STRENGTHENING CAPACITY TO INCLUDE THE ENVIRONMENT IN DEVELOPMENT PLANNING

Proceedings of the panel on environment and development capacity building
held at the
Northeast Universities Development Consortium Conference,
Williams College, October 15-16, 1993

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The session was chaired by Partha Dasgupta of the University of Cambridge. The panelists for this session were Edward Barbier of the University of York, Randall Kramer of Duke University, Uttam Dabholkar of the United Nations Environment Programme and World Bank, and William Moomaw of the Fletcher School of Law and Diplomacy, Tufts University. Henry Bruton of Williams College was the discussant.

Partha Dasgupta:

There are four speakers: Edward Barbier from University of York, an ex-student of mine, actually; Randall Kramer from Duke University here, Uttam Dabholkar from UNEP and World Bank, and William Moomaw from the Fletcher School of Law and Diplomacy on the other end and Henry Bruton, you all know, from Williams College and I am Partha Dasgupta from the University of Cambridge. The way we will organize it is to have each of the speakers take about 15 minutes to express his thoughts on a problem area and then at the end of the hour I will ask Professor Bruton to discuss and give his thoughts and that will be about 15 or 20 minutes and then we'll open up the floor for discussion.

Edward Barbier:

When Bill Jaeger asked me to make some remarks on this session I thought about it a lot, first in London and then in York -- I recently moved to the university -- and I thought that perhaps it might be best to approach this, for my own sake, at least, from a more general perspective. Firstly, I will try to provide a background as to why we ought to be interested in strengthening the capacity for environmental economics and secondly why developing countries,

in particular, ought to be interested. It shouldn't just be the agenda of multilateral organizations, such as UNEP, or aid agencies in the North, but developing countries themselves should benefit. And finally, I have some general thoughts from my own interest and my own knowledge of the field and of the capacity building agenda. I have titled my remarks, "The Economics of Environment and Development: The Capacity Building Agenda."

As part of the preparations of Agenda 21 for the UN Conference on Environment and Development in June 1992, the UNCED Secretariat made the following statement: "In the last two decades, there has been some progress through conventional economic policy applied in parallel with environment policy. It is now clear that this is not enough, and that environment and development must be taken into account at each step of decision making and action in an integrated manner."

A recent review of progress in economic research on natural resource degradation in developing countries in the 1980s and early 90s has also noted important research initiatives in 'resource accounting' methods; the impact on the environment of economic policies, particularly pricing policies for natural resource products and resource-based activities; the effects of 'user incentives', for example, common property rights, land tenure and distribution, intra-household decision-making, etc., on the way individuals manage the resources available to them; and improvements in the methodology of economic valuation of environmental impacts in terms of appraising both the benefits of environmental preservation and the costs of degradation.

In short, there is a rapidly emerging 'new' sub-discipline of economics of environment and development, and there is an even more rapidly expanding demand for policy analysis that applies environmental economics to development problems. In the near future, this analysis will be concerned with the following issues:

-- proper economic valuation of natural resources

-- integration of environmental considerations into economic planning and policymaking

-- economic incentives for sustainable resource management

-- the role of trade and international economic policies in resource management

-- the relationship between poverty, population growth and the environment.

An overriding feature of recent economic analysis in environment and development has been to treat the environment as an 'asset,' or form of 'natural capital,' that must be managed to 'sustain' economic development. The crucial decision is how much to 'draw down' stocks of natural capital to re-invest in other economic assets, i.e., reproducible (man-made) capital, foreign assets and human resources, in order to meet both current and future economic opportunities. This decision is of paramount importance to many low-income developing countries, as they are usually characterized as having an abundance of natural capital and too little human and man-made capital. Similarly, poor people within developing countries are considered to be overly dependent on natural resources and primary production, because of the lack of economic opportunities in other sectors of the economy and insufficient (man-made) capital formation.

Why Should Developing Countries Care About an Economics of Environment and Development? Unfortunately, there is little evidence to suggest that they do. Current development strategies are notable for failing to be either efficient or sustainable in their use of natural capital. One of the major reasons for this is the failure to appreciate the critical role of natural capital in economic development. Natural resource management is usually accorded a low priority on the development agenda, and even basic facts about the natural asset base are ignored. If governments of developing economies are to be convinced that sustainable and efficient management of their resource base is essential to economic development, then they must perceive the role of natural resources in supporting the economy as a whole.

For example, many low and lower middle income developing countries are characterized by a high degree of resource dependency. Many of these economies are directly dependent on natural resource products for the overwhelming majority of their exports. In most cases, export earnings are dominated by one or two commodities. Resource dependency has been a feature of these economies over the past 25 years, and for most low-income countries, has remained a persistent feature since the mid-1960s. More of the lower middle income economies have reduced their resource dependency with time, but this is clearly a long term process. Careful

management of the natural resource base may be necessary to maintain the 'capital' required for this transition and to achieve long term development goals. Running down the natural resource base today through inefficient and unsustainable exploitation could jeopardize development efforts by reducing future export earning potential, as well as needlessly wasting current earnings.

The failure to manage resources efficiently and sustainably today also increases vulnerability to the economic stresses imposed by external debt. External debt as a percentage of the gross national product (GNP) and debt servicing as a proportion of GNP and exports have risen substantially in virtually all low and lower middle income resource-dependent economies. For these economies the ability to meet debt repayments and to induce further economic development will depend on the continued successful exploitation of their natural resource bases. Without sustainable management, the debt burden may severely constrain development efforts.

The resource base in poor resource-dependent economies is far from static. Although comparison of land classifications across countries is fraught with difficulties, the most notable change over the last fifteen years in most economies is the decline in forest area and the increase in cropland. Much of the forest land has presumably been lost to agricultural conversion, with fuelwood and fodder gathering a factor in some areas and depletion for timber operations important in major producing countries. Some empirical explorations of the causes of deforestation, particularly from frontier agriculture expansion, are discussed further below.

Expansion of cropland clearly appears to follow the classic agricultural extensification pattern. Particularly in low income resource-dependent economies, low levels of fertilizer use and yield changes suggest very little agricultural intensification, with the notable exception of Indonesia, Sri Lanka and to some extent Kenya, Benin, Ghana, Nigeria and Zambia. A worrying trend in some poor Sub-Saharan economies is the fall in agricultural yields, particularly for cereals. Many other economies show substantial yield increases only because yields were abysmally low in the mid-1970s. Some economies that have increased agricultural intensification -- for example Indonesia, Sri Lanka and Kenya -- also face rapid population growth and severe constraints on cropland availability, as indicated by extremely low levels of cropland per capita.

In general, most of the low-income resource-dependent economies have long since extended cropland beyond their stock of favorable land with good chemical and physical properties for agriculture. Those countries that do still have 'excess' favorable land face difficulties in cultivating it, as much of this land occurs in areas with climates and growing season (e.g. arid/semi-arid zones) that prevent or severely constrain rainfed cultivation.

