly desirable permanent energy policy. It is often said that energy conservation is our most important energy source. Energy wasted is energy lost, regardless of its source, and all industrial nations waste huge amounts of energy every year. The United States and Canada are by far the worst offenders, since they consume nearly twice as much energy per capita or per dollar of gross domestic product as any other industrial nation (Schipper and Lichtenberg, 1976; Darmstadter et al., 1977). Numerous analysts have concluded that between 30 and 40 per cent of all energy consumed in the United States is wasted (Sawhill, 1974, Schipper and Lichtenberg, 1976), and much of this waste could presumably be prevented by effective conservation programmes (Dole, 1975; Skidmore, Owings, and Merrill, 1976). Even if levels of energy consumption in all European countries are much lower than in the United States, it has been estimated that conservation could reduce future European energy requirements by over 25 per cent (Meyer-Abich,

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1978; Directorate-General for Research, Science and Education, 1979). Moreover, energy conservation costs only a half to a quarter as much as new energy production (Lovins, 1977; Schneider, 1978). Hence there are quite sufficient grounds, apart from the current energy crisis, for promoting energy conservation as a vital policy in all industrial societies.

Energy conservation is particularly critical for consumers, for two reasons: (a) between 30 and 50 per cent of all direct energy consumption in most industrial societies occurs in the domestic sector; <sup>1/</sup> and (b) most efforts by industry, business and the public sector to conserve energy will have far-reaching consequences for consumers. The focus of the present paper is therefore on individuals and households as the final consumers of energy. This domestic consumption sector covers both energy used in the home and energy for personal transport.

#### B. The meaning of consumer energy conservation

The basic goal of all energy conservation policies is to reduce the consumption of energy from non-renewable sources. Four alternative approaches to the implementation of this policy goal will be considered below, namely:

(a) Technical efficiency. - Make current technical equipment more efficient so that less energy is required to perform the same functions (e.g., having the furnace cleaned and serviced);

(b) Alternative sources. - Change from a non-renewable to a renewable energy source (e.g., install a solar heating system);

(c) Behavioural changes. - Use technical equipment more efficiently, so that less energy is needed to maintain present lifestyles (e.g., reduce the heating temperature at night);

(d) Lifestyle modifications. - Adopt new patterns of consumption and living that require less total use of energy (e.g., move from a single-family to a multi-family dwelling).

All four approaches to conservation involve both technical and human factors, although the first two rely mainly on technical actions, while the latter two are primarily concerned with human aspects of energy use. Viewed from a different angle, the first three approaches do not presume any intentional changes in consumer values and goals, whereas such changes are central to the fourth approach - even if lifestyle modifications can range from minor alterations (such as walking more) to a shift towards totally new living styles (characterized, for example, by low consumption and self-sufficiency). While these approaches differ significantly in emphasis, they should not be viewed as incompatible or mutually exclusive; a comprehensive energy conservation policy might incorporate all four of them.

#### C. Areas of domestic energy consumption

Energy consumption by individuals and households can broadly be classified in three broad categories of direct use, to which has to be added one category of indirect consumption for the production of all goods. Direct use is estimated to

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<sup>1/</sup> Sweden - 29 per cent; United States - 34 per cent; France - 37 per cent; United Kingdom - 38 per cent; Federal Republic of Germany - 46 per cent. (Newman and Day, 1975; Darmstadter et al., 1977:29).

constitute about 60 per cent of all domestic energy consumption in the United States, indirect consumption about 40 per cent (Hayes, 1976) <sup>2/</sup>. The three principal areas of direct domestic use are (Newman and Day, 1975:34):

(a) Space conditioning: heating and air conditioning (32 per cent of all direct domestic use in the United States);

(b) Use of appliances: for water heating, cooking, refrigeration, lighting and all other uses (24 per cent of all direct domestic use in the United States);

(c) Private travel: by motor-car, taxi, bus and aeroplane (44 per cent of all direct domestic use in the United States).

Some writers treat the use of appliances for water heating as a separate category because of its relative importance.

#### D. The need for social research on consumer energy conservation

Much of the existing research and writing on energy conservation has dealt principally with the technical aspects of energy consumption and demand (BMFT, 1978; Cook, 1976; Fichtner, 1976; Skidmore, Owings, and Merrill, 1976). Most conservation proposals consequently rely on technological devices for obtaining, transmitting and using energy more efficiently. Admittedly, more efficient technology can greatly reduce the waste of energy. No matter whether technological innovation is as simple as putting insulating covers on water heaters, or as complex as developing more fuel-efficient cars, it must be a fundamental aspect of any energy conservation policy. Energy consumption is a technical process, and the more efficient that process, the less energy it will require.

It would be wrong to believe, however, that a "technical fix" approach would be sufficient, in itself, to achieve significant energy conservation. Technology is worthless unless people are willing to adopt and use it in an appropriate manner. Consequently, promoting energy conservation is ultimately as much a human as a technical problem. In fact, a variety of highly effective conservation technologies are already available, but knowledge of how to induce people to adopt and use these conservation technologies is often lacking (O'Toole, 1976). This problem clearly calls for research by all the social sciences, including sociology, psychology, economics, political science, jurisprudence and public administration. Because this paper is concerned mainly with consumer behaviour, it will draw primarily on work by sociologists and social psychologists.

When examining the problem of energy conservation, social scientists have frequently adopted a macroperspective, concentrating on such topics as the effect of conservation on national economic growth and industrial productivity (Energy Policy Project, 1974; Hudson and Jorgenson, 1974), projections of energy consumption trends (CONAES, 1978; Hirst and Carney, 1978), or scenarios of

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<sup>2/</sup> We will not deal with the indirect consumption of energy that occurs whenever a person buys an energy-intensive product (such as steel, aluminium, paper, cement, and plastics), since reducing the amount of energy required to produce these goods is largely a technical problem that is commonly placed within the industrial sector. And even if consumers do wish to avoid purchasing energy-intensive goods, this can be very difficult because (a) they have no way of knowing how much energy is embedded in each product, and (b) adequate non-energy-intensive goods are often unavailable.

possible future societies (Harman, 1977; Lovins, 1977; CONAES, 1977). Relatively little attention has been given to the question of how to achieve greater energy conservation. <sup>3/</sup>

E. A theoretical perspective on energy conservation

Theoretically the problem of promoting consumer energy conservation can be viewed as a particular instance of the general process of creating intentional social change. Although social scientists have constructed conceptual models of this overall process (R. Warren, 1977), they have so far not developed a theoretical framework to examine the implementation of energy conservation. A suggestive perspective on this topic is provided, however, by the parable of the "tragedy of the commons" (Hardin, 1968), which emphasizes the continual conflict between immediate private interests and long-term public concerns. The problem has been described as follows:

"Time is running out for the world. Overpopulation, pollution and the depletion of non-renewable resources are the result of uncontrolled growth in a finite environment. These processes are the product of a pervasive conflict between the individual short-term good, which demands continual growth, and the collective long-term good, which requires restraint. Garrett Hardin ... compares our situation to that of a group of herdsmen grazing their cattle on a common range. Each is motivated to add an animal to his or her herd, since the net profit will be the full value of an animal less a small cost due to competition from the new animal for the available grass. Since each herdsman will profit from adding animals, there is an inexorable trend toward overgrazing of the range, which ends only with the ruin of all the shepherds. Hardin argues that the logic of the commons operates whenever people have unlimited access to a cheap but finite resource.... The logic of the commons dictates that, through the rational actions of individuals pursuing their own well-being, these resources will all be exploited until they can no longer support the population. This situation is called tragic because individual rationality leads with certainty to collective ruin "(Stern, 1976).

The basic point is that when a desired public good exists in finite quantities, eventual collective disaster can be avoided only if everyone restrains his tendency to maximize short-term benefits. In other words, the "challenge of the commons" is to discover how intentionally to orient human behaviour and society toward the goal of balancing private expediency and public responsibility. An alternative way of stating the problem is to ask how people can be induced to contribute their individual share to the attainment of a public good of benefit to everyone (Olson, 1965). Successful implementation of any large-scale energy conservation programme may well depend on the finding of a viable solution to the twentieth-century version of the "public good dilemma" that appears to be leading inexorably to a "tragedy of the energy commons".

It is of critical importance however, not to misinterpret the parable. It does not suggest that all personal interests should be surrendered to serve the public good. The argument is rather that some kind of limit must be placed on the unbridled pursuit of private gain, so as to permit collective goals to be achieved. Such restraint on individuals can always be imposed by outside forces,

<sup>3/</sup> Ian Forbes (1977) makes this point quite forcefully in a rebuttal of Amory Lovins' idea of "soft energy paths": "It is this question of 'how' that is so fundamental to decision-making in general, and energy in particular, yet it is absent from many current deliberations in all but the most simplistic sense."

such as government or the market-place. Alternatively, individuals can voluntarily control their own behaviour for the sake of the common good. In this analysis of consumer energy conservation policies, it will be assumed that both voluntary and obligatory strategies are necessary and can be integrated into coherent public policies to reduce the consumption of non-renewable energy.

F. Previous social research on consumer energy conservation

Since the 1974 oil embargo, well over 200 empirical studies of consumer energy conservation have been conducted by social scientists, mainly in the United States. Economists have re-examined the effects of price changes on energy consumption; social psychologists have carried out experiments on the effects of information and incentives on conservation attitudes and actions; sociologists have conducted surveys to discover how extensively conservation practices have been adopted by the public; and political scientists have explored possibilities for governmental conservation programmes. <sup>4/</sup>

The findings of this research can be summarized as follows:

(a) Most people understand that there is an energy problem, and between a third and a half of them view it as serious, either now or in the future;

(b) There is no correlation between believing in the seriousness of the energy problem and taking conservation action;

(c) Knowledge of energy conserving techniques is not sufficient, by itself, to motivate people to take conservation action;

(d) Intensive consumption-feedback and financial incentive programmes can reduce domestic energy consumption by 10 to 20 per cent, at least for a short period;

(e) A majority of households have taken some minimal conservation action, such as turning off unnecessary lights;

(f) People are just beginning to take major conservation action, such as insulating their homes;

(g) When asked about the reasons for taking conservation action, people generally have two equally frequent answers: to save money, either now or in the future; and to help to solve the energy crisis;

(h) Rising energy prices, as experienced so far, affect people differently, according to their income level: low-income groups have little discretion to reduce energy use, and hence merely suffer further financial hardship; middle-income groups respond to price increases by attempting to reduce energy consumption; high-income groups make no more than token conservation gestures, and largely continue to consume as much energy as before;

(i) A large majority of the public would like the government to take rather strong action to promote energy conservation in an equitable manner, including the setting of energy efficiency standards for buildings and products, the allocation of financial subsidies for investment in home conservation devices,

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<sup>4/</sup> Many of these studies are summarized and analysed in six recent works, which together provide a fairly comprehensive overview of recent social research on energy conservation: Cunningham and Loperato, 1977; Ellis and Gaskell, 1978; Milstein, 1977; Warkov, 1978; and Winett and Neale, 1978.



the establishment of zoning and land use regulations to promote conservation, and the introduction of programmes for energy rationing;

(j) At the same time, the less disruptive of current lifestyles a proposed energy conservation programme is, the more widely and quickly it is likely to be adopted.

These general findings provide useful information on current energy conservation efforts, but also on serious gaps in our knowledge. In particular, there is at present an almost total lack of social research that might assist public policy-makers and government officials in designing and implementing effective energy conservation policies (Cunningham and Lopreato, 1977:77).

#### G. The process of promoting consumer energy conservation

The principal concern of the present paper is to develop an analytical framework for social science research on consumer energy conservation policies. More specifically, the concern is with strategies that governments - federal, State and local - could use to promote energy conservation among consumers. Figure 1 presents a model of the over-all process of promoting consumer energy conservation. The framework consists of three main parts: "current consumption", "policy strategies" and "policy outcomes".

### II. THE CONTEXTS OF DOMESTIC ENERGY CONSUMPTION

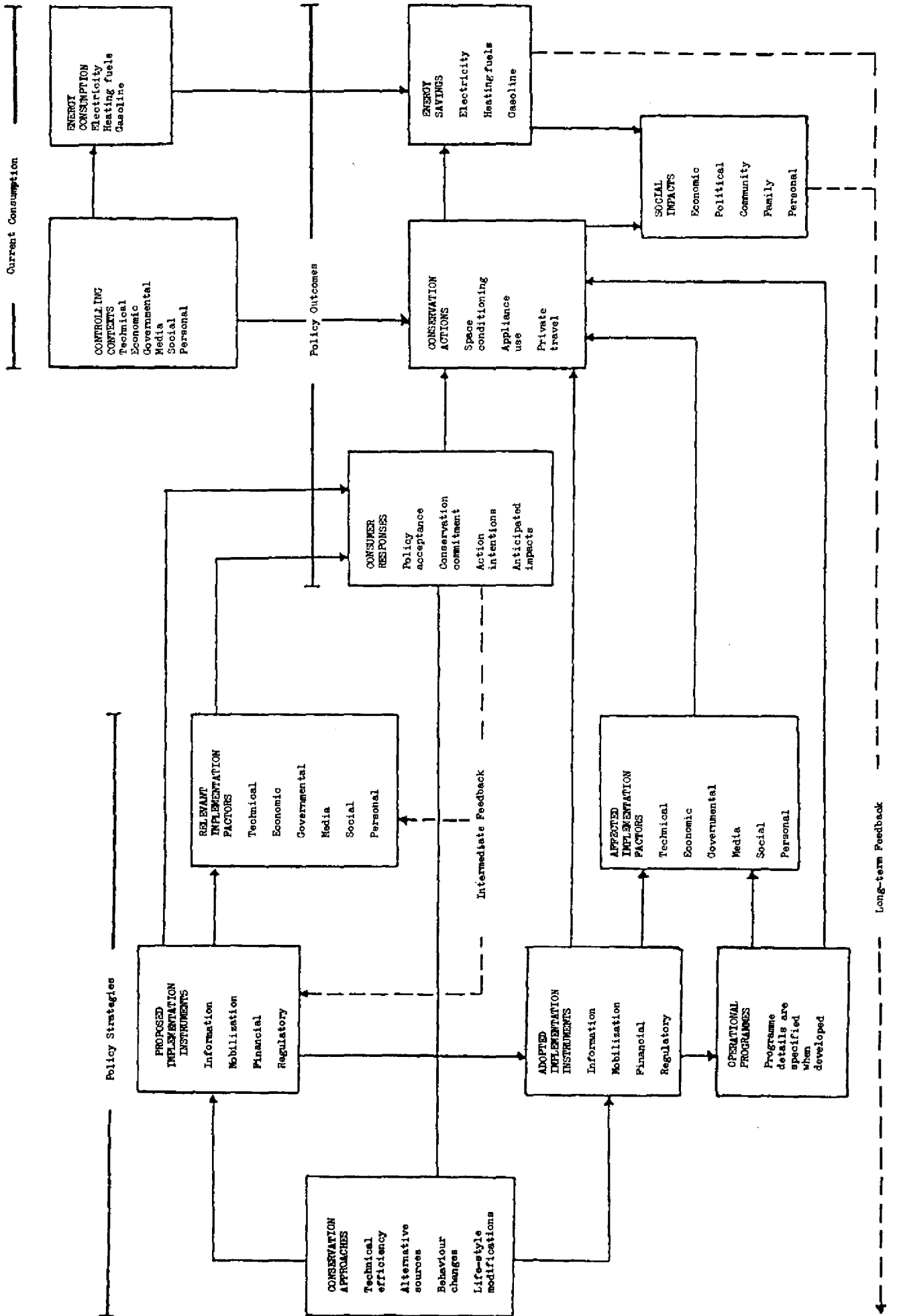
In order to devise policy to make people change the way in which they use energy, it is necessary first to understand both their present patterns of energy consumption and the conditions or contexts that shape those patterns. Consumer energy use patterns have been fairly well documented for the United States (Newman and Day, 1975; Perlman and Warren, 1977); and similar research has been conducted in the Federal Republic of Germany (Joerges and Kiene, 1979; Stanford Research Institute, 1975), in Sweden (Doernberg, 1975; Schipper and Lichtenberg, 1976), and in several other European countries (Darmstadter *et al.*, 1977). However, little attention has so far been given to the contexts determining the patterns. This section therefore focuses on these contexts and possibilities of changing them in order to conserve energy.

Current patterns of energy consumption are the joint product of: the technical characteristics of the physical equipment involved in producing, distributing and consuming energy; the institutional characteristics of relevant economic, governmental, media and social structures; and relevant personal characteristics of individual consumers. Changes in energy consumption, whether desirable or undesirable, will always be a consequence of changes in some or all of these controlling contexts. Changes in one context will, as a rule, have repercussions in the other contexts, necessitating complex adaptation before consumption patterns become stabilized on a new level. Any policy for promoting energy conservation - whether its main thrust is technical, institutional or personal - must therefore be based on an understanding of the ways in which these interactive contexts shape energy consumption.

Whereas numerous studies of energy conservation have examined the technical factors influencing energy consumption, little research has been done on the ways in which the technical context is integrated into institutional and personal systems (for one attempt to do so, see Joerges and Kiene, 1979).

THE PROCESS OF PROMOTING CONSUMER ENERGY CONSERVATION

Figure 1



A. The technical context

The technical characteristics of people's living conditions will directly affect the amount of energy they consume, regardless of individual variations in use patterns. The major features of the technical context are determined by:

(a) The dwelling unit: its size, construction, insulation and other thermal properties;

(b) Energy-consuming equipment in the dwelling unit: type, fuel used, and functional efficiency of the heating unit, hot water heater, and other major household appliances, such as stove, refrigerator, freezer, dish-washer, washing machine and dryer;

(c) Personal transport equipment: type and functional efficiency of motor-cars, recreational vehicles and motor-cycles;

(d) The public transport system: type, fuels used, and its functional efficiency;

(e) The community design: relevant characteristics of the physical infrastructure of the community for work, shopping, education, recreation and transport such as density, relative location of facilities, and microclimatic conditions.

Some technical factors are subject to consumer choice; others are not, either because the market fails to provide consumers with alternatives, or because alternatives are out of the legal or economic reach of individual consumers. Important characteristics of that part of the technical context which can be manipulated directly by consumers include: insulation in the attic; air leaks around windows and doors; operating conditions and insulation of heating units; size and fuel efficiency of other major household appliances (within the limits of available products); thermostats and other metering and regulating devices for energy-consuming equipment (again within the limits of available instruments); and the size of one's car. Technical characteristics that cannot easily be altered by the average consumer include: the size, construction and location of one's home; the physical design of the community; facilities for public transport; and new fuels and associated technologies, e.g. solar collectors and photovoltaic cells, that are not yet commercially available <sup>5/</sup>.

Total energy consumption in a community is heavily influenced by numerous features of its physical design and properties (see for example, Harwood, 1977). Particularly crucial in this respect have been: the pervasive urban trends toward single-family dwellings; suburbanization and urban sprawl; separation of work, residence, consumption and recreation; increasing reliance on private cars; and neglect of public transport systems. Comprehensive community planning and redesign to make buildings, land use patterns and transport networks more energy efficient offers many new and fascinating possibilities for conserving energy. This endeavour may be seriously limited, however, by the fact that the social integration of complex technical aggregates such as whole cities is not well understood by the social sciences (Joerges, 1977 and 1979).

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<sup>5/</sup> Little research has been conducted on the institutional and personal dimensions of new energy-conserving fuels and technologies. A few relevant works are: Campbell, et. al., 1977; Council on Environmental Quality, 1978; Klein, 1979; and Krusche, 1979).

For each area of energy consumption (e.g. space conditioning, hot water heating and private travel), the questions can be asked: whether current energy-consuming technology is economically feasible; whether it is legally and economically available to individual consumers; and, if so, whether it is actually used by them. Depending on the answers, the analyst may then look for factors determining energy consumption in the economic, governmental, mass media, social and personal contexts.

#### B. The economic context

Energy consumption is a complex economic activity which as a rule involves the combined use, over an extended period of time, of numerous goods and services delivered by both public and private companies. Disregarding the level of income and ownership of goods, which will be treated as personal characteristics, the complex economic context of domestic energy consumption is mainly shaped by such factors as:

(a) Public utility rates: in what ways do current energy prices and rate structures (declining, constant, or increasing with the amount used) explain people's energy choices and consumption levels? 6/

(b) Billing procedures: do procedures for energy billing (such as metering the amount actually used, charging according to the size of the dwelling unit, the time schedule of the billing, information contained in the bill, or payment for petrol by credit card) affect energy consciousness, willingness to pay for various kinds of energy, and the amount consumed?

(c) Energy and product availability: are technically and economically satisfactory types of energy and energy-consuming equipment made available to consumers? To what extent do energy and utility companies exercise monopolistic control over energy prices and availability? Is the availability of energy and energy equipment affected by the economic resources of consumers and their willingness to pay?

Again, some economic factors - such as the structure of energy and utility companies, or the functioning of the energy economy as a whole - are relatively impervious to change initiated by consumers. Those factors are influenced primarily by long-term government and business action. Industry and government will, however, be sensitive to the general consciousness and concerns of the consuming public about energy matters.

Other features of the economic context can, to a certain extent, be manipulated by individual consumers and organized consumer groups. These include prices and rates for various forms of energy; types of metering and billing; types of energy-consuming appliances; and consumer information provided by producers and sellers of energy and energy-consuming equipment.

