



UNITED NATIONS ENVIRONMENT PROGRAMME



MEDITERRANEAN ACTION PLAN

THE BLUE PLAN

FUTURES OF THE MEDITERRANEAN BASIN

EXECUTIVE SUMMARY AND SUGGESTIONS FOR ACTION

PROVISIONAL REPRODUCTION

MEDITERRANEAN BLUE PLAN REGIONAL ACTIVITY CENTRE
SOPHIA ANTIPOLIS - FRANCE

It is of utmost importance to provide the governments of the Mediterranean countries with an overall picture of the economic and environmental situation in the Mediterranean region and of the close interdependence between all its components.

Split, 1977

Mostafa K. Tolba

Executive Director of UNEP

The following text is a summary of the Blue Plan main report entitled "Futures of the Mediterranean Basin (Environment and Development 2000-2025)". It was prepared for those who wish to have a synoptic view of the Blue Plan findings, not only officials, decision-makers and planners from the coastal countries together with the regional and local authorities involved, but also teachers, journalists or anyone concerned with development prospects and environmental conservation in the Mediterranean region.

The text has necessarily been simplified and makes special reference to action that can be undertaken either at the national or local level, or that of the region as a whole. It is hoped that its content will encourage the reader to peruse the main report released at the same time, as well as the specialized booklets on the various economic activities or geographical environments of the Mediterranean basin, to appear later.

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1. A PROSPECTIVE APPROACH

1. For the first time, all countries of a major region of the world have combined their efforts in order to explore the dynamic relationships between their economic and social development and their common environment, from the sea they surround to its shores and hinterland. This study and reflection on the possible futures of the Mediterranean basin is the subject of the "**Blue Plan**", formulated within the framework of the Mediterranean Action Plan adopted in Barcelona in 1975 under the auspices of the United Nations Environment Programme. The Blue Plan is first and foremost a prospective study intended to illustrate the future consequences of decisions taken - or not taken - now, to highlight the linkage between events and action, to identify issues, and to detect potential breaking points.

2. This **summary** contains the main findings of the Blue Plan "scenarios", possible images of the future for horizons 2000 and 2025 which have been constructed, at the request of the states concerned, according to consistent sets of hypotheses on the population, economic growth, environmental policies and Mediterranean co-operation. The prospective study is neither a prognosis nor a forecast of what the future holds, and the long-term visualizations outlined in the report are not intended to furnish easy formulas for action. Carried out by independent experts, the work, however, provides authorities and planners in the various countries with the opportunity of continuously setting their national development strategies within a context that assures, as far as possible, protection of the Mediterranean environment. In addition, it facilitates identification of useful areas of co-operation.

3. The Blue Plan approach was formulated at the level of the **Mediterranean basin** as a whole, taking into account either a country's entire territory or the coastal administrative regions, depending on the case. Its global nature may therefore conceal local trends stemming from specific circumstances, and does not provide for an accurate description of what may happen in a given spot in the basin. Nor can it take into account unexpected events or sudden disruptions, such as ideological or political upheavals, major natural disasters or serious technological accidents. This approach has, however, used as far as possible the studies or national scenarios prepared by the countries themselves. In any event, it provides the **general context** in which these local trends and events may occur, a context which, ultimately, has a profound influence on them.

4. The findings of the Blue Plan "scenario" exercise highlight a number of salient points. The first is the fact that, over the periods under consideration, most problems of development, natural resource management and environmental protection were viewed in a substantially **different** way by the countries **north** of the basin and those **south and east** of it, for reasons stemming at the sametime from climatic variations, differences in level of economic development and the contrast in population trends.

5. In addition, the whole exercise confirms an assumption on which it was largely based, namely that the national **strategies and development policies** pursued by all the Mediterranean countries have, regardless, a significant impact on the state of the environment in the region. It shows in particular that protection of the Mediterranean Sea, its shores and coastal regions cannot be assured through action carried out on the sea alone, or its coastal regions alone, but depends largely on the development, environment and physical planning policies followed by the Mediterranean countries at the entire national level. It also depends on economic and commercial interactions between these countries as a whole and the rest of the world in the agriculture, industry, energy, tourism and transport sectors. In this respect, the scenarios confirm the validity of analyses carried out in other studies, such as the report of the World Commission of Environment and Development or "UNEP's Environmental Prospectives up to the Year 2000 and Beyond".

6. The various scenarios envisaged, whether they are based on the continuation, more or less enhanced, of current trends (the so-called "trend" scenarios), or on a more goal-oriented alignment of Mediterranean co-operation, at the level of both the environment and development (the so-called "alternative" scenarios), lead to "images" of the Mediterranean environment that do not radically differ at the 2000 horizon, very close to the present and virtually already determined. Whatever the scenario, up to this date the situation will in principle be kept **more or less under control** in most countries through contingency action, provided that declared policies and stipulated regulations are in fact implemented. However, the scenarios for the 2025 horizon (in less than 40 years, i.e. the same span as from 1950 to 1988) indicated that the situation may change radically and that the state of the environment is likely to deteriorate considerably. Considering the time lag needed to obtain significant effects from environmental protection, **policies more vigorous** than the current ones must be decided upon and implemented here and now if the serious shortages and irreversible degradation threatening the future of the Mediterranean are to be avoided or attenuated, particularly concerning soil, water, the forest, the coast and urban environments.

7. More specifically, the exercise implies that, in any event - even in the most favourable scenarios - protection of the land and sea **coastal strip** will be very difficult in the long run because of growing human pressures and the vulnerability of the natural environment. This will generally be the case in the **regions south and east of the basin**, but also all along the urbanized coasts of the northern region. This problem will therefore require the continuous and unswerving determination of governments and public authorities, based on the active and lasting support of the populations concerned. The most favourable scenarios in fact imply a permanent mobilization on behalf of the environment.

8. During the coming decades considerable investment will be required to ensure an economic and social development compatible with the needs of the Mediterranean populations, especially in the south and east of the basin. Environmental protection should be incorporated in this investment from the outset and should not be considered, as is still too often the case, as an additional cost, which can be dispensed with or postponed until later. In fact, environmental protection and the search for sustainable development may be a source of employment and wealth. The main fact that emerges from the scenarios, however, is that, in the case of the Mediterranean basin, **development itself will only be achieved through protection of the environment** : without it, the fragility of environments makes natural resources vulnerable, and living conditions, the charm of the region, deteriorate to the cost of the population and visitors alike.

9. The extent of the environment-related problems stemming from socio-economic constraints affecting countries in the south and east of the basin - and in all the scenarios despite their fairly broad range - shows that efforts undertaken at the national and local level, however significant and relevant they may be, will not suffice. Greatly increased **North-South solidarity and South-South co-operation** are fundamental for the protection of the sea and the basin as a whole. Solidarity and co-operation for environmental protection are not confined to action focusing on this area per se, but seem to imply, in addition, the harmonious growth of intra-Mediterranean trade (making it possible, in particular, to offset food shortages), the development of communication systems (in all forms), a mobilization geared to new technologies adapted to the conditions of the region, and a better understanding of the demands of the future on the part of each and every Mediterranean person.

10. The Blue Plan scenarios do not attempt to give optimistic or pessimistic views of the future, but simply to provide a **basis for reflection** in order to initiate action in each Mediterranean country and at the level of the Mediterranean Action Plan itself. They show that the region's environment will be subject to increasingly strong pressure, but that ways exist to reduce considerably the effects of these constraints and to reverse the most adverse trends. Among these options, the most important ones seem therefore to be:

- the **search for new patterns of development** in the region, based on stronger intra-Mediterranean co-operation and more resolute North-South solidarity;

- the **systematic consideration of the environment** in all sectors of development, in particular at the level of coastal areas;

- the **promotion of a better understanding** of the interactions between development and the environment in the Mediterranean, leading to the adoption of new kinds of behaviour among national or local officials from both the public or private sectors and among **all Mediterranean peoples**.

11. After an analysis of Mediterranean development and its relationship with the environment according to the different scenarios, the summary presents possible **trends** for the various Mediterranean environments, all requiring protection. It then makes **suggestions for action** - rather than recommendations strictly speaking - oriented to the impact they could have on trends. These suggestions could be adopted at both the national and the Mediterranean level through co-operation among the countries concerned, and should facilitate the formulation of initiatives to be launched for the effective application of the various components of the Mediterranean Action Plan, such as the protocol on land-based pollution, or the one concerning specially protected areas. A short review of the background and approach of the Blue Plan is given in the Annex.

2. DIFFERENT FUTURES

DEPENDING ON DEVELOPMENT PATTERNS

I. DEVELOPMENT PATTERNS AND CHOICE OF SCENARIOS

12. The Blue Plan scenarios studied the impact of population and urbanization, agriculture, industry, energy, tourism and transport on the Mediterranean environment (soil and water, the forest, coast and sea). The aim of the prospective exercise is not to recommend types of development, but to illustrate their **effect on the environment**. These types of development are greatly affected by population trends, the kind of international economic relations established between countries (particularly by the forms of co-operation between northern and southern countries, or between southern countries and, at the national level, by the constraints of space and natural resources, and a country's choice of development/environment strategies.

13. Compared to a continuation of current trends (the Blue Plan reference trend scenario T-1), three comparatively varying kinds of development have been envisaged:

1) **development with weak economic growth**. If world economic trends are reflected by slow growth in most Mediterranean countries, budgetary constraints could greatly hamper the maintenance and investment operations needed for environmental protection. It would be more difficult to enforce regulations (as industrial enterprises would be more vulnerable) and they would be less effective because of lack of new investment. (This situation corresponds to the Blue Plan "worst trend scenario" T-2);

2) **development with rapid growth, but neglectful of the environment**. This kind of rapid growth could entail serious, even irreversible, damage to the environment because of the greatly increased pressure on resources and the difficulty in gearing efforts to compensate for the harm done. (This situation corresponds to the Blue Plan "moderate trend scenario" T-3);

3) **well-balanced development, concerned for the environment**. The combination of certain choices of national strategy (a priori involving environmental regulation policies among others) and enhanced international co-operation (North-South with a more assertive Europe, and South-South among regional groups) could produce a compatibility between economic growth and protection of the Mediterranean environment. (This situation corresponds to the Blue Plan "alternative scenarios" and the objective of **sustainable development**: "reference alternative scenario" A-1 and "integration alternative scenario" A-2).

14. To give a schematic example of the interactions between development and the environment, the kind of relationship existing between a domestic economy and the international economy, and the degree of food self-sufficiency chosen, conditions a country's agricultural development and therefore the intensity of pressure on soil and water resources.

The trend scenarios describe trends which prolong, without description, the main ones observed so far;

The alternative scenarios on the contrary, describe trends which diverge from those observed so far, and feature a more global-oriented attitude on the part of the governments of Mediterranean countries, at both the domestic and the international level.

I THE TRENDS SCENARIOS

The economic impetus of the trend scenarios is provided by the expansion of the international market, still characterized by American and Japanese economic and technological predominance. American dynamism enables the United States, inter alia, to maintain a lasting lead over Europe as regards high technology. In this context, whether from a political, economic, cultural or other viewpoint, Europe does not assert itself as much as it would wish. Similarly in the Mediterranean countries in both the North and South adapt more or less to this joint United States-East Asian predominance.

In this situation, it seemed appropriate to define three different kinds of trend scenario, depending on how pronounced the above pattern appeared to be:

- a **reference trend scenario T-1**, which prolongs current trends, compared to two fairly contrasting scenarios. In the **worse trend scenario T-2**, international economic growth remains weak, particularly because the predominant partners in the world economy do not co-ordinate their political, financial and macro-economic policies. As a result, the third-world debt problem remains acute. In contrast, in the **moderate trend scenario T-3**, better co-ordination of economic policies between the European Community, the United States and Japan contributed to fairly steady economic growth.

As regards the environment, the three trend scenarios lead to an adjustment of government efforts in the light of economic potential, greater in moderate trend scenario T-3 than in worse trend scenario T-2. Whereas stop-gap action, taken as an emergency measure, is often the case in T-2, although co-ordination is poor and decisions on action are delayed, and thus more expensive

For some aspects of the prospective exercise, only the two contrasting scenarios, worse trend T-2 and moderate trend T-3 have been used, with reference trend scenario T-1 representing in this case an intermediate or average situation between the two.

II. THE ALTERNATIVE SCENARIOS

The main feature of the two alternative scenarios is the greater influence of the Mediterranean countries, facilitated by a multipolar configuration in which Western Europe, the United States, Japan and perhaps one or two other countries or groups of countries assert themselves on the world scene. In particular, political Europe is more evident, although it plays a different role in the two scenarios.

The two alternative scenarios differ basically as regards the relations established among Mediterranean basin countries, namely:

- in the reference alternative scenario A-1, a "Mediterranean" concept of relations among coastal countries, with the European Community countries and the Mediterranean countries, both industrialized or industrializing, endeavouring to create together an area of harmonious development, with a maximum opening of trade and migration flows between them. In this scenario, Mediterranean exchanges flow mostly North-South, with the European Community affording a certain spillover effect;
- in the integration alternative scenario A-2, a more "regional" concept of these relations, economic co-operation involving preferably groups of countries, for instance the countries of an extended European Community, the Maghreb countries, the Arab East etc., with a maximum opening of trade and migration flows within these groups, maintaining however certain barriers between the groups, as countries wish to protect themselves to some extent from international influences. In this scenario, the European Community plays a less influential role and the non-EEC coastal countries form fairly integrated subgroups.

Development strategies in the alternative scenarios can be termed "self-reliant", understood in this case as the search for complementarity between the development of a "modern" sector, modelled on that of advanced industrialized countries, and the development of small and medium-sized enterprises in the urban sector. This is easier in reference alternative scenario A-2, since integration facilitates planning and provides larger markets.

In these scenarios, environmental policies and physical planning are better incorporated into decision-making and development plans. For instance, preference is systematically given to non-polluting manufacturing processes, biological processes, or water-saving irrigation methods. The approach is also much more "systematic" than mechanical sectoral, geared to integrated development planning and the environment.

The reduction or deterioration of these resources would in turn be a constraint, even a curb, on continued agricultural development.

15. Economic indicators will naturally differ greatly at the 2000 and 2025 horizons, chosen by the Blue Plan, depending on the various kinds of development. Thus per capita GNP for the countries in the south and east* of the basin (from Morocco to Turkey, excluding Libya because of its special position as an oil exporter) would rise from a range of \$620 - 1,050 in 1985 to :

- \$900 - 1,500 per capita in 2025 in the case of slow economic growth, equivalent approximately to a doubling in forty years;
- \$1,200 - 2,600 per capita in the case of faster economic growth, but neglectful of resources and the environment;
- \$2,000 - 3,500 per capita in the case of sustained growth based on the optimized management of resources and the environment, in the context of active international co-operation.

16. As regards the environment, development strategies could differ as to their specific combination of the various regulatory mechanisms available, such as regulations, incentives, and/or direct intervention, by taking into account the various aspects of environmental and resource protection to a greater or lesser extent and on a more or less interventionist basis. The alternative scenarios in particular are characterized by an **integrated approach**, based on the conviction that action has to be taken on all resources at the same time, starting with "human resources" by involving the population in decision-making mechanisms and implementation of necessary measures.

* The terms "northern countries" and "southern and eastern countries" appear frequently in this study. Naturally they do not imply identical situations in each of these two groups of countries, but underscores the distinct contrast which usually exists between the two shores of the Mediterranean.

Turkey is often in an intermediate situation between the two groups. Depending on the subject under consideration, it will be included either with the northern countries (for some economic sectors in particular) or with the southern and eastern countries (particularly for population and urbanization).

II. TOWARDS VARIOUS POSSIBLE FUTURES

17. **Slow growth** of the world economy would be reflected by equally slow economic growth at the Mediterranean level because of the interdependence between this area and other regions. These development conditions would effect virtually all sectors (**worse trend scenario T-2 with low economic growth**). Economic stagnation in the countries north of the basin would produce **tremendous development difficulties** in the southern and eastern countries - starting with agriculture - to the extent that some countries would experience falling levels of production and/or per capita consumption in some sectors as vital as agriculture production or energy consumption, which means a gradual erosion of their socio-economic situation rather than an improvement. The financing of industrial growth would be curbed by the lack of resources and the burden of persisting debt. International tourism would be neither beneficial nor "healthy", involving both low-cost mass tourism and an "elitist" tourism, object of fierce competition among the different countries.

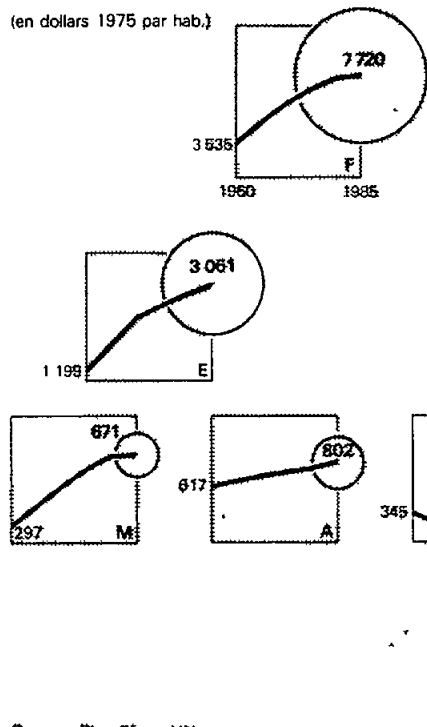
18. **Environmental protection** would have few resources for intervention or prevention, reflected by delayed and inadequate case-by-case measures adopted to meet the most urgent needs, within the context of poorly applied regulations and reticence at all levels. One of the most worrying environmental trends would be the gradual disappearance of many forests (fuelwood, and grazing), causing **accelerated** (and sometimes irreversible) **soil degradation** and disturbing runoff patterns and water regulation. Marginal land in the southern and eastern countries would be subject to heavy pressure leading to their degradation (erosion), and water resources in the major agricultural regions of the northern countries would be threatened by growing pollution (nitrogen from fertilizers). In contrast, some pressures, as well as most kinds of pollution, would be lower than for other development patterns because of the stagnation or weak growth of economic activities. The Mediterranean **population** would reach its **maximum** level, and the very large population groups of working age would be faced with insurmountable underemployment. Urbanization would also be at its highest level (in absolute terms) and virtually uncontrollable, and a minimum of services and sanitary conditions would be a cause of concern in the cities.

19. Following the rules of the game for the scenarios, this kind of growth (T-2 scenario) was continued up to the end of the period, i.e. 2025. It is likely, if not certain, that **social or geopolitical disruptions** would occur well before the end of the period - since the situation would deteriorate faster after the turn of the century - and would impose a change of policy and behaviour, i.e. "a change of scenario".

20. The recovery of economic growth at the world level in the 90s and better co-ordination among the major economic partners would have a definite spillover effect on the economies

PRODUIT INTÉRIEUR BRUT PAR HABITANT
Évolution 1960-1985

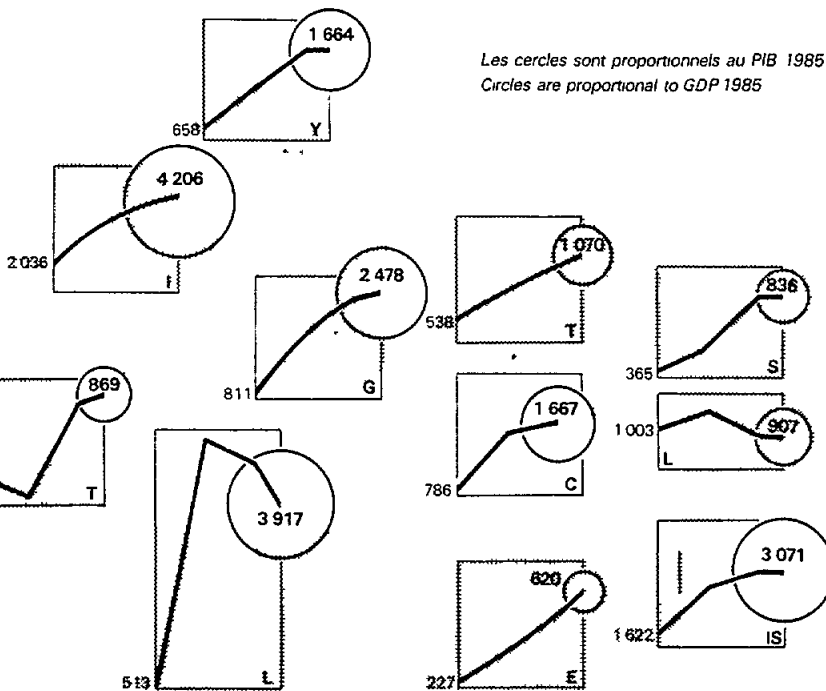
(en dollars 1975 par hab.)



GROSS DOMESTIC PRODUCT PER CAPITA
Evolution trends, 1960-1985

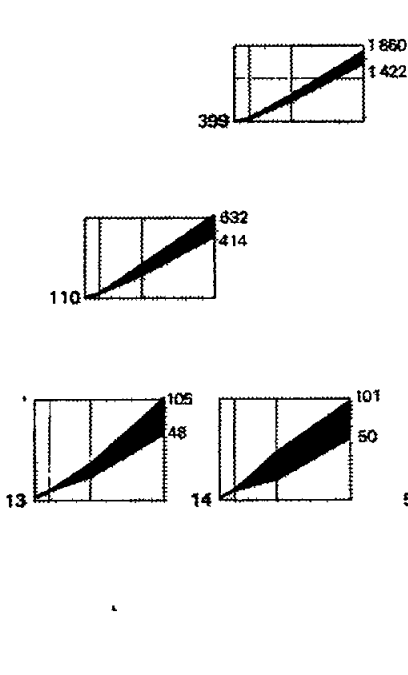
(in US \$ 1975)

Les cercles sont proportionnels au PIB 1985
Circles are proportional to GDP 1985



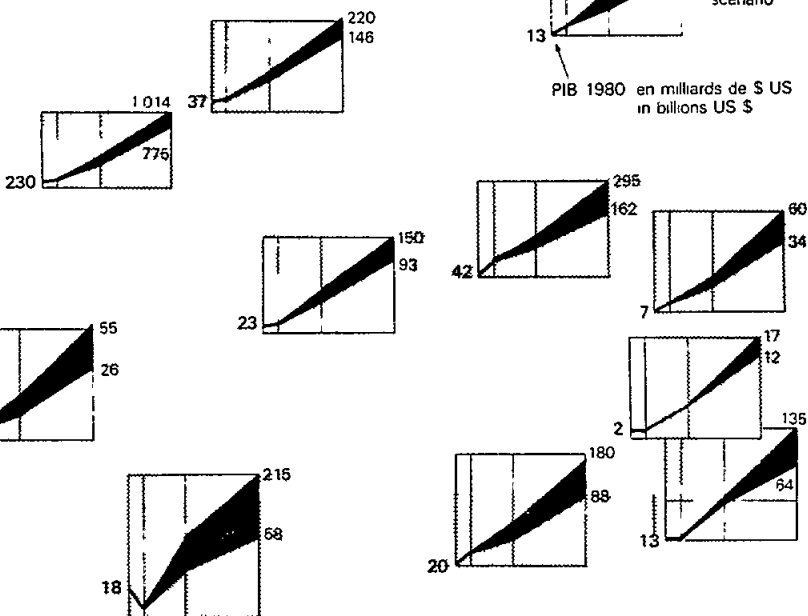
Source: Plan Bleu - UN
Source: Blue Plan - UN

PRODUIT INTÉRIEUR BRUT
Scénarios d'évolution 1980-2025



GROSS DOMESTIC PRODUCT
Extreme scenarios, 1980-2025

1980 85 2000 2025
Eventail des scénarios
Ranges of scenario
PIB 1980 en milliards de \$ US
in billions US \$



Source: Plan Bleu - UN
Source: Blue Plan - UN

of the Mediterranean basin countries (**moderate trend scenario T-3, with strong economic growth**). The countries of the European Community, for instance, would gain on average about one half point growth - which is significant over a long period of four decades - which would have a positive effect on the development of the other basin countries. In the southern and eastern countries, the overall rise in production levels would be strengthened by less dynamic **population growth** (total and urban) leading to a noticeable improvement of per capita socio-economic indicators i.e. of economic and social well-being. Agricultural productivity and yields would virtually double by 2025, and part of the output of highly intensified agriculture would be directed towards the major European and international markets, in a general atmosphere of trade growth.. Industries in the countries north of the basin would increase their specialization in high-technology sectors (special materials, fine chemicals, information technology and process control, etc.). The basic industries in the southern and eastern countries - primary processing of raw materials, manufactured goods and agro-food - would undergo spectacular development, to the point of exceeding production levels of the countries north of the basin after 2000. Agricultural intensification itself would produce strong industrial demands in these countries: fertilizer, tractors, machinery, etc. Industrial growth, agricultural intensification, the ensuing development of transport, requirements for the population's well-being, would all lead to the vigorous growth of energy consumption (about 70% higher than in the previous scenario), particularly for electricity. All sources of energy should be mobilized, both in the Mediterranean basin and at the world level (coal, oil, natural gas, uranium, and to a lesser extent renewable energies).

21. Although the legislative and financial resources and technical means to undertake environmental protection are easily available, this kind of scenario paradoxically proves to be **the most harmful** for the Mediterranean environment and the one which creates the most pollution, because of the high level of all economic activities and delays in the application of measures which, in any event, aim at combating the effects of pollution a posteriori rather than preventing them. Although this is not the case of "uncontrolled growth" as in the past - which populations and governments would no longer tolerate - this kind of growth is insufficiently concerned about the environment. Many effects will no doubt be felt after the end of the period but some trends could evolve rather quickly (forests, soil, water resources, coast and near-shore marine area) and would be virtually irreversible. **Pressures on the coast would be particularly heavy** and virtually impossible to control as most activities would be concentrated there and would provoke bitter conflict about resource uses (some of which are mutually exclusive). **Economic disruptions** - starting perhaps with hydrocarbon supplies - and even **irreversible ecological degradation** would be the inevitable alarm signals of later, but even more serious, dangers.

22. These two extreme kinds of scenario demonstrate the difficulties of development, especially in the countries south and east of the Mediterranean basin, in an international climate of fierce competition, whether economic growth is weak or strong (with its adverse effects), resulting in poor or inadequate attention paid to the Mediterranean environment. By contributing to a better distribution of effort, a sharing of knowledge, experience and practice, and market organization, international co-operation in a multi-polar and better balanced world, and more specifically north-south or south-south Mediterranean co-operation could provide a fresh impulse to economies and to societies (alternative scenarios).