Cropland use and productivity in resource-dependent lower middle income economies follow similar patterns as in the low income economies. In general, fertilizer use and yields and yield changes appear higher in the lower middle income compared to the low income economies, suggesting a slightly higher level of agricultural intensification. However, in common with the low income countries, many lower middle income economies also display low cropland availability per capita and a low ratio of favorable total cropland. Climatic conditions again limit cultivation of much of the 'excess' favorable land in the North African and Middle Eastern countries, whereas social, economic and climatic constraints on frontier agricultural expansion also limit exploitation of the additional favorable land available in the South American countries. Clearly, much cultivation of marginal -- or ecologically fragile -- land occurs in resource-dependent lower middle income economies.

Thus the continuing dependence of most of the world's poorest economies on their resource base should give environment management a high priority as a development concern. This is particularly the case given that past economic polices and investments have led to rapid changes -- frequently with adverse economic consequences -- in resource stocks and patterns of use. Demographic trends have often worsened the relationship between population and resource carrying capacity in many regions. Continuing agricultural extensification into marginal lands have increased the susceptibility of economic systems and livelihoods to environmental degradation.

A re-appraisal of demographic and agricultural policies to take into account the new realities of resource-carrying capacity constraints and the need to improve the potential of marginal lands while sustaining the productivity of high potential lands is required. With regard to

population-environment linkages, one useful approach is to view the role of population growth in terms of increasing the 'scale' of human demands on limited natural systems. Another approach is to extend economic theories of household resource allocation to determine the extent to which increased family size is a cause and/or effect of environmental degradation.

To summarize, the natural asset base of the poorest, resource-dependent economies is being rapidly run down. Yet these economies remain in a fundamental state of 'underdevelopment.' In short, development is essentially 'unsustainable' because net depreciation of the natural asset base (and any increase in population) is not being compensated by investment in renewable (human and physical) capital. Clearly, a higher priority should be placed on efficient and sustainable management for natural resources to maintain the environmental 'capital' required for this transition and to achieve long term development goals. Rethinking the economic relationship between poverty and environmental degradation in developing countries from an economic perspective is also a necessary component of this new development thinking.

The Capacity Building Agenda. Cultivating this 'new development thinking' requires a commitment to changing the current development 'mind set.' Increased bilateral and multilateral assistance for environment and development projects is important in signaling to developing countries that their environmental assets are worth conserving. Perhaps more far reaching but hitherto neglected on the international agenda would be the powerful 'demonstration effect' of industrialized countries improving their own record with regard to 'internalizing' environmental externalities through economic, environmental and energy policies.

However, as I have argued previously, there still remains the challenge of developing countries determining for themselves that efficient and sustainable utilization of their natural capital is fundamental to achieving their own national development goals. A change in development thinking is therefore an essential pre-condition for developing countries to begin the initially difficult task of correcting the pervasive market, policy and institutional failures that prevent the attainment of environment and development goals.

Changing the conventional development 'mind set' that is currently biased against the

efficient and sustainable management of natural resources is therefore an important, but often overlooked, aspect of the goal of integrating environment and development. Certainly, more research in the economics of environment and development is called for, but much more important is that the international community assist developing countries themselves to increase their capacity both to conduct such research and to translate its implications in national and local policy initiatives. In short, there is a complementarity between improved investment in the natural capital of developing countries and in investing in the human capital of these countries to improve their own policy analysis and implementation capability in the economics of environment and development.

There are several ways in which institutions and donor agencies in the North can assist this capacity building process in the South:

- by providing undergraduate and graduate programs in the economics of environment development in Northern institutions, with generous scholarships for developing country students, and assisting the development of similar programs in the South
- by providing short courses and other training programs for policymakers and managers from the South to improve their understanding of the economics of environment and development, in particular its implications for policies and development strategies
- by providing opportunities for long-term collaborative research in the economics of environment and development between institutions and individuals in the North and counterpart institutions and researchers in the South, with the explicit agenda of fostering the capacity of the latter to undertake policy-relevant research in the economics of environment and development.

These approaches are by no means exclusive, nor on their own are they sufficient to improve the integration of environment and development strategies in the South. However, my main point is to emphasize that, if we are serious that the economics of environment and development represents an important shift in contemporary development thinking, then we must be prepared to make a commitment to ensure that the capacity to adopt this new thinking is

fostered where it is needed the most -- in the low and lower middle income economies themselves.

Randall Kramer:

Thank you. When asked to join this panel he suggested that I talk about some of the things that have been going on at the universities in the Research Triangle Area of North Carolina in the area of environmental development. So I'm going to talk about a couple of initiatives that are going on and some of their successes and weaknesses thus far. I think all of us would agree that colleges and universities face a number of challenges in enhancing the effectiveness of decisionmaking for sustainable development. I'm going to talk about some of the experiences with two initiatives that have been undertaken in the Triangle area to address issues of environmental development planning in the less-developed world. One of these initiatives is a new institution, the Center for Tropical Conservation, which was organized at Duke University in 1988 to cut across traditional departmental and school boundaries. The other initiative I will discuss is a research and training consortium, known as the Center for World Environment in Sustainable Development, which is a joint undertaking of the three Triangle universities: North Carolina State University, the University of North Carolina at Chapel Hill, and Duke University. Both of these initiatives are interdisciplinary in their nature but economists are playing key roles in these institutions. Let me begin with the Duke Center for Tropical Conservation. This was really the brainchild of, and beneficiary of some fundraising by a development economist some of you know, Malcolm Gillis, who formerly was the Dean of Arts and Sciences at Duke and recently assumed the presidency at Rice University. This Center grew out of the frustration of Malcolm and several other individuals on campus that the disciplinary orientation of the University did not lend itself well to making an impact on tropical resource management issues. So a semi-autonomous Center was established with the help of a cooperative agreement from the US Agency for International Development in 1988. The Center for Tropical Conservation has operated outside of any particular department or school but has drawn together natural and social science researchers from throughout the campus, including the Duke University Marine

Laboratory of the North Carolina coast. The Center has funded a number of research projects over the past several years. An ideal Center for Tropical Conservation project starts with state-of-the-art science, a biological conservation issue in the tropics, adds to it economics and social science necessary to understand human impacts and finishes with the institutional component on how the problem might be solved. One example of research which has had its training from it that the Center for Tropical Conservation has sponsored is its work on biological biodiversity conservation in the tropics. This research has been tended by two researchers; one a primotologist, who is also interested in forest ecology, along with a resource economist with interests in development environmental policy. Several manuscripts have been produced out of that project combining economic and ecological perspectives to review what's known about causes of biodiversity policies and potential management approaches. The project has involved several graduate students with an interesting mix; that included a US student who did dissertation work in Indonesia, an Indian student who did dissertation work in Madagascar; and another Indian student who has begun master's thesis work in Indonesia. An outgrowth of this project is an upcoming working conference on tropical biodiversity conservation, which will bring together academics, developers, conservationists and policy workers and it's designed to develop a set of recommendations for policy measures for project designers. In addition to the biodiversity activity the Center for Tropical Conservation has sponsored interdisciplinary work on forest management and policy, ecotourism, and environmental policy for industrializing countries. The Center has been quite successful in bringing together faculty from natural sciences, social science disciplines to address tropical conservation development issues.