#### C. The government context

Government agencies exercise considerable control over both the technical and economic contexts of people's energy use. This is especially the case when public utilities are operated by the government, which then influences domestic energy consumption in the same direct way as the economic factors mentioned above, although consumer/government relations pose problems distinct from those

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6/ This topic of energy rates has been extensively studied by economists. See Düwall, 1976; G. Hannon, 1974; Lebanon, 1977; Luhmann, 1978; and Luther, 1978.

encountered by consumers in the private market. Even if mediated by the economic and technical contexts, government influence can still be quite pervasive. Important features of the government context are:

(a) Regulations governing energy companies and utilities: price determination (fixed prices, price ceilings, or procedures for setting prices); investment credits and depletion allowances; monopoly controls; and operating requirements;

(b) Standards for equipment efficiency and information on equipment, building standards, appliance standards and motor-car standards, as well as regulation of product advertising and labelling;

(c) Research and development for alternative technologies: legal and financial measures to encourage the introduction of innovative products and processes in household and transport technology;

(d) Community codes: zoning laws, building requirements, landlord-tenant contracts and liability rules;

(e) Consumer policy: consumer information and protection provided by public agencies;

(f) Government officials: their public stance toward energy conservation and leadership in promoting it.

Many of the above factors can be manipulated easily if the government wishes or is under public pressure to do so. This is true in particular for regulations and operating requirements for existing utilities; standards for equipment and materials available in the market; and advertising and labelling regulations. Other factors, such as investment planning in energy production, building, zoning and rent laws and energy research and development in industry, are in principle subject to governmental control, but cannot readily be influenced by the agencies responsible for conservation policy. Dispute about which government agency has the authority to take action as described occurs regularly, whenever conservation interests conflict with other interests. This applies to both horizontal linkages (i.e. between departments) and to vertical linkages (i.e. between federal, State, and local governments).

#### D. The mass media context

Part of the information that influences people's decisions about energy consumption is channelled through the mass media. This is obviously the case for product advertising by private business, and for government sponsored information about the energy situation and energy policy. In addition, the various media may, or may not, give special attention to energy issues from the consumer's point of view.

The context of mass media communication is very broad, encompassing television, radio, newspapers, magazines, books and films, as well as the "new media" of computer-based telecommunication. Its main features are:

(a) Editorial content: information about the energy situation and energy conservation generated by the media themselves, as well as by the audiences reached by these messages;

(b) Product advertising: the extent, content and effectiveness of business advertising for energy-consuming products and energy uses;

(c) Image advertising: the extent and content of "advocatory" advertising by industry, utilities and government stressing particular points of view on energy issues and responsibilities;

(d) Consumption and conservation literature: the availability, content and distribution of commercial literature on energy consumption patterns and conservation practices.

In respect of all these factors, a distinction must be made between the transmission and reception of information. The fact that information on energy conservation is transmitted to the public through the mass media does not ensure that it will reach the intended audiences. The extent to which energy consumption is actually shaped by the media context depends largely on the manner in which information is geared to personal factors such as concern and knowledge about energy matters, as well as informal communication networks for disseminating media information. Although information alone rarely changes behaviour, the mass media perform the function of giving pervasive support and legitimation to all kinds of social behaviour. The mass media can therefore be presumed to influence energy consumption patterns, and to affect attempts to change these patterns so as to attain new socially desirable levels (either higher or lower). The role played by the media in the process is not clear, however. On the one hand, the media are the main channel through which business and utilities disseminate information designed to de-emphasize conservation issues (Battelle-Institut, 1977; Sethi, 1978), while neither consumers nor government can easily influence the structure or the messages of the media. On the other hand, the press and television have generally taken a rather "progressive" stand on energy conservation, and attempts have been made, with some success, to market ecological products through the mass media (Raaij, 1978).

#### E. The social context

Within the limits imposed by available technology, energy-related behaviour is affected by interpersonal influence and mutual support as much as by media information, government regulations and economic conditions. The context of social influence, outside the media, government and the economy, must therefore be regarded as another set of critical factors determining energy consumption. It covers:

(a) Social communication between individuals: intercourse with friends and neighbours on a regular basis, and group expectations concerning energy use, conservation efforts and ownership of energy-consuming products;

(b) Neighbourhood activities: the existence, visibility and effectiveness of activities at neighbourhood level designed to affect energy consumption or conservation;

(c) Organizational actions: membership and participation in interest groups, such as consumer and environmental associations that actively promote energy consumption or conservation, or that indirectly support either the consumption or conservation of energy through their actions;

(d) Community programmes: the existence, visibility and effectiveness of programmes at community level designed to affect energy consumption or conservation.

Two conflicting principles operate in this context. On the one hand, the closer and more personal a social setting is for the individual, the more influence it is likely to exert on him or her. This suggests that social communication between individuals should be very effective in promoting energy conservation. On the other hand, the more highly organized and centralized the social setting, the more easily it can be redesigned to encourage social change. This suggests that interest organizations and communities should be especially effective in promoting conservation. In this context, the major consideration is therefore the nature and viability of social linkages between large organizations and more informal social relationships. If these linkages are numerous and strong, changes can be introduced at a broad level, and will then be transmitted outward to neighbourhoods and small groups where most individuals will encounter them.

The social context of energy consumption is also the setting for two opposing forces. The social inertia of established tradition and deeply rooted customs often acts as a barrier to technical and economic change that would conserve energy. At the same time, the social context provides a dynamic field in which new social movements arise and alternative solutions to economic and technical problems make their appearance before being accepted within the economic and government contexts (Rammstedt, 1979).

#### F. The personal context

Energy consumption is always influenced by numerous personal factors. At the end it is the individual consumer who acquires and uses energy-consuming equipment; who either consents to current energy conditions or seeks to alter energy consumption patterns by demanding appropriate changes in other controlling contexts. In theory, the personal context is composed of two parts: the "inner" behavioural attitudes acquired through past socialization, which mirror earlier states of the other controlling contexts; and the current states of the other contexts as perceived and experienced by the individual. Also included in this context are the socio-demographic and socio-economic characteristics of consumers. Without strictly differentiating between "inner" tendencies and experiences of "outer" situations, the vast array of personal factors affecting energy consumption can be reduced to the following components:

(a) Basic value structures: people's values concerning technological development, economic growth, material consumption, socio-economic status, quality of life, environmental protection and resource conservation;

(b) Perceptions of the energy situation: awareness of an energy problem (either at present or in the future); perceptions of the degree of seriousness and imminence of the problem, its probable causes and consequences; and the people and groups to whom responsibilities for action and management are attributed;

(c) Knowledge of energy consumption and understanding of technical energy systems: knowledge of present energy patterns of energy-using equipment and of possible means and procedures for reducing energy consumption;

(d) Experience in energy conservation: the nature, extent and "immediacy" of a person's past experience with energy conservation efforts;

(e) Socio-demographic and socio-economic characteristics: age, sex, race, family composition, education, occupation and income.

It has been argued that basic value structures in industrial societies are undergoing remarkable changes, although it is not clear whether these changes are essentially a class phenomenon or reflect particular stages of technological and economic development (Inglehart, 1977).

Although energy is increasingly being perceived as posing real and serious problem in some countries - and this may affect energy consumption in subtle ways (Battelle-Institut, 1977; Milstein, 1977; Zimmerman, 1978) - no direct relationship between this perception and energy-related behaviour has so far been demonstrated (Honnold and Nelson, 1976). More seriously, knowledge of energy use and competence in dealing with technical energy systems at the level of the individual are generally quite low (Clemens and Neun, 1978; Molt, 1977; Newman and Day, 1975). However, previous personal experience in energy-conserving practices appears to increase receptiveness to new conservation measures (Curtin, 1975).

#### G. Focus on the consumer

It was argued in section I above that energy conservation can be viewed as a problem of the "commons" or "public goods" that might be approached either from a macro, or structural, perspective or from a micro, or individual, perspective. Much writing on energy conservation has been limited to one of these two perspectives. On the structural side, engineers have commonly studied total energy systems, while macro-economists have explored national or international economic market-places (see Hoffman and Jorgenson, 1977, for a discussion of these structural approaches). On the individual side, psychologists have focused on internal psychological states as determinants of energy consumption, while micro-economists have treated individuals solely as rational economic agents.

In the present analysis, the intention is to bridge the macro-micro gap by focusing on consumers as active decision-makers who continually respond to both external structural forces and internal personal conditions. No attempt will be made to construct a "total system model" encompassing every variable that might conceivably affect energy consumption. Instead, all contexts that influence energy consumption will be examined - technical, economic, government, mass media, social and personal - with a view to detecting the factors that are most critical in shaping the actions of energy consumers. Questions will be asked about the ways in which relevant factors interact with one another, and the manner in which consumers respond to them in terms of consumption. In short, the focus will be on the energy consumer as an active decision-maker who responds to the complex setting provided by the technical, institutional, and personal contexts.

### III. STRATEGIES FOR PROMOTING CONSUMER ENERGY CONSERVATION

This paper is particularly concerned with strategies that could be used by governments to promote energy conservation among consumers. A strategy is a plan for enacting a public policy. As is shown in figure 2, strategies can be seen as containing six major components: (a) alternative approaches to the goal of conserving energy; (b) proposed instruments for implementing a conservation policy; (c) factors in the controlling contexts that are expected to be affected by the proposed policies; (d) the implementation instruments that are actually adopted; (e) the specific programmes that are developed for implementation; and (f) the portions of the controlling contexts that are actually affected by the adopted instruments and programmes. These components are discussed below under the three headings of: conservation approaches; implementation instruments; and implementation factors.



#### A. Conservation approaches

As was mentioned in section I, the over-all goal of reducing the consumption of non-renewable energy can be approached in four different ways by: making current technical equipment and processes more energy-efficient; by changing from non-renewable to renewable energy sources and technologies; by using technical equipment more effectively; and by adopting new patterns of living that require less energy consumption. In addition, three major areas of domestic energy consumption were identified: space conditioning, appliance use and private travel.

Combining these four approaches with the three consumption areas produces a twelve-cell matrix, shown in figure 2. Within each cell of this matrix particular actions that might be taken by individuals or households to reduce their energy consumption can be identified. The full range of possible consumer action to conserve energy is virtually limitless, but the energy savings that can be realized from such action - for instance turning off lights - are relatively trivial. Actions may serve as symbols of an individual's concern with conservation, however; they may make people more energy-conscious, or give them the feeling of contributing to global conservation efforts. They do not, however, save large amounts of energy. A carefully planned conservation policy should therefore primarily emphasize actions - such as the ones listed in figure 2 - that do result in substantial energy savings.

#### B. Implementation instruments

To attain a policy goal such as consumer energy conservation, governments must select and utilize various implementation instruments. These can be thought of as alternative means of intentionally creating social change, and hence are the dynamic core of any policy strategy. In figure 1, the implementation instruments are divided into two sets - proposed and adopted - which can be described simultaneously. The first set consists of the instruments that are considered by the government and proposed to the public. On the basis of the response from the public, interested organizations and other governmental agencies, parliaments and governmental agencies will adopt some (or all) of the proposals as instruments for attaining the defined policy goal.

In this paper the discussion will centre on the implementation instruments, ignoring specific operational programmes. The reasons are twofold. Firstly, many public officials and energy experts often jump immediately from the broad goal of conserving energy to designing specific conservation programmes, giving little or no thought to the kinds of instruments that might be most effective in pursuing their goal. It is contended that giving careful attention to alternative implementation instruments is a crucial, perhaps the crucial element in the development of strategies for social change. Secondly, since programmes must always be tailored to fit the particular situations in which they are to be conducted, they tend to differ widely according to place and time. In contrast, instruments can be analyzed in general terms without reference to particular settings.

Instruments for implementing social change can be grouped into four broad categories: 6/

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6/ These different types of instruments for social change are discussed more fully in Olsen and Goodnight, 1977. For a more theoretical analysis of ways of intentionally creating social change, See R. Warren, 1977,

Figure 2  
 IMPORTANT CONSUMER ENERGY CONSERVATION ACTIONS ARRANGED  
 BY CONSERVATION APPROACHES AND AREAS OF CONSUMPTION

Conservation Approaches	Areas of Consumption		
	Space Conditioning	Appliance Use	Personal Transportation
Technical Efficiency	Add insulation to the dwelling unit	Insulate the hot water heater	Drive a small, fuel-efficient auto
Alternative Source	Install a solar heating system (active or passive)	Install a solar hot water heater	Use methonal as an auto fuel when available
Behaviour Change	Lower the heating temperature	Lower the hot water temperature	Travel by mass transit or carpool
Lifestyle Modification	Live in multifamily housing	Share use of appliances	Live to one's employment

Figure 3

ENERGY CONSERVATION IMPLEMENTATION INSTRUMENTS

Information instruments

1. Problems awareness: Informing people about the nature and seriousness of the energy problem.
2. Conservation techniques: Informing people about actions they can take to reduce domestic energy consumption.
3. Consumption feedback: Giving people frequent feedback on their current level of energy consumption.

Mobilization instruments

4. Neighbourhood activities: Conducting neighbourhood-level energy conservation activities such as block workshops.
5. Organizational actions: Encouraging existing interest organizations to promote energy conservation in their actions.
6. Community programmes: Organizing community-wide energy conservation programmes of various kinds.

Financial instruments

7. Monetary incentives: Offering monetary benefits or imposing monetary penalties to encourage energy conserving actions.
8. Price increases: Allowing or forcing energy prices to rise so as to encourage reduction in energy consumption.
9. Energy surtax: Imposing a surcharge on all purchases of non-renewable energy, with revenues redistributed to all citizens.

Regulatory instruments

10. Energy standards: Setting and enforcing required energy efficiency standards for all energy-consuming products.
11. Energy allocation: Establishing energy consumption quotas or otherwise rationing the consumption of energy.
12. Community design: Using planning, zoning, and other legal actions to reorient community land use and building design.

(a) Information instruments - based on cognitive and attitudinal theories of social change. These instruments communicate information to people in order to make them aware of a problem and the actions they can take to help alleviate that problem, and also to change people's attitudes and values so that they will want to take those actions.

(b) Mobilization instruments - based on theories of social change through social interaction and influence. These instruments involve people in social activities in which they will be influenced by others or can act collectively to attain common goals.

(c) Financial instruments - based on economic and behavioural theories of social change. These instruments provide monetary inducements or impose deprivations that will make it rationally expedient for people to change their behaviour.

(d) Regulatory instruments - based on theories of social change through the social power structure. These instruments employ political power to alter the social environments in which people live, so that individuals will change their actions in response to these new conditions or will be sanctioned for not doing so.

Figure 3 lists three different implementation instruments falling within each of the above four categories. In the following paragraphs these twelve instruments will be commented upon in some detail.

Problem awareness: People have to be informed about known fuel availability, energy use patterns, energy projections and other aspects of the energy problem. The hope is that if people truly understand the extent and seriousness of the global energy crisis, they will voluntarily begin conserving energy. With few exceptions, however, all research conducted to date has found little or no correlation between belief in the reality of the energy problem and eventual energy conserving actions (Cunningham and Lopreato, 1977; Gottlieb and Matre, 1976; Honnold and Nelson, 1976; Perlman and Warren, 1977; Stern, 1976; D. Warren, 1974). Consequently, modifying the attitudes of individuals does not appear to be a necessary first step in promoting energy conservation (Heberlein, 1975). Nevertheless, increased understanding of the energy problem seems to make people more ready to respond to other measures (Zuiches, 1976); educational efforts may thus lay the groundwork for energy conservation by creating a favourable climate of public opinion.

Conservation techniques: People have to be informed about actions they can take to reduce their consumption of non-renewable energy, and also about the possible savings in resources and monetary terms arising from these actions. Such information is necessary if people are to understand how to reduce their energy consumption. However, there is fairly general agreement that this kind of information is insufficient to induce conservation behaviour (Ellis and Gaskell, 1978; Hayes and Cone, 1977; Milstein, 1977; Palmer, Lloyd and Lloyd, 1978; Winett *et al.*, 1977). For example, a recent field experiment showed that neither attending a block workshop at which conservation techniques were described nor having a home energy audit made any significant contribution to people's knowledge of how to save energy in the home (Olsen and Cluett, 1979). In short, the current conclusion is that "information alone does not work" (Winett and Neale, 1978).

Consumption feedback. Consumers have to be given frequent or continual feedback on their current energy consumption in order to be able to compare the current level with a preselected goal. It is presumed that, if people can be made aware of using too much energy - in relation to either an ideal standard or a goal set

for themselves - they will take action to reduce their energy use. This feedback process has been studied in a large number of experiments related to electricity consumption. Results have been contradictory. <sup>7/</sup> In some cases electricity consumption was reduced by 10 to 20 per cent, especially when consumers had set demanding goals for themselves (McClelland and Cook, 1978; Palmer, Lloyd and Lloyd, 1977; Seligman, Darley and Becker, 1977-1978). However, a number of studies related to feedback information combined with financial incentives for conservation found that only the latter reduced consumption significantly, feedback by itself producing no energy savings (Hayes and Cone, 1977; Kohlenberg et al., 1978; Winett, et al., 1978). There is no doubt that feedback will make people more aware of how they are using energy, but there is serious doubt among many researchers that feedback, by itself, is sufficient to motivate people to take conservation actions (Ellis and Gaskell, 1978).

Neighbourhood activities. Conservation activities and programmes conducted within local neighbourhoods will expose people to interpersonal pressure to adopt energy-saving practices. Such activities may include informal meetings among friends, workshops at neighbourhood level, and educational programmes on energy conservation in local schools. (The latter efforts might be particularly effective when schools are viewed as "community schools" that serve the entire population of a neighbourhood.) A study of responses to the 1974 oil crisis in the United States discovered that a major factor determining people to take conservation actions was the extent to which the neighbours were making such efforts (D. Warren, 1974). More recently, a programme of conservation workshops at apartment block level indicated a significant increase in conservation actions among those who attended (Olsen and Cluett, 1979). Neighbourhoods thus appear to offer a potentially effective setting for energy conservation activities.

Organization actions. Special interest associations of all kinds can be used as vehicles for promoting energy conservation. Numerous studies have found that membership and participation in an organization can strongly influence people's attitudes and actions (Verba and Nie, 1972). Consequently, if such organizations were to stress energy conservation in their programmes and actions, their members might be stimulated to practise conservation at a personal level. In addition, the organizations can also exert influence on non-members and the public as a whole. Particularly important are consumer organizations that actively work for energy conservation (illustrated by Verbraucher-Zentrale, 1978). Environmental organizations have also been promoting energy saving but have not yet given much attention to consumers.

Community programmes. The entire community can be used as a setting for encouraging energy conservation. The rationale is the same as for neighbourhoods and interest organizations, but in this case the programme is sponsored and co-ordinated by an agency of the city government, and may include a variety of activities aimed at a broad category of people. Few communities have as yet undertaken such extensive conservation efforts, but experiments (for example in Davis, California) report strong interest among citizens and over-all energy savings by the community of 25 per cent or more (McGregor, 1977).

Financial incentives: Monetary benefits (such as tax deductions, tax credits, investment credits and interest reductions) can be introduced to promote investment in energy-conserving equipment or other conservation measures. Monetary penalties (such as taxes or surcharges) on energy-consuming equipment or energy-wasting activities can also be used. The effects of incentives on energy consumption have been examined in several studies, with mixed results. In

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<sup>7/</sup> For a survey of all these studies, see Ellis and Gaskell, 1978.

one study, cash incentives reduced car driving by 20 per cent (Foxy and Kake, 1976). Over 75 per cent of the respondents in a recent survey in the United States indicated that the new programme of government tax credits for 15 per cent of expenditure on home insulation would have "some" or "much" influence on their decision to take action (Olsen and Cluett, 1979). Several studies have also been carried out on the effect of cash rebates for reduced household consumption of electricity. Although very large rebates (price decreases of 200 per cent or more) produced energy savings of up to 30 per cent, smaller rebates (less than a 100 per cent price decrease) had little effect on energy consumption (Hayes and Cone, 1977; Kohlenberg, *et-al.*, 1978; Winett and Neale, 1978). Thus the use of financial incentives may prove effective in promoting energy conservation, but more evidence would be required to take a definite stand.

Price increases: This instrument relies on the presumption that energy consumption should decline proportionally as prices rise. Energy prices can be increased by removing all non-market or political constraints, thus allowing prices to rise to the current world market level, or by imposing taxes on energy sales to raise the price above the market level. Price increases can be applied evenly to all energy sales, or they can be structured in various ways such as increasing block rates or time-of-day pricing (Ifo-institut, 1978; Luhmann, 1978; Luther, 1978; Skidmore, Owings and Merrill, 1976). Numerous surveys have found that rising energy costs furnish the most common reason given by consumers for adopting conservation measures (Cunningham and Lopreato, 1977; Gottlieb and Matre, 1976; Milstein, 1977; Perlman and Warren, 1977). The evidence is contradictory, however. Despite sharp increases in petrol prices after 1974, consumption continued to rise steadily in all countries (Schneider, 1978; Willenborg and Pitts, 1977). And another study noted that "there was no evidence that families with higher fuel prices ... have lower rates of energy use per room or higher rates of conservation practice adoption" (Gladhart *et al.*, 1978). Moreover, even if rising prices do reduce energy consumption, there is considerable evidence that the process does not function either equitably or very effectively. Since low-income people generally use minimally necessary amounts of energy, while spending a disproportionately large share of their budgets on energy, a price increase will only cause them severe financial problems without significantly reducing their energy consumption (Newman and Day, 1975; Morrison, 1978). Meanwhile, high-income families can afford to pay more for energy without experiencing serious financial hardship, so that rising energy prices since 1974 have not reduced their energy consumption, despite the fact that they use much more energy per capita (Kilkeary, 1975; Walker and Draper, 1975; Morrison, 1978). Only middle-income people have so far tended to respond to rising energy prices by reducing their consumption (Cunningham and Lopreato, 1977; Curtin, 1975; Perlman and Warren, 1977). There are also numerous other grounds for questioning the presumed elasticity of energy consumption (Forbes, 1977, Ifo-Institut, 1978; Olsen and Goodnight, 1977); the effectiveness of pricing as an instrument for promoting energy conservation is therefore open to serious doubt.

