United Nations Environment Programme
Mediterranean Action Plan
Regional Activity Centre for the Blue Plan

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EUROPEAN COMMISSION

# Observation and evaluation of environment and development in the Mediterranean (Preparatory phase)

Ninth Ordinary Meeting of the Contracting Parties to the Convention for the Protection of the Mediterranean Sea against Pollution and its related protocols

Barcelona, 5-10 june 1995

UNEP(OCA)/MED IG.5/Inf.5
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# Introductory Note

During their 8th Meeting at Antalya in October 1993, the Contracting Parties to the Barcelona Convention recommended that the Blue Plan Regional Activity Centre (BP/RAC), within the framework of the Mediterranean Action Plan, set up a permanent mission of observation and evaluation of environment and development for the region.

This recommendation followed earlier requests to reinforce the Blue Plan databases and a financial impulse from the European Commission to bring in this observation function in early 1993. It is based on the systemic and prospective approach adopted from the beginning of Blue Plan's activities that lead up to extensive gathering of socio-economic and environmental data and to in-depth analysis of long-term relations between environment and development for the entire Mediterranean basin. For the Contracting Parties, the activities thus capitalised during the last ten years and form an ideal basis to promote, as a decision-making tool, the so-called "Mediterranean Environment and Development Observatory" (MEDO), as entrusted to the BP/RAC. This mission constitutes a specific function within BP/RAC and not an independent structure.

This note introduces the document produced for the 9th Meeting of the Contracting Parties in Barcelona, elaborated within the context of the preparatory phase of this new BP/RAC function.

It underlines the final purpose and objectives as well as the main products of this approach.

## *Final purpose and objectives*

Beyond the impact of human activities on the environment, it is now essential to better understand and to inform others about how the degradation of the Mediterranean natural and cultural resources has feedback affecting the durability of socio-economic development. Sustainable development concerns, as brought to light during the Earth Summit in Rio de Janeiro in 1992, are connected to this loop of interactions between socio-economic development and the environment.

Recent changes in environmental policies reflect, on the one hand, the acknowledgement of the complexity and the interweaving of socio-economic and environmental phenomena that lead to proposals of more and more tightly integrated intervention strategies. On the other hand, they show the awareness of these phenomena by all the societal actors, resulting in the redefinition of the role of the state and public authorities in sociological and institutional changes.

According to the Blue Plan, to favour these changes, the Mediterranean environmental policies should aim at the following objectives:

– **Knowledge, innovation and evaluation.** Scientific knowledge of phenomena and the production of reliable information and data are the starting point of any serious attempt made in favour of the environment. Follow up of environmental parameters generates and reinforces environmental awareness (monitoring soil degradation, water reserves and quality, urbanisation, industrialisation and tourism and their respective and combined impacts upon the environment).
Nowadays, environmental evaluation is a powerful driving force for scientific, technical, sociological, economic and prospective research concerning demography, social behaviour, potentialities and limits of resources..., as well as a tool for correcting policies and actions already implemented.

– **Integration into intervention programmes.** When used as an essential element to assist in individual and collective decision-making, systemically organised knowledge forms a basis for new territorial policies such as the integrated strategies for urban development or for the management of Mediterranean coastal areas.
Considering the complexity of conflicting situations and of the contradictory objectives of the various actors, the design and then implementation of such strategies represent difficult but essential processes of apprenticeship which have to address the needs of sector integration (with respect to activity sectors competing for the use of environmental resources), of social integration (combating inequality or exclusion) and of temporal integration (preservation of the patrimony for future generations).

– **Mobilisation of people and their forms of organisation.** Knowing that there are many unknown and uncertain factors in the collective search for sustainable development,

the success of integrated strategies will depend essentially upon the capability of the implemented policies to fire the imagination, to spur on intelligence and to arouse participation of all societal actors. In addition to the needs for awareness and training, this mobilisation is based upon society's capabilities of self-regulation in the face of environmental challenges.
Mediterranean environmental policies must therefore aim at managing environmental components and human resources for the best, while developing human skills and convictions in order to take on the challenge of sustainable development.

### *Approach and products*

To define and implement these policies, it is necessary to use the existing tools and methods to observe and study the environmental conditions and modifications so as to improve identification, planning, implementation, follow-up and evaluation of actions contributing to sustainable development in the Mediterranean.

On this point, the use of remote sensing, environment impact assessments, geographic information systems, systemic and prospective analysis, indicators, economic incentives in favour of the environment and scientific knowledge of global changes must be encouraged so as to contribute to the promotion of the observation, follow-up and evaluation function of development/environment interactions.

Within this framework, the BP/RAC observatory function activities have proved to be complex to define, to set up and to harmonise during the preparatory phase.

Indeed, innovation in the approach used has to be managed regarding simultaneously various activities:
- choice and construction of basic methods and tools;
- implementation of study programmes focused on data and indicators;
- assistance to scheduled national observatories in the Mediterranean countries;
- setting-up of scientific and institutional partnership networks.

That is why the results submitted in this interim report, comprising five fascicles, are essentially provisional or incomplete because they only correspond to a pilot phase which requires concerted action, filling-out and successive adjustments.

Among the activities and products launched and described in this set of documents, the following are to be mentioned:
- information adapted to the follow-up of Agenda 21;
- subject-related analyses according to the major sustainable development problematics;
- institutional studies for a better understanding of the role and scope of public policies;
- sustainable development indicators as elements of a common language.

At the very core of the observatory's objectives, the further elaboration of sustainable development indicators for the Mediterranean countries is a meticulous and complex task.

This work is at the point of intersection of:
- scientific research in various fields;
- major programmes of data gathering and processing;
- detailed knowledge of social, economic, environmental and institutional conditions prevailing in each country of the Mediterranean basin; and,
- the capability of carrying out systemic analyses and cross-interpretation of data and phenomena.

After a long progression, the objective is to provide a system of indicators being simple and easily understandable, feasible and reliable, cross-referencing, and highly meaningful to all potential users.

It involves extensive networking of scientific institutions, international organisations, national and local Mediterranean partners, in order to validate the results obtained with them. That is the very reason why these interim results derived from the observatory's work are being released now.

Accordingly, for the Mediterranean Environment and Development Observatory to succeed, full co-operation from Blue Plan's partners will be necessary, as well as an appropriation of results by all those actors working on sustainable development in the Mediterranean and, more particularly, by those living on the Mediterranean coast.

In this respect, it is worth mentioning that the participants to the Conference on the Mediterranean observatories organised during the inauguration of the Moroccan national observatory (Rabat, December 1994), showed a particular interest in the approach put underway by BP/RAC within the frame of MAP and the first reorientation for the continuation of the work.

The interim report describing the state of progress of the Blue Plan evaluation and observation mission is composed of five different fascicles:

- fascicle 1: The Mediterranean environment and development observatory function
- fascicle 2: From problematics to indicators, water as an example
- fascicle 3: Environmental institutions in the Mediterranean countries
- fascicle 4: Follow-up of Agenda 21 for the Mediterranean countries
- fascicle 5: Methods and tools.

Since these fascicles deal with very different subjects, they are designed for separate reading without overall knowledge of the report being necessary. Accordingly, there is some repetition from one fascicle to another.

In line with the above, the Blue Plan team will be particularly grateful for any constructive criticism or comments concerning the different fascicles.

*Michel Batisse*
*President of BP/RAC*


This report represents the collective work of the BP/RAC team managed by Bernard Glass (Director) and Arab Hoballah (Deputy Director).

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# The Mediterranean environment and development observatory function

## Contents

## Foreword

La perseverancia siempre da una flor<br>(Perseverance always produces a flower)<br><br>Ancient Spanish proverb

As the meeting point of three continents and the cradle of our planet's great civilizations, the Mediterranean basin is a concentration of great patrimonial, natural and cultural wealth, making it today's the first tourist destination in the world. However, because of its recent socio-economic development, considerable changes have been put into effect, endangering this inheritance. Population growth is at the center of these changes; from 380 million in 1992, the total population of the basin will reach between 520 and 570 million inhabitants in the year 2025.

As a logical continuation of the BP/RAC work on systemic and prospective analysis of the Mediterranean basin, the "Mediterranean environment and development observatory" function was established to follow up these changes and to generate the required information for their monitoring and, if necessary, for their control.

The observatory function is a point of convergence between:
- scientific research in many fields;
- programmes on data gathering and processing;
- precise knowledge of social, economic, environmental and institutional conditions in each country of the Mediterranean basin;
- the capability of systemic analysis and cross-interpretation of data and phenomena.

It is presented in this fascicle in its full complexity and rigor.

Chapter 1 deals with the context of its emergence, its objectives, and the general organization of its activities. Its objectives are presented through the conclusions of an extensive Conference on Mediterranean Observatories, co-organized by BP/RAC and held in Rabat in December 1994.

Chapter 2 goes on to cover theoretical methods and logistic tools that the observatory uses comply with the observation and evaluation missions within the perspective of sustainable development in the Mediterranean. These methods and tools are detailed in fascicle 5.

The Mediterranean basin combines a relative geographical unity with different development choices and a variety of social and human conditions. Chapter 3 refers to the geographical objective of the observatory's investigations and its main physical, human, economic and environmental characteristics.

Chapter 4 presents an overview of the concrete studies and actions that the observatory has initiated. Details of these studies and actions may be consulted in fascicles 2, 3 and 4.

# 1. Context and objectives

## 1.1. Context of the BP/RAC observatory function

***Outline of the Blue Plan approach at the global level***

In 1975 in Barcelona, the Mediterranean countries adopted a Mediterranean Action Plan (MAP) under the auspices of the United Nations Environment Programme (UNEP). The Blue Plan Regional Activity Centre (BP/RAC) was assigned to carry out part of the MAP socio-economic component.

From the outset, the main focuses of Blue Plan, in order to understand Mediterranean issues, have been:
- the problematics of environment/development;
- the long-term taken into account;
- aid to decision-making.

Within this framework, emphasis has been placed upon certain analysis tools:
- systemic analysis,
- the scenarios method used as a tool for exploring possible futures.

Scenarios have been produced for the Mediterranean Basin, considered on the global scale, according to the following process:

- A first step – "knowing" – permitted to take into consideration the situation at the beginning of the 1980's through twelve sectorial studies. At the same time, a set of data was gathered which is the origin of the Blue Plan's socio-economic database.

- A second step – "exploring" – led to the construction of five scenarios (three trend-related and two alternative ones) based upon hypotheses concerning five chosen themes (the international economic context; the Mediterranean populations; national development strategies; space management, and awareness of the environment).
  In the course of this construction, five environmental components were looked at in greater detail: soil, water, forest, coast and sea. Similarly, five activity sectors were focused upon: agro-food, industry, energy, tourism, and transport.
  To carry out this work, Blue Plan brought on a small permanent team and a network of Mediterranean international and national experts.

- The third step – "proposing" – organized the presentation and discussion of the results as well as publishing Blue Plan's work at a global level.

Subsequent to the 1989 publication of the important summary report entitled *Futures of the Mediterranean Basin. The Blue Plan,* the Contracting Parties to the Barcelona Convention recognized the scope and interest of Blue Plan's work. Its approach and results stand out as aiding tools for decision-making for those responsible of Mediterranean coastal planning and development.

In 1989 and 1991, the Contracting Parties, as well as the working group for the reorientation of Blue Plan's activities, recommended that its activities be reinforced while requesting it to act as Mediterranean environment observatory and to integrate this new function into its prospective approach.

### *The Earth Summit, Rio – June 1992*

On December 22, 1989, the United Nations General Assembly requested that a world meeting be called to establish strategies aimed at terminating the deterioration of the environment "within the framework of intensified national and international efforts made to encourage the sustainable and ecologically rational development in all countries".

Intense mobilization and preparation in all countries led to the holding of the United Nations Conference on Environment and Development (UNCED), otherwise known as the Earth Summit, held in Rio de Janeiro (Brazil) in June 1992, and the production of a global action plan called Agenda 21 and its adoption by the governments attending the Summit. Agenda 21, from now on and into the 21st century, must be implemented by Governments, development agencies, United Nations organizations and independent-sector groups in every area in which human (economic) activity have an impact on the environment.

The spin-offs of the Earth Summit have been and are still considerable, in particular in the Mediterranean basin. For instance, in terms of the knowledge of the different territories, the preparation of the UNCED was, for the different countries, an opportunity to draw up and distribute national reports about the state of the environment, sometimes for the very first time.

Following the Rio summit, the United Nations set up a Commission on Sustainable Development (CSD) which convenes each year to examine progress made in implementing Agenda 21 and to propose specific programmes. This initiative was followed in many countries by the establishment of National commissions on sustainable development having the same objective as the CSD but on a national scale. More recently, in Tunis, in November 1994, the Ministerial Conference on sustainable development in the Mediterranean recommended the establishment of a Mediterranean Commission on Sustainable Development.

### *Emergence of the Blue Plan observatory function*

In 1992, the Cairo Euro-Mediterranean Conference, held at the initiative of the European Commission (EC) and the Earth Summit, revealed the need for objective systems on information and evaluation in order to achieve sustainable development.

The EC deemed it necessary to set up an observation mechanism of the Mediterranean environment, in conjunction with the European Environment Agency (EEA) (being founded at the time). For its prior work, Blue Plan had established socio-economic and environmental databases that the EC considered to be an ideal anchor point for this desirable function of Mediterranean earth and coast environment observatory.

It was towards this end that an agreement was reached in 1993 between the EC (GD XI) and BP/RAC. This agreement does not lead to the creation of a separate structure from the Blue Plan but rather completes the means made available to all Mediterranean countries, without changing its nature in terms of data and information required for managing Mediterranean land use and environmental issues. A first phase in establishing the observatory was thus engaged for a period of three years (1993-1996), a preparatory or pilot phase, that must enable to develop and to test internal and partnership working methods on a full scale.

The Contracting Parties met at Antalya (Turkey) in October 1993 and insisted that the observatory's activities should deal with both environment and development, by enhancing the concept of sustainable development. Accordingly, they defined means complementary to those of the EC in order to ensure synergy between Blue Plan's systemic and prospective studies and its new function, referred to hereafter as the Mediterranean Environment Development Observatory (MEDO).

Thus, since the reorientation of Blue Plan's activities in 1991, the observatory function, often referred to simply as MEDO, has gradually been established. Nevertheless, we must emphasize the fact that MEDO is not a specific structure within BP/RAC but simply an activity programme identified in terms of its contents, its means and its results. This is further discussed in paragraph 1.3, presenting the organization of MEDO's work; in chapter 2, detailing its methods and tools; and, in chapter 4, describing its first results.

### 1.2. An observatory for the Mediterranean countries

On the occasion of the inauguration of the Moroccan National Environment Observatory, and together with this, the first international Mediterranean Conference was organized by Blue Plan in Rabat in December 1994 on: "Environment and development observatories: an information and decision-making tool" with the support and active participation of UNESCO, UNDP, the European Union (EEA), UNEP (GRID), CEDARE and the French Environment Ministry (IFEN).

The participants were essentially officers from public administrations concerned either by the environmental planning and management in their country or by information systems, or were directly interested by or already involved in the preparation and establishment of national observatories.

The conclusions of this Conference are reproduced in full below because they clearly summarize the state of the question in the Mediterranean basin and the expectations of the coastal countries towards MEDO.

**Conclusions of the international conference on:**

**"Environment and Development Observatories: An Information and Decision Making Tool"**

Rabat, December 1994

## I. Context and objectives of the conference

A Conference was held in Rabat from December 7 to 10, 1994, at the time of the inauguration of the National Environment Observatory of Morocco – ONEM. The participants, experts and representatives of 16 Mediterranean Basin countries, 15 international governmental organizations and NGOs, among which the Mediterranean Action Plan (MAP), the Blue Plan Regional Activity Centre (BP/RAC) and their Mediterranean Environment and Development Observatory (MEDO), worked on the following objectives:

- Analysis of the experiences of environment and development observatories at several geographical levels.
- Evaluation of operations in and around the Mediterranean region, by assessing the means and products as well as their use in practice.
- To look for complementarity and synergy within Mediterranean initiatives in the fields of environment observation and appraisal.
- Development of co-operation between Mediterranean countries and international organisations as well as between Mediterranean countries themselves.

This approach complies with the general objective of integrating environment and development to the concept of sustainable development, around the catalyst "observatory" tool.

The recent national and international initiatives for implementing observatories in the Mediterranean are clearly segmented, and their results can not be considered as an ideal reference.

The discussions highlighted the fact that these operations, particularly at the national level, were initiated at extremely different levels of environmental knowledge. In some Mediterranean countries, there are extensive databases which may not cover all fields: the information must be completed, integrated and used appropriately according to the new directions for sustainable development. In other countries, the available data is often insufficient (i.e., non-existent) to reach a satisfactory level of information on the state of environment.

The implementation of a national observatory must entail gradual identification of the priority issues which are to be analysed and integrated to environmental data so as to create the initial tools of emerging environmental policies: environmental audits, regional and municipal environment planning, environmental impact studies, discussion with economic actors,...

The different national situations, regarding socio-economic status and available means used for environmental purposes, could tend to widen the gap between the basin's coasts. Exchanges on experience acquired in the construction of observatories in each country, reinforcing and using a single common language, contribute to the ecological solidarity at the regional level.

## II. The observatory concept: from data issues to information for decision making

Although wide experience has been acquired in collecting and processing data on the environment and sustainable development, and despite the fact that many institutes, agencies, centres or observatories have for the past few years been working on these data, it seems clear that there is no "ready to use" environment and development observatory model. Each experience and institution only work on their specifically national objectives and issues.

In the course of the meeting discussions on these examples, several key factors were highlighted in order to facilitate, improve, consolidate the implementation, operations and use of a national observatory, i.e.:

1. The public demand for information to allow implementing environmental and sustainable development policies, plays a central role in the creation or credibility of an observatory. Agenda 21 and its application to the Mediterranean (MED 21), as well as the associated conventions (biodiversity, climate, desertification...), constitute a strong political issue at the international and national levels. National Commissions and the Mediterranean Commission for Sustainable Development will have to produce periodical reports based on reliable figures and information. Setting up plans or national strategies requires data collection efforts involving the "observatory".
2 One of the work priorities is the specific identification of issues where information is required. These can be very different according to the field involved (local or regional actions, national policy implementation, international co-operation) and according to the determined objectives (scientific knowledge, public awareness, aid to decision-making...)
3. Collection of necessary data and production of practical information must be extensively based on available observation systems and statistic studies. Thus, the inventory of existing data and information sources, even if only partial, is one of the first stages of observatory creation. In most countries, there are entire fields for which territorial observation data are very limited. Specific work must then be undertaken, using the most adapted tools (such as remote sensing).
4. The reliability of data must be monitored. Data harmonisation is also essential for international comparative analysis purposes and for creating a common language.
5. An observatory plays an essential role in integrating environmental and socio-economic data in order to supply indicators of sustainable development. The localisation of specific factors is crucial and in many cases requires using geographical information systems.
6. Real access to data and information must be guaranteed to the users. All too often, information is detained by specialists and never reaches the political decision-makers, economic partners or the public for whom they were initially compiled.
7. The costs of acquiring and processing data and information are a very constraining factor, which must be kept in mind not only when an observatory is created, but also to ensure its perenniality, and thus avoid that its role in aiding decision-makers remains only temporary.

8. The main reason for creating an observatory is to supply products meeting the demand of the users which serve as aids to the decision-making process. Among these, the most important are indicators, regional or sectorial syntheses and reports on the state of environment. According to the national situation and political requirements, these basic products could be reinforced by scenarios highlighting the possible choices as well as by documentary wake systems.

## III. Observatories and the Mediterranean area

The general structuring concepts for an observatory must be interpreted and adapted to Mediterranean characteristics, not only from the standpoint of its specific environment and development issues but also because of the diversity of Mediterranean actors.

Thus, the priorities in implementing localised observatories within the Mediterranean must reflect the characteristics of the natural media, soil, water resources and importance of space and resource utilisation conflicts in the coastal areas. These priorities will have to be defined at the provincial or national level as well as for the entire Basin, with particular emphasis on the evolutions having unreversible effects. The answer to these priority needs will of course be hingent upon available data and information.

From the point of view of the actors, the Mediterranean represents a wide variety of economic situations and different stages of environmental policy implementation. Clarification of political requirements must cover the specificities of provincial or national contexts. A voluntaristic approach to information on issues and operational tools is a prerequisite for proper initiation of activities and subsequent appropriate use of observatory products.

Lastly, it is necessary that the ties between the Mediterranean actors, in this case national observatories, such as ONEM, and regional observatories, such as the Blue Plan's MEDO, and the international organisations be specified; this involves the European Union and its specialised agency EEA, the CEDARE, OECD, the World Bank or the specialised institutions of the United Nations (UNEP, UNDP, UNESCO, FAO...).

## IV. The co-operation network

Co-operation is essential to ensure that national and regional observatories in the Mediterranean are efficient.

It can be established in different ways: with the national socio-economic partners of the observatory; with the other Mediterranean countries in the form of bilateral agreements; with third countries and the international organisations to ensure the relevancy of the observations on the Basin and a follow-up of the global parameters leading to sustainable development in the area.

Within this framework, the role of the Blue Plan's MEDO initially consists in triggering effective overall co-operation within the Mediterranean network where it plays a key role.

Multilateral co-operation authorised by MEDO will be all the more efficient that it will lead to bilateral agreements, which will not only involve exchange of knowledge and know-how, but also sharing practical lessons learnt from observation systems, thus as the experience gained from the creation of ONEM. Specifically, training is considered as a key element for transfer of know-how.

Along these lines, the role of the Blue Plan's MEDO within MAP, is predominant in several fields:

1. It must serve to motivate the implementation of national observatories, as a catalyst for both the will to do and the assistance in gathering the required funds.
2. It must be a link between the Mediterranean Basin coastlines to enable efficient exchange of knowledge and establish permanent dialogue between the national observatories on both sides of the Mediterranean, and a bridge between the regional organisations or programmes such as the European Union and its EEA, the CEDARE or the Sahara and Sahel Observatory.
3. It must serve as relay to ensure that the Mediterranean is included in the international Earthwatch Programme and particularly in the UNEP GRID programme for which it could act as the technical centre for the Mediterranean. More generally, it must appear as a useful relay vis-à-vis the major participating international organisations (World Bank, FAO, UNDP, UNESCO, OECD).

4. It will be a meeting place where partners can compare national situations through the use of sectorial syntheses, prospective studies, harmonised indicators and reports on the state of Mediterranean environment, to support the work carried out by the national observatories.

## V. Conclusion

The Conference was a strong opportunity for exchange between the experts and lead to the beginning of the Mediterranean network of environment and sustainable development observatories. Several major principles were discussed to give a Mediterranean direction to the activities of the observatories.

Above all, it appears essential to be attentive to the proper articulation of the "observatory" tool within the environmental policies entrusted to an institution by a country or by an international organisation in order to guarantee that environmental information is integrated to the decision-making processes and to public life. Specifically, the communications on the observatories' activities at different geographical levels must be disclosed to the public at large, whose motivation and role are determining factors for environment and sustainable development.

Then, the very nature of the stakes of sustainable development in the region implies that all international, national or local partners be particularly attentive. Therefore, if all environmental policies, implemented at different levels and based on the objective knowledge and follow-up of the situations, are to be gradually harmonised and converged, it appears essential that Mediterranean governments and international organisations contribute to the establishment and operation of observation, follow-up and assessment structures of the "observatory" type, in order to guarantee relevant levels of activity and sufficient perenniality.

Finally, Conference participants recommended that BP/MAP MEDO be appointed initiator and co-ordinator of contributions to the emerging national institutions of the "observatory" type and to the harmonisation of data and products where comparability is an essential factor of efficiency. Consequently, MEDO's mandate needs to be extended by the Contracting Parties to the Barcelona Convention when MAP is restructured in compliance with the orientations of Agenda 21 and MED 21. Also, partnerships with the EEA of the European Union on the one hand, and with UNEP's GRID on the other must be specified, and even confirmed, to ensure better coverage of the Mediterranean area by their own respective objectives and activities.

## 1.3. Organization of the observatory activities

### *Summary of MEDO objectives*

The objectives assigned to MEDO by the Contracting Parties at Antalya in 1993 are summarized below:

- "to contribute to a better understanding of the situations and trends concerning all relationships between environment and development at the level of the Mediterranean basin and of the coastal regions in each country;
- "to supply officials and decision-makers, at the local, national and international levels, with objective elements of information to gear their action towards sustainable development in the interest of the entire region".

To accomplish these objectives, Blue Plan organized MEDO activities on the basis of the following missions:

- to carry out scientific analysis on sustainable development in the Mediterranean and produce the necessary investigation methods and working tools for any Mediterranean observation and evaluation function of environmental and developmental issues, whether national or international;
- to serve as a catalyst and assistant to national initiatives, clearly targeted at the Southern and Eastern countries of the basin, and to ensure training in methods and tools previously developed;
- to ensure a follow-up at the basin level, as a spin-off of Blue Plan's prior work.

### *The restructured BP/RAC team*

To carry through its different assignments, BP/RAC is now restructured in the form of three complementary functional poles (see diagram on the next page):

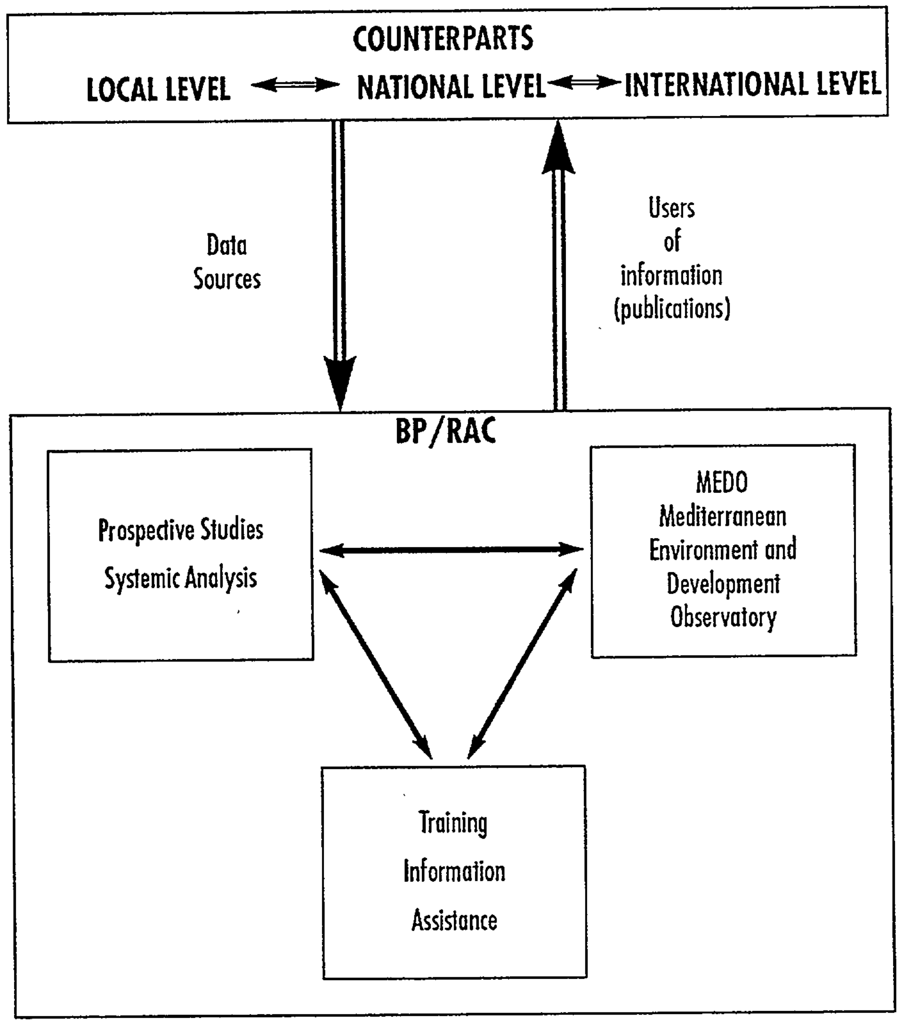
- observation and evaluation
- systemic and prospective analysis
- training and information.

MEDO's activities have proved to be complex to define, to set up and to harmonise during the preparatory phase. In actual fact, the MEDO had to simultaneously manage the innovation of several aspects:

- the choice and construction of its basic methods and tools;
- the implementation of study programmes focused on data and indicators;
- the assistance to projected national observatories in the Mediterranean countries;
- the setting-up of scientific and institutional partnership networks.

This is the reason why the results submitted in this interim report, comprising of five fascicles, are essentially provisional or incomplete because they are being tested or under scientific pursuit.

*Functional poles and relationships with partners*




### *Methods and basic tools*

Reorienting Blue Plan's activities, subsequent to the publication of its summary report on *Futures of the Mediterranean basin* and incorporating the new observatory function, called for new scientific analysis and data processing tools.

Further to the UNCED in Rio, the focus placed by new national and international strategies upon the sustainable development concept challenged the international scientific community to think about this concept which is stimulating and yet scientifically very imprecise.

Therefore, Blue Plan launched specific research programmes in collaboration with university teams, aiming at updating the Mediterranean prospective analysis in the light of this new concept and recent geopolitical events in the region, as well as establishing sustainable development indicators adapted to the Mediterranean region.

In order to make more rational use of its socio-economic and environmental databases; make them more easily accessible to scientific users and other partners, such as national observatories; and, regularly update databases according to new scientific acquisitions and concerns, Blue Plan has developed its own information system called the MEDIS (Mediterranean Information System on the Environment and Development).

At the same time, for better use and easier access to the significant and constantly updated mass of documents accumulated since the beginning of Blue Plan's work, a documentary unit has specifically been individualized. Its work extends beyond the simple assisted provision of documentation. To meet the recent demands of Blue Plan in terms of the detailed knowledge of its national Mediterranean partners, this unit directed a part of its information research towards institutional matters. This institutional focus led to the start up of a fully fledged study programme at BP/RAC on environmental institutions in the Mediterranean.