23. This desire for co-operation, based on the solidarity of coastal countries, would promote strong agricultural growth (tripling of production) through the increase of irrigated land (doubling), fertilizer use and mechanization (tripling for the basin as a whole), as the output of the southern and eastern countries would be directed either towards outside markets (inter alia European in the case of reference alternative scenario A-1 with strong north-south co-operation), or towards regional self-sufficiency (case of the A-2 alternative scenario with south-south regional integration). Industrial growth in the countries south and east of the basin would be strong and well-balanced for the main branches (except perhaps for the capital goods industry which may present problems and include the export of manufactured goods towards the countries north of the basin, substantial in the case of strong north-south co-operation, or based more on regional complementarity in the case of predominant south-south co-operation. As with the previous scenarios (type T-3), strong industrial, agricultural, transport, etc. growth would entail high energy consumption, but with two main differences: greater attention (even a priority) would be given to energy saving and there would be a clear preference for some sources (very vigorous development of natural gas, clean fuel and expansion of renewable energies, especially at the end of the period). North-south or south-south relations, and rising incomes and living standards would further tourism, whose development would be at its highest level (about 700 million tourists in all), with the vigorous growth of domestic tourism.

24. In addition to north-south or south-south international co-operation, promoting the exchange of experience and knowledge, the alternative scenarios are also characterized by a completely different approach to environmental problems: incorporation of protection costs in budgets, consideration of environmental factors in decision-making processes, less centralization but better co-ordination, involvement of local populations in decisions and management, etc. The forests, soil and water would no longer be considered as three different environments, subject of more or less independent action, but as ecosystems forming a single resource, protected and managed as such. Similarly, the coast would be the subject of integrated planning, linking the three levels of decision-making and development: local, regional and national.

25. Since agricultural intensification would be carried out while seeking the most efficient use of inputs, industrialization would resort to less polluting processes, energy use would be oriented to cleaner sources, tourism would be better distributed in time and space, urbanization would be based on a well-balanced network of small and medium-sized towns, employment would gain from the (encouraged) dynamism of small and medium-sized enterprises, **impacts on the environment and resources would be minimized** (although not entirely disappear, of course). Land-based pollution and the physical and biological degradation of the Mediterranean coast would also be minimized, even halted.

26. The **trend scenarios** therefore proved to be **unstable**, either because of the **growing deterioration of socio-economic conditions** in a number of countries (exacerbating the geopolitical instability of the Mediterranean basin), or because of the **accelerated degradation of environments and resources**, leading to "natural" disasters, in fact largely aggravated by human action: floods, landslides, the irreversible loss of soil, desertification, etc.

27. Only the **alternative scenarios** seem able to reconcile economic growth and protection of the Mediterranean environment in the long term, even the very long term, i.e. ensure "**sustainable development**". The key to these scenarios lies, rather than in growth rates, in greater **Mediterranean co-operation** and the **integrated management** of environments in the development process. The A-1 scenario, with strong north-south co-operation, would no doubt contribute to faster economic development in the countries south and east of the Mediterranean basin; the A-2 scenario, with predominant south-south co-operation, could lead to a better balance. A **combination** of the two over a period of time would probably be the most **propitious**.

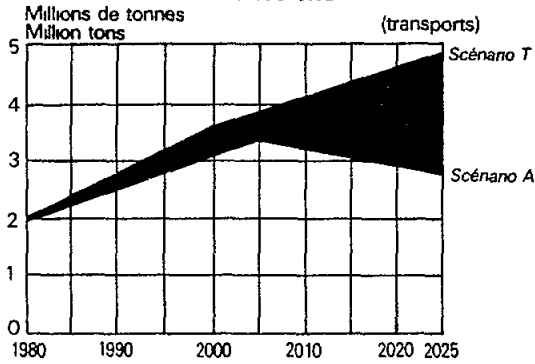
28. The Blue Plan horizons 2000 and 2025 may seem remote to experts in economic forecasting. In fact "economic time spans" are rather short compared to the "ecological time spans" of forests, soil or water, although a distinction should be made between the long time spans for genesis and/or rehabilitation of environments and the increasingly short time spans associated with degradation: by 2000 the soil lost and forests decimated could reach disastrous levels.

29. The conclusions of the scenarios must be somewhat nuanced depending on whether consideration is given to a country as a whole, or only its Mediterranean coastal region, or the sea itself. At the level of countries and coastal regions, the **most worrying medium-term threat** seems to be the **inability to check advancing soil erosion**; soil protection requires that of the forest upstream. At the level of coastal regions and the sea, **priority** should be given to **protection of the coast**, defined as the narrow strip where land and sea meet, in which

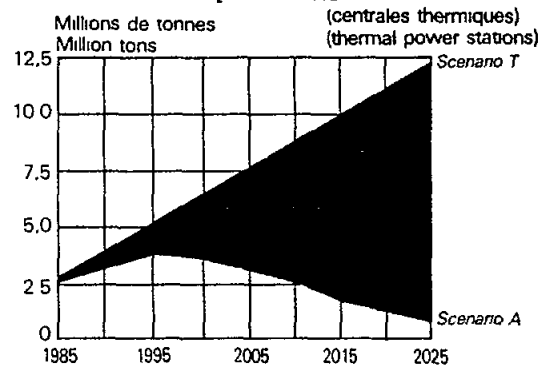
QUELQUES RÉSULTATS DES SCÉNARIOS DU PLAN BLEU (pour l'ensemble des pays méditerranéens)

SOME OF THE BLUE PLAN FINDINGS (for the Mediterranean countries as a whole)

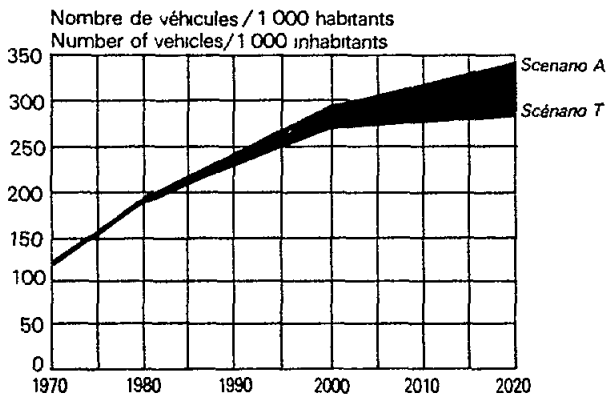
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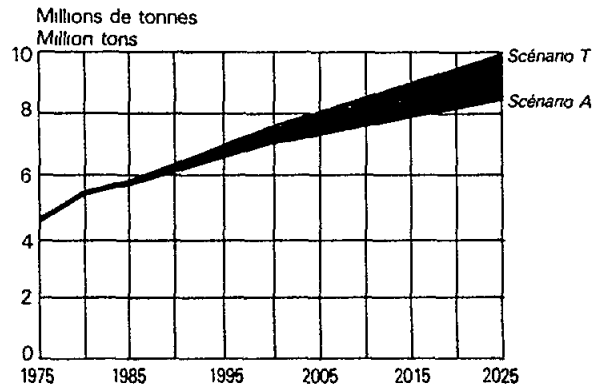
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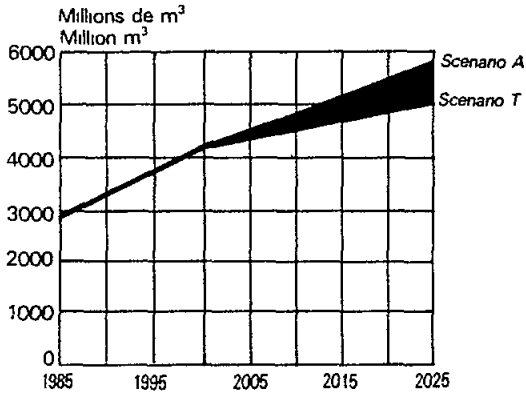
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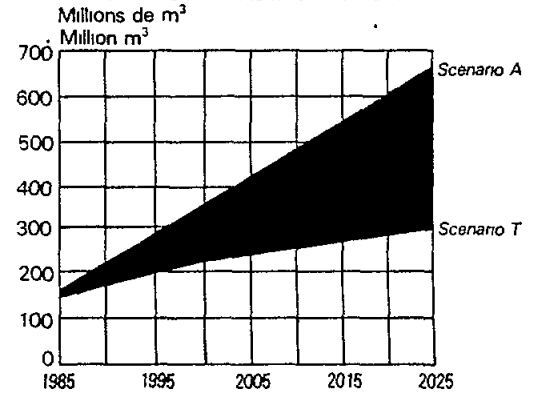
CONSOMMATION D'ENGRAIS
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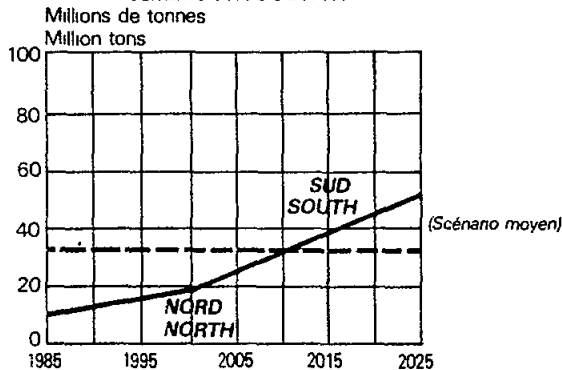
EAUX USÉES . POPULATIONS LITTORALES
SEWAGE . COASTAL POPULATION



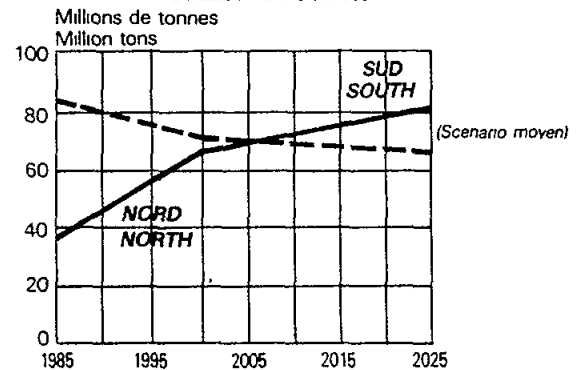
EAUX USÉES . TOURISME LITTORAL
SEWAGE . COASTAL TOURISM



PRODUCTION DE CIMENT
CEMENT PRODUCTION



PRODUCTION D'ACIER
STEEL PRODUCTION



direct action can only be local and/or national, but where threats to the environment are the worst, even in the most favourable scenarios. Rather than the sea in general, the coastal strip is where the future of the Mediterranean environment hangs in the balance.

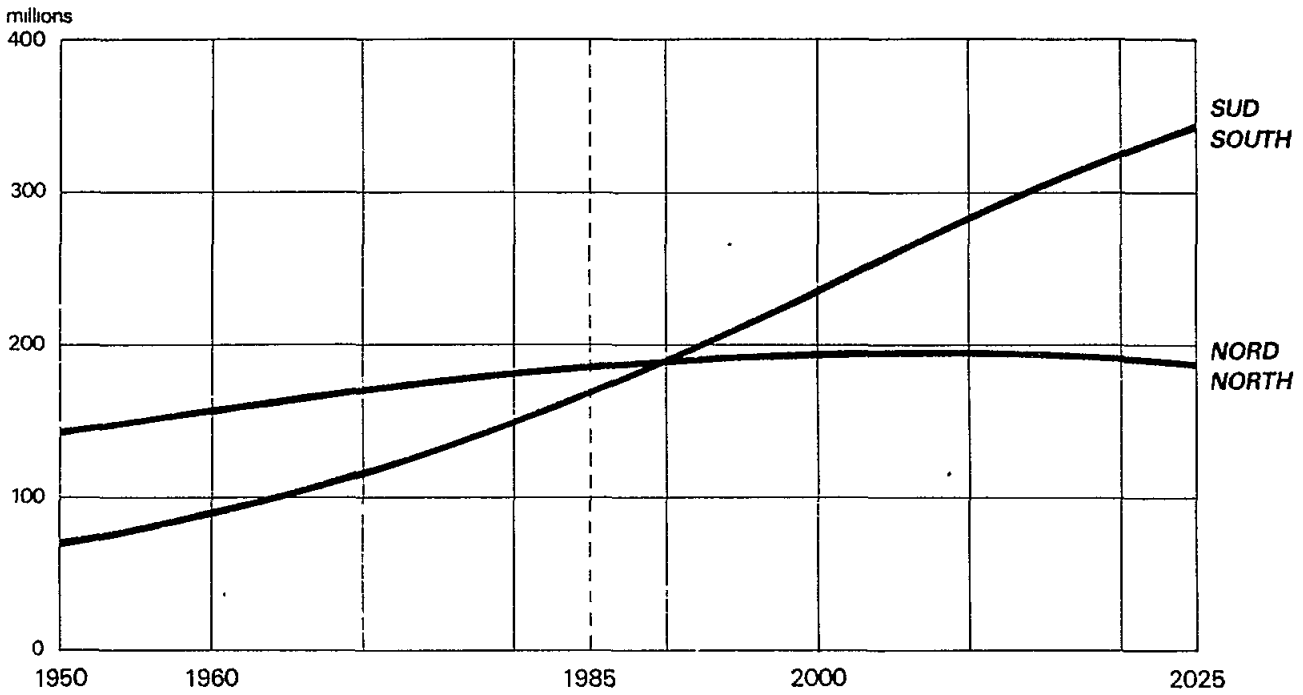
30. Finally, it seems that beyond 2000, **population growth** will change even the very dimension of problems for most countries south and east of the Mediterranean basin. Whatever the scenario, **production will necessarily have to be increased** through greater technification based on better scientific AND sociological knowledge, closely involving local populations in these efforts; or **population growth will have to be decisively reduced**; no doubt both will be needed.

31. In addition to raising the awareness of all Mediterranean people about the issues of their environment, the challenge of the development/environment alternative scenarios is not to establish a "new" economy but a **new rationality for decision-making**.

3. THE DEMOGRAPHIC AND ECONOMIC PROSPECTS
OF MEDITERRANEAN BASIN

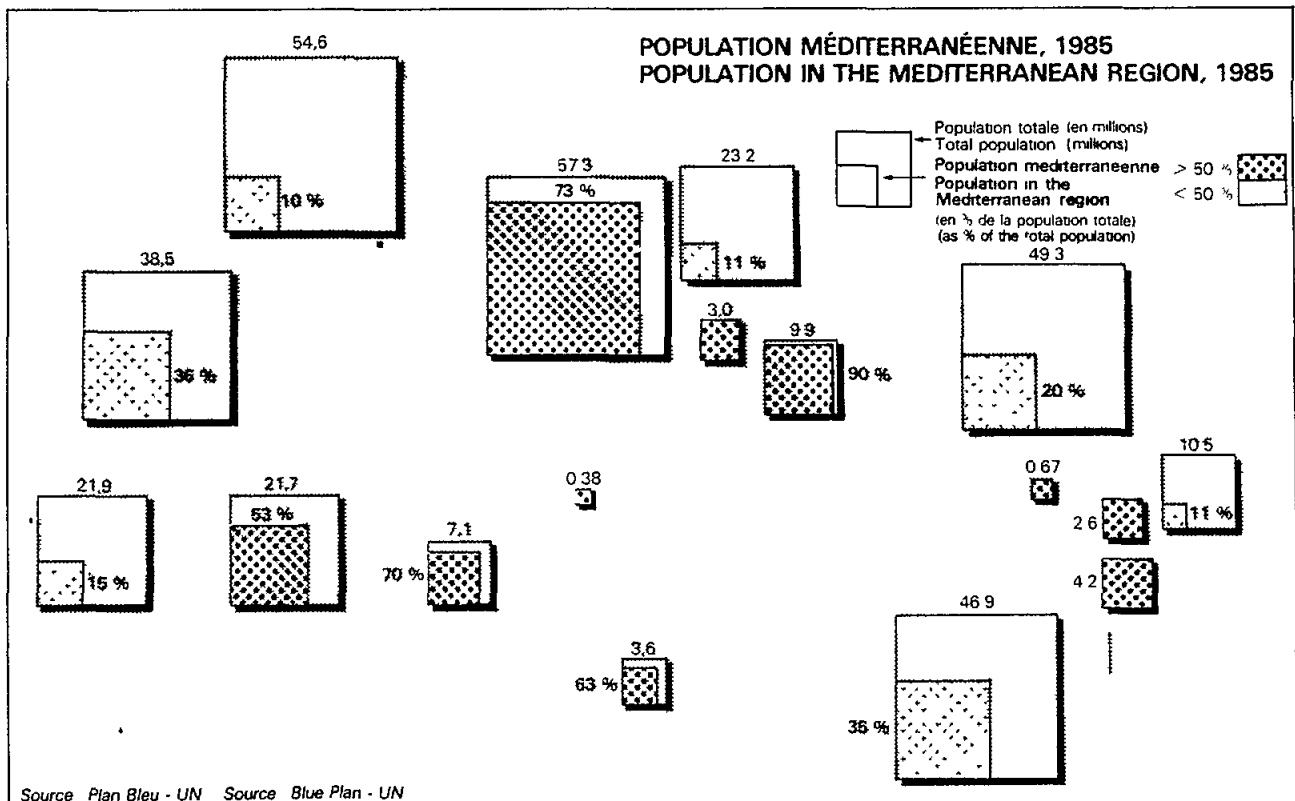
POPULATION DES PAYS MÉDITERRANÉENS
Évolution 1950-1985 ; scénario moyen 1985-2025

POPULATION IN THE MEDITERRANEAN COUNTRIES
Evolution trends 1950-1985 ; average scenario 1985-2025



Source Plan Bleu - UN
Source Blue Plan - UN

Le rythme d'accroissement de la population de l'ensemble des pays méditerranéens semble s'atténuer à partir de l'an 2000. La population des pays du Sud dépasse celle des pays du Nord à partir de 1990.
The rate of population growth of the Mediterranean countries as a whole seems to level off from the year 2000. The population of the southern countries exceeds that of the northern countries as from 1990.



Source Plan Bleu - UN Source Blue Plan - UN

I. POPULATION TRENDS AND EXPLOSIVE URBAN GROWTH

32. Depending on the **development patterns** envisaged, the population of the Mediterranean basin coastal countries as a whole, currently around 360 million, would reach between 520 million and 570 million in 2025. The difference between the two figures is equivalent to the current population of Egypt or Turkey. The countries north of the basin, from Spain to Greece, will account for only about one third of the total population in 2025, compared to two thirds in 1950 and about half today. On the contrary, the countries south and east of the basin, from Morocco to Turkey, will contain nearly two thirds of the total Mediterranean basin population in 2025, i.e. twice their current number and nearly five times more than in 1950.

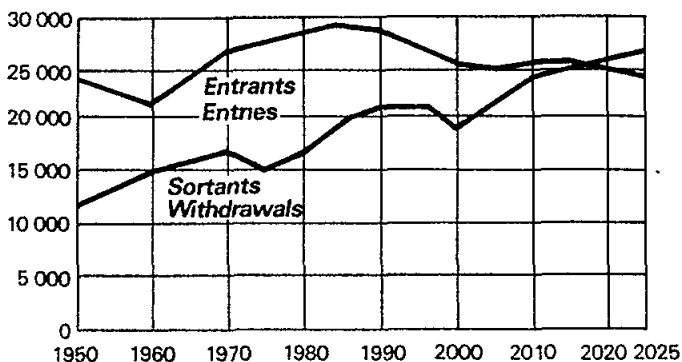
33. The trend in **fertility rates** is at the root of this difference between these two shores of the basin : levels often below the population replacement threshold in the north (2.1 children per women of childbearing age), estimated fertility indicators remaining very high - although in comparative decline - with 5 children or more per woman in the south and east, and higher in rural areas than in the cities. Thus the Mediterranean Sea is **one of the very few boundaries** separating two adjoining areas with **contrasting demographic features**. It is estimated that the population in the south and east will not become stationary (stable population with zero growth rates) until the second half of the twenty-first century.

34. The **age structure** of the population will clearly play a vital role in the **labour market** in 2000 and 2025, although the true activity rates are extremely uncertain. In the countries north of the basin, the working age population (theoretical difference between entries in the 15 - 24 age group and withdrawals in the 55 - 64 age group) will increase less and the labour force will become older. At the beginning of 2000, the labour force should even start to decline in some countries, reflecting the serious shortage of young adults on the labour market. The entry of women into the labour force should continue and could partly offset the shortage. In the **countries south and east** of the basin, with comparatively high fertility rates, potential entries will grow faster than withdrawals and the **gap** will be increasingly large until it peaks around 2000. Demand pressure is therefore likely to **worsen considerably employment problems**, all the more severe in the case of development with weak economic growth (and probably strong population growth).

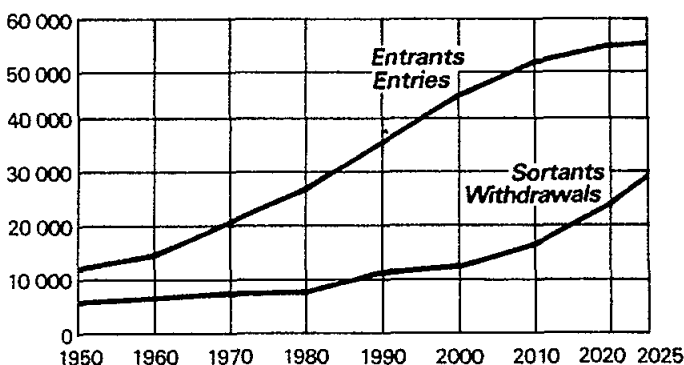
35. Whatever kind of development is pursued, **urbanization will continue at a fast pace** : close to a **ceiling rate** (70-80%) for countries north of the basin, **tending** towards to these figures in the **southern and eastern countries** (mostly between 40% and 50% at present). In these southern and eastern countries, **urbanization often precedes industrialization and development** (heightening the phenomenon of precarious or illegal squatter settlements),

**LES ENTRANTS ET LES SORTANTS DU MARCHÉ DU TRAVAIL
DANS LES PAYS MÉDITERRANÉENS (en milliers)
Évolution 1950-1985 - Scénario moyen 1985-2025**
**ENTRIES INTO AND WITH DRAWALS FROM THE LABOUR MARKET
IN THE MEDITERRANEAN COUNTRIES (in thousands)
Evolution trends 1950-1985 - Average scenario 1985-2025**

ESPAGNE, FRANCE, ITALIE, GRÈCE, YOUGOSLAVIE
SPAIN, FRANCE, ITALY, GREECE, YUGOSLAVIA



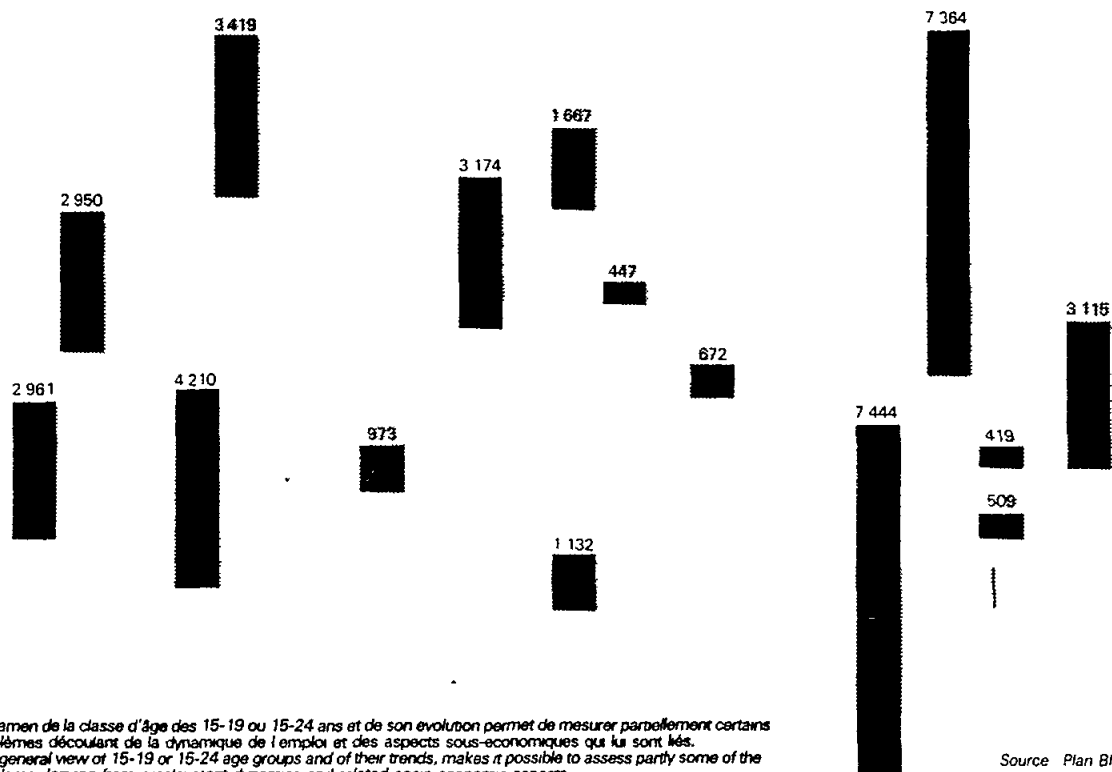
TURQUIE, SYRIE, ÉGYPTE, LIBYE, TUNISIE, ALGÉRIE, MAROC
TURKEY, SYRIA, EGYPT, LIBYA, TUNISIA, ALGERIA, MOROCCO



NB entrants = 15-24 ans sortants = 55-66 ans
entries = 15-24 age group withdrawals = 55-66 age group

Source Plan Bleu - UN
Source Blue Plan - UN

POPULATION ÂGÉE DE 15 À 19 ANS EN 2025 (en milliers) - Scénario moyen.
POPULATION AGED 15-19 IN 2025 (in thousands) - Average scenario.



L'examen de la classe d'âge des 15-19 ou 15-24 ans et de son évolution permet de mesurer par elle-même certains problèmes découlant de la dynamique de l'emploi et des aspects socio-économiques qui lui sont liés.
The general view of 15-19 or 15-24 age groups and of their trends, makes it possible to assess partly some of the problems deriving from employment dynamics and related socio-economic aspects.