Energy surtax: This instrument is a variation on the pricing approach; it is intended to eliminate the inequities of an open market and to direct the economy toward more labour-intensive and less energy-intensive production. As proposed by several writers (Energy Policy Project, 1974; Hannon, 1975 and 1977; Mauch, 1979; Wilson, 1976; and Schneider, 1978), the surtax would apply to all purchases involving non-renewable energy sources and the rate would vary according to current assessments of known supplies and shortages. The funds collected through this tax would be redistributed equally to all adults at the end of the year as an "energy refund". Large energy users would pay more taxes than their refund, while small energy users would receive a larger refund than

the taxes paid. Wilson estimated that such a tax could reduce total energy consumption in the United States by as much as 18 per cent. Since no country has yet imposed an energy surtax with a refund, there is at present no empirical evidence on which to evaluate the effectiveness of this instrument.

Energy standards: Governments should establish and enforce a variety of criteria for the efficiency and performance of energy-consuming equipment. Such standards might apply to building construction, building renovation, furnaces, hot water heaters, other household appliances and motor-cars. In the United States, for instance, the Energy Policy and Conservation Act of 1975 laid down minimum fuel efficiency standards for all new cars, beginning with those made in 1978. However, no country has yet made very extensive use of energy standards, and there has been virtually no social science research on the effectiveness of this instrument. Two important points about this approach can be noted, nevertheless. Firstly, problems of administration, surveillance and enforcement will undoubtedly occur, but costs will remain manageable as long as the standards are applied to organizations rather than directly to individuals. Government agencies can then deal directly with a relatively small number of bodies which incorporate the standards into their operating procedures, so that the government need not become actively involved, unless the standards are grossly violated. Secondly, with such a macro or structural approach to enforcing standards, it is possible to retain considerable freedom of action for individuals (Pirages and Ehrlich, 1974).

Energy allocation. Through the use of this instrument the government becomes directly involved in the process of deciding how energy shall be distributed and consumed. It may set energy use quotas for various categories of consumers or activities, or it may actually determine how much energy each consumer will be allowed to use for different purposes. Allocation schemes can thus vary from broad directives to detailed rationing, but in all cases the government plays the crucial role. As with energy standards, there have been few empirical studies on the energy-saving effects of allocation schemes. The two points made above concerning energy standards also apply to energy allocation, but some additional remarks are also called for: rationing is widely disliked by the public, so that most managers would prefer to avoid it if possible (Keck *et al.*, 1974; Milstein, 1977) rationing often hurts the poor the most (Newman and Day, 1975:123); rationing programmes can be extremely expensive and difficult to administer and enforce, unless the government sets up a legal "white market" for rationing coupons to prevent the growth of "black markets". This allocation approach cannot be totally dismissed, as it remains an instrument of "last resort" in times of severe energy shortage, but it is clearly not the most practical way of promoting energy conservation on a permanent basis.

Community design: Broad-scale redesign and reconstruction of communities could be a forceful instrument to provide more energy-conserving land use, buildings and transport networks. Changes would be brought about by the use of community planning, zoning and building requirements, public ordinances and other legal action by the community or by government agencies (Harwood, 1977). The goals of these efforts might include the construction of more multi-family dwelling units, the redevelopment of inner-city areas to attract middle-class residents, the locating of industries in "industrial parks" with nearby housing for their workers, the development of new forms of transport such as "moving pavements" or "people movers", or the organization of cities into "neighbourhood clusters" containing all necessary facilities and services within easy walking distance. At present one can only speculate about the amount of energy that might be saved in such communities, although it might well amount to a third or even one half of our present consumption (Harwood, 1977).

Figure 4  
LINKAGES BETWEEN IMPLEMENTATION INSTRUMENTS AND FACTORS

Implementation Instruments	Implementation Factors					
	Technical	Economic	Governmental	Media	Social	Personal
Problem awareness	Criticism of high energy technology	Advertising for energy conservation	Government sponsored information programmes	Convey information about the energy problem	Information programmes by private groups	New understanding of the energy problem
Conservation techniques	Consumer demand for conservation technologies	Consumer demand for conservation loans	Government sponsored information programmes	Convey information about conservation techniques	Information programmes by private groups	Increased knowledge of conservation techniques
Consumption feedback	Development of feedback meters	Reduction in cost of feedback meters	Government require feedback meters	Convey information about feedback meters	Information programmes by private groups	Increased knowledge of energy consumption
Neighbourhood activities	Changes in all relevant technical factors	Conservation costs reduced by co-operative efforts	Sponsored by local government	Convey information about neighbourhood activities	Develop neighbourhood activities	Acquired experience with conservation
Organizational actions	Changes in all relevant technical factors	Conservation costs reduced by co-operative efforts	Government co-operation with private organizations	Convey information about organization actions	Develop organization actions	Acquired experience with conservation
Community programmes	Changes in all relevant technical factors	Conservation costs reduced by co-operative efforts	Government development and financing	Convey information about community programmes	Develop community programmes	Acquired experience with conservation
Monetary incentives	Changes in all relevant technical factors	Offer cheaper energy-conserving equipment	Government-provided subsidies	Convey information about available subsidies	Support by organizations and communities	Increased consumer awareness of energy costs
Price increases	Changes in all relevant technical factors	Increase energy prices or alter rate structures	Government-increased taxes on energy	Convey information about energy prices	Support by organizations and communities	Increased consumer knowledge of energy prices
Energy Surtax	Changes in all relevant technical factors	Increased labour-intensive production	Government-administered tax	Convey information about the surcharge	Supported by organizations and communities	Development of a conservation ethic
Energy standards	Changes in all relevant technical factors	Industry-set voluntary product standards	Government-imposed and enforced standards	Convey information about energy standards	Supported by organizations and communities	Increased awareness of energy use efficiency
Energy allocation	More energy efficient products	Creation of a "white market" for allocations	Government-imposed and enforced allocation	Convey information about allocation schemes	Supported by organizations and communities	Increased awareness of energy systems
Community design	Construction of multi-family dwellings	Co-operation of local businesses	Legal actions by local government	Convey information about community design	Supported by organizations and community	Development of a conservation ethic



### C. Implementation factors

In section II consumer energy use was shown to be shaped by a wide variety of controlling contexts, which were classified under the headings of technical, economic, governmental, media, social and personal. As implementation instruments are employed to create social change, several of these controlling conditions are likely to be affected. Consequently, a thoroughly planned strategy will determine in advance which of these conditions - which we shall call implementation factors - can and should be changed; in other words, which features or factors in the controlling contexts are to be manipulated or engaged by the proposed implementation instruments. Once the programmes have been put in to operation it is vital to determine which implementation factors are actually being altered or affected.

Each implementation instrument is likely to affect a unique set of implementation factors, although there will undoubtedly be numerous overlaps among the different sets. Figure 4 is a matrix setting out 12 instruments and 6 types of factors. Each cell indicates factors that might be particularly critical in conjunction with a particular implementation instrument. The matrix can thus be viewed as a set of hypotheses concerning the most important linkages between implementation instruments and factors in the process of promoting consumer energy conservation. Each implementation instrument is linked to a number of relevant factors; in reality a sequential series of changes may be induced. Although such sequences are not depicted in the matrix, one illustration of them would be the case where consumers were provided with information on techniques for conserving energy. Information programmes might be developed by a number of governmental agencies and private organizations. The media would then transmit these programmes to consumers in various ways. If the communication effort was successful, it would increase people's knowledge of possible conservation practices. Finally, it is to be hoped that this knowledge would be used by consumers to make energy-saving changes in their technical, household and transport equipment.

## IV. OUTCOMES OF CONSUMER ENERGY CONSERVATION POLICIES

Public policies and strategy may produce many different outcomes. Some outcomes will be attitudinal changes, others will be direct actions. Some will be obvious at the individual level, while others will be visible primarily at community or society level. Some will be intended, others will be partially or wholly unintended. Finally, the outcomes may be desired or undesirable. Four different sets of possible outcomes from strategies designed to promote consumer energy conservation are described below.

### A. Consumer responses

When proposing strategies for implementing energy conservation policies, governments should take account of probable responses by the consumers to the instruments to be applied, the extent to which key factors affect energy consumption and other aspects of daily life, and feelings about the long-range goals of that policy.

Policy acceptance. The first reaction to a proposed policy is generally an over-all evaluation of the goals and strategies involved. In brief, people accept or reject the policy. Four distinct dimensions of public acceptance can usually be recognized; personal attitude towards the strategy; the perceived probable effectiveness of the strategy; the perceived desirability of the strategy for society as a whole; and willingness to support the strategy if adopted.

The major finding from research on public acceptance of energy conservation policies is that rather large proportions of the population accept many fairly stringent conservation measures if they are necessary and applied in a fair way (Olsen and Goodnight, 1977; Zimmerman et al., 1977). For example, a recent national survey in the United States reported that the following programmes would be acceptable to a large majority of the population: mandatory conservation standards for new buildings; mandatory energy efficiency standards for all appliances; taxes on domestic oil to raise prices to world levels; and government allocation of fuels according to needs (Milstein, 1977). These findings suggest that the public may be much more ready to accept financial and regulatory conservation measures than many political leaders believe. The respondents to these enquiries insisted, however, that instruments must be used in a fair manner, so as not to harm or benefit any particular groups or classes of people.

Conservation commitment: People may well accept a proposed strategy and be willing to support it because they think it would be effective and beneficial for the country, but at the same time refuse to let it affect their own attitudes or action. Hence it is also necessary to measure the extent to which a proposed strategy for energy conservation would affect people's personal commitment to conservation. Four important dimensions of personal commitment can be distinguished: interest in different forms of energy conservation; perceived importance of energy conservation for oneself or society; a sense of personal responsibility for energy conservation efforts; and a feeling of having control of one's own energy consumption and an ability to change it if desired.

Intentions: As people become increasingly committed to energy conservation, they are likely to begin think about specific actions to save energy, and to make plans that may include intentions to alter personal consumption patterns, to consider energy costs when purchasing appliances, to improve dwelling or to buy a smaller car. The next set of consumer responses to be considered, therefore, consists of specific conservation actions that people would intend to take if a proposed conservation strategy were implemented. Measurement of these intentions, which might be divided into the following categories, should indicate the probability of action: space conditioning, especially heating; the use of appliances especially hot water heaters; personal travel, especially by car; and major lifestyle modifications.

Anticipated impact: When people evaluate a proposed strategy for energy conservation, they usually also take into account its possible indirect impact. Hence it is useful to explore the expected impact before actually adopting the strategy. Four types of anticipated impacts can be considered: economic impact, including employment, income levels, inflation, economic growth and socio-economic equity; social impact, including community cohesion, class conflict, family stability and migration; political impact, including the extent of government planning, centralization or decentralization of power, and political movements; and personal impact, including effects on individual economic security, lifestyles, personal relationships and standard of living.

#### B. Conservation actions

Once specific conservation programmes have become operational, policy outcomes ought to be measured in terms of direct conservation actions taken by individuals and households.

As was indicated in section I, most consumer actions have so far been limited to steps requiring minimal effort and expense, and have not significantly reduced energy consumption. Typical examples are: turning off unnecessary lights; turning the thermostat down a few degrees; and closing unused rooms (Olsen and Goodnight, 1977); Cunningham and Lopreato, 1977; Olsen and Cluett, 1979). There is some indication, however, that in the past year or two more people have begun to take some serious conservation actions. For instance, recent polls in the United States have indicated that over half of the respondents claim to have insulated their homes or put weather-stripping around doors and windows (Gallup, 1978). Nevertheless, it is important to note that none of the existing enquiries on conservation actions have been specifically related to any of the implementation instruments or factors discussed in section II. A study of conservation actions introduced by various strategies ought to identify (a) the policy goals; (b) instruments to implement the goals; and (c) the policy programmes; and (d) the factors that have been changed. With that information it will be possible to measure the influence of various strategies for promoting consumer conservation actions.

### C. Energy savings

The ultimate goal of energy conservation policy is to reduce the total consumption of energy from non-renewable sources. It is therefore to be hoped that the various actions taken by consumers as a result of a government strategy to promote energy conservation will produce considerable energy savings. This may not necessarily happen, however; the conservation actions taken by consumers may essentially be of a symbolic nature, giving people the feeling of having contributed to the conservation effort without producing significant energy savings; the actions may follow the "boomerang law of energy conservation" (Hayes, 1976:63), which states that "whenever we save energy we save money" and "whatever we spend that money on will require energy." For instance, if a family sells its car to save energy, and then takes a holiday trip by aeroplane, it may end up consuming more energy than if it had kept the car. Unless consumers are made fully aware of the energy they are consuming in their various activities and attempt to alter basic consumption styles, conservation policy may prove totally ineffective in the long run.

Any evaluation of energy conservation policy must try to measure consumer's actual savings in electricity, heating fuels and petrol. This task involves two specific methodological problems: data must be available on levels of energy consumption prior to conservation actions, which can become quite complicated for consumption that is not metered (such as oil, coal and petrol), or when utilities refuse to grant access to their billing records; to measure energy savings, levels of energy consumption after conservation actions must be compared with consumptions levels that would have occurred without the actions, always taking into account current weather conditions. This comparison can be made in either of two ways: A control group can be selected that is identical to the experimental group of consumers as regards all variables affecting energy consumption; it must then be restrained from taking any conservation actions during the course of the study. However, such requirements are extremely difficult to meet in social research. Alternatively, on the basis of a consumer's past record of energy consumption before taking any conservation actions, a regression equation can be constructed to predict the amount of energy that would have been used without any conservation actions. Although this procedure is empirically more rigorous than the procedure of matching control and experimental groups, it becomes cumbersome in a large-scale study, since separate regression equations must be constructed for all respondents. Moreover,

it assumes that a sufficient number of measurements of past energy consumption can be obtained for each consumer, which is often impossible. There is no easy solution to this dilemma, and the researcher will simply have to use whatever procedure is most feasible in a particular study.

#### D. Social impacts

The intended outcome of conservation actions by consumers is a reduction in their consumption of non-renewable energy. At the same time, however, these actions - or a resulting lower demand for energy - may have other consequences for society. If desirable, these impacts constitute a side benefit of the energy conservation policy. If undesirable for society or individuals, they must be viewed as additional costs. These costs and benefits should be taken into account in evaluating the success of the policy and deciding whether to discard, continue or expand it.

Very little attention has been given so far to the problem of how to assess the social impact of broad public policies. Hence there is no specific procedure for assessing the process of promoting consumer conservation. A few observations may nevertheless be appropriate: the concept of "social impacts" should be made to include effects on the economy, the political system, communication processes, organizational activities of all kinds, personal living conditions and lifestyles, and the over-all quality of life of a society; this analysis will be quite demanding, and hence cannot be carried out in a hurry; the assessment will inevitably involve numerous value judgements about the significance and desirability of effects; the analytical process can be conducted in a systematic manner only if it applies a rigorous methodology - such as measuring all effects using standardized social indicators (Olsen et al, 1978) - and does not merely rely on subjective judgements of researchers, as has frequently been the case in past social impact assessments.

The social effects of energy conservation will undoubtedly be considered desirable by some parts of society and undesirable by others, and are thus likely to generate considerable social conflict and political debate. The outcome of these controversies will largely depend on the techniques used to manage the social impact of energy conservation policies. Social science research can contribute significantly to an understanding of both the strategies and the impact of consumer energy conservation. Moreover, such research might demonstrate that the conservation of energy need not entail an unpleasant sacrifice of current comforts, but rather could lead to numerous improvements in the quality of human life (Olsen, 1979).

#### REFERENCES

Batelle-Institut. Einstellungen und Verhalten der Bevölkerung gegenüber verschiedenen Energiegewinnungsarten. (Frankfurt: Bericht für das Bundesministerium für Forschung und Technologie BMFT) 1977.

Batelle-Institut. "Rationelle Energieverwendung im Wohnungsbau". (Frankfurt: Bericht für das BMFT) 1976.

BMFT Rationelle Energieverwendung. Statusbericht 1978, Teile 1 und 2.

Campbell, Vincent N., et al. "An Attitudinal Study of the Home Market for Solar Devices." Unpublished paper available from the US Department of Energy (1977).

Clemens, Brigitte, und Hans Jörg Neun. Der Energieverbrauch der privaten Haushalte - Eine Untersuchung der Konsum - und Sparmotivation. (Unveröffentlichte Diplomarbeit an der Universität Augsburg) 1978.

CONAES (Committee on Nuclear and Alternative Energy Systems, Synthesis Panel). "Report of the Consumption, Location, and Occupational Patterns Resource Group" Unpublished draft report, US National Research Council, Washington, D.C., (1977).

CONAES (Committee on Nuclear and Alternative Energy Systems, Demand and Conservation Panel). "US Energy Demand: Some Low Energy Futures." Science, Vol. 200, April, 1978 pp. 142-152.

Cook, Earl. Man, Energy, Society. San Francisco, W.H. Freeman 1976.

Council on Environmental Quality. "Solar Energy: Progress and Promise." Washington, D.C., US Government Printing Office, 1978.

Cunningham, William H. and Sally Cook Lopreato. Energy Use and Conservation Incentives: A study of the South-western United States. New York, Praeger 1977.

Curtin, Richard T. "Consumer Adaptation to Energy Shortages." Survey Research Center, University of Michigan, Ann Arbor, Michigan, 1975.

Darmstadter, Joel, Joy Dunkerley, and Jack Alterman. How Industrial Societies Use Energy: A comparative Analysis. Baltimore, John Hopkins University Press, 1977.

Doernberg, A, "A Comparative Analysis of Energy Use in Sweden and the United States." Unpublished report by the Brookhaven National Laboratory, Upton, New York, 1975.

Dole, S.H. "Energy Use and Conservation in the Residential Sector". Rand Corporation, Santa Monica, California, 1975.

Directorate-General for Research, Science and Education. "An Analysis of Some Possible Energy R & D Strategies for Europe". Unpublished draft report, Commission of the European Communities, Brussels, 1979.

Düwall, Peter. "Über die energiewirtschaftliche Bedeutung und die technischen Möglichkeiten der Änderung der Elektrizitätszuwachsrate privater Haushalte in Ballungsgebieten". (Unveröffentlichte Dissertation). 1976.

Ellis, Peter, and George Gaskell. "A Review of Social Research on the Individual Energy Consumer." Unpublished report by the Department of Social Psychology, the London School of Economics and Political Science, London. 1978.

Energy Policy Project of the Ford Foundation. A time to Choose: America's Energy Future. Cambridge, Mass.: Ballinger, 1974.

Fichtner, Beratende Ingenieure GmbH. "Daten und Fakten für energiesparende Massnahmen in Haushalt und Kleinverbrauch." (Bonn: Bundesministerium für Forschung und Technologie.) 1976.

Finsterbusch, Kurt, and C.P. Wolf. The Methodology of Social Impact Assessment. (Stroudsburg, Pa.: Dowden, Hutchinson & Ross), 1977.

Forbes, Ian A. "Energy Strategy: Not What but How?" Unpublished manuscript available from the Energy Research Group, Inc., Framingham, Mass. 1977.

Foxx, R.M. and D.F. Kake. "Gasoline Conservation: A Procedure for Measuring and Reducing the Driving of College Students." Unpublished paper available from the Department of Psychology, University of Maryland, College Park, Maryland, 1976.

Gallup, George. A Survey of Homeowners Concerning Home Insulation. (Princeton, New Jersey: The Gallup Organization.) 1978.

Gladhart, Peter M., James J. Zuiches, and Bonnie M. Morrison. "Impacts of Rising Prices Upon Residential Energy Consumption, Attitudes, and Conservation Policy Acceptance." In Seymour Warkov, ed., Energy Policy in the United States. (New York, Praeger Publishers), Ch. 6. 1978.

Gottlieb, David, and Mark Matre. "Sociological Dimensions of the Energy Crisis: A Follow-Up Study." Unpublished paper available from the Energy Institute, Houston, Texas, 1976.

Hannon, Bruce. "Energy Conservation and the Consumer." Science, Vol. 189(11 July), pp. 95-102. 1975.

Hannon, Bruce. "Energy, Labour, and the Conserver Society." Technology Review (March/April), pp. 47-53. 1977.

Hannon, Gerard M. Studies in Energy Tax Policy. (Cambridge, Mass.: Ballinger Publishing Co.). 1974.

Hardin, Garrett. "The Tragedy of the Commons." Science, Vol. 162, pp. 1234-1248. 1968.

Harman, Willis W. "The Coming Transformation." The Futurist (February), pp. 5-11. 1977.

Harris, Louis. Study No. 3739, 1977.

Harwood, Corbin Crews. Using Land to Save Energy. Cambridge, Mass.: Ballinger Publishing, 1977.

Hayes, Denis. "Energy: The Case for Conservation". Worldwatch Institute Paper No. 4, Washington, D.C. 1976.

Hayes, Denis. Rays of Hope. New York: W.W. Norton and Co. 1977.

Hererlein, Thomas A. "Conservation Information, the Energy Crisis, and Electricity Consumption in an Apartment Complex." Energy Systems and Policy, Vol. 1, pp. 105-117. 1975.

Hirst, Eric. "Residential Energy Conservation Strategies." An unpublished paper available from the Oak Ridge National Laboratory, Oak Ridge, Tenn. 1976.

Hirst, Eric, and Janet Carney. "Effects of Federal Residential Energy Conservation Programmes." Science, Vol. 199 (February), pp. 845-851, 1978.