### *Operational study programmes*

The basic methods and tools described above have led to the development of more operational study programmes as a direct response to the objectives assigned to MEDO.

These programmes concern:

- an in-depth analysis of environmental fields that appear to be priorities with regard to the Mediterranean problematics of sustainable development, aiming at producing quantitative and qualitative evaluation indicators;
- a comparative study of institutions in the Mediterranean countries concerned by sustainable development issues and a hence a possible interest in indicators corresponding to these concerns;
- a follow-up of Agenda 21 in and for the Mediterranean countries in response to the Commission on Sustainable Development's call adressed to international organizations.

### Assistance to national observatories

Little by little, the countries of the Mediterranean basin are establishing their environmental and sustainable development policies as well as the corresponding institutions, with a certain offset among the Northern, Southern and Eastern borders of the basin. Information systems are recognized as being the key question of all these policies. National observatories are now being set up, developed or simply designed in the different countries.

A major effort of intermediation among the Mediterranean borders will be necessary to facilitate the transfer of know-how and above all to harmonize the data gathering and processing procedures so as to guarantee their high quality and their possible comparability. The objective is to produce a common scientific language and, eventually, a common strategy towards sustainable development.

Blue Plan wishes to contribute to this intermediation effort as a catalyst and an assistant with respect to the emerging observatories. To accomplish this mission operationally, MEDO has chosen to concentrate its action first on four countries: Morocco, Tunisia, Turkey and Albania.

For the time being, its assistance to these countries bears mainly upon the following: 1. the positioning of the future national observatory within the existing organizations concerned with environment and the statistical institutions, accordingly to environmental national policies as they are now appearing; 2. the designing of the observatory project in itself; 3. its setting up; and, 4. assisting in gathering the required funds.

### The network of institutional and scientific partners

To address its assignment, directed towards the Mediterranean, and to optimize its small team with respect to the extent of its objectives, Blue Plan has designed working methods centered upon a strong role of intermediary and expertise federator.

Indeed, the notion of sustainable development suggests intense multidisciplinarity: on this point, MEDO enhances Blue Plan's systemic analysis, yet little used in scientific circles. This means that Blue Plan co-operates with a wide network of scientific partners from different disciplines and countries.

Furthermore, although many international organizations are working in some sustainable development areas, few of them are really concentrated on the Mediterranean world, besides MAP and its Regional Activity Centres. Partnership with MAP and especially BP/RAC, will open up the perspectives of targeting their activities more accurately in geographical terms.

MEDO therefore draws upon institutional, scientific and technical-type networks, operating at several geographical levels: .

- international organizations
  - specialized agencies of the United Nations system or associated: UNEP, UNDP, FAO, UNESCO, WHO, ILO, World Bank,WTO...
  - as well as the European Union, its European Environment Agency, Eurostat, BEI, OECD, IUCN,
  - research centres and similar bodies: ICAMAS, IFREMER, OEI, ICONA, CIESM, WCMC, MEDIAS, CEDARE, IMA, IME...
  - associations and other NGOs: Silva Mediterranea, World Future Society...
- national organizations

  - the different ministries and administrations concerned
  - national statistics services
- regional and local organizations
  - administrations in charge of land-use development and environmental issues in the Mediterranean coastal regions
  - regional statistics services
  - ocal communities.

Finally, Blue Plan comes into the growing configuration of experts whose profiles stand between intellectuals (either scholars or scientists) and politicians. The expert's objective is to understand the world in order to change it and the final goal of his work is this conversion. For analysis, he uses the intellectual's knowledge and reflexes. For action, he is connected to the political actor. The intellectual's legitimacy rests on knowledge; the politician finds it in exercising power. And the expert is necessarily an intermediary. Therefore, Blue Plan must weave an ever more effective network of scientific and political partners to carry through its mission of intermediation:
- intermediation among the Mediterranean borders;
- intermediation between scientists and political players;
- intermediation among the several fields concerned by sustainable development.

# 2. Methods and tools

This chapter summarizes the methods and the basic tools recently developed by MEDO. More details will be found in fascicle 5.

## 2.1. Towards sustainable development indicators

The concept of sustainable development, firstly mentioned in the Bruntland report of 1987, then widespread under media coverage further to the Earth Summit, has become more and more popular since then, blotting out the pre-existing development theories. But what is its real meaning? Is it an empty shell, a simple phenomenon of fashion, a rebirth of ideas that had been known for a long time under a different name?

The lack of accuracy in its definition has not been an obstacle but a spring for declarations from all sides about this topic, which shows not only its value per se but also its driving force for generating questions. Anyway, there is a generalized will among the countries and international bodies to take a stand on this issue.

This generalized interest justifies the establishment of indicators in order to evaluate the possibility for patterns of production and consumption and for environment and resource uses to be perpetuated.

The Mediterranean basin combines a relative geographical unity with a wide range of developmental choices and varied human and social conditions. These characteristics should enable it to become a pilot area for sustainable development.

In addition, there is a direct relation between Blue Plan's work and the sustainable development concept, giving Blue Plan considerable headway in working on this issue. It must be preserved. That is why the Blue Plan, together with the Centre Economie – Espace – Environnement (C3E) of the University of Paris I, initiated a specific research programme entitled "In search of sustainable development indicators for the Mediterranean basin". Some of its results are referred to below.

### *Which sustainable development in the Mediterranean?*

Given the amount of abiguity concerning this concept, it seems useful to give it some clarification and a Mediterranean-specific definition, knowing that the underlying principles of sustainable development are more important than the terminology being employed (eg. sustainable, supportable, viable...).

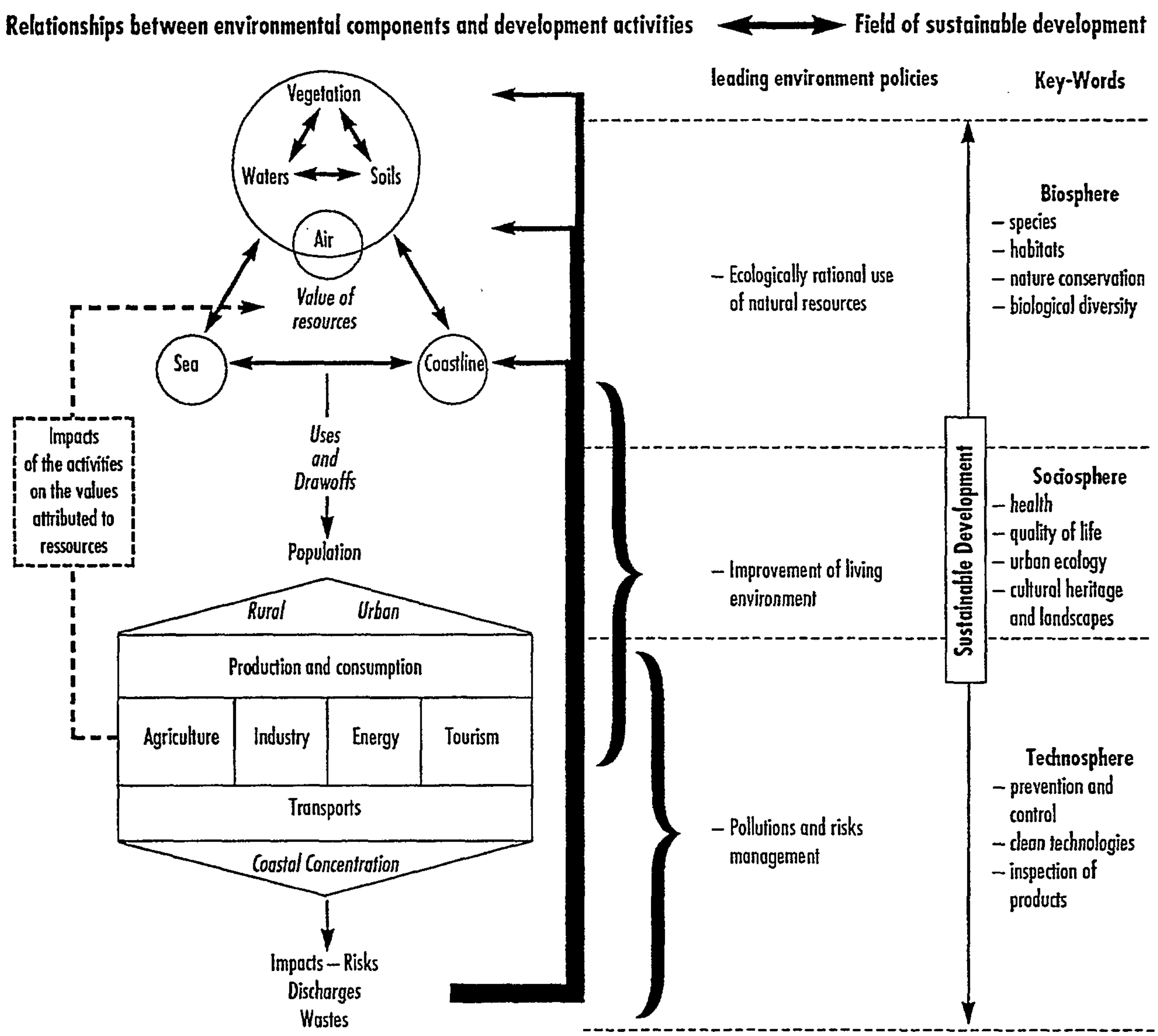
A personalised definition of sustainable development in the Mediterranean by combining the definitions given by the Bruntland report and FAO, could be as follows: "Development which is respectful of the environment, technically appropriate, economically viable and socially acceptable to meet the needs of present generations without endangering the possibility for future generations to satisfy theirs."

Sustainable development is first and foremost a model for integration; any reference made to it signifies accepting its underlying principles and the displaying stakes in the environmental, economic and social interactions and the way in which they are perceived and the manner in which to act upon them. <u>It is a process, not a state to reach.</u> It is only viable and imaginable at the global level, however, it is at the local level that actions should be taken to promote it.

The founding principles of sustainable development, annonced in the Earth Summit can be related to those principles inspiring the Blue Plan. They have been grouped and commented upon in the fascicle 5 according to three categories:
- the philisophical or ethical principles;
- the political principles; and,
- the methodological principles.

In order to contribute to the sustainable development, Blue Plan suggests two approaches:
- a regional approach leading to global comprehension and monitoring of the Mediterranean system over time, by enhancing relationships between environment and development to assess priority actions for sustainable development;
- a local approach which, from a prospective vision, aims to contribute not only to decision making but also for the integrated development and management of coastlines.

In each case, the Blue Plan uses systemic analysis highlighting relationships between the biosphere, sociosphere and technosphere (illustrated on the following diagram). These relationships are summarized in three tables in the fascicule 5:
- pressure of human activities on the environment;
- pressure of environmental degradations on the sociosphere;
- environmental interactions.




This diagram illustrates the relationships between environment components, development activities and outstanding environmental policies, among which: rational use of biosphere ressources, improvement of daily environment,and management of pollution and risks. Sustainable development systems cover all three fields (biosphere, sociosphere, technosphere).

***Which indicators are adapted to the Mediterranean Basin?***

In order to grasp the essence of sustainable development, the main feature of indicators must be their adaptability. This is why it is impossible to define one or more optimal indicators in all cases. However, the aim of this presentation is not to define the best indicators for a closed system, which would necessarily be limited in scope, but rather the procedure that can be used to build up indicators.

Indicators must include characteristics which belong to the specificities of the concept:

- they must be designed within the systemic context and consider economy as a sub-system of the surrounding sociosphere and ecosphere;
- they must include distributive elements, in the statistic sense of the word. The concept of sustainable development refers to the idea of equity and the assessment of indicators must explicitly show which social categories or which geographical areas are affected by environmental degradation;
- they must be applicable to prospective approaches;
- they must reveal explicit relationships, in other words, they must determine and describe why environmental issues, or environment, technosphere and sociosphere are interrelated;
- they must express the uncertainty related to understanding the ways in which ecosystems and technosphere operate, without limiting this to an economic uncertainty, in other words to a quantifiable range of risk.

Concerning the indicator development methodology for the Mediterranean Basin the first question was: Who will be receiving the information? These are people in charge of administrations (major national or international decision-makers) and actors in the field of land development and planning (States, local collectivities, businesses). These actors from the public and private sector of the Mediterranean Basin work at various levels. The first requirement for a system of indicators is therefore to comply with the plurality of observation levels and to examine more thoroughly the relevant levels of observation. The observation levels applied by MEDO are as follows:

- the entire Mediterranean level;
- the national level;
- the wateshed level;
- the coastal regions level;
- the local level: cities;
- the level of maritime zone.

Instruments will then have to be developed, in conformity with the indicator requirements, i.e., give information on state and evolution; allow prospective applications; and, comprise of distributive and standard elements. On the basis of this concept, some tools have been retained by MEDO for the development of indicators. Given that these tools are still being tested, only a short list of these tools will be included here (the complete presentation of their definition and their usage will be published later):

- state indicators: simple structural ratios; simple normative ratios; simple ratios of coastalisation; Gini indices (presents the distributive characteristics of an indicator); aggregate indices...
- indicators of evolution: simple comparisons; elasticity of substitution; elasticity communicating interactions...

Finally, the limits of these indicators must be examined, to assess how they may be completed, and which information systems are required to process them. At MEDO several tests are also underway to accurately evaluate the relevance and limits of indicators produced in this way.

The overall scientific approach is being conducted theoretically (this is the subject of the first part of fascicle 5) and also applied to several priority environmental parameters such as water (the subject of fascicle 2).

According to the major areas of problematics identified by the Blue Plan after long-term prospective studies of the relationships between development and environment, these tools will essentially be used for early and preventive integration of environmental issues to the multiform and multiplayer processes of development and environment. Their utility is based on better knowledge of procedures and decision-makers, in charge of coastal evolution trends.

### *Which actors for which actions?*

Qualitative comparison of Mediterranean countries efforts towards sustainable development requires information adaptation to the specific context of each country. Problems are country specific and the initial level of experience is not always comparable. This is why indicators must be reported and interpreted within the appropriate context, taking into account the specific ecological, geographic, social, economic and structural features of each country. For example, the relationship between expenditures for environmental protection and the state of the environment can only be assessed on the basis of the general national situation and additional information. If taken out of context, high expenditures could be interpreted as being used to deal with environmental conditions of mediocre quality or with a satisfactory level of quality which must be maintained.

Simultaneously, data must be available on institutions and decision-making instances in Mediterranean countries, and on the geographical level under their authority. This information is not only complementary to the pre-defined system of indicators, it is in fact the backbone of the system.

In matters of environment and development, the emphasis is most often put on technical factors and solutions. In fact, it is the institutions, through their presence or absence; capabilities or lack of capability; performance or non-performance, which determine whether these technical solutions will succeed or fail.

Institutional factors are, however, difficult to assess. To give an example, the following criteria are presented in fascicle 5 which are key elements for arrehending the diversity of situations:

- the breakdown of authority between the central State and territorial districts;
- the existence of supervising administrative authorities, or national or local agencies specifically in charge of the environment;
- the hierarchical level of a governmental organization and its field(s) of authority;
- the logic behind the creation of environmental institutions;
- the available means;
- national plans and programs for environmental protection;
- the legislation;
- the adoption of regional or international environmental obligations.

Some of the of these criteria of analysis were used in a preliminary comparitive study of institutions conducted by MEDO; this is the objective of fascicle 3.

The assessment of the administrative and institutionnal features of a country requires a preliminary study on national situations and the existing institutions in order to clearly understand how roles are distributed and which action is currently undertaken in each country. The approach requires qualitative and not only quantitative analysis of the actors' interplay.

As a conclusion to these somewhat theoretical considerations, it must be emphasized the conceptual complexity of sustainable development indicators, which to some extent explains the difference between the political will to engage this way and the difficulty of translating this will into tangible action plans.

### 2.2. The Mediterranean Information System for Environment and Development (MEDIS)

The creation of MEDO's information system required a detailed study of Blue Plan's organisation in general and of MEDO in particular, in relation with the most recent technologies in data collection, storing, processing and communication. Indeed, within the prospective studies at the Mediterranean Basin level, Blue Plan had already accumulated considerable quantities of data on Mediterranean countries, essentially those concerning the socio-economy.

The Mediterranean Information System for Environment and Development (MEDIS) is a simple and efficient tool created by MEDO to achieve the following objectives:

- to structure data available at the Blue Plan and to increase the access level to data scientific users;
- to assist in data analysis and development of relevant indicators;
- to draw up tables, charts and thematic maps.

In the long term, MEDIS will also become:
- an assisting tool for systemic and prospective assessments;
- a modelling and simulation tool;
- a tool for data exchange between MAP centres, international institutions, and national observatories.

### *System content and structure*

Fascicle 5 presents provisional results, lessons and perspectives which can already be drawn from the gradual establishment of MEDIS. More particularly, the system's content is described in terms of database structuring and in quantitative terms of open fields of data and data effectively entered.

The statistical database (SDB) that was developed through the use of a database management system (FOXPRO) is running under Windows 3.1 and covers all socio-economic and environmental data which Blue Plan has treated at different representative scales. A "Man-Machine" interface has been developed. It gives the potential users the possibility of processing, storing and handling all data and downloading them to other types of software for analysis, state assessment printouts or map making.

The equipment required to use the MEDIS software is an IBM PC/AT micro-processor or compatible computer with at least 8 megabytes of live memory, a disk drive and an 80 Megabyte harddisk. Execution time of the MEDIS application strongly depends on the computer. The minimal system lay-out requires an 80486 processor, running at 33 MHz and a graphic interface with display resolution of 800*600 pixels in a 256-color palette. Due to its user-friendliness, the software does not require extensive training.
With regards to Geographic Information Systems (GIS), the Blue Plan uses two GIS stations: the first uses the Atlas GIS software distributed by Strategic Mapping Company, the second uses PC ARCINFO and ARCVIEW 2 software distributed by E.S.R.I. The two softwares share an A3 graphics tablet, a black and white HP 4M printer with 600 pixel resolutions by inch and a Canon CLC10 colour printer.

Among the socio-economic data which form 80 % of the current database, 90 % of the data represents the national level, or "country" and are classified according to such themes as population, energy, agriculture, macro-economy and tourism, etc. The largest number of available data covering the period from 1950 to the present involves the time range 1960 to 1990. The volume of the database, in its present state represents 10 Mo for 150 000 statistics.

The detailed study carried out on SIMED, to identify the available supplementary data, has led to a list of parameters, sources and partners that is as exhaustive as possible. These lists of partners and identified sources are detailed in fascicle 5 according to the environmental or socio-economic parameter concerned.

### *Lessons and perspectives*

The main difficulties encountered during the implementation of MEDIS, stem from the way in which MEDO has been developed. As is the case for any major project, technical and scientific factors are difficult to measure in the pilot phase, which is why this is such an interesting stage.

Activity ranking and allocation

The main trends defined in the pilot phase of MEDO have proven to be insufficiently detailed to allow specific description of tasks and clear allotment of resources and means. To guarantee project feasibility and success, permanent scientific support and proper co-ordination and management of the Blue Plan team will be required.

Application of the information system within the organisation

The relevance of the information system to MEDO's activities, is its capacity to meet user demands swiftly and specifically. It also involves its capacity to manage and make readily available large quantities of information, required by Blue Plan prospective studies.

This is why it is absolutely essential that the Blue Plan team have thorough knowledge of the role and capacity of the computer tools currently developed, especially GIS, in order to establish sustainable development indicators and analyse the interactions between environment and development. Constant efforts must be made to train and inform users on the progress of the development of the information system.

Specifications and gradual development of MEDIS

Although a technical team has been appointed to specifically develop computer systems for the Blue Plan, MEDIS is the result of permanent multidisciplinary work between computer specialists and scientific users. The data processing team work must therefore be organized stringently to allow the construction of the software elements of the emerging system simultaneously with the response to users.

In fact, this gradually discovers the tool and hence, make their expectations. Such expectations are linked to the development of scientific methods specific to MEDO studies which were not sufficiently clarified prior to MEDIS's start-up. As a consequence, multidisciplinary teams hesitated as to their direction which is understandable during the pilot phase of MEDO.

Among the important points that have suffered from this state of things we can highlight the selection of geographical observation levels; the type and volume of data to manage and/or store within socio-economic and environmental data; the type of processing required particularly in the development of environment and development indicators; and, the quality and quantity of software products to develop in response to user needs inside and outside of Blue Plan.

To develop the work specifications of the observatory's studies and the Blue Plan in general in a compatible form with the activity programme of a MAP centre will permit the use of MEDIS to be improved. This will be more efficient as the user demands will be validated and coherent with the suggested work specifications.

Supplying MEDIS with statistical and geographical data
MEDIS essentially began with a foundation of socio-economic data which was based on Blue Plan's prospective studies done at a global scale and over a time scale of more than 10 years. To date, MEDIS has concentrated its efforts on structuring data in the computer framework and on their accessibility for a growing number of scientific users. Its has also focused on additional data collection and research, acquisition and introduction of environmental data into the MEDO database.

The information system, as structured and completed during the pilot phase, requires permanent improvement of data collection for each scientific field considered as a priority by MEDO. This is only feasible through the contribution of regional activity centres of MAP and national observatories – MEDO partners, supported by the usual database and other statistical yearbooks of international, national or regional organisations.

In view of the large quantities of data that need to be processed annually, data input is also an important issue for MEDIS. It must also be stressed that when such data exists they are often heterogeneous in quality and require validation by scientific users.

The constitution of geographical backgrounds is linked to the quality and quantity of physical and thematic maps to be digitised. This operation is a lengthy procedure which can sometimes lead to a time lag between data input operations and the development of statistic and geographic maps and other software products.

Using data from remote sensing at a fine scale and the proper interpretation of satellite images are intresting means for completing the information required by the activities of an "Observatory" type organisation. Integration of this type of information to geographical and statistical database will be a major asset for thematic processing of MEDO.

***The MEDO partner information systems***

To improve the exchange of knowledge and know-how between BP/RAC and its partners, it is useful that information systems be compatible, allowing the easy exchange of data and processing modules. Accordingly, fascicle 5 is an analysis of the data processing tools (content, hardware) of the MEDO closest partners, i.e. the other MAP regional activity centres, while proposing a possible configuration for a network using current telecommunication techniques.

There follows a presentation of the current state of the national observatory projects in the countries considered as pilots for MEDO action:

Morocco, Tunisia, Turkey, Albania. Finally, some international programmes of interest to MEDO are presented as a complementary subject.

## 2.3. Documentary tools

The unit in charge of the documentary function was clearly individualized in Blue Plan in 1993 within MEDO framework. Accordingly, it was designed as a tool aimed at offering services to the Blue Plan partner network.

During the MEDO's current pilot phase, documentation-information work is being built around the following priority areas:
- study of the documentary collection at BP/RAC;
- identification of the various information sources in MEDO's fields of interest such as institutions, on-line data bases, general and specialized periodicals, institutional and scientific serials, libraries and documentation-information centres, etc.;
- definition of methods and tools needed for documentation management.

At the same time, effort was made to better identify the expressed and latent needs of potential users, who are often geographically remote. Little by little, a documentary function has been established that is both subject-based and institution-based, the first results of which are outlined in the fascicule 5.

### *Collection of institutional information*

One of the Blue Plan's goals, in particular that one of MEDO, is to provide authorities and decision-makers, at the local, national or international levels, with objective elements of information so that they can direct their action towards sustainable development in the interest of the entire Mediterranean area. To develop the Observatory function, Blue Plan must work in close collaboration with various partners such decision-makers in public bodies, international organization experts and specialists from scientific organizations.

Within this framework, the documentary function has to accompany and contribute to the development of Blue Plan's technical and scientific partnership and favor general Mediterranean inter-institutional cooperation. As it stands today, it is a tool for collecting and processing meta-data, that is referencial data on organizations. The objective is to disseminate the information or data gathered as a means of knowing "who is doing what" in the fields of development and environment in the Mediterranean.

The volume and the interest of the gathered information and the "philosophy" of the process put underway revealed the need to summarize and hierarchize the information so as to produce useful tools for Blue Plan's national and regional partners. This gave rise to the development of a specific research programme on the Mediterranean institutions concerned by sustainable development since the question, for a better organization of MEDO activities, is to produce information, methodologies and indicators targeted on users.

As a first phase of this new study programme, a series of national surveys has been initiated. They underline the diversity of contexts and existing institutions as well as the constraints and country-specific concerns. The *Mediterranean Country Profiles: Institutions – Environment – Development* derive from this work. They are structured as follows:
- the first part recalls the geographical framework of the country with an overview of its national resources,
- the second part presents the social and economic context, the main human activities and their pressure on the environment,
- the third part deals with the main public actors being directly or indirectly concerned with environmental issues, their fields of action and means as well as the responses found to environmental concerns (planning and programming, legislation, international cooperation).

Examples of this kind of survey have been produced for the countries mentioned above, Albania, France, Morocco, Tunisia and Turkey. They are distributed as individualized documents during the Ninth Meeting of the Contracting Parties in Barcelona (June 1995). Designed as reference tools, they provide basic summarized information which will be periodically updated in close cooperation with the countries concerned.

A second phase consists on carrying out comparative institutional studies, the first results of which are presented in Fascicle 3.

### *Informative watch*

The time when a documentation centre manager could feel proud of answering most demands by means of information that his department had itself processed, or the documents that it had gathered, is a thing of the past. A documentation unit is no longer a "library"; it is rather a window providing access to information no matter where that information is located.

In fact, documentation centres have become diversified. Some of them, generally large departments, are specialized in data gathering and processing, systematically and exhaustively. In some cases, they can even dispense with contacts with the end user and work only with intermediaries (other documentation centres). Other smaller and more numerous units keep document acquisitions to the minimum (except at the heart of their speciality areas) and make large use of databases and services offered by the networks they are part of.

The Blue Plan documentation unit corresponds to this kind of small structure. Therefore, in order to set up a mechanism in charge of monitoring the Blue Plan's fields of interest, the novelties and new perspectives they may disclose, two complementary areas of work have been defined:

- creating a database intended initially to store then to disseminate the documentation available at BP/RAC,
- identifying and publicizing the on-line documentary databases that contain pertinent information about sustainable development and the Mediterranean area.

Fascicle 5 presents the following:

- The Blue Plan's documentary data bases;
- The on-line databases of potential interest to MEDO and its partners. Thirty documentary systems on environment and development were chosen for exploration.

### *Towards the establishment of a Mediterranean documentary network*

Given the explosion of information, documentation centres can no longer manage all the information flows. Indeed, scientific information is expensive and not always adapted to the specific and immediate needs of the users, in most cases due to a lack of resources. It is only by working within a network that these costs can be spread and shared, at the same time ensuring, by establishing substantial documentary reservoirs, that users have an access more suited to their varying needs.

Aiming to a future network of documentary activities on the Mediterranean, a co-operation work has been started with other documentary units in order to increase knowledge about studies and publications on the Mediterranean and to better inform each other on the access ways to publications and documents in general.

This initiative is even more necessary as regards grey literature. Due their rarity, these documents are difficult to gather and it is only by being close to the source that they can be found. Therefore, their collection is only possible by working on a network. Furthermore an informative watch can be better achieved by working in co-operation.

Contacts have been made to better know " who is doing what " in MEDO's fields of interest and what their achievements are in the documentary field (methodology, tools, thesauri). At the present time, emphasis is being placed on the exchange of publications. The following table shows the institutions with which a co-operation has been established and should be strengthened.

# 3. Facts and figures on the Mediterranean

Now that the theoretical methods and logistic tools that MEDO is setting up to address its missions of observation and evaluation for sustainable development in the Mediterranean have been introduced, it is useful to recall the geographical entity of MEDO 's investigations and its main physical, human, economic and environmental features. This will be done before moving on to deal with the more operational studies and actions that MEDO has launched on and for the Mediterranean countries.

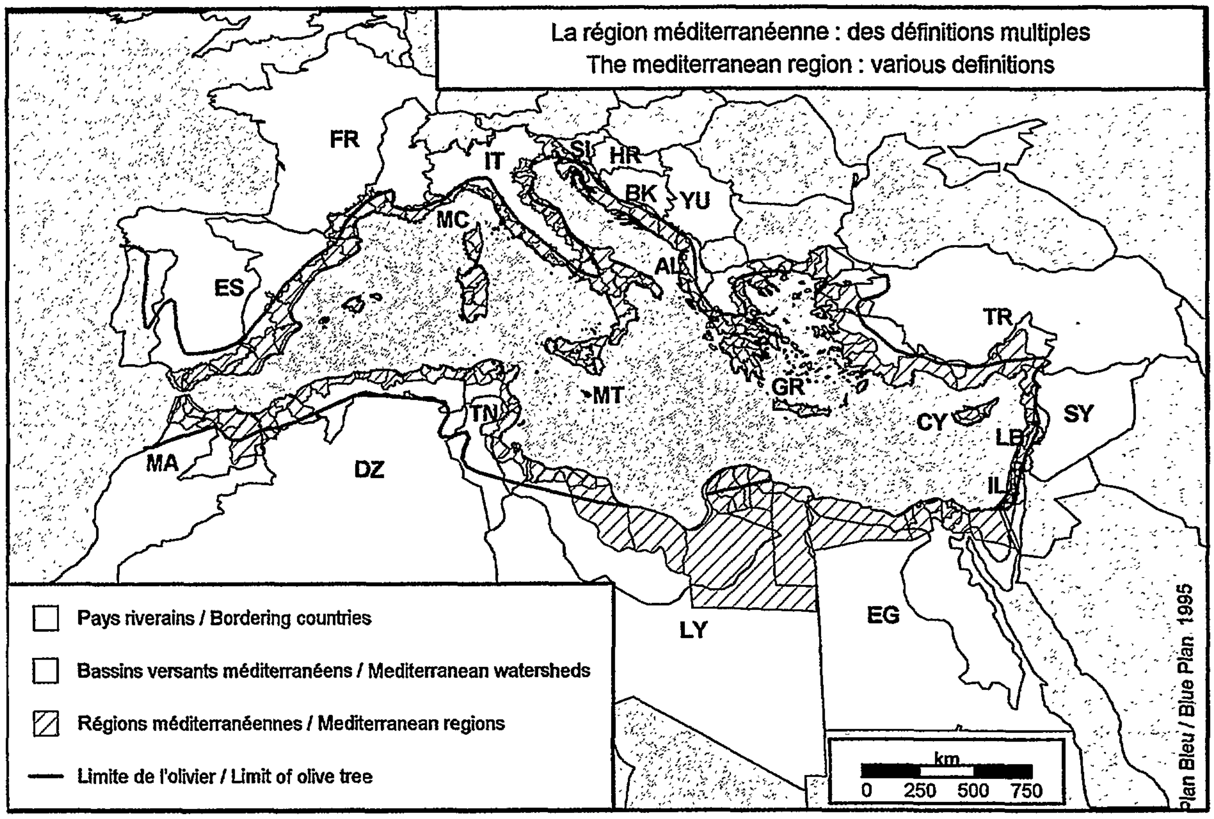
### 3.1. Key figures concerning the region

***The Mediterranean region: various definitions***

The definitions of the Mediterranean region are based equally on objective and scientific criteria and on chosen objectives.