In addition to funding interdisciplinary research that might <u>not</u> be funded from traditional sources, the Center for Tropical Conservation has had an active educational mission as well. It has contributed to the education of current and future scientists and resource managers through a graduate training program. A modest number of students have been sponsored through the Center for Master's degrees and two different places on the Duke campus, one being the School of the Environment, with which I'm associated, and the Duke Institute of Public Policy. In

addition the CTC has worked with the School of the Environment to offer short courses on sustainable development for World Bank staff and others. A shortcoming of the Center for Tropical Conservation has had its heavy dependence on primarily a single funding source, Agency for International Development, that's created sustainability problems due to a changing AID interest and priorities in, I might add, personnel, but recently the Center has begun to diversify its funding and attract funding from foundations. But I think the long-term health of the Center remains in question. On the other hand, the Center has been a model of being trim and fit; it's maintained a very low overhead with only three staff members, including the director, and almost all of its work has been carried out through national scientists and social scientists in their existing departments and schools. So that has enabled it to maintain a great deal of flexibility. So that's one institute that has cut across departmental and school boundaries within a particular university.

Now I want to talk about the Center for World Environment and Sustainable Development, which goes by the shorthand name of the World Center. The World Center was formed in 1991 by faculty at the three universities I mentioned before: University of North Carolina, North Carolina State and Duke. They began collaborating actually first on joint course on conservation and sustainable development, and this was a truly grassroots effort. It did not result from administrators at the three universities getting together and trying to think of something that would be attractive to funders; instead faculty said, wouldn't it be great if we could get together and offer a course that our students could take together. That initially happened between North Carolina State University and Duke University. The course was just begun again without any kind of official approval, just the faculty at the two schools listed it on the catalogue in both places, and the course rotated back and forth. In later years, after the UNC faculty joined the offering, a site was found in the Research Triangle Park, which is more or less equidistant between the three universities.

In its current offering, the course has 100 graduate students from the three universities. They represent a dozen different countries and there are students with working experience in many additional countries. This semester the course is being taught by a regional economist from

Duke, an ecologist from the University of North Carolina and an agricultural scientist from North Carolina State. In addition to sponsoring this course, World Center serves as an umbrella organization to encourage collaborative research among faculty from the three universities. The cooperating faculty from UNC have come primarily from the School of Public Health along with faculty from the ecology program in the City and Regional Planning Department. At NC State the core faculty are from the College of Agriculture and the College of Forestry. And from Duke, the cooperating faculty are primarily from the School of Environment and the Sanford Institute of Public Policy. The World Center has attracted funding for several research projects. Just one example is a study going on now of ecotourism potential of the Atlantic coastal forest of Brazil, involving researchers from Duke, NC State and the US Forest Service. The World Center also puts out a directory of faculty, Duke University has a newsletter which sponsors various seminar series that rotate among the three universities. The World Center for Environment and Sustainable Development has fostered a great deal of interchange among faculty and students at the three universities interested in environmental development issues. It's been able to draw on the different, but often complimentary, strengths represented by the faculty at the three universities. For example, only North Carolina State University, which is a land grant school, has substantial capability in agricultural sciences, obviously a subject vital to Third World development. The Center has also established strong links with cooperating universities in other countries and has a decentralized structure with faculty coordinators on each campus. That again for this Center has kept overhead costs very low. Thus far the World Center has not attracted any large grants for mega-projects but has served as a catalyst for small groups of faculty and students to seek funding in ways that facilitate work across the universities. One problem that the World Center has yet to overcome is that it sometimes finds itself in competition for funding with departments or centers on one of the three campuses, including the other one I mentioned, the Center for Tropical Conservation.

Let me close with just a few summary remarks. Two rather institutional responses to the need for strengthening capacity have been observed in the Triangle area. The Duke Center for

Tropical Conservation, has successfully combined cutting edge natural science and social science information in a resource management context; it has spurred a considerable amount of interdisciplinary research for enhancing the effectiveness of natural research policy in developing countries. The work is being disseminated through conferences, a policy-oriented paper series and more traditional publication outlets. However, it is still seeking a sustainable funding base. The Center for World Environment and Sustainable Development is this three-university arrangement, it has encouraged the sharing of courses and faculty expertise that address the environmental development nexus and the faculty and student interchange has been significantly enhanced as a result of the Center. While quite successful in its role as a clearinghouse for information, to move beyond this role will require significant incremented funding, including the possibility of core support from the three universities. A key ingredient for success in both of these centers so far has been the emphasis on pulling together multidisciplinary teams. Research funding that required interdisciplinary mixing among the teams was originally the magnet that pulled people together in both centers, but it's my observation that the intellectual enjoyment that has arisen from mixing up these disciplinary perspectives has far exceeded the expectations of most of the faculty and student participants.

Uttam Dabholkar:

Historical experience of the practice of planning development does not provide much evidence of attention to natural resources or to the environment as constraints, or as inputs, determinants of productivity, or as elements in social welfare. Moreover, the role of the environment as provider of ecological services which are critical to continuation of economic activity (e.g. biogeochemical cycles) and to human health and well being (e.g. as absorber or recycler of wastes) is also not recognized.

As awareness of the environment has increased, the demand for environmental quality improvement and for environmental assets conservation has grown, especially in the developed countries. Further, as the environmental capital has shown definite signs of depletion or

degradation, attention has increasingly come to be given to the functions of the environment, and changes in environmental stocks, amenities and services in relation to social and economic well being. A good deal of this perception exists at the global level and in academic discourse. Increasingly, practical ways and means are being searched to translate the concerns for sustainable development into decisions on economic and sectoral policies, investment allocations, choice of technology, and scale and location of development projects.

The majority of the developing countries has been preoccupied with problems of economic structural transformation and development in the context of widespread poverty, rapid population growth, heavy external debt service burdens, shrinking markets for exports, erosion of purchasing power of exports and national currencies, diminishing access to foreign investment and technology, and so on. It is only relatively recently that the connections between natural resource degradation and economic growth, between destitution and pollution, between demographic pressures and resource depletion, or between participatory governance and the quality of the local environment, or between equity in the distribution of the benefits of development and environmental quality have begun to come under scrutiny.

UNEP's advocacy of environment and development interconnections since the Stockholm Conference of 1972, the report of the World Commission on Environment and Development, and resolution of the United Nations General Assembly on the Environmental Perspective To The Year 2000 And Beyond, adoption by the world community of Agenda 21 of the UNCED, and it follow-up at national levels, and active involvement of the World Bank, UNDP and a number of other multilateral and bilateral development institutions in environmental assistance during the recent past have helped bring into clear relief the significance of integrating environmental considerations in the planning of development.

Four main principles permeate the current professional and institutional interest in integrating environmental considerations in development planning:

(a) A preventive and precautionary approach is effective and efficient in dealing with environmental problems. If environmental problems are to be addressed at their source, sectoral

(e.g. agriculture, industry, energy, transport, health) development policies, programs and projects need to internalize environmental management considerations. In other words, allocation of investments, choice of technology, scale of production and location of economic activity need to be guided by concerns of environmental conservation and improvement, along with other concerns, in every sector of development.