- Hoffman, K.C., and D.W. Jorgenson. "Economic and Technological Models for Evaluation of Energy Policy". The Bell Journal of Economics, Vol. 8 (No. 2), pp. 444-466. 1977.
- Honnold, Julie A., and L.D. Nelson. "Voluntary Rationing of Scarce Resources: Some Implications of an Experimental Study." Paper read at the annual meeting of the American Sociological Association. 1976.
- Hudson, Edward S. and Dale W. Jorgenson. "US Energy Policy and Economic Growth, 1975-2000." The Bell Journal of Economics and Management Science, Vol. 5, pp. 461-514. 1974.
- Ifo-Institut für Wirtschaftsforschung. "Einfluss der Tarifgestaltung auf die Stromnachfrage unter besonderer Berücksichtigung der Abnahmestruktur und der Stromverwendungsarten in der Bundesrepublik Deutschland." (München: Gutachten im Auftrag des BMWi). 1978.
- Inglehart, Roland. The Silent Revolution. Princeton, New Jersey: Princeton University Press. 1977.
- Joerges, Bernward. Gebaute Umwelt und Verhalten. Baden-Baden: Nonos. 1977.
- Joerges, Bernward. Überlegungen zu einer Soziologie der Sachverhältnisse." Leviathan, Bd. 7 (Heft 1), 1979.
- Joerges, Bernward, und Norbert Kiene. "Privater Energieverbrauch - umweltbelastend und sozial diskriminierend." In: B. Joerges, ed., Verbraucherverhalten und Umweltbelastung. Materialien zu einer verbraucherorientierten Umweltpolitik. (Meisenheim: Hain, in Druck). 1979.
- Keck, Carol A., et al, "Changes in Individual Travel Behaviour During the Energy Crisis, 1973-74." New York State Department of Transportation, Albany, New York, 1974.
- Kilkeary, Rovena. "The Energy Crisis and Decision-Making in the Family." US National Technical Information Service, No. PB-238783. 1975.
- Klausner, Samuel Z. "Energy Rationing and Energy Conservation: Foundations for a Social Policy." Energy Systems and Policy, Vol. 1, pp. 119-141, 1975.
- Klein, Hans-Joachim. "Energiesparbewusstsein und Innovationsbereitschaft am Beispiel der Anwendung von Sonnenenergie." (Institut für Soziologie der Universität Karlsruhe, unveröffentlichtes Manuskript), 1979.
- Kohlenberg, Robert J., Roland Barach, Celeste Martin, and Susie Anshell. "Experimental Analysis of the Effects of Price and Feedback on Residential Electricity Consumption." Unpublished paper available from the Department of Psychology, University of Washington, Seattle, Washington: 1978.
- Krusche, Herbert. "Die Diffusion von Sonnenkollektoren. Erfahrungen privater Erstverwender." In: B. Joerges, ed., Verbraucherverhalten und Umweltbelastung. Op. cit.
- Leach, Gerald, et al. A Low Energy Strategy for the United Kingdom (London: The International Institute for the Environment and Development). 1979.
- Lebanon, Alexander. "The Household Demand for Energy and Fuels in OECD Countries." European Economic Review, Vol. 9 (No. 1), pp. 61-81. 1977.

Lovins, Amory B. Soft Energy Paths: Toward A Durable Peace. (Cambridge, Mass.: Ballinger Publishing Co.). 1977.

Luhmann, Hans-Jochen. "Wirtschaftspolitische Massnahmen zur Einsparung von Energie im Sektor 'Haushalte und Kleinverbrauch'". In: K.M. Meyer-Abich (ed.), Wirtschaftspolitische Steuerungsmöglichkeiten zur Einsparung von Energie durch alternative Technologien, Kap.6, pp. 597-837. 1978.

Luther, Gerhard. "Stromtarife - Dumpingpreise für Energieverschwendung? Ein Plädoyer für eine zeitgemässe Struktur der Elektrizitätstarife." (Saarbrücken: Institut für Experimentalphysik). 1978.

Mauch, Samuel, et al. 1979. "Energiepolitische Besteuerung des Energieverbrauchs. Elemente und Wirkungen einer schweizerischen Energiesteuer." Wirtschaft und Recht, Heft 1, pp. 84-104.

McClelland, Lou, and Stuart W. Cook. "Energy Conservation Effects of Continuous In-home Feedback in All-Electric Homes." Unpublished paper available from the Institute of Behavioural Science, University of Colorado, Boulder, Colorado, 1978.

Meyer-Abich, Klaus M. (ed.). Wirtschaftspolitische Steuerungsmassnahmen zur Einsparung von Energie durch alternative Technologien (Arbeitsgruppe Umwelt, Gesellschaft, Energie, AUGÉ, Universität Essen, und Energiewirtschaftliches Institut, EWI, and der Universität Köln). 1978.

McGregor, Gloria Shepart. "Davis, California: A Pace-Setting Energy Conservation City". Environment Comment (July), pp. 16-18. 1977.

Milstein, Keffrey S. "How Consumers Feel About Energy". Unpublished paper available from the Office of Conservation and Solar Applications, US Department of Energy, Washington, D.C., 1977.

Molt, Walter. Preiswahrnehmung komplexer Güter am Beispiel der Pkw-Nutzung. Zeitschrift für Verbraucherpolitik, Vol. 1 (No. 4), pp. 325-338, 1977.

Morrison, Denton E. "Equity Impacts of Some Major Energy Alternatives." In Seymour Warkov, ed., Energy Policy in the United States: Social and Behavioral Dimensions, New York: Praeger Publishers, Ch. 12, 1978.

Murray, James R., et al. "Evolution of Public Responses to the Energy Crisis." Science, Vol. 184, pp. 257-263, 1974.

Newman, Dorothy K., and Dawn Day. The American Energy Consumer. Cambridge, Mass.: Ballinger Publishing, 1975.

Olsen, Marvin E. "Assessing the Social Impacts of Energy Conservation." In Karen Gentmann (ed.) Social Science Perspectives on Energy. (Chapel Hill, North Carolina: University of North Carolina Press), 1979.

Olsen, Marvin E., and Christopher Cluett. "Evaluation of the Seattle City Light Neighbourhood Energy Conservation Programme." Unpublished report available from the Battelle Human Affairs Research Centres, Seattle, Wash. 1979.



Olsen, Marvin, Martha Curry, Majorie Greene, Barbara Melber, and Donna Merwin. "A Social Impact Assessment and Management Methodology Using Social Indicators and Planning Strategies." Battelle Pacific Northwest Laboratories Report RAP-18, 1978.

Olsen, Marvin E., and Jill A. Goodnight. Social Aspects of Energy Conservation. Northwest Energy Policy Project Report for the Pacific Northwest Regional Commission, Portland, Ore. 1977.

Olson, Mancur, Jr. The Logic of Collective Action. Cambridge, Mass.: Harvard University Press. 1965.

O'Toole, James. Energy and Social Change. Cambridge, Mass.: Massachusetts Institute of Technology Press. 1976.

Palmer, M.H., M.E. Lloyd, and K.E. Lloyd. "An Experimental Analysis of Electricity Conservation Procedures." Journal of Applied Behaviour Analysis, Vol. 10, pp. 665-672. 1977.

Perlman, Robert, and Roland L. Warren. Families in the Energy Crisis: Impacts and Implications for Theory and Policy. Cambridge, Mass.: Ballinger Publishing, 1977.

Pirages, Dennis C., and Paul R. Ehrlich. "Ark II: Social Responses to the Environmental Imperatives". San Francisco: W.H. Freeman, 1974.

Raaij, W. Fred van. "Ecological Concern and Consumption." Unpublished paper, Department of Psychology, Tilburg University, Tilburg, The Netherlands, 1978.

Rammstedt, Otthein. "Möglichkeiten und Grenzen eines Konzepts zur Hebung des Umweltbewusstseins aus der Sicht der Social Movement Theory." Unpublished report available from the International Institute for Environment and Society, 1979.

Sawhill, John C. Remarks at "Project Independence hearings", San Francisco, Calif., 7 October 1974.

Schipper, Lee, and Allan J. Lichtenberg. "Efficient Energy Use and Well-Being: The Swedish Example." Science, Vol. 194, pp. 1001-1013, 1976.

Schneider, Steven A. "Common Sense About Energy, Part Two. Less is More: Conservation and Renewable Energy." Working Papers for a New Society (March/April, pp. 49-59, 1978).

Seligman, Clive, John M. Darley, and Lawrence J. Becker. "Behavioral Approaches to Residential Energy Conservation." Energy and Buildings, Vol.1, pp. 325-337, 1977 to 1978.

Sethi, S. Prakash. Advocacy Advertising and the Multinational Corporation. Columbia Journal of World Business, Vol. 12 (No. 3), pp. 32-46, 1977.

Skidmore, Owings and Merrill. Bonneville Power Administration Electric Energy Conservation Study. Portland, Oregon: Bonneville Power Administration, 1976.

Stanford Research Institute. "Comparison of Energy Consumption Between West Germany and the United States." Unpublished report by Stanford Research Institute, Menlo Park, California, 1975.

- Stern, Paul C. "Effect of Incentives and Education on Resource Conservation Decisions in a Simulated Commons Dilemma." Journal of Personality and Social Psychology, 1976.
- Stockman, David A. "The Wrong War? The Case Against a National Energy Policy." The Public Interest, No. 53 (Fall), pp. 3-44, 1978.
- Verba, Sidney, and Norman H. Nie. Participation in America. New York: Harper & Row, 1972.
- Verbraucher-Zentrale Nordrhein-Westfalen. Rationelle Energieverwendung - statt Energierationierung. Mitteilungsdienst Heft 5/6 (Dez.), 1978.
- Walker, Nolan E. and E. Linn Draper. "The Effects of Electricity Price Increases on Residential Usage by Three Economic Groups: A Case Study." Texas Nuclear Power Policies, Vol. V, The University of Texas Center for Energy Studies, Austin, Texas, 1975.
- Warren, Donald I. "Individual and Community Effects on Responses to the Energy Crisis of Winter, 1974." Unpublished report available from the Institute of Labor and Industrial Relations, University of Michigan, Ann Arbor, Michigan, 1974.
- Warren, Roland L. Social Changes and Human Purpose. Chicago: Rand McNally College Publishing, 1977.
- Warkov, Seymour, ed. Energy Policy in the United States: Social and Behavioral Dimensions, New York: Praeger Publishers, 1978.
- Willenborg, John F., and Robert E. Pitts. "Gasoline Prices: Their Effect on Consumer Behaviour and Attitudes." Journal of Marketing, Vol. 41 (January), pp. 24-31, 1977.
- Wilson, David G. "Taxing the Risk." Working Papers for a New Society, Vol. 3 (Winter), pp. 9-12, 1976.
- Winett, Richard A., H.H. Kagel, R.C. Battalio, and R.C. Winkler. "The Effects of Monetary Rebates, Feedback, and Information on Residential Electricity Conservation." Journal of Applied Psychology, Vol. 63. pp. 73-80. 1978.
- Winnet, Richard A. and Michael S. Neale. "Psychological Framework for Energy Conservation in Buildings: Strategies, Outcomes, Direction." Unpublished paper available from the Institute for Behavioural Research, Silver Spring Maryland, 1978.
- Zimmermann, Karl, et al. "Hintergrunduntersuchung zur Akzeptanz von Strategien zur Energierationalisierung." In: K.M. Meyer-Abich (ed.), Wirtschaftspolitische Steuerungsmöglichkeiten zur Einsparung von Energie durch alternative Technologien, Anhang III. 1977.
- Zuiches, James J. "Acceptability of Energy Policies to Mid-Michigan Families." Michigan State University Agricultural Experimental Station Research Report 298, 1976.

ON ENERGY AND AGRICULTURE

Paper transmitted by the International Institute  
for Applied Systems Analysis (IIASA)

Prepared by Mr. C. Marchetti\*

INTRODUCTION

God said to Adam: "With the sweat of thy brow shalt thou eat bread". With the poetic image of evaporative cooling, God obviously had in view muscular exertion and the central importance of a mechanical input in order to run the agricultural system.

Since then things have not changed drastically. Three quarters of humanity still engage in agriculture in a way only marginally different from neolithic times, with draught animals complementing to the toil of man. The other quarter, the evolutionary tip, has tamed machines for the same purpose and embarked on the large-scale use of synthetic chemicals.

The result of these last two innovations, and especially the second, has been a noticeable increase in the specific productivity of land. The price to be paid, however, has been a disproportionate increase in the amount of energy spent per unit of product generated. As this ratio keeps increasing with time - and the still neolithic agriculture will soon enter the energy game - it may be worth pausing for a moment to reflect on the consequences of what we are doing and where we are going. The analysis below is devoted to a study of this interface between energy and agriculture.

Historical patterns

Plants are defined as organisms capable of tapping solar energy through their capacity to split water into hydrogen and oxygen using solar light. This hydrogen is used first to reduce CO<sub>2</sub>, and then to feed the production of a vast array of energy-carrying chemicals. Practically all of the biosphere ultimately depends on them for its energy input, through a complex hierarchical web of parasitism.

When man became differentiated from apes, he fitted well into this web, as a hunter-gatherer. In this role, he was no different from many other creatures. The pressure to grow had to be met by extending both his geographical habitat and the range of digestible foods.

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Here came the first breakthrough, with the use of energy. Plants defend themselves against predators with an impressive panoply of weapons. The most important ones are chemical and tend to make the plant indigestible, in one way or another, and occasionally poisonous. Animals developed counter-weapons, but these tended to be sophisticated and specialized, consequently restricting the range of edible material. Man's stroke of genius was to apply thermal treatment in order to upset or destroy the delicate organic chemistry of defence.

Fire must be seen first of all as the tool for a breakthrough in food technology, in most cases improving digestion of plant material, particularly seeds, and sometimes just making it possible.

There are still populations living on palaeolithic, non-agricultural technology, and they do not fare as badly as is usually imagined. A detailed study of the "work-leisure" distribution of time in a primitive tribe made by Eibl-Eibesfeldt (2) shows that these primitive people work the equivalent of two days a week and spend the rest of the time relaxing or socializing. The wildest dream of the trade unions made real.

As far as energy is concerned, then, the situation appears to be excellent. If we suppose that our man supports an extended family of four, then the ratio between the energy he gets as food and the energy invested to produce sustenance must be of the order of 50:1. This energy ratio ( $E_r$ ) will be the common yardstick used in this paper:

$$E_r = \frac{\text{Energy out}}{\text{Energy in}}$$

Agriculture conceptually operates in the reverse direction. It explicitly modifies the ecosystem in order to expand the production of biological material which is assimilable directly or by thermal treatment (cooking).

On the one hand, man becomes the ally of certain plants by collaborating in their reproduction cycle and fighting their natural enemies. On the other hand, he puts himself first in the list of selective forces, by choosing the plants most profitable from his point of view. Neolithic man operated with extreme patience and cleverness. Our "green revolutionaries" have added very little to the splendid job he did.

All his interference, however, did cost time and energy, and analysis of primitive agriculture which still preserves neolithic characteristics will tell us what man really gained in the operation. Table 1 and figure 1 show that the energy ratio for primitive agriculture is still of the order of 50, showing no gains and no losses compared with the case of the hunter-gatherer.

What then, was the driving force behind the laborious development of agriculture? Simply that after having filled the available niches geographically, the only avenue left for expansion was intensification. Agriculture reduces the amount of land necessary to support a person, and it consequently supports the human population's natural drive towards expansion. The entire development of agriculture to date can be interpreted in this way.

The introduction of draught animals, for instance, did not reduce the toil of man. Peasants with animals worked as hard as those without. Nor did it drastically increase productivity per man. But by having a stronger impact on

FOOD ENERGY / ENERGY SUBSIDY

FARMGATE OR DOCKSIDE

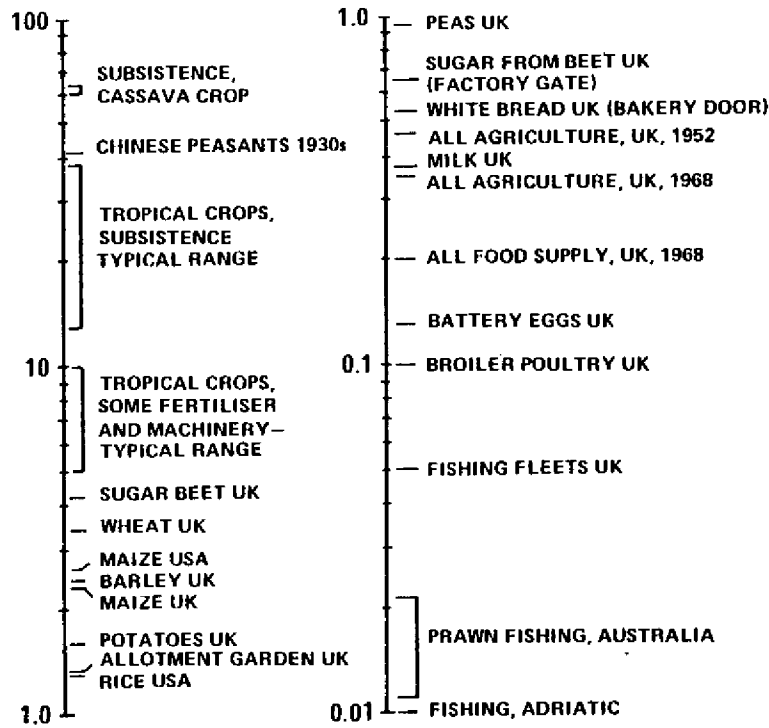


Figure 1. Energy ratios for various food sources (at farmgate or dockside). From G. Leach

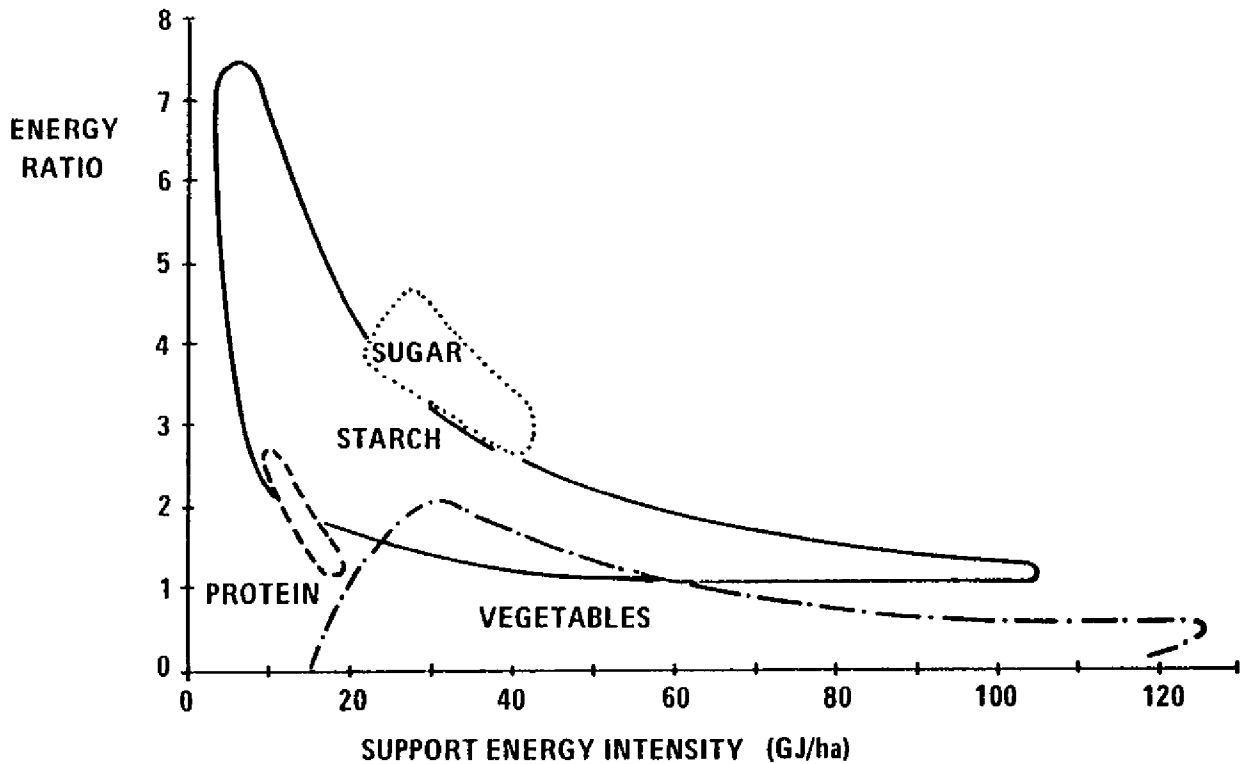


Figure 2. Energy ratio versus support energy intensity for various crops. The curves envelop about 50 points from a variety of agricultural systems. From R.M. Gifford.

the ecosystem, it essentially increased the specific productivity of land. It was again a transition moving in the same direction, increasing the intensity of human life.

Ruminants were the most successful symbiotic draught animals, mostly because they do not compete with man for food, being able to digest all sorts of roughage or graze on poor pasture, extracting energy from cellulose and properly managing nitrogen through flora in the rumen.

The apex of this evolution was probably reached by Chinese agriculture at the turn of the century. Billions of people cleverly devised and carefully checked all sorts of devices to maximize output. As a result, the amount of (fertile) land necessary to support a person was reduced to 100 square metres, a great leap forward from the few square kilometres necessary to support a hunter-gatherer - a factor of more than  $10^4$  in intensification. And with a very respectable energy ratio of 40. (7)

The ecological system so created, however, although still very appealing aesthetically, bears no resemblance to a natural ecosystem, first and foremost because of its great structural simplicity. As a consequence, equilibrium and resilience are lost, producing a system that is very unstable and difficult to manage, and one that provides full-time employment for the wits and toil of most of the Chinese population. Chinese agriculture is the brilliant pinnacle of a monumental enterprise started about 10,000 years ago.