Source Plan Bleu
Source Blue Plan

contrary to the situation in the north. A certain variation in forms of urbanization can however be observed for these countries depending on the development pattern:

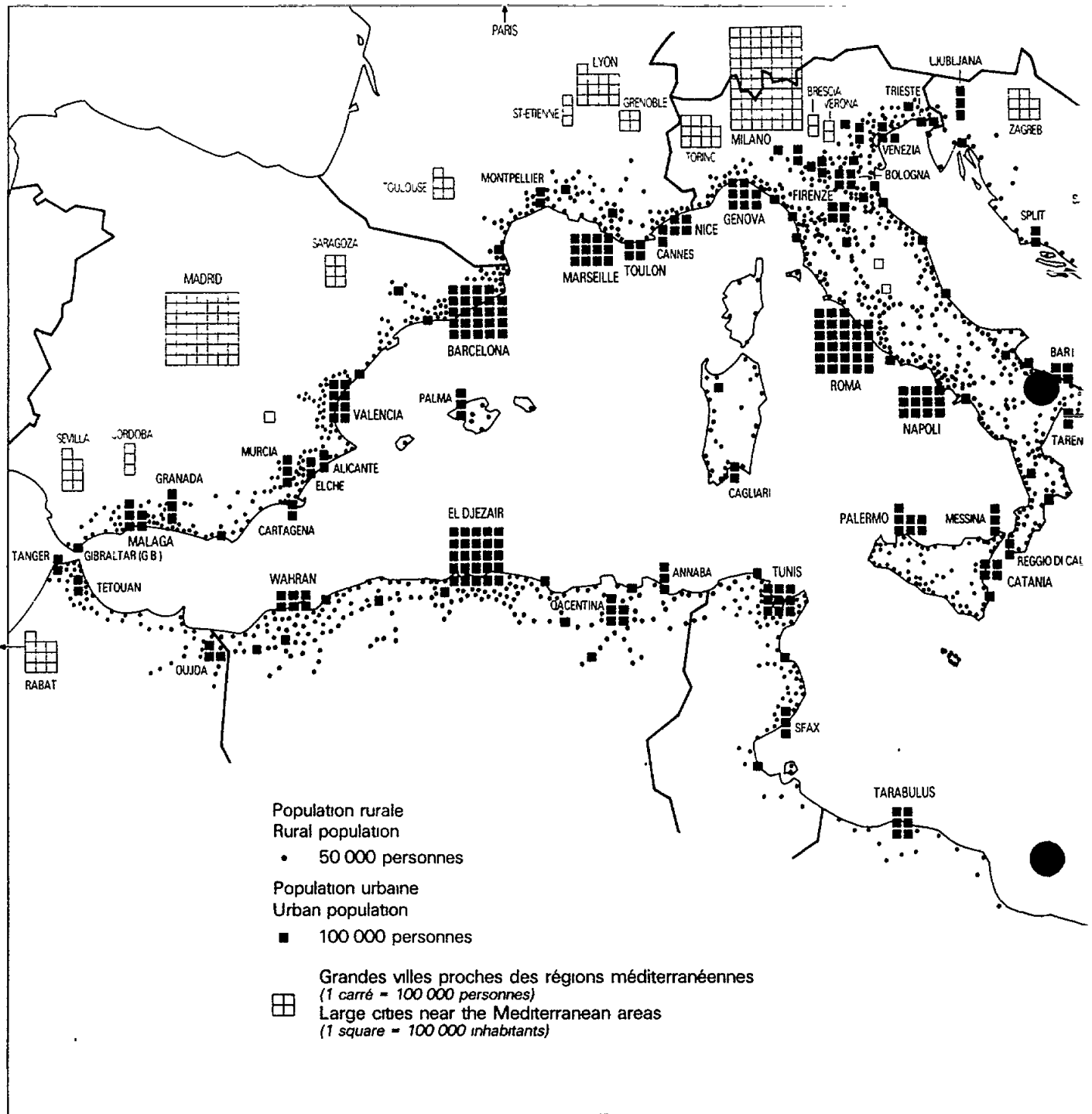
- in the case of prolonged weak economic growth (T-2), urbanization would be fairly quick and **difficult to control** because of the cost of infrastructure;
- the situation would be similar if economic growth started to speed up (T-3) without domestic countermeasures and international co-operation, as was observed in some places in the 70s;
- an attempt would be made to achieve a **balance between town and country** and between **large cities and medium-sized or small towns** in the case of growth patterns more careful about rational, spatial organization and protection of the environment and the quality of life.

36. Urban growth will be "explosive" in the southern and eastern countries where urban growth is, on average, **five times faster** than it was in Europe in the previous century and a half (1800-1950). The rate is not the only factor to be considered. The size of the urban population will be very large: **200 million more urban inhabitants by 2025** in the south and east, i.e. as much as the total urban population in the Mediterranean regions at present. Depending on the scenarios, the urban population of the Mediterranean basin could in fact number between 380 million and 440 million, compared to a little over 200 million today. The **difference between the two figures is equal to between six and seven cities the current size of Cairo.**

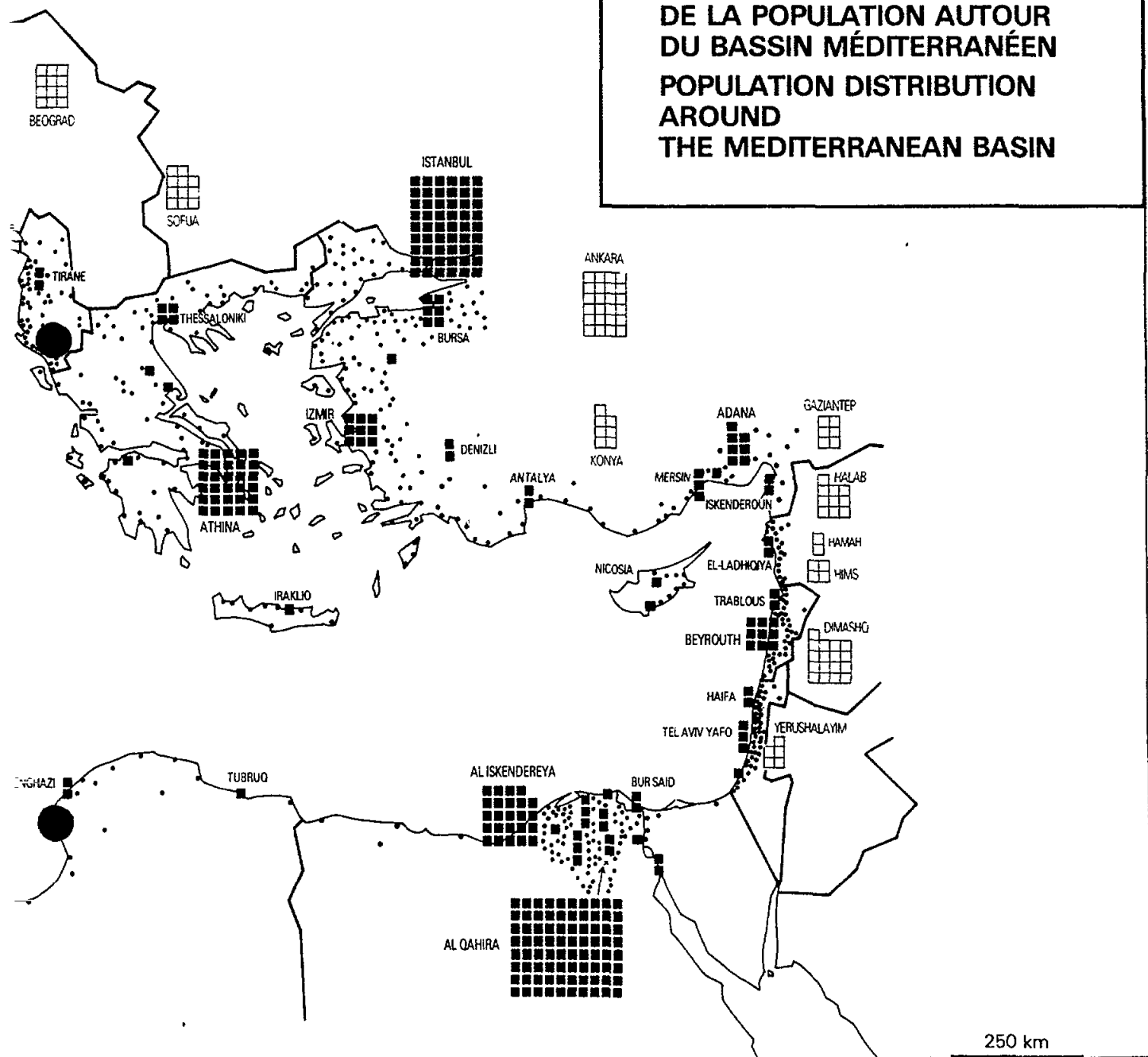
37. Urban growth will swell the major agglomerations and metropolises: depending on the country and the scenario it will affect small and medium-sized towns very unevenly, depending on urban structure, the tradition of large towns and their attraction. The **growth rates of the large cities**, or "megalopolises", will entail or accentuate well-known **imbalances** (congestion, overcrowded and unhealthy shantytowns, delinquency, etc.). The major capitals already monopolize between 30% and 60% of urban employment, and their sphere of economic influence extends over the whole of the country (unlike other towns, with limited spheres of influence).

It is estimated that on average up to three quarters of demographic growth will go to swelling the population in major cities, but everything will depend on physical planning policy and the efforts made to assist small and medium-sized towns to improve their situation.

38. Another aspect of physical planning policy must also be considered: this is the **attraction of the coast** and the very strong growth of urban population in this already densely populated area.



RÉPARTITION
DE LA POPULATION AUTOUR
DU BASSIN MÉDITERRANÉEN
POPULATION DISTRIBUTION
AROUND
THE MEDITERRANEAN BASIN



The coastal urban population, currently about 80 million, will reach **between 150 million and 170 million in 2025**, with very strong growth in the southern and eastern countries where urban population rates are likely to exceed 80% in some coastal areas.

39. The **quality of life** in Mediterranean towns and agglomerations will depend largely, in the next 40 years, on physical planning policies and whether they are carried out with determination or on the contrary neglected. Main efforts should focus on:

- **water supplies**, sanitation, combating the wastage of a scarce resource which competes with other uses (agriculture, industry). Savings could be effected by recycling water and making a distinction between uses;
- the **elimination of toxic waste** and its possible reuse. There should not be the least temptation to export urban waste, as done, for instance, by some cities in the United States;
- the **creation of green spaces**, essential in Mediterranean towns which already have less (on average four times less) than north European towns. Green spaces must be supplemented by the maintenance or creation of pedestrian precincts (medinas, roads closed to traffic, etc);
- the **saving of energy** by developing **solar technologies** for domestic use and space heating, and by supervising the use of coal and fuel (as in Ankara) in towns already severely affected by air pollution;
- the strengthening of efforts to **reduce automobile pollution** at the origin (clean cars, vehicles designed especially for urban traffic, etc.) as air pollution, already severe in some towns, may become unbearable with the growth of automobile traffic. Efforts made to restrict the source (new cars) must be quickly extended;
- the **reduction of pressure**, sometimes considerable, on peri-urban agricultural land in countries where it is scarce and in most coastal regions. In this respect some successful experiments demonstrate that land control legislation and practice can provide lasting protection for agricultural areas near towns and avoid uncontrolled urbanization;
- the maintenance or development of **types of housing adapted** to spatial constraints and the ecological and cultural conditions of the country.

II. PROSPECTS FOR THE FOOD AND AGRICULTURE SECTOR

40. **Agriculture has a strong impact on the environment** on account of its massive and unparalleled consumption of water and land; situations differ greatly, however, between European countries (including Turkey) and the **other countries** in the basin. The latter (excluding Egypt) are characterized by more **limited natural resources**, particularly water, a comparatively low **technological level** (barring exceptions), and an often **precarious food**

situation. Much influenced by its natural and historic context, the development of Mediterranean agriculture also depends to a great extent on the agricultural policy decisions of the major producing countries, as well as on the organization of international trade.

41. Already favoured by their level of development, the more developed countries on the northern shores experienced rising output following the materialization of the European Economic Community, to the point of largely achieving, even exceeding, their self-sufficiency in most staple foods. At the same time, the countries south and east of the basin, subject to the constraints of lack of resources and population pressure, are suffering from inadequate productivity and a structural, often rising, food deficit, despite attempts at agrarian reform and modernization at the national level.

42. In the case of weak economic growth, the growth of agricultural production in the countries south and east of the basin will necessarily be sluggish, with clearly adverse social consequences. On the other hand, the expected per capita income gaps between agriculture and the other sectors should not widen too much, which could have a stabilizing effect on the rate of rural exodus. The agricultural population, increasing at a rate close to that of overall population growth, will exert growing direct pressure on marginal land (increased risk of soil degradation).

43. The pressure on natural resources caused by fast economic growth, neglectful of the environment, will be very different. In the southern and eastern countries, the growth rate of agricultural production will be high, possibly fuelled by the large agricultural holdings linked to irrigation districts, in turn constantly expanding, therefore requiring heavy investment. Whatever the number of jobs created by these modern mechanized enterprises (in fact providing little employment), the rural exodus can only speed up, fuelling the kind of urbanization that is difficult to control. The most disturbing aspect, however, is that this kind of growth, poorly adapted to the Mediterranean region, which retains few people on the land, will in addition be wasteful with natural resources and comparatively polluting. In fact a large amount of water will be consumed for agricultural use, accompanied by the massive use of fertilizers and pesticides. Soil trends will be very sensitive to the techniques used. Efforts to increase agricultural production could moreover be limited by the availability of water and land, as well as the production capacity of industrial suppliers to produce inputs such as tractors and fertilizers.

44. Among the environmental consequences of increased fertilizer and pesticide consumption (factors of 5 to 6 or 8 depending on the case) and of irrigation are:

- the **risk of soil salinization** through insufficient drainage (the surface area thus lost will have to be deducted from the area gained);
- the **risk of food poisoning and loss of drinking water** (pollution of groundwater or stocks by nitrogen and phosphorous, the heavy metals usually accompanying the latter, and pesticides, some of which accumulate in living tissue);
- the **impoverishment of fauna and flora**; already only 10% of the traditional domesticated animal species known in the Mediterranean a century ago remain today;
- the **degradation of aquatic environments** (rivers, lakes, lagoons and the sea through eutrophization, with its harmful effects (killing of fish, proliferation of insects, putrefaction, etc.).

45. In the case of **sustained economic growth, but attentive to the environment and resources** and also attempting to conserve long-term agricultural prospects, the resources in water and agricultural land of the southern and eastern countries will be subject to strong demands, but more **economical technologies** would limit the amounts of areas used. This kind of development assumes at the same time **efforts as to investment, agricultural research and training** and a **price policy** which is an integral part of national development and land use plans. **North-South co-operation** in research and development could inter alia be directed towards increasing yields in the traditional environment, and the optimized use of industrial inputs.

46. Thus the issues concerning agricultural development are **different** in the countries north of the basin, where the European Community agricultural surpluses currently prevail, and the countries south and east, threatened with shortages. For the former, the overriding issue is **regulation**, whereas for the latter, **increased production** (in unit terms or in value) depending on the possibilities of international trade and the specialization stemming from it) is vital, even if the food deficit cannot be completely overcome. In the countries south and east of the basin, an increasing amount of artificial elements are therefore likely to be introduced in agriculture, requiring capital and know-how, but depending on technological developments, they could differ in terms of choices made and resources employed. On the one hand the massive and poorly co-ordinated use of industrial inputs (fertilizers, pesticides, machinery) could seriously damage the environment (T-3 scenario); on the other hand, a **suitably adapted and mastered use, sparing with products but exigent as to knowledge and various inputs, could significantly reduce degradation** (alternative scenarios). These two options do not represent as easy alternative, and the latter, favorable to the environment, could be implemented in the countries south and east of the basin only within the context of **enlightened international co-operation**. These countries are therefore the most exposed to over-exploitation of resources, which may go as far as desertification.

47. In the north it is a matter inter alia of:

- **controlling and managing land left wild** by the abandonment of agricultural activities, resorting to various kinds of incentives for farmers and a suitable land-tenure policy, supplemented where necessary, by reforestation;
- **avoiding "over-irrigation"** which wastes water through thoughtless withdrawals and pumpings;
- **avoiding overproduction**, which sometimes involves the destruction of surpluses, especially as it pollutes while both producing for no useful purpose and destroying production;
- **stabilizing the amounts of chemical inputs** used, aiming at better mastery of their use; the development of technological research could greatly assist this objective.

In the south and east the much stronger pressure on more limited resources will affect, in particular:

- **water**, of which 80% is currently used for irrigation, for which **difficult choices** will have to be made: faced with inexorably rising costs, production will have to be directed either towards other sectors or towards **high value-added products** linked to exports;
- **land**, where **soil erosion** and shrinking plant cover linked to **salinization** could lead to **declining fertility** and irreversible losses;
- **spatial economics**, where urbanization and industrialization appropriate good agricultural land while the latter extends into more fragile **marginal land**;
- **pollution** stemming from **over-rapid agricultural intensification**, through fertilizers and pesticides being dispersed into a system which is scarcely prepared to receive them.

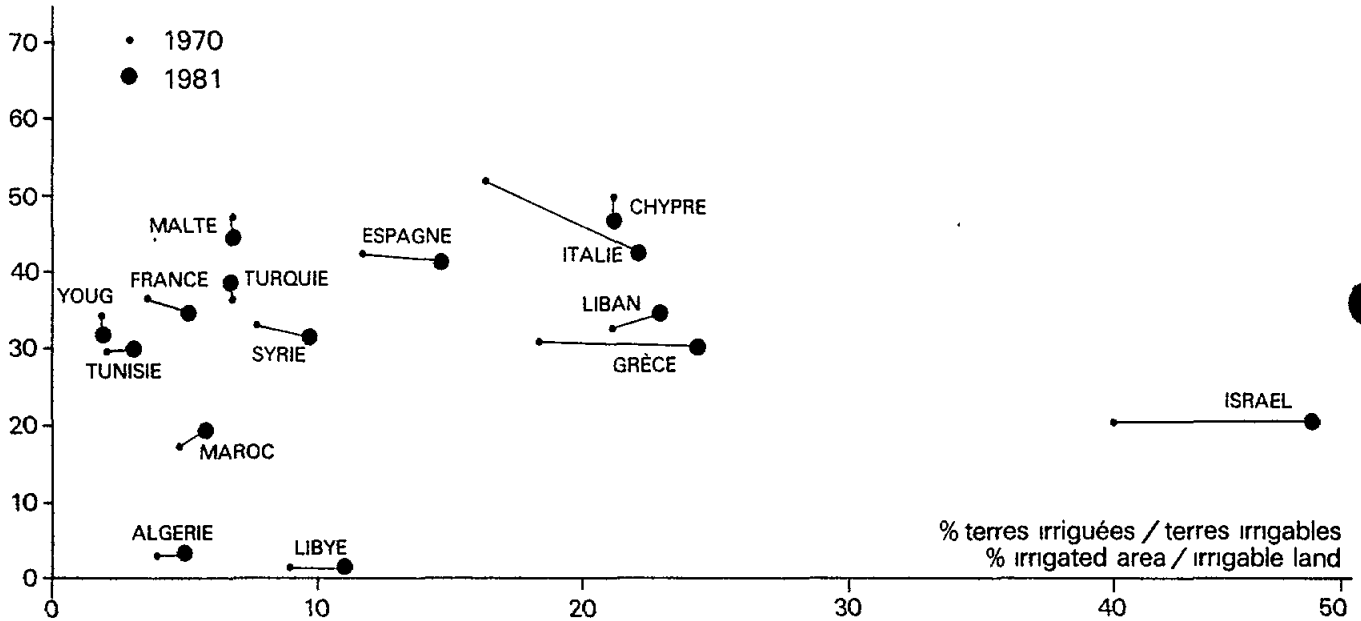
"Non-soil" production will also have to be supervised as regards effluent, mainly in coastal areas.

48. Considering the geographical configuration of the basin and the location of towns, it is likely that Mediterranean agriculture will tend to **concentrate** in the large plains and coastal plains, adding to the "artificiality" of agriculture. In the Mediterranean basin trade in agricultural products, which could amount to **100 million tonnes** by 2000 (five times higher than today) will bring in new **industry-port and agro-food infrastructure** in the same areas, especially on the coast.

49. As regards relationships with the environment more specifically, agricultural **intensification** should not be carried out in a haphazard or **poorly controlled** way, but on the contrary should be well-targeted and properly guided, by co-ordinating the technological **mastery of industrial inputs** (mechanization, fertilizers, pesticides, machinery, etc.) and by

SURFACE TOTALE, SURFACE CULTIVÉE, SURFACE IRRIGUÉE
Évolution 1970-1981

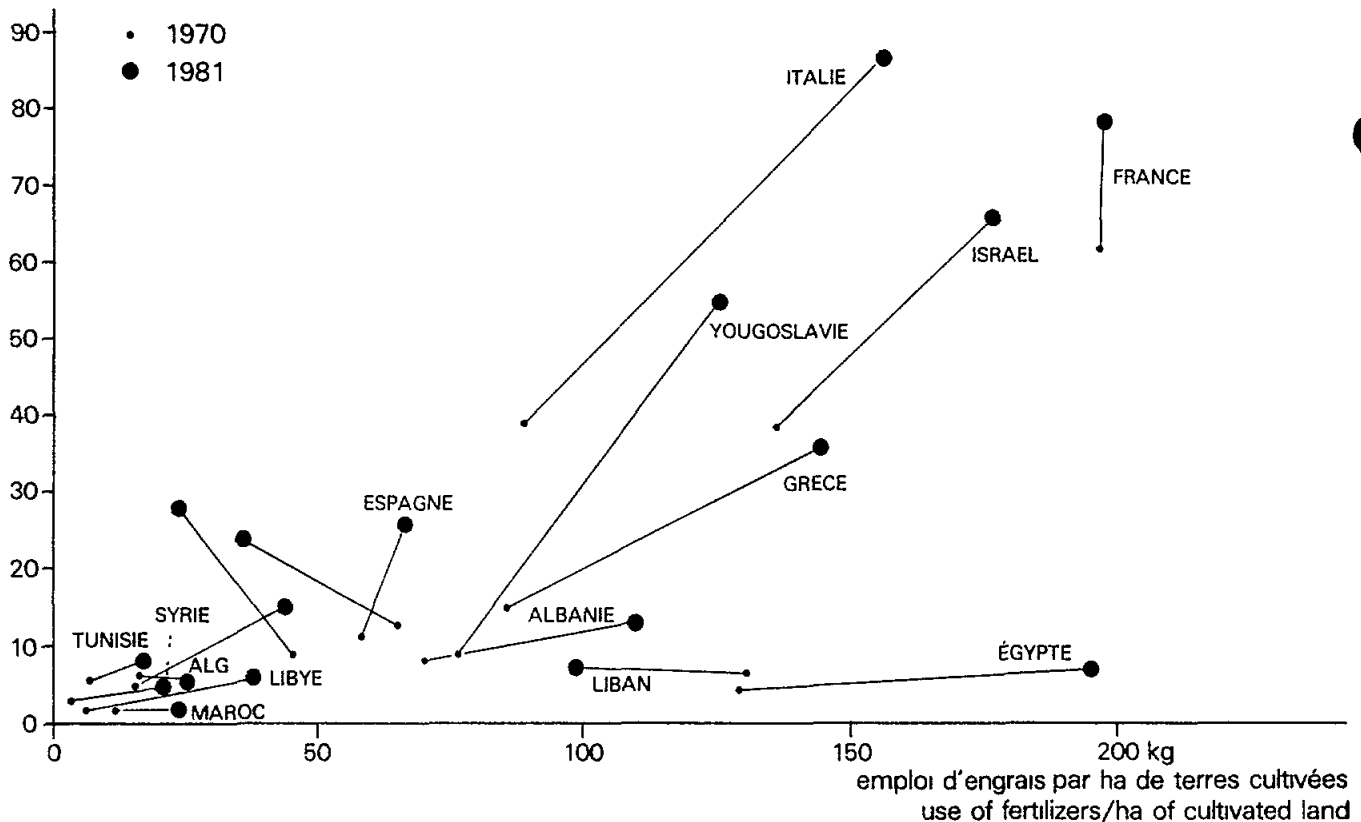
% terres arables/total des terres
% arable land/total land



En Egypte, 100 % des terres cultivées sont irriguées, sur 5 % seulement de la superficie totale du pays
In Egypt, 100 % of cultivated land is irrigated land, which corresponds to only 5 % of total country land

UTILISATION D'INTRANTS INDUSTRIELS
Évolution 1970-1981

% tracteurs/1 000 ha de terres arables
% tractors/1 000 ha arable land



INDUSTRIAL INPUTS IN AGRICULTURE
Evolution trends 1970-1981

emploi d'engrais par ha de terres cultivées
use of fertilizers/ha of cultivated land

integrating the production of these inputs into the industrial and agricultural development process. This will contribute to reducing as much as possible the damaging effect of the large expected increase of these inputs. In the north, attempts should be made to **stabilize the amounts** of industrial inputs used in order to master better their application. In addition, **better knowledge** of the evolution of the pollutants (fertilizers and pesticides) in the environment would help to **combat their impact more effectively**.

The following measures should also help to improve **agricultural production** while paying more attention to the **Mediterranean environment**:

- **soil salinization** (one of the biggest threats to agricultural land) and waterlogging could be avoided to a large extent by **improving and maintaining the drainage networks** in existing irrigation districts and by taking care to install them correctly in new districts;
- investments in **major irrigation dams** should always be followed by investment and necessary measures to **equip irrigation districts** appropriately, in close co-operation with local populations (duly trained and informed);
- the development and application of **biotechnologies** likely to increase or improve agricultural production (nitrogen fixation, crop protection, animal feed, etc.) a prime area for **international co-operation**, should be more strongly encouraged in the region;
- the **conservation** of cultivated plant varieties and domestic animal breeds is **essential** for the development of future production in the Mediterranean region;
- means of **tackling the very uneven production** from one year to another, caused by the vagaries of the Mediterranean climate, could be bolstered through **technical and institutional mechanisms** which would contribute to reduce pressure on soil and water;
- finally, special attention should focus on the ways in which **agro-food industries** develop in Mediterranean coastal areas, as regards both site coverage and the risk of pollution and discharge into the sea.

50. As regards **marine living resources**, the requirements of the Mediterranean coastal population in marine products are **high**, (about 4 million tonnes per year) and change continuously in favour of **better quality species** (sea perch, gilt-head bream, etc.). Compared to these needs, current **production** is very low, with a ceiling of around one million tonnes a year since the beginning of the 80s. According to the **trend scenarios**, the development of marine living resources and their use without major constraint would continue, more or less along present lines. A relative increase in catch tonnages could be foreseen on the short-term, which could peak, then decrease through the **over-exploitation of stocks** and the **deterioration of the environment from pollution**. With a better balanced kind of development and more effective collaboration among coastal countries, corresponding to the

alternative scenarios, it would be possible to adapt catches to better assessed fish stocks. In any event, **Mediterranean regions will remain importers of fishery products.**

51. **Aquaculture** could also be developed (27,000 tonnes in 1987, 44,000 expected in 1992); more than **1 million hectares** of coastal areas could be devoted to this activity, including a number of very productive brackish lagoons which could be developed.

52. Fisheries and aquaculture are a **specific sector** which could **contribute more** to meeting food requirements in the Mediterranean basin. First of all, **statistical data should be coordinated and standardized**, as well as the various systems for assessing stocks, in order to increase the accuracy and reliability of results.