(b) Although many initiatives and investments relating to the conservation and improvement of the environment do not come about through the working of the market mechanism, and require deliberate public investment and regulation, a great deal of responsible environmental management can be induced by adjustment of economic policies and market signals, including removal of price distortions to ensure that price of resources, services and products better reflect real scarcities and costs.

(c) Attainment of environmental objectives is not cost-free; nor is it automatic. The gap between rhetoric and reality has to be bridged through institutional, administrative and social reform, as well as investment effort, apart from scientific research, training, education and public information. Environmental rehabilitation and quality improvement needs to be planned and such planning needs to be linked to development policy and planning for realism, consistency and optimality. Sometimes environmental objectives are specifically given, e.g. phasing out of the substances that deplete the stratospheric ozone layer, following a fixed time table as a result of the country becoming a Party to the Montreal Protocol. These objectives have to be achieved cost-effectively. More often, environmental standards and management regimes need to be determined on the basis of a comparison of costs and benefits among available alternatives.

(d) Social and economic objectives of development are not independent of the environmental objectives. When trade-offs exist among them, they need to be made explicit. Sometimes it may be possible to trace the economic, social and environmental implications of alternative courses of action (e.g. clearance of part of forest land for agriculture) over time, including those in respect of employment, trade, investment and economic growth. Sometimes there may exist potential synergy between a social development objective (e.g. public health), and

an environmental objective (e.g. improved sanitation, waste disposal and drinking water supply) and an economic objective (e.g. higher labor productivity). Bringing such and other potential synergies into play is part of the challenge of integration of the environment in development planning.

In practical terms, the essence of integrating environmental consideration in development planning lies in establishing the process through which an acceptable reconciliation of social, economic and environmental objectives can be achieved over specified time periods. Essentially, the decision-maker or the policy-maker has to make informed choices in regard to policies, programs, project designs, technologies, all of which have a bearing on the composition, distribution, including spatial distribution, of economic growth. Correspondingly, the relevant capacity building has to find expression at various levels, and has to mobilize fully the capacity of the market mechanism to guide household and enterprise behavior to foster environmentally sustainable development.

Some overarching factors which impinge on the developing countries' capacities to provide for environmental consideration in development planning should be kept in view by way of providing a context for the subject under discussion.

(a) Over the last five years there has been a surge of activity to assist the developing countries in preparing environmental action plans or policy and strategy frameworks for environmental conservation and sustainable development. There has also been a number of national conferences and workshops on the subject. Development projects are becoming increasingly sensitive to environmental management aspects, and institutional arrangements for environmental assessment, monitoring, regulation and guidance are evolving steadily in many developing countries. Awareness of and policy pronouncement for environmental protection and improvement are clearly visible, and so is the concern not to lose the opportunity or the momentum of industrialization, structural transformation and economic growth.

(b) Yet, apart from the grant and concessionary funds that are, and might be, made available to the developing countries under the Global Environment Facility (which are specifically

meant for activities aimed at achieving designated global environmental benefits), there has been no increase in external aid available for environmental rehabilitation, improvement and protection. Many developing countries need an infusion of significant investments to deal effectively with desertification, deforestation, water management, sanitation and waste disposal and industrial pollution control. In the absence of such investments, their capacity to integrate environmental objectives in the development process remains severely limited. Moreover, most developing countries do not have affordable access to modern pollution control and environmental technologies which might enable them to minimize the environmental damage associated with their industrialization, urbanization and agricultural development.

(c) The developed and the developing countries alike face the challenge of integrating environment and development. However, putting into practice guidelines for sustainable development by the developed countries should not constrain, but should facilitate, proper consideration of the environment in development in the developing countries. For example, issues such as, what should constitute sustainable forestry management practices, or what should be the time profile of introduction of progressive environmental standards for traded goods, or prices of exports based on the extraction and processing of natural resources, if they were to embody appropriate environmental management costs, technical co-operation to enable the developing countries to fulfill stringent environmental standards, need to be addressed through bilateral and multilateral dialogue and policy co-ordination. Such forward-looking practices will help bring about environment-development integration in tangible ways. Economists have a role to play in facilitating such synergistic international economic and environmental co-operation. This area of applied research has not received enough attention.

(d) Unfavorable international economic factors (e.g. falling and/or fluctuating prices for commodity exports, protectionist trade policies) and domestic circumstances (e.g. poor quality of governance, inefficient administration, lack of social cohesion or unity) which obstruct economic and social development, will also impede the integration into the development process. Addressing these structural impediments through domestic and international political dialogue is

critical to making progress towards sustainable development.

(e) Finally, it is important to keep in clear view the experience of assistance to the developing countries in capacity building for planning economic development. it is often argued that the emphasis in that assistance had been overly on methodological refinements that had little relation to the real needs of societies, excessive preoccupation with the role of the State, and with the part bureaucratic and technocratic control and direction can play, and inadequate attention to the role of the market mechanism, economic incentives and private enterprise, and to the human, social and institutional ingredients and means of development.

Country needs for assistance differ depending, inter alia, on their patterns of economic development and social and institutional structures. Yet, from the experience of a few countries which have made a deliberate effort to relate environmental policy to economic management, and vice versa, it is possible to identify some principal components of internalizing environmental sensitivity in development planning. These are outlined as follows:

(a) Environmental Policy Framework. Fundamentally, this should delineate environmental concerns, priorities, their geographic distribution and environmental quality, amenity, services and capital goals. It should also trace the sectoral and other practices and policies which bear on the environmental concerns and goals. The policy framework should also specify the country's environmental management commitments under global and regional agreements.

Increasingly, the process through which national environmental policy frameworks are designed is informed by broad-brush analysis of implications for national well being of alternatives, including implications of absence of environmental management interventions. Further, increasingly, national environmental policy frameworks are being arrived at through a participatory and consensus-building process involving not only sectoral, environmental and economic departments of the government, but also various interest groups, e.g. private industry and trade, labor, NGOs and community action groups. A national environmental policy framework evolves over time. However, at any point in time, it needs to provide an authentic

indication of the environmental commitments and goals of the country.

(b) Institutional Framework. The Department of the Environment which would monitor and report on the state of the environment, identify trends, define environmental standards and policies, in conjunction with sectoral ministries, and monitor progress of their implementation, is central to the institutional framework. Its work needs to be projected and supplemented by environmental focal points within the sectoral ministries. Feasible technology choices and investment needs entailed by providing for environmental management of sectoral development programs and projects, and efficient location and scale choices are facilitated by the environmental focal points working within the sectoral ministries, while being fully accountable to helping achieve the development objectives of the concerned sectors. Further, the organizational unit which oversees economic planning has to assume the responsibility of ascertaining the consistency and feasibility of the proposed environmentally responsive programs and projects and policy adjustments proposed by sectoral ministries.

In most developing countries, the government can play only a limited role in protecting and improving the environment. The resources represented by the people and communities, and by the private sector, have to be brought into full play for effective environmental management. In order for this to happen, consultative mechanisms are necessary to allow participation of affected interest groups to determine the priorities, programs and policy adjustments. Many countries have national councils for the environment at federal and state levels which serve as sources of ideas and proposals to reconcile environmental and development needs, and also as platforms for building consensus for decision-making for environmentally sustainable development.