#### The third input

As we have seen, up to the turn of the century agricultural development followed a very consistent path of progressive intensification, keeping energy ratios more or less constant, at a level more or less necessary to maintain a certain level of social activities. In fact, with an energy ratio of 50, about 20 per cent of the population can live uncoupled from direct agricultural activity. As  $E_r$  remained constant over time at a level fairly similar to that of the hunters, we may conclude on the basis of pure energy considerations that agriculture was not the cause of the formation of cities and, ultimately, the modern form of our civilization because it provided a surplus, as is often said, but because it permitted critical population density through continuous improvements in intensification.

The summit having been reached by Chinese agriculture, evolution could continue only as a result of a qualitative breakthrough. It came at the turn of the century with the introduction of fossil fuels - not machines, because machines are one of the elements of the breakthrough, but all innovations are finally related to fossil fuels.

Machines were introduced marginally, e.g. as steam engines to run threshers, at the end of the last century. They really flourished, however, only after the Second World War, when the automobile industry produced a solid, cheap and dependable tractor. The effect of introducing the tractor was to replace the team of oxen by a mechanical horsepower team 10 to 50 times more powerful. This led to a roughly proportionate increase in the productivity of labour without, however, substantially intensifying production. Consequently, instead of 20 per cent, perhaps 80 per cent of the population could leave the land. Through the machine, with its external energy input, evolution branched away from the previous trend.

Unconstrained by tight energy balances, the machine also permitted an extension of cultivable land much in the direction of the previous trends. The effect of the use of chemicals, on the contrary, fits the original trend perfectly. Fertilizers are intensifiers - they have always been used, but only the external energy input from fossil fuels has made it possible to produce them in significant quantity.

Also significant is the impact on energy consumption. Very careful analysis of all the energy inputs going into fertilizer production (including the energy necessary to build the equipment to make them) shows that they load the agricultural energy budget by more or less the same amount as the machinery itself (9). Table 1 illustrates the situation with two typical examples.

New trends

As figures 1 and 2 and table 1 show, the consequence of these new trends has been a precipitous decrease in  $E_r$  falling, on average, from about 50 to about 2, for "modern" agriculture. On the right side of figure 1, many fairly important crops are well below the mean, and winter lettuce does not even appear, having an extravagant  $E_r$  0.01. We spend more than 100 calories of fossil energy to produce 1 calorie of lettuce. Chasing for fish in the Adriatic, a food, but not agricultural operation reported for comparison, would certainly not have lured a neolithic fisherman, being very attentive to keeping  $E_r$  at the proper level in order to survive.

Table 1

Indian corn production Energy inputs-outputs		
	Neolithic agriculture (Mexican farmer)	Modern Agriculture (United States farmer)
Labour	1 150 hours	17 hours
Labour	115 Mcal	-
Machinery	15 Mcal (axe and hoe)	1 500 Mcal
Seeds	36 Mcal (10 kg)	140 Mcal
Fuel	-	2 100 Mcal
Nitrogen	-	2 500 Mcal
P,K, pesticides	-	500 Mcal
Irrigation	-	780 Mcal
Electricity and Drying	-	700 Mcal
Transport	-	180 Mcal
Miscellaneous	-	200 Mcal
<b>Total</b>	<b>167 Mcal</b>	<b>8 600 Mcal</b>
Corn yield	2 000 kg or 6 700 Mcal	5 400 kg or 1 8700 Mcal
$E_r$	40	2.16

Source: Adapted from Pimentel.

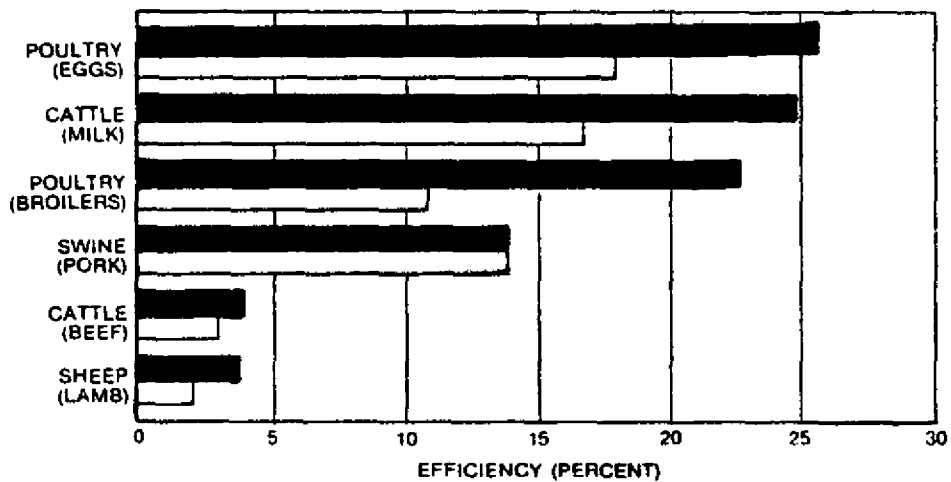
The recent breakthrough with "external" energy inputs has meant that the intensification in agriculture has far outstripped the growth of population, particularly in the United States. This has led to considerable surplus capacity, especially for grains, and to a curious evolution in eating habits in order to get rid of that surplus.

Animals have, since the beginning, been the companions of Homo agricola, in various symbiotic configurations, which can be reduced basically to two:

- (a) Transforming and storing food; and
- (b) Providing mechanical energy.

Function (a) has usually been prevalent, and the logic is that an animal can have a food spectrum which does not overlap with that of man, consequently expanding the potential for the human input via its products and its carcass. Another rationale is that seasonal inputs of easily degraded foods can be stored in the form of meat for the low season.

However, every time we filter energy through a transformation - a hierarchical level in the food chain - the rule of thumb is a loss of one order of magnitude in the energy and protein value of the carcass with respect to the input. With milk or egg production, the transformation loss is of the order of a factor of four to five (figure 3). Strangely enough, ruminants do not fare particularly well; their superiority lies mostly in their capacity to digest very rough inputs rich in cellulose.



EFFICIENCY IN CONVERSION BY TRANSFORMING ANIMALS  
■ PROTEIN; □ ENERGY. From C.H. Noller, 1976

Figure 3. Efficiency in conversion by transforming animals, defined as the ratio between proteins or calories produced and proteins or calories in the feed.  
Protein. Energy. From C.H. Noller.



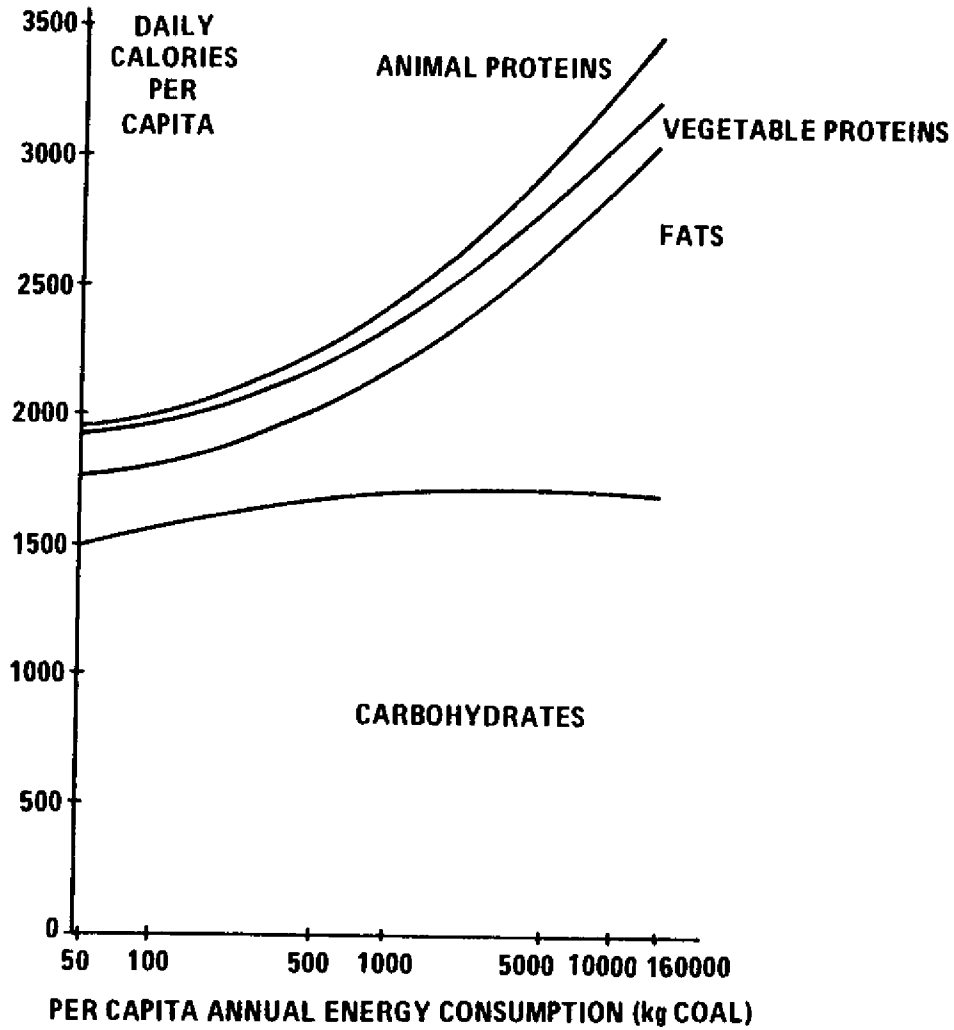


Figure 4. Caloric input versus per capita energy consumption (kg coal equivalent) taken as an index of wealth. From L.A. Sagan and A.A. Afifi.

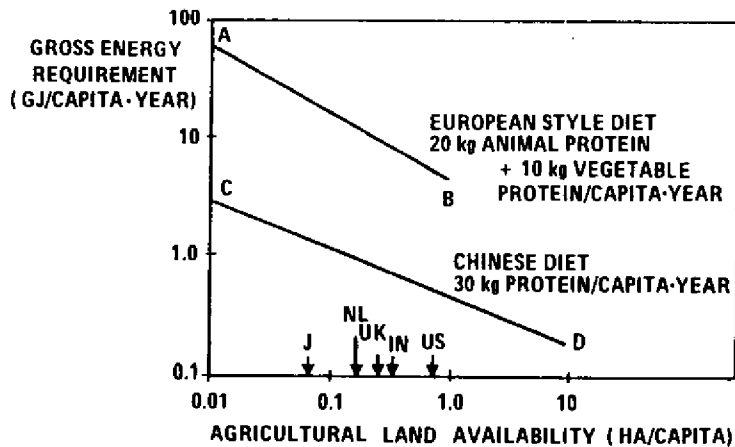


Figure 5. Fossil energy inputs versus agricultural intensification. Four countries' positions are reported. About 150 case points have been used to construct the curves. From M. Slesser.

By increasing the protein input in the form of animal protein - and in order for these animals to grow rapidly - they are fed easily digestible grains. Any surplus can be "efficiently" taken care of. The energy ratio, however, plummets to well below unity. For feed-lot beef, it is in the range of 0.1, meaning that an input of more than 10 calories of fossil fuel is needed to get one calorie of beef. For proteins only, the ratio is 100 (14). This fact has two consequences. The first is that the fossil energy input for agriculture may rise extremely rapidly as the living standards of the world population rise. Figure 4 shows how diet evolves with income, here indexed to energy consumption, and figure 5 shows how energy expenditure increases with the intensification of agriculture, here expressed in terms of hectare per person to be supported. Four nations are located on the abscissa to indicate where we stand.

In figure 5, two curves are given, one referring to "Chinese" eating habits, and the other to "European" or more precisely North American habits, where animals are largely used as intermediate processors. This situation opens up new avenues as the amount of fossil energy to produce protein from micro-organisms gives rise to an energy ratio more or less in the range of  $E_r - 0.1$ , with present technology (14); a possible asymptotic value of 0.5 has been considered.

Micro-organisms have a long history of domestication by man, providing chemical transformations which improve the preservability, digestibility and taste of agricultural raw materials. Bread, wine, and tempeh are the three characteristic cases, their use already established in the dawn of history.

Micro-organisms are geniuses in handling biochemical problems, and the next question - whether one can feed them fossil energy products - has been solved without a hitch. Plants have the privileged position of interfacing between the biosphere and solar energy via photoproduction of hydrogen, which then feeds all the chemical chains inside the plant. If, however, agriculture develops in such a way that the energy obtained is substantially less than the energy put in, why then not let micro-organisms do the same job and avoid agriculture altogether, the advantage being that land is no longer required?

Such proposals have been made (8), with nuclear reactors to be used as primary energy sources, and hydrogen produced by water decomposition as a feed. The proper micro-organisms able to "do the rest" are under intensive development (13).

### Conclusions

The menace for agriculture, if not immediate, is visible, and agricultural practices start reacting in the proper direction, to delay, if not avoid, the defeat. The increase in human population - expected to reach 6 billion in the year 2000, and a ceiling of perhaps 20 billion in 2050 - spells, in fact, a final defeat (16). Not only will these people ask for better nutrition than is available now, but their cities and amenities will consume agricultural land, pushing the operation points further toward the left in the graphs of figure 5.

As things are happening now in the United States - and will be in the near future in other countries like Australia - low intensity is exported where high intensity is already the rule. United States exports of grains and soyabeans to Japan can be interpreted in that way. The energy cost of transport from the United States to Japan is lower than the energy cost of intensification of agriculture in Japan to get the same result.

This may not be the case in the medium-range future. If 6 billion people tend to live in their cars and feed on meat from their fridges, the Los Angeles way, there will be no land left. And the attraction of the Los Angeles way of life seems irresistible. In this case the movement toward landless food production via micro-organisms is inevitable, and will come rapidly. In the real world, however, situations are rarely so drastic, as proper changes along the way soften their outcome. What then can be a reasonable target for agriculture in the meantime?

As table 1 shows, the energy cost of modern agriculture can be split equally between mechanics and chemistry. In mechanics, most of the work goes into tillage, whose main objective is to kill weeds. Here we have to say first that tractors have improved their mechanical efficiency over the last 30 years (12), but not their fuel efficiency to any great extent. As their efficiency at the axle is perhaps 15 per cent, there is plenty of room for improvement there.

Low tillage techniques are under development and their application is spreading, especially in the United States. Tillage has the main objective of modifying the ecosystem, which plants have been doing all the time by using proper chemicals. The basis of low-tillage techniques is the use of herbicides to control weeds. Seeds are planted by "injecting" them into the soil (15).

Herbicides and pesticides that now operate on the principle of carpet bombing may progressively move to the hormonal or perhaps genetic level, and require less and less energy, as the amounts necessary will be reduced.

The largest slice of the energy for chemicals is taken by fertilizers, with nitrogen in first place. Nitrogen, however, mostly goes to grains. Consequently, the other line of attack that promises to minimize energy expenditure lies in the development, by genetic engineering (5), of grains capable of directly, or more probably through symbiosis with bacteria, fixing nitrogen from the atmosphere. Nitrogen fixing in grains, contrary to what one would expect, would not draw upon the energy resources of the plant. Plants actually use nitrogen in reduced form, but they can draw it from the soil only in an oxidized form, e.g. as  $\text{NO}_3$ . The energy a plant (e.g. wheat) expends to reduce this nitrogen is almost exactly the same as that which a legume (e.g. soybeans) expends to extract it from the atmosphere (4, 1).

Rough calculations show that improved tractors, low tilling, targeted herbicides and pesticides, extended capacity for nitrogen fixation, all have a potential for reducing energy consumption in agriculture by one order of magnitude, bringing  $E_r$  to a safer level of 10 to 20.

The fad of more "natural" feeding habits, with lower consumption of meat and balanced vegetable protein diets, may establish itself as a custom and then lead the European curve in figure 5 to approach the Chinese one, thus making possible a further gain, of perhaps a factor of five, in energy expenditure.

A last point, which is beginning to receive some attention, is that of farm waste (and forests) as a source of food. Cooking, as mentioned above, extended the range of edible resources, and biochemical processing, the clever way, may extend it further. Ruminants have done a lot in this direction, but microbiologists can certainly do better. And forests may constitute an almost inexhaustible resource if a clever way can be found. With total world food production amounting to less than one billion tons of coal equivalent (tce) per year, farm waste amounts to about three billion, and biomass production in forests to about 50 billion tce. Fermenting part of the farm waste to biogas or

alcohol, to be used for instance to run tractors, may be a good intermediate objective to increase the resilience of the agricultural system by uncoupling it from the world energy system.

To conclude, this analysis of trends as seen from the angle of energy consumption patterns induces neither pessimism nor optimism. It shows a challenge that is within the technical capacity of mankind, and it shows a fast-changing pattern that will tax the ingenuity of engineers in the field of agriculture.

To sum up this view of the best path to solutions, I would say: More bits and less kilowatts.

#### REFERENCES

1. W. Brill, "Biological nitrogen fixation", Scientific American (March 1977), 68-81.
2. I., Eibl-Eibesfeldt, Liebe und Hass, (Munich, Piper, 1975).
3. R.M. Gifford, "Energy in agriculture", Search, 7 (1976), 411.
4. R.W.F. Hardy, and U.D. Hawelka, "Nitrogen fixation research: A key to world food?", Science, 188 (1975), 633.
5. A. Hollaender, ed., Genetic Engineering for Nitrogen Fixation (New York and London, Plenum Publishing Co., 1977).
6. J. Janick, C.H. Noller and C.L. Rhykerd, "The cycles of plant and animal nutrition", Scientific American (September 1976), 75-86.
7. G. Leach, Energy and Food Production (Guildford, Surrey, IPC Science and Technology Press, 1976).
8. C. Marchetti, "Hydrogen and energy", Chemical Economy and Engineering Review, 5, 7, January 1973.
9. D. Pimentel, "Energy use in cereal grain production", in Proceedings of the International Conference on Energy Use Management (Oxford, Pergamon Press, 1977).
10. Pimentel, D., and others, "Energy and land constraints in food protein production", Science, 190 (1975), 754.
11. L.A. Sagan, and A.A. Afifi, Health and Economic Development I: Infant Mortality, Report No. RM-78-41 (Laxenburg, Austria, International Institute for Applied Systems Analysis, 1978).
12. D. Sahal, "A generalized logistic model for technological forecasting", Technological Forecasting and Social Change, 7 (1975), 81.

13. H.G. Schlegel, and R.M. Lafferty, "Novel energy and carbon sources, A. The production of biomass from hydrogen and carbon dioxide", Advances in Biochemical Engineering, 1, 143-168 (1971).
14. M. Slessor, and others, "Energy systems for food policy", Food Policy, 2, 2 (1977), 123,13.
15. Triplett, G.B., and D.M. Van Doren, Agriculture without Tillage, Scientific American, 236, 28 (January 1977).
16. H. von Voerster, and others, "Doomsday: Friday 13 November AD 2026", Science, 132 (1960), 1291.

THE SEARCH FOR ALTERNATIVE ENERGY SYSTEMS AND  
LOW-ENERGY-CONSUMPTION SOCIETIES

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INTRODUCTION

Solutions to problems which seem infinite cannot be found within well-delineated spheres of expertise. The energy problem has that seamless quality; however, most of the expertise dealing with energy has indeed been operating in very clearly defined domains.

The questions posed in this paper relate to the organization of skilled work in industrialized countries. How does the organization of work, both inside and outside government, influence the search for alternative energy systems? And what are the dominant paradigms in scientific and methodological thought and research that act as barriers to new thinking? Comprehending the constraints within which experts function, when dealing with energy problems, is just as important as understanding the macro-politics of energy. Breaking the impasses requires that we know something about the arrangements of power and authority and the ideas that surround these arrangements.

The subject matter of this paper may be placed under the general topic of social structure, as we are in fact dealing with the social structure of energy activities. The concern is with the ability of large, now almost planetary, systems and organizations to adapt to changing circumstances regarding resources. Although this paper will discuss two interdisciplinary energy research projects in the United States - the Committee on Nuclear and Alternative Energy Systems of the National Academy of Sciences, known as CONAES, and the University of California project on "Distributed Energy Systems in California's Future" - the lessons learned are relevant far beyond that country's borders and might well be applicable, with some modifications, to most industrialized nations. The paper focuses on the ability of scientists and engineers, as well as other workers, to carry out research on energy questions in the intellectual climate of the latter part of the twentieth century, and also questions their capacity to suggest policies that stem from such research. In an anthropological context, the situation could be summarized in the following terms:

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"The more varied and enriched the total culture, the more difficult it becomes for each member of the society really to participate in its various activities. He begins to be an onlooker, then a bystander, and may end up indifferent to the welfare of his society and the values of his culture. He falls back upon the immediate problems of his livelihood and the narrowing range of enjoyment still open to him, because he senses that his society and his culture have become indifferent to him". (A.L. Krober)

This narrowing of outlook has similar ramifications for organizations (whether business, governmental, or scientific) as they operate with the same degree of self-interest, and activities are structured to maintain the organization irrespective of wider societal needs. The main interest here is the effect on the consideration of energy options.

The CONAES study and the Consumption, Location and Occupational Resource Group report

Within the framework of the CONAES study a special resource group considered the changes in lifestyle that would accompany changes in per capita consumption of energy by the year 2010. The question arose of what would happen to consumer tastes if energy levels remained the same or increased two-or-threelfold over the next 30 years.