As regards fisheries, **concerted action** among states should be pursued, and **optimal use of the coastal strip** should be ensured, particularly as regards small-scale fisheries and the installation of artificial reefs and aquaculture facilities in the open sea.

Concerning **aquaculture** it would be useful:

- to identify and protect **potential aquaculture zones** in each country notably lagoons;
- to carry out necessary **experiments** to develop various products;
- to give more systematic attention, from the viewpoint of aquaculture potential, to the **location of marinas.**

III. INDUSTRIAL TRENDS

53. Whereas around 1950 the Mediterranean coastal countries produced a percentage (30%) of world industrial production lower than that in 1929, and the decline of the Mediterranean basin seemed to be definitive, after 1950 these countries experienced **growth higher than world average**, and some of them even had spectacular growth. There was a **strong imbalance**, however, in the value added of manufacturing industries in the Mediterranean basin (more than 200,000 million dollars in 1983) between the Mediterranean regions on the **northern shore** and those on the **southern and eastern shore** (about 80% and 20% respectively).

54. Major **trends** differ depending on whether the countries are already industrialized or not:

- for the **north**: the **peaking** in some countries, the decline in others, of **traditional industries** such as steel, cement, and oil refining, followed perhaps by part of the inorganic chemicals

and aluminium industries, and the emergence of new highly automated industries resorting to robotics (itself a new industry), and using new technological processes, including biotechnologies. The development of these industries will depend partly on relations between Europe, the United States and Japan, but also some rapidly developing countries (notably in Asia) and will therefore be faster in the case of enhanced international co-operation. Drawing largely on the tertiary sector, many of these industries could in addition be established in Mediterranean regions;

- for the south and east: population growth will entail considerable demand for traditional manufactured goods, and basic industries such as steel and cement should continue to grow.

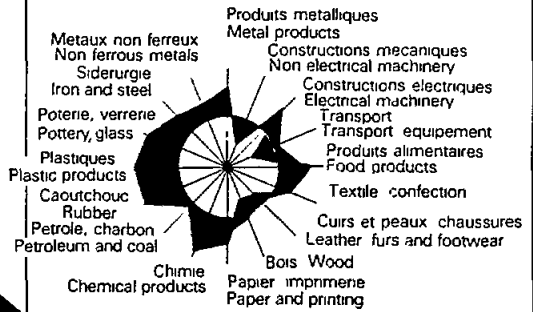
The kind of development with the most spillover effects for the southern and eastern countries would be an industrial development based on both the growth of the domestic market - which assumes vigorous agricultural growth - and broad access to the European market (the case of the alternative scenarios). Co-operation agreements along these lines would bring about the growth, not only of light industry, but also of other industries, particularly those concerned with the primary processing of products : metallurgy, petrochemicals, and in general all heavy industry. However, these primary processing industries are the most polluting ones (along with food and agriculture). North-South economic co-operation mindful of the environment, such as envisaged for this kind of development, should therefore ensure that the transfer of northern markets to the south does not imply a transfer of pollution. This transfer should, on the contrary, offer an opportunity to gear technological development towards less polluting processes. The best prospects for development could be in the countries which manage to achieve a balance between the growth of major industries based on modern non- (or less) polluting industries, stemming from co-operation framework agreements, and of small and medium-sized firms deriving from the internal vitality of society.

55. The range of possible industrial development is considerably broader in the south and east than in the north (where the scenarios in fact vary comparatively little). The southern countries could maintain considerably higher industrial growth rates over the long run, although stagnation cannot be ruled out.

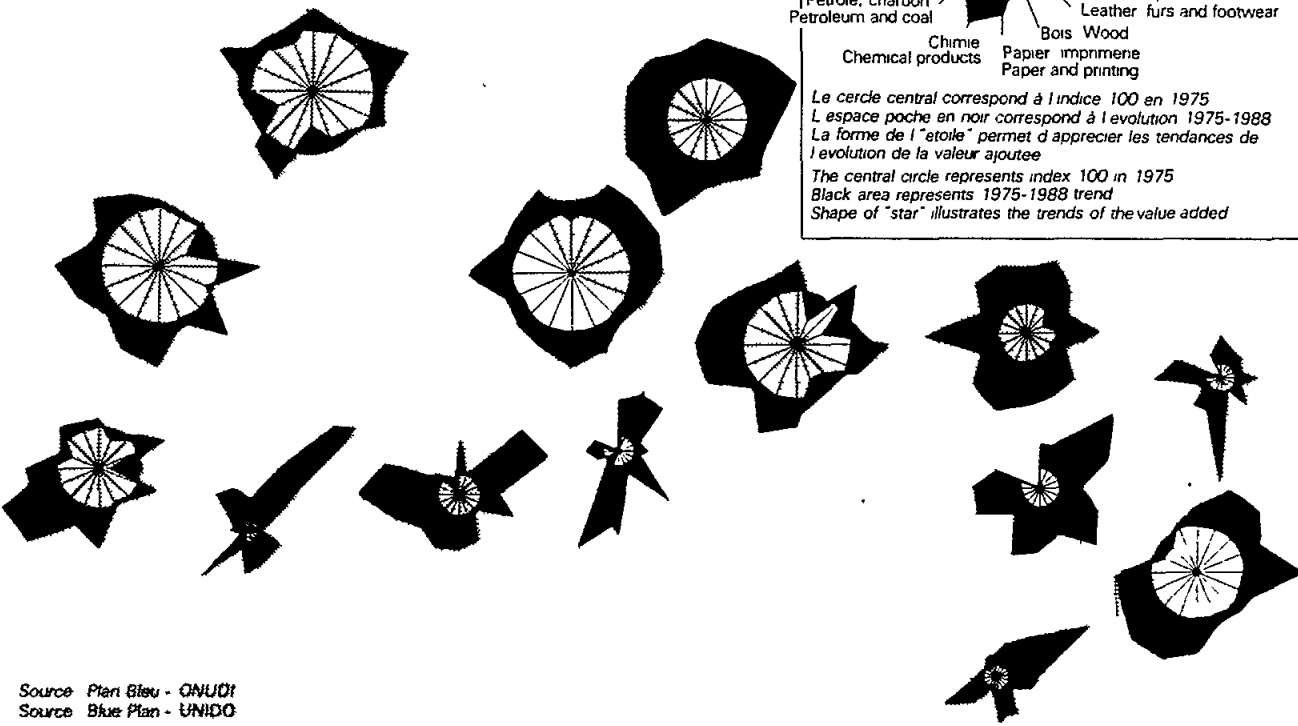
A large number of industrial installations are already located on the coast; this trend will grow. It is moreover only one of the aspects of relationships between industrialization and land use, because along with land directly occupied by industrial installations, there is land indirectly "consumed" by induced urbanization, transport, utilities (water, energy, etc.) and communications.

LES STRUCTURES INDUSTRIELLES Évolution 1975-1985

INDUSTRIAL STRUCTURES Evolution trends 1975-1985



Le cercle central correspond à l'indice 100 en 1975
 L'espace poché en noir correspond à l'évolution 1975-1988
 La forme de l' "étoile" permet d'apprécier les tendances de l'évolution de la valeur ajoutée
 The central circle represents index 100 in 1975
 Black area represents 1975-1988 trend
 Shape of "star" illustrates the trends of the value added



Source Plan Bleu - ONUDI
 Source Blue Plan - UNIDO

56. Mining trends depend heavily on the world market, affected by the slackening need for raw materials. Open-cast mining will no doubt continue to progress (mechanization), but impact on the environment is serious: degradation of sites, dust emissions, etc. Biotechnologies should develop for the post-extraction treatment of ores, although it is as yet impossible to reach a conclusion on the possible effects of induced biological pollution.

57. Between 1985 and 2025, the iron and steel industry is likely to stagnate in the north at a little over 30 million tonnes (the decline in Spain, France and Italy being just compensated by increases in Greece and Yugoslavia). The south and east (from Morocco to Turkey) should exceed northern output after 2000, reaching at least 50 million tonnes in 2025 in strong-growth types of development. Control of pollution in the traditional iron and steel industry is possible, but at a relatively high cost (20% to 25% of overall investment). But after a period of comparative immobility in production lines, it seems that the medium-term trend is towards a real transformation of the iron and steel industry, with the use of natural gas (for which the countries south of the Mediterranean are in a particularly good position) and of the direct ore-reduction process. Impact on the environment would lessen, although not all sources of pollution would be eliminated as there would not necessarily be a parallel adaptation in downstream operations. In any event, the iron and steel industry will continue to be located preferably on the coast. In the longer term, the possibility of a bio-steel industry based on bacteria and using solar energy could be developed, certainly less polluting than the current processes, and for which the Mediterranean basin would be in a good position.

58. Northern countries' cement production (90 million tonnes, at most) would be exceeded after 2000 by that of the countries south and east of the Mediterranean basin (more than a total of 100 million tonnes in 2025 in an average scenario). No technological innovation is expected here, since cement is a very inexpensive product which uses plentiful and cheap raw materials. The very heavy dust emissions of cement works can, however, be reduced, from more than 3 kg/tonne of cement to less than 0.5 kg/tonne by using anti-pollution devices, as anti-pollution efforts are profitable over several years.

59. As regards petrochemicals, capacities should change little in the north. In the long run, capacities in the south and east should, in this case too, exceed those in the north and would be mostly located on the Mediterranean coast. The heavy chemicals industry produces a large volume of waste, which can be controlled by anti-pollution devices; the fine chemicals industry creates less, but sometimes very toxic, waste, and the risk of accidental pollution may arise. In both the south and north pollution caused by used non-biodegradable plastic materials, barely thermodegradable at low temperature, is likely to cause difficulties.

60. Concerning finally **inorganic chemicals**, various hypotheses about development in the agro-food industries indicate that **fertilizer needs** in the countries south and east of the basin were **considerable** in all the scenarios. Fertilizers represent the largest part (in tonnage) of the inorganic chemicals industry. **Ammonia** production capacity on the south and eastern shores (3.5 Mt per year) already exceeds that of the northern shore and should **continue to grow**. Without expecting any significant technological change, **pollution control is possible** in the fertilizer industry, and will be more so in the future, depending on the resources allotted to it. The real **turning-point** would be the **direct fixation of nitrogen** by bacteria, which would imply an appraisal of the nitrogen fertilizer industry (but not necessarily that of potassium and phosphate fertilizers).

61. The impact of **industrial growth** on the **Mediterranean environment** will therefore be considerable during the next forty years, especially in the countries south and east of the basin. **Trends or transformations** both in the north and in the south and east which will gradually alter the industrial landscape will be equally important. But this impact will change completely depending on the **policies followed or measures undertaken** by states, **industrialists or local authorities**.

Impact related to the **heavy pressure of new activities**, many of which would be concentrated on the coast, will largely depend on **land-use policies** decided upon and implemented at the national, regional, or local levels. The prior development of "**industrial zones**", duly drained and equipped with installations for the **evacuation or reprocessing of waste**, or for **water recycling**, should produce **savings** in resources, site coverage and water (bottlenecks in development).

62. The various Mediterranean countries either alone or jointly (following the example of practice within the European Communities) could be **stricter about waste**; but relevant regulations are insufficient, and everything will depend on the **quality of the inspectors** for industrial plants, and on their **capacity for dialogue** with those responsible for production in the **enterprise**.

As regards the existing industrial stock, identification and supervision of "**hazardous industries**" is a priority (that some Mediterranean countries have in fact already considered). State action should also focus, for example, on the **evacuation of toxic wastes**: an organized system for evacuation and treatment, which scarcely exists at present even in the most advanced countries, is essential in the Mediterranean countries.

Finally, the **role of the enterprise** is at least as vital as that of the state. Improvements as regards industrial pollution depends on the enterprise. Depollution installations are

sometimes expensive (steel works), but the introduction of depollution techniques, and above all processes, can also be **profitable** (re-use of "waste or by-products", recycling etc.); in this respect the development of information exchanges on "**clean technologies**" would be very useful both internally and among countries. In any event **national and regional incentives** for the application of **existing industrial anti-pollution techniques** (which are not always used) should be improved and training stepped up in this area.

IV. ENERGY PROSPECTS

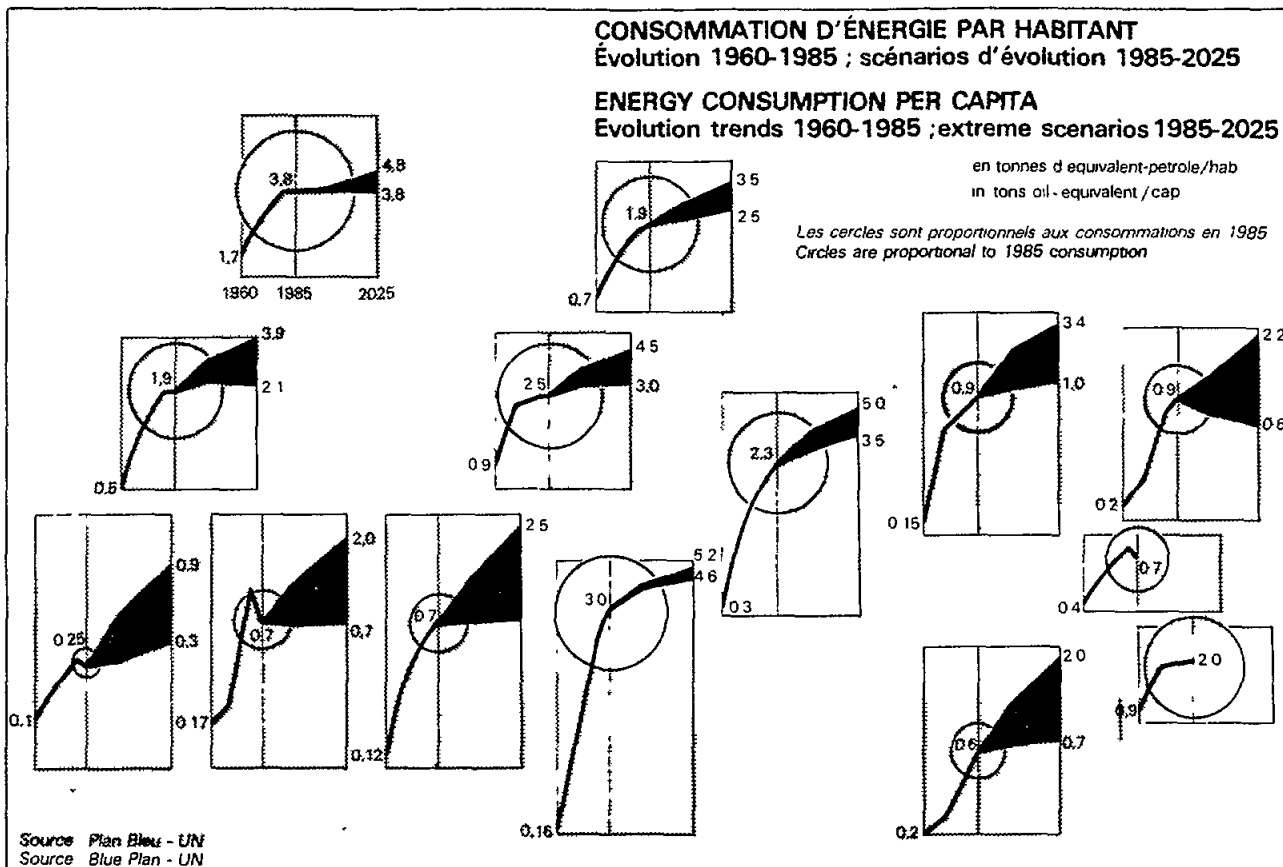
63. In the countries **north** of the Mediterranean basin, energy consumption has tended on the whole to **stabilize**, decreasing in some countries as a result of very serious energy-saving efforts, rising slowly in the other countries to end probably by stabilizing there too. This relative stability in consumption limits to some extent the options for future supply, especially when major capital investment programmes have been launched and will continue until the end of the 90s (the case notably of some nuclear programmes).

The situation is quite different for the countries **south and east** of the basin, where **needs are considerable** and where also the principal Mediterranean **hydrocarbon deposits** are located.

64. Most countries, because they are either importers or exporters, rely heavily on the **international context** for the development of their energy sector (in turn dependent on, and conditioning, industrial development), and specifically on the **market trends** of the main fuels : oil, coal, gas, uranium.

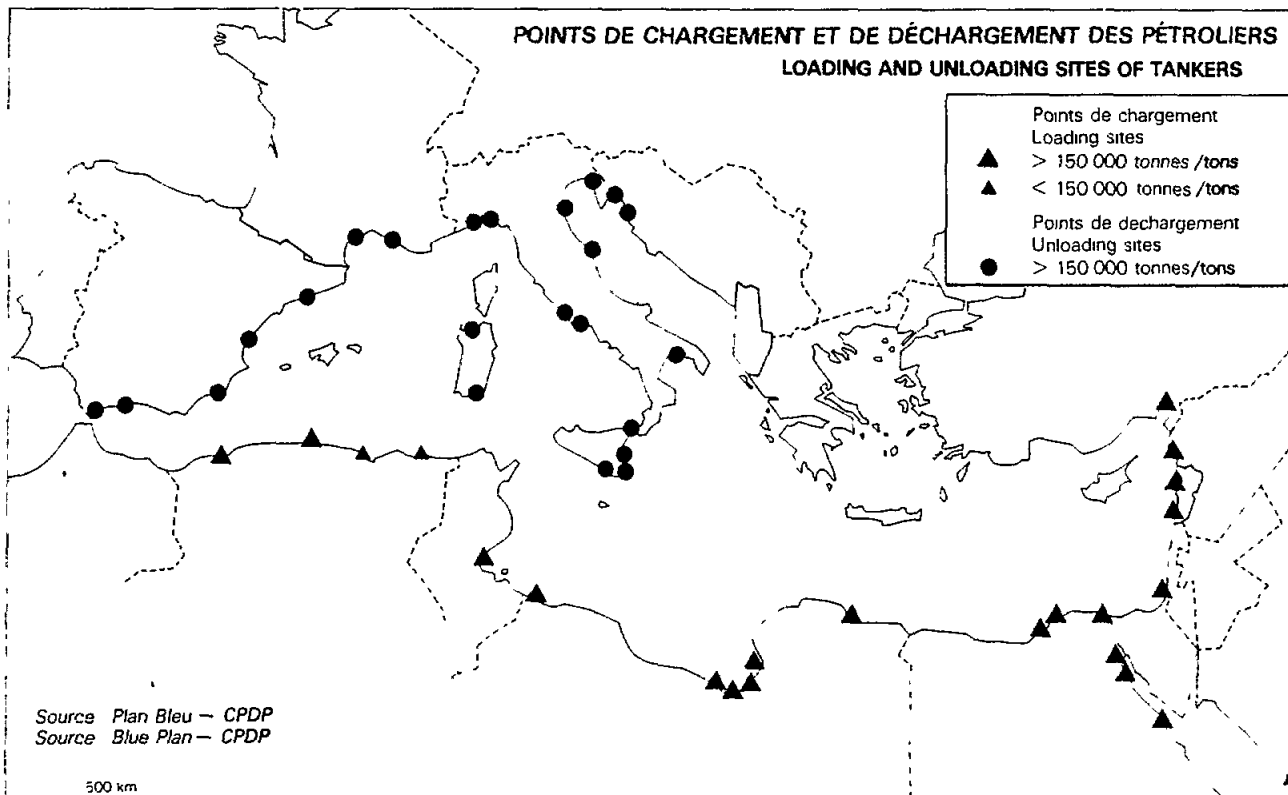
Depending on the various kinds of development envisaged, **total commercial energy consumption** in the Mediterranean countries could range **between less than 1 000 million tonnes oil equivalent (toe)** in 2025 in the case of **slow economic growth**, and approximately **1 500 million toe** in the case of **steady growth**, compared to 600 million toe in 1985; consumption would tend to be **evenly distributed** between the north (from Spain to Greece) and the south and east, instead of 80% for the north and 20% for the south and east in 1985.

65. Whatever kind of development occurs, it is likely that **electrification will continue to expand quickly** in the **southern and eastern** countries, starting in the rural areas with lighting and television, also keeping pace with **urbanization and industrialization**. Electricity consumption could grow tremendously in the south and east, from 110 million Kwh (110 TWh) in 1985 to 900 or more than 1000 TWh in 2025. Whatever kind of production process is used (fossil fuels or uranium), it is likely that most of the **150 or 200 thermal power**



L'éventail des accroissements de la consommation d'énergie par habitant selon les différents scénarios est très important dans les pays du Sud et de l'Est du bassin

Range of increase in per capita energy consumption is much larger in the southern and eastern countries of the basin, depending on the scenarios



stations to be built (the number depends on unit size) will be located on the Mediterranean coast, since 140,000 million cubic metres of cooling water are required annually, of which more than 1,000 million will evaporate (on average one power station every 20 Km of coast). Up to 2000, the power stations in countries south and east of the basin could run on natural gas (a comparatively exceptional case at present), fuel oil, and no doubt increasingly on imported coal, for which all the necessary reception facilities would have to be located on the coast. Beyond 2000, and assuming a recovery in orders for nuclear power stations in general throughout the world, and in particular in the countries on the northern shore of the basin, the nuclear option will also be open to southern and eastern countries. A fundamental choice will therefore have to be made around 2000 between coal and nuclear, unless natural gas is adequately set up in the meantime for electricity generation.

66. From the viewpoint of impact on the environment, the safety features of nuclear power stations would have further improved, the problem of radioactive waste would be virtually solved and its storage would have become a commercial undertaking. As regards coal-fired power stations, currently one of the main sources of SO₂ and NO_x emissions, new combustion processes either after gasification or using fluidized beds, without mentioning the many processes already known for the desulfurization of combustion fumes, are likely to have been marketed by the end of the century. This trend detracts from the relevance of calculations on atmospheric pollution based on current processes (between 12.5 Mt and 25 Mt of SO₂, 3-6 Mt of NO_x, 900-1,800 tonnes of dust, etc. for the whole of the basin in 2025).

67. Oil consumption should stabilize or even fall in the north, but continue to rise in the south and east until it slightly exceeds that of the north (a total of between 360 million and 500 million tonnes in 2025, depending on the vigour of world and energy growth). Between 1985 and 2025 the total cumulative consumption of the Mediterranean countries would exceed 14,000 million tonnes, nearly triple current known reserves in the region. This means that new reserves will have to be discovered, and that the possible gap would have to be met with imports, a common situation for the countries in the north, a new one for some in the south which, currently oil-producers, will in turn become importers.

68. Will the new oil reserves come from the Mediterranean Sea itself? Off-shore exploration (about 20 platforms in operation and 100 or so concession-holders) have not so far produced remarkable results: production is in the order to 5.5 Mt per year. Any scenario in this field is naturally subject to geological unpredictability, but no case has been foreseen in the scenarios in which the Mediterranean would develop large-scale off-shore activities, with the environmental hazards involved. Other environmental aspects related to oil in the Mediterranean are, on the one hand, refining and, on the other, maritime transport. Refining operations are likely to continue their decline in the north and increase in the south

and east. They are located mainly on the coast, but increasingly improve control of their discharges and pollution.

69. One **unknown factor** of future energy development is related to the **potential of natural gas**, whose known reserves increase steadily at world level - they are already large in the Mediterranean basin - and whose **advantages** with respect to the environment are considerable. Important technological progress under way (deep drilling for example) could further increase its **availability**. Assuming a development based on co-operation and regard for the environment, it would play a major role in increasing South-South and South-North **energy trade** (through an increase in the number of **trans-Mediterranean pipelines** through the Strait of Sicily or the Strait of Gibraltar rather than by methane tanker transport). Thus, natural gas consumption could increase even more as it finds new applications (electricity, motor fuel, etc.)

70. Assuming a development neglectful of the environment, **renewable energies will not be promoted**. These forms of energy require the launching of more active **North-South or South-South technical co-operation** programmes. In the context of goal-oriented programmes for developing these energies, such as envisaged in the **alternative scenarios**, **decentralized conversion of solar energy** (thermal and electrical energy) could spread in rural areas where it would help to solve the **fuelwood problem** or improve living conditions (water heaters). With a **breakthrough in photovoltaic cell technology**, solar energy could also make an increasing contribution to **local electricity production** for which countries south and east of the basin would be in a particularly good position. Finally, wind energy could be used for the same purpose, especially in the **Mediterranean islands** and on some still isolated parts of the coast. A **Mediterranean solar energy industry** could therefore **emerge** in the coming years.

71. The **climatic impacts** of energy use can be **local** (changes in micro-climates, smogs), **regional** (acid rain, thermal waste), or **global** (the "greenhouse effect" of exhaust fumes). These impacts - easier to imagine than to quantify - could have **feed-back effects** on development in the Mediterranean basin. The **greenhouse effect** could have an influence not only on the sea level, but also on rainfall and the regional water cycle, the northward shift of aridity and forest fires; possible changes in organic (hence agricultural) productivity and ensuing **alterations in ecosystems** cannot be ignored in any prospective study. Studies in this area are still fragmentary and their conclusions uncertain. **Mediterranean researchers** have the task of closely following work in this field, or taking part in it. The Blue Plan hypotheses have not entirely discounted a **curb on world coal consumption** and subsequently, on **all fossil fuels**, in view of the need to reduce the greenhouse effect at the global level.

72. Future demand can be anticipated fairly accurately in the Mediterranean energy sector : resources are subject to heavy constraints related to the international context. The coastal countries do, however, have **some options open to them; exchange of information and practices**, and the establishment of **suitable policies** geared as a priority to **energy conservation and environmental protection** would be useful.

Electricity and gas networks in Mediterranean countries of the European Community are already interconnected to a large extent. It would be appropriate to extend this kind of **interconnection** to the other Mediterranean countries. **Electricity development prospects** should be closely followed, with a view to the exchange of information and experience (inter alia for pollution control).