This involves three physical components: the sea, the coast, the land. The terrestrial limit most often considered coincides with that of the olive groves. The other limit is that of catchment areas where rivers flow into the Mediterranean: the watershed forms a Mediterranean "basin".

Administratively, data stem from the entities of territorial divisions, whether these are regional districts or local units (departments, provinces, governorats, willayas, ...). However, within the major political and socio-economic options at national level, all Mediterranean Basin countries are considered as Mediterranean, i.e., 20 States recognized by the UN (October 1994); this is also the case for alliances and institutions of political, financial, cultural influence: MAP, EU, O.I.C., OECD, UMA, etc..


La région méditerranéenne : des définitions multiples
The mediterranean region : various definitions
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CY
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LB
MA
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LY
EG
Pays riverains / Bordering countries
Bassins versants méditerranéens / Mediterranean watersheds
Régions méditerranéennes / Mediterranean regions
Limite de l'olivier / Limit of olive tree
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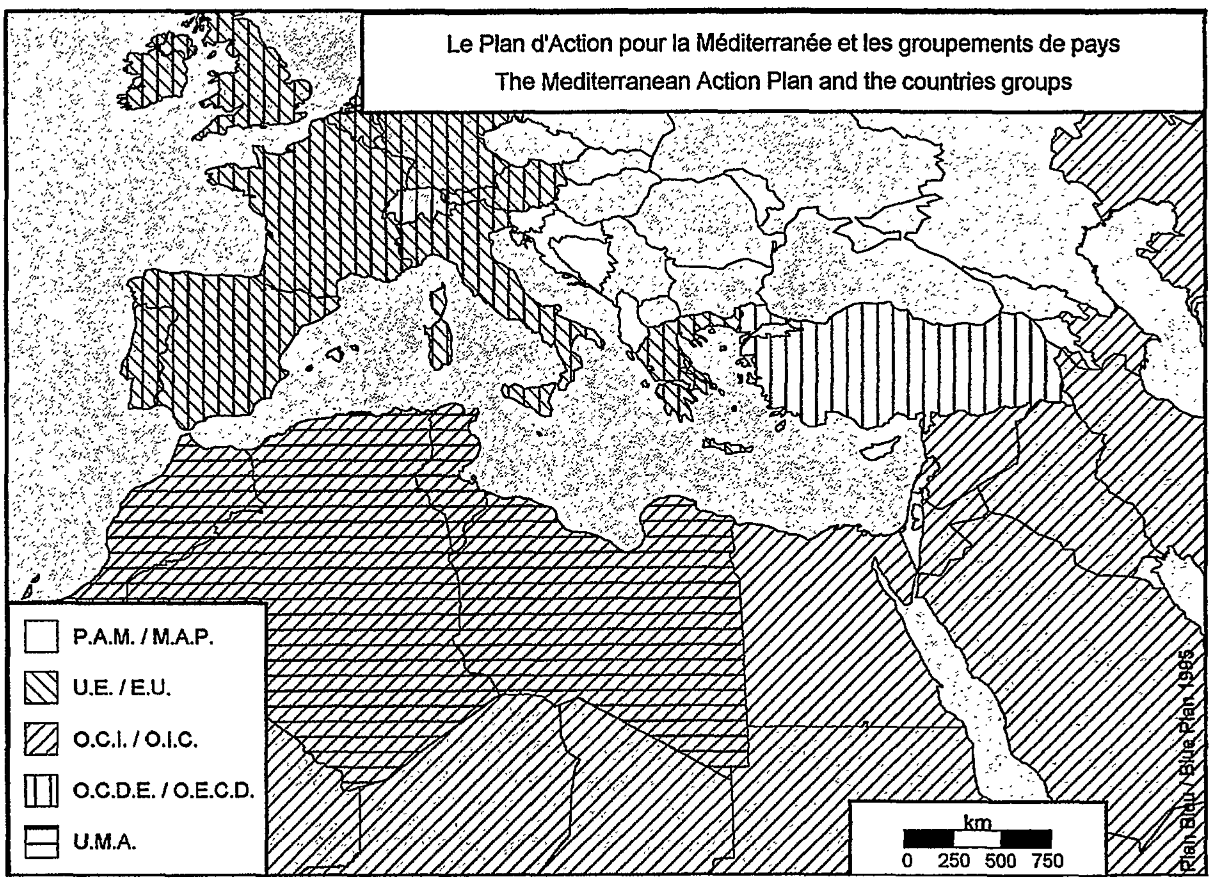
Plan Bleu / Blue Plan 1995


Le Plan d'Action pour la Méditerranée et les groupements de pays
The Mediterranean Action Plan and the countries groups
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O.C.D.E. / O.E.C.D.
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Plan Bleu / Blue Plan 1995

### *The Mediterranean basin and the world*

If compared with the planet surface of emerged lands, the Mediterranean countries represent 6.42%; Mediterranean regions[1], 0.65%.

With respect to the surface of Mediterranean countries, the Mediterranean regions represent 10.2%; catchment areas, 21.77%.

At the crossroads of three continents, the Mediterranean stretches over 3,800 km; its surface is assessed at 2.5 million $km^2$, or 0.8% of the total ocean surface; its volume is approximately 3.7 million $km^3$.

In 1950, the population of all Mediterranean basin countries totaled 212.5 million inhabitants, 8.44% of the world's population; the Northern countries, from Spain to Greece, represented 142 million or 67%, the most densely populated country being Italy with 47 million inhabitants, then France, Turkey and Egypt.

In 1992, the Mediterranean population was estimated at 380 million inhabitants, or 7.2% of the world's population; the Northern countries represented 47% of the total, the most highly populated country remains Italy (58 million) followed closely by France, Turkey and Egypt.

### *Mediterranean Geography: mountainous and changing*

Mountain ranges formed during the primary era, moved, rejuvenated, fractured; mountain ranges folded and broken by the alpine uplift of the tertiary era – caused by the collision of Eurasian and African continental shelves – still underway at the rate of 1 to 2 mm/year; volcanic eruptions dating back hundreds of millions of years ago or volcanoes still active today; several narrow coastal plains; rare open deltas where the sea flows in; a desert, the Sahara, bordered by undifferentiated coastal areas. This is the Mediterranean landscape, varied, complex, always moving; the African shelf is still sliding under the Eurasian shelf, which leads to frequent earthquakes, particularly in the central Mediterranean. Under the sea, the continental shelf is often reduced to its simplest expression; except in the bays, in the High Adriatic Sea and in the area of large deltas, canyons and valleys form a straight-line with the land. The Mediterranean is a deep sea, with an average depth of – 1.500 m and – 5,000m in the Peloponnese high seas. There are thousands of islands in the Mediterranean; Italy and Greece represent 73% of island territories, and others are independent States: Malta, Cyprus.

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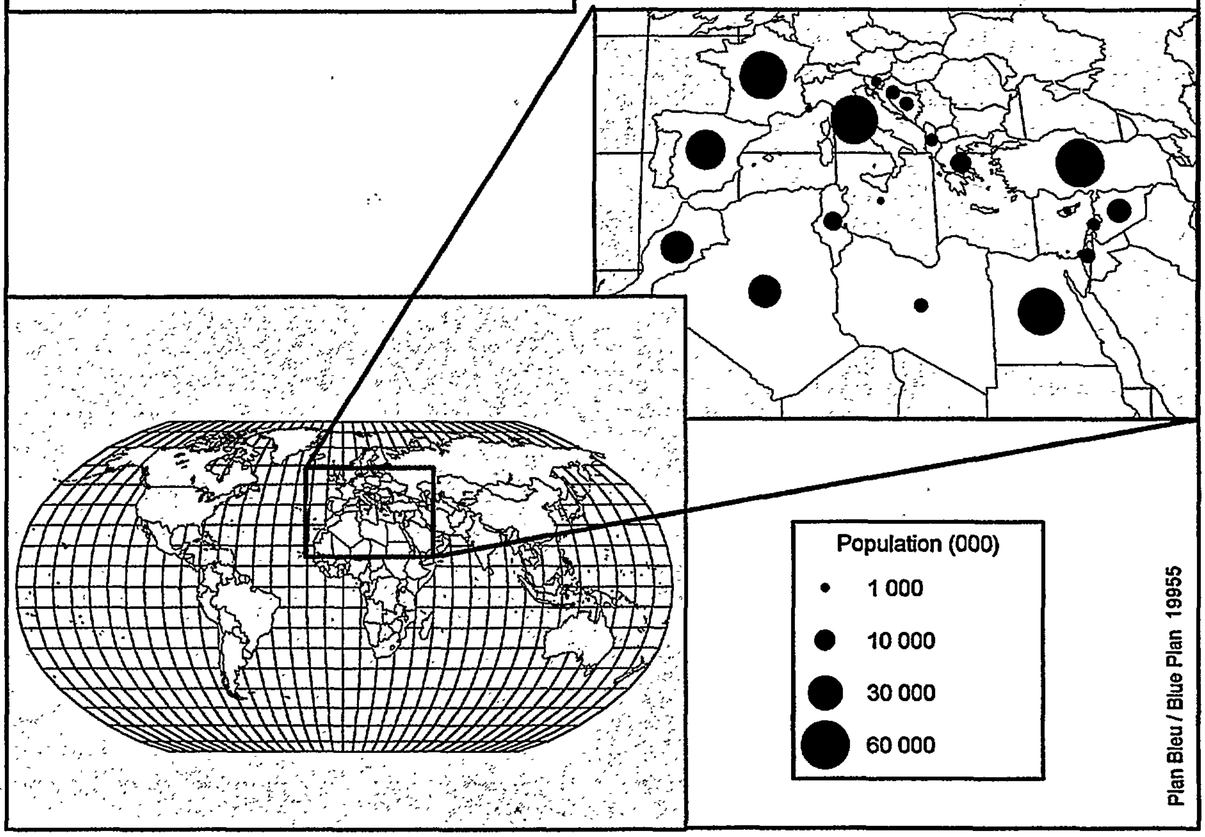
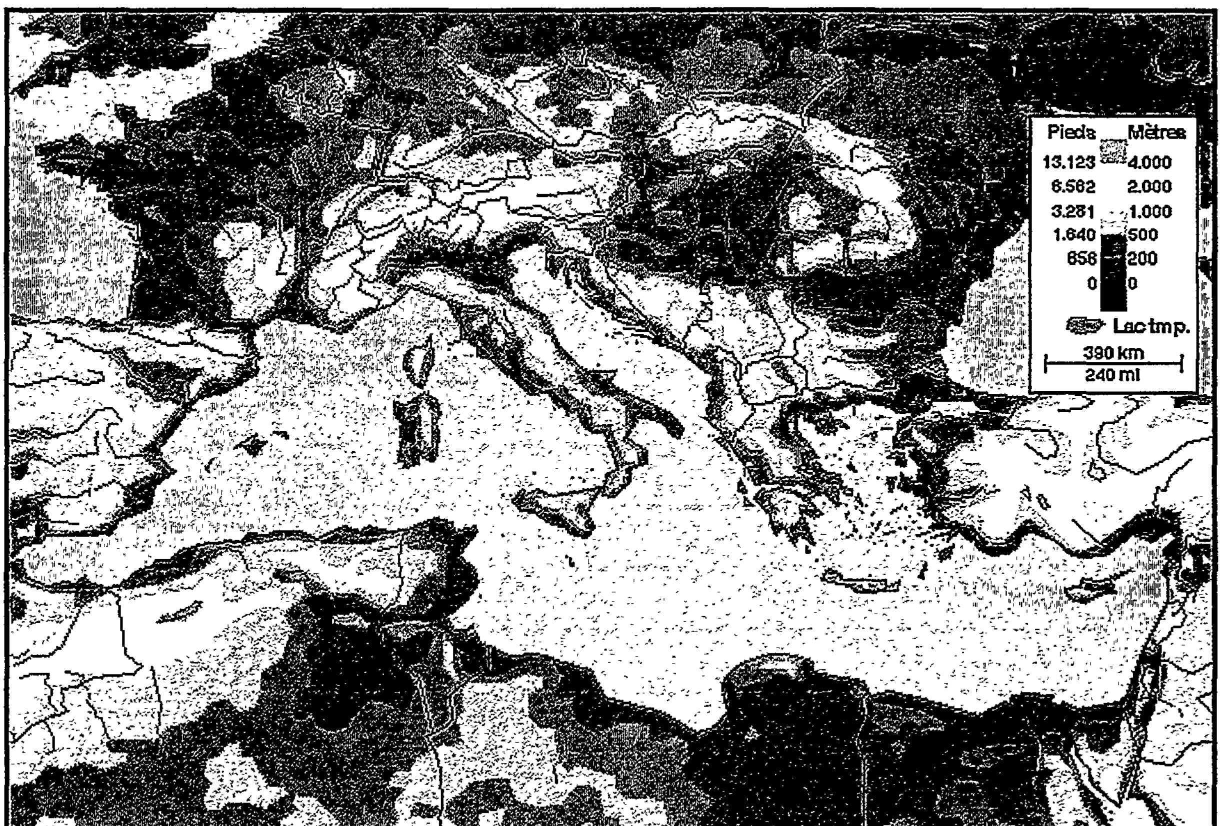
[1] NUTS 3 regions : Level 3 of the Nomenclature of Territorial Units for Statistics (i.e., departments, provinces...) for European countries, and equivalent units (governorats, willayas...) for the other Mediterranean countries.

Le bassin méditerranéen dans le monde
The mediterranean basin and the world




Le Relief méditerranéen / The mediterranean refief

Source : © 1993 Brøderbund Software, Inc.

Plan Bleu / Blue Plan 1995

### *Fertile but fragile soil*

Geological and ecological history in the Mediterranean Basin has resulted in a superposition of highly varied soils; they were essentially formed over a sedimentary substrate resting on a metamorphic base. The soils are usually fertile and exploited or suitable for agriculture. But considering the climatic conditions of the Basin, they are sensitive to physical and chemical damage. This is why increasingly, fertile soils are difficult to recover for agriculture.

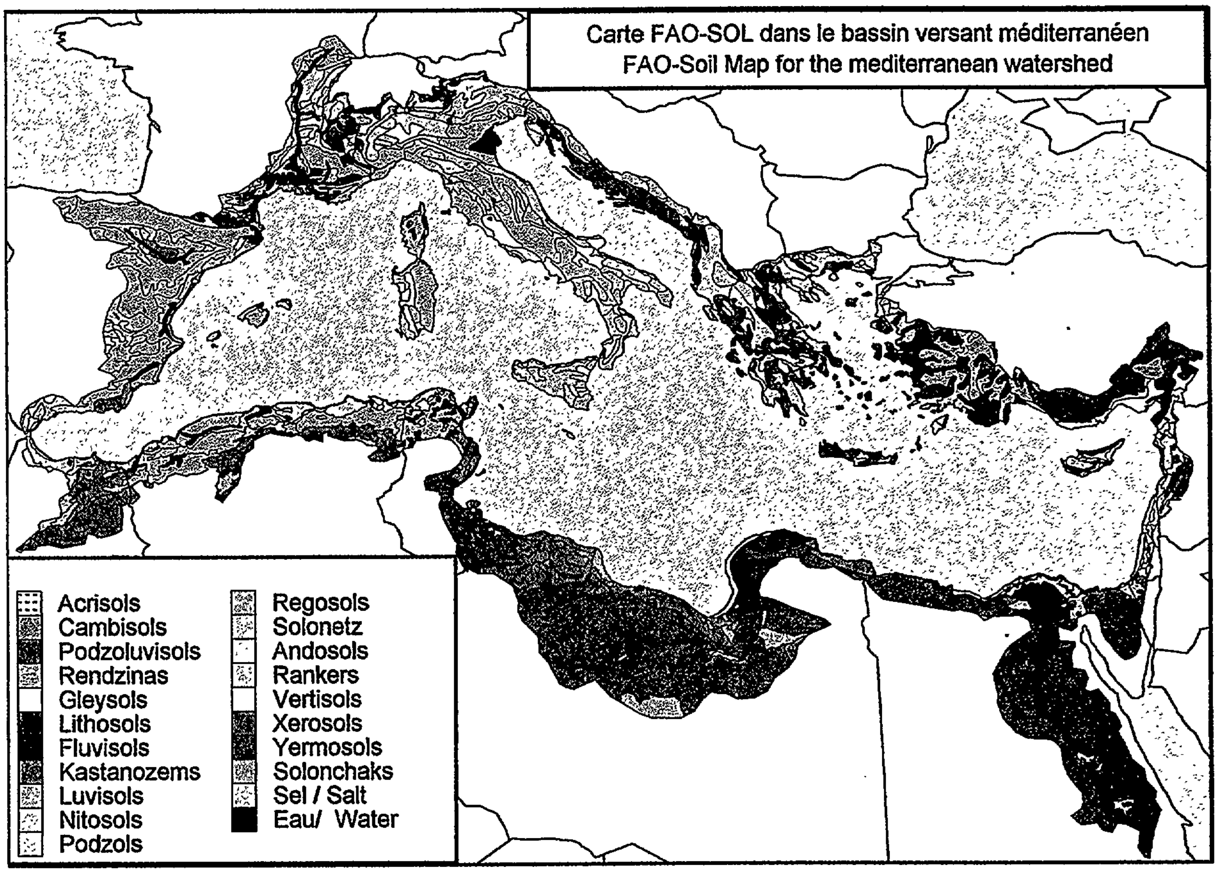
44.3% of these surfaces are covered by fertile soils: they are cambisols for 29% (burnished at an initial stage of alteration), fluvisols at 6.24% (alluvial deposits, the most fertile in the area), the luvisols at 9.24% (red Mediterranean soils or "terra rossa").

The other types of soils, listed hereunder, represent 52% of surface areas. They are also cultivated or used for grazing. However, this leads to many problems: congestion, salinization, erosion, destructuration, packing ...

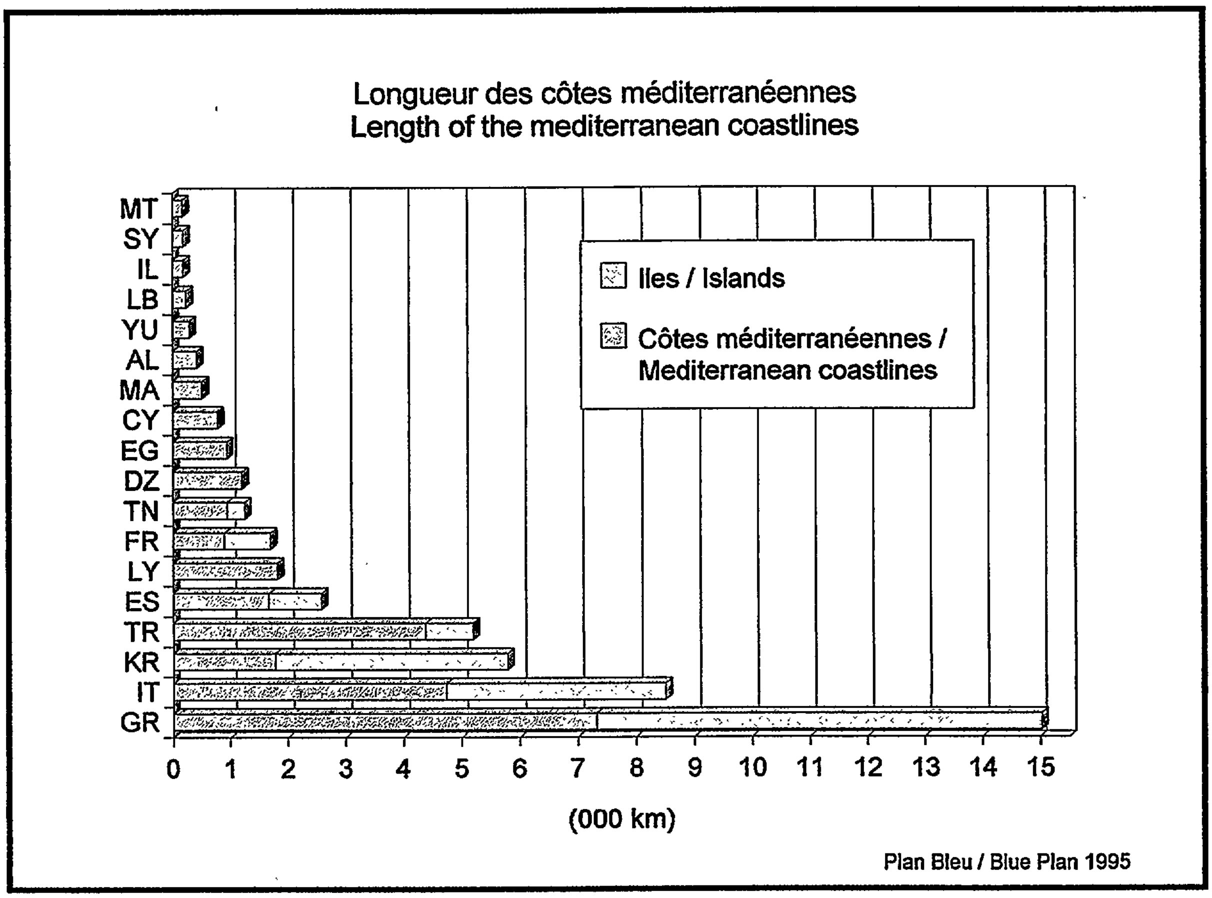
1. heavy, crackling clayey soils (vertisols): covering 1.4% of the entire surface but more abundant in the Near East;
2. salty, brackish soils (solòchaks): scarce but nonetheless a problem in North-Africa;
3. thin soils on strong slopes, and heavy-textured soils (lithosols, rankers, rendzines and regosols): covering 22.14% of the surface and particularly abundant in former Yugoslavia;
4. semi-desertic soils and deserts (yermosols and xerosols): covering 27.11% of the basin surface, especially in Libya and Egypt. Their degree of fertility is dependent upon availability of water.

### *Long and varied coasts*

The Mediterranean coasts cover approximately 46,000 km: 74% in Europe (without including continental Turkey), 14% in Asia (with continental Turkey), 12% in Africa. The island surface alone covers 19,000 km. Rocky coasts represent about 54% of the whole, the rest being tectonic land.



Carte FAO-SOL dans le bassin versant méditerranéen
FAO-Soil Map for the mediterranean watershed
Acrisols
Cambisols
Podzoluvisols
Rendzinas
Gleysols
Lithosols
Fluvisols
Kastanozems
Luvisols
Nitosols
Podzols
Regosols
Solonetz
Andosols
Rankers
Vertisols
Xerosols
Yermosols
Solonchaks
Sel / Salt
Eau/ Water

Longueur des côtes méditerranéennes
Length of the mediterranean coastlines
MT
SY
IL
LB
YU
AL
MA
CY
EG
DZ
TN
FR
LY
ES
TR
KR
IT
GR
Iles / Islands
Côtes méditerranéennes / Mediterranean coastlines
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
(000 km)
Plan Bleu / Blue Plan 1995

### *A sea in motion*

Formed of individual seas, the Mediterranean was born 6 million years ago, when the Detroit of Gibraltar opened to allow the Atlantic Ocean to penetrate the desertic basin where river flows could not compensate evaporation rates. It is today almost tideless, except in the Adriatic and the Gulf of Gabes where the limited depth and the narrow coasts are sensitive to tides. The theoretical period for "water renewal" is 90 years and that of vertical change 250 years.

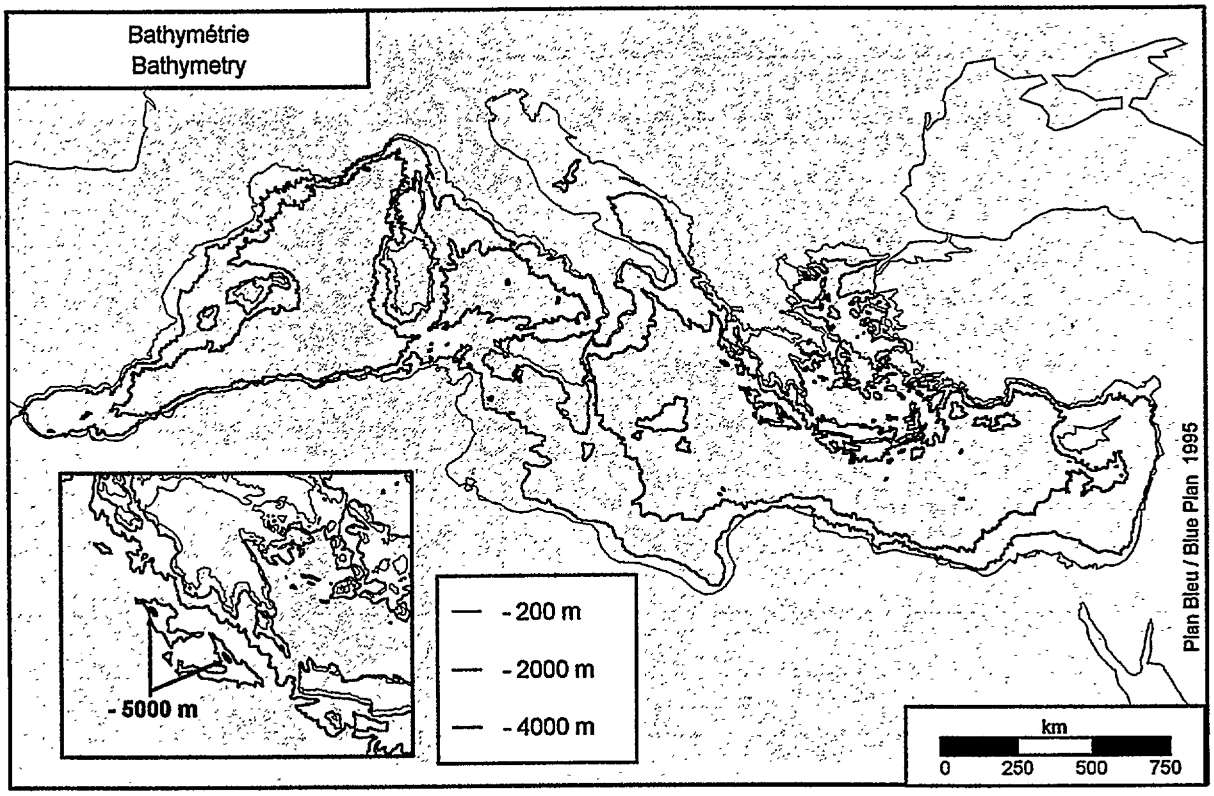
Water losses from evaporation – 2,900 $km^3$/year, i.e. a 1m deep water layer- and from the outflow from Gibraltar – 1,5 million $m^3$/sec – must be "renewed". On the average, the net contribution of the Black Sea to the Mediterranean is 6.5%, that of rivers 16.1%, that of rains 33.3%, that of the Atlantic, by the water flowing into Gibraltar (slightly higher than the outflow), 44.1%, i.e. a net global contribution of approximately 93,000 $m^3$/sec.