The assignment was loaded from the start. "Lifestyle" was a vague and emotive term. Lifestyle changes were considered threatening. In terms of methodology, an anthropological analysis of consumption behaviour as something separate from production behaviour was inconceivable. There were basic assumptions about the relationship between gross national product (GNP) and quality of life, or GNP and level of energy expenditure. There were also assumptions about dimension; large-scale complex technologies, for instance, were viewed as more intellectually challenging or more efficient than small-scale technologies. The task of the resource group was to provide evidence that would at least question these untested assumptions.

As work proceeded, many of the initial differences among the participants crystallized into distinct paradigms which could be recognized by social philosophers, historians and geographers as old themes in the history of Western civilization. Some 15 years ago Lewis Mumford reminded us:

"From late neolithic times in the Near East right down to our own day, two technologies have recurrently existed side by side: one authoritarian, the other democratic, the first system-centred, immensely powerful, but inherently unstable, the other man-centred, relatively weak, but resourceful and durable."

The same opposition emerges in Amory Lovins' "hard-soft" analogy, and certainly European and North American environmentalist groups would agree that nuclear power may be associated with a totalitarian state, whereas dispersed solar sources are more likely to be associated with democracy, diversity and social equity. Although there was a variety of views represented in the CONAES study, it is probably fair to say that, at the start, the dominant thinking supported the idea that large-scale complex technologies would be more likely to preserve life as it is today in the United States and to spread the good life to other nations. The same people were convinced that strong, centralized technology was accompanied by economic growth which buttresses values such as individual freedom.

In this context, and as an exercise rather than as the pursuit of a utopian vision, the study explored two possible societies with the intent of examining the implications of contemporary assumptions about energy and society. The work was entitled Energy Choices in a Democratic Society because the authors wished to call attention to the relations between energy supply and the political process.

The first exercise was intended to explore the need for energy in a society that looks very much like the present one projected into the future, without major changes in attitudes but with significant improvements in amenities, roughly consistent with those that have occurred in recent decades, combined with prudent energy use. This scenario brought out the inefficiency and waste in the present North American energy expenditure system. In the second case a society was explored in which attitudes towards resources had changed significantly; society had decentralized in respect of land use and work; people valued thrift and self-reliance; it was a nation less vulnerable to terrorism and violence and one that was at the same time better supplied with the amenities of life. This exercise illustrated a society with high technology and low energy use simultaneously. The energy levels associated with these two societies are 75 and 53 quads (quadrillion Btu) respectively.

The energy supply for the two scenarios included solar energy. Scenarios designed to minimize consumption of fossil energy and use solar energy more extensively may be constructed. If some of the more optimistic solar energy projections from the (CONAES) Solar Resource Group were realized, solar energy could contribute more than half the energy required by the 53-quad scenario, and almost half that required by the 75-quad scenario.

The energy use pattern in 2010 would differ from that of today. The percentage of energy used in the commercial sector would increase, while that in the residential sector would drop. The percentage for the industrial sector would remain approximately constant as a percentage of the total energy used.

Table 1  
Present and future energy use patterns

	1972		2010 scenarios			
	quads per cent		75-quad quads per cent		53-quad quads per cent	
Residential	14.8	21	9.5	13	8.7	16
Commercial	8.7	12	11.6	16	5.8	11
Industry	31.2	44	35.4	49	27.3	51
Transport	16.5	23	15.8	22	11.5	22
Total	71.2	100	72.3	100	53.3	100

The 75-quad scenario

The over-all conclusions from an analysis of the technological and behavioural changes that would be required by the 75-quad scenario suggest that potential energy savings in each major sector of the economy would be significant. Even with 35-per-cent growth in population (from 214 to 280 million) and per capita GNP, total energy consumption would be approximately the same in 2010 as it is today. Moreover, this level of energy consumption could be attained without a significant reorganization of living, working and transport patterns. This does not, however, mean that energy consumption would remain constant over the entire period between now and the year 2010, even if all the energy-conserving measures



considered were implemented. A more likely path would be an increase in energy consumption until 1990, followed by a decline in the twenty-first century as the capital stock and consumer durables wore out and were replaced by more efficient units.

These conclusions pertain to non-renewable primary energy resources measured at the point of extraction. In addition, one may estimate that approximately four quads of solar energy would be needed in 2010 to provide space heating and cooling and hot water. This energy would otherwise have to be obtained from non-renewable resources to maintain the comfort levels postulated. Here brief mention may be made of the assumptions and conditions in each sector that led to these conclusions.

Output from the industrial sector was assumed to grow at 0.8 per cent per capita per year. By 2010, total per capita output would be 32 per cent higher than in 1972. The total energy requirement to produce this output would be almost the same as that of today. This improvement would result from the efficiency of measures postulated, which include better housekeeping and maintenance, better heat recovery, improved plant logistics and specific process changes. The increases in efficiency and corresponding energy savings were estimated by the Industrial Resource Group of the CONAES Demand/Conservation Panel on the assumption of a fourfold increase in energy prices by 2010.

Energy use in the residential sector would be significantly reduced from 1972 values. The reduction would be accomplished by measures including increased insulation, thermostat controls set lower, and improved housing construction practices. A shift away from single-family dwellings toward multi-family and better insulated mobile homes was postulated. Solar water heating was assumed to be used in 60 per cent of the houses built after 1976. All houses built after 1977 were assumed to be passive solar houses that maximize heat gain and retention during the winter and minimize it in summer. Increases of about 40 per cent in the efficiency of appliances were assumed. The stock of appliances was assumed to reach saturation point at about 1.2 times the present stock per capita.

Commercial floor space was assumed to double per capita, but energy intensities would be halved as a result of measures such as improved heating, ventilating and air conditioning systems, lower lighting levels and insulation. Total energy requirements in this sector would increase.

In the transport sector, total energy requirements would fall. Air travel per capita would be assumed to increase by a factor of three. Increased energy use in air transport would be partially offset by assumed improvements in load factors, engine efficiency and average trip length. Another major change would be in transport by motor-car, where energy savings from shifts in trip patterns and increases in fuel economy to 35 miles per gallon were estimated at about 75 per cent. Car ownership would reach saturation point at 1.2 times the present level per capita. Use of electricity in transport would increase from 0.001 per cent to 0.01 per cent of total energy use in that sector.

These were broad assumptions that led to certain conclusions regarding the significant potential for energy savings in the United States economy. In the 1970s, national concern about energy consumption focused on the relationship between energy and output. It is important to note that in this scenario the behavioural and technological changes that would lead to energy savings do not restrict production of goods and services. Consumers would retain approximately the same levels of space heating and cooling and water heating. The goods and services would merely be delivered and used more efficiently. Transport services

would also be used more efficiently. In the industrial and commercial sectors, savings per unit of output would result from the efficient use of known technologies, and not from production cut-backs. The high-energy-productivity society would be founded on appreciable conservation of energy, achieved by a variety of mechanisms ranging from economic policy to regulations, education, market signals and research and development. Examples considered were tax deductions, loan guarantees, taxes on heavy users, energy efficiency taxes on appliances, building codes and energy price increases. Equity considerations were central.

#### The 53-quad scenario

The second case described is a high-technology, low-energy-consumption society. The 53 quad society explored the potential for energy reductions associated with changes in attitudes. The primary thrust would be towards qualitative shifts. The people in this society would not attempt to turn back the clock, but would utilize technology in a way that improved the quality of their lives. Advanced technology would appear at many points: solar energy, advanced motor-cars, magnetically levitated trains, microprocessor building and process control systems, extensive use of co-generation, and so on.

The longevity of products was emphasized. The economist K. Boulding demonstrated almost 30 years ago that stocks of goods contribute to human well-being, in contrast to flows, which contribute to GNP. A shift in emphasis from one to the other will give rise to processes designed to minimize resource consumption over time. The shift in cultural attitudes embodied in the 53-quad society would necessitate the development by economists and other social scientists of new measures of progress in society.

The scale of this society would reflect the needs of a participatory democracy. Technology would have to fit political values: there is growing awareness that technology can be used to determine questions of value and social equity. The trends towards tightly meshed technological systems which were characteristic of the 1970s would be reversed in the 53 quad society, increasing the likelihood that most of the system could survive even if a part of it was severely damaged, as the stability of a technological system is dependent on the types of external perturbation that occur and the types of redundancy built in.

Several basic tenets of other scenarios are called into question by the 53 quad scenario. The scenario demands major occupational shifts from centralized employment of individuals in large corporations to individual jobs, principally in services. This factor was inserted to enhance potential self-reliance so as to counteract a growing mentality of dependence. Increased emphasis would be placed upon recreation and leisure time. The United States at present falls close to the bottom of the list of industrialized nations in terms of leisure time. The nature of the basket of goods consumed would change, and new measures of economic welfare other than GNP would emerge. Energy use for transport would be affected by shifts in city construction patterns. Emphasis upon decentralizing cities into sub-units and transporting bulk goods rather than finished goods would alter transport energy needs significantly. The replacement of vehicles and aeroplanes by high-speed ground transport systems would lead to further reductions in energy for transport.

Overall, new attitudes in society would result from major changes in the most important factors that affect gross energy demand. Efficiency would increase significantly because of large price increases, and conservation programmes would be demanded by citizen groups. Attitudes towards transport, throw-away products, the form of cities and space use - and attitudes towards other

important aspects of life not usually discussed in connexion with energy, such as the quality of interpersonal relations, work organization, the percentage of the work force which is self-employed, participation in processes that determine the quality and directions of everyday affairs - all would change.

There are several important lessons to be learned from this second society. First, there are a large number, though not an infinity, of ways to use 53 quads or any other amount of energy. For example, Ireland and New Zealand expend about the same amount of energy each year, but in very different ways. Similarly, individuals vary in their energy use, regardless of the energy available. Next, certain supply technologies such as oil, gas and solar energy are less intrusive than others, such as nuclear energy. Changes that come too fast, whether in the form of increases or decreases in the amounts of energy used, are disruptive in society; changes that include a grass-roots input will have effects and results that are different from those that are imposed by business or government.

Furthermore, it was found that there is no basis for believing that the continued growth of our present technology will not produce dramatic changes in lifestyle (rather than preserve it as some would believe). Such growth has changed and will continue to change the fabric of life in all industrialized countries. Lifestyles change with or without technology. In general, it may be concluded that consideration of low energy, high technology societies expands the range of choice and increases the time within which one can plan for the age after fossil fuels.

#### Ideological barriers to change

There were additional, and for the most part unexpected, reactions to the work which the resource group generated. First came denial: the group was describing "impossible futures"; it was planning for future scenarios that "went against the grain of human nature". To an anthropologist specializing in understanding of human nature, this reaction meant "we don't like it". Reasons for disliking such scenarios may range from fear of the unknown, satisfaction with one's present station in life, a dislike of the past which the future is seen as resembling, to anxiety arising from a challenge to basic paradigms never before questioned. A second reaction was to impugn the group's credentials. Although the resource group represented the disciplines of anthropology, sociology, physics, computer technology, engineering and economics, it had not placed sufficient emphasis on quantitative data: "more tables, less prose" was advocated. The criticisms reflected ancient disagreements about the use of qualitative and quantitative methods, and served to illustrate how difficult it is in general for many scientists to incorporate findings from disciplines which could contribute to more intelligent discussion of "unbounded" or "seamless" problems, such as energy.

On the question of method, anthropologists such as Colson have often observed the role of divination as a decision-making procedure which legitimates the basis for choice. The Azande people of the Sudan consulted their oracles in the same spirit that the British Coal Board or the United States Department of Energy consult their statisticians or their number specialists. They wish to minimize risk-taking, where the future is uncertain, or at least to legitimize the decisions taken should there be a need for accounting. Research on energy suffers from an overly-developed dependence on numbers.

To the false sense of concreteness and the credibility problems caused by this reliance on numbers must be added an even more serious consequence. Much that is important is left out. Questions of freedom or democracy cannot easily be discussed numerically. Can social structure, the effect of various types of

employment on energy efficiencies, or questions dealing with conditions necessary for social sharing or co-operation be dealt with numerically? We have seen what happens when questions of quality of life are discussed using only a quantitative approach. How can one so discuss the waste ethic?

To see the energy problem as a social and cultural problem rather than a technological one is not to belittle the importance of technology, but rather to recognize the role that values play in determining planning directions. Then we can begin to exchange experience. For example, a thorough understanding of the organization of the traditional European or Oriental city - cities that were planned prior to the invention of the motor-car - provides very important lessons for the United States; and the European renovation and restoration movement often implies conservation of energy and presents models for low-energy scenarios which, besides conserving materials and capital, also enable us to maintain a sense of history and community.

The question of professional flexibility has been much discussed lately under the rubric of the "mind-set", an expression which indicates inflexibility. The problem of "mind-set", of which quantitative views are but a part, is hard to break because our identity as professional physicists, engineers, anthropologists, etc., is often tied up with success in achieving certain sets of mind useful in delimiting research problems and solutions.

Following the CONAES study, the author attempted with Norman Milleron to systematize an understanding of ideological barriers among energy planners. Three general areas bear mentioning: ideas about time, ideas about progress and ideas about scale and complexity. As for time, it is perhaps not surprising that a restricted time perspective has dominated energy discussions. Anthropologists are by training global in time perspective. In a more restricted time perspective solar energy might appear as intermittent and thereby not dependable. In a global time perspective fossil sources of energy may be viewed as disastrously intermittent. According to Linder, the technology that has given us our sense of time has, in a broader sense, not expanded the time that people spend in important endeavours such as eating, conversing and love-making. Thus, flat-plate solar collectors may not be used on the Stanford University campus in California because the policy of the University dictates an amortization period of five years. Similarly, under present policies in many countries lenders may not take into consideration the life-cycle cost of building components in appraising housing loans. It is important to fit the time perspective to the problem. Restricted time perspectives can hinder environmental protection and discourage conservation in buildings. For households, however, short-term feedback regarding savings can add up to significant conservation.

Progress is also perceived as relating to time perspectives. Much of the hostility towards "soft energy" paths stems from a view of progress which does not fit with the perspective. For the most part, technology is used as a measure of progress, and it is the presence of technology rather than its use or consequences that provides the measure. For example "progress" is said to have eliminated the drudgery of women's work, yet Vanek, for instance, has furnished evidence to the contrary. More importantly, the cost of technological progress is swept under the rug by use of the concept of "externalities" or long-term costs. It should be remembered that cultural progress is dependent upon factors other than those arising from the use of energy, because it is the way in which energy is used rather than the expenditure of energy per se that affect the quality of life.

Ideas about scale and complexity enter the picture at all points. In countries where increasing amounts of government money are spent on the military, more money is also devoted to science. Big machines and massive technologies that fit into systems of bigger systems are part of a trend toward centralized and concentrated power. The attraction of research on risks and complex solutions rather than solutions that function are part of this picture. In the United States, one speaks of the risks of nuclear energy and the risks of coal. Does this fascination lead us to speak less about conservation or solar energy because there are no reports of any related hazards? How can we explain the remark that conservation is considered controversial in the United States?

People who like life big and risky seem to find a low-energy society intellectually dull. Conservation is labelled a prissy pursuit. No Nobel prizes are awarded for such work.

To define the concepts involved in the energy problem may be the prelude to finding solutions. Two contrasting paradigms are evident here, each adaptive in different conditions. Opposing positions are being questioned: When is big bad? When is small beautiful? When is more really more, and when is it simply indigestion? Society must also ask itself: when is centralization appropriate and when is decentralization best, and in what conditions do maladaptive ideas persist? In short, what works?

#### Organizational barriers to change

The connexion between work organization and the development of alternative technologies is becoming obvious. Evidence suggests that it may be easier to change people's consumption habits than to change their work patterns, particularly for those who are responsible for making energy change happen. It may be true, as David Morris notes in a paper on "Municipal energy independence," that the governing principle of energy planning has been that there would be no change in lifestyles, that the basic institutional arrangement of energy delivery would not be altered. That is what many people seem to want - a transition that does not require a redefinition of jobs or even thinking about modifications in their work.

In a study which was part of the project on "Distributed Energy Systems in California's Future", a range of people involved in the implementation of California's solar building code were interviewed; they represented various interest groups related to housing, building codes and energy use: bankers, contractors, architects, building inspectors and estate agents. Each belonged to a particular work subculture with an organization and set of values peculiar to his or her work group. They showed almost self-contained levels of dealing with the code. In an analysis of court cases, it was found that the major objections to the code were often elaborated around arguments about higher construction costs, inflexibility of prescriptions, lack of materials, lengthy amortization periods and the collapse of certain industries, such as those manufacturing electric-resistance heating devices.

Architects often react critically to codes they feel will hinder their creativity or contribute to more paperwork. For overworked and understaffed building inspectors, it is worry about yet more work. Estate agents are satisfied with the status quo. Government bureaucracy is inflexible in setting down a mandate circumscribing the work, even if solutions to problems might lie outside its competence. Public utility organizations are interested in preserving their position as generators and sellers of energy, not as buyers.

The point of enumerating these cases of self-interest is to focus on the aspects of the transition to low-energy societies that inhibit speedy developments if government, or industry, or professional workers are responsible for the transition. It is necessary to realize that workers, whether they are in industry, government or professional societies, are often not free to create new structures. Even if solar energy or conservation does mean that cities could be more livable and that the unemployed might have jobs, it will not necessarily lead us into a smooth transition. The agents for change must be those who stand to gain. Change strategies that effect employment will work best when the change does not challenge entrenched power, nor add burdens to already overburdened workers. Uncertainty in the work place, particularly among high status workers, such as scientists and corporate executives, makes for conservatism.

#### Implications for alternative energy directions

Among the most profound questions were those raised by a sociologist during the CONAES study:

"How did we get into this mess? Must we assume that the role of energy in human affairs was hitherto not correctly perceived? Or is our institutional-political machinery so defective that correct analysis and valid information cannot be translated into sensible courses of action? Or is the conflict of goals among sectors, regions and classes so fundamental that it is impossible to define the common good? Or have we been living with a framework of assumptions that once were viable but suddenly are no longer so? Why?"

The same people who got us into this mess are still in charge. The "mind-set" in the dominant energy establishments is a mentality that prefers the complex solution to the simple one, the big toy to the workable gadget, laser fusion to community solar collectors. At the turn of the century, the President of the American Chemical Society predicted that by the 1970s the United States would be running on solar energy. Why did it not happen? The Second World War, the military development of nuclear power, the monopolization of energy research through the creation of the Atomic Energy Commission - are all part of the answer. The failure to separate military from civilian energy goals in the United States and elsewhere is undoubtedly connected with the slow development of solar energy. Oil also provides an example of the use of energy for the purpose of gaining power:

"Oil has been contrived (with full intent by the industry) to be the major energy resource of modern industrialism. From initial ownership of oil-bearing land to the ultimate consumer, oil engenders an incredibly complex power and control network that reaches deep into the government and economy of almost every nation in the world, as well as into a broad range of industries that are financially or technically dependent on the oil business."

The ideological and organizational barriers to change are simply a reflection of the world-wide trend towards central control, irrespective of the political forms that government may take. Does this mean that we should be pessimistic about alternative energy futures? No, but we need to be wary; we need to set our priorities carefully and to nourish grass-roots contributions. We should begin where there is least resistance and most self-interest. After the 1973 oil embargo there were striking reductions in energy use by American industry, although the companies did not move to extend the energy-saving concepts to the consumer through the products they produced. They had no incentive.

In a similar vein, cities are beginning to practise conservation from motives of self-interest. It is in the economic self-interest of municipalities to reduce the amount of money spent on imported energy and to keep the savings as far as possible within the local economy. What is interesting about conservation and solar energy use in American cities is that its driving force has been initiatives by dedicated private citizens.

In the Bronx in New York, grass-roots community development has provided a successful model which other segments of the population can draw on to try new possibilities. The organizers of such work are often disenchanted professionals or unemployed graduates attracted to new challenges. The United States Co-operative Bank Law should allow private citizens to develop energy co-operatives and apply for loans and technical assistance.

Finally, a word about the leadership needed to bring about change. Building codes are a mechanism around which a process of education can begin, although they can give rise to resistance as well. Government and industry, and professional societies, need direction from those who are affected by their work. New ideas are desperately needed. Governments have often borrowed new ideas from more flexible communities of people.

IMPLICATIONS OF INTERNATIONAL COMPARISONS OF ENERGY  
USE: THE SWEDISH/AMERICAN CASE REVIEWED

Background paper prepared by  
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I. INTRODUCTION

The shock of the oil embargo heightened interest among countries in examining each other's energy use, with the goal of both understanding differences and possibly discovering interesting energy conservation technologies. In 1975, a comparison between the United States and Sweden was undertaken because in many ways these two countries exhibited important similarities in enough areas to make the comparison credible; the present work summarizes that initial comparison\*\* and extends it, offering in addition a discussion of what has taken place in each country, relevant to the comparison, since 1972.

Unfortunately, discussion of energy use in other countries has often been marred by misunderstandings. They arise from comparisons of energy use and gross national product, two quantities that have taxed correlators and energy statisticians for decades. Though serious work cannot be based upon relationships between two such aggregated quantities, it is useful to review some of the popular myths surrounding energy comparisons among countries.

II. MYTHS ABOUT ENERGY AND THE ECONOMY

"Other countries use less energy and enjoy the same standard of living; so can we." This statement reflects the fact that the use of energy per unit of national income (E/G) is considerably lower in Europe than in the United States (and Canada). While much fruitful work has shown that European countries do indeed generally use energy more efficiently than North American countries, the reverse is sometimes true. But the ratio of energy to GNP is inappropriate as a measure of energy efficiency, because effects of climate, economic structure, lifestyles and the composition of imports and exports can also affect it. We therefore, reject the use of these gross comparisons.

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\*\*For further reading, see L. Schipper and A. Lichtenberg, "Energy use and well-being: the Swedish example", L. Schipper, "Energy use and conservation in industrialized countries", in J. Sawhill, ed., Energy Conservation and Public Policy, Report of the 55th annual American Assembly, (Prentice Hall, 1979). These works contain the bulk of the references for the present discussion. References to new material appear in the reference list following the article.