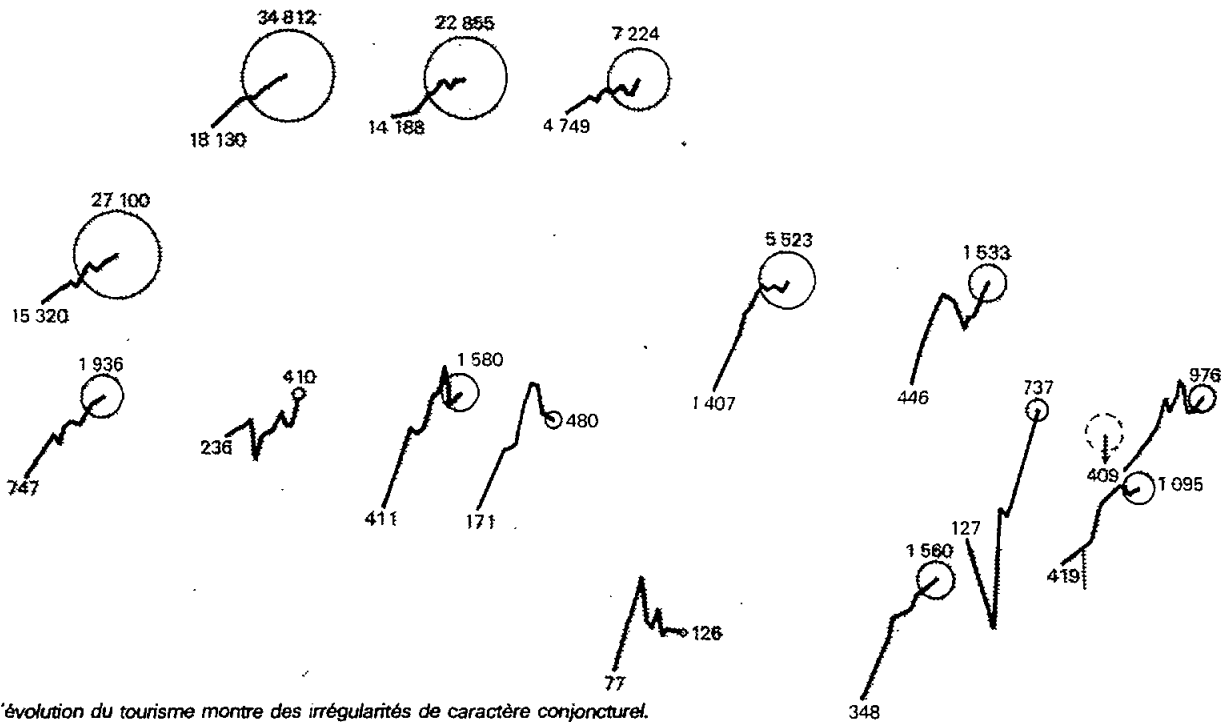
In the southern and eastern countries, the search for a **solution to the fuelwood problem** in rural areas (distribution of LPG, followed by decentralized rural electrification) is **urgent** in order to spare the often overexploited forests.

Even with a high rate of growth and penetration, the contribution of **solar energy** would not be significant in the Mediterranean countries on the short or medium term. In the **long term**, however, it should become more important. Through more systematic targeting, solar energy could already make a useful contribution, particularly for scattered dwellings and irrigation in the rural world.

V. THE FUTURES OF TOURSIM

73. Host to about 35% of international tourism, the Mediterranean basin is the **biggest tourist region in the world**. Tourism - both international and domestic - is one of the **most active sectors** in the basin, and seems to be little affected by the unevenness of economic growth in the countries of origin. It concerns **all Mediterranean countries**, which all have **ambitious plans** to develop their tourism, international first of all, but also (especially in the countries south and east of the basin where **domestic tourism is emerging**, usually starting from rather low level of around 10% compared to 50-60% in Europe). The **total** of these plans seems **higher than the total flows** than can be anticipated at the level of the basin. Authorities appreciate the **significant effects** of tourism on the GDP, employment, and the balance of payments, for which it ensures a considerable coverage of imports (10-25%, depending on the country, partly offsetting the food deficit or covering part of the oil bill).

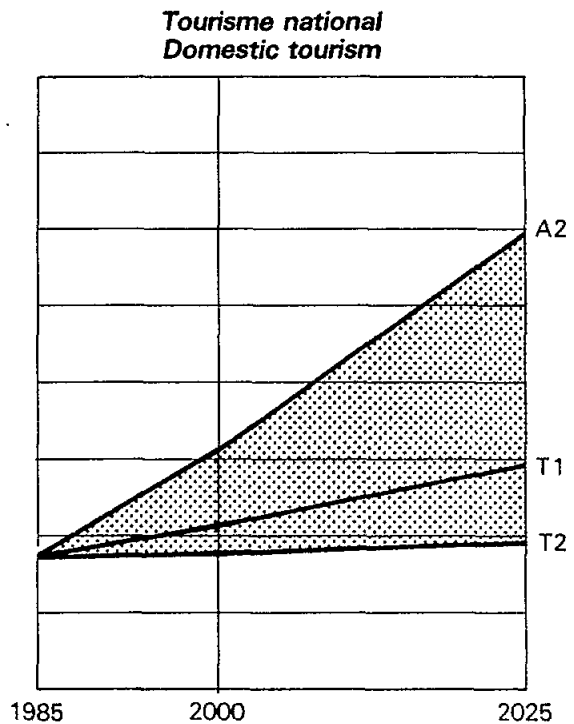
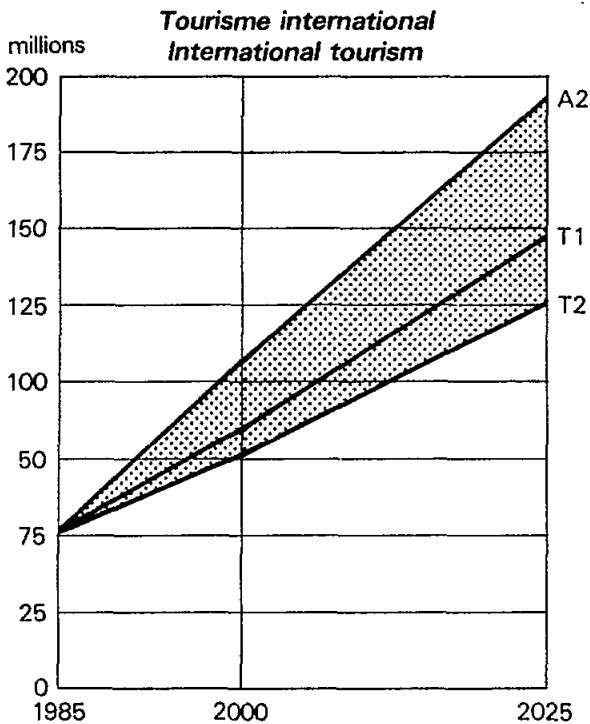
TOURISTES INTERNATIONAUX DANS LES PAYS MÉDITERRANÉENS (en milliers)
Effectifs 1984 et évolution 1970-1984
INTERNATIONAL TOURISTS IN THE MEDITERRANEAN COUNTRIES (in thousands)
1984 figures ; trends 1970-1984



L'évolution du tourisme montre des irrégularités de caractère conjoncturel.
Irregularities in tourism trends depend on circumstances.
 Source : Plan Bleu - UN
 Source : Blue Plan - UN

NOMBRE DE TOURISTES INTERNATIONAUX ET NATIONAUX SUR LE LITTORAL MÉDITERRANÉEN EN 2025
Scénarios T1, T2 et A2, 1985-2025

NUMBER OF DOMESTIC AND INTERNATIONAL TOURISTS IN THE MEDITERRANEAN COASTAL REGIONS
Scenarios T1, T2 and A2, 1985-2025



Source : Plan Bleu
 Source : Blue Plan

74. Mediterranean tourism is characterized by three basic features:

- it is heavily and increasingly **concentrated on the coast**. No Mediterranean country that has attempted to improve tourist distribution throughout its national territory seems to have been successful. In some countries, **coastal tourism** represents up to 90% of all tourism. Nearly **100 million tourists** (52 million international and 45 million domestic in 1984) visit the Mediterranean coast, giving a total of about 1,400 million guest-nights;
- it is **heavily seasonal**, the high season culminating in **four weeks** of particularly heavy business. This leads to a notorious **under-exploitation**, even "**wastage**", of tourist lodgings and installations;
- host to about 80% of international tourists, the **three countries to the north-west** of the basin (Spain, France and Italy) **dominate** the tourist market. According to the scenarios, they will **continue** to do so, despite comparatively faster growth into other regions. In these three countries, however, concentration on the coast is definitely less intense than in most of the other countries, with the notable exception of Egypt.

75. On the basis of these **major trends**, and with growth rates that some tourism experts may perhaps find too cautious, the most divergent **kinds of development** would lead in 2025 to:

- **380 million tourists** for the Mediterranean countries as a whole (265 million international) of which nearly half on the Mediterranean coast in the case of **weak economic growth**;
- **760 million tourists** in the case of **strong growth** (410 million international tourists and 39 million domestic tourists, a true national "**explosion**"), of which about 350 million on the Mediterranean coast. The number of **guest-nights** corresponding to these 760 million tourists would be in the region of **11,000 million**. It should be observed that if **current lodging capacity** - 33 million beds - were to be used all the year round it would be **sufficient** to receive them. This gives an idea of the interest in a **staggering**, at least partially, the **holiday period**.

One of the most important **questions** for the future is that of a **better distribution** among the various host countries, which could lead to an **improvement in geographical balance**. But would the most visited countries in the north-west accept this diversion or would they try to keep their share of the market? And in the same vein, how will the Mediterranean countries of the European Community react when the Single European Act comes into force in 1992 leading to a huge redistribution of goods and persons which could pave the way to expanding tourist installations (with north European capital) in areas like Sardinia, the Greek islands, etc.

Another query is related to the emergence of domestic tourism in a number of countries south and east of the Mediterranean basin, inter alia those with a high population growth rate and with good or strong economic growth. Will this kind of tourism, which usually starts with holidays at home, (particularly difficult to account for in statistics), develop according to the **European model**, based on new lodging capacity whose rapid growth could conflict with the quality of and respect for the **environment and landscapes**?

Finally, a qualitative aspect of tourism development is related to the change in types of tourists, with a trend towards increasing diversification in the kinds of tourism offered (sport, cultural, recreation, conferences, etc.) and the development of shorter and more frequent periods of stay.

76. The **impact** of this kind of tourist development on the **Mediterranean environment** can be assessed first of all in terms of **direct land coverage**. It is estimated that currently site coverage of all tourist lodgings (hotels, rented or self-catering accommodation, secondary residencies, youth hostels, holiday villages, camping and caravan sites, parking lots, etc.) is in the order to **4,400 km²** for the countries as a whole, of which about 90% in the three north-western countries, Spain, France and Italy. This coverage could **double by 2000**, to reach **8,000 km²**, most of it on the coast. **Solid waste** produced by tourists, currently in the region of 2.8 million tonnes per year, would reach between **8-12 million tonnes in 2025**, while **sewage discharges** would rise from 0.4 thousand million cubic metres to a figure that could be as high as 1.5 thousand million cubic metres. This means that tourism will contribute significantly to waste and to **water drawoffs** in coastal areas, in competition with urban requirements, precisely at **peak periods**.

77. An increasingly serious consequence, which cannot be quantified, is the threat of the **rapid degradation** - even disappearance - of **fragile natural sites** and the deterioration of **historic sites** (Venice, Luxor, etc.) from mass tourism, increasingly difficult to control. To save these treasures of mankind, should manmade parks be constructed with the full use of new technologies to **replicate sites** that have become too famous and to reduce pressure?

However, relationships between environment and development should not be considered solely in terms of the impact of tourism on the environment. **Conversely**, tourism is currently a **strong incentive** for the **protection** of landscapes and even the quality of the environment (bathing waters, cleanliness of beaches, pedestrian paths, etc.). Regional and local officials are particularly aware of this.

78. In principle it would be possible to **receive four times more tourists** in the Mediterranean, (a level intimated by some scenarios), but countries, local authorities and those working in

the tourist sector, who in addition are competing with each other almost everywhere in the basin, will not be able to handle this kind of growth without an effort to improve information, analysis and co-operation.

Each country, as far as it is concerned, should aim at **improved spatial distribution** (distribution of flows to avoid saturation) and especially **throughout the year** (partial staggering of holidays, short stays, winter tourism) to spread the load, increasingly concentrated on the narrow **coastal strip**. **Collaboration with local populations** at the decision-making level and more careful integration into the physical and cultural environment is essential to avoid the **clear risk of rejection**. The joint use of installations by the local population and by domestic and foreign tourists is one of the ways of achieving this objective.

The **rapid development of different kinds of tourism** must be closely followed by each country, as the trend towards **more active tourism** (sport, culture, conferences) has become more important. Finally, systematically raising the awareness of tourists as regards protection of the environment they have come to enjoy is essential in the countries as a whole. The **protection of some prestigious and over-visited natural or cultural sites** could be promoted by this awareness-heightening, but it may also require new solutions (recreational areas).

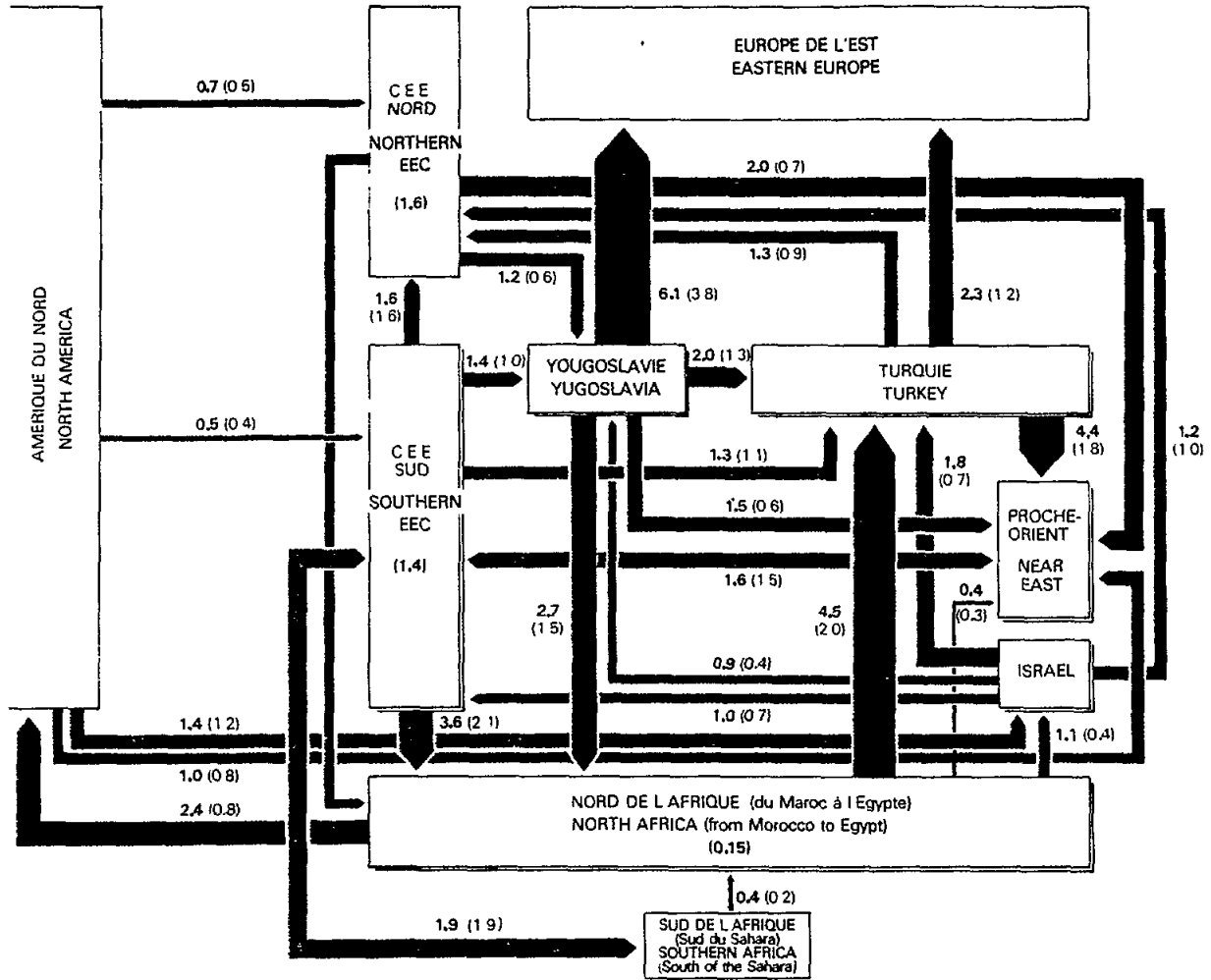
VI. TRANSPORT IN THE MEDITERRANEAN

79. The future of transport largely depends on:

- the **growing mobility** of persons (including tourists and migrants);
- **changes in transport technology**;
- the **strengthening** of intra-Mediterranean trade, but with a comparative reduction of heavy products;
- an **increase in combined carriage** (road-sea, road-rail, etc.) and the growth of multimode "exchange intersections";
- the fact that the Mediterranean is increasingly becoming a **transit area**.

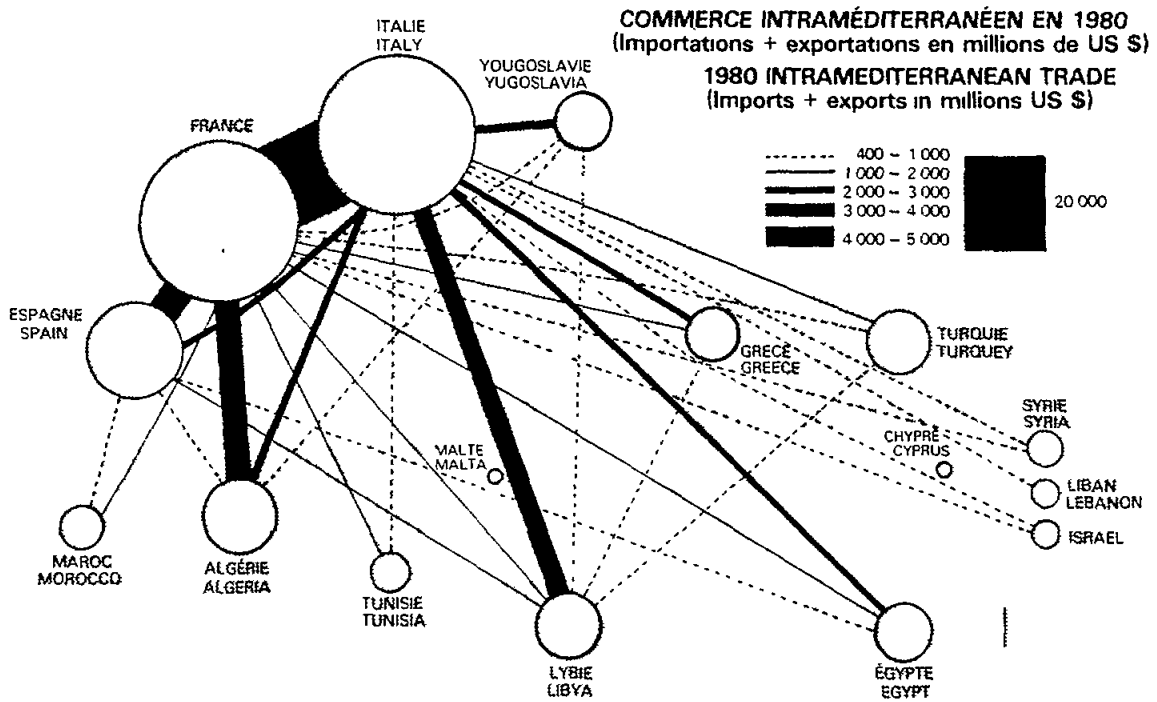
80. In the maritime area, **oil transport** (currently around 200 Mt per year and 200 to 250 tankers at any time) is **unlikely to increase much** during the scenario period: intra-Mediterranean traffic between North Africa and southern Europe should peak, then decline. The main traffic would continue to come from the Arabian-Persian Gulf through the Suez Canal, heading partly for the Mediterranean countries but also for countries outside the

LES LIENS ÉCONOMIQUES DES PAYS MÉDITERRANÉENS EN 1980
ECONOMIC LINKS OF MEDITERRANEAN COUNTRIES IN 1980



Liens économiques entre les pays (sur la base des échanges commerciaux en 1980)
Le 1^{er} chiffre représente le lien dans le sens de la flèche le 2^e, entre parenthèses représente le lien en sens inverse
Economic ties among countries (based on 1980 trade)
The first figure represents the economic tie in the direction of the arrow the second figure (in brackets) represents the economic tie in the opposite direction.

Source Plan Bleu - CNUCED Source Blue Plan - UNCTAD



Source Plan Bleu - CNUCED
Source Blue Plan - UNCTAD

Mediterranean through the Suez-Gibraltar route. Crude transport should drop, while the transport of products refined by the producer countries should rise, which changes somewhat the transport profile in favour of smaller ships with specialized cargoes (some of which more polluting or more toxic would increase risks during major accidents). Renewal of the tanker fleet should take at least twenty years. Hence, the need to speed up the installation of land facilities in order to comply with the MARPOL 1973/78 stipulations concerning the dumping of oil in the Mediterranean, which implies vigorous and immediate action on the part of states (penalties for degassing are barely symbolic and rarely applied; incentives to use installations are insignificant). Although contrary to oil use of natural gas is likely to expand vigorously in the case of rather strong economic growth, mobilizing to a maximum all energy resources, and even more so in the case of goal-oriented gas promotion policies, intra-Mediterranean transport of LNG will probably grow very little. On the contrary, there would be an increase in the number of trans-Mediterranean gas pipelines between Africa and southern Europe.

81. With respect to other products transported by sea, as industrialization proceeds in the countries south and east of the basin, and trade grows, there will be an increase in the transport of chemical products, either in bulk, in drums, or packed, and a parallel rise in the risk of accidental pollution (some of these products are highly toxic). With about 2,000 merchant ships plying the Mediterranean at all times, the frequency of accidents or "events at sea" is currently 60 per year for the Mediterranean as a whole (collisions, sinkings, strandings, etc.), with a comparative concentration near Gibraltar and in the area situated to the south and east of Greece and south of the Dardanelles.

This growing industrialization in the countries south and east of the basin will entail not only an increase in their imports of raw materials and bulk foodstuffs but also their trade in semi-finished and finished goods with the EEC countries and other industrialized regions.

For the transport for these different kinds of merchandise the use of "load units", containers and semi-trailers (roll-on/roll-off) will become widespread in the Mediterranean with the growth of this traffic.

Large container-carriers would continue to serve the long-distance links with the rest of the world, in particular; on the other hand roll-on/roll-off cargo ships would be increasingly used on intra-Mediterranean links and their number would increase.

Care should be taken to ensure that the loading of merchandise hazardous for the marine environment is authorized only on those roll-on/roll-off vessels which meet the new, much stricter international safety regulations currently being drafted.

At the **national** level priority could be given to:

- the installation of **facilities in port complexes** to reduce maritime transport **nuisances** as far as possible;
- greater efforts to speed up the installation of **deballasting facilities** (about 20 are needed).

82. **Road transport** will continue to develop strongly. The **road network** of the Mediterranean coastal countries, a little over 2 million kilometres long (all roads over the region as a whole) at the beginning of the 80s, of which nearly three-quarters in Spain, France and Italy could reach between 3-4 million kilometres depending on whether economic growth is weak or strong.

Whereas the already large networks in the countries north of the basin would grow little, in the **southern and eastern** countries, where they would keep pace with and facilitate economic and social development, networks would **expand vigorously**, to the extent of catching up with or even slightly exceeding those in the north in 2025. Surface area covered would rise from about 40,000 km² at the beginning of the 80s to 63,000 km² (case of weak economic growth) and to 74,000 km² in 2025 in the strong economic growth scenarios. Depending on the case, between 10,000 and 20,000 km² are thus likely to concern strictly Mediterranean regions. A large part of this surface area, in fact, already constructed, is on the **coast** itself.

Considerations such as **incorporation into the landscape** or **protection** of potential agricultural areas should encourage the **careful choice of routes** and avoidance of inhabited areas, (noise).

83. The Mediterranean countries **automobile stock**, nearly 60 million vehicles at the beginning of the 80s (of which more than 80% in Spain, France and Italy), is likely to **double** by 2000, and reach nearly 175 million vehicles in 2025 (with little difference between the various development possibilities, the lower rate of motorization in the case of slow economic growth being partly offset by a higher population level). At this date, the three north-western countries would only account for a little under half the total stock.

Polluting vehicle emissions - NO_x, DO_x, hydrocarbons, carbon monoxide - depend much on the **characteristics** of the vehicles and **conditions of use**, and will depend increasingly on the standards effectively set in the future. Mediterranean cities, where **thermal inversion** occasionally occurs: Athens, Cairo, Algiers, Rome, etc. are increasingly affected. Under current standards, NO_x emissions could **peak** at 3.6 million tonnes in 2000 and incompletely burnt hydrocarbon emissions at 8 million tonnes; beyond that they could **decrease** through regulation combined with technological progress.

To be effective, **efforts to reduce emissions** at the source should be **vigorous and quick** because the **renewal** of the Mediterranean automobile stock, particularly in the south and east, is fairly slow (about fifteen years). Greater attention should focus on diesel vehicles and those with small cubic capacity (more numerous in the Mediterranean than in northern Europe), the supervision of used vehicles (also more numerous in the basin countries), and the harmonization of speed limits. The wider use of gas engines (LPG) would be an interesting contribution to the reduction of pollution. **Specific regulations fixed at the national level on automobile traffic are essential in congested agglomerations.** Collaboration on trucks would be useful.

84. **Railways play a modest role among means of transport in the Mediterranean.** Although the share of passengers transported is steady and even growing, that of merchandise is declining (about 20-30% of total goods transported compared to 40% twenty years ago) because of competition from road haulage. There is no longer any prospect of extending the network. However, **better interconnections** and crossing points (Sicily, for example, linked by a 3.3 km bridge) could make a considerable difference. Bridging the **Strait of Gibraltar** by a road or rail link is an open-ended issue, and a positive decision on this matter would have a clear impact. Finally, the railway could be used more for interurban services. Generally speaking, it is the **means of transport least damaging to the environment.**

85. **Air transport** will continue to expand vigorously in the region, with a **high growth rate** at least up to 2000. It will form a more active **intra-Mediterranean mesh**, less dependent on off-centre gateways such as Paris, Madrid, Geneva, Frankfurt, Zurich, etc. Air transport will be increasingly associated with tourism, particularly mass tourism (tour operators).

Some **new airports** will be constructed with, hopefully, more precautions as regards the **coastal strip**. On land the protection of surrounding areas will depend especially on the **control of urbanization** by local authorities. Aviation technology could be **transformed** after 2000. In any event, it has, over the past fifteen years, made progress in lowering energy consumption and noise.

The problem of **air corridors** and the **risk of congestion** over airports must be carefully examined by the **national civil and military authorities**: it also requires **Mediterranean collaboration**, especially because the **air network** will be decisive in the creation of a **new Mediterranean geography** and the process of bringing Mediterranean countries, regions and cities closer together.