(c) Legislative and Regulatory Framework. Many countries lack a coherent and adequate body of regulations and legislation essential for bringing about proper environmental management. Economic policy adjustments and incentives and the application of economic analytical techniques help integrate environmental and economic considerations in decision-making on production, consumption and distribution of goods and services. However, realistic

legislative and regulatory measures and an administrative machinery for their enforcement have to supplement and complement the part played by economic incentives, policies and tools. For example, allocation of emission rights, coupled with trading among firms in those rights, when administered in a regulatory framework for pollution control, can help bring about, cost-effectively, the desired improvements in environmental quality, in designated areas.

Just as observance of environmental standards, proper waste disposal practices and restrictions on environmentally harmful use of natural resources requires the guidance and discipline of regulations, the carrying out of environmental impact assessments of development projects and observance of proper procedures to be followed for the purpose, require legislative backstopping. The legislative framework also needs to support the exercise of fiscal and economic policy measures to generate the revenues required for environmental management.

(d) Environmental Assessment and Monitoring. In order to plan for land, forests, mangroves and coastal areas rehabilitation and development, as well as for improved air and water quality, improved access to drinking water, irrigation, fuel wood, fodder, and sanitation and waste disposal, the developing countries need to establish the environmental databases and information systems which would enable them to monitor environmental trends and problems and ascertain their significance for development. Often they need technical assistance and technology to prepare the foundation of scientific knowledge on which systematic consideration of the environment in development planning could be based.

Increasing attention is being devoted in applied economic research over the last few years to preparing environmental and natural resource accounts, and relating them to, or integrating them in, national income accounts. To the extent such work can contribute to macroeconomic policy adjustments or planning to achieve environmental objectives in tandem with economic objectives, it can play a valuable role. In practice, however, it is not clear what part environmental accounting has played so far, or can play, in developing planning, whether in the developed countries or in the developing countries.

Perhaps more importantly, if assessment of environmental changes, and analysis of their

economic significance, can be clarified at specific sub-national levels and major problem areas, e.g. drought-prone areas, flood-prone areas, eroding hills, polluted coastal areas, heavily sedimented rivers, it might help guide regional development policies and planning. There is promise in the application in the developing countries of Geographical Information Systems (GIS) and related satellite imagery and computer technology, to help translate the notion of area development planning, based on ecosystem (e.g. watershed) management into practice. There is a classic opportunity here for partnership among geographers, ecologists, economists and sociologists.

(e) Economic Valuation. Outlined below are some important ways in which economic valuation can help integrate environmental consideration in development planning. Some of the papers presented at this conference illustrate the promise and the practical difficulties inherent in this avenue.

(i) Allocation of scarce resources to environmental protection and improvement is an economic problem. It is vital that countries are themselves able to determine whether, to what extent, where and when it is worthwhile to invest in environmental rehabilitation and management. Decisions on air quality and water quality standards, waste disposal, recycling and sanitation technologies, conversion of natural capital into man-made capital, import of capital equipment embodying environmentally sound technology, phasing out of technologies, and retrofitting of factories, spatial industrialization of industrial development for better environmental quality, and other decisions should be guided by an estimation of costs and benefits of alternatives. Imputation of non-market values and assignment of prices to traditionally unpriced environmental goods and services have to play a practical role in facilitating strategic and policy decisions on environmental quality standards.

(ii) Economic valuation of environmental policies and management alternatives should also help guide the sharing of responsibilities in international environmental co-operation, e.g. control of pollution of the oceans or international rivers; conservation of biodiversity; control of greenhouse gas emissions; controlling the spread of deserts. Valuation, among other things,

should help provide approximations of reasonable baselines for estimating the so-called "incremental costs" of implementing a country's responsibilities under global or regional environmental agreements. Economic valuation can reinforce the advance of international environmental co-operation.

(iii) Economic analysis should help elucidate how international economic co-operation and international environmental cooperation can be made mutually supportive. Bilateral trade and environmental management scenarios, with corresponding estimation of the time profiles of benefits and costs over time, can help countries arrive at mutually beneficial trade and environmental policy options. Traded commodities, e.g. tropical timber, fish, animal produce, horticultural products, food crops and cash crops, are often subjected to varied interpretations of what should constitute proper environmental management, or sustainable development practices. Economic valuation can facilitate trade and technical co-operation regimes which should be conducive to progress on both economic and environmental fronts.

(iv) Valuation of changes over time in natural resource stocks or environmental quality, and assessment of its significance for foregone, or accrued, economic growth or social development, can provide useful inputs to decision-making on sectoral and environmental policy formulation, allocation of investment resources among sectors or regions, and regional development planning, which tries to respond to environmental, economic and social objectives in an integrated framework. Such valuations can also help elucidate the basis for the design of such projects and programs at sub-national levels as would achieve the potential synergies among local environmental improvement, productivity growth, and reduction of poverty.

(v) To the extent non-marketed, yet scarce, environmental goods and services are available to people cost-free, or at least than the marginal opportunity costs of their use, they are used inefficiently in consumption and production patterns. Creation of markets for these goods and services, or assignment of prices to them to approximate their scarcity values, should help increase economic efficiency as well as improve environmental quality and conserve natural resources. Increasingly, the policy advice and project-level assistance provided by development

institutions is beginning to include attention to valuation of non-marketed environmental goods and services.

(vi) Finally, economic analysis of environmental impacts of development projects helps integrate environmental considerations in the design of projects by making it possible to extend the project appraisal framework. Even when environmental impact assessment is required to be carried out by law, there is a risk that it might remain isolated from the mainstream of information provided by estimation of social costs and benefits of project alternatives, unless economic values are placed on the assessed impacts. Increasingly, project appraisal practices call for valuation of environmental impacts and its inclusion in estimating social costs and benefits of alternative project designs.

In conclusion, the approach to integration of environmental considerations in development planning needs to be pragmatic, and geared to bringing about results, both in terms of improved environmental conditions, and accelerated social and economic development. While it has to be guided by informed decisionmaking, based on knowledge of implications for social well being of alternative courses of action, it has to be realistic, facilitating and fostering, rather than being inflexibly directive or controlling.

Economists have a major role to play in this process, especially in informing the decision-making on policies, programs and projects through valuation of benefits from environmental protection and improvement, valuation of changes in the environmental capital, valuation of likely environmental impacts of alternative policy, program or project designs, imputation of values for non-marketed environmental goods and services, and delineating possible adjustments of economic policies to foster environmentally responsible behavior. Even within the economics profession, a much more active part needs to be played by sectoral economists, such as energy economists, transport economists, industrial economists, agricultural economists, trade economists and institutional economists, in ascertaining the significance of providing for the environment in pursuing development in their respective sectors, rather than leaving the arena to environmental or resource economists.