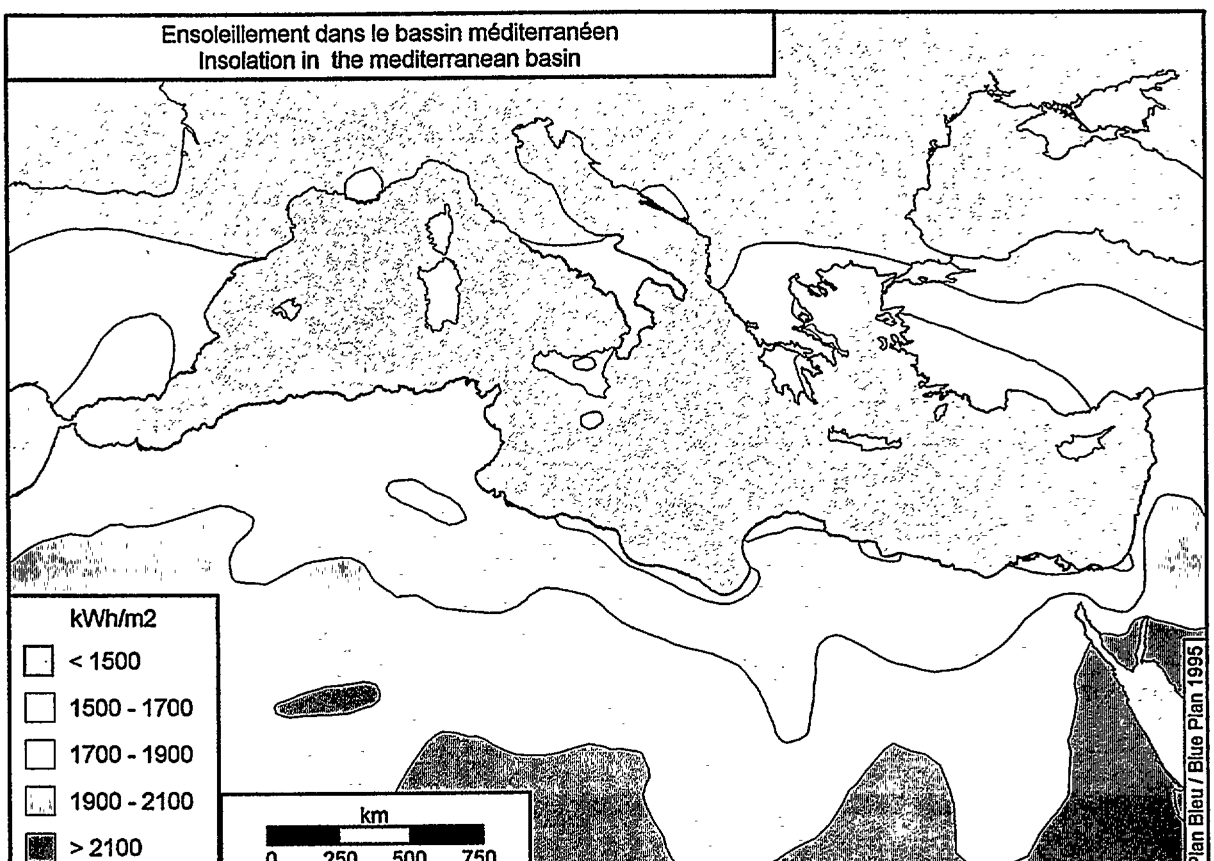
Increasing evaporation and smaller quantities of clear water towards the east explain that the salinity of the Mediterranean is increasing from west to east: 36.5% in the Alboran Sea and 39.5% in the Levant Basin; average rate is 38%. Saltier waters accumulate in the deep zones and initiate a specific circulation system, shallow thresholds separate the seas (-320m at Gibraltar, -50m in the Bosphorus, -200m in the Dardanella, -400m between Tunisia and Sicily), all these factors contribute to uniformization of temperatures, highly variable at the surface, at 13°C of thermocline (approximately – 100m) in very deep zones.

### *Original climate resulting from varied influences*

The Mediterranean climate is above all determined by the interactions between the desertic zone in the South and the Atlantic Ocean in the west, in other words, by influences outside the Mediterranean. However, the latitude and protection of the surrounding mountains, as well as the presence of the sea, play an important role. The sea stores heat for the lands around it, it moderates temperature variations and regulates rains and winds. Mild, rainy winters, early springs, hot, dry, sunny summers, rainy fall seasons are the dominant characteristics of this climate. The number of rainy days is limited and even more so in the south, but rainfalls are often violent. The sun shines over 2,300 h/year. However, the presence of mountains and the surface of the area induce a variety of differences, from dry to damp Mediterranean climate.

The characteristics of the Mediterranean climate can also be found in the regions of the Cape in South Africa, San Francisco in California, Perth in Australia and Valparaiso in Chile; these regions are a transition between the temperate and tropical zones. The Mediterranean Basin is the largest area where this climate can be found: in latitude from 28°N to 44°N, and in longitude from 5°W to 33°E.


Bathymétrie
Bathymetry
- 5000 m
- 200 m
- 2000 m
- 4000 m
km
0 250 500 750
Plan Bleu / Blue Plan 1995


Ensoleillement dans le bassin méditerranéen
Insolation in the mediterranean basin
kWh/m2
< 1500
1500 - 1700
1700 - 1900
1900 - 2100
> 2100
km
0 250 500 750
Plan Bleu / Blue Plan 1995

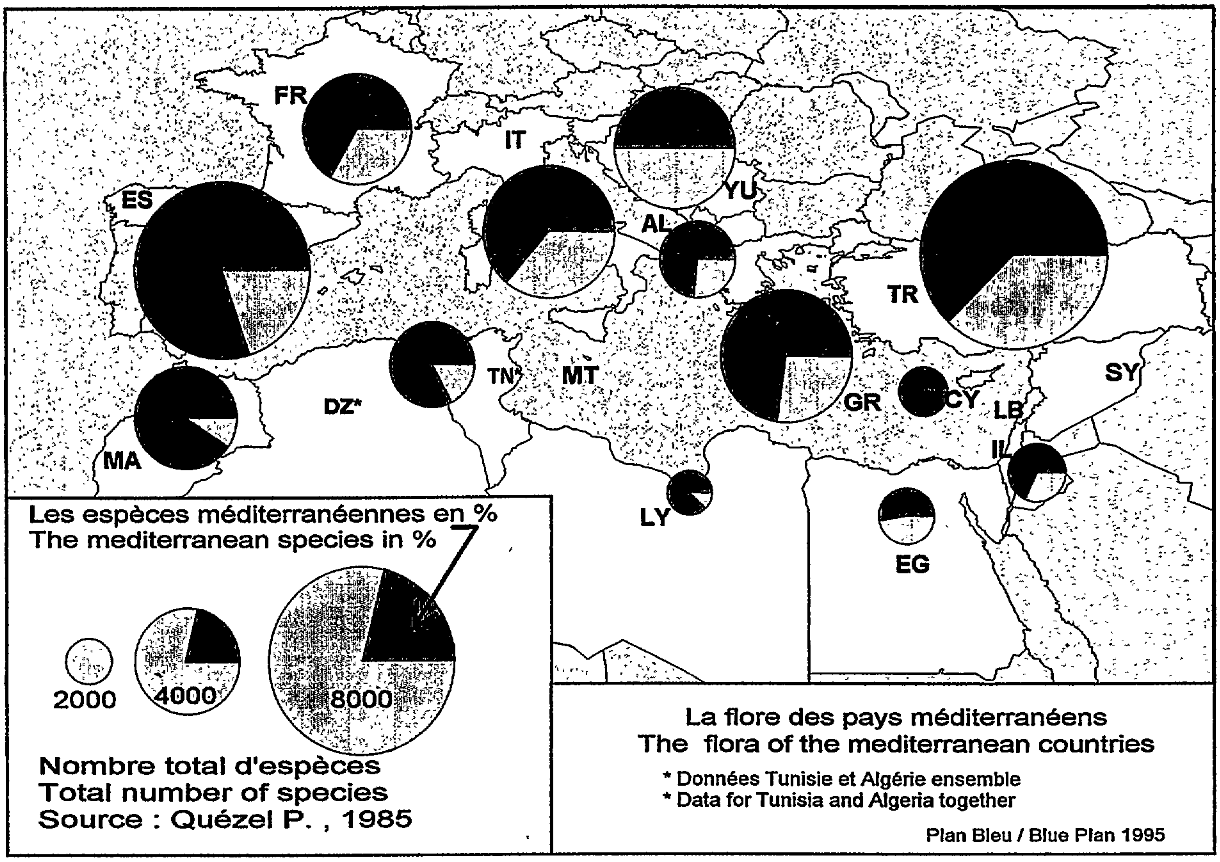
### *Rich flora, fauna where symbol species are declining*

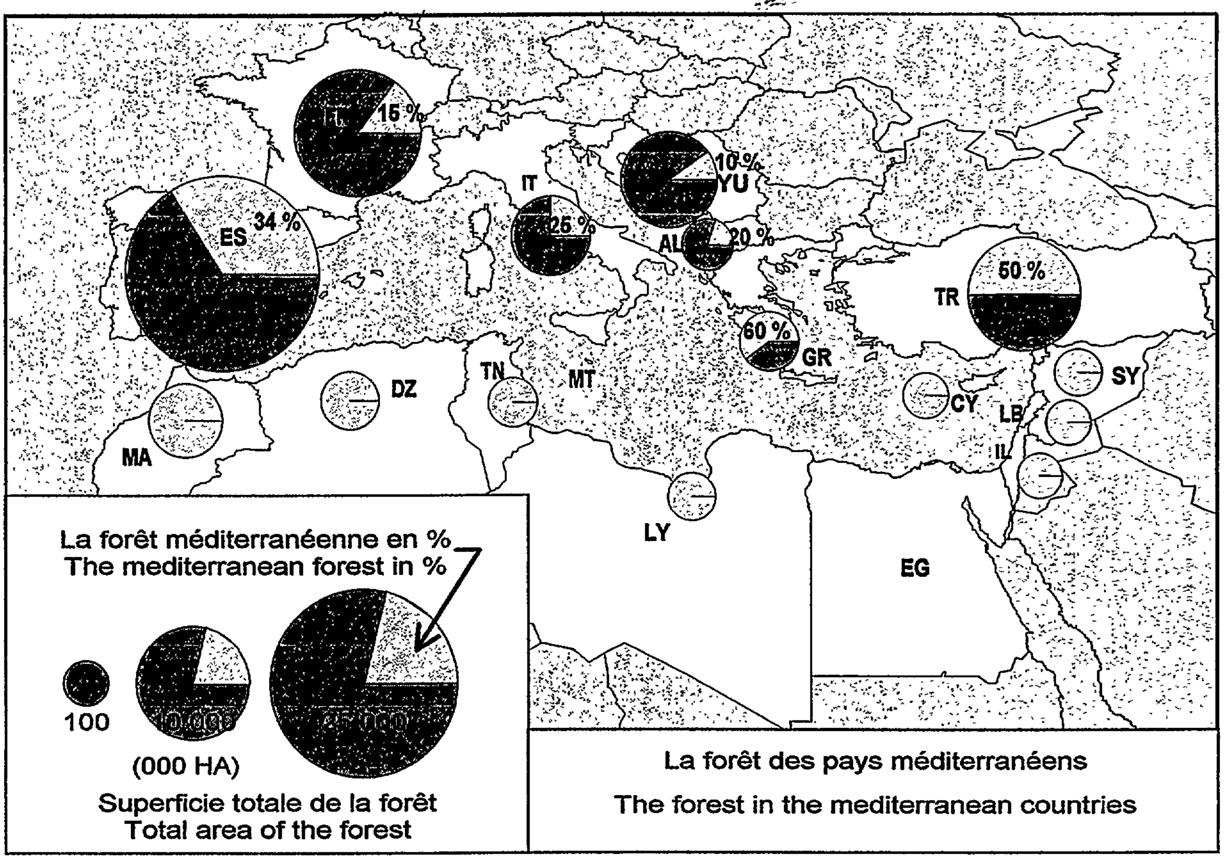
Resulting from the situation at the crossroads of floristic trends, from the parcelled geography, from the many islands, from climatic conditions inducing biological cycles and specific morphological characteristics, the wealth in flora around the Mediterranean is considerable, representing approximately 25,000 species, of which over 10% are endemic – as a comparison, the Australian continent can only boast of 15,000 species. Furthermore, the Mediterranean Basin, particularly the Near East and Turkey, is the cradle of the "wild parents" of several cultivated varieties indispensable to human nutrition.

Fauna is also considerably rich, even if, under human pressure, the large land and sea mammals (cetaceans, monk seals), as well as sea turtles are in constant regression. Thus, today, the Mediterranean bioclimatic region shelters 2.5% of reptile species while it only represents 1.3% of emerged lands.

### *The forest plays a fundamental role*

The Mediterranean forest is characterized by persistent foliage, the green oak, and several varieties of pines, among which the Alep pine. It has the largest number of anthropic features and is one of the most damaged forests in the world: it now only covers 5% of its initial surface, 32 million hectares; 12 million hectares are covered by maquis and garrigues, as a result of damage. However, it continues to play a central role: north and south, in the battle against soil erosion, in the regulation of water flows, in the maintenance of biodiversity and landscape quality; in the south, as grazing and picking grounds, for firewood mainly (3 to 10 tons of wood/ha/year). In the north, the forest is recovering lost ground, but not in the south and it is also disappearing in the coastal zones.


FR
IT
YU
ES
AL
TR
TN*
MT
DZ*
SY
GR
CY
LB
IL
MA
LY
EG
Les espèces méditerranéennes en %
The mediterranean species in %
2000
4000
8000
Nombre total d'espèces
Total number of species
Source : Quézel P. , 1985
La flore des pays méditerranéens
The flora of the mediterranean countries
* Données Tunisie et Algérie ensemble
* Data for Tunisia and Algeria together
Plan Bleu / Blue Plan 1995


FR
15 %
10 %
YU
IT
25 %
ES
34 %
AL
20 %
50 %
TR
60 %
GR
TN
MT
DZ
SY
CY
LB
IL
MA
LY
EG
La forêt méditerranéenne en %
The mediterranean forest in %
100
(000 HA)
Superficie totale de la forêt
Total area of the forest
La forêt des pays méditerranéens
The forest in the mediterranean countries

### *Water: a resource becoming more and more scarce*

The countries in the Northern Mediterranean Basin detain 86% of the water resources; 2/3 of resources in the South are exogenous. Agriculture, and irrigation, are the main consumers:73.2%. Drinking water supplies represent 12% of consumption; the consumption per capita varies from 4 to 5 l/day for a desert inhabitant to 500-800 l/day for a tourist, and 250 to 300 l/day for a European. Industry and heat plants consume the rest.

As a whole, the demand for water is subjected to seasonal variations, opposed to surface water flows which are irregular. This leads to tension between the users, particularly in coastal areas which, tend to use the largest quantities of water, due to urbanization, tourism, irrigation and industrialization. This exaggerated consumption results in the deterioration of water quality and/or depletion of reserves.

There is enough water in the North of the Mediterranean Basin, but in the South, almost 1/3 of the population has no water. The situation is such that some countries are using non-conventional resources: recycling (Israel), desalinization (Malta), unrenewable underground water tables (Libya).

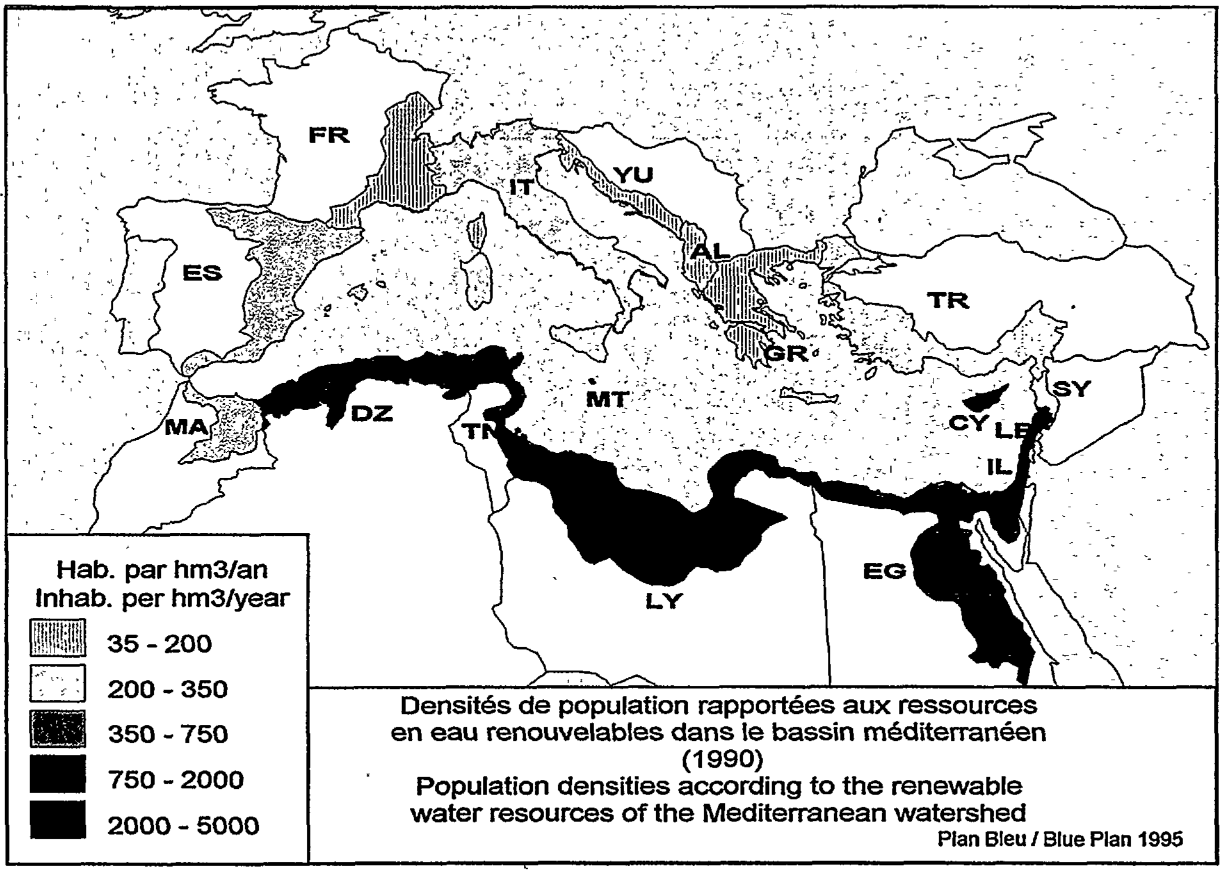
### *Natural, insidious or catastrophic risks*

In the Mediterranean Basin, erosion from water and winds is a fundamental issue. Its onslaught, furthered by the degradation of land cover which no longer protects the soils, opens the way for instability on slopes and coasts, for landslides and desertification by losing potentially productive soils. Thus, 31% of the land in the Basin lose 15 t/ha/year; on some slopes, where the rock is brittle, these losses can reach 250 t/ha/year and the solid flows of rising water can exceed 150 kg/m$^3$. In an average year, 455 Milliards m$^3$ of surface waters carry to the sea 330 million tons of suspended matter. The eroded surface nears 48% in Israel, 76% in Tunisia,72% in Greece, 71% in Spain. These losses are so considerable that, despite the fact that new soils are being used, the surface of farm lands has not increased in Syria or in Egypt.

These insidious changes could be the origin of severe cracks with their catastrophic consequences.

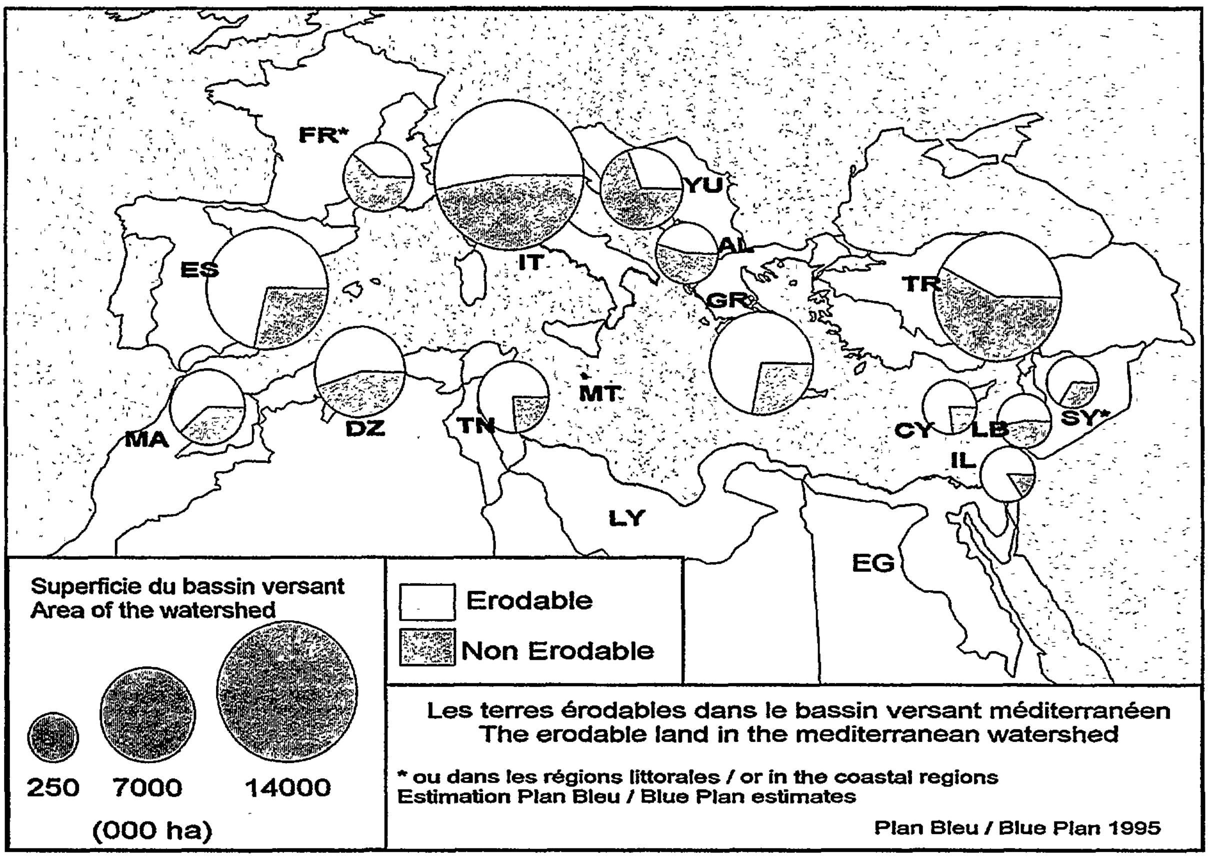
In particular, the probability and seriousness of torrential flooding considerably increase in the areas of the Mediterranean basin more open to erosion.

In general, Mediterranean countries are affected by the convergence of natural risks that could occur brutally: seismic events, volcanic events, flooding, landslips, forest fires, or gradual events such as drought, desertification, disappearance of ecosystems which are an important constraint upon coastal development and management.




Densités de population rapportées aux ressources en eau renouvelables dans le bassin méditerranéen (1990)
Population densities according to the renewable water resources of the Mediterranean watershed

Plan Bleu / Blue Plan 1995




Les terres érodables dans le bassin versant méditerranéen
The erodable land in the mediterranean watershed

* ou dans les régions littorales / or in the coastal regions
Estimation Plan Bleu / Blue Plan estimates

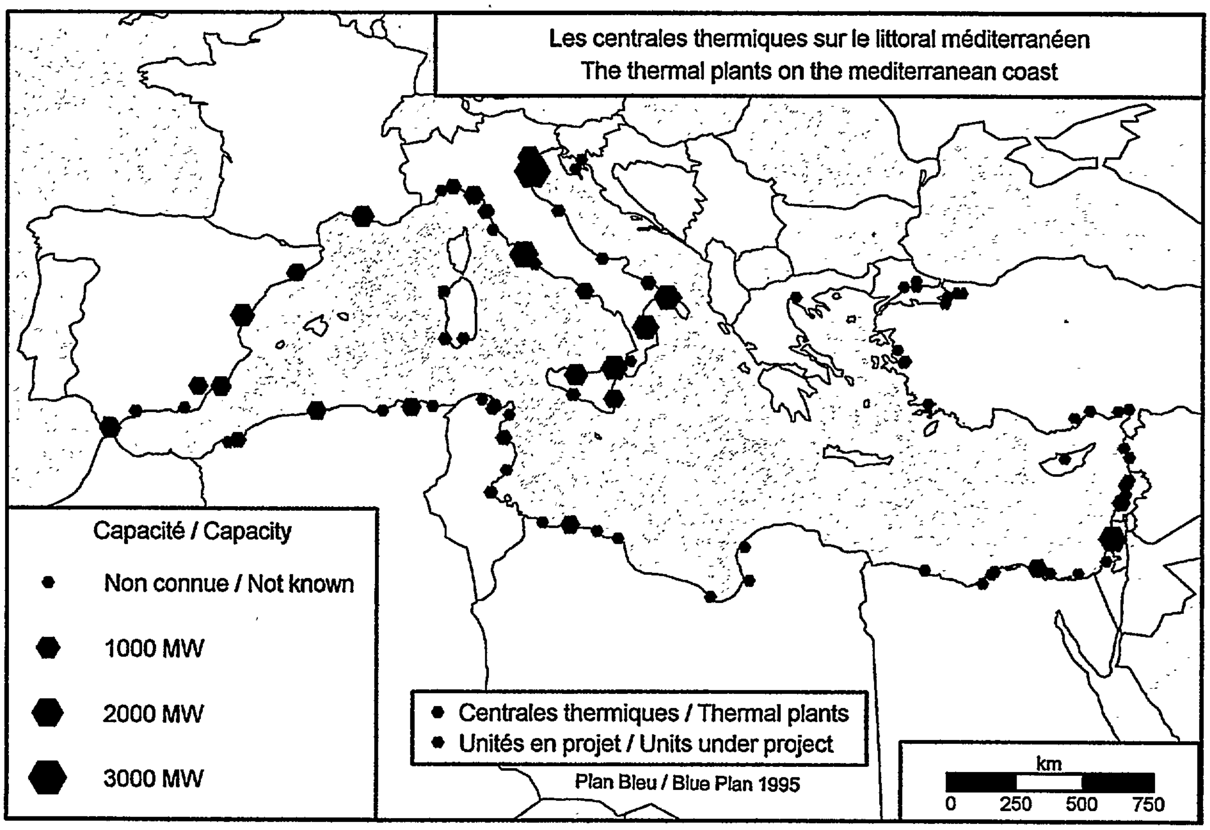
Plan Bleu / Blue Plan 1995

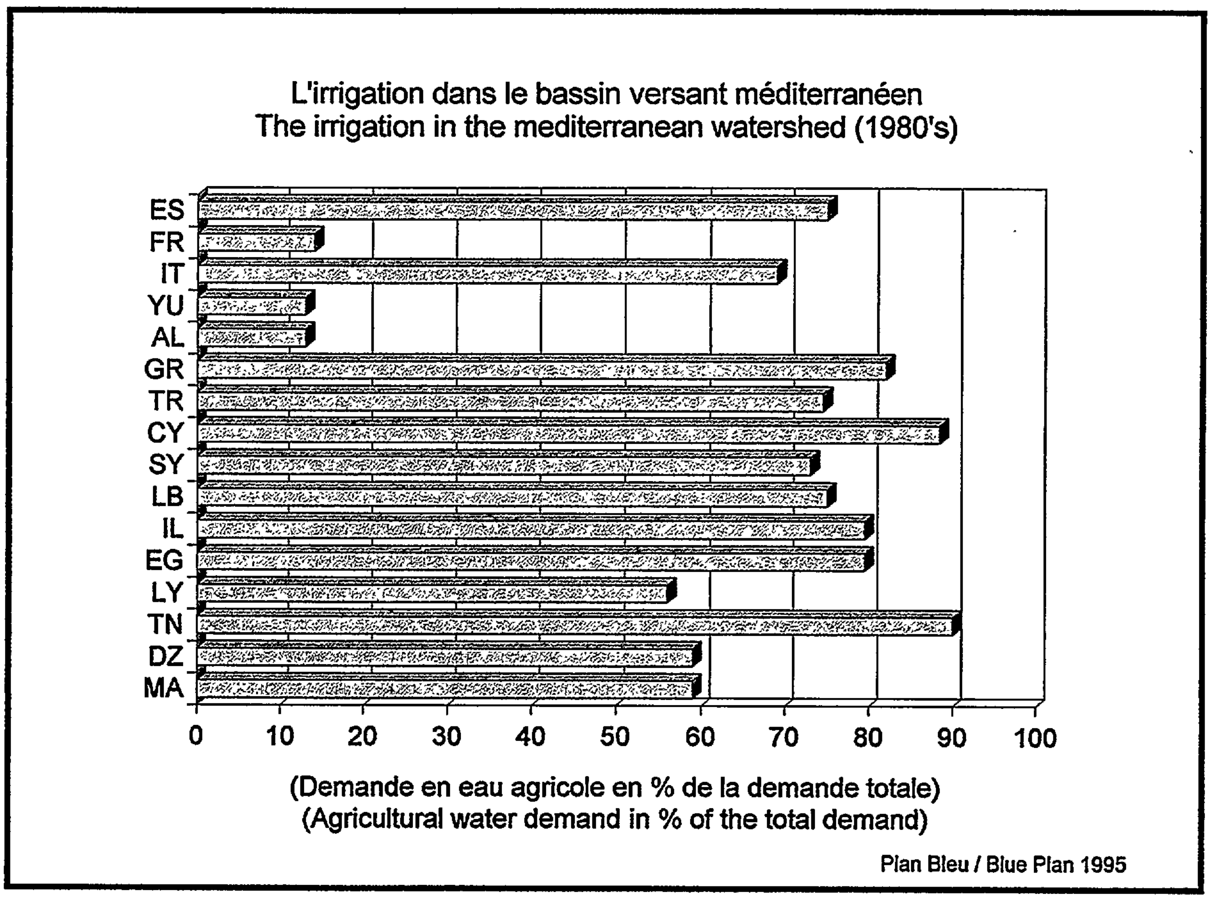
### *Increasing energy consumption*

In 1950, the consumption of energy in the Mediterranean countries was approximately 100 Mtoe, a little over 6% of the world trend, while the Mediterranean population represented 8.5% of the world population. In 1990, consumption has exceeded 700 Mtoe, 8.4% of the world rates, whereas the population is only 7.2%. However, the variations in consumption between the North and South are considerable: in 1990, France, the largest consumer, represented 4,016 koe/capita versus 601 for Egypt or 267 for Morocco, whereas the world average is 1,600 koe/capita.
Oil reserves, concentrated in the South (Libya: 58%; Algeria: 23%) are estimated at 5,200 million tons (end of 1990), 3.8% of world reserves; reserves of gas, also concentrated in the South (Algeria: 58%; Libya: 21%) are estimated at 5,675 $Gm^3$ (end of 1990), 4.2% of world reserves.
While almost all charcoal is consumed in the North, while uranium registers tremendous growth, oil remains the first source of energy, i.e. a little over 50% of commercial energies in 1990. However, it is showing a global drop in favor of gas where consumption figures have gone from 25 Mtoe in 1971 to 115 Mtoe in 1990. At the root of the matter: a high increase in electricity consumption in all Mediterranean countries: 410 TWh in 1971 (i.e. 2,000 kWh/capita in the North, and 170 kWh for the South and East), 1,051 TWh in 1990 (i.e., 4,800 kWh for the North and 850 kWh for the South and East).