4. THE EVOLUTION OF MEDITERRANEAN ENVIRONMENTS

I. THE PROTECTIVE FOREST

86. The most important role of the Mediterranean forest is to **protect the soil, increase and stabilize water resources, and conserve endemic plant and animal species**. The next half-century will be decisive for the maintenance, protection or survival of some forests, subject to **formidable pressure**, particularly in North Africa and the east of the basin. The **evolution** of the Mediterranean forest tends towards **degraded forms** on account of the **pressure** (overgrazing, excessive removal of fuelwood, fires, clearing, disease, etc.) being exerted on the various kinds of stand. To combat these trends, **protective** (management) or **rehabilitation** (retimbering, planting) **action** will have to be taken.

87. Currently, the main pressures in the south and east of the basin come from **overgrazing** and **excessive removal of fuelwood**, while fires are increasingly prevalent and disease is not negligible. The main pressure in the north is from fires, more or less related to excessive numbers of tourists or to leisure activities, and abandonment by the rural population (lack of upkeep and supervision of stands). In the parts closest to heavy urban and industrial concentrations, with intense automobile traffic, the phenomena of **tree degradation** associated with **acid rain** are **appearing**, similar to those affecting Europe. It must regrettably be observed that **tree disease** (whose mechanisms are still poorly understood) are **growing** in both extent and gravity in the Mediterranean countries. This threat could become a major one in the years to come.

87. If these trends continue, current or planned retimbering or planting policies will be very **insufficient**:

- in the **southern and eastern** countries, Mediterranean stands will be **reduced by a quarter**, even a half, in the worst case, by 2025. In Tunisia, for example, all unmanaged forest will disappear.

- in the countries **north** of the basin, Mediterranean forests suffer to such an extent from fires that plantings are already insufficient to compensate for losses, whereas agricultural wasteland is expanding.

Even with patterns of development that are more concerned about **conservation** in general, and protecting the forest capital in particular, a halt to the decline would not be observed either in the north or the south and east until some twenty years after the introduction of relevant policies, i.e. well after 2000, assuming a **considerable and prolonged effort** on the part of the countries concerned.

89. If the first positive results of this effort are to be obtained **before 2025**, with an effect on **adverse trends**, and if an **increase in irreversible situations** is to be avoided locally, this action will have to be taken immediately, as time is short and **negative trends are gaining ground**.

Forest research will have to be **better integrated** into planning processes (with an improvement, inter alia, of links between research and applications), with a view to **strengthening the role of the forest in rural development**. It is no less urgent - and no doubt more difficult - to **change attitudes radically** through information, extension services, or persuasion (political decision-makers, forest officials, coastal populations, the media, etc.).

90. Despite a time lag between the northern countries and those south and east of the basin, the very **existence of woodland in coastal regions** and areas with a **strong human concentration** is threatened by trampling, degradation, fire, pollution, and disease, and by abuse of man-made creations (artificial plantings, dune stabilization, green spaces, urban parks, etc.) which are generally replacing areas which were once naturally wooded. One of the few effective and lasting **means of defending** areas to be preserved regardless would be to turn them into national estates managed by specialized bodies.

91. In the hinterlands of the countries south and east of the basin **management conditions** are far from optimal and need to be improved. The biomass balance of the forest could be improved by **reducing the removal of fuelwood** (improved efficiency of cooking and heating implements, supply of sustainable fuels, planting of fast-growing fuelwood trees near villages) and by **improving the fodder "system"** (fodder trees, improved grazing land supplemented by artificial feed, etc.). **Jobs** could be created in this sector - even a civil service - linked to work beneficial to ecosystems, and local communities could be reimbursed for some of the direct or indirect benefits obtained from the forest in downstream areas, even far away. In these hinterlands, the **stakes in the forest are considerable**, for their future depends to a large extent on its evolution. Responsible authorities would gain in encouraging new forms of co-operation with local people to protect endemic forests from overgrazing. The setting up of **biosphere reserves** could further this action.

92. In the countries **north** of the basin, lasting protection of the forest, beyond **fire control**, would be achieved by way of the study of diseases and of the prospects for autochthonous species. Care must also be taken as to the way in which production, leisure and landscape protection functions will be incorporated.

93. Finally, forest protection can facilitate **conservation of the genetic heritage** of the particularly rich Mediterranean flora. In this vein, the planting of foreign species where

endemic ones are economically viable should be avoided. In both the north and the south, action could focus on the establishment of protected areas for endemic species and of appropriately managed and protected conservation areas (species banks, conservations, etc.)

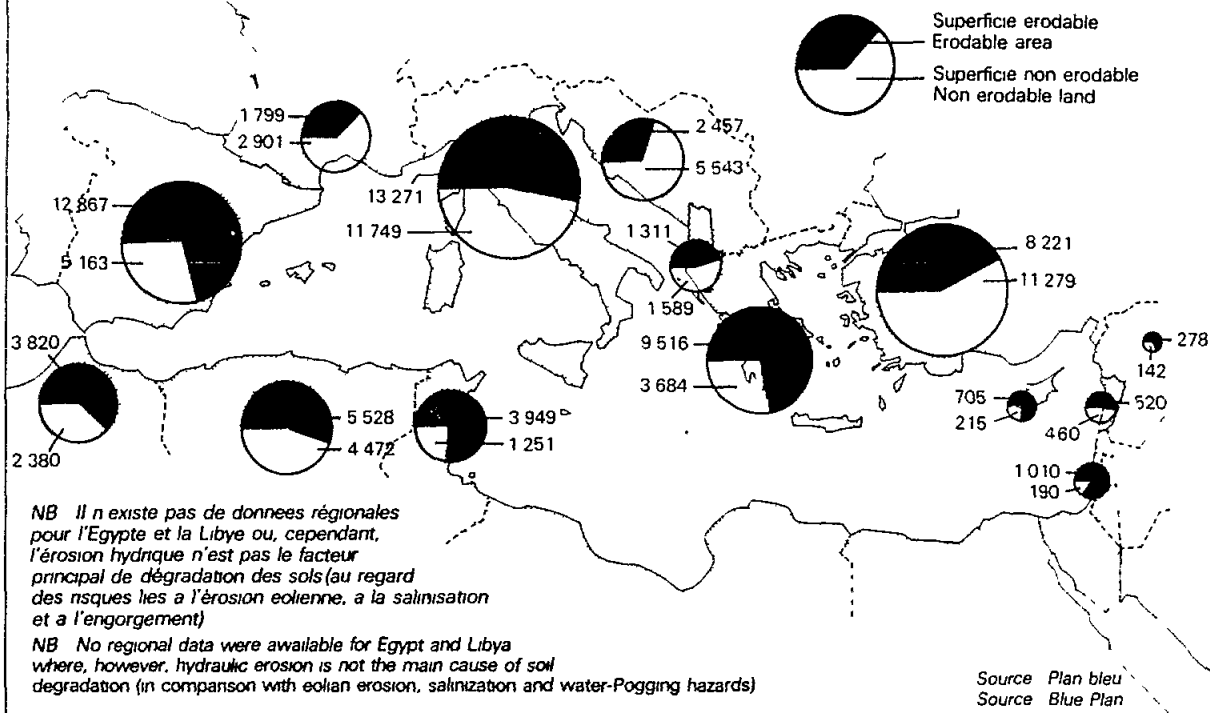
II. THE THREATENED SOIL

94. The prospective study on land surface covered by human activity other than agriculture indicated that the strongest pressures will continue to be exerted by urbanization and the development of road and motorway networks (average comparable coverage in the region of 70,000 km² for each activity in 2025 for the basin as a whole). Although figures are not really excessive compared to the size of national territories, the impact becomes much more noticeable if it occurs to the detriment of agricultural land or in the limited and desirable areas in coastal regions (and a fortiori in the case of a combination of both).

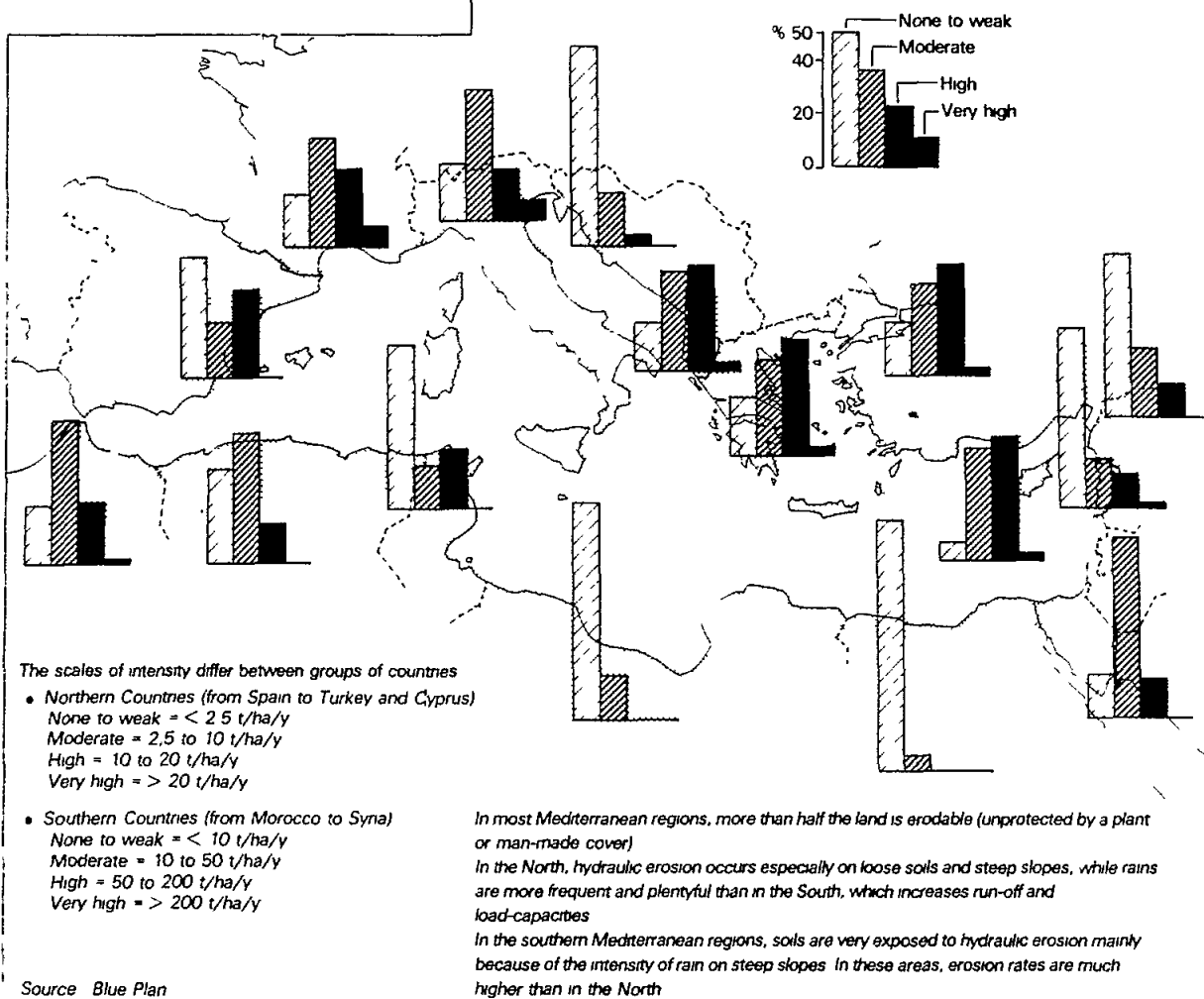
95. As regards the impacts of agricultural activities, soil erosion (through run-off water in particular), desertification and salinization of irrigated land leads to loss of productive soil, starting with those lying on the surface, naturally richer in organic materials.

96. In the Mediterranean regions (in this case the watersheds), surfaces "protected" from water and wind erosion by plant cover currently vary according to the country from about 20% to more than 60%. However, the extension of "serious" erosion (from 5t/ha/yr to more than 50t/ha/yr) in agricultural and other land (mainly forest and grazing land) is a reality in all the Mediterranean countries (in particular Greece, Turkey, Algeria, Israel, etc.). In 1980, 35% farmland in the Mediterranean (watersheds) in fact lost from 5 to 50t/ha/yr, giving an estimated annual loss of "productive" sediment of around 300 million tonnes per year from agricultural land alone (arable land, temporary crops, gardens, vines, fallow, etc.). It should be stressed, moreover, that the annual loss figures conceal the fact that in the Mediterranean climate losses are most often concentrated over a few months, at the time of heavy rainfall, which requires appropriate control methods (steps, terrases, etc.). Soil erosion causes the silting up of downstream reservoirs and dams. The life span of these installations, usually estimated at around fifty to one hundred years, is increasingly likely to be shortened in regions experiencing heavy general soil erosion (Italy, Turkey, Greece, Spain, the Maghreb countries), thus reducing the volume of water reserves in the absence of watershed management. Silt retention in dams deprives some coastal zones (deltas, beaches) of the sediment inputs needed to maintain them and subjects them to increased erosion. Conversely, sediment reaching the sea worsens coastal pollution as it provides an ideal medium for many organic and inorganic pollutants which contaminate the host environment

LES TERRES ÉRODABLES DANS LE BASSIN VERSANT MÉDITERRANÉEN EN 1980 (en milliers d'ha)
ERODABLE LAND IN THE MEDITERRANEAN WATERSHED (in thousands ha)



INTENSITY OF HYDRAULIC EROSION OF SOIL IN THE MEDITERRANEAN WATERSHED (as % of total watershed area)



(river beds, water intake for agriculture and urban supply, deltas, estuaries and coastal zones).

97. As regards **irrigation**, its **negative effects** stem from the fact that many kinds of soil, **potentially fragile and unstable**, have a **poorly known or limited capacity to absorb the inputs** related to agricultural intensification (especially in the countries south and east of the basin). If this capacity is exceeded, i.e. in the case of inadequate mastery of drainage and irrigation techniques, the phenomena of salinization, waterlogging or alkalization of irrigated land and irrigation water lead to **productivity losses**, then **gradual soil sterilization** which may, moreover, occur quickly, in a span of 5 to 15 years.

The **salinization** of irrigated Mediterranean land currently exceeds 30% in some countries (such as Greece, or the Nile Valley in Egypt) and goes up to 50% in the Euphrates Valley in Syria.

98. The **future trends** of these factors depend on **development patterns**, via the interplay of **complex linkages** between agricultural development and its **impact on the soil**. The following aspects will be decisive in this respect:

- **investment**, reflecting both agricultural development policies and social choices,
- options as to **farming practices**, reflecting production objectives,
- the kind of **techniques used** (improvement and application).

With respect mainly to the countries south and east of the basin (not excluding the differences between these two regions):

- **Economic development with slow growth**, accompanied by **extensive agriculture** up to 2025 will entail a "**wastage**" of agricultural land and the **accelerated degradation** of marginal land brought under cultivation. Eroded land and the fertile layer removed could increase considerably.

- **Economic development with strong growth**, but **unconcerned about conservation** will produce an **even greater "wastage"** of soil and water resources (particularly for the southern countries), and also a squandering of the **industrial inputs** used for intensifying agricultural production. It could **endanger the future of agriculture** in some North African or Near-Eastern countries. **Erosion** and the sediment removed would also increase **substantially**, although following a different pattern from the previous scenario.

- **Strong and conservation-minded economic growth** based on Mediterranean co-operation and serious education and guidance efforts, combined with the search for efficiency in farming practices, would result in **less pressure** on the soil (on account of the abandonment of the most marginal land), supplemented by effective control of degradation factors. **Erosion** and the volume of soil removed would **decrease**, comparatively speaking, without **disappearing** completely.

99. **Whatever the scenario the erosion of Mediterranean soil and inability to check its processes** clearly seems to be one of the most worrying threats. Soil policy implies both **rapid and very long-term action**, along with the **mobilization of considerable resources**.

Experiences are very different. An initial prerequisite would be to prepare an inventory for all those concerned (problem of communication...) and **analyse the reasons for success or failure**, related either to the characteristics to the soil itself or to neglect of the socio-cultural aspects of the problem, tackled from a purely technical viewpoint.

Necessary agricultural intensification should take in account, from the outset, **control techniques for combating potential erosion** in the case of dry farming in the Mediterranean climate (cereal/alfalfa rotation patterns, replacing deep mechanical ploughing with surface ploughing), and the **risk of salinization** in the case of irrigated farming (with improvement and maintaining of adequate drainage networks). The **water retention capacity** of some soils with a **calcareous crust** could be improved by encouraging deep scarification and the introduction of species with deep roots to break up the soil below surface ploughing.

For **mountainous regions**, countries could give higher priority to **soil maintenance** by adopting measures to **combat overgrazing and deforestation**. On the slopes, they could foster the maintaining or repair of the traditional steps and terrasses (stabilizing elements). Abandoned and eroded agricultural land on steep slopes could be gradually converted into **fuelwood forests**. In the northern hinterlands local authorities and forest officials could join forces to ensure suitable management of abandoned rural areas, including through **preventive afforestation and the timbering of agricultural wasteland**.

III. THE WATER CONSTRAINT

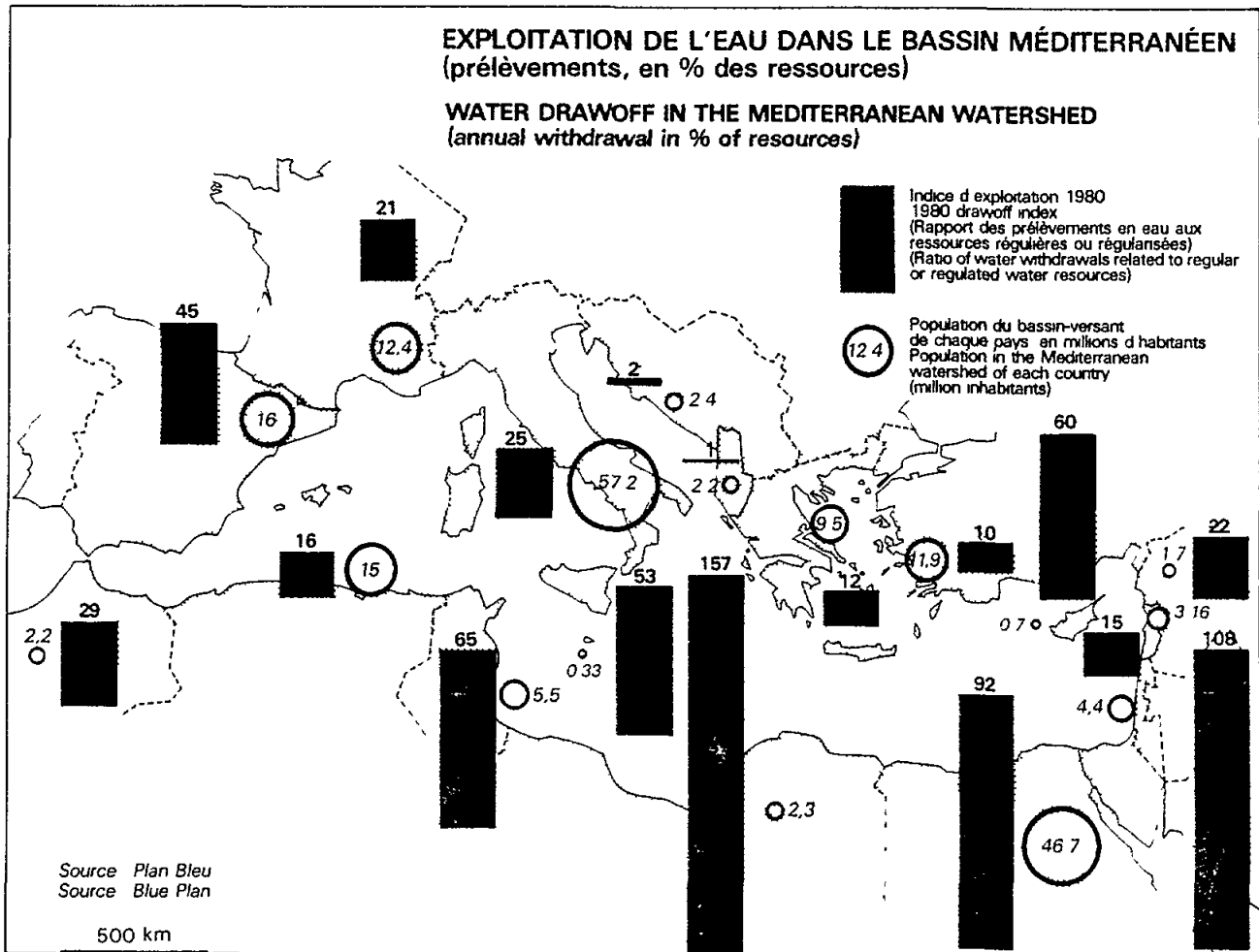
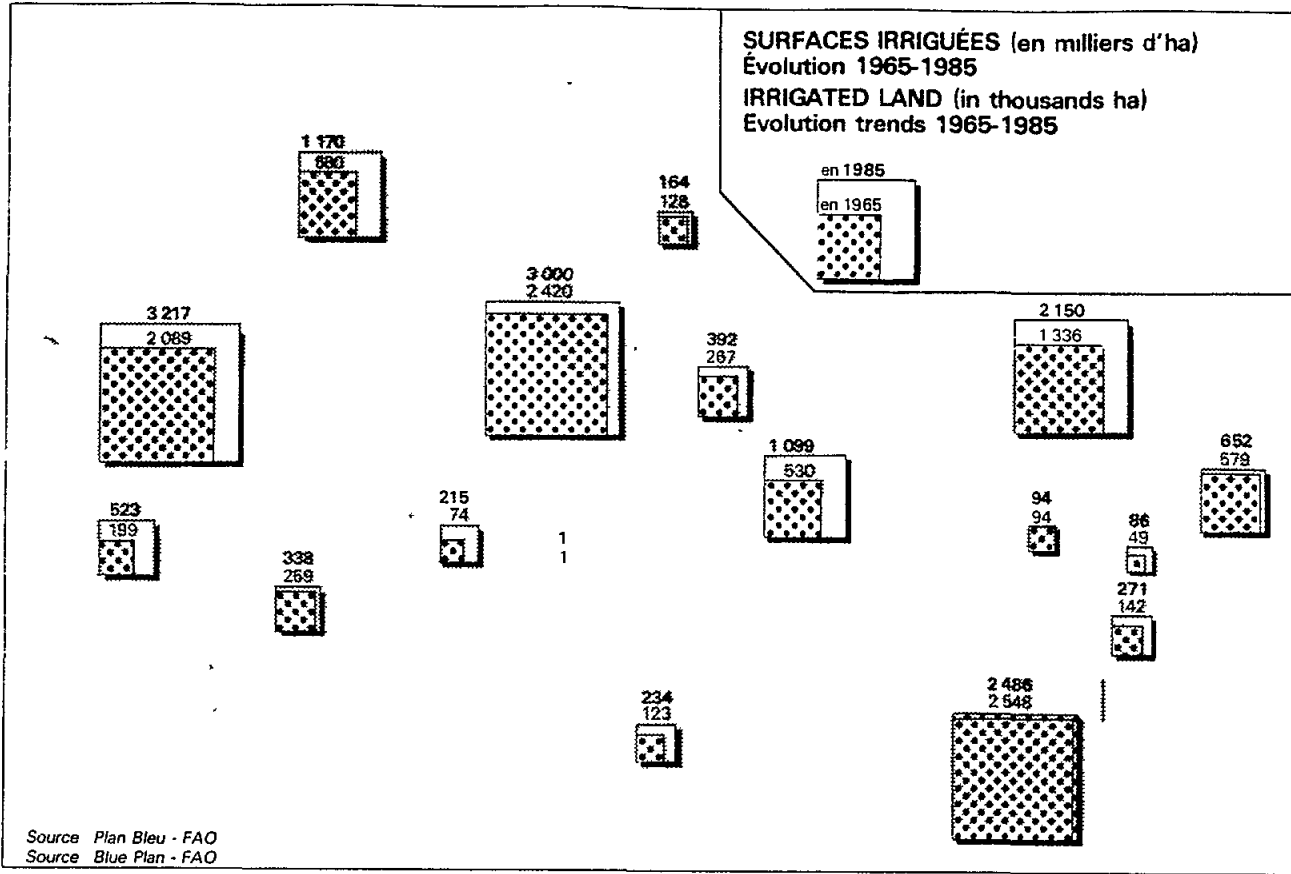
100. As much as 80% of water used in some countries is devoted to agricultural development. Water appears as **one of the main factors limiting agricultural development** in the south and east of the Mediterranean basin, particularly in the 2000-2025 period.

101. In the Mediterranean countries, irrigated areas currently cover more than 16 million hectares and have increased over the past fifteen years at an average rate of 200,000 hectares per year, entailing additional water requirements in the order to 2,000 million m³ per year. Studies show that in whatever the development pattern, in addition to a necessary and particularly difficult choice to be made between agricultural and urban needs, irrigation techniques will have to be improved (geared to greater water saving) and in some countries recycling, after treatment, urban sewage or agricultural effluent will also have to be introduced. This will present tough investment problems, entailing high running-costs, as agriculture will have to change its production structure to some extent to justify high utilization costs. Surface areas under irrigation could possibly be increased in the north (from Spain to Greece) from 3.8 million to 4 million hectares by 2025 (at an estimated cost in the region of US \$70,000 million (1985 \$)), entailing additional water requirements in the order of 38,000 million to 40,000 m³ per year. To the east and south of the basin (from Turkey - which has a large potential for increase - to Morocco), the extension of areas under irrigation could reach about 7 million hectares (of which 2.5 million in Turkey) by 2025, at a cost exceeding US \$140,000 million (1985 \$) and corresponding to an additional 70,000 million m³ of water per year. In fact, in all cases water needs could and should be reduced by more economical use of water. In the southern and eastern countries, these measures could save more than 30% of the water used.

102. In addition to their use in agriculture or energy (hydro-electricity production), dams also play a part in stabilizing runoffs and protecting against floods. This rule will increase the growing irregularity of the climate, the increasingly devastating effects of floods (aggravated by erosion which itself is growing), and the extension of some cities into flat plains or basins.

Unfortunately, whatever their purpose, dams tend to silt up increasingly quickly, requiring expensive extra height. Silting up seems to be even faster in hillside lakes (small and medium-scale hydraulic installations).

103. Between 1985 and 2025, urban water consumption in the countries north of the basin would increase by between 40% and 60%, but in the countries south and east of the basin it would be multiplied by a factor of 3.7 to 4. It is clear that whatever the development scenario, the supply of drinking water to urban areas will be one of the most critical problems in those countries, if only because of the volume of investment required.



Un fort indice d'exploitation des ressources en eau nécessite le recours à des ressources non conventionnelles : nappes fossiles non renouvelées, recyclage d'eaux usées, multiples utilisations de l'eau, réduction des pertes, dessalement de l'eau de mer.
A high water drawoff index calls for utilization of non conventional resources : non renewable fossile resources, recycling of used water, multiple water uses, reduction of losses and seawater desalination.