In many developing countries, the institutional, regulatory, administrative, analytical as well as the data prerequisites for systematic integration of environmental objectives and constraints in development decision making are inadequate at present, and, correspondingly, the economists' role is somewhat circumscribed. In any case, for maximum effectiveness, the role needs to be played in partnership with environmental experts and activists, other social scientists, lawyers and administrators, organizations experts and consensus builders. While economic valuation and analysis should inform the policy and planning process as fully as possible, and while the market mechanism and prices should encourage environmentally responsible behavior in every possible way, the institutional framework for decision making which lies outside of the market should provide for the participation of affected interest groups in order to reconcile social, economic and environmental objectives in development.

William Moomaw:

I hope I can be forgiven for being maybe a little iconoclastic on this topic because I've come to development from a different route than most of you. I started out in the natural sciences and just 22 years ago taught the first course at Williams College dealing in environmental science, and have since, continually moved over the spectrum to environmental policy. It didn't take me long to discover that I just had to talk with economists, whether I wanted to or not. They seemed to be the people to listen to on development issues and so I tried to educate myself over the years to be able to converse with them even though I speak economics with a very heavy accent.

The whole question of development seems to me to be an evolving concept right now. As someone who's come in from a different direction I discovered that I had some trouble accepting the normal definitions in thinking about development. Originally development was seen as a very single-dimensional activity: how do we raise the per capita GNP of people? Usually when we talk about development we talk about the "developing countries," that is, basically, those countries that were not as industrialized as some select group that we call "developed countries." I guess the trouble that I have with that perspective is that it promotes the notion of a static goal.

What is developed is what we see right now: Europe, North America, Australia, Japan; that's what developed means. That is the goal which everybody else in the world is moving towards, so some day Lagos will be Bonn, Delhi will be... I don't know what Delhi will become, but perhaps Delhi will become a kind of Toronto. I just feel that it is foolish and misleading to think of things that way.

Actually all economies are developing economies and I came to this realization by studying the correlations between environmental impacts and conventional measures of economic growth. Looked at historically, basically every country has followed its own unique development path as measured by these two parameters. The amount of environmental damage created by any given country as it grew economically is very different even from its neighbors. One could also examine other social measures and correlate those with economic growth, and obtain a unique national development path.

That shouldn't surprise us because every country has a different set of assets. North America is a country which developed with a labor shortage, which is why North Americans are constantly looking for labor-saving technologies. The region had abundant natural resources and an influx of capital that originally came from Europe. Europe developed with a completely different mix of resources and capital and labor. Those are just not the conditions in Africa or Asia or Latin America today. And so what may have worked in terms of labor-saving technology in North America, when we talk about the technology transfer and development may be just the wrong technology to transfer to some countries.

It is very important to think about these issues in the individual context of each country and each region, and economic analysis and especially environmental economic analysis is critical to this process. I would also suggest that economic assessment must go hand in hand with a parallel technical and scientific analysis. Let me just suggest or quote to you from a meeting was held in 1990 in Nairobi on climate change. G.O.P. Obasi, the director of the World Meteorological Organization, said "Africa's participation [in international negotiations for a framework convention on climate change] is of vital importance. But Africa must negotiate with

knowledge." Knowledge is really about capacity building, but capacity building for what? It has to be a capacity to identify environmental issues that are related to development. It has to be the capacity to negotiate those agreements as Obasi suggests, and it has to be the capacity to choose options and implement whatever strategies are decided upon. Let me just give you some examples that I've been either peripherally or directly involved with in the last few years, which I find really surprising.

In the buildup to the UN Conference on Environmental Development, that was held a little over a year ago in Rio, in June 1992, a new set of global environmental issues came on the stage that were thought largely irrelevant by most Third World Countries. Yet something happened once these issues got onto the international agenda in 1985 with the Vienna Convention to protect the ozone layer. This rather empty framework convention was rapidly transformed into a major political instrument, the Montreal Protocol in 1987 thanks to Mostafa Tolba from UNEP, who single-handedly leveraged ozone protection onto the international agenda. This was followed by global climate change at the Toronto Conference of '88, that first made climate alteration an international concern along with the biodiversity treaty a little bit later. These global issues went beyond the local concerns of an individual country in Africa, Asia or Latin America. As someone recently stated, "if global climate change really does occur the way some scientists say it will, sea level will rise on all shores." So actions taken in the South may now be of interest to the nations in the North. To put it very crudely, what happens in terms of development paths in the South is now important to the North in a way that a local issue is not.

How can you use this new dynamic to determine your own strategies that will shape your development paths? Well I think what happened in the period prior to the Rio Summit is instructive. As I indicated, climate change was not on the agenda of any developing country that I know of prior to 1989. However a group of non-governmental organizations recognized that the world should not make the same mistakes that had occurred in negotiating the Montreal Protocol to protect the ozone layer. With little developing country interest, there were only 2 representatives of developing countries that attended the signing of the Vienna Convention in

1985, and only a few more showed up at the Montreal Protocol in 1987. It was essentially an agreement run by the North. So these non-governmental organizations went to people at UNEP and said, "Would you cosponsor with us a series of meetings in different parts of the developing world where we would just get people in these countries thinking about climate change, and find out about the indigenous capabilities in those countries. So the first of these meetings was held in Delhi in February of 1989 and the result was really quite remarkable. Holding an international conference in a country and inviting people from that region, one can actually call up government ministers and say, you know, there's going to be an international conference here and we would like for you to come and speak at the conference. You can imagine when they are told by their first secretary, "Mr. Minister, you've been invited to speak on India's position on climate change six months from now." They may never have heard of climate change or if they had heard about it they don't think it had much to do with their country. What happened was that they learned something about climate change very fast, which is one of the purposes of this series of conferences. There were soon all kinds of officials from India, Bangladesh, Pakistan, Nepal, Sri Lanka and China who learned about climate change, and they presented their ideas which were covered in the news. Suddenly there was built up a sense that here's an issue about which something is going to happen. Much as Obasi said about African nations, Asian nations prepared to negotiate with knowledge. To make a long story short there were actually 5 of these conferences. They were held in Delhi, in Nairobi, in Cairo, in Sao Paolo, and Bangkok, and each of them produced a report such as the Cairo Compact of Climate Change. Most of them are just conference statements, in which the people in that region, working with international organizers, were able to identify the issues that were most relevant for Africa or South Asia or for Southeast Asia or for Latin America. Now I can't prove to you that this series of meetings made the difference, but it is the case empirically that over 100 prime ministers and heads of state and presidents showed up in Rio, 154 countries signed the climate treaty. I don't think that would have happened had there not been some process of capacity building that took place through this process. Also many researchers in the region came into prominence, and were recognized for

their work by their own governments because of their presentations at the conference. How was this all funded? It was funded largely by private foundations. I don't believe UNEP put any money into these meetings but they kindly lent their name and granted some semi-official status. It really did generate some independent capability for people from developing countries to participate meaningfully in the development of the climate convention. Now in addition to that there was a more official process going on.