"There is a strong correlation between energy use (E) and GNP (G), both in time and among countries". There is no doubt that correlations between E and G, either cross-sectional or in time for a single country or among countries, can be found with good statistical accuracy. But the price of energy is missing from this simplified measure. Whereas energy prices fell for decades, they are certain to rise now. When E-G models are re-run using energy prices as an intermediate variable, with a variety of couplings (or "elasticities") relating price to level of use, the results are usually very different from the simplified case - the ratio of energy to GNP, for the use of the United States, can vary by a factor of more than two for a factor-of-four variation in the energy price. (1) Moreover, among countries at any given level of income, there is fairly wide variation in per capita energy use, again indicating that the correlation, while impressive, leaves considerable scatter. The only firm rule that emerges is that in the long run

THERE ARE NO FIRM RULES RELATING ENERGY USE TO GROSS NATIONAL PRODUCT.

Many factors must be considered, none of which are exposed in the simplistic analyses offered by many critics of conservation. We will avoid using E/G unless no other measures are available.

"Higher productivity is due to higher energy use per worker." Though machines (capital) that improve productivity also use energy, the overwhelming share of energy in any advanced economy is used for space and process heating, not for operating machines. And most technologies that have advanced productivity have also decreased energy requirements per unit of product. That energy use per worker has increased in most countries is easily explained - machines have increased output per worker faster than output per unit of energy because wages have tended to rise while energy costs have fallen. But energy use per worker, especially between different countries or different industries, is an especially deceptive measure that should not be used casually in discussions of energy conservation.

"Industries that use less energy per worker (or per unit of product), like leather or textiles, are 'more efficient' than those that use more energy, such as plastics." This popular idea has little validity for energy conservation arguments because different products and processes are being compared whose output is used in different ways. It is not clear to what degree (and at what cost) leather could be a substitute for plastic in, say, seat covers. Nor does the assertion that the energy cost of a shirt made of synthetic fibres is greater than that of a "natural" cotton shirt necessarily provide grounds for conclusions about energy use. Energy, as one of many production factors or resources, is not the only factor that deserves attention in the energy debate.

The United States uses more energy per capita (or per dollar of GNP) than most countries because:

(a) Exports are large. Wrong - American exports are relatively much smaller than those of most other industrialized countries, and we tend to import a small amount of energy embodied in foreign trade, while most western European countries export embodied energy.

(b) America feeds the world. Wrong - agriculture, especially grains and other export staples, is not energy-intensive on an energy/ton or energy/dollar basis, compared with paper, steel etc.

(c) America's defence apparatus is large, especially in other countries. Wrong - because defence includes services as well as aeroplanes, and our overseas forces draw on energy supplies from other countries. Sweden also has a high per capita defence budget.

(d) American industry produces more energy-intensive products than others do. Wrong - while Switzerland produces far less heavy industrial output (paper, chemicals) than most, other European countries and Japan actually produce more, per capita. Indeed, the structure of United States or Swiss industry appears to have evolved beyond energy-intensive raw materials towards products with higher value-added than industry in the Federal Republic of Germany or Sweden. The point is that United States energy use cannot be "explained" away by references to structural phenomena such as those mentioned above.

The importance of these myths in the energy debates of the past and present cannot be over-emphasized. It has often been argued that differences in culture, lifestyle, policies, form of government, or non-energy resource base affect energy use in ways beyond the control of energy policy. But international comparisons help sort out insulation techniques, industrial processes and automobile propulsion systems that have important consequences for energy use. As techniques for using energy, these systems have little to do with the non-technical differences among peoples and countries. Certainly, the implementation of specific technologies, in the name of energy conservation, may depend on non-technical aspects of a country and its lifestyle. But such questions can be answered only when energy use and conservation among many countries has been fully examined.

### III. THE MEANING OF CONSERVATION

The meaning of conservation is often ignored or left undetermined in studies. This is unfortunate, as it is important to determine how much the differences in relative energy needs can be attributed to conservation and how much to structural features, such as the presence or lack of energy demanding raw materials, or a cold climate. For our purposes, (2) energy conservation means reducing the cost of using energy with other resources by

(a) Substituting less costly inputs, notably capital, for energy;

(b) Altering behaviour in the short run (e.g., miles driven or indoor temperature); or

(c) Gradually altering lifestyles or economic structure (living near work, owning fewer cars, producing less raw steel).

The principal driving force behind conservation is the increased direct and social cost of energy. This definition is consistent with traditional economic thought. (3)

The definition advanced may seem narrow, but it has an important meaning in international discussions. The effect of great variations in income upon energy use (through ownership of equipment) is not considered part of conservation. Nor is the increase in energy use associated with rapid rises in incomes in less developed countries in any sense "anti-conservation". But it is important to look at tasks and the energy associated with these tasks. When energy per unit of activity is considerably lower in one country than another there are, prima facie grounds for believing that the effects of conservation are present. Indeed, it was the finding of such differences in the comparison between the United States and Sweden that led to many further investigations in the former

of Swedish techniques, particularly in the building sector. With these considerations in mind, the comparison between the United States and Sweden will be reviewed.

#### IV. THE UNITED STATES AND SWEDEN COMPARED

##### A. General considerations

In summarizing the comparison we will, wherever possible, break down differences in energy use according to the scheme suggested in the discussion of conservation, separating effects of economic structure, lifestyle, and energy intensity. For example, when comparing heating, the amount of living space per capita is an indicator of standard of living and economic structure; the desired indoor temperature is one of lifestyle, influenced both by energy costs and by habits, as well as perhaps by outdoor climate and the affordability of central heating. It has been shown (4) that in colder northern Japan, indoor temperatures tend to be higher than in southern Japan, where heating equipment is far less prevalent.

The reason for this breakdown follows from the discussion of conservation: higher energy costs will stimulate short term reductions in indoor temperature, which may persist, but also more important middle term changes in building practices, including the addition of insulation to existing homes. This second action reduces the energy requirements for a unit of indoor thermal comfort, possibly by a great amount. In the long run, very high heating costs might affect the size of dwellings or the choice between single-family and multiple-family dwellings, that is, the economic structure of the habitat sector. This breakdown allows the analyst to find those differences in energy use among countries that may suggest immediate conservation measures - mostly technical - which have little political or social impact on people's lives.

To compare any two countries, many small effects have to be taken into account before energy use can be directly compared, including differences in natural distances, fuel extraction (almost non-existent in Sweden) and climate.\*\*\*

An additional consideration, often overlooked, turns out to be important too. If one counts the energy embodied in the goods and services making up foreign trade, it is found that the United States is a slight importer of energy, in an amount equivalent to 1 per cent of the total energy used in 1973. This included the energy used to refine fuels that are imported and exported, but not the thermal energy of combustion contained in those fuels. Sweden, in contrast, is clearly a net exporter of embodied energy, with the net embodied energy exported amounting to 8 to 9 per cent of total internal consumption. This is also true for the Federal Republic of Germany and Japan. With regard to fuel, Sweden, like most European countries, imports a larger charge of energy, both crude and refined, while the United States imports considerably less in relative and absolute terms. The United States exports coal and Sweden exports refined oil because of excess refining capacity. Moreover, geography and trade put certain uses of energy out of reach of normal accounting practices, since a much larger share of Swedish production, consumption and transport passes through foreign countries than is the case for the United States. Fortunately, the most troublesome discrepancies or difficulties turn out to be relatively small or readily quantifiable.

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\*\*\*Air conditioning is non-existent in Sweden, but there is little need to heat factories in the United States, and these two uses, by coincidence, nearly offset one another.

## B. Contrasts in energy use

After allowing for these adjustments, it is found that the greatest differences in energy use appear in the intensities (or efficiencies) of use for process heating, space heating and transport. To display the over-all effects of both intensity and mix of output, these relative quantities (for Sweden and the United States) are set out in table 1.\*\*\*\* As can be seen, space heating in Sweden is remarkably less intensive than in the United States, when measured in Btu/square metre/degree-day. Other studies suggest that Sweden and Denmark are unique in this area. Living space per capita is nearly as large in Sweden as in the United States, while most of Europe falls behind these countries in this important measure of living standards. The energy intensity of apartment heating in Sweden is nearly as great as in single-family dwellings (see below). This means that the relative efficiency of space heating in Sweden compared with the United States cannot be ascribed to the greater proportion of apartments in Sweden.

On the other hand, households in Sweden generally have smaller appliances than in the United States, reflecting a different lifestyle and lower after-tax incomes, and this results in somewhat lower household use of electricity. Other European countries fall even further away, although the gap is narrowing. In the commercial sector, the same high degree of thermal integrity appears in Sweden.

Indoor temperatures in Sweden are higher than in the United States. One relative inefficiency in the use of heating and hot water occurs in Sweden because of common metering and unregulated hot water and heating systems. This leads to surprisingly high consumption of fuels for heating in apartments, although the over-all use of heating is more efficient in Sweden than in the United States because building shells are well constructed.

In the industrial sector, the differences in intensity are consistent with the results of other studies. Sweden is neither the most nor the least efficient country. While oil refineries in Sweden produce relatively less petrol than in the United States, other product mixes are comparable. The over-all Swedish mix in manufacturing is weighted more heavily towards energy-intensive products than is the case in the United States. The lower energy intensities found in Sweden, however, are generally tied to higher energy prices there, suggesting that prices do affect industrial energy "needs" considerably. It has been shown that higher prices have been important in eliminating the building of any new wet cement ovens, given the energy-conserving dry oven of today.

The greatest contrast is found in transport, dominated in both countries by the automobile. Swedes travel only 60 per cent as much as Americans, and use 60 per cent as much fuel per passenger mile. This held Swedish gasoline use in the early 1970s to a third of America's. Public transport and inter-city railways are less energy-intensive and more widely used in Sweden, while air travel is overwhelmingly larger in the United States. Intra-city trucking in Sweden is considerably less energy-intensive than in the United States, but long-haul trucks in Sweden use slightly more energy per ton-mile than in the United States. The greater distances in the United States mean that ton mileages (at distances greater than 30 miles) are far greater there. The over-all long-haul mix is less energy-intensive, but total use is greater because of distance. Here

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\*\*\*\*More detailed tables are contained in Efficient Energy Use and Well-being: The Swedish Example, Report No. LBL-4430 (Berkeley, California, Lawrence Berkeley Lab.). A revised version appeared in Science, 194 (3 December 1976), p. 4269.

is a clear example of how greater use, on the part of the United States, has little to do with inefficiency. In fact, American freight transport is more weighted towards the less energy-intensive railways than that of most other countries.

### C. Policies and prices

Historically, higher energy prices in Sweden than in the United States have been an important factor in prompting the more efficient energy use in that country. While pre-embargo oil prices in the United States and Sweden were roughly equal (table 2), Americans enjoyed natural gas and coal resources that provide heat 20 to 50 per cent more cheaply than oil. In the case of electricity, the two countries were radically different (up to 1972). Since 75 per cent of all electricity generated in Sweden was produced by hydropower, the ratio of the cost of electricity to the cost of heat from fuel was only half as great in Sweden as in the United States. Industry in Sweden naturally developed a more electricity-intensive technology base. However, 30 per cent of thermal electricity generation in Sweden was accomplished through combined production of useful heat and electricity in industries or in communities, the latter systems providing district heat. Consequently, in Sweden, only about 7,000 Btu of fuel were required (in 1971/72) for the thermal generation of a kilowatt-hour of electricity. Increases in the cost of nuclear electricity and oil favour the continued expansion of combined generation, but institutional problems slowed that expansion in the late 1970s.

An example of the effect of different prices helps explain Swedish energy use. In Sweden, cars are taxed in proportion to weight, both when new and through yearly registration. Swedes found a loop-hole, the registration of cars through companies, but the government discovered this trick and raised the tax on company-owned cars. Petrol is taxed, the amount recently being raised to 90 cents per US gallon, against less than 15 cents in most of the United States. Even so, Sweden has relatively low-priced petrol compared with France or Italy. But generally high prices compared with the United States restrain total car use, especially in short trips and in cities.

Although the impression that Sweden is somehow "energy-wise" and the United States less so is unavoidable, the real lesson from this comparison of the two countries is that energy use for important tasks is flexible, given time, technology, economic stimulus and, in some cases, favourable government or institutional policies. Indeed Sweden could be using more energy than the United States per capita (or per unit of GNP) and still be more efficient (as is the case in manufacturing), or the converse. And Sweden is not a special case. Other countries show similar variation in energy use.

What were the major historical energy policy differences between Sweden and the United States before 1973? These may explain the differences outlined above: Sweden always had an electricity policy, but coal and then oil were imported as necessary to meet rising demand. Sweden taxed motor fuels heavily, but for fiscal, not energy purposes. In the housing sector, the cold climate made energy-consciousness a must, however, as is reflected in progressively tighter building practices. Altogether Sweden had energy policies but little energy use policy. (5) (6)

The same was true for the United States (7). Little attention was paid to energy demand, certainly in no small part because of ample, low-cost domestic supplies. The energy properties of the building stock, particularly in the residential sector, (8) suggest a situation far from economic effectiveness even in the days of relatively cheap energy. Thus, in both Sweden and the United States the

demand for energy before 1973, while certainly a function of many non-energy policies or ad hoc supply policies, was not formed directly by an over-all energy policy.

#### V. THE POST EMBARGO RECORD

While little careful analysis of the post embargo period has been attempted, some data available now indicate progress towards more effective energy use, especially in the United States. Table 3 gives a few important indicators for the United States and Sweden.

In Sweden, grants and loans have been handed out extensively for industrial and building improvements and innovation. While the Starre Report (9) shows disappointing results from the programme on buildings alone (far less energy saved per unit of investment than planned), the industrial programme (10) shows remarkable results, bringing about a 2 per cent saving in oil/electricity use at a cost of less than \$12 per barrel equivalent. However, both these programmes complement the spontaneous improvement in efficiency stimulated by higher prices.

In Sweden the "spontaneous" observations are somewhat different. Cars grew in average size until 1977, and their numbers continued to rise at around 3 per cent a year. While industrial conservation projects show some startling successes, (10) the sluggish economy, which did not recover until 1978, prevented the major users (paper and pulp, and steel) from maintaining the high capacity necessary to achieve energy efficiencies with existing plants. Hoped-for expansion in industrial co-generation has been slowed as well.

In the residential sector results have also been mixed. While some data show a small reduction in oil use per home (table 3), there have been steady increases in electric heating (using more resource (primary) energy than oil) and in electric heat use per house. And residential non-heat electricity use is still growing much faster than in the United States. Finally, electricity use in commercial buildings also grew between 1972 and 1977. However, rates of growth in Sweden have slowed considerably since 1973.

Thus it is primarily structural changes - growth in car numbers, new home size and appliance use - that have pushed up petrol and electricity use. Indeed, consumer energy prices (in real terms) in Sweden fell from their 1974 high until late 1978 (table 4). No wonder there was frustration in Stockholm at the lack of success in the consumer sector. However, an intensive campaign in 1979 brought about a 7 per cent saving in oil heating in late winter. Finally, it should be noted that new Swedish homes suffer 40 per cent less heat loss than existing stock, and already improvements in these new homes are expected. (11)

In the United States, where nearly every indicator of energy intensity was greater than in Sweden, progress has been dramatic, as table 3 shows. While the prices of energy have moved in conflicting ways (table 4), all observers now expect that prices will rise steadily, especially following the 1978 National Energy Act. However, major conservation programmes were relatively limited: mandatory improvements in auto fuel economy; development of building and appliance standards (promulgated in only a few States as of 1979); and various local or national tax credits for residential conservation or renewable energy projects. (3) (12)

What has certainly hampered conservation in the United States has been low fuel prices, at least in world terms. But given time, both countries have promising prospects - in fact, they seem to teach us an important principle: that rising energy prices, coupled with limited intervention (i.e. building standards, some

financial incentives, and above all time), seem necessary and sufficient to bring about massive conservation over time, in response to tightening energy supplies.

The reason for this somewhat startling conclusion is that only six years have passed since the events of late 1973, far too short a time to replace most energy-using equipment, yet two of the wealthiest economies in the world have been able to reduce energy use by roughly 10 to 15 per cent compared with pre-1973 trends in energy intensity and economic activity. In countries with high but still rapidly growing incomes (most of the OECD countries), the capital stock is still growing rapidly; for less developed countries, little of the capital equipment that will use energy in the year 2000 is yet in place - and obviously the prospect for more effective use is great.

## VI. SOME LESSONS FROM THIS COMPARISON

As international exchange of ideas about energy are common now, from the comparison we have made it would be worthwhile to see what might be of interest to one or more regions interested in conservation. The focus is on the man-made environment because neither Sweden nor the United States exhibits outstanding technologies for saving energy in the heavy industrial sector, nor are the cars they produce among the most energy-efficient ones. However, new paper pulp mills in Sweden, total energy systems in the United States and expanded industrial co-generation in both countries represent conservation potential in industry. It should be emphasized, however, that each country must work to find its own solutions to energy uses that are climate dependent (buildings), lifestyle-dependent (land use planning and transport) or policy-dependent. Even in industry it is important not to simply shop in other capitals for energy-saving equipment, but to build instead on existing ideas with new ideas, leap-frogging existing efficient technology to find even more productive ways of using energy with other resources.

### A. Buildings

Compared with other nations, the Scandinavians widely employ enviable practices in the building sector. Energy use per unit of area per unit of climate, the best measure of efficiency, is markedly less than in Central Europe or the United States. Moreover, evidence accumulated in conversations with European energy officials suggests that most European countries are a long way from establishing truly energy-efficient building stocks. Scandinavian home-building practices make it clear that heating needs can be cut considerably - by as much as 80 per cent compared with pre-1973 homes in the United States. While insulation of existing homes in the United States is the most popularly cited need, control of infiltration and ventilation may make an even larger contribution to saving energy profitably, when existing or new Swedish buildings are compared with untight United States structures. Experience in the building research programme at the Center for Environmental Studies, Princeton, and the Lawrence Berkeley Lab. suggests that the low air infiltration rates now called for in Swedish building codes (considerably less than one change of air per hour in homes) can be achieved.

One effect of careful insulation and tightening of structures is the increase in comfort that goes beyond relief at lower heating costs. When structures are carefully controlled, the heat works more efficiently, causing less rapid air exchange and heating up of the interior near vents. Draughts are reduced. The temperature differences between floor and ceiling, between areas near windows and inner parts of rooms are narrowed, reducing both air motion and discomfort.

Indeed, it has been suggested that Swedish homes are built so well in order to satisfy desires for comfort ahead of simply saving energy.

One of the most important technologies being applied in Scandinavia is the heat exchanger. It has become clear that infiltration losses in homes can be reduced so far that odours, indoor pollution including evaporation of plastics, radon gas from building materials, cigarette smoke, etc. can become a nuisance or even a real health hazard. Forcing ventilation by fans and ducts has been a common practice in Swedish homes. The exhaust air contains valuable heat, however, and an inexpensive heat exchanger could recover much of the heat while allowing the unpleasant pollutants to be expelled before they could build up in the home. In new Swedish apartment buildings, where the heat content of exhaust air is enormous, heat exchangers can be required, an attractive possibility for centrally heated and ventilated United States buildings. It should be noted that heat recovery is extremely important in the United States in the warm months. At present several European and Japanese firms are planning to market inexpensive heat exchangers in the United States. United States manufacturers will undoubtedly be close behind, and soon ahead.

#### B. District heating

One technology often suggested by the European experience is district heating (DH), by which blocks (or square kilometres) are provided with water-borne heat (and hot water) from central plants. In Denmark, Sweden and many eastern European countries a significant proportion of all apartment buildings and most buildings in city centres are heated in this way. Elsewhere district heating makes important local contributions, though in no case does the energy saving attributable to DH have more than a small impact on total energy consumption.

How does district heating save energy? Heat-only systems produce hot water in well maintained high-temperature boilers whose heat transfer from fuel to water is significantly higher than in individual boilers, more than offsetting the relatively small (10 per cent) losses in transmission of water. In the ideal case, the largest possible fraction of hot water is made in conjunction with electric power. Heat that would have been rejected to the environment is now used to heat buildings; the extra amount of energy added to this water (or alternatively the electric power sacrificed) is typically 5 to 8 times less than the useful heat produced. Alternatively, DH can be described as a system that produces electricity for far smaller losses than in condensing-only power plants. Energy savings are equivalent to the extra fuel which would be required if electricity and heat were made separately. Exactly how large a proportion of all district heat is produced with electricity depends on the characteristics of the season as well as the electric power demand characteristics and existing power plant mix. DH economics depend both on this accounting and, critically, on the capital cost of distribution, which in turn is dependent upon the amount of heat sold per square kilometre. In densely built areas with long heating seasons, such as cities in Scandinavia, DH provides low cost heat.

Other important advantages accrue to cities with DH. Pollution from burning oil is markedly reduced because controls are better than in separate boilers. This advantage was important in starting up such systems in Sweden in the days when oil was cheaper. Moreover, oil-fired DH systems run on cheap heavy oil. Additionally, DH stations can run on a variety of fuels, including wood or coal, and can be built to switch rapidly from one to another. Since the combustion operation is centralized, congestion associated with fuel delivery is minimized. Finally, DH relieves individual building owners or occupants of worry about heating, as it is reliable.