104. A distinction can be made between the effects of the various development patterns on the use of water resources:

- With slow growth, affecting water through lower demand, but also a delay in installations, the total pressure on water would be weaker and pollution would be concentrated first of all on the urbanized coastline. Choices would be made to the detriment of agriculture and the advantage of cities, which nevertheless, in some countries, would not be able to benefit from a widespread water supply. Water quality would deteriorate and commercial water would be treated in particular, i.e. for consumers able to pay a high price before use.

- With rapid but poorly controlled growth, demand will be much higher and investment would be concentrated on the mobilization of this resource (upstream of the water "sector"), therefore partly to the detriment of the environment. This will entail conflicts as to use, to the benefit of the most dynamic economic sectors. In other words, increasingly higher prices (the water budget could largely exceed one percent of industrial manufacturing costs) could produce a drop in demand in some sectors or for some social groups. Pollution would be fairly heavy downstream.

- With vigorous, and conservation-minded growth, in a context of international co-operation and special attention to training, uses would be adapted to resources, particularly through the control of wastage, increase in the number of circuits and transfers, and re-use. An effort would also be made to educate the population in this respect, by raising awareness of the cultural value of water. The outcome would naturally be more favourable for the environment, and the overall quality of water would be better, although at the cost of rather expensive downstream treatment.

105. In addition to these sectoral estimates of water requirements, an overall prospective study was undertaken at the level of the Mediterranean regions of the basin countries, and focuses on future drawoffs as compared to available resources. This study led to a division of the coastal countries into three groups:

- the countries where water availability will remain adequate up to 2025 and beyond, and where there is even a fairly comfortable margin for increased per capita drawoffs. This group of countries includes those with low population growth (France, Italy, Yugoslavia) and with stronger population growth (Albania, Turkey, Lebanon). Maintaining this margin will require efforts to develop and manage water, and to preserve appropriate quality;

- countries where water availability, although still adequate at present, will drop considerably (Morocco, Algeria and also Spain and Cyprus). The global demand for water could, in

principle, be met up to 2025 with new **water-resource development** or major interregional water transfers (costly in terms of energy consumption, especially in the case of uneven relief), providing that per capita demand does not increase too much compared to current levels. Countries in which per capita demand increases substantially would then, before 2025, fall into the next category;

- countries where **current availability is already limited** or negligible. As from 2000, resource "exploitation indexes" exceed or already exceed 100%, i.e. **stable resources** are (or would be) used more than once or supplemented with **non-conventional resources** (fossil water, desalination, etc.). There are six such countries in the Mediterranean basin (i.e. one country out of three), including both countries with low population growth (Malta), average growth (Israel, Tunisia), and high growth (Egypt, Syria, Libya).

Aside from resorting to usually expensive non-conventional resources, or to imports (projects exist for importing by ship, which will not go beyond possible cases of temporary crisis), a number of countries would therefore have to reduce per capita consumption by proceeding with obviously difficult choices, for example between agricultural and urban requirements, taking care to establish a suitable price policy.

106. **Water resources** in many Mediterranean countries are naturally restricted by the climate. But for most of them this **constraint** could be overcome by **rational and skillful management**. Solutions for this kind of management are rather well-known and can simplify difficult choices between several competing uses. But **adaptations** will in any event be necessary sooner or later: the sooner they are introduced the less economic growth will occur to the detriment - partly irreversible - of the environment in both the north and the south and east (with naturally varying degrees of intensity). As in the case of soil or forest resources, rapid economic development, neglectful of the environment and resources, may seem less expensive, but only to the extent that these adaptations would be postponed (with increasing costs).

The **hierarchy** of water problems, **motivations** for conserving water in the environment, and the **choice of components** to be preserved will depend on the countries, whether their water is plentiful or scarce, or on their state of economic development. These choices would have to be based on:

- less global and more regional **analyses** and **prospective studies**, extending those of the Blue Plan and drawing from them as regards development prospects;

- **processes of consensus** for adopting **qualitative and quantitative** objectives as regards the conservation levels for aquatic areas to be protected, and the regime and quality of water to be conserved, including for coastal waters.

Options chosen should fit into **water management and protection schemes incorporated into development plans.**

Effective achievements of objectives would imply:

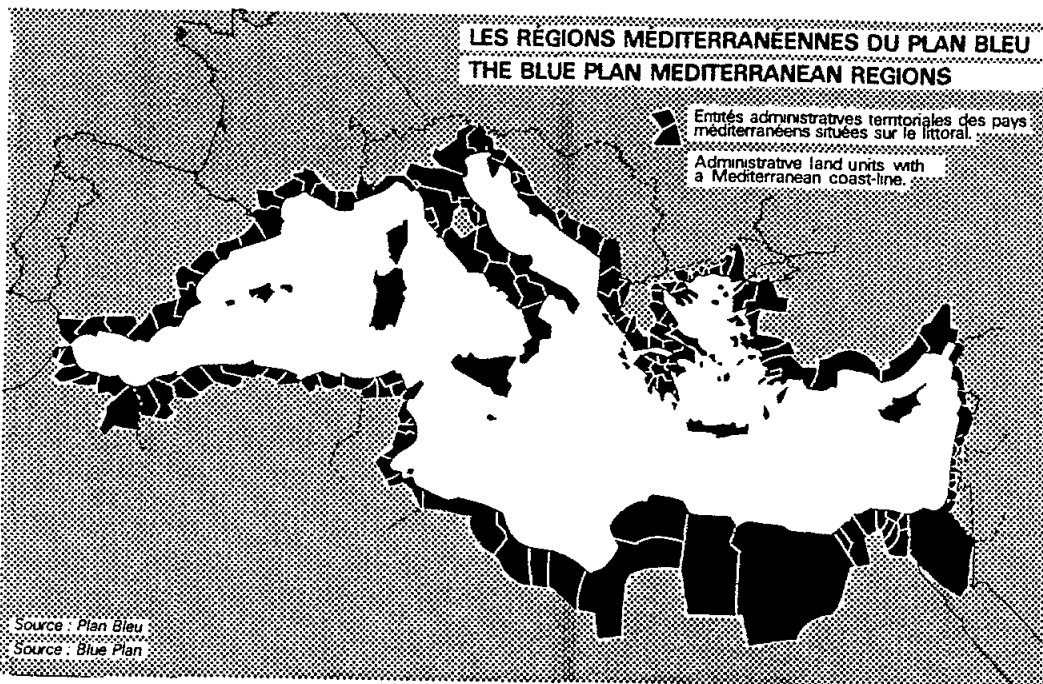
- the setting up of mechanisms to internalize various external effects of water use in the economic decision-making process;
- the establishment of integrated water management authorities (basin agencies, committees), endowed with appropriate legal and financial resources and empowered both to guide and co-ordinate water management and conservation and to intervene as regards uses in general;
- the development of information systems - assessment networks, regular census-taking operations, data banks - working as an "observatory of water resources and uses" for management authorities and the general public.

There is also a need for improving the **technical aspects** of water uses (especially for irrigation) by encouraging **water saving**, especially in countries where resources are scarce, and **developing the treatment and recycling of urban and industrial effluent for agricultural use.**

Finally, as pointed out for the forest and soil, social inertia adds to that of nature, and for results to be significant and lasting, efforts would have to be made, in this case to **change attitudes and behaviour.**

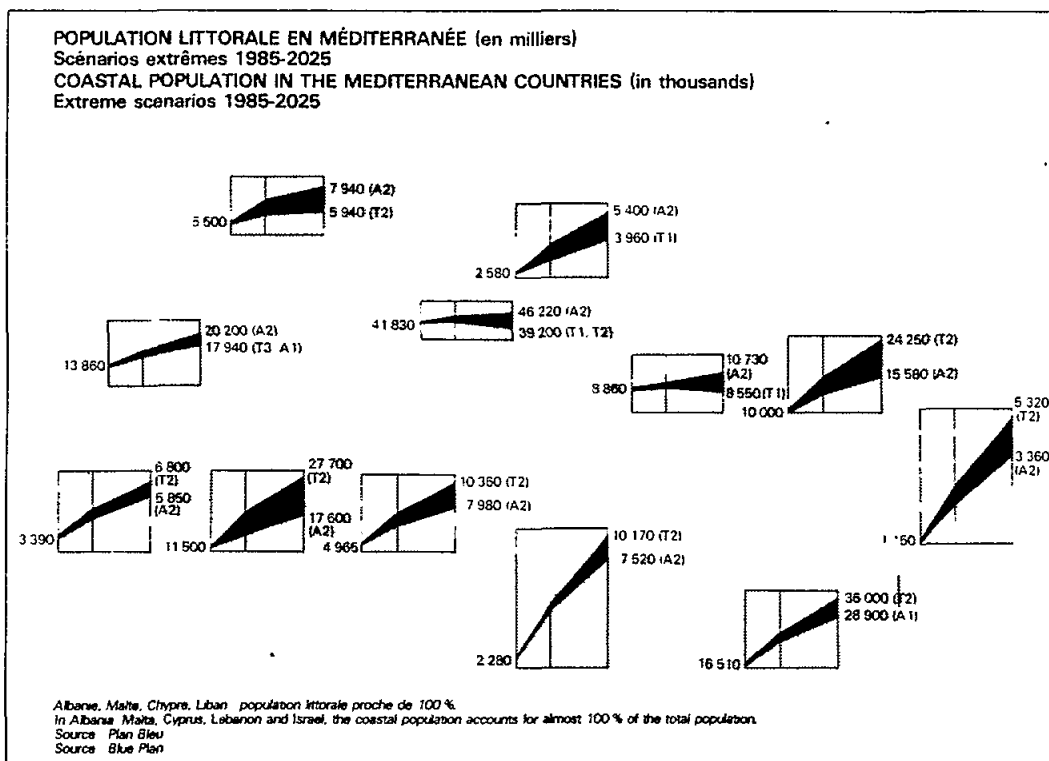
IV. A COVETED COASTLINE

107. The total length of the Mediterranean coastline is estimated at about 46,000 km. The coast in the northern regions, (Spain to Turkey inclusive), some of it very indented and includes many islands, totals nearly 3,000 km. The Mediterranean coasts are often rocky and development potential varies. The "flat", useful coast accounts for only about 40% of the total and, for the southern countries (from Morocco to Syria) to about 4,000 km. Thus all the **demographic and economic developments** will be concentrated on these 4,000 km.



La définition administrative des régions littorales des pays méditerranéens, utilisée par le Plan Bleu, a principalement servi d'assise aux travaux prospectifs régionaux concernant les populations, l'urbanisation, le tourisme et les activités sur le littoral. Les études portant sur l'environnement méditerranéen se sont appuyées etc. (reste inchangé).

The administrative definition of Mediterranean coastal regions, as presented here, provided the main bases for the Blue Plan regional prospective studies related to population, urbanization, tourism and coastal activities. The studies on the Mediterranean environment were based on a broader concept of the administrative Mediterranean « regions, » or else on the topographic and hydrographic borders of the watershed.



108. For the coastal countries as a whole, the total **population of coastal regions** was 133 million in 1985, including an **urban population** of 82 million. The population of coastal areas should reach between 195 million and 217 million in 2025 (an increase of 45-62%), with an urban population numbering between 145 million and 170 million. These figures give an idea of the **dual phenomenon of urbanization and coastal concentration** under way in the Mediterranean basin. Taking the highest figures, 120 million of the 217 million inhabitants on the coast (or 90 million of the 170 million coastal city-dwellers) will live in the countries south and east of the basin.

109. In addition to the pressure of population and urbanization on the coast, that exerted by all kinds of activity has to be considered:

- **tourism**, whose concentration on the coast is virtually unavoidable;
- **industry and energy**, most of whose major installations are already located on the coast, and will increasingly be established there;
- **58 main loading and unloading oil ports**;
- **50 refineries**, plus 11 in the planning stage (in the southern and eastern countries alone);
- **62 thermal power stations** and 32 in the planning stage, without counting all those that will be required by 2025 (100 or 150 on the southern and eastern shores alone);

In other words, already 170 major installations and 43 in the planning state, excluding cement plants, steel works, fertilizer plants, etc.;

- **fisheries and aquaculture** (possibly 1million hectares);
- **ports for coal, cereals, etc.**, together with related industries;
- etc.

110. The **natural areas**, either wild or still intact, are likely to **dwindle** whereas they should be extended; the 70 or so "specially protected areas" currently registered (natural or regional parks, nature reserves, etc.) are not everywhere as protected as they should be and require the vigilance of authorities and public opinion. To ensure more effective protection the surface area under protection should be doubled in ten years. Among the specially fragile zones are notably the wetlands and most of the areas suitable for aquaculture.

111. One of the **major conclusions** of the scenarios is that all these activities will exert **considerable pressure** on the Mediterranean coast, on the landscapes which are the basis of its cultural and tourist reputation, and above all on the **near-shore marine zones**, which are **particularly threatened**, especially because they are the most fragile and also the most important as regards **marine living resources**. In addition to degradation caused by this

physical pressure, there is, of course, all kinds of pollution emitted in the Mediterranean coastal zone, but physical pressure is probably the most serious threat.

112. A warming of the climate by 1.5 to 4.5°C due to the "greenhouse effect" caused by increasing concentrations of exhaust and industrial gases in the atmosphere could produce a rise in the level of the Mediterranean by 40 to 120 cm in the next fifty years. It is estimated that beyond 50 cm the cost of protection measures would become huge and require political choices to decide which zones to protect and which ones to abandon. Especially vulnerable areas would be the low coastal plains and deltas of which there are few in the Mediterranean but whose economic, ecological and human importance is considerable (Ebro, Rhone, Po and the North Adriatic, Thessalonika, Ceyhan in Turkey, the Nile delta and the Tunis region).

113. Particularly vigorous policies are required from states, regions, and local authorities in order to achieve effective protection and avoid destructive coastal concentration; integrated planning, which could be based on the scenario method at the local level seems essential for short-term, or more long-term planning.

This kind of integrated planning requires the co-operation of specialists in very different disciplines related to both economics and ecology, as well as the land and the sea. Examples of this kind of co-operation are few and it is the task of national or local authorities to organize it. At the level of action and management, the situation is even more difficult because of the dispersion, overlapping or lack of administrative responsibility on the land and sea sections of the coastal strip in virtually all countries. New administrative bodies could be set up, as in the case of water resource management: physical planning agencies, coastal committees, etc.

114. Among the actions which seem to be the most urgent or necessary are:

- exchange of experiences (and possibly of projects) for the more effective use of the specific features of different coastal regions, and their complementary aspects;
- the use of modern computerized geographical information techniques, especially geared to processing environmental data;
- an inventory of the areas of the coastal strip most threatened by future development, and the preparation of impact studies for development zones, while identifying as from now areas to be protected at all cost and potential aquaculture zones;
- bringing under protection as quickly as possible in each country, a significant part of the land and marine coastal strip - about one third of its total length - through legislation, purchase (coastal conservatories), agreement with local populations or private owners etc.;

- **efforts**, in the implementation of projects to be established on the coastal strip, to reduce to a **minimum impingement on the near-shore marine area** and to protect marine species in their larval and young stage by **prohibiting certain kinds of fishing in defined zones**;
- establishment of a better linkage or co-ordination between coastal development and that of the **hinterland**, in order to achieve a certain degree of decongestion on the coast;
- a deliberate option, when making choices, for **flexibility in a number of installations**, facilitating subsequent **adaptation to changing situations and prospective management**.

It should be recognized that **regulatory and legal action** alone is likely to be ineffective in the longer term to protect the coast and that it should be **accompanied** by deliberate intervention in **economic mechanisms** (price formation), notably in those of the **property market**. This implies setting up **agencies** able to define the development objectives of specific zones within the context of **regional and national** development scenarios, duly endowed with **means of implementation**.

V. THE COMMON SEA

115. In addition to the study of **pollution in the high seas**, most of the data gathered by the MEDPOL programme within the framework of the Mediterranean Action Plan concern **coastal waters**, which induced the Blue Plan to concentrate more on the **interactions between activities on the coast and the coastal sea**. In any event, the scenarios confirmed the close links between the state of the Mediterranean Sea, the development of coastal regions and Mediterranean watersheds (and "airsheds") and, beyond that, **national development strategies and environment policies** of the countries as a whole. Negative effects can be assessed: erosion, salinity, excessive use of chemical inputs. The relationships between economic activities and the state of the sea should be studied more thoroughly from the viewpoint of atmospheric pollution for, in the current state of knowledge, environmental meteorology, in this respect, provides assessments that are not detailed enough for a prospective study.

116. All **development patterns** that neglect the environment lead to a **direct and indirect worsening** of the state of the Mediterranean Sea depending on the scenarios. Either **economic growth** is comparatively weak, but with stronger population pressure which reaches its maximum, or economic growth is vigorous but with insufficient attention paid to protection of the Mediterranean environment. The kinds of **development concerned about the environment** correct or even reverse these trends, but sometimes at a **high cost**, justified however by the gravity of these threats and awareness of it. **Efforts** undertaken to combat urban and industrial pollution start to bear fruit in some countries, but are still uneven.

117. In the case of **well-balanced growth** (with 150 million inhabitants on the coast in 2025) the **rate of connection to urban sewage systems** would be in the region of 80% in the countries north of the basin, and 70% on average in the countries in the south and east. In the case of **slow growth** (with 175 million inhabitants on the coast), the rate of connection in the southern and eastern countries would not exceed 45% on average. The volume of waste would be larger in the case of controlled growth, but **domestic pollution** would be from 20% to 30% lower (more connections, but also more treatment).

118. The **strong growth of fertilizer consumption** is likely to lead to a **severe increase in discharges of nitrogen and phosphorous** into the sea : a factor in the order to 3 in the case of slow growth, and a little over 2 in the case of strong and controlled growth, through the introduction of efficient techniques for the management of fertilizer application and also for the control of sediment removal (within the context of erosion control). In 1980, the countries contributing the most sediment (all categories combined) to the Mediterranean Sea were Italy (more than 400 million tonnes per year), Turkey (nearly 300 million tonnes), Greece (more than 200 million tonnes), Spain (nearly 120 million tonnes) then Tunisia and Algeria (a little over 50 million tonnes each), with depending on the case, 10-20% of this sediment coming from agricultural land (up to 30% for Greece and 40% for Algeria). Whereas the kinds of development that neglect the environment will witness a growth in these percentages (especially in the case of slow growth, with the gradual spread of farming to fragile marginal land, sensitive to erosion), only the kinds of development concerned about conservation of the environment and resources could bring about a decrease.

119. **Industrial activities** on the coast are a serious and growing threat, perhaps less for major installations whose emissions can be more easily controlled than for the **small and medium-sized plants** which could proliferate on the coast. Only the vigorous **regulation** of plant location (prior equipment of economic activity zones), **preventive treatment** and the systematic use of **less polluting processes**, ("clean" technologies,) would make it possible to combat the exponential growth of **diffuse** forms of pollution and save water at the same time.

120. **Pollution associated with maritime oil transport** should barely increase - since overall traffic would not grow much - but a decrease in the short- and medium-term is **not expected** because of delays in renewing fleets and lack of **installations on land** (which would prevent compliance of the MARPOL 1973/1978 stipulations concerning oil spills in the Mediterranean). It is assumed that environmentally-minded types of development will speed up construction of this kind of installation. Aside from oil, the **risk of accidental pollution from chemical products** in particular will rise most in the case of strong economic growth

(with increased trade), and less in the kinds of development with stringent environmental protection regulations.

One problem linked to **growing electrification** and the location of **thermal power stations on the coast** is that of **thermal waste**. These stations will create localized **high temperature zones** which affect **wildlife** and **plant life** (whose sensitivity to temperature in the Mediterranean is well known). Co-ordination at the regional level is required.

121. Finally, it should be recalled that **most of the threats to the coast** have repercussions on the sea : in addition to the effects already mentioned, the impact on **choice reproduction zones for living resources** must be stressed. This threat to the reproduction of species, aggravated by over-fishing in some kinds of development and by degradation of the marine environment from land-based pollution, justifies the most stringent environmental protection policies combined with a **development based on the conservation** of the environment and resources.

122. The sea is the **common property and natural link** among all the Mediterranean coastal countries. Clearly threats are most serious on the **coastal strip** which falls under the **jurisdiction of each country**. However there is a **continuity between the coastal sea and the high seas**. **Pollution does not recognize the limits of territorial waters**. This is why the outcome of the various Blue Plan scenarios must be observed on the sea itself.

Clearly there is **no question here of adding to the guidelines for action concerning protection of the Mediterranean Sea** which, over the past twelve years, have been formulated, discussed and decided upon by the various organs of the **Mediterranean Action Plan**.

Following the Blue Plan work, it seems however that the studies, and the decisions that are drawn from them, would benefit from being set squarely in the **more general context of the economic and social development** of the coastal countries and of the environmental policies incorporated in their national plans. Protection of the sea starts with protection of the coast; as it has been repeatedly stressed, all environments are found on the coast and all human activities are carried out there. But environmental trends on the coast depend on environmental trends in the hinterland (forest, watersheds, etc.), and sectoral activities depend on the general economic level. Although it is true that land-based pollution is the biggest threat to the Mediterranean Sea, the complex application of the relevant protocol, the time spans involved for its effective implementation by all countries in all its aspects, suggest that **this application should be closely correlated with the overall prospects for economic development and environment** in the coastal states, either at the level of the basin as a whole, or at the level of particular areas concerning one or several countries.

It is clear that the state of sea pollution will depend on the effective application of all the international conventions and protocols intended to avoid or reduce pollution, whether from land-based inputs, hydrocarbons, transport, or the maritime transport of hazardous substances. International monitoring of maritime "corridors" is in particular essential to avoid clandestine degassing operations and ensure safety. However, habits and practices will clearly be formed at the level of the countries, together with the setting up of installations enabling the more or less effective application of international agreements. Thus, the fate of the sea is determined on land in minds and wills.

At the national level alos many local or lesser measures can be taken, which will primarily affect the coastal environment, but which ultimately will affect the state of the whole sea. Control of any form of pollution which destroy the marine biomass and of any excessive aggression of the marine environment by the dumping of non-biodegradable substances or by the destruction of the seabed should form part of an ethical attitude as regards the marine environment which still runs counter to age-old habits.

5. FROM THE NATIONAL LEVEL TO THE MEDITERRANEAN LEVEL :
SUGGESTIONS FOR CO-OPERATION

I. THE STRUGGLE FOR THE ENVIRONMENT WILL TAKE PLACE ABOVE ALL AT THE NATIONAL LEVEL

123. The hypotheses of the Blue Plan studies took into account, for the "alternative" scenarios, a consolidated policy of environmental protection and, especially, an improvement in its incorporation into development or physical planning policies.

However, the work also highlighted the fact that, even in the case of the "trend" scenarios, reference to policies followed over the years did not reflect reality in many respects, because the effective application of government decisions was far removed from the intentions expressed or laws passed.

124. In this respect the biggest discrepancies lie in the following areas:

a. **Control of urbanization:** the will to direct or curb urbanization through urban planning, land-use planning or guidelines on coastal development is sometimes thwarted or deflected by decentralization of the competent authorities. Lack of supervision and numerous "dispensations" have been observed as regards housing or tourism. Reality scarcely corresponds to the expressed intention to create protected areas or to shield some zones from urban encroachment. The coast in particular is increasingly subject to the pressure of vested interests. In 20 years nearly 2000 km of coastline have been sacrificed in this way, although this was not the intention at the national level.

b. **Supervision of productive or transport activities:** monitoring of industrial plants and disciplines as regards maritime transport do not comply with the relevant requirements. Planning and strategies concerning industrial waste are clearly inadequate, and its destruction, storage or transport are often a hazard. There is also a discrepancy between stipulations and practice as regards the monitoring of degassing operations on ships in transit.

c. **Waste-water treatment stations:** The level of land-based pollution requires adequate measures. And yet, aside from the major rivers, there is little evidence of real progress. On the coast, waste water depollution rates are rarely available, but do not exceed 15% on average. Many treatment plants are not in a suitable operating condition.

Nevertheless, despite the discrepancy between intentions expressed or programmes adopted and the reality of environmental practices, the Blue Plan studies show that decisions on the bulk of environmental protection will be made, or not, largely at the level of the state. Essential legislation and standards will have to be established at this level, as well as the

necessary mechanisms and institutions with the financing and competence to apply them (based for example on the "polluter pays" principle). The heterogeneity of geographical, socio-economic or cultural situations leads in the same direction: only states can stipulate and implement a suitable policy within their borders.

125. The intensification of efforts currently under way (trend scenarios), and even more the strengthening of environmental policy (alternative scenarios), implies a change of direction and a more goal-oriented action focusing in particular on:

- the strengthening of physical planning and programmes and, if necessary, the formulation and publication of "national and regional environmental protection plans" with deadlines set for objectives;
- the application of an approach by "scenario" for the establishment of coastal "charters", including the active participation of local institutions, socio-professional organizations and the population;
- the study of employment policies for young people and the contribution that could be made in this respect by taking into account the objectives of environmental protection and the more effective economic use of natural resources;
- the training of environmental experts able to ensure the link between scientific research, supervision or regulations, and the implementation of new development activities;
- raising the awareness of elected representatives and the officials of local authorities and national agencies working in the area of development or physical planning as regards environmental issues.

Without greater awareness on the part of the public about the interactions between, on the one hand, the environment and natural resources and, on the other, individual and collective activity; it will be futile to expect a rapid and smooth evolution towards satisfactory forms of sustainable development in the Mediterranean basin as a whole. More systematic and consistent efforts would therefore have to be undertaken to:

- develop general education concerning the Mediterranean environment with the help of teaching materials focusing on the realities and problems of the region;

- disseminate objective and serious **information** to the public about the possibilities and constraints of the local and regional environment in which they live, directed at various age groups and stressing the fact that one generation takes over from another;
- encourage national and local **associations** for environmental protection and landscape conservation, underscoring in particular tangible action and evidence of results.

II. BROAD FIELDS ARE OPEN TO MEDITERRANEAN CO-OPERATION

126. The **prospective study** on the Mediterranean basin could only be initiated with the **agreement** of all the coastal states concerned, anxious not to be overtaken by their fate and the passing years as regards **development and the environment**, and no doubt also the role of their region in the world. In turn, this last part of this report is devoted to this **co-operation between coastal countries**, starting with issues likely to emerge, or become more pronounced, in the near future. In accordance with the **original intentions of the Blue Plan**, some **suggestions for intra-Mediterranean action**, identified in the light of the scenarios and the accompanying studies, are therefore submitted to **decision-makers**, so they can assess their suitability for implementation. This could be based on **multilateral or bilateral co-operation**, on the establishment of **exchange networks**, on **joint projects** or on the development of **solidarity**.