### *Agriculture: a major consumer of water*

In the Mediterranean Basin, agriculture is characterized by two permanent factors: limitation of natural resources and nutritional dependance. Small plains and climatic constraints: irrigation is a requirement to improve yields which, in some cases, could be multiplied by 3 or 4. Irrigation bears the heaviest weight in water demand: it represents 62% of consumption in the North and 93% in the South. Irrigation faces different problems, among which salinization is not the worst, although it is gaining ground in the Southern and Eastern countries where drainage is poor and evaporation levels are high. As an example, the risks in terms of surface are the highest in Egypt: 30% of the land in the Nile valley have become saline and 40% are showing the first signs; Syria is in second position with 12% of its Mediterranean catchment areas threatened. At the world scale, salinization would continue to expand annually over surfaces identical to those where irrigation is now being used.


Les centrales thermiques sur le littoral méditerranéen
The thermal plants on the mediterranean coast
Capacité / Capacity
Non connue / Not known
1000 MW
2000 MW
3000 MW
Centrales thermiques / Thermal plants
Unités en projet / Units under project
Plan Bleu / Blue Plan 1995
km
0
250
500
750


L'irrigation dans le bassin versant méditerranéen
The irrigation in the mediterranean watershed (1980's)
ES
FR
IT
YU
AL
GR
TR
CY
SY
LB
IL
EG
LY
TN
DZ
MA
0
10
20
30
40
50
60
70
80
90
100
(Demande en eau agricole en % de la demande totale)
(Agricultural water demand in % of the total demand)
Plan Bleu / Blue Plan 1995

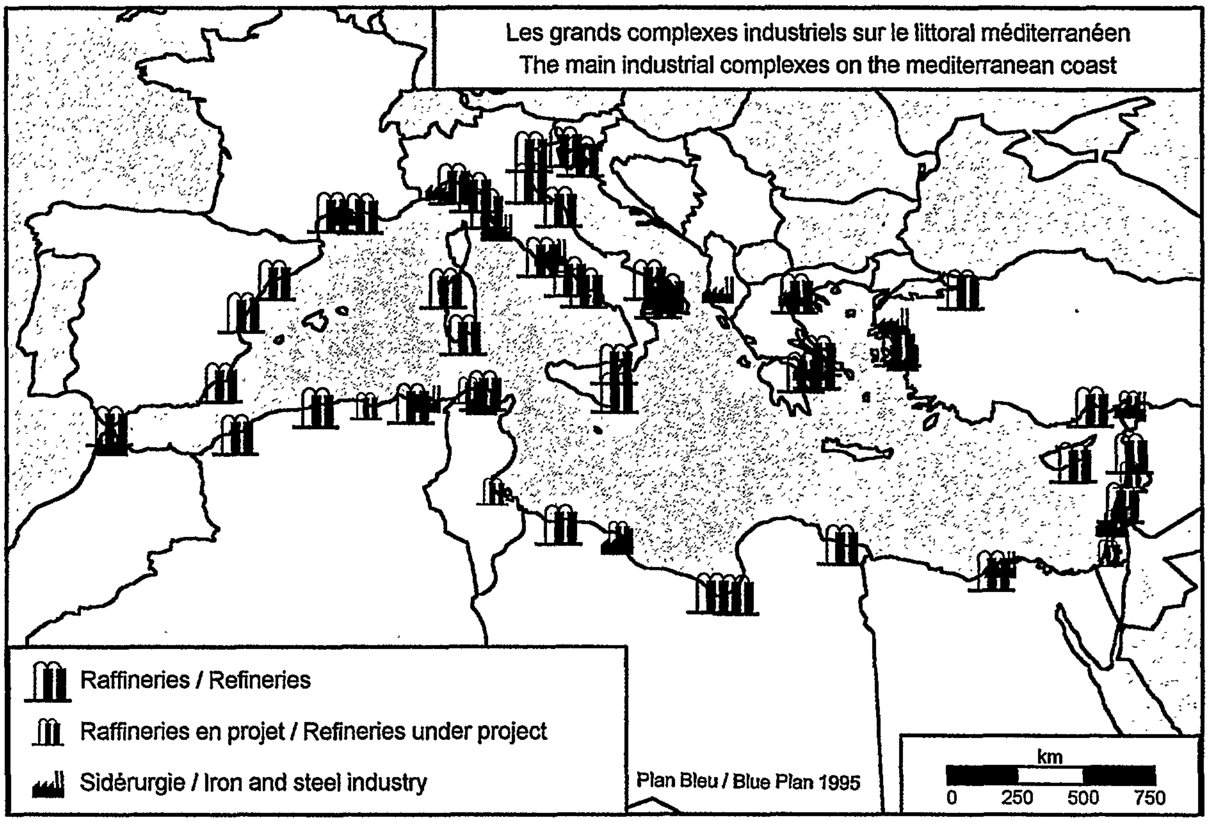
### *A young industrial region*

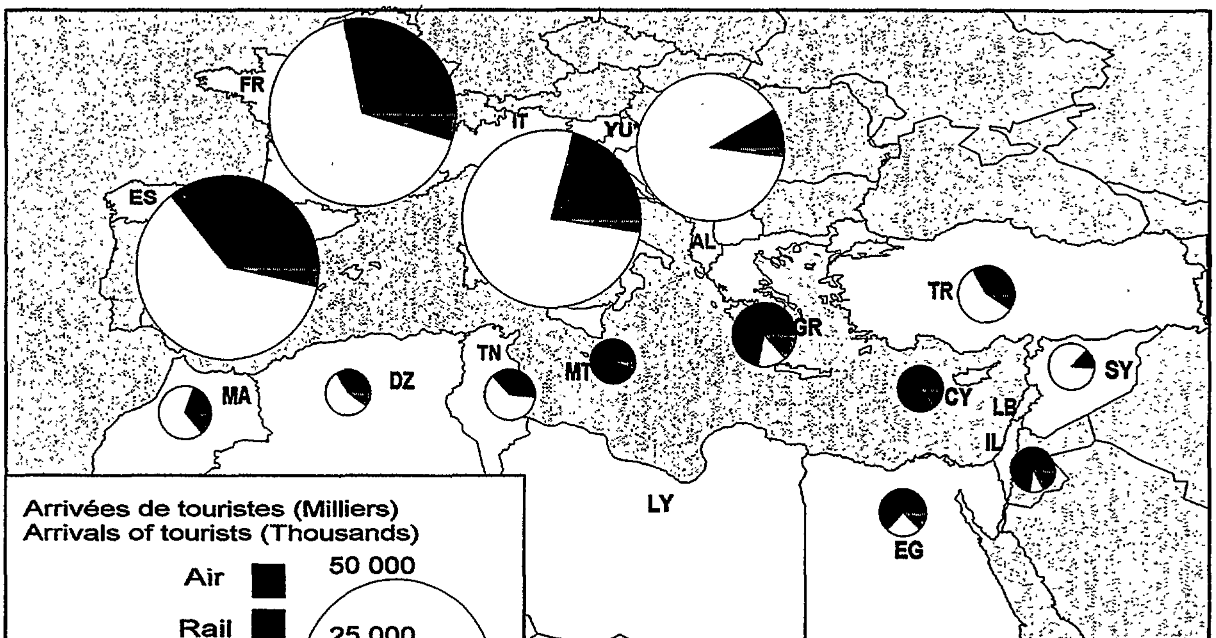
From the European industrial revolution to 1950, the Mediterranean Basin has always been considered as a marginal under-industrialized region: the rare industries at the time were concentrated on the Northern coast. From 1950, expansion began to accelerate; it reached the Southern coast as of 1970, particularly Libya and Morocco. From the 70s onwards, the industrial landscape changed: the Northern countries demonstrated a slowdown, while disruptions occurred in the South, as result of oil price variations.

Today, the Mediterranean countries shelter 7.2% of the world's population and ensure 16% of the world's industrial production, but France and Italy still represent 70% of industry and 87% with Spain, maintaining strong differences between North and South. The development of industry faces several difficulties, among which strong competition over space from urbanization, along the coasts especially where major industrial groups, energy plants, and port related activities are trying to establish a presence. Industry also requires great quantities of water; the global needs reach 14 $km^3$/year, 3/4 of which are consumed in the North.

### *The world's first tourist venue*

In 1990, international tourism involved 440 million tourists. From 1986 to 1990, growth rate was 7.3%. Europe alone is host to 180 million international tourists. With 147 million in 1990, the Mediterranean Basin is the world's first tourist venue. In Mediterranean countries, between 1970 and 1986, the annual growth rate of the number of tourists was 4.5% and reached 4.8% between 1985 and 1990, which is lower than the world level for the same period. Spain, France, Italy and Greece host 4/5 of international tourism; but these four countries have shown an annual growth rate of 4.5% versus 10.3% for all Southern and Eastern countries. In 1990, Malta demonstrated the highest tourist density/$km^2$ with over 870,00 tourists; Spain has the highest number of people/coastal km. However, tourists are turning away from over-urbanized areas, in favor of the hinterlands and a marked preference for "unspoiled" coastlines, further East can be observed. Globally, island or southern destinations can be reached by plane, superseded by ground transportation in Europe.


Les grands complexes industriels sur le littoral méditerranéen
The main industrial complexes on the mediterranean coast
Raffineries / Refineries
Raffineries en projet / Refineries under project
Sidérurgie / Iron and steel industry
Plan Bleu / Blue Plan 1995
km
0 250 500 750


FR
IT
YU
ES
AL
TR
GR
TN
MT
SY
MA
DZ
CY
LB
IL
LY
EG
Arrivées de touristes (Milliers)
Arrivals of tourists (Thousands)
Air
Rail
Route / Road
Mer / Sea
50 000
25 000
1000
Source O.M.T. / W.T.O.
Arrivées de touristes en provenance de l'étranger
Arrivals of tourists from abroad 1991
* (1990)
Plan Bleu / Blue Plan 1995

### *Transports: from sea to road*

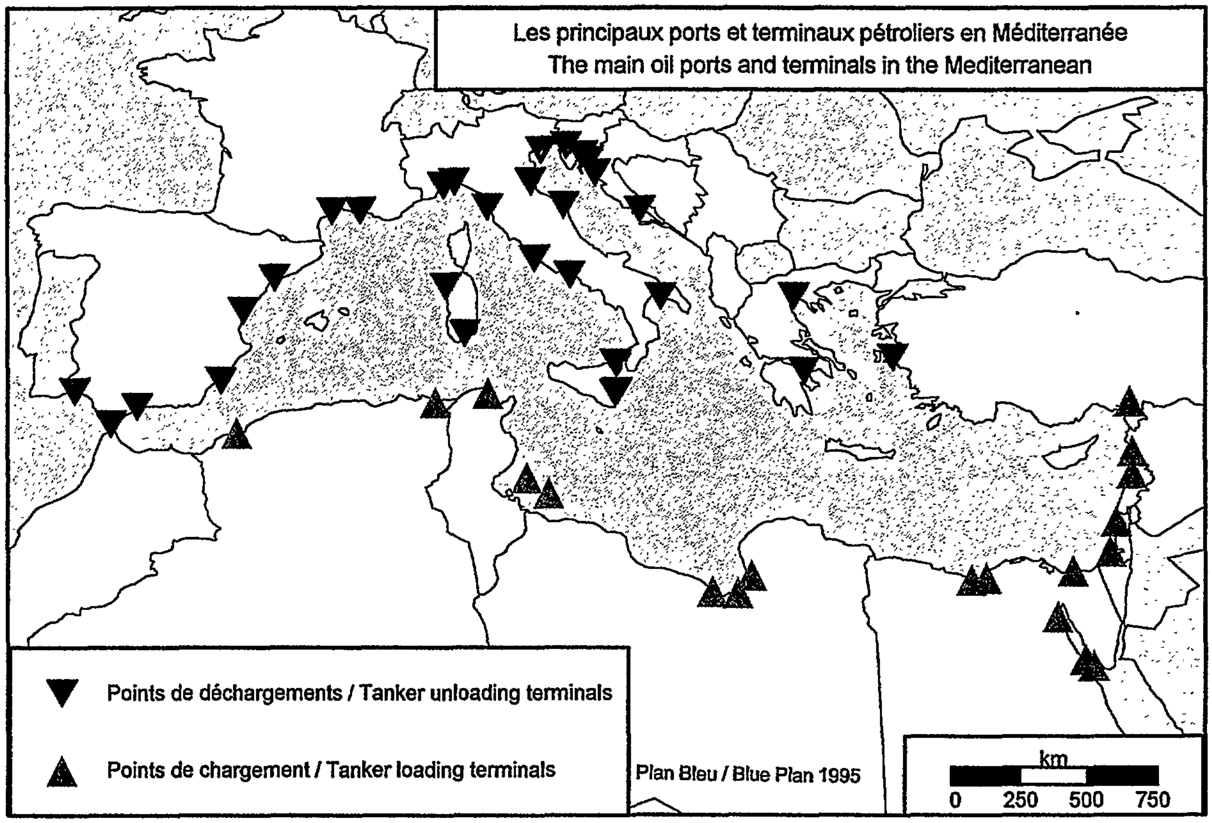
Road transportation has only recently developed in the Mediterranean Basin, slowed down for years by the mountains and the sea. Today, the Northern facade has many road and highway "terminals", and a network of expressways, particularly in Italy, France and Spain. On the Southern and Eastern fronts, the impact is still to come and requirements in terms of roadwork are considerable; there, the strong recent dynamics of the car fleet have not yet reached the level of "saturation" observed in Northern countries. The Mediterranean car fleet represents approximately 60 million units.

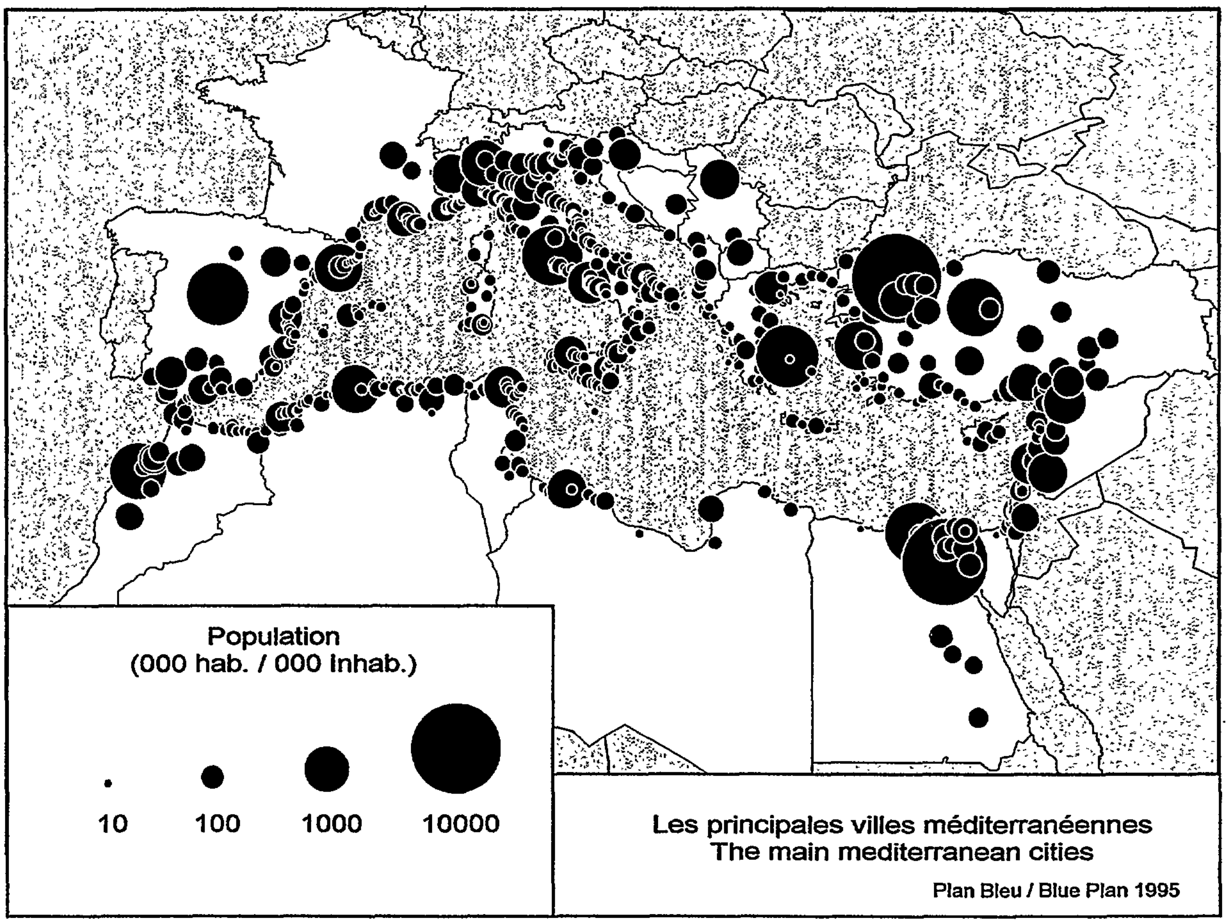
The other modes of transportation must not be forgotten. While the train, with more networks in the North than in the South, is not used extensively, while air travel has been growing for 20 years, sea transportation maintains its capital role; air transportation has only recently taken over an increasing part of transmediterranean passenger traffic. Furthermore, the Mediterranean is frequently used by merchant ships ensuring exchanges into and out of the Mediterranean and by ships in transit. Oil products are the main goods transported: 35% of world oil comes through the Mediterranean The annual traffic rate of ships of over 100 tons is estimated at 220,000 and there are 2,000 merchant ships constantly present in the Mediterranean, among which 250 to 300 oil ships, which equates to 1/3 of world traffic. These figures are increasing, and demonstrating qualitative evolution.

### *The Coast: an attractive area*

For thousands of years, the Mediterranean coasts have been attractive, but over the past 50 years, the attraction has reached an intensity unknown until now and resembles a mass phenomenon. This concentration, called littoralization, has for the most part, in the North, followed industrialization; in the South, where littoralization is reinforced by the presence of the desert, the reverse situation has occurred and has increased difficulties.

In 1990, the Mediterranean coastal area, 11% of the surface of other countries, covered 35% of total population, i.e., 133 million people. In this zone, urbanization covered 14,000 km$^2$, in majority located on the North coast; the French Côte-d'Azur demonstrates 92% urbanization rate. Between 1950 and 1990, the total population in the South has increased by 175%, the urban population, essentially coastal, by 500%. Some Southern cities, have undergone a multiplication of 50. Over 8 million inhabitants in the South and over 17 million in the North are located in 18 coastal cities of over 700,000 inhabitants.


Les principaux ports et terminaux pétroliers en Méditerranée
The main oil ports and terminals in the Mediterranean
Points de déchargements / Tanker unloading terminals
Points de chargement / Tanker loading terminals
Plan Bleu / Blue Plan 1995
km
0 250 500 750


Population
(000 hab. / 000 Inhab.)
10 100 1000 10000
Les principales villes méditerranéennes
The main mediterranean cities
Plan Bleu / Blue Plan 1995

### 3.2. Several key figures for the Mediterranean countries

The key figures of the following tables give a global view of Mediterranean countries as well as of the "Mediterraneity" of these countries, by differentiating the Mediterranean regions.

The Human Development Indicator (HDI), calculated by UNDP in 1990, has been added to these conventional indicators. This composite measure of human development is based on indicators representing three components of human development with equal weighting: life expectancy (at birth), knowledge (alphabetization of adults and average number of study years) and revenue (in dollars per inhabitant readjusted to purchasing power parity).

The HDI, with values between 0 and 1, allows measuring socio-economic progress without using GNP. When these two parameters are used to classify countries, the results are often different. While, in the countries of the Mediterranean Basin, HDI is comprised between 0.549 for Morocco and 0.927 for France in 1992, it goes from 0.171 for Guinea to 0.932 for Canada.

| | Mediter-ranean coastlines (km) | | SURFACE (km²) | | | POPULATION (thousands of inhabitants) | | | | DENSITY (inhab./km²) | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Total | Incl. islands | Entire country | Mediter-ranean watershed | Mediter-ranean regions | Last year available before 1990 | Entire country | Mediterranean regions | | Entire country | Mediter-ranean regions |
| SPAIN | 2 580 | 910 | 504 783 | 185 600 | 95 504 | 1987 | 38 832 | 14 500 | 37 % | 77 | 152 |
| FRANCE | 1 703 | 802 | 547 026 | 130 100 | 47 248 | 1990 | 56 556 | 5 839 | 10 % | 103 | 124 |
| ITALY | 7 953 | 3 766 | 301 277 | 301 200 | 165 843 | 1988 | 57 399 | 32 987 | 57 % | 191 | 199 |
| MALTA | 180 | 180 | 316 | 316 | 316 | 1988 | 346 | 346 | 100% | 1 094 | 1 094 |
| MONACO | 4 | | 2 | 2 | 2 | 1989 | 30 | 30 | 100% | 15 000 | 15 000 |
| EX-YUGO-SLAVIA | 6116 | 4 024 | 255 804 | 79 300 | 42 448 | 1981 | 22 425 | 2 421 | 11 % | 88 | 57 |
| ALBANIA | 418 | | 28 748 | 28 748 | 9 055 | 1990 | 3 256 | 1 325 | 41 % | 113 | 146 |
| GREECE | 15 000 | 7 700 | 131 944 | 131 900 | 100 278 | 1981 | 9 740 | 8 710 | 89 % | 74 | 87 |
| TURKEY | 5 191 | 809 | 779 452 | 195 000 | 122 612 | 1990 | 56 473 | 11 336 | 20 % | 72 | 92 |
| CYPRUS | 782 | 782 | 9 251 | 9 251 | 9 251 | 1982 | 503 | 503 | 100% | 54 | 54 |
| SYRIA | 183 | | 185 180 | 22 000 | 4 200 | 1988 | 11 338 | 1 251 | 11 % | 61 | 298 |
| LEBANON | 225 | | 10 230 | 9 800 | 4 892 | 1970 | 2 126 | 1 923 | 90 % | 208 | 393 |
| ISRAEL | 200 | | 20 770 | 10 500 | 4 078 | 1983 | 4 038 | 2 489 | 62 % | 194 | 610 |
| EGYPT | 950 | | 997 739 | 200 000 | 114 767 | 1986 | 48 205 | 19 784 | 41 % | 48 | 172 |
| LIBYA* | 1 770 | | 1 775 000 | 45 000 | 45 000 | 1984 | 3 637 | 2 941 | 81 % | 2 | 65 |
| TUNISIA | 1 300 | 301 | 154 530 | 90 000 | 45 712 | 1988 | 7 770 | 5 439 | 70 % | 50 | 119 |
| ALGERIA | 1 200 | | 2 381 741 | 133 000 | 47 027 | 1987 | 23 039 | 10 105 | 44 % | 10 | 215 |
| MOROCCO | 512 | | 458 730 | 80 000 | 41 950 | 1990 | 25 061 | 3 881 | 15 % | 55 | 93 |
| Total** | 46 267 | 19 274 | 8 542 523 | 1 751 717 | 900 183 | | 370 775 | 125 807 | 34 % | 43 | 140 |

* Estimates based on coastal area of the regions.

** The figures for the basin as a whole are only givens indicatively, since they have been calculated over several years.

Sources: national yearbooks and population census, Blue Plan estimates for Mediterranean basin population and density in 1990

| | Population 1992 | GNP 1992 | GNP per inhabitant (1992) | Human Development Indicator |
|---|---|---|---|---|
| | Thousands | Milliards of dollars | Dollars | 1992 |
| SPAIN | 39 085 | 546,02 | 13 970 | 0,888 |
| FRANCE | 57 372 | 1 277,10 | 22 260 | 0,927 |
| ITALY | 57 809 | 1 182,77 | 20 460 | 0,891 |
| MALTE | 360 | 2,61 | 7 300 *(1991)* | 0,843 |
| EX-YUGOSLAVIA* | 10 597 | 10,83 | 1 030 *(1991)* | 0,857 *(1990)* |
| ALBANIA | 3 363 | n.d. | n.d. | 0,714 |
| GREECE | 10 300 | 75,09 | 7 290 | 0,874 |
| TURKEY | 58 544 | 115,92 | 1 980 | 0,739 |
| CYPRUS | 718 | 7,05 | 9 820 | 0,873 |
| SYRIE | 12 958 | 14,66 | 1 170 *(1991)* | 0,727 |
| LEBANON | 3 781 | n.d. | n.d. | 0,600 |
| ISRAEL | 5 118 | 67,66 | 13 220 | 0,900 |
| EGYPT | 54 679 | 34,99 | 640 | 0,551 |
| LIBYE | 4 867 | 23,43 | 5 330 *(1989)* | 0,551 |
| TUNISIA | 8 418 | 14,48 | 1 720 | 0,690 |
| ALGERIA | 26 254 | 48,31 | 1 840 | 0,553 |
| MOROCCO | 26 193 | 26,98 | 1 030 | 0,549 |

* 1990 data

Sources: UN World Population Prospects 1992, World Bank and Human Development Report, UNDP 1994

The figures represented here for former Yugoslavia had to be completed by data on the new parties to the Barcelona Convention: Slovenia, Croatia and Bosnia-Herzegovina.

| | Mediterranean Coastlines (km) | Surface ($km^2$) | Population (1991) (thousands of inhabitants) | GNP per inhabitant (1991) (dollars) |
|---|---|---|---|---|
| SLOVENIA | 41 | 20 251 | 2 110 | 3 300 |
| CROATIA | 5 773 | 56 538 | 4 685 | 3 300 |
| BOSNIA-HERZ. | 25 | 51 129 | 4 481 | 2 950 |

Source: State of the World 1993/1994

# 4. Studies and actions

This chapter outlines the initial results of the more operational studies and action underway at MEDO. For further details, the reader should refer to fascicles 2, 3 and 4.

## 4.1. Follow-up of Agenda 21 for the Mediterranean Countries

In order to follow the achievements gained towards sustainable development, Agenda 21, Chapter 40, recommends that countries at the national level, and international governmental and non-governmental organisation s at the international level, develop activities leading to the identification of indicators for sustainable development (ISD).

A specific work programme has been initiated by the Division for Sustainable Development of the UN to bring together all the actors involved and to produce a set of indicators which meet the requirements of both the Commission for Sustainable Development (CSD), which was implemented by the UN after the Rio Conference of June 1992, and the member states. For reasons of clarity and continuity, this programme has focuses its attention on the four fundamental aspects of sustainable development (i.e., social, economic, environmental and institutional aspects) and on the related chapters of Agenda 21.

The Blue Plan, through the activities of the Mediterranean Environment and Development Observatory (MEDO), will contribute to the efforts of the international community by adapting ISD to the Mediterranean region. This contribution is the topic of a current and specific study within MEDO, called "FOLLOW-UP OF AGENDA 21 FOR THE MEDITERRANEAN COUNTRIES". The initial results are presented in this fascicle.

To evaluate the extent of the task and common aspects of methodologies used by the international community and Blue Plan, it is useful to refer to the UN's work programme.

***The work programme of the UN Division for Sustainable Development.***
This programme involves three major categories of activity: those related to the list of basic indicators, those related to the development of highly aggregated indicators, and those related to research on crossed indicators. The sub-programme concerning the list of basic indicators is set out in 5 stages, which are:
- exchange of information and organisation of work meetings (1995 and after) between the numerous actors concerned by the issue of indicators,
- drawing up methodological files (1995-96) according to each selected indicator, under the responsibility of "lead agencies". These files

should allow those Governments who so desire, to use these indicators in their national reporting to the fifth session of the CSD (1997),
- training and capacity-building (1995-98) to the attention of countries and other relevant groups who wish to use the indicators for monitoring progress towards sustainable development at a national level,
- monitoring experiences in a few selected countries (1996-98) in order to test the indicators selected,
- evaluation of the list of selected indicators (2000).

To initiate the meetings of Phase 1, an initial list of indicators was proposed which was organised according to the four aspects of sustainable development, related chapters of Agenda 21, and the "Driving force – State – Response" approach (concept which covers and extends the well-known "Pressure – State – Response" approach developed by OECD). The first core set of indicators have been developed according to the following criteria:
- primarily national in scale or scope (countries may also wish to use indicators at state and provincial levels);
- relevant to the main objective of assessing progress towards sustainable development;
- understandable in that they are clear, simple, and unambiguous;
- feasible within the capacities of national governments, given their logistic, time, technical, and other constraints;
- conceptually well-founded;
- limited in number, remaining open-ended and adaptable to future developments;
- capacity to broadly cover Agenda 21 and all aspects of sustainable development;
- representative of an international consensus, to the extent possible; and,
- dependant on data which are readily available or accessible at reasonable cost/benefit ratio, adequately documented, of known quality and updated at regular intervals.

The work which has lead to this initial set of indicators also revealed the insufficiencies facing the international community in its quest for ISD. This could motivate new research programmes. Future efforts may be summarised as follows:
- research of highly aggregated indicators;
- the identification and assessment of relationships between the four aspects of sustainable development previously mentioned, and hence between the basic indicators suggested in the list above (geared towards the proposition of crossed indicators);
- the proposition of grouping basic indicators into relevant sub-sets for the different potential users;
- scientific research to identify additional basic indicators in order to better respond to the preoccupations covered by Agenda 21.

The work programme of the Division for Sustainable Development must present its initial results at the third session of the CSD (1995).

*MEDO's study for the follow-up of Agenda 21*

The studies specifically concerning Agenda 21, which began in early 1995, were possible not only because of Blue Plan's experience in both the collection of statistical and geographical data and prospective analyses, but also because it enlarged its research within environmental indicators, as this became implemented within the frame of MAP's activities a few years ago.