Whether DH is economic for the United States, however, or other regions with less than extremely cold climates, is questionable. When comparisons are made of DH economics in Europe or the United States and Scandinavia, the heating load that enters in the calculation is often assumed as being at current levels, rather than calculated on the conservation that would be appropriate at the price charged for DH. European figures for heat demand are bloated by the lack of individual meters, a problem particularly acute in Sweden. The real cost of DH may be unknown since the unit price is so sensitive to the number of units over which the enormous fixed costs are spread. If DH can provide cooling, of course, the economics change considerably since such cooling reduces peak electricity loads and reduces waste heat loading in the summer in cities. Certainly technical studies and actual implementation, as has been discussed for cities in Minnesota and other colder American states, are important. At present, it appears that it is far cheaper to save fuel by end use reduction than by DH, at least in the central United States.

However, the real problems for DH in the United States may be institutional. Sweden and the Federal Republic of Germany have contemplated mandatory hook-up laws as a means of ensuring high density use and thereby low unit costs. Land use planning with long time horizons, far more prevalent and accepted in Europe, is essential to the orderly build-up of a system over a decade. Moreover, DH has penetrated principally apartment areas. In Västerås, Sweden, where virtually all single-family and multiple-family dwellings receive district heat, unit costs for detached houses were two to four times greater than for apartments, because of higher distribution costs. In the United States, detached houses are dominant and little high-density new construction is planned. DH may not fit into American living patterns except in existing down-town areas, possibly in conjunction with urban renewal.

Will Scandinavian DH systems be important in the United States? Unfortunately, many of the advantages appear only indirectly and not as direct cost reductions, especially when conservation reduces heat needs so much in most of the United States. And DH can only appear as a result of co-ordinated action, with government present at nearly every stage. Indeed it has been argued that DH has been attractive in many places as an extension of municipal power into the service of comfort. But struggles over nearly every recent government energy effort does not augur well for DH. Thus, DH faces institutional tangles that may be worth overcoming only in areas like Minnesota, where the potential benefits are undeniably great. Smaller ventures, such as time-of-day pricing and individual metering of apartments or large scale retro-fit insulation programmes, ought to be tried first before any large-scale DH is promoted nationally. For ultimately the energy saved per unit of investment should be far higher with schemes simpler than district heating.

### C. Transport

In the field of transport the lessons for the United States are sensitive and relate to policy matters. The difficulty in dealing with transport, as incomes rise and cars become more important, is clear: autos are popular. Obviously, one cannot "hold back" the car in the United States or elsewhere without offering attractive alternatives.

Because of low petrol prices, tax subsidies to owners of single-family dwellings, little or no land use planning, and easy access to freeways, people are spread out, and public transport in America seems hard put to it to capture even a small fraction of land passenger miles. The decline in public transport's share of passenger miles in Europe, very much similar to the drop seen in the United States 20 to 40 years ago, emphasizes this even more clearly. As usual,

this decline in share happens because the car increases its role in absolute terms. New owners, new patterns of commuting, new uses of the auto for vacations have become as abundant in Europe as in America in the post-war era. Thus, car miles have increased ten-fold in Sweden since 1950, and similar increases have occurred everywhere in Europe (see table 5).

Herein lies an important point: what will be the ultimate levels of car ownership, miles driven and efficiency in Europe (and the developing countries, for that matter) compared with the United States, where miles per gallon are now increasing and ownership is all but saturated? (see again table 5). Swedish experience over the past decade - a rapid increase in ownership, slight increases in car weight, a decline in miles per gallon - does not bode well for the countries in Europe that have not even achieved the level of one car for three inhabitants. Yet all governments must at some point confront the future role of the automobile and associated problems of land use, lest increases in the use of petrol frustrate the desire to lessen oil imports.

#### D. Lifestyle

While the original study avoided treating lifestyle explicitly, it is clear that this factor does enter into explanations of differences in energy use patterns between countries. For the energy conservation planner wary of establishing normative conservation goals or standards, the issue of lifestyle may be unwelcome. Nevertheless, it is important to use our observations of other countries in an attempt to understand the possible couplings between energy, conservation and lifestyle.

Quantitatively there are two aspects of lifestyle that bear directly on energy use: the mix of non-energy goods and services demanded by consumers, and the mix of key energy-intensive activities that interact directly with energy. To the latter group belong central heating and high indoor temperatures, patterns of car ownership and use, land use patterns, appliance ownership, vacation and travel habits and ownership of second homes or boats. The United States, Canada and Sweden tend to have the greatest energy demands arising from these patterns, while the remainder of Europe, though considerably "behind", is narrowing the difference somewhat.

It is hard to label activities such as living far from work as "wasteful", yet it is important to investigate why people live and work where they do, why they may evacuate cities at week-ends for second homes, why they prefer detached single-family dwellings to apartments. For example, most countries allow home-owners to deduct mortgage interest payments from taxes, an important subsidy for home-owning, especially in high-tax countries like Sweden. Moreover, commuters in Sweden can deduct the cost of their monthly bus fares from income, and those who can prove that driving saves 45 minutes per hour (each way) compared with public transport can also deduct the full cost of driving. These "lifestyle" subsidies may be justified on social grounds, but they have a measurable impact on dispersion patterns, which in turn tends to increase energy use.

Should any country "embrace" another country's lifestyle for the sake of saving energy? Probably not. However important the connexion between lifestyle and energy, there are so many conservation opportunities that involve technology or minimal behavioural adaptation to higher energy costs that we may not need to model our lives on other people's just to save energy. However, understanding the energy implications of alternative patterns of consumption, location and occupation certainly would illuminate options for society. Thus, the energy comparison of Mora, Sweden and New Ulm, Minnesota has created great interest in

trying to quantify the energy implications of perceived differences in lifestyles in the two countries. In this case the market-basket differences probably have less to do with observed differences in energy use than the lifestyle (or technical) differences in direct consumption habits.

While little information yet exists that allows general conclusions to be made about energy and lifestyle, details from the Swedish-American comparison and other work support some important tentative findings:

(a) The greatest differences in driving habits arise from the far more prominent use of the car for short trips in the United States. Commuting by car is gaining, however, in all countries, and load factors are low, partly because people living in clustered areas are still taking public transport. Greater distances in the United States affect distance to work, but do not account for the significantly greater distances travelled. Indeed, distance per car per year (table 5) varies far less across countries, suggesting that it is the ownership of a car that sets off lifestyle changes leading to increased driving nationally.

(b) Land use planning influences lifestyles and energy use considerably. As people spread out into suburbs, often aided by government home-building subsidies, cars become a vital link to shopping facilities and services. However, zoning in Sweden allows some services to be "built into" residential areas, while in the United States the suburbs seem to isolate residences from services.

(c) The low relative cost of scheduled and charter flights in the United States compared with Europe offers an energy-intensive but time-saving alternative to vacation travel by car. In Europe low cost charters have gained immensely in popularity, at least in the Scandinavian countries, but in most places the car seems to dominate vacation travel, causing immense traffic problems. Additional studies are needed to compare patterns and costs of car use in Europe and the United States. Rail travel is still important for vacationing and even for a good deal of inter-city business travel in Europe, because of high density, which clearly helps public transport.

(d) Whole-house heating is saturated only in the United States, Canada and the Scandinavian countries. One study by the Organisation for Economic Co-operation and Development suggests that affluence in Central Europe will support significantly greater demand for such heating. Similarly, appliance use will grow. Car ownership is still far from saturation in Central Europe, but is growing dramatically. Whether cars and appliances will ever approach those of America in size is unclear. If European countries begin now with appliance standards, new large devices not yet in place could be significantly more efficient than their American counterparts of the 1950s and 1960s at similar levels of use and saturation.

(e) Other links between living patterns and energy use have yet to be understood. For example, what is the over-all impact of commuting to second homes in countries like Sweden, Denmark or France? Does the fact that Americans move every six years on average make it more difficult to design communities and residences with a view to long-range resource costs? Will increases in affluence in Europe lead to the "Americanization" which is observable in Sweden and Denmark?

Quantitatively it is possible to separate effects of lifestyle from energy comparisons by concentrating on the use of heating, cars and appliances. Whether lifestyles directly affect the intensities of devices, which can be affected by policies and prices, is unknown. In any case we know that lifestyles do affect

energy use, and we know that these structural effects are apparent in a few important areas. This accounts for a significant part of the differences in energy use between North America and Central Europe (Scandinavia being intermediate). Since conservation mainly affects intensities, we can safely say that a great deal of conservation can be uncoupled from issues of lifestyle, while further reductions in over-all energy use might come about through key lifestyle changes in the United States. Whether these changes will occur is another matter, worth discussion elsewhere.

## VII. SUMMARY AND CONCLUSIONS

What has been learned from surveying energy use and conservation in industrialized countries? First, beyond question energy conservation accounts for a major part of the differences in energy use between countries. But structural lifestyle differences are almost as important. Energy prices (or taxes), higher in most European countries (and in Japan) than in the United States or Canada, have played an extremely important role in bringing about the use of these energy saving technologies. This factor is too often ignored by those who cite other countries as examples of energy-conserving societies. But we can say in all certainly that

INTERNATIONAL COMPARISONS OF ENERGY USE SHOW THAT THERE IS MUCH TECHNICAL FLEXIBILITY AND CONSERVATION POTENTIAL WITHIN PRESENT UNITED STATES ENERGY USE PATTERNS, AND IN OTHER COUNTRIES, PROVIDED THAT ECONOMIC INCENTIVES AND TIME ARE ALLOWED TO PLAY A ROLE.

Energy use policies per se are secondary in the establishment of today's practices, but policies will be more important in the future. Energy-saving building codes are the most important of these, but are themselves only truly significant in Scandinavia and perhaps now in part of the United States. Most European countries plan to introduce or stiffen building codes, but the Scandinavians are by far the leading practitioners of energy-efficient buildings. Measures to increase the efficiency of the motor-car are also important.

Lifestyle, coupled with energy through the standard and size of homes and the nature and extent of personal transport, plays an important role today in energy demand.

## VIII. THE CARROT OR THE STICK

As a final consideration, we will now explore how best to stimulate or ensure the economic use of energy. It has been noted above that a combination of policies, including that of allowing energy prices to rise to world levels, appears necessary and sufficient: there is little talk of long-term restrictions on behaviour or economic structure as a means of achieving energy economy.

In Sweden, pricing policies have included taxes that try to incorporate perceived social costs into energy prices. Thus, the cost of strategic oil storage is borne by oil users through a tax; the perceived fears of an excessively rapid expansion of nuclear power are reflected in a tax on electricity. The well-established welfare system handles the burden of high costs on the less well off. A growing problem, i.e. private use of business-registered (and thus, "tax-free") motor vehicles, accounting for nearly half of new car sales in 1976, was caught in 1977 through tax reform.

But low electricity prices appear to persist, (13) and a majority of Swedes still do not pay directly for their heat. On the other hand, apartment block management have taken steps to improve energy use. Over-all, some reforms in Sweden are called for (13).

In the United States, low prices still persist, though levels are rising and attitudes are changing. But there has been little interest in taxing domestic fuels to raise their prices to world levels - witness the defeat of President Carter's Crude Oil Equalization Tax proposal. In other words, for all the talk of the high social cost of importing oil, few seem to be willing to face that cost, let alone pay it.

In Sweden the State has subsidized conservation. The reasoning is simple - support is given to measures whose rates of return are acceptable to society but too low for individuals or firms to bear alone. In the United States there has been little direct subsidy of conservation. But President Carter's address of 16 July 1979 reversed a policy set down in the 1978 National Conservation Policy Act (14) by inviting, if not forcing, energy suppliers to provide capital for conservation as long as the rate of return exceeds (or alternatively as long as the amortized cost of energy saved falls below) that of new energy supplies. In Europe such activity is limited to the services of oil distributors (in Sweden or the United Kingdom, for example). That is, the United States approach may ultimately reach out to touch every existing building, in contrast to the more passive Swedish approach.

The comparison has shown that in the industrial sector energy prices have been an important consideration in the choice and the energy intensity of equipment; a certain influence on the size of cars and to a lesser extent the use of the alternative, public transport; a consideration in the construction of buildings; and to a lesser extent an influence on heating habits. Moreover, the consensus of high-level studies in both countries (1) (13) is that future energy needs per unit of activity will fall considerably owing to rising prices, increased awareness, and new techniques for achieving even greater energy economies.

If the flexibility of energy use illustrated by the comparison between Sweden and the United States applies to most high-income countries, then tens of millions of tons of oil (or oil equivalent) will be profitably saved in the next 20 years; these supplies may be crucial for the rest of the world, where affluence is scarcer than oil and the funds to buy scarce fuels are severely limited. Thus the potential for more effective energy use, as illustrated in this comparison, is encouraging to all who use energy - in fact, all the peoples of the world.

#### REFERENCES

1. Committee on Nuclear and Alternative Energy Systems, Report of the Demand and Conservation Panel (Washington, National Research Council, National Academy of Sciences, 1979). Summarized in Science, 14 April 1978, p. 142.
2. L. Schipper and J. Darmstadter, "The logic of energy conservation", Tech. Review, January 1978.
3. L. Schipper, "Another Look at Energy Conservation", American Ecology Review, Papers and Proceedings, May 1979.
4. T. Shoda, S. Murakami and H. Yoshino, Qualitative Level of Indoor Environment and Energy Conservation in Japanese Houses. (Tokyo, Institute for Industrial Science, University of Tokyo: 1978).

5. M. Loennroth and others, Energy in Transition. (Stockholm, Secretariat for Futures Studies, 1977). A revised version was due to be published in 1979 by the University of California Press.
6. M. Loennroth and others, Sol Eller Uran? (Stockholm, Liber foerlag, 1978).
7. R. Stobaugh and D. Yergin, Energy Futures (New York, Random House, 1979).
8. L. Schipper, "International analysis of residential energy use and conservation", to appear in Proceedings of the Second International Conference on Energy Use Management (Oxford, Pergamon Press, 1980).
9. G. Starre, Bostadsstyrelsens Utvaerdering av energisparstoedet, Del 1: Bostaeder (Evaluation of Energy Conservation Support: Homes) (Stockholm, Housing Authority, 1979).
10. SIND (Statens Industriverk), Utvaerdering av Statsbidragen till Energibesparande Aatgaerder i Naeringslivet (Evaluation of National Subsidies for Energy Conservation Measures in the Economy) (Stockholm, Liber foerlag, 1979).
11. A. Rosenfeld, and others, Building Energy Compilation and Analysis, Report No. LBL-8912 (Berkeley, California, Lawrence Berkeley Lab., 1979).
12. B. Hyman and R. Saltonstall, "The evolution of conservation as a key element of national energy policy", Paper No. 77-Wa-TS-3 (New York, American Society of Mechanical Engineers, 1977).
13. Energi: Energikommissionsbetaenkandet (Report of the Swedish Energy Commission) Stockholm, Department of Industry and Liber foerlag, 1978), vol. 1 (with 17 volumes of appendices).
14. L. Schipper, and others, "National Energy Conservation Policy Act: An Evaluation", Nat. Resources Journal, 1979 (in press).
15. J. Dunkerely, and others, How Industrial Societies Use Energy. (Baltimore, John Hopkins Press, 1978).
16. WAES (World Alternative Energy Strategies), Energy Demand Studies; Major Consuming Countries. (Cambridge, Mass., Massachusetts Institute of Technology Press, 1977.)

Table 1

Energy use in Sweden and the United States, 1970-1972

	<u>Ratios: Sweden/United States</u>			Notes
	Per capita demand	Intensity	Total energy use	
<u>Cars</u>	0.6	0.6	0.36	Swedish driving at 24 miles per gallon uses less energy
Public transport (trains, buses)	2.9	0.80	2.35	Public transport accounts for 40 per cent of passenger miles in trips under 20 km in Sweden
Urban trucks	0.95	0.3	0.28	Swedish trucks smaller, more diesels
Residential space heating (energy/degree/day area)	1.7 (0.95)	0.5	0.81	Sweden 4200 degree days C; US 2900 degree days
Appliances	?	?	0.55	More, larger appliances in US
Commercial total square feet	1.3	0.6	0.78	Air conditioning important in US only
Heavy industry (physical basis)	Paper 4.2 Steel 1.1 Oil 0.5 Cement 1.35  Aluminium 0.5 Chemicals 0.6	0.6-0.9		Sweden more electricity intensive due to cheap hydroelectric power. Also, Swedish co-generation
Light industry (\$ V.A.)	0.67	0.6	0.4	Space heating significant in Sweden
Thermal generation of electricity	0.3	0.75	0.23	Sweden has large hydroelectric, and co-generation projects

Note: Table 1 allows a breakdown of the various elements of per capita energy demand into structure factors (first column) and intensity factors. In each case, the ratio of Swedish to United States demand, intensity or total consumption is given. By using this scheme, direct comparisons of GNP, market basket in the aggregate or the true exchange rate are avoided. The actual figures are given in some detail in Schipper and Lichtenberg, loc. cit. For residential space heating, the structural factor is broken down into differences in degree-days and differences in area per capita. The structural effect of plentiful hydropower in Sweden is seen in the low ratio for demand for thermally produced electricity; the effect of co-generation is seen in the low ratio of fuel/kWh produced.

Table 2

Typical energy prices in the United States and Sweden.

	United States				Sweden			
	1960	1970	1974	cents/kWh (1970)	1960	1970	1974	cents/kWh (1970)
<u>Oil Products (cents/gal)</u>								
Petrol	30	35	45	1.04	53	61	116	1.82
Diesel fuel	23	28	35	0.83	42	48.8	90	1.45
<u>Heating oil</u>								
Small customers	15	18	35	0.50	13.3	13.2	40.6	0.37
Large customers	10.5	12	25	0.33	13.3	13.2	40.6	0.37
Heavy oil	7	8	23	0.23	7	8.5	22.5	0.24
<u>Gas (cents/MM Btu)</u>								
Residential	82	87	113	0.29	...	550	680	1.9
Industrial	550	680	1.9					
Firm service	51	50	...	0.17	...	...		
Interruptable service	33	34	...	0.11	...	...		
<u>Coal for Industry</u>								
(\$/ton)	10	13	25	0.14	...	18		0.2
<u>Electricity (cents/kWh)</u>								
Base	2.75	2.75	...	2.75	3.14	2.12	2.3	...
Base and space heating	1.75	2.0	...	1.5	...	1.5	2.0	
Industrial	1	1	1,5	(0.4- 2.1)	...	0.93	1.8	(0.6- 2.2)

Sources. Listed in Schipper and Lichtenberg. loc. cit.

Note. Exchange rate used: \$1 = Skr 5.18 (1960-1970); \$1 = Skr 4.30 (1974).



Table 3

Energy indicators in Sweden and the United States, 1972 to 1977

	UNITED STATES	SWEDEN
Cars per capita	+ 10%	+ 16%
Miles per gallon	+ 3%	- 5%
Petrol per car per year	- 7%	+ 5%
Oil or gas heat per house	-(10 or 15%)	- 8%
Electric heat per house	0%	+ 5%
Appliance electricity per house	+ (5 or 10%)	+ (30 or 40%)
Energy per unit of product	- 17% (value added)	- 2% (shipments)
Real GNP	+ 8%	+ 8% (1968 prices)
Energy-GNP ratio	- 5% (1973-1977)	- 3% (gross energy) - 8% based on delivered energy

Sources: various. Industry data in Sweden affected by low capacity in 1977. Residential figures include an increase of about 3 per cent in average dwelling size. Heat is approximately climate-corrected. United States sources include Monthly Energy Review, United States Department of Energy, Energy Information Administration, July 1979; American Gas Association; Atlantic Richfield Oil Co., and Oak Ridge National Laboratory. Swedish sources include Statens Industriverk (see reference 10) and Pm 1979:1, Energi; Energikommissionsbetaenkandet (reference 13) (Bilagsdel; Energibehov foer bebyggelse); electricity supply and use tables from Central Statistical Bureau.

Table 4

Percentage change in real energy prices in the  
United States and Sweden, 1973-1977

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	UNITED STATES	SWEDEN
Residential electricity		
Non-heating	+ 20	- 4
Heating	+ 34	+6 (1974-1977)
Heating oil	+ 30 or 40	+ 45
Heating gas	+ 45	-
Petrol	+ 18 (1973-1978)	+ 3

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Sources: United States - United States Department of Energy, Monthly Energy Review, July 1979; Typical Electrical Bills: All-electric Homes (United States Department of Energy, Energy Information Administration, October 1978).

Sweden - Statens Pris och Kartellnaemd, Stockholm (State Price Board); Swedish Esso, "Oljeaaret i Siffror", 1972-1979; Svenska Elverksfoereningen, yearly reports.

Table 5

## Passenger transport, 1972

	Passenger miles per capita	Miles per car in total passenger mileage	Share of cars in total passenger mileage	Energy consumption per capita (mwh)	Intensity (Kwh per passenger mile)	Price of petrol (US=100)	Percentage of income spent on driving	Car ownership Cars per 1000 people	Car ownership Cars per 1000 people 1961 1972
United States	11 300	9 360	92	9.4	.90	100	3.4	344	462
Sweden	6 280	8 900	84	(3.8)	(.60)	(180)	(0.8)	173	303
Canada	6 550	10 000	88	6.3	1.1	(110)	-	237	377
France	3 980	-	77	2.2	.71	256	0.7	133	269
Federal Republic of Germany	5 870	8 900	82	2.4	.51	243	1.1	92	253
Italy	4 160	7 610	80	2.2	.65	348	0.6	48	229
Netherlands	4 620	10 000	81	2.2	.59	-	-	53	229
United Kingdom	4 990	8 950	80	2.0	.49	192	1.1	113	230
Japan	3 760	-	34	0.9	.74	250	0.2	7	119
Europe average	4 840	-	80	2.3	.60	-	-	-	-

Sources: RFF; IEA; Swedish data modified by Schipper and Lichtenberg (loc. cit.); prices for petrol and income shares from RFF.

ANNEX I

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