In January of 1989, something called the Intergovernmental Panel on Climate Change was created and each government was allowed to send delegates to these meetings and they met many times. The purpose of this new institution was to assess the science and the possible consequences of climate change. What might actually happen in Africa? What might actually happen in Asia? How likely is it that the science says the sea will rise half a meter, or by 20 or 40 centimeters from global warming? How likely is that? Many countries do not have many people with technical training in climate change, but they send delegates anyway. They learn from other delegates. Some of them ended up being sent to UNEP sponsored education and training programs for environmental protection. In addition to the programs at Williams College, we have one at Tufts University that's now in its fourth year. In the second year of that program we had four fellows who after finishing their course of study in December, were back in New York in January for the Intergovernmental Negotiating Committee meeting on climate change representing their governments. That was a one-month turnaround. Now as I said to some of my colleagues I hope we taught them well, because these people do not have the time to wait 20 years to gain experience. They need to gain skills right away because these global problems are upon us, and the international community is responding. So I think there are many ways in which non-governmental organizations, universities, intergovernmental operations are able to assist capacity building in unconventional ways. In other words, we're not just looking for what governments can do, we're not just looking for what international lending agencies can do Global environmental problems create opportunities for other agents out there to help developing countries respond.

The other thing that's happened is that partly because of these global issues a series of indigenous organizations have been strengthened in several countries. In India there is the Science Research Center in Bangladore and the Tata Energy Research Institute in Delhi. In Bangkok there's the Thai Development Research Institute. In Bangladesh there is the Bangladesh Center for Advanced Study in Dacca. In Nairobi there is the African Center for Technology Study; and Sao Paolo University has taken on this role in Brazil. Many of the people at these institutes are becoming major international science and policy shapers on global issues, and are increasing the capacity within those countries to create international treaties to better reflect the needs of their own people. Global issues create the opportunity for enhancing technology transfer that addresses global issues because all countries wherever they are along their development paths have a stake in the outcome. It is exceedingly important that there be participation from all parts of the globe, and countries that are weak in technical training need to find improved ways of improving that capacity in their countries. The challenge is to learn how this can be accomplished in a way which brings together economists with technical people to do a better job of finding less damaging development paths for all nations.

Henry Bruton:

It is especially helpful to hear these reports on the institutional arrangements and programs at Duke, Tufts, and York. I think there is general agreement among the speakers as to the basic organization and approach being followed. Certainly there are no glaring differences that suggest one place has one view of the basic problem and another has a quite different, contrary approach. So it seems to me that, rather than summarize the previous comments or commenting directly on individual papers, I might try to introduce some more general observations into the discussion. Let me then proceed in this way.

My understanding of our most general objective is something like the following: we now believe that high (or possibly not so high) rates of growth of GDP (as conventionally defined and measured) has significant adverse ecological consequences in almost all countries. These

consequences are such that the growth rate that produced them cannot be sustained in the long -- or maybe not so long -- run. Therefore a country that seeks to put in place a growth process that can be sustained over the indefinite future must take into account, and find a way to compensate for, these adverse environmental effects.

When we speak of developing the capacity of a country to include these environmental considerations in development planning and policymaking we usually refer to two things. The first is the direct one of providing as great an understanding and as widespread an understanding as is possible of the issue. The second is to create the means by which any constraint on the growth of output due to the effects on the environment is either eliminated completely or pushed well back.

A good example of both of these points is China at the present time. China has achieved an unusually high rate of growth of GDP in the last decade or so. It has done so -- as a pair of recent books strongly argue -- at the expense of great damage to a wide range of ecological characteristics. The objective is to create capacity in China to make almost everyone acutely aware of this unsustainable cost and to find ways -- i.e. new technologies, new knowledge in general, new growth patterns, different sources of certain commodities, etc. -- that might enable it to continue to achieve favorable growth rates with acceptable environmental consequences.

Evidently solving environmental problems by zero growth of output is not very appealing in countries that now have extremely low levels of GDP per capita. It should be noted, however, that an increasing number of people are pushing the idea that growth of GDP, even in poor countries, is not a very convincing objective. John Stuart Mill, more than 100 years ago for example, was critical of growth and seemed to look forward to his idea of the stationary state. Still it is, I think widely accepted that growth without environmental damage is the basic objective of almost all countries. The question then is how to go about achieving this objective.

We speak of building the capacity in developing countries to include environmental considerations, i.e. of incorporating into our formal analyses of growth the environmental issues. I want to ask exactly what this means and some ways to go about it.

We have heard in recent years a great deal about privatization and a more market friendly approach to development, so let me begin with the idea that the basic capacity that we seek to create, and that we need to worry about, is the capacity of the market to function in such a way that environmental costs of production are explicitly recognized. Thus it has been argued that the best way to include environmental matters into development planning and policy making is to find ways to extend the market such that they (environmental issues) are reflected in all market prices.

A simple example is non-renewable natural resources. As the quantity of a particular natural resource falls relative to its demand, its price rises. This rise will have several consequences: it will reduce the quantity of the resources demanded for production, it will induce further search for additional supplies of the resource, it will induce search for substitutes, and will reduce the demand for consumption goods that makes use of the resource. With all these adjustments taking place, it is unlikely that we would ever run completely out of a particular resource. Its relative price would simply get higher and higher. Such an approach implies a great deal of confidence in the accuracy with which market signals reflect the `true' supply situation. It further implies confidence in managers and producers to find ways to adjust, to substitute etc. without marked reduction in output. Evidently, one needs a bit of optimism if this approach were to be relied on completely with respect to natural resources.

The results of the several increases in oil prices illustrate this argument. Some countries allowed the market price of oil to rise, and the economy responded in exactly the right way. Other countries allowed the price to rise, but little adjustment was induced. Still others tried to prevent the price from rising, and thereby prevented the signals that might have led to adjustment of the kind mentioned above.

The usual operation of the market provides prices for natural resources, albeit such price do not always reflect the `true' supply situation. The usual market operation will not however provide a price for ozone layers, and frequently not for air and noise, and sometimes not even for water. The market argument then asks: Is there a way that market signals may be created or modified so that prices are generated in a way that economic agents respond to them.

Now we need more optimism. We have to assume that the government is able to design and implement taxes (or user fees) and subsidies in such a way that producers respond to them. To design the appropriate taxes and subsidies requires a great deal of technical and economic information. Such information is rarely available in any country, rich or poor in GDP terms. To implement the taxes and subsidies, once they are designed, implies further a great deal of administrative capacity and honesty in the bureaucracy.

Even if a country were able to do all these things, we still require the previous assumptions that all economic agents can and do respond to these correct signals. We continue to need considerable technological optimism about the capacity of the community, given proper signals, to respond adequately and promptly so that the adjustments come about.

Note that one of the essential prices in this approach is the discount rate. The discount rate is of course a difficult notion, and lends itself to great dispute.

It is difficult to feel comfortable about this market approach, but alternative approaches seem equally or even more treacherous. Suppose that a country's policy makers concluded that reliance on the market seems so dangerous and far fetched that they conclude that trying to build the capacity to approach the task in this way is doomed to fail and is a waste of resources.

The alternative requirement is to rely on direct regulations and edicts by the government, combined with the government financing and organizing the R and D that is to find the new technologies that allow the substitutions, etc. described earlier. To proceed in this way requires that government agents without the aid of market signals know how and what kind of technologies to create or at least to search for and how to bring their use about through some sort of direct regulation and enforcement. To do this sort of thing is surely no less complex and uncertain than it is to rely on the market approach. Certainly there is little evidence to suggest that the governments of many developing countries could carry out an approach of this kind. It requires that the government know things that are not reflected, or made to be reflected, in market prices.