The chosen method is the following:

- according to the structure of the chapters of Agenda 21, several points have been selected which appear useful to direct MEDO's production of ISD. Since the objective is to contribute to the follow-up of sustainable development in the Mediterranean region, this selection of framework-themes is also based on Agenda MED 21 drafted for the Conference of Ministers of the Environment of Mediterranean countries (Tunis, November 1994).
- then, a set of initial indicators is proposed to be submitted to the Mediterranean partners of Blue Plan.
- finally, the first illustrations of these indicators will be developed and are to be gradually published for the countries and other organisations wishing to use these indicators in order to follow up on the progress towards sustainable development in the Mediterranean.

MEDO is specifically concerned with the characteristics of the Mediterranean features. In fact, some themes that may have little or no relevance to the Mediterranean are not studied, while Mediterranean characteristics of the indicators are thoroughly examined, particularly at the Mediterranean coastal regions.

All indicators are built up with the help of the "Mediterranean Information System for Environment and Development" (MEDIS), currently being implemented by MEDO. Amongst other methods and tools developed by the observatory, fascicle 5 will also present MEDIS in more detail. MEDIS will gradually make the indicators accessible.

Agenda 21 and Agenda MED 21 comprise of 40 chapters. An additional chapter on tourism has been added to Agenda MED 21. These chapters, except for the first in preamble form, are divided into four sections:
Section I. – Social and Economic Dimensions
Section II. – Conservation and management of Resources for Development
Section III. – Strengthening the Role of the Major Groups
Section IV. – Means of Implementation

The progress status of the study specifically concerning the follow-up of the Agenda 21 for the Mediterranean countries, presented in this fascicle, only include the following chapters :

Section I. – Social and Economic Dimensions

3. Combating poverty
4. Changing consumption patterns
5. Demographic dynamics and sustainability
6. Protecting and promoting human health
7. Promoting sustainable human settlement development

Section II. – Conservation and Management of Resources for Development

10. Integrated approach to the planning and management of land resources
11. Combating deforestation
14. Promoting sustainable agriculture and rural development
15. Conservation of biological diversity
17. Protection of the oceans, all kinds of seas, including enclosed and semi-enclosed seas, and coastal areas and the protection, rational use and development of their living resources
18. Protection of the quality and supply of freshwater resources: Application of integrated approaches to the development, management and use of water resources

Chapters within Sections III and IV are discussed in fascicle 3 involving the environmental institutions in the Mediterranean countries.

More specifically, chapters of Agenda 21 which are analysed and exploited hereafter, in a provisional form, successively include:

- commented excerpts from Agenda 21;
- commented excerpts from Agenda MED 21;
- recommendations on the priority themes to be examined in the Mediterranean context;
- recommendations on the indicators to be developed within the MEDO framework;
- indications on what is already available at Blue Plan; and
- to conclude, one or two initial illustrations of indicators will be included. These illustrations will be presented in the form selected by MEDO. Any graphic representation or map of indicators will be accompanied by comments and precautions for use.

### 4.2. Institutional studies

However, all aspects of sustainable development can not be limited to their sole quantitative dimension. Indicators, which are, by definition, quantifiable elements, do not lead to an understanding of aspects inherent to choices of societies or states, of the way in which administrative authorities are organized, of specific perceptions of environment proprer to the countries. This is why indicator systems must be completed by qualitative information. The approach then becomes global. It not only covers socio-economic and environmental issues but also the institutional dimension since institutions are largely responsible for the success or failure of actions envisaged for environment and development.

The word "institutions"is used here in its widest sense. It covers institutional capacity of nation states to implement policies – ministries and governmental agencies – as well as the policy making process and the application means. The concept may also include the ways of people and territory participation by means of political (public local authorities) and non-political representative bodies (NGOs, professional associations).

The institutional approach then constitutes a major field of work in the deepening of the Blue Plan's general approach currently being undertaken. Most of the measures recommended in the Blue Plan's report (Futures of the Mediterranean basin, Oxford University Press, 1989) involved the role of the nation state. It had been demonstrated 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..."

Five years after publication, and two years after the Earth Summit of Rio, an institutional study program has been initiated at the Blue Plan. It is intended to identify keys for a better understanding of the evolution trends of the emerging environmental policies in the Mediterranean basin. At the same time, it seeks to improve knowledge on the decision-making bodies governing the various geographical units in the different Mediterranean countries.

The study program has begun by drawing up national monographies mentioned in 2.3. On the basis of the national monographies, a comparative study of national institutional situations is being undertaken, the first results of which are presented in Fascicle n° 3.

The study, by no means exhaustive, notes how the implementation of environmental policies over the last two decades has changed the Mediterranean institutional landscape. It suggests items for reflexion, at the Mediterranean basin scale, to all those interested in following up national policies within a sustainable development perspective and to Mediterranean decision-makers, who are directly concerned by the implementation of environmental policies and the related tools, i.e. observation, knowledge and evaluation.

The analysis undertaken initially emphasizes the role of public actors, mainly the state and sub-national public communities. Four issues, having been developed by MEDO institutional study program until now, will be dealt with:

- environmental central authorities in the Mediterranean countries,
- the role of autonomous agencies in the implementation of environmental policies,
- breakdown of environmental authority between the state and sub-national territorial units,
- national planning and trends towards sustainable development.

The comparisons established do not aim at finding one or more models. The objective is to highlight means by which highly diverse situations can be better understood. Besides, it is difficult to avoid in the comparisons the distorsions resulting from specific cultural identities, different levels of development or administrative traditions shaped by national history and culture.

The interest of this approach is to stress, whenever possible, on the one hand the appropriateness of the each country's environmental policy to national priorities of the environment-development problematics and on the other hand the environmental performance at the Mediterranean basin level, by evaluating the efforts granted by all the Mediterranean countries with respect to environmental components.

### *Environmental central authorities*

Between 1970 and 1990, national environmental policies in the Mediterranean basin have mainly consisted in preparing rules and setting up an environmental central authority as well as specialized agencies. The creation of a Ministry of the Environment is the most visible sign of a political concern about environmental issues.

The field of responsibility of the authorities involved is described in Fascicle 3. It rather corresponds to what is stated by law in each country. The analysis should be deepened in order to understand the real practice in the different countries so as to identify the major directions of administrative actions. Despite the diversity of situations, three institutional configurations can be observed.

- First, the system of <u>autonomous ministries for the environment</u>. Nine countries have rendered full independence to such environmental bodies: France, Italy, Malta, Bosnia-Herzegovina, Turkey, Syria, Lebanon, Israel, and very recently, Morocco.
- In nine other countries, the environmental responsibility is exercised at a ministerial level but it <u>coexists with other sectorial responsibilities</u>. The association sometimes involves Public Works (Spain, Croatia, Greece), or Land Use Planning (Slovenia, Greece, Tunisia), or Agriculture (Cyprus) or Health (Albania). In Egypt and in Algeria, the Environment is associated, within the same ministry, with more traditional public services.
- Finally, in Lybia and Monaco, the governance of the environment is a matter of a <u>subordinate unit under the authority of a traditional ministry</u> (public works).

Environmental administration, whether under the authority of a ministry for the environment or of a traditional ministry, essentially include bodies in charge of coordination, preparing legislation and regulations, undertaking research.

In fact, no country has a central organization with the exclusive authority to define and implement complete environmental protection policies, not even countries where there is a ministry of the environment. In all countries of the Mediterranean basin, environmental authority is spread about several ministries: agriculture, capital works, industry, health, interior, merchant navy. Furthermore, in several cases, the role of ministries for the environment is limited to defining the general directions and ensuring coordination, whereas regulatory authority is entrusted to long-standing ministries.

The fragmentation of authority can be explained not only by the usual reluctance of administrations in charge of a specific field of action, refusing that their prerogatives be limited, but also, at least in some cases, by the deliberate will of political authorities to maintain task separation. For instance, in countries where water resources are scarce, water policies have an impact on economic growth; if powers in this field were concentrated, the responsible body would derive considerable amount of power from this situation, which is something authorities wish to avoid (Cherot, Roux, 1988).

***Autonomous bodies for the implementation of environmental policies***

In addition to administrative services within a ministry, there exist other government bodies, more or less autonomous, being legal entities, with alloted means and resources. These bodies constitute the necessary and effective technical tools for a rational management of the environment, space and habitats.

In the Mediterranean basin countries, this institutional choice has been used for a long time in scientific research management concerning the environment among many other fields. There are also several semi-autonomous agencies under the authority of long-standing ministries (public works, agriculture, etc.).

Public industrial and commercial agencies are created in developing countries to ensure the management of major public services requiring heavy investments, such as sewage treatment, water production and supply. For instance, two large governmental agencies in Turkey (State Hydraulics Works and Bank of Provinces), ONEP (Office national de l'eau potable) in Morocco, ONAS (Office national d'assainissement) and SONEDE (Société nationale d'exploitation et de distribution des eaux) in Tunisia...

Their status allows more flexible administrative and financial management; besides state subsidies, these organizations may have their own resources (service taxation, collection of control taxes, penalization of infringements...) and may receive external financial assistance resulting from bilateral and multilateral cooperation. This institutional arrangement works well and is often duplicated.

This option is also adopted to manage structures in charge of reinforcing, coordinating and stimulating the environmental policies of several Southern and Eastern Mediterranean countries, frequently even before the appearance of a ministry for the environment. This is the case of the following multifunctional agencies: CEP (Committee for Environmental Protection) in Albania, EEAA (Egyptian Environmental Affairs Agency) in Egypt, ANPE (Agence nationale de protection de l'environnement) in Tunisia.

### *Breakdown of environmental authority between the state and subnational territorial units*

From the four issues presented in Fascicle 3, the breakdown of authority between the state and subnational territorial units is the mostly developped. This is where history has the greatest impact. Since political regimes are heterogeneous, it has been decided to focus the analysis only on breakdown of responsibility between the central government and subnational territorial units. In order to better comprehend the dynamics at hand, the analysis deals with <u>decentralisation</u>, i.e., the transfer of responsibilities to elected autonomous authorities, and <u>deconcentration</u>, or handling over of some administrative authority to lower territorial administrative levels closer to the population. A brief overview of implemented strategies is carried out in Fascicle n° 3 concerning five countries: Spain, Italy, France, Turkey, Morocco.

After this overview, extreme caution is needed. The contrast between the situations is striking. An optical illusion could stem from the existence of sometimes similar denominations for institutions. This is even aggravated by the necessary translation of terms or by the work of searching the equivalence of the names of institutions. The risk is to hurriedly confuse the name with the thing, the appellation with the object, without checking whether beyond the similar denominations, the institutions really do have common features. In reality, this is not the case, and any comparison must be made "contextually" to avoid hasty judgements and errors of appreciation.

Spain, France and Italy, having had similar structures and organizations, derived from what is often called "the Napoleon administrative system", have evolved towards strong decentralization in favor of the regions. But different ways have been undertaken. And the differences can be considerable: quasi-federalism in Spain, Italian regionalism, administrative decentralization in France. In Turkey, municipalities gain autonomy; in Morocco, the decentralization movement could favor the regional level.

Everywhere around the basin, the autonomy of communes seems to be stronger, since they are the basis for the community life, both politically and economically. "Local authorites construct, operate and maintain economic, social and environmental insfrastructure, oversee planning processes, establish local environmental policies and regulations, and assist in implementing national and subnational environmental policies. As the level of governance closest to the people, they play a vital role..."(Agenda 21, chapter 23: Preamble to Section 3. Strengthening the Role of Major Groups, and chapter 28, already quoted).

But we are faced with a new problem, that is whether communal structures, sometimes more than a century old, are adapted to manage equipment and infrastructure as well as natural resources and milieux, the structure of which pertains to spatial logics different from the administrative or political logic. This is why the federating structures gradually being implemented are of most interest, such as metropolitan areas in Italy, intercommunal organizations in France, merging of local administration in Turkey, urban areas prefecture in Morocco.

As regards deconcentration of government services, despite national differences, the trend is present everywhere. In the field, these services become the indispensable tools for ministries which now have to deal with abundant legislation. It seems that decision-making in the Mediterranean basin countries seeks to be better adapted to local environmental conditions.

But, here again, there are various possible responses. External services of central environmental authorities are usually created according to the administrative logic, either at the regional level or at the lower levels (departments, provinces, governorates...). To our knowledge, there is only one country in the Mediterranean basin where the ministry for the environment has set up deconcentrated services on the basis of a geo-ecological approach. Tunisia has recently created six regional Directorates to cover the country's natural milieux: north coastline, central coastline, south coastline, high mesas and northern plains, steppes, southern Sahara.

This leads us to the question of spaces related to environmental problems. Natural environment, as well as development concerns, are not bound by administrative frontiers. It is a well-known fact that basin agencies for an integrated water management are established on the basis of hydrographical characteristics. In other environmental fields, no territorial division can satisfy all approaches neither can it meet at the same time ecological requirements, administrative or economic constraints, and historical traditions. Meanwhile, Nature spontanously creates some physical solidarity at the time of earthquakes or floods.

### 4.3. Theme-related analyses

The work programme initiated by United Nation's Division for Sustainable Development (and quoted in paragraph 3.1.) calls upon the international scientific community to develop research programmes which will enable ISDs to be identified, established and produced, facilitating and evaluating their usage.

Consequently, during MEDO's pilot phase started the in-depth analyses of environmental subjects that appear to be important as regards the specifically Mediterranean problematics, in view of producing evaluative indicators. These analyses appeared necessary to balance the knowledge and database already accumulated within Blue Plan with respect to prospective analysis carried out at the Mediterranean Basin scale. In fact, this data covers the socio-economic sphere much better than the environmental sphere.

The following priority themes were chosen to start with: water resources, soil resources, vegetation cover, i.e. forest, biodiversity ant the coeastal regions. The methods for analysis which were elaborates belong deliberately to the systemic methodology included in the concept of sustainable development.

### *The methodology followed-up for the thematic analyses*

In response to questions raised by the establishment of ISDs, MEDO has set up a process that is gradually being applied in the analyses of various subject areas. The method is set out in the following way:

The scientific context

MEDO's work entirely fits in with prior BP/RAC projects. Moreover, the subjects dealt with by MEDO are of major international and Mediterranean concerns. This is evident as many international organizations, scientific institutions and other networks of co-operating institutions are already developing their activities with regard to these subjects.

It is worth taking a closer look at these activities so as to properly integrate their existence and their results into MEDO's work. A network of scientific and technical co-operation should be created between the various international programmes and BP/RAC.

The state of knowledge and the quality of the data

ISDs have to be conceptually well established, and furthermore, they depend upon basic data that must be readily available, accessible at a reasonable cost, adequately documented, reliable and regularly updated. MEDO has therefore decided to carry out specific work on the quality of the data concerning Mediterranean countries, in particular data concerning environmental parameters.

This work also offers the advantage of identifying shifts in the use of technical or institutional terms within scientific standards of measures, and within the interpretation and recouperation of their results. This has slowed down the comparison of data between different locations and different time periods. However; this work is a necessary preliminary condition for the setting up of a common language that can be used between technical experts. It is also useful for the establishment of fruitful co-operations between countries as such a common language can take into consideration their situation and their troubles within the difficult, but indispensable, task of producing large amounts of high quality data.

The Mediterranean problematics

Here, we need to refer to and structure the most important issues encountered in these countries with respect to the priority environmental subjects that are being assessed. This step is more a synthesis of existing scientific and institutional bibliographies.

The input from the sustainable development concept

Concerns of inter- and intra-generation solidarity on the one hand, and of integration between the four sustainable development aspects on the other, mean that the analysis of the phenomena has to be based on a systemic approach. This approach was first considered from a more theoretical point of view, as mentioned in fascicle 5. Here, it is rather a matter of developing its more operational aspect through work centered upon a single environmental parameter and breaking down the consequences with regard to its relations with other sustainable development parameters.

Development and feasibility of ISD

The theoretical study into ISDs has proposed a method of developing these indicators. First of all, this method is applied here and tested on an environmental parameter. Finally, the identified indicators are assessed according to their feasibility as a function of the availability and quality of the basic data, such as: existence of these data in the BP/RAC databases; existence and availability among national or international partners; availability at an affordable cost; possibility of drawing up the short or medium term; long-term feasibility, etc.

Institutional study

Not all of the indicators are useful to all the actors involved. To guarantee that ISDs are put to optimum use, knowledge must be gathered on the tasks of the numerous institutions and actors, in each country, that are involved with the specific environmental field considered. Knowledge on the following should be gathered, as accurately as possible: responsibilities and powers, objectives and strategies, policies and programmes, capabilities and means, legislative and regulatory framework. This stage in the methodology covers all of the following: the public and private sector, the central administration and the local communities, the NGOs and the communities, etc.

From problematics to policies and from policies to ISDs

Depending on the actor involved, the understanding of the problematics will be transformed into thinking which may differ from one actor to another; it may also lead to a specific position and strategy, a plan of actions and an evaluation of their own. The actor is helped in formulating its policy through a good understanding of phenomena, as synthesised by relevant indicators In the same way, the clarification of the policy will allow indicators to be proposed that will help to follow-up and assess those actions that are of actual use to the actor.

Selection of ISD systems

The list of ISDs previously eloborated in a general manner, which are accompanied by methodological gselection grids should be combined with precise knowledge of the actors involved in the socio-economic activities having an impact upon the sustainability of development. Such a combination should lead to the proposal of ISD systems that are short, cross-related and particularly meaningful to the user.

### *Water resources*

Among the many subject-related analyses concerning priority environmental parameters for the Mediterranean basin, that most advanced at MEDO concerns water resources. It is described in fascicle 2. Since this analysis is complex and detailed, there will be no summary in this fascicle. This meticulous work, involving close collaboration with the Blue Plan partners is underway. Therefore, fascicle 2 describes in detail the first steps and outlines briefly of the latest steps of the methodological approach described above.

As regards the other subject-related analyses underway at MEDO, since they are not the subject of specific fascicles in this document, they will be referred to below, but only concerning their problematics in the Mediterranean and in particular with respect to sustainable development.

### *Soil resources*

In Blue Plan's prospective analysis exercise on the Mediterranean basin, the soil soon appeared to be a resource limiting agricultural and food development. The macroeconomic prospective trends in the increasing need for agricultural inputs, whether they concern fertilizers, irrigation or mechanization, have been based upon postulates whereby neither the earth nor the rural societies placed any limit upon development. But in the Mediterranean basin difficult climatic conditions are combined with fragile soil, often on steep slopes, badly protected by vegetation, exploited and even over-exploited for a long time, close to the limit where degradation leads to the irreversible loss of fertility. At the same time rural societies do not necessarily have the means (financial and technical) of stalling any such degradation. Under these conditions, soil as a resource restricts development possibilities. Even in localized terms, soil degradation by erosion, salinity, destructuring... is leading to an irreversible loss of the resource.

However, unlike the approaches developed from an in-depth quantification of water as a resource, the Blue Plan has not carried out to a prospective analysis of the soil resource in the Mediterranean basin, for three main reasons:

– Data highly localized in terms of space

Most of the scientific data available regarding the dynamics and changes in soil resources in the Mediterranean concern experimental lots or highly localized geographical sectors, often relatively sparse. The chosen lots are often disconnected from sectors where there is intense agricultural pressure because scientists are first and foremost interested in processes that explain soil dynamics. Other studies are nonetheless available, which attempt on the basis of process studies, to set up measures to control and master soil changes. Many measures are therefore available but they need to be brought together.

- A transfer of scales difficult to do

The transfer of knowledge from one scale (a lot or a small watershed) to another scale (the Mediterranean large watershed) is very difficult to make because of the diversity of factors involved in soil dynamics, from upstream to downstream of the watershed. Although physical and human factors dominating this dynamic process (land use, protective land cover, geological soil fragility, slopes, size of lots) may be controlled to some extent on the experimental scale, they appear far too diverse on the scale of the large watershed, to be extrapolated or accumulated.

- Remote sensing contribution limited to monitoring

The results supplied by the CORINE programme demonstrate that to be credible, a system of inventory, monitoring and control of risk sectors changes needs to take into consideration not only physiographic and vegetation data but also the data relative to soil exploitation systems: size of the lots, land ownership aspects, social and economic issues.

Soil problematics in the Mediterranean

Soil resources can be considered from four different approaches:

- Soil is a "productive" resource of plant and animal biomass due to the food chain; it contributes to the production and economy of a country because it is the fundamental support for agriculture and husbandry. This approach is that most widely used in sectorial analyses.
- Soil is an "economic" resource, a capital for making financial gain. Real estate pressure may arise, leading to speculation phenomena that are difficult to control. Resource exploitation may be done in several forms: culture, husbandry, urbanization, construction, industry, tourism. Potential or effective users may come into conflict regarding land use and/or appropriation.
- Soil is an "ecological" resource. It is a biotope, a support and a source of life, enabling flora and fauna to exist to a point that they can become particularly diversified in certain media. It provides for species feeding and reproduction. Thanks to its biological and physical characters, it is a fundamental link in the natural balance.
- Soil is a "patrimonial" resource. This notion involves all the three previous functions, and even those that are not expressed, while bringing in social values too.

Blue Plan has chosen the last approach for its analysis considering the variety both in terms of environmental, economic and social values applicable to the soil element of the Mediterranean system.

The characteristics of the Mediterranean climate make it aggressive on the soil, particularly in marginal zones due to, for instance:

- the high intensity of rainfall concentrated over a short period after the dry season erodes the soil that has been fragilized by the vegetation decohesion and degenerescence,

- the intensity of evaporation favors the concentration of mineral soils at the surface. This chemical degradation is accompanied by a physical transformation (the formation of a rigid and water-proof crust). These two phenomena cause soil sterilisation in a trend that is difficult to reverse. Only intensive washing can correct the situation, while being soil-depleting, but it calls for a great deal of water, a resource that is particularly rare in areas living under the threat of salinization.

Soils and sustainable development in the Mediterranean

In the Mediterranean, soil is a fragile resource being sufficiently rare to be disputed and a source of conflict (economic, social and territorial); but the resource is not well known, neither in terms of its quality nor its dynamics and in particular as a resource needed for development.

The fact that there is no control or monitoring is not due to a lack of knowledge but to hesitations among researchers who are interested either in soil dynamics (erosion, degradation) or in its management and its improved productivity within a given sociological and economic framework by employing their knowledge as a political basis for overall development or for conservative strategies.

Provisionally, it can be concluded that the Northern Mediterranean differs from the Southern Mediterranean. In the North, the European countries are the subject of very extensive rural land abandonment accompanied by the development of fallow land in the marginal sectors that are least interesting for agricultural production. The more sensitive sectors are therefore gradually taken away from erosion. Furthermore, only the southernmost regions of Europe (Southern Spain, Italy and Greece) have enough summer evaporation to provoke salinization of irrigated zones that are badly drained. In these countries, besides an extensive soil chemical pollution that is difficult to quantify or locate, there are problems of space management that are becoming more and more acute. With the gradual abandonment of the inland rural areas, urbanization is increasing more or less anarchically on the coast where space is becoming a scarce resource causing serious conflicts to arise.

In the South, the riparian Mediterranean countries have to cope with a double pressure upon the soil coming from rural and urban sectors growth. In these countries, soil-related problems appear in terms of management and preservation of one of the four initial natural resources for agricultural development (with water, energy and the varieties of cultivated plants and animals), as well as in terms of land use management and the need for balance between spatial growth of economic activities, again essentially in the coastal areas.

### *Plant cover including forestry resource*

Plant cover is provided by herbaceous and ligneous plants. It is indissociable from water and soil resources because it is in a state of constant interaction with them in every land ecosystem. Generally speaking, in the Mediterranean the absence of vegetation corresponds to an irreversible trend towards the sterility of the soil due either to water shortage or to erosion or to physico-chemical degradation. The function of regulating the water cycle and of protecting the soil ensured by vegetation becomes apparent when it disappears under the effect of excessive anthropic pressure.

On this point, the Blue Plan focuses on the important role of the Mediterranean forest as an environmental component of the Mediterranean system: the disappearance of a resource (the forest) induces that of two others (soil and water) with negative feedbacks on the two economic sectors initially concerned: agriculture (soil and irrigation dams) and energy (hydraulic dams). In addition, run-off causes risks of landslides (threats to the habitat and to infrastructures) as well as risks of violent overbank floodings.

Knowledge of the changes in forest cover thus appears to be essential for a territorial diagnostic of relations between the environment and development. Through the Silva Mediterranea organization, FAO makes enormous contributions to the follow-up of the Mediterranean forest problematics. As for water and soil, this problematics must be analyzed differently depending on country situations in the North, South or East of the Mediterranean.

It is found that two thirds of the Mediterranean wooded areas are in Europe where standing trees represent 90% of the total (including the temperate forests). Per hectare, these standing tree volumes are 84 $m^3$ in Europe and 17 $m^3$ for the Southern and Eastern countries.

FAO has analyzed these contrasting situations as follows:

"In the North
The forest is overtaking the abandoned agricultural land in the form of scrub and bush; management is neglected because of a labor shortage and profitability problems. These forests are exposed to fire, the resulting devastation of which is considerably covered in the media each year. Although they are not profitable to their owners the landscaping and protective functions of these Mediterranean forests are nevertheless important. Accordingly, the various countries invest considerable financial resources in equipment to prevent forest fires and to control them.

"In the mountainous inland areas, concern has focused on protective forests and soil restoration: correction of torrents, protection of the lowlands against flooding, regulation of water resources, control of soil erosion, rewooding and grass planting in the watersheds.

"In the South and East
The forest is exposed to excessive demographic pressure which often causes damage. Abusive exploitation with insufficient concern for the future by increasing poor rural populations is degrading and slowly

destroying forest populations that have gone beyond the threshold of resilience and can neither reconstitute nor regenerate themselves because of the climate and the lack of rest. There is also unorganized or anarchical clearing aimed at extending agricultural land. Wooded surfaces are decreasing as well as their biomass productivity".

Blue Plan's prospective analysis of the Mediterranean forest

An environmental chain has been established in order to better understand, according to the different scenarios, the influences or pressures produced by the most important factors, in particular fire, clearing, overgrazing, fuelwood withdrawals and plantations, so as to evaluate the share of disappearing forest, the share of progressive degradation and the compensations that are being applied, through plantation and pressure control.

All the scenarios reveal a worrying change that may become catastrophic for some countries between now and the year 2025. The least favorable scenarios estimate a loss of 60% of the existing forest coverage. The most optimistic consider that, after a reduction of 20 to 25%, it could be stabilized over the next 30 years as long as a particularly volontary forestry policy is implemented by most concerned countries in the South and East.

Forestry management for sustainable development

FAO has confirmed the unfavorable path taken by the Mediterranean forest. It estimates that the average deforestation factor over the last 10 years is –1.1% (against –0.8% for the world tropical forest) for the Southern and Eastern countries... compensated for to some extent by plantation. Hence the interest of the Mediterranean Forestry Action Programme defined in 1993 to engage the management of Mediterranean forestry land in a process of sustainable development. But this sectoral program has to be placed systemically in a context where the overall trends must be taken into account:

- the pressure of rural populations on the forest will remain considerable for many years yet, in the South and East of the basin. Therefore, these populations must be helped in implementing multi-use management methods of the forestry spaces,
- tourism will continue to develop strongly around the Mediterranean. The quality of sites, a factor of attractiveness, is mainly based upon that of forestry landscapes which can offer a decisive "comparative advantage". Therefore, amenities, in particular touristic, must not deteriorate the forests in the South and East as they have in the North,
- the world trade in wood and derived products is tending to become international and homogeneous, to the detriment of a "handicapped" Mediterranean forest where growth is slow, soils are fragile and exploitation conditions are difficult. Thus, local supply by short and well controlled circuits should be given preference.
- the ecological functions of the forest (maintaining biodiversity, carbon storage, regulating climate and the water cycle, protecting soil) will become increasingly important: the global ecological value of the

Mediterranean forest may be far higher than the value of wood production.

Monitoring, in particular thanks to the remote sensing tool, the changes in forest cover and the parameters governing it, is therefore highly important to characterize the state of the environment in the Mediterranean basin.

### *Biodiversity*

In the Blue Plan report concerning the futures of the Mediterranean basin, biological diversity was not explicitly dealt with. Although the concept is well known and has been used for some time by ecologists, it only came to the knowledge of the general public during the preparation of the Earth Summit, and more particularly of the Convention on biodiversity that was signed at that time (1992).

In the field of nature conservation, biological diversity appears just beneath the other aspects and often justifies the different actions that are envisaged (protection of spaces, reintroduction or regulation of species). What is new in the current approach is that other disciplines have become aware of the existence of biological diversity (developers, prospective analysts) and of its importance for the sustainability of man's presence on Earth.

In acknowledging biological diversity as one of the priority environmental components to cover, MEDO's approach is justified by the media-related impact of the question but above all because of its importance in a holistic approach to sustainable development. MEDO wishes to contribute to the survey and to the complementary establishment of knowledge about biological diversity in the Mediterranean by emphasizing domestic biodiversity. This aim involves an active scientific and institutional co-operation, specially with SPA/RAC.

According to the definition selected by OECD in 1991 pertaining to its indicators, biological diversity refers to the variety of the living species at every level including genetic elements, species, populations, ecosystems and natural processes that ensure the perpetuation of life in all its forms: wild species, domestic species and their different races as well as agro-systems resulting from the Man's multi-secular action.

Available knowledge concerns essentially the "wild" biological diversity. The Mediterranean region can be considered as an important location because of its biological wealth, to be placed immediately after equatorial and tropical regions. To illustrate this, reptiles and batrachians are a good example. With respect to areas of approximately equal size, the Mediterranean region, in absolute value terms, represents approximately 82 species of reptiles per million km$^2$, the south-west of the United States 58 species, Guyana 134 and Mexico 363. For batrachians, the respective values are 31, 23, 104 and 144. These values are relatively high, in particular if we consider that the Mediterranean is flanked on the South and the East by large desert stretches that prohibit or considerably limit the exchange of fauna with the major biodiversity areas represented by tropical Southern Africa and the Indo-Malaysian region in the East.