A. THE PROGRESS ON KNOWLEDGE

127. Concerning **data and statistics**, it must be recognized that in the Mediterranean collecting and measuring mechanisms still provide a very **inadequate** basis for projections, analyses and **choices**. The statistics supplied by international organizations, which divide up this part of the world somewhat artificially into Africa, Western Asia and Europe are limited. Entire areas **elude** analysis, or are documented by **unreliable data**. This is the case, to take just a few examples, of data on relationships between air and sea pollution, endangered species, the quality of surface water and groundwater, domestic and even international tourism by coastal region, etc.

The establishment of some **fifty series** of comparable socio-economic statistics and a number of **key indicators on the quality of the environment** would be useful. The places where **environmental data** are gathered and processed should be better identified and their efficiency and accessibility improved. **Networks** accessible to each coastal country could also be established based on specialized, but well-connected, **data banks**.

In addition, experience has shown how difficult it was for a number of countries to obtain data concerning the **Mediterranean regions** as such and the **coastline**. The harmonization of statistical data gathering according to administrative districts, or appropriate spatial divisions (e.g. by watershed) could be the subject of **collaboration among countries** and would be of **great help for future work**.

The development of **new techniques** could facilitate or partly modify the measuring, gathering and processing of data and their presentation (automatic cartography, for instance). **Remote sensing** will contribute significantly to renewing **monitoring techniques** for plant life, the soil, the climate, the coastal strip and urbanization. Intra-Mediterranean co-operation for **monitoring by "ecozones"** with the setting up of pluridisciplinary teams, would make it possible to develop links, still very inadequate, between the production of basic images and the users, on the basis, for example, of the joint interpretation of some **illustrative coastal sites***, especially where monitoring networks have already been established.

As regards **basic and applied research**, the countries could identify gaps which exist between scientific knowledge and decision-making or practical application. Thus **environmental meteorology**, the study of **complex, multi-purpose ecological systems**, the clinical study of **plant diseases**, the rehabilitation of degraded ecological systems, the recycling of water resources, the application to agriculture of **genetic discoveries concerning conservation or selection**, etc., could be useful to all Mediterranean people. Without an active policy for the **intra-Mediterranean dissemination of knowledge**, the gaps are likely to widen between countries in, for example, the application of **bio-technology** to agriculture. The Blue Plan would have liked to have been able to give **more consideration** to the question of **new technologies** and their future role in the search for patterns of development that have more regard for the environment.

In this respect, the Blue Plan work also lacked a study of **perception and behaviour**, especially trends in demands and needs. Some existing **social prospective studies** (use of leisure time, food consumption, environmental awareness, etc.) showed that the forecasting exercises needed a social prospective, closely linked to **culture**. The establishment of a **network**, notably in the **academic context**, enabling the exploitation throughout the Mediterranean, of studies and research undertaken, could improve the situation.

* Portugal has carried out this work for the whole of its national territory with the assistance of the European Communities : the cost was approximately one million dollars.

B. CO-OPERATION ON MANAGEMENT AND THE ENVIRONMENT

128. **Concerted action** among Mediterranean states could, in this case, speed up the **strengthening of environmental policies** and especially their **incorporation into development policies**.

Some forms of co-operation could be based on **existing structures** : this is the case, for instance, of the General Fisheries Council of the Mediterranean, for fisheries, or of "Silva Mediterranea" for the forest; other structures remain to be **established** in areas where exchanges are still at a very low level. In this respect, the formation, on a formal or informal basis, of exchange and co-operation networks is quicker and more effective than **establishing new institutions**.

The **Genoa Declaration (1985)** foreshadowed this kind of linkage for example by proposing the identification of **100 historic sites** of Mediterranean interest, which were adopted in 1987, or **50 new protected natural sites** on the coast. Those responsible for them are expected to exchange experiences within the context of MAP. Similarly, managers of the "biosphere reserves" meet within the framework of Unesco's MAB Programme. The MEDPOL programme, which links about one hundred research and analysis laboratories, and the Priority Actions Programme, which gathers together specialists on specific subjects, operate in the same way.

A better idea of requirements can be obtained by specifically reviewing the main **possible areas of Mediterranean co-operation**:

1. Co-operation on spatial management

129. **Coastal management** For reasons that were clearly stressed by the Blue Plan, **development of the Mediterranean coast - including the islands - calls for an exchange of experience on national policies and development practices likely to reduce pressure on the coast, and encourage the development of the hinterland.**

Co-operation, particularly through comparative studies, could start with **planning and development methods, conservation regulations, legal and financial protection mechanisms (coastal conservatories, for instance), promotion of awareness among tourists of environments to be protected, conservation of the near-shore area, the use of remote sensing, etc.** **Meetings between officials** responsible for coastal regions would be very fruitful in this respect. The necessary information, exchange and training activities would be facilitated by

the establishment of a "Mediterranean Coastal Observatory" focusing its attention on the changes taking place in the coastal strip.

The current inadequate rate of installation of **waste-treatment stations** in coastal regions implies that the objectives of the **Genoa Declaration** may not be met. Even though measures are the responsibility of each state, at least a **MAP questionnaire** could be drawn up at the Mediterranean level, enabling preparation of a public overview of the situation and prospects for the next five years. **Plastic packaging** distributed in coastal regions should be replaced by **biodegradable packaging**. Finally, an efficient co-operation network among **port authorities** could be useful for identifying problems and bottlenecks. The co-operation already under way between the European Community and the Mediterranean countries could help to complete port installations where they are needed for the application of the MARPOL Convention on degassing.

130. **Urban management** In 2025 more than 150 million people will be living in the towns of the Mediterranean regions (against 82 million in 1985). Collaboration among **specialists** could, in this case, focus mainly on the **creation of new towns, control of the use of peri-urban areas** where agricultural land is destabilized, **economical urban transport**, the protection and restoration of **historical centres**, the reduction of air pollution, the design of low-cost housing and public areas, small-scale urban systems in harmony with rural areas, etc. **Urban management** as such (waste, sanitation, water, traffic, plantings, etc.) could rise to exchanges through direct "technical twinning" between Mediterranean towns.*

131. **Water resources management** The uncertainty and irregularity of water resources constitutes a **real bottleneck** for Mediterranean development, particularly for the southern and eastern countries.

Collaboration could focus on several aspects : resource management institutions, distribution of drinking water, sanitation techniques, water-saving irrigation techniques, re-use of waste water for agriculture, solar pumps, desalination of sea water, supply of water to small islands. The organization of **internships** and **regional training courses** for water resource management (domestic, agricultural and industrial uses, integrated planning and management) is a prime area for intra-Mediterranean co-operation.

* There are currently 360 twinnings, of which only 45 between North and South and ten between South and South. Less than a dozen twinnings concern technical exchanges.

132. Forest management Co-operation could be very beneficial in the following areas: upkeep and testing of stable, multi-purpose farm-forest cum grazing systems, management and protection of watersheds, multi-purpose forest management (including for hunting), the successive process of different kinds of vegetation, diseases specific to Mediterranean trees, procedures for timbering by stages, (choice of trees for retimbering), combating of forest fires, techniques and equipment for clearing undergrowth, exploitation of by-products, alternatives to fuelwood. Here again the organization of specialized regional internships and training courses could be encouraged.

133. Management of protected areas The rich genetic heritage of the Mediterranean region, as regards both wild species and cultivated or domestic varieties, is seriously threatened. The application of the Barcelona Convention protocol on "specially protected areas" and the work of the Salambo (Tunisia) Regional Activity Centre should help to develop the protection of coastal and marine regions. In co-operation with the IUCN, it is essential to extend action to all the Mediterranean-climate land ecosystems in the region, particularly, through the expansion and improvement of the biosphere reserve network, the creation of biotope reserves and the adoption of a regional conservation strategy. The conservation of outstanding sites and Mediterranean landscapes should bolster this effort to conserve ecosystems, and could also be an area of co-operation. The participation of local populations in the management of protected areas is essential, and could also offer an opportunity for an exchange of experience.

134. Management of marine living resources Although they are not abundant, Mediterranean living resources could contribute to reducing the food dependency of some coastal countries if exploitation were carried out in a rational way so as to be sustainable. This kind of objective requires effective international co-operation, for which the General Fisheries Council of the Mediterranean provides a sound framework, but which should be stepped up and suitably co-ordinated with the action of other sectors such as transport or pollution control. Information about existing fish stocks (demersal and pelagic species), their migration and reproduction cycle (especially in the less studied eastern basin) is essential for optimizing fisheries. A joint assessment of migrant species should also be encouraged. Above all, priority should be given to concerted action between countries exploiting the same resource, and the formulation, if necessary, of measures to limit fishing activity and ensure distribution of this resource, together with supervision of the effective application of measures. Legislation on use of the coastal strip through artificial reefs and, in general, national management and development plans for fisheries should be harmonized as far as possible.

2. Co-operation on appropriate technology

135. The establishment of new industries in the south and east of the basin in particular will create an urgent need for information on precautions to be taken on installation, recycling, and on depollution devices. It will be equally useful, however, to exchange the mechanisms and processes of "clean technologies" introduced into industrial processes, which make it possible - often with economic benefit - to reduce waste, save materials and energy, and re-use by-products. This could offer a broad area for exchange and co-operation between specialists from the north and south, in fields such as energy, water, biotechnologies or waste, which may possibly receive support from the European Community.

3. Co-operation on major hazards

136. Erosion of the genetic heritage The Mediterranean bovine, ovine and caprine domestic races amount to only 10% of what they were a century ago; populations of shrub species and plants that are part of the traditional diet are rapidly disappearing. The urgent establishment of biological conservatories, gene banks, botanical gardens and biosphere reserves, covering the land ecosystems of the Mediterranean region, will alone contribute to conserving ex situ and in situ the components of the wild or domestic genetic heritage of the region in order to maintain, for information, the domestic varieties and wild fellow-creatures essential for the genetic selection of varieties needed for agriculture and stock-farming in the future. A Mediterranean network of botanical conservatories and arboreturns could be established. A Mediterranean association for the protection of nature could prove useful.

137. Natural hazards Natural telluric hazards have always existed in the Mediterranean, whether earthquakes, volcanic eruptions, or landslides. Moreover, the irregularity of the climate causes floods and recurring disastrous droughts. Solidarity is all the more effective in these spheres as it concerns neighbouring countries likely to be affected, in turn, by the same calamity. Studies on seismic hazards undertaken in the region under the auspices of UNDP, Unesco and PAP could be fruitfully extended to the Mediterranean basin as a whole. Work carried out on drought and agroclimatology is also an important area for regional co-operation.

138. Technological hazards Technological hazards are becoming increasingly serious in the Mediterranean basin with the development of industrialization, the manufacture and transport by land and sea of new chemical products, the increase in toxic waste, the production of nuclear energy, etc. Co-operation could focus on prevention techniques and practices, identification and marketing of new products (pesticides in particular), adoption of suitable legislation, measures to be taken in case of accidents, or transborder co-operation among

local authorities. All coastal states could take advantage of the progress made by some industrialized countries, and of European collaboration, already under way. Broadening the fields of competence of the Malta Centre coincides with this recognition of new risks as regards maritime accidents.

Among the top priorities is co-operation on industrial waste, particularly toxic waste (destruction, transport, storage, reprocessing, etc.). The organization of regular contacts among industrialists, in co-operation with public authorities, would be a positive step.

C. FROM COLLABORATION TO MEDITERRANEAN SOLIDARITY

139. The work of the Blue Plan has often highlighted the need for collaboration much further upstream in a number of major sectors of economic activity, as a prerequisite for a true Mediterranean solidarity.

In this respect, it was observed that bilateral relations between states only marginally covers environmental problems. These issues should be given more importance in bilateral scientific, technical or commercial agreements between Mediterranean countries.

Relations between neighbouring countries have to be facilitated to achieve better international balance: maritime, and also air and road transport, electrical interconnections, communications, etc. A network of exchanges should link up the Mediterranean basin, where currently preference is given to relations along certain mainlines, whose lesser ramifications tend to stagnate. The situation can be improved by strengthening short-distance relations, still too limited, particularly among southern countries.

At the regional or international level, increasingly numerous forms of collaboration are pursued within organizations in which the Mediterranean States find themselves involved in decision-making processes that do not pay sufficient attention to the Mediterranean identity, especially the distinctive features of the Mediterranean environment. Very different kinds of international organizations, such as FAO, WHO, Unesco or world development organizations (World Bank, UNDP), are collaboration or decision-making levels in which the Mediterranean countries participate, but are a minority and never form a group. It would be appropriate for these bodies to take the special nature of the Mediterranean into account as far upstream as possible, on the basis of prior consultations, for instance in the MAP framework. The concerns of the Mediterranean countries would benefit from being better known before the adoption of environmental policies by these organizations. The same holds true for regional organizations, such as the European Community or the League of Arab States in which some countries of the region participate. Three major areas of economic

activity: food and agriculture (resources and consumption), energy and tourism seem in this respect suited to a more advanced form of collaboration.

140. Food and food resources should be given special consideration. In forty years self-sufficiency levels in the Mediterranean regions have fallen from 60% to 40% or even 30%. In order to halt or reverse this trend, a stronger kind of solidarity, which would avoid a rupture with its many repercussions, including on the environment should be the subject of intra-Mediterranean collaboration, and co-operation with other regions (of Europe in particular).

The drop in self-sufficiency in Mediterranean countries, which appears unavoidable in the short- and medium-term raises the issue of food security for these countries. Suitable financial or commercial co-operation would facilitate orderly specialization in production and would justify an intensification which, properly managed, would exert less pressure on the environment. More intense co-operation in agronomic and agroecological research would be useful (soil fertility, water use, creation of varieties and conservation of species, etc.). A priority research and development programme on products subject to shortage (cereals, oil seed, etc.) or to strong demand (fruit and vegetables) would be welcome. The same kind of approach is valid for stock-farming. Co-operation on fisheries and aquaculture, to the point of establishing regulations to be observed, is essential.

141. Energy is another sector where effective collaboration could start up rather quickly. The differences between oil consumer and producer countries will tend to dwindle with time, and all countries have experiences or will experience the vigorous development of electricity. Electrical energy is therefore a special area for the exchange of experience and know-how, particularly on supply, on clean combustion techniques, etc. The use of natural gas, already significant and a link between various Mediterranean countries, could increase considerably. Co-operation could focus on exploitation (deep drilling), production (small deposits) and utilization techniques (efficient industrial uses, chemicals such as methanol, combined electricity production, fuel gas, etc.).

Knowledge acquired on solar energy and other renewable sources of energy could, in the end, create a true technological bridge between north and south and strengthen South-South co-operation, particularly on equipment for water (irrigation pumps), dispersed dwellings, production of baked clay materials, the drying of agricultural products, etc.).

142. Finally, for tourism, rapidly developing in a somewhat haphazard way, in which all Mediterranean countries compete, collaboration could first focus on information about

demand and occupancy rates in the region (where the margin of error for figures exceeds 30%). It could also concentrate on the **improved management** of intra-Mediterranean tourism, which currently accounts for 25% of international tourism (**tariffs and air services**, and especially the **staggering of peak periods** through "time-planning"). It could involve the concerted appeal to tourism outside the Mediterranean. Finally, if it were recognized that foreign tourists are willing to contribute to **protection of the Mediterranean**, and that \$5 per one-week stay would bring in more than \$250 million, the establishment of a **voluntary contribution**, which could only be set up at the Mediterranean level, could have a **considerable impact**, especially if it were supplemented by a parallel contribution from the countries involved. Generally speaking tourists, who benefit greatly from the quality of life and the Mediterranean landscape, must be invited to make a **tangible contribution** to their protection.

D. A PROGRAMME FOR THE YOUNG GENERATIONS

143. The future of the Mediterranean may be seriously affected or modified by the implementation of **policies for the education, information and awareness-heightening of the young public - tomorrow's generations**. The young public in particular is not always aware of the time needed for a tree to grow, to manage a forest, or make the soil fertile and save it from desertification. It is **not always aware of the fragility of the world it has inherited**. This area could be the subject of fruitful exchange between coastal countries : handbooks for young people, teaching experiences in the field, and television programmes. It would be useful to take stock of public action undertaken and show that its effect may be decisive (for example, to increase waste-water treatment from 20% to 30% in ten years).

State policy and its implementation, together with policies of local authorities, are too little known and publicized. It would therefore be useful to **disseminate** information among Mediterranean people about **efforts undertaken in countries other than their own**. Stimulation among countries, cities and associations could mobilize some people or bolster the efforts of those who, in the sphere of the environment, occasionally feel isolated. The launching, in 1988, of the "International Week for the Mediterranean" is a step in this direction, but its scope is still too reduced.

Raising the awareness of young people about the fragility of the environment is one aspect: **entry into working life** is another. Joint efforts will therefore have to be made for **training in environmental professions**, and even more in the professions which must take into account basic concepts about the environment. In this respect, the training of town planners, engineers and technicians is one of the most fruitful means of North-South co-operation, one of the easiest to implement, and the one whose results will prove to be the most useful. This

kind of **co-operation for training**, already under way among Mediterranean countries in some areas, could be developed for all areas of environmental protection, resource management, or any other field identified above.

Sombre employment prospects also raise the increasingly difficult problem of the **incorporation of the young people into working life**. **Communal work schemes** mobilizing youth are being tried out in various places. Environmental protection can and must be given an important part in these initiatives, with the organization of exchanges and internships among countries facilitating effective participation in tangible action.

144. It is not easy to grasp the **extent of the changes** which will take place in the Mediterranean basin during the **next forty years**. Perhaps it can be better understood if one considers that **60% of the people who will be living in the Mediterranean in 2025 are not yet born**. These **325 million** or so Mediterranean people of the future will not perhaps have the same cultural and material references as the present generations, but their basic needs will not be very different from ours. It is the present generations whom they will hold accountable for the environment they find. It is for the Mediterranean people of today to take immediate action to **counter adverse trends and to prepare an acceptable future for themselves and their descendents**.

ANNEX : STAGES OF THE BLUE PLAN WORK

BACKGROUND

In Barcelona in 1975, soon after the United Nations Conference on the Human Environment in Stockholm, the Mediterranean coastal countries decided to formulate jointly and implement a Mediterranean Action Plan, under the auspices of the United Nations Environment Programme. In addition to legislative and scientific activities directly concerned with protection of the Mediterranean Sea, the Action Plan was to include a **socio-economic component** intended to trace the origins of environmental degradation and to undertake the integrated planning of development and more careful management of the resources of the Mediterranean basin. For this purpose, it was decided to conduct a future-oriented study at the level of the basin as a whole: the "**Blue Plan**", initiated at the Split intergovernmental meeting in February 1977, is the **first prospective study on relationships between the environment and development launched by all countries within the same region.**

The "Blue Plan is clearly not intended as an instrument for guiding or centralizing planning. It is first and foremost a study aimed at the long term (2000-2025), undertaken jointly by participating states, and available to the authorities and planners in the various countries of the Mediterranean region. The information it contains will assist them in formulating their own plans and making their own decisions to ensure optimal sustainable socio-economic development, while avoiding excessive degradation of the environment. It forms a store of knowledge immediately accessible to all countries involved. It initiates a continuous process of co-operation among Mediterranean authorities at various levels.

All work was carried out in **close collaboration** with the states concerned through the Blue Plan "Focal Points" nominated by each country, and was both extended and expanded on the basis of national inputs.

In 1977, project implementation was designed in **three phases**: an initial reconnaissance phase, an in-depth study phase, a phase of presentation and discussion of the findings.

The exploratory **first phase** (September 1980 - May 1984), under the responsibility of a seven-member "Group of Co-ordination and Synthesis"* was based on twelve sectoral studies (agriculture, water, energy, population, culture, etc.), entrusted to twelve pairs of experts (one from the north and one from the south of the Mediterranean). It gave rise to a series of synopses, transmitted to the Member States, which were summarized at their request in a booklet distributed in more than 6000 copies, in French, English and Arabic.

* Chaired by Mr. Ismail Sabri Abdalla

The **second phase**, used functional or "systematic" analysis and exploration tools such as "scenarios". Methods and schedules were approved in Athens in May 1985 and work began immediately thereafter. The second phase as such ended in mid-1987 with the presentation of a preliminary report.

The **third phase**, designed to ensure the dissemination, discussion and acknowledgement of findings, concludes with the publication of the report, finalized at the beginning of 1988 on the basis of, in particular, comments received on the preliminary text during a period of direct exchange with the various countries.

II. APPROACH AND METHOD OF WORK

The relationship between development and the environment in the Mediterranean basin focuses on five main **environmental "components"**: - the **sea, soil, inland water, the forest**, and finally the **coast**, (40,000 km under increasing, conflicting pressure from most human activities).

As regards development, it interacts mainly with the environment, not only through the effect of population, growth and its spatial distribution (**urbanization** and "**littoralisation concentration**"), but also through the impact of the five **sectors of economic activity** considered essential because of their effect on the environment : **agriculture, industry, energy, tourism and transport**.

Two **time horizons** were chosen for the Blue Plan prospective exercise: **2000 and 2025**, and it was decided to formulate a small number of scenarios for the global exploration of possible futures:

- **one reference trend scenario (T-1)**, based mainly on the continuation of current main trends;
- **one worse trend scenario (T-2)**, in which development problems are aggravated within an international context of persistent economic recession and harsh competition;
- **one moderate trend scenario (T-3)**, with recovery of more vigorous development within the context of increased international co-operation and genuine efforts to take the environment into account.

- one reference alternative scenario (A-1), based on a more goal-oriented and self-reliant form of development, broader North-South co-operation, and incorporation of the environment into decision-making and planning processes.

- one integration alternative scenario (A-2), similar to the preceding one, but in which, while the northern countries consolidate within the European Community, a number of countries south and east of the Mediterranean basin decide, in turn, to form regional bodies and build up South-South co-operation.

III. ORGANIZATION OF WORK

Preparation and implementation of the second phase of the Blue Plan was reviewed by meetings of the Contracting Parties in Athens (April 1984) and Genoa (September 1985), and also by meetings of the Focal Points (January 1984, May 1985, July 1987).

To ensure the "open book" participation of the Mediterranean countries in the second phase of the Blue Plan, the Athens Intergovernmental Meeting (April 1984) decided to establish a **Steering Committee**, which held twelve sessions and was closely associated with the bulk of the work.

Research and the prospective study were undertaken from Sophia Antipolis as from 1985 within a technical and administrative structure set up for this purpose by the French government: the Blue Plan Regional Activity Centre.* The bulk of the work was carried out by a very small central team under the guidance of a scientific director, assisted by thirty or so Mediterranean consultants.**

In order to base the envisaged scenarios as much as possible on the reality of the various countries concerned, the Focal Points requested that the Mediterranean countries endeavour to formulate their own "**national development/environment scenarios**" a common framework defined beforehand by the Blue Plan team.

* Whose President is Mr. Michel Batisse.

** The scientific director being Mr. Michel Grenon (France), the central team benefited from the participation of Messrs. A. Lahmidi (Morocco), P. Komilis (Greece), L. Khaldoun (Algeria) and J.P. Giraud (France), Mr. I.H. Abdel Rahman acting as senior adviser.

Since defining the scenarios was a particularly delicate exercise, the Blue Plan team resorted to the assistance of an open study group of twenty or so scientific experts from the various Mediterranean countries.* Within this group, basic choices were always made through consensus.

While the specially created national teams formulated the scenarios for the Mediterranean countries, the central team prepared global studies on population, urbanization, macro-economic development, agriculture, industry, energy, tourism, transport, environment/development relationships, specific impact on the coast, etc. Economic and environmental data were gathered at the same time.

Finally, the central team maintained close contact with the other components of the Mediterranean Action Plan, i.e. with the Co-ordination Unit and MEDPOL Programme in Athens, the Regional Activity Centre for the Priority Actions Programme in Split, the Regional Oil Combating Centre in Malta, and the Regional Activity Centre for Specially Protected Areas in Tunis/Salambo.

Many specialists - over three hundred in all - participated in one or other phase of the work. During their preparation, the Mediterranean scenarios were submitted to a number of national teams or officials. Consideration was given in their preparation to the "national scenarios" formulated or outlined by the countries in 1987. The Blue Plan Mediterranean scenarios aroused growing interest and benefited from numerous suggestions, confirming the truly collective aspect of the exercise.

IV. DOCUMENTS

The documents stemming from the Blue Plan comprise:

- the report entitled "Futures of the Mediterranean Basin (environment and development 2000-2025)" together with this synopsis and suggestions for action
- specialized booklets
- data bases

* Chaired by Mr. Jacques Lesourne.

The report "Futures of the Mediterranean Basin" comprises an introduction, followed by five parts:

- an **introduction** recalls the Blue Plan objectives and the background of its launching and progress;
- the **First Part** outlines the geographical context and time scales;
- the **Second Part** explains the choice of hypotheses and the formulation of scenarios;
- the **Third Part** presents future prospects by sector (agriculture, industry, energy tourism and transports) and the ensuing spatial distribution of populations;
- the **Fourth Part** analyses the trends for the different environments (the forest, soil, water, the coast and the need for their protection);
- finally, the **Fifth Part** summarizes the main lines and conclusions of the report according to patterns of development and to economic sectors and environments, and makes suggestions for action at both the local and national level as well as that of Mediterranean co-operation.

This report was submitted in preliminary form to the Contracting Parties of the Barcelona Convention at their fifth session in Athens, September 1987 and finalized in the light of comments received.

In addition, 18 **specialized booklets** are being prepared, corresponding to specific prospects for various economic sectors or geopolitical environments. Each of these monographs submitted before publication to a detailed review by a number of specialists from the various Mediterranean countries, will contain between 50 and 100 pages, depending on the subject. The list of the booklets envisaged is given below:

1. Development of the coast and coastal regions
2. Evolution of urban systems
3. Evolution of intensive agriculture
4. Evolution of the hinterland and mountain regions
5. Conservation of fragile areas, wildlife and plant life
6. The future of the Mediterranean forest
7. Prospective study on water resources and needs
8. The future of the islands

9. Developments in the state of the sea and marine pollution
10. Living marine resources (fisheries and aquaculture)
11. Industry and the environment
12. Energy and the environment
13. Tourism and the environment
14. Transport and the environment
15. Natural hazards and their sequelae
16. Health, environment and development
17. Trends in perception and behaviour in the Mediterranean
18. Development of regional and local institutions for the environment and resources

In addition to the report and booklets, a very extensive documentation was gathered and produced, basically in the form of two **statistical data bases**: demographic and economic data (by value and type) and environmental data, comprising several hundred thousand items, with the demographic and economic bank completely computerized.

In this way a substantial volume of information was gathered about the Mediterranean regions, and a true network of scientific and technical co-operation developed during the preparation of the Blue Plan.