So there are far reaching difficulties with any approach, and yet we all agree that it is

urgent that we find a way to take these environmental matters into account. It seems to me that the great need to accomplish establish some explicit, rather formal approach to this issue should be recognized as high priority for all programs.

I doubt that any generalizations are possible that can lead directly to policy making. Some governments can do some things and not others. So the kind of division of labor between market and non-market forces is something that may vary from country to country and from time to time. This means that the capacity we need most in almost all countries is the capacity to have quite undogmatic, informed people who can study the economy/government/environment situation to determine how to proceed.

The kind of training reported on here seems to me to refer largely to rather technical environmental issues. I would urge that increased attention be given to the study of the kind of issues that I have just summarized.

There is one further point about technological optimism, perhaps one should, say more generally, knowledge accumulation optimism. Suppose one were a technological (knowledge accumulation) pessimist, i.e. believed that it was beyond the capacity of humankind to achieve strong rates of growth of GDP in a manner that was compatible with maintaining environmental integrity, what then? One of the great advantages of a market oriented approach is that it induces a great many people to search for ways to meet the problem, not just a handful in government laboratories. This possibility of failure should be recognized and reflected upon. For example the United States has been trying to control the Mississippi River for a century without much success. We have spend huge sums in the search for a cure for cancer. It took centuries and millions of deaths before a smallpox vaccine was found.

In particular we should address the question of whether we should accept low (or lower) growth rates of GDP until we can see more clearly the means of affecting the environmental consequences of that growth.

Partha Dasgupta:

What I would like to do is make a few remarks which are relevant to the issue, and perhaps along the way I'll pick up a few responses to some of the points made by the four speakers.

Now in a way it says something quite terrible about our profession -- economists, that is -- our journey as citizens, that we should be sitting in 1993, talking about strengthening capacity to include the environment in development planning. Development planning has been going on for about 45 years at the very conscious level. So what the heck have we been doing all this time? It is to me remarkable how very convincing the environmental matters have been systematically ignored in development literature (although the agriculture economists have been very conscious of it), but I'm talking about the dominant set of writings. My own first experience of how tremendously insensitive to these matters one could be was in 1979 I wrote a book for UNEP and before it was published the United Nations Environment Program arranged a conference on the manuscript of the book with something like 40-45 civil servants from Third World countries. One by one they commented on the fact that they enjoyed the book, which I didn't believe one bit, I don't think they had read it, but that they came from poor countries so that their problem, their concern was about poverty, not about these esoteric matters. Now I should say at once that the book has nothing on amenities, it was mainly about water, soil erosion, forests, degradation, so forth. So I didn't quite know what they were talking about. But of course things have changed enormously. Today no civil servant who wants to keep his job in the Third World will say, "I'm concerned exclusively with property but not with environment," because he will now say that these two are related matters.

So it's in that context that I would like to spend about 4 or 5 minutes telling you about what some of us are trying to do. UNEP is currently financing a sequence of teaching workshops that I'm involved with, designing and participating in and lecturing on -- something like two a year. For each of these occasions we invite 20-25 university teachers of economics from poor countries, the last one was exclusively for teachers from Sub-Saharan African universities, and the idea there is to present a period in intensive course of lectures on environmental economics, the

theory of it as well as backup material from the World Bank, material which are applied case studies. This will continue for the next several years. The hope is that the next generation of civil servants will be more geared to these problems because the idea is to try and see whether these sort of ideas can be taught in university courses of economics in Third World countries by the participants themselves.

Allied to that we're starting a program of research workshops which will be shorter in duration, 3-4 days, where we would invite university teachers of economics in Third World countries to present semi-finished work on environmental matters that they themselves are undertaking at the university. Our idea is that to allow semi-finished products of that sort to be vetted and discussed by peer groups in a way which we are very fortunate in enjoying by going to conferences such as this one. That starts next year. We thought that we would start the teaching program so that there would be some preliminary response by way of small research projects that these participants engage themselves in.

The third thing, and that's still very much in the discussion phase, is, and I'll tell you why I'm mentioning it in this sequence, is the possibility of starting a journal on the field of environment and development and the idea there would be for the editors and the editorial board to very consciously seek contributions from economists in poor countries. Many of us are undertaking the commitment to write papers for it ourselves and the theory is thought that if work is to be done in poor countries by people who are teaching there then it needs a venue, a method by which their work is disseminated, and that's one way of getting confidence, of publications and doing research and having one's ideas checked.

The particular thing that I like teaching in these courses is to end with something like unsolved problems. When I say unsolved problems I really mean it's a deep puzzle for me. I haven't the faintest idea how to think about it so I'm going to suggest it to you. Several of the participants here have rightly mentioned that environmental protection in rural communities for countries can only happen if decisionmakers, regard environmental resources very much indeed as a natural part--a sort of common furniture--of their economic thinking. Professor Bruton has

rightly reminded us that a natural way of commodities entering into our conscious, ourselves, they are price signals that sort of alerts you to things, concentrates the mind when you have to pay for something, and that's very reasonable. Professor Bruton has also rightly pointed out that one of the great difficulties in this entire field is the fact that there will be large numbers of commodities for which market prices will not be there for reasons we all know.

The question is then what kind of signals do we rely upon in a natural daily fashion to ensure that no major error is made in their use? A good deal of the discussion at this table today has been about larger fields like ozone layer or global warming, public goods of that sort. The kind of commodity that I personally have always worked on, partly because people earlier weren't working on them and it's nice to work on something nobody else is working on, are the local ones, the small-scale problems, the village pond, the threshing ground, the local forest, and so forth. These are very, very valuable commodities to the users, but these are very localized users. If one thinks in terms of prices for "goods" like that, then these will be named prices, these will be personalized prices, not anonymous prices of the kind that we work on when we discuss economic theory. How do these village folk, how do these rural communities, how have they coped with them in the past? They weren't using a price structure. Sometimes they were by the way, but not always, in fact very often they would not.

As I read the anthropological literature what comes on very strong to me is the fact that large systems of norms of behavior evolved over centuries to cope with the fact that these were resources of value and whose ownership was pretty well defined, but defined through the norms of behavior, it's not defined in the legal sense, but in the sense that we use the term. But it seems to me one of the real major dilemmas that we are experiencing over the development phase is the fact that due to migration, urbanization, aging of population and a variety of causes that we can identify, many of these norms of behavior are eroding which makes certain members of the community, old people, widows in particular, females in general, very, very vulnerable.

These are things which were kept in harness, more or less in control, in the past. There was also a lot of hunger in the past, of course, it's not a new phenomenon, but still, the general

signals and norms that people in these local communities observed, are eroding. This seems to me to be a major puzzle. I don't quite know how to think about it: what kind of levers have to be pulled at the central level, the central or even the local district level, which would curb some of the major damages that have been done by the erosion of these social institutions? These are open questions for me. I'd like to alert teachers of economics to them, maybe they will be able to provide answers.