The problematics of Mediterranean biodiversity

The trends towards changes in biological diversity are today clearly identified and well accepted by public opinion. In the Mediterranean, the current trends towards the rarefaction of natural spaces and to the decrease of some species populations is similar to the same processes elsewhere on the planet. For instance, in the 1950's, the monk seal was present throughout the Mediterranean. Today, only a few isolated individuals still remain in the Western basin and the population is declining on the Greek and Turkish coasts.

In the Mediterranean basin, few species have disappeared from but some of them are particularly vulnerable either because of their small numbers (Corsican deer, monk seal, Bonnelli eagle) or because the habitats where they live are themselves threatened (endemic plants of the coast). There is often a combination of the two causes.

The challenges of biological diversity for sustainable development can be analyzed from three points of view:

- the action of human activities on biodiversity: economy, agronomy. This is Man's direct use of biological diversity resources in order to satisfy his immediate needs or those concerning the very short term (the next ten years). Agronomic research must constantly adapt sophisticated cultivars to environmental variations (climate, pollution, parasites). To do so, it must delve into the genes of wild plants or of traditional cultivars. Pharmaceutical research uses many wild species to isolate active molecules designed to become new medicines.

- the importance of biodiversity for humans: patrimony, scientific knowledge. The most classical definition of sustainable development is that of Bruntland's report, indicating that it must "meet the needs of the present without compromising the ability of future generations to meet their own needs". This principle of inter-generational solidarity leads to that of precaution. We know little about the needs of future generations and therefore we must preserve the greatest possible biological diversity in order to leave to our descendants a world capable of satisfying their needs. This action will only be possible if we have extensive scientific knowledge of biological diversity both in terms of quality and quantity.

- the operation of ecosystems and the biosphere. Each species, each habitat is not isolated but is part of a system in a state of dynamic balance. Current scientific knowledge about the architecture of these ecosystems, their operation and development, is as yet highly fragmented. However, some species or habitats are probably the vault stones to vast systems and as things now stand, there is no way of predicting the final consequences of their possible disappearance.

For instance in the Mediterranean, Posidonia appears to play a key part as a species or as a habitat through the seaweed communities it forms. It might be thought that the disappearance of a Posidonia seaweed community would seriously affect the operation of the coastal ecosystem in depriving many species of their reproduction or spawning places. In this case, the principle of precaution means maintaining the greatest possible biological diversity but also intensifying scientific research in order to better know these key species.

### *The coast*

The coast is a natural are where land, river and sea influences meet and interact. One of the major conclusions of the Blue Plan report on the futures of the Mediterranean basin was to underscore the many conflicts affecting the coastal areas. The almost inevitable characteristic of the ever increasing use of space and coastal resources resulting from all scenarios, has led to awareness of the urgency of land-use planning issues facing this area. This reflection was at the origin of the Coastal Area Management Programs initiated within the framework of MAP and to which Blue Plan is making an intense contribution.

<u>Features of the Mediterranean coast: nature and resources</u>

Some of the specifically Mediterranean aspects of the coast derive from the physical characteristics of the Mediterranean Sea: it is warm, generally with low tides, high salinity and the continental plateau is narrow. The nature of Mediterranean coasts differs from one area to another depending upon the geological substrate, tectonics and dynamic factors of bank accumulation or erosion: rocky coasts with outstanding submerged forms, accretion coasts with beaches, dunes, marshes, lagunas and deltas.

One of the main characteristics of the Mediterranean coast is the inland area. Indeed, with the notable exception of the delta planes and the Sahara rim, the periphery of the Mediterranean basin has typically mountainous inland areas with a more or less powerful relief and steep slopes. Coastal plains are particularly narrow, sometimes non-existent. It can be estimated that three quarters of the coast fit into this configuration.

The Mediterranean coast is also distinguished by its high percentage of insularity. Eleven of the bordering countries have insular areas. For two of them (Syria and Albania) such areas are insignificant. Two other islands are entire states (Malta and Cyprus). The remainder of the islands belong to the three countries of the Western basin (Spain, France and Italy) and to four countries in the Eastern basin (Croatia, Greece, Turkey and Tunisia).

The environmental components in the coastal regions have some particular characteristics. Water needs are covered by imported water from the inland areas and by the exploitation of coastal aquifers. Soil as a biological resource may be saline and alkaline in the deltas. As a spatial resource, soils are limited by the sea and the relief. Forests are characterized by the high numbers of thermophile elements. High endemism and rich fauna and flora characterize the coastal ecosystems.

At the border between continental and marine environments, the characteristics of the Mediterranean Sea, related to the nature of the coasts (and obviously with the climate and the nature of the soils) produce terrestrial and aquatic ecosystems having outstanding ecological interest and containing very special living communities (briny and/or lagoon-type environments, Posidonia colonies, etc.). The biomass and the biological productivity of these ecosystems are considerable. For instance, coastal lagunas represent between 10 and 30% of total fish production in the Mediterranean. As far as posidonia beds are concerned, they actually construct the sea bed and stabilize the coasts guaranteeing the durability of the coastal edges which are a primarily production area, a spawning and nursery place for many species. Finally, it should be mentioned that among the coastal ecosystems, wetlands are particularly important for the reproduction of water birds and as a halting place for migrating birds.

This quick look at the characteristics of the Mediterranean coast suggests two observations: the space is limited because of the relief and the environment is in a fragile state of balance between terrestrial and marine domains.

Coastal activities

The coast is the obliged location for some socio-economic activities: fishing and fish farming, port activities, maritime transport, extraction activities (salt, sand, offshore oil), seaside tourism and nautical tourism, national defence marine activities. All of these activities lead to the use and development of the maritime domain (stretches of water, mooring areas, oil terminals, marine defence areas of testing) and the coastline itself (ports, yachting ports, dikes and sea-control works) as well as the terrestrial domain (human habitat, means of communication with the hinterland, storage and warehousing of goods, shipyards, sea-plants...).

In addition to these uses are other activities needed for the operation of human groups: agricultural activities, administration, health, education, services of all sorts. The coast is also the preferred location for various activities such as oil refining, industries based upon the import of raw materials (iron and steel) or upon export (phosphates) while thermal power stations use sea water for cooling. Organization of these elements in space leads to more or less extensive human settlements with varying levels of speciality.

In the Mediterranean, the coast is particular in that it has been occupied by humans for a very long time. There are many archaeological and historical sites forming an outstanding architectural inheritance which is an advantage and a constraint at the same time: it is an advantage in terms of culture and as a tourist resource and a constraint in terms of its protection and preservation.

Contemporary economic development, demographic growth, urbanization and changes in lifestyles are emphasizing the attraction of business to coastal regions and to the coastal strip. The factors of concentration for these businesses are connected more particularly to the following:
- continuous tourism development itself connected to the growing standard of living and to the growth in air transport,
- internal population movements, characterized in the North by the inflow of retired people and in the South by rural exodus, amplifying the urbanization process,
- a certain amount of heliotropism among companies seeking attractive locations in terms of the quality of their lifestyle,
- the globalization of goods exchanges which is amplifying the transport function.

The phenomenon of men and business concentration characterizes coastal regions all over the world, where 60% of the planet's population live. This concentration characterizes in particular the Mediterranean coast: the Blue Plan has named it "littoralisation" (coastalization).

Problems and conflicts on the coast

This concentration of activities is leading to many conflicts, first between competing activities and second between activities and the environment. In the first case, competition and conflict concern the use of the space (but also labour force, water and forests) between socio-economic activities which can also be mutually exclusive (for instance, urbanization and agriculture). Conflicts between activities and the environment result from the pressures that these activities apply to resources and natural environments by withdrawals, polluting wastes, interference with natural processes and destruction. The latter aspect is a great concern when the result is the irreversible loss of a resource or a natural environment. For society, the degradation of unique historical sites should also be considered as an irreversible loss.

The development of the accretion coasts illustrates the complexity of development/environment relations. The construction of accretion coasts depends on the incoming terrestrial or marine sediment resulting from the effect of natural erosion in watersheds and rocky coasts as well as on marine dynamics (waves and swell, currents). This makes the coastal areas particularly sensitive to any change in the interactive system of such elements. Such changes could derive from:

- dams and reservoirs even located far upstream, trapping sediments and altering the flow of watercourses (and therefore their transportability),

- the modification in the plant cover of the watersheds influencing the amount of sediments carried (silting up or stripping of the coasts, flooding),
- sea-control works that stop or modify coastal erosion, perturb coastal currents and therefore the accretion areas,
- the extraction of materials which reduces the available volume of sediment, sometimes also interfering with sea turtle egg-laying sites.

Among other things, this can cause destabilization of deltas and the stripping of beaches with silting up or sanding up in other zones. This chain is a typical "feedback loop" in which the negative impact on the environment of different activities cause so great a degradation of the natural resource that this one in turn limits or even prohibits such activities. This chain of events also indicates the multitude of actors involved, from national electricity companies to local construction material contractors, from foresters or mountain breeders to port authorities or tourist developers.

### 4.4. National observatories

Among MEDO's main functions, the most important and difficult to implement is the support given for the creation of national observatories in the Mediterranean. This support is based on a compatible system for collection, processing and communication of environmental and socio-economic data.

To succeed, during the MEDO pilot phase, Blue Plan has chosen to concentrate on four countries: Tunisia, Morocco, Turkey and Albania. Some other countries like France, Italy and Spain are considered as comparative references because of the advanced state of their national and regional or equivalent observatories.

#### *Pilot country: Morocco*

After a three-year preparatory phase, the Moroccan National environment observatory (ONEM), under the aegis of the Ministry of the Environment, was inaugurated in December 1994 with the participation of UNDP, UNESCO and MAP (Blue Plan). In 1993, ONEM had requested the support of the Blue Plan observatory function and that of IFEN (Institut français de l'environnement) to better define its missions and begin its activities with a network of partners that had yet to be constructed. It is the most advanced project of which MEDO is a partner.

Its missions are:
- support for the integration of environment and development issues,
- management of environmental data,
- evaluation of the impacts of socio-economics activities on the environment,
- analysis of the incidence of environmental degradation on the economic growth of the country,

- study of environmental conditions and trends, at the national, regional or local levels,
- production of methodological decision-making tools,
- production and communication of environmental information,
- periodical printouts of reports on the state of the Moroccan environment,
- management of a network of acting partners, assuring the supply of environmental information and data. Included amongst these partners are the Ministries of Public Works, Energy and Mines, Agriculture and Industry as well as research centres and NGOs,
- constant surveillance of the environment.

This observatory has only recently become operational. Monographies have been made and regional studies carried out. An initial publication on the assessment of the current studies was communicated during the inaugural seminar of Rabat.

ONEM has set up membership rules for its network of players called RAPIDE.

Among the projects currently carried out by these partners, the following can be cited:
- the project involving know-how for new geographical information production and management technologies in the fields of land development, urbanisation and the environment,
- the development of geographical referential methods for the inventory and monitoring of the natural environment; the development of data input and processing methodology for space-related information; development of mapping and geographical database; the implementation of space-related information systems meeting the needs of rural space development; training and cooperation programmes in terms of GIS; models of the potential and risks of farm land degradation.
- the development of inventory maps for soil resources; models of the potential production and risks of farm land degradation in the Settat Province and Northwestern regions of Morocco, based primary on socio-economic data and satellite images.

***Pilot country: Tunisia***

The Tunisian Observatory for the environment and development (OTED) is a project prepared by the National Agency for the Protection of the Environment (ANPE) under the aegis of the Ministry of the Environment and Land-use Planning (MEAT). The draft project document was established together with MEDO with particular attention paid, among other things, to obtaining coherence between the respective observatories. Submitted to the attention of UNDP, its support was obtained and an agreement signed in July 1994 for a two-year preparatory phase.

Since then, at the request of the authorities concerned, MEDO has proposed the terms of reference of the main consultant for the methodology of setting up the observatory and suggested a number of consultants likely to correspond to the demand. Therefore, regular exchanges take place between ANPE and MEDO officials. An assistance, co-operation and exchange agreement between the two observatories is being established and may later serve as a framework for MEDO's relations with its other Mediterranean national partners.

Designed as a tool for decision makers through the development indicators concerning the state, progress and evaluation of the environmental and development interactions. It also contributes to the drafting of the national report on the state of the environment.

ANPE is the main operator of MEAT in this field, and it maintains close cooperation with MEDO in order to develop global methodology to create and follow up on the OTED Project.

To succeed in its mission, OTED works with the database created by the MEDGEOBASE project, the Sustainable Development Network project and national institutes, as well as other centres such as the National Centre for Remote Sensing (CNT) and the Regional Institute for Computer Science and Telecommunications (IRSIT).

The following are among the current projects undertaken by CNT:
- the development of an Information System for Urban Planning. Its main objective is the implementation of urban follow-up and planning methodology, based on a geographical information system for the Tunis area. As database, this project uses maps, the urban planning framework and satellite images.
- Digitising the maps of the "Forest and Grazing-ground Inventory" is carried out by the Forestry Institute (in cooperation with CNT). The objective of this project is to set up a geographical information system for the follow-up of forest and grazing zones over the entire Tunisian territory.
- It will allow the establishment of a map of 120,000 km$^2$ on the number of forests and grazing grounds, development of a general mapping framework and finally the design of a general development scheme.

IRSIT is incorporated in the implementation project of an information system concerning rural development. The objective is to obtain available data and required statistical and mapping analysis to direct the choices of decision-makers on activity planning programmes and to monitor the situation over the mountain ranges in the North-western part of Tunisia.

Finally MEAT has undertaken a project in association with CNT, INS (National Institute of Statistics) OTC and GDTA (The Aerospace Remote Sensing Development Group) (France) to the implementation of sustainable development.

All these projects will constitute an important basis for the operational start-up of the Tunisian observatory.

*Pilot country: Turkey*

Initially, it was envisaged to study a system of environmental information and management within a UNDP current programme. After several inter-ministerial discussions involving essentially the Ministry of the Environment, the State Planning Organization and the State Institute of Statistics, the need for an observatory was clearly appreciated. The Ministry of the Environment set down the ground work for a Turkish Environment and Development Observatory (TEDO) as one of its priorities. This interest and this need were brought to the attention of the representatives of the European Union (in Brussels and Ankara) and of UNDP. Both organizations have expressed interest in the project.

A draft project document for a two-year preparatory phase was recently established by a Turkish team assisted by MEDO and the project proposed for European Union support (GD XI – LIFE financing). It will benefit from a UNDP pre-existing financial contribution for the Ministry of the Environment and, very probably, from complementary support. In addition, the World Bank intends to include TEDO as a tool for the follow-up and evaluation of the National Environmental Action Plan now being finalized.

The objectives of the future observatory as defined in the memo drafted after the preparatory phase of the Turkish Environment and Development Observatory are:

- to facilitate the sharing of data with the organisations dealing with environmental and development issues,
- to increase private sector's and NGO's access of public data,
- to contribute to the improved comprehension of situations, implications, trends, and relationships between environment and development,
- to supply local, regional or national decision-makers with objective data to multiply actions in favour of sustainable development for economic interest zones,
- to structure the activities in relation to the systemic and prospective approach.

*Pilot country: Albania*

Information sessions about the observatory function in general, then about the Mediterranean and Albanian observatory functions, have been held with the Committee for Environment Protection (CEP), the Institute of Statistics, members of the government (many have since changed) and delegations from the European Union and UNDP.

A draft project document which first requires precise identification of the institution most directly concerned and of the local team that will be in charge of, should be established between now and the end of 1995 and submitted to the attention of the European Union (GD XI – PHARE programme) and UNDP, and possibly also the ERDB.

A project similar to MEDGEOBASE, and to CORINE Land Cover, is planned for the countries of Eastern Europe, including Albania. This project will be funded part by the European project PHARE.

The National Statistics Institute of Albania is presently working with the French Statistics Institute (INSEE) to implement new information collection procedures. Complete upgrading of the former system is also underway.

## Conclusion

> Men are the enemies of everything they do not know.
>
> *Ali ibn Abi-Tâlib*
> *VIIth century Arabian poet*

> States should cooperate to strengthen endogenous capacity-building for sustainable development by improving scientific understanding through exchanges of scientific and technological knowledge, and by enhancing the development, adaptation, diffusion and transfer of technologies, including new and innovative technologies.
>
> *Principle 9 of the Rio Declaration en Environment and Development, June 1992*

As a principle of action for sustainable development, Agenda 21 states both knowledge of phenomena and of interactions between environment and development as well as information for decision-making. Accordingly, environmental policies at every level propose the establishment of observatories among their basic instruments.

BP/RAC, through its Mediterranean environment and development observatory function (MEDO), has added to its major objectives to contribute to Mediterranean national capacity-building in terms of environmental policies, by participating in the establishment or reinforcing of <u>national observatories</u> that are reliable, perennial and fully integrated with reflection work concerning national priorities, with action preparing and with decision-making.

As a MAP Regional Activity Centre, Blue Plan is entirely involved in MAP restructuring being prepared at the time of its twentieth anniversary, that is the Action Plan for the Protection of the Marine Environment and the Sustainable Development of the Coastal Areas of the Mediterranean also referred to as MAP phase II.

In particular, MEDO activities within the Blue Plan are based upon the production of elements for a <u>sustainable development Mediterranean strategy</u>. This field of action is described explicitly in the text of MAP II under discussion:

"promoting and developing a function of observation and assessment of the interaction between environment and development in the Mediterranean basin:
- based on existing relevant activities at national and regional level;
- contributing to the provision of technical support for the development of similar national functions when requested by governements;

- receiving, processing and analysing relevant information on Mediterranean environment and development;
- analysing developments in the interaction between environment and development in order to assist the decision-making process;
- elaborating sustainable development indicators applicable to the Mediterranean along the lines developed by UNCED and other international and regional institutions."

In line with prior Blue Plan work on the systemic and prospective analysis conducted at the Mediterranean basin scale, MEDO activities are also aimed at contributing to regular knowledge of the state of the environment in the Mediterranean and to the follow-up of Agenda 21 and of Agenda MED 21, its adaptation in and for the Mediterranean bordering countries.

Working together with the international scientific community in the search for sustainable development indicators, MEDO proposes that the Mediterranean be a pilot "eco-region" for testing the indicators to be retained by the United Nations Commission on Sustainable Development because of the important past of the region involving co-operation in the environmental field within the Mediterranean Action Plan established under the aegis of UNEP.

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UNEP

# Observation and evaluation of environment and development in the Mediterranean (Preparatory phase)

Ninth Ordinary Meeting of the Contracting Parties to the Convention for the Protection of the Mediterranean Sea against Pollution and its related protocols

Barcelona, 5-10 june 1995

UNEP(OCA)/MED IG.5/Inf.5
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Original : FRENCH

1 The Mediterranean Environment and Development Observatory function

## 2 From problematics to indicators: water as an example

3 Environmental institutions in the Mediterranean countries

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# From problematics to indicators: the example of water

## Contents

# Methodological foreword

## 1. The MEDO subject-related analyses

MEDO initiated a number of projects during its pilot phase the most important of which included:
- the establishment of methodological, data processing and logistic tools used as a basis for all the other work. The tools are presented in fascicle 5 and outlined below:
  - the conceptual and methodological framework for structured monitoring of sustainable development in the Mediterranean countries;
  - the Mediterranean information system for the environment and development (MEDIS) currently being established and developed at MEDO;
  - documentary tools gradually being established by MEDO for its own needs and for its partners.
- in-depth analysis of environmental subjects that are of a priority with respect to the Mediterranean problematics of sustainable development, so as to produce indicators; and qualitative and quantitative evaluation tools;
- a compared study of the institutions in each of the Mediterranean countries that are affected by sustainable development issues and which could, therefore, be interested in the indicators corresponding to such concerns;
- assistance in setting up national observatories in BP/RAC's counterpart countries.

An in-depth analysis of certain environmental subjects appeared necessary to balance the knowledge and database already accumulated within Blue Plan with respect to prospective analysis carried out at the Mediterranean Basin scale. In fact, this data covers the socio-economic sphere much better than the environmental sphere.

The priority subjects chosen to begin with are: water resources; soil resources; biodiversity; and the coastal areas. The study methods are developed with a systemic approach and based upon the concept of sustainable development.

## 2. The efforts of the international community in search of sustainable development indicators

The work of MEDO concords entirely with the efforts made by the international community to look at the problem of indicators for sustainable development (ISD). At the present time, these efforts are being synthesized by United Nation's Division for Sustainable Development programme of work.

This programme proposed an initial list of basic indicators to initiate international co-operation. In order to understand the rest of this fascicle, it would be useful to review the criteria that were used in the development of these basic indicators; these are as follows:

- primarily national in scale and scope (countries may also wish to use indicators at state and provincial levels);
- relevant to the main objective of assessing progress towards sustainable development;
- understandable in that they are clear, simple, and unambiguous;
- feasible within the capacities of national governments, given their logistic, time, technical, and other constraints,
- conceptually well-founded;
- limited in number, remaining open-ended and adaptable to future developments;
- capacity to broadly cover Agenda 21 and all aspects of sustainable development;
- representative of an international consensus, to the extent possible; and,
- dependant on data which are readily available or accessible at reasonable cost/benefit ratio, adequately documented, of known quality and updated at regular intervals.

The work that terminated in this initial list of indicators also revealed insufficiencies facing the international community in its search for ISDs and which could motivate new research programmes. Forthcoming efforts can be summarized as follows:

- a search for highly aggregated indicators, on which the SCOPE programme is already working in cooperation with UNEP;
- an analysis of the relationships between the four aspects of sustainable development (social, economic, environmental and institutional) and hence between the basic indicators proposed in the above mentioned list (geared towards a proposal for cross indicators),
- a proposal to group basic indicators into relevant sub-sets for the different potential users,
- scientific research to identify additional basic indicators in order to better respond to the concerns dealt with in Agenda 21.

Consequently, the work programme is calling upon the international scientific community to develop research programmes which will enable ISDs to be identified, established and produced, facilitating and evaluating their usage.

### 3. The methodology used in MEDO's subject-related analyses

In response to questions raised by the establishment of ISDs, MEDO has set up a process that is gradually being applied in the analyses of various subject areas. The method is set out in the following way:

The scientific context
MEDO's work entirely fits in with prior BP/RAC projects. Moreover, the subjects dealt with by MEDO are of major international and Mediterranean concerns. This is evident as many international organizations, scientific institutions and other networks of co-operating institutions are already developing their activities with regard to these subjects.

It is worth taking a closer look at these activities so as to properly integrate their existence and their results into MEDO's work. A network of scientific and technical co-operation should be created between the various international programmes and BP/RAC.

The state of knowledge and the quality of the data
ISDs have to be conceptually well established, and furthermore, they depend upon basic data that must be readily available, accessible at a reasonable cost, adequately documented, reliable and regularly updated. MEDO has therefore decided to carry out specific work on the quality of the data concerning Mediterranean countries, in particular data concerning environmental parameters.

This work also offers the advantage of identifying shifts in the use of technical or institutional terms within scientific standards of measures, and within the interpretation and recouperation of their results. This has slowed down the comparison of data between different locations and different time periods. However; this work is a necessary preliminary condition for the setting up of a common language that can be used between technical experts. It is also useful for the establishment of fruitful co-operations between countries as such a common language can take into consideration their situation and their troubles within the difficult, but indispensable, task of producing large amounts of high quality data.

The Mediterranean problem
Here, we need to refer to and structure the most important problems encountered in these countries with respect to the priority environmental subjects that are being assessed. This step is more a synthesis of existing scientific and institutional bibliographies.

The input from the sustainable development concept
Concerns of inter- and intra-generation solidarity on the one hand, and of integration between the four sustainable development aspects on the other, mean that the analysis of the phenomena has to be based on a systemic approach. This approach was first considered from a more theoretical point of view, as mentioned in fascicle 5. Here, it is rather a matter of developing its more operational aspect through work centered upon a single environmental parameter and breaking down the consequences with regard to its relations with other sustainable development parameters.

Development and feasibility of ISD

The theoretical study into ISDs has proposed a method of developing these indicators. First of all, this method is applied here and tested on an environmental parameter. Finally, the identified indicators are assessed according to their feasibility as a function of the availability and quality of the basic data, such as: existence of these data in the BP/RAC databases; existence and availability among national or international partners; availability at an affordable cost; possibility of drawing up the short or medium term; long-term feasibility, etc.

Institutional study

Not all of the indicators are useful to all the actors involved. To guarantee that ISDs are put to optimum use, knowledge must be gathered on the tasks of the numerous institutions and actors, in each country, that are involved with the specific environmental field considered in this fascicle. Knowledge on the following should be gathered, as accurately as possible: responsibilities and powers, objectives and strategies, policies and programmes, capabilities and means, legislative and regulatory framework. This stage in the methodology covers all of the following: the public and private sector, the central administration and the local communities, the NGOs and the communities, etc.

From problematics to policies and from policies to ISDs

Depending on the actor involved, the understanding of the problematics will be transformed into thinking which may differ from one actor to another; it may also lead to a specific position and strategy, a plan of actions and an evaluation of their own. The actor is helped in formulating its policy through a good understanding of phenomena, as synthesised by relevant indicators In the same way, the clarification of the policy will allow indicators to be proposed that will help to follow-up and assess those actions that are of actual use to the actor.

Selection of ISD systems

The list of ISDs previously eloborated in a general manner, which are accompanied by methodological gselection grids should be combined with precise knowledge of the actors involved in the socio-economic activities having an impact upon the sustainability of development. Such a combination should lead to the proposal of ISD systems that are short, cross-related and particularly meaningful to the user.

## 4. Theme-related analysis regarding water resources

Among the subject-related analyses concerning priority environmental parameters for the Mediterranean basin, those concerning water resources are the ones that have advanced most. Nevertheless, this meticulous work, involving close collaboration with BP/RAC counterparts, is still in the process of being established. Therefore, this fascicle details the first steps and gives only a brief preview of the latest steps in the methodological approach described above.

# 1. Scientific context

## 1.1. Blue Plan's scientific work on water resources

In the Mediterranean, more than anywhere else, because of the summer drought, the importance of irrigation and tourism, water is constantly at the core of society's concerns. That is why Blue Plan[1], from the outset, made it a priority subject within its prospective studies. Scenarios concerning water resources in the Mediterranean that were based on national and international scientific work and interchanges with national experts, led to a specific publication of the Blue Plan[2]. Its severe conclusions, backed by the necessary figures, alerted the Mediterranean populations to the risk of new water shortages, previously unexpected in the light of history, and upon the speed at which they might occur. In 1994, J. Margat gathered together the general bibliographical references available on the subject of water resources in both the Mediterranean basin, in general, and each Mediterranean country. This in the form of a bibliographical collection[3] which will be regularly updated by BP/RAC.

Although water problems are often local, macroscopic analysis within the Mediterranean Basin casts much light on the overall situation and on the specific situations of the different countries. Water management will have to integrate increasing constraints of interdependence in the mobilization and use of water resources not only at the national, but also at the transboundary level. According to J. Margat, water management in its many aspects, in the same way as any necessary evolution in the behaviour of various economic actors, can only develop harmoniously if a sustained effort is made for training, growing public awareness and exchange.

The similarity of the problems to be solved linked to geographical conditions and shared historical heritage should lead to close collaboration between the Mediterranean countries and a veritable Mediterranean water policy. Dialogues are vital at every possible level: local, regional (ie., hydrographic basins), national and international (when the resources of the same hydrographic basin are used by several countries or when each country contributes to the degradation of a common sea as a result of dumping).

1 Michel Batisse and Michel Grenon. *Futures of the Mediterranean Basin: The Blue Plan*, Oxford, 1989.

2 J. Margat. *Les ressources en eau: situation et perspectives*, fascicle of Blue Plan No. 6, éditions Economica, 1992.

3 J. Margat. *"ressources en eau et utilisations des eaux dans les pays méditerranéens"* bibliography of articles, publications and synthesis reports, selection of references, not published, August 1994.

## 1.2. Institutional and scientific co-operation

Setting up a Mediterranean co-operation within the field of water depends on the political will of national actors. Co-operation for a scientific exchange, discussion and action has already been started through a system of institutional and subject-related networks, both Mediterranean and international; MEDO is maintaining increasingly strong relations within such co-operations.

### *1.2.1. The international institutions*

Water is considered to be a priority area by many of the United Nations agencies and international donors who have initiated specific action programmes on water issues.

UNEP/MAP

The Mediterranean Action Plan (MAP) was adopted in 1975 in Barcelona under the auspices of UNEP. Within this action plan, all the Mediterranean coastal countries and the European Community are committed not only to protecting the sea from pollution but also to ensure that development along its coasts respects the environment. One of the major breakthroughs of the Barcelona Convention and of MAP was to establish multilateral environmental protocols. Active collaboration with UNO, ECE, UNIDO, FAO, UNESCO, WHO and IAEA led to an initial assessment of the polluting sources in the marine environment in 1984.

UNEP-WHO-WMO-UNESCO

In 1977, the Mar del Plata Conference drew attention to the lack of data and above all water quality control which lead to the launch of a global monitoring programme for the quality of freshwater (GEMS/WATER). In 1980, the United Nations General Meeting decreed the International of Drinking Water and Supply Sanitation Decade (or the *Water Decade*). Collaboration between UNEP, WHO, WMO and UNESCO was thus strengthened around this problem. Catastrophic flooding and other natural catastrophes led to the initiation in 1990 of the International Natural Disasters and RisksCatastrophes Decade. Risks of flooding are one of the main concerns of the Mediterranean region.

World Bank

In 1988, the World Bank and the European Investment Bank initiated an environmental programme for the Mediterranean. The first phase was devoted to analyzing problems concerned with the identification of of priority actions on the basis of MAP's work. The *Mediterranean Technical Assistance Programme* (METAP) have been translating these priorities into action since 1989. The integrated management of water resources is one of its priority subjects.

UNESCO/International Hydrological Programme

Through its International Hydrological Programme (IHP), revised every 5 years, UNESCO is endeavouring, among other things, to assess impacts of climate change on water resources, to study altering water resources due to demographic pressure and climate change; and to provide support to all the member governments, in particular arid and semi-arid areas in order to study the water cycle and the institutional aspects of water management. The IHP is now in its fourth stage (1990-1995).

OECD/Environment status group
In 1989, the OECD Council requested a more thorough investigation into the question of the means of integrating environmental concerns into economic policies. The request was renewed in 1991 during the G7 Summit and the Environmental policies committee was instructed to "futher develop core sets of reliable, legible, measurable and policy relevant environmental indicators". In addition, the member countries asked OECD to begin a new programme regarding environmental performance reviews. This is essentially aimed at assisting the member countries in improving the evaluation of their collective and individual environmental management modes. The evaluation of water resources and management practice is dealt with and illustrated by a number of state, pressure and response indicators. Three country profiles have already been produced: the United Kingdom, Portugal and Italy.

### *1.2.2. Technical co-operation networks*

Co-operation between governmental institutions, local communities and non-governmental associations are being established thanks to international financing. There are more and more decentralized co-operation and subject-related networks.

The Mediterranean Wetlands network (MEDWET)
The wetlands of the Mediterranean Basin are of high ecological, social and economic value and have suffered considerable degradation during the 20th century. To reverse this trend and ensure the proper use of wetlands throughout the Mediterranean, long-term co-operation has been instigated under the project named MEDWET. The project was initiated at the end of 1992 by the European Commission, the Ramsar Convention, the governments of Spain, France, Greece, Italy and Portugal, WWF, BIROE and the Tour du Valat biological station. It began in the European Union countries and is now developing pilot projects in Tunisia and Morocco.

The main activities are the development of common inventory and monitoring methodologies adapted to the Mediterranean zone as well as information exchanges. A series of publications has been produced to provide better understanding of the Mediterranean wetlands, and supply of scientific and technical information on the subject. One of the publications concerning *"water resources in the Mediterranean, the challenges for today"* is being produced as a joint venture with BP/RAC.

The Mediterranean Water Agencies network (MEDWAN)
This programme was developed jointly by the Mediterranean Water Institute (NGO founded in 1982) and METAP on the basis of a regional

network of experts. The main action undertaken includes: 1) setting up an interactive network of experts on water; 2) an institutional survey of waste water management practices in the Mediterranean Basin; and, 3) a study on water economy. The third action, co-financed by the World Bank and the government of Monaco, draws on six case studies: four towns in the Western Mediterranean (Fez and Tangiers in Morocco, Bizerte in Tunisia, Algiers in Algeria) and three towns in the Eastern Mediterranean (Alexandria in Egypt, Ramalla District in the Palestine independent territories and Izmir in Turkey).

### *1.2.3. Scientific research and monitoring networks*

The MEDO partners network

With the support of its Mediterranean counterparts (national observatories, environmental institutions, subject-related networks), MEDO compares national situations through sector-based summaries, prospective studies, harmonized indicators and reports concerning the state of the environment.

MEDO also appears to be a relay through which the Mediterranean can be intergrated into global monitoring programmes for the world (GRID); water monitoring (GEMS, MED-HYCOS project) and regional programmes of the European Union and those of its European Environmental Agency; as well as programmes which evaluate environmental performance of actions using indicators of United Nation agencies. The Mediterranean basin can be considered as a full-scale laboratory for regional scale testing of methodologies of sustainable development indicators which are now being developed in a variety of international or intergovernmental organizations.

The Sahara and Sahel Observatory network (OSS)

The international association OSS was born on October 16, 1992. Its objectives tie in with the perspectives of chapter 12 of Agenda 21 concerning the control of desertification. OSS represents Saharan and Sahel countries and is developing the establishment of long-term monitoring structures for the natural environment. In terms of water issues, the priority subject for 94-95 is the management of large fossil aquifers. The specific objectives are to assess knowledge concerning groundwater resources and to encourage countries to establish a framework for dialogue on joint management (common definition of basin limits, language, and common management models). A study of the monitoring indicators of water resources most relevant to the OSS region is being carried out jointly with FAO, UNESCO-PHI and BP/RAC.

The MEDPOL network

The objective of the MEDPOL project, a scientific component of MAP, is to co-ordinate a network for the monitoring and follow-up of the marine water quality and sources of pollution (telluric, atmospheric). Data is being compiled at the Mediteranean scale from national correspondent laboratories of MEDPOL which are to use a common methodology at each measuring station. An assessment of the pollution load entering into the

Mediterranean has been published[4]. The figures need to be updated in orderrto evaluate the impact of the preventive action carried out by the different countries.

The MED-HYCOS project

The feasibility study of the project for a hydrological cycle observation system began in July 1994. It forms part of the WHYCOS programme (world hydrological cycle observation system) supported by WMO, UNESCO and the World Bank. It concerns all the Mediterranean countries. Its three main objectives are: 1) to modernize on a regional scale hydro-meteorological surveillance (selection of key stations in each Mediterranean country and a common methodology for monitoring); 2) to better understand regional hydro-meteorological phenomena on a regional basis as well as environmental trends (analyses of historical statistical series and annual trends); 3) to encourage the exchange of data in the environmental fields. An analysis of multi-annual trends is indeed necessary in order to interpret the phenomena of conjunctural water shortages, frequent in the Mediterranean region.

The FRIEND-AMHY project of IHP (UNESCO)

This is a IHP IV project concerning the application of hydrological analysis methods using regional data series. A group of research institutes is monitoring the hydrological characteristics of Mediterranean water courses as part of the Friend-AMHY programme. The secretarial duties of this group are handled by CEMAGREF (Lyon - France). An initial summary of northern Mediterranean river flows was published in 1993.

The GEMS/WATER world network

The GEMS/WATER programme is a component of the global monitoring system of UNEP (GEMS) while WHO is responsible for implementing the "continental water" component. This includes the selection of representative measurement stations in agreement with the countries with accordance to defining a set of parameters of interest and proposing standard methods of measurement. The database gathering together the information supplied by the countries is managed by the National Institute for Water and Environment Research, situated in Canada. Seventy countries are participating in this programme but only 35 to 40 of them supply data on a regular basis. Countries participate on a voluntary basis. Few measurement stations exist in the Mediterranean and the participating countries (Italy, Egypt, Tunisia) do not supply information regularly.

One of the conclusions of the GEMS/WATER programme is that if the source of pollution is more or less clearly identified, their quantitative measurements are not satisfactory due to the choice of water quality indicators, and the validity of these measurements on a national scale, and particularly on a global scale.

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4 UNEP/ECE/UNIDO/FAO/UNESCO/WHO/IAEA. *Pollutants from land based sources in the Mediterranean*, UNEP Regional Seas Report and Studies N°32, 1984.

### *1.2.4. Exchange networks concerning intervention and management policies*

The international network of the River Basin Management Organisations

The increasing interest in establishing water management authorities on a watershed level (drawing from the experience of French river management), led to the founding in May 1994 of an international network of river basin management organizations which united representatives from Spain, France, Morocco, Brazil, Chile, the Ivory Coast, Hungary, Indonesia, Mexico, Poland, the Czech Republic, Romania, Slovakia, Ukraine and Venezuela. The partners have declared that they wish to apply the following common principles: 1) integrated resource management at a drainage basin level, 2) the establishment of basin solidarity through the "polluter pays" principle, 3) the conditions of associating partnerships for the programming and management of basin organizations, the national authorities (eventually, together with competent international institutions) having a local authority, the water users and the relevant NGOs concerned, 4) the development of information and training of representatives for these countries enabling them to fully assume the responsibilities and missions within the framework of a basin policy.

The Mediterranean Water Network (MWN)

To deal with the challenges connected to water in the future, ministries in charge of water, convened in Algiers in 1990 where they decided to adopt a common declaration and set down long term policies for the exploitation and management of water resources. The declaration proposes four courses of action: 1) to evaluate resources and needs of the populations, 2) to save water and protect the resources, 3) to improve the management of current uses and better manage water in the future, 4) to implement an economic water price policy. Reaffirmed in Rome in 1992, this solidarity was confirmed in Valence in 1993 when the Mediterranean Water Network was founded bringing together national and regional institutions. This network whose secretarial duties are covered by the Ministry of Public Works, Transport and the Environment (MOPTMA) in Spain, is responsible for supervising and implementing the Algiers recommendations. Interim technical committee duties are provided by the Mediterranean Water Institute based in Marseilles.

City networks

The World association for large metropolitan cities (Metropolis) was founded in 1985, and in 1993, established four permanent commissions one of which deals with "Environment, urban ecology and health". This commission's work concerns three main areas: 1) implementing integrated environmental policies, 2) information systems as a decision-making tool, 3) water observatories. The priorities applicable to the latter, as derived from a questionnaire sent to 22 metropolitan cities in 1994 were: 1) to take into account the entire water cycle, 2) the cost of water and pricing as an essential subject, 3) public information to avoid waste and contamination, 4) the study of water quality indicators as essential elements for establishing policies. Most of the main Mediterranean cities form part of the Metropolis association but few of them answered the initial questionnaire on water management in urban areas. A second questionnaire concerning water costs in urban areas was sent out in August 1994.

The MEDCITES programme financed by the World Bank and other international financial supporters connects the cities of the Mediterranean coast where there are similar problems of pollution in the four areas of METAP interest (water resources, marine pollution, solid and dangerous wastes and degradation of coastal areas).

The MEDURBS programme initiated by the European Union intends to promote the exchange of experiences in the Mediterranean and of know-how in the field of municipal management and development. This is to be done through networks of co-operation amongst European local communities and local communities in other Mediterranean countries. Water resource management is one of the areas of common interest. During the first conference held in May 1994, the MEDWATER network of the MEDURBS programme set up a goal to assess the quality of water distribution systems and user services, and to make users and employees, within the concerned cities, conscious water resource management. This second stage of action will be in the form of technical seminars.

***Table 1 : Institutional and scientific co-operation on water in the Mediterranean region***

(This table summarises the above whilst making no claim to be exhaustive)

| acronym | definition | main area of interest |
|---|---|---|
| FRIEND-AMHY | IHP programme on flow regimes determined from international experimental and network data sets Group for the Mediterranean | hydrological flow regimes of the Mediterranean watershed |
| GEMS/WATER | Part of the on-going global monitoring system of UNEP (GEMS) | water quality |
| IDNDR | International Decade of Natural Disasters and Risks | natural disasters |
| IME | Mediterranean Water Institute, secretariate of MEDWAN, technical secretariat of MWN | water (all aspects) |
| MEDCITES | Network of Mediterranean cities financed by the World Bank and other financial supporters | urban |
| MED-HYCOS | Mediterranean hydrological observation system project (WMO) | hydrological cycle |
| MED POL/MAP | Co-ordinated programme for pollution monitoring and research in the Mediterranean | marine pollution |
| MEDWAN | *Meditterranean Water Agencies*, financed by METAP | drinking water |
| MEDWET | *Mediterranean Wetlands* , programme financed by DG XI | wetlands |
| METAP | *Mediterranean Technical Assistance Program,* financed by the World Bank | environment |
| METROPOLIS | World association of the major metropolises | urban |
| MEDURBS | Programme concerning European and non-Mediterranean towns financed by the European Union | urban |
| OECD | Organisation for Economic Co-operation and Development, governmental environmental group | environmental indicators |
| MEDO – BP/RAC – MAP | Mediterranean Environment and Development Observatory, Blue Plan Regional Activities Centre for the MAP | evaluation tools |
| WHO | World Health Organisation | health |
| OSS | Sahara and Sahel Observatory | desertification, natural environment monitoring tools |
| MAP | Mediterranean Action Plan | |
| IHP/UNESCO | International Hydrological Programme of UNESCO | hydrological cycle |
| RIOB | International Network of River Basin Management Agencies | intergrated management |
| MWN | Mediterranean Water Network | rational management |

# 2. State of knowledge and quality of data

## 2.1. The question of observation levels

The watershed is rarely used as a management unit in the Mediterranean countries. Therefore, it is difficult to gather any aggrgated socio-economic information at the drainage basin level which is desirable for a systemic analysis centered on water resources. In the analysis, two spatial subdivisions are overlaid: that of environmental problems (the "ecological" window: subdivided into watersheds or a comparison between the coastal area and the inland area) and that of decision-making (the "socio-economic window": administrative, national, regional and local subdivisions).

To carry out its work on water resources, MEDO selected to concentrate on four geographical levels; moving from one to another required considerable flexibility in terms of data processing tools:

1. The entire territory of each neighbouring country because, on the one hand national economic statistics are available, while on the other hand laws and regulations, policies and sector planning arrangements, are more often established at the national level.

2. The Mediterranean watershed. Natural river basins which often extend far inland are the reference frame for assessing water resources. They also form a relevant observation base for integrated management. The conventional Mediterranean watershed is defined as all the national watersheds of the water courses flowing into the Mediterranean (excluding the Marmara sea); the continental area and the islands; while confining the Nile basin to the part downstream of Aswan. This basin extends into the neighbouring countries of the MAP and three non-neighbouring countries (Bulgaria, Switzerland and Macedonia).

3. The coastal territories of each of the neighbouring countries. This level is defined by the mosaic of administrative territorial units along the coast and for which comparable statistics are available (population, urbanization, land usage). If the physical units defined by the hydrographic systems are the most relevant geographical fields of reference to estimate water resources, the socio-economic or even geopolitical units are more appropriate for defining and forecasting the water demands that various human activities will generate.

4. The local level of the towns and the coastal fringe itself is a narrow coastal and marine strip where human pressures and urban development are concentrated.

Each of the these levels of observation corresponds to different actors, specific problems and specific action possibilities. Considering the "water withdrawals" aspect, it is more interesting to focus on consumption in the coastal areas where figures are high. If we are looking at the pollution of continental and infra-coastal waters, it is better to have information about the socio-economic activities concerning the watersheds. If we are talking about flood risks, to which coastal areas are exposed, safety developments will be necessary upstream in the watershed.

### 2.2. Water resources: status of knowledge and quality of data

Knowledge of the phenomena based upon accurate and reliable databases is an essential forerunner to the analysis of any problematics and search for means of action.

Therefore, exploring sources of knowledge and data is a good starting point. It is based upon the available documentation[5] in BP/RAC, but may have obvious short-comings. All of the information gathered together in BP/RAC comes from national (monographic publications, statistical directories and national summary reports) and international sources (often based upon national sources, for instance the tables of the World Resources Institute, OECD, the World Bank, etc.), international scientific works, symposiums and conferences (communications that are often not published).

Since 1994, FAO, land and Water Development Division have been working on a "AQUASTAT" subject-related database focused on water resources and its agricultural uses. Initially, the African continent was chosen as the pilot zone. The data gathered comes from bibliographic summaries and the results of a questionnaire sent out to the agricultural administrations of the countries concerned with this pilot phase. The first results will lead to subject specific profiles on each country.

#### *2.2.1. Water resources from the quantitative point of view*

The water balance of the conventional Mediterranean basin is calculated according to the sums of flows of all types (inflows and outflows) over aperiod long enough for the values used to be considered as stable. The existing monographs on elementary river basins make the assessment of water flows in each country possible. By analyzing this data, the following remarks can be made:

1. An analysis of the total renewable theoretical resources (their regular share, their shares inside and outside the country) has been carried out at the national and Mediterranean basin levels. However, there are many gaps concerning the exploitable resources (and what the countries refer to by this term), and the share of mobilized resources. These analyses are useful for comparing the water "wealth" of the

[5] The set of references consulted is gathered together in the bibliography mentioned in the first section

different countries i.e. by referring the resource to the population or to the surface area.

Water resource managers make an economic distinction between theoretical renewable resources and exploitable or manageable resources which incorporates the technical and/or economic feasibility for managing this resource. However, few countries consider the ecological aspect of the water resource, i.e. the need to preserve the integrity of the wet ecosystem. In France, the nature protection law defines a flow that is reserved for the natural environment, which has to be complied with by development projects.

2. The estimated total resources of the countries are updated from recent national documents. However, some national reports like those presented at the Rio Earth Summit sometimes modify the figures without indicating the value dates and the observation periods. It is difficult to know whether these modifications correspond to improved knowledge of the resources or whether they derive from a change in the methods of estimation or more simply, from conceptual definitions.

3. France and Spain, in 1986 and 1994, respectively, carried out a national water resource a ccount giving a particularly detailed breakdown of the resources and their uses, even tackling the qualitative aspects.

4. A number of concepts need to be clarified to ensure data comparability; following is a quick summary of the definitions made by J. Margat; used by FAO in the AQUASTAT project; and by OSS:

Natural renewable water resources (in the broadest sense):
These consist of: 1) real evapotranspiration from arable land and forests, 2) total runoff from surface and groundwater water.
Only the second component is generally the subject of quantitative evaluation while the former is essential for dry farming, forests and pasture land.
The distinction between surface and groundwater resources often leads to double counting.

Regular resources
This is the permanent surface and groundwater flow. It is measured by the average low water flow of water courses (lowest monthly flow of the year) and the run-off of groundwater to the sea (and in some cases, by guaranteed run-off when multi-annual frequencies are sufficient: 4/5 or 9/10).
This aspect of the resources is particularly useful for evaluating conjunctural shortage problems.

5. Water resource estimations are based on long series of observations. A history of the flow measurements made on the main Mediterranean rivers is useful in analysing shortage trends. A reference network of

hydrological stations and regular updating of their results are useful for long-term management. This approach is being developed by the WMO.

The MED-HYCOS project will gather data from fifty or so stations set out all along the Mediterranean basin, managed by national hydro-meteorological organizations. The data gathered will be used for the quantitative and qualitative evaluation of the available water resources and should also provide information about some environmental key variables, such as: pH, water conductivity, water temperature, dissolved oxygen, turbidity, air temperature, rain, relative humidity, wind speed, net radiation. The aim is to encourage a system of free data exchange similar to that of the WMO's meteorological observation system.

6. Similarly, monitoring groundwater is particularly important in the Mediterranean. In general, there is lack of regular data concerning aquifer levels and flow rate from sources. It justifies the same effort as made for surface water, all the more so in that groundwater represents a regular source of supply and is cheaper to mobilize than surface water. Networks to monitor the quality of groundwaters exist in some countries: they are widely developed in Israel, Tunisia and France, and found here and there in Morocco and Algeria.

7. Regular monitoring must produce information about the state of the resources for a relatively wide audience and means of transferring the information (bulletins, databases open to the public). This is still scarce within the Mediterranean countries.

### *2.2.2. Water resources from the qualitative point of view*

Coastal waters

Actions on water and pollution affects other components of the environment, in particular the marine environment, the final receiving body of continental waters and what their loads. The MEDPOL project has established a common methodology for monitoring the quality of marine water in all of the Mediterranean countries while proposing a minimum list of common parameters. However, the various national laboratories involved in the MEDPOL programme only monitor some of these quality parameters on a regular basis. Only a partial image of the bacteriological quality of Mediterranean coastal waters can be gained from measuring feacal coliforms in the North of the Basin and in some of the Southern and Eastern countries.

The second subject tackled by MEDPOL is the identification of pollutant sources. An assessment of land based pollutants in the marine coastal environment was made in 1984 (on the basis of a questionnaire sent out to all the countries in 1974). Measurements of BOD, COD, nitrates and phosphates for the main marine areas are available. Due to the insufficiency of the national responses to the revised MED X questionnaire (MED X Bis) it has not been possible to update the data from the 1984 assessment except, to some extent, for the following countries: Albania, Cyprus, France, Slovenia, Spain and Syria. Unfortunately, recent data measurement methods are not always specified by the countries and do not refer to the same zone, therefore, it is difficult to see a change when the 1974 and 1994 data are compared.

Continental waters

In most of the national reports on the environment, the degradation of groundwater and surface water quality is of a major concern. Several examples of river pollutant measurements are available. However, measurement methods, observation frequencies and the monitored variables differ from country to country and are rarely explained in these general reports. Quality standards vary from country to country depending upon the purpose of the water use is to be put, the objectives assigned to the measurements by the countries and the available means for measurement. These criteria are rarely mentioned.

Comparing the means of monitoring and supervision available in the different countries is considered as a pririty aspect for MEDO. A questionnaire[6] (subsequently referred to as MEDO questionnaire No. 1) was sent out to all the countries in November 1994 - to the focal points of the BP/RAC and to national experts or officials in the field of health and water resources - to take stock of the organizations in charge of monitoring the water quality, their perceptions of the specific quality problems, national objectives for monitoring water quality, available means, analyses of results (classification), the standards used, etc. Most of the countries replied except for Libya, Syria and Greece but sometimes giving incomplete answers. The analysis of the questionnaire leads to the following comments[6]:

1. Responsibility for water quality monitoring often falls upon several different institutions; this fragmentation of responsibility is subsequent to the objectives assigned to water quality monitoring: monitoring natural habitat or protection of health. Turkey 's questionnaire underlines the problem of sectorized responsibilities; efficient management of the system is difficult without a certain legislative framework that defines the allocation of skills. Distinctions made by certain countries between government institutional parties responsible for water resources and the entities responsible for assessing and monitoring networks need to be clarified.

2. Table 2 describes the monitoring networks that exist in the countries. The interpretation of what a monitoring network involves is not consistent in all the various countries. Similarly, supervision and monitoring vary with respect to quality and therefore with respect to the objectives set for the measurements: health protection, maintained quality for sectorial uses, protection of the ecosystem's integrity. The main objective for most of the countries is sanitation of drinking water supply. Networks and measurements are therefore located upstream or

6. BP/RAC-MEDO. Questionnaire No. 1 on the monitoring means of the quality of continental waters in the Mediterranean countries, not published (sent out to the countries for comments), February 1995.

along the distribution pipes. The effects of domestic and industrial pollution are rarely assessed.

***Table 2: Networks for supervising and monitoring continental water quality** (according to questionnaire No. 1)*

(the list of monitored variables is not always exhaustive in the answers to the questionnaire )

| Country | Responsible entities | Extension, objectives, monitored variables* |
|---|---|---|
| ALBANIA | – The Committee for the Protection of the Environment (CEP)<br>– Public Health Department of the Ministry of Health and Protection of the Environment | – geographical coverage: 40 stations situated on the main rivers and 10 stations for drinking water<br>– objectives: drinking water<br>– variables monitored: DO, SS, BOD, N, Heavy metals |
| ALGERIA | – *Agence Nationale pour les Ressources Hydrauliques*(ANRH) | – geographical coverage: the whole national territory, 100 stations situated along the rivers and 1000 bore holes<br>– objectives: drinking water, industry, irrigation<br>– variables monitored: DO, SS, COD, BOD, N, Heavy metals |
| CROATIA | – Department for Public Health in Pula | – geographical coverage: the whole country and 40 measurement stations in the coastal watersheds<br>– objectives: drinking water supply<br>– variables monitored: DO, SS, COD, BOD, N, P, Heavy metals, Feacal coliforms |
| EGYPT | – Drainage Research Institute<br>– Nile River Institute<br>– Research Institute for Groundwater | – geographical coverage: Nile delta, canal network, lakes<br>– objectives: drinking water, irrigation<br>– variables monitored: total dissolved solids (TDS), DO, temperature, pH, SS, P, NO3, NH4, Feacal coliforms |
| SPAIN | – MOPTMA water quality control department of General Hydraulic Projects<br>– *Organismos de Cuencas* | – geographical coverage: the whole country with 1000 measurement points (453 measurement points on the COCA network) and 191 automated warning stations (SAICA network)<br>– objectives: drinking water, irrigation, quality standards, application of law against pollution<br>– variables monitored: DO, SS, COD, BOD, N, P, Heavy metals, Feacal coliforms (44 parameters in all) |
| FRANCE | – *Agence de l'Eau*<br>– DIREN | – geographical coverage: 1400 stations distributed throughout France + additional water agency network; 188 stations for surface water, 62 for groundwater in the Agency Rhône-Méditerranée-Corse<br>– objectives: drinking water, bathing, natural habitat monitoring (information to consumers and managers of natural habitat)<br>– variables monitored: DO, COD, BOD, NH4, NO3, PO4, Heavy metals, Feacal coliforms, temperature, pH, conductivity, % saturation O2, SO4, Cl, Ca, Mg, K, Hg, HCO3, CO3 and optional parameters |
| ISRAEL | – Water quality Division, Ministry of the Environment<br>– Hydrological Service, Water commission, Ministry of Agriculture<br>– Public Health Service, Ministry of Health<br>– Central Laboratory, Mekorot Water Company | – geographical coverage: the whole country<br>– objectives: drinking water, irrigation, measurement of conformity of industrial waste with environment ministry standards<br>– variables monitored: DO, COD, BOD, N, P, Heavy metals, Feacal coliforms, pesticides, synthetic organic solvants , phenols, detergents,chlorides, pH, conductivity |
| ITALY | – Ministry of the Environment<br>– River water authorities, regional administration units | – geographical coverage: systemic and periodic monitoring of rivers since 1987 according to each region: Fruili Venezia Giulia, Veneto, Emilia Romagna, Piemonte, Umbria, Trento and Bolzano. The 4 main rivers include many measurement points.<br>– objectives: protection of the environment<br>– variables monitored: DO, COD, BOD, N, P, Heavy metals, Feacal coliforms, pH, chloride, NH4, Total coliforms, Feacal Streptoccoci, salmonella |

| | | |
|---|---|---|
| LEBANON | – Ministry of Hydraulic and Electric Resources with UNICEF | – geographical coverage: certain administrative units and watersheds. 20 measurement points<br>– objectives: quality of drinking water |
| MALTA | – WSC (Water Services Corporation) | – geographical coverage: the whole country. 96 boreholes, 9 pumping stations<br>– objectives: drinking water supply quality<br>– variables monitored: SS, N, Feacal coliforms |
| MOROCCO | – ONEP (*Office Nationale de l'Eau Potable)*<br>– Public Hygeine Division of the Epidemiology and Directorate of Sanitary Programmes | – geographical coverage: watersheds, dams (700 measurement points), water courses (700 points for Hydraulics Administration), drinking water supply points (2000 points for ONEP) and groundwater (80 points)<br>– objectives: drinking water, irrigation<br>– variables monitored: DO, COD, BOD, N, P, Heavy metals, Feacal coliforms |
| MONACO | – *Service de l'environnement*<br>– *Société Monégasque des Eaux* | – geographical coverage: the entire national territory. Freshwater projects - 7 sources<br>– objectives: drinking water<br>– variables monitored: Feacal coliforms |
| SLOVENIA | – Hydrometeorological Institute of Slovenia | – geographical coverage: the entire national territory (225 stations, water courses, groundwater, lakes, sea)<br>– objectives: drinking water, leisure, fishing, industrial use<br>– variables monitored: DO, MES, COD, BOD, NO2, NO3, NH4, P, Heavy metals, Feacal coliforms |
| TUNISIA | – *Direction Générale des Ressources en Eau* (DGRE) | – geographical coverage: certains bassins versants (nord, sud, désert) 15 sites pour la qualité physico-chimique<br>– objectives: priorité: drinking water. Better management of resources<br>– variables monitored: DO, COD, BOD, N, P, Bore, Feacal coliforms, Chlorides |
| TURKEY | – State Hydraulic Works | – geographical coverage: the entire country. 1022 measurement stations<br>– objectives: drinking water, irrigation, integrated basin management<br>– variables monitored: DO, COD, BOD, Heavy metals, N inorganique, PO4-, NH4, total P, and Feacal coliforms (measured in certain stations)<br>(Rqe : means of control unsuitable in terms of equipment and personnel) |
| GEMS | UNEP, WHO, UNESCO, WMO | – geographical coverage: 450 stations in 59 countries (initial project: 1200 stations)<br>– objectives: improve the validity and comparability of measurements world-wide; evaluate long-term changes in water quality<br>– variables monitored: 50 or so including DO, BOD, Feacal coliforms, N, Heavy metals, Toxic organic matter... |

3. The legislative tools for monitoring water quality, when they are available, define reference values or international and national standards, among other things. In general, national drinking water quality standards are drawn from the directives of the WHO or the European Union. Systems for quality classification of water courses exist in Algeria, Croatia, Spain, France, Italy, Morocco and Monaco. The criteria used are different making them difficult to compare. To diagnose the overall Mediterranean basin, it would be desirable to homogenize the standards used; the reference values; and, the classification systems.

4. The results of measurement campaigns are not always released to the public. Most countries give elements of information in their national reports on the environment (not regularly distributed). Only a few

countries mention the existence of specific publications concerning the quality of water and available database: Algeria (publications every three years), Egypt (annual publication on the Nile), Spain (annual publication), France (annual activity report from the Rhone-Mediterranean-Corsica water agency), Israel (publication, periodicity not indicated), Morocco (natural habita quality bulletin, periodicity not specified and hardly accessible to the public).

5. Monitoring of groundwater quality is rarely arised. The few exceptions are, in France, the groundwater quality Observatory established by the Ministry of the Environment and managed by the *Bureau de Recherches Géologiques et Minières* (BRGM). The database is consultable. Similarly, in Tunisia, the General Directorate of Water Resources (DGRE) has a project for a groundwater quality observatory.

Long-term monitoring according to the objectives of preserving the integrity of ecosystems, recommended in chapter 18 of Agenda 21 is not very widespread. Such an objective involves, sewage treatment before being discharged and assessment of the water in its natural habitat on a regular basis. The main limit to this monitoring is its cost, considered excessive by most countries. International support from structures like UNEP (via GEMS) and WMO (through the MEDHYCOS project) is an interesting breakthrough because it allows regular monitoring of a reduced network of measurement stations around the Mediterranean. These stations use the same methodology for a small number of quantity and quality variables.

### *2.2.3. Water demands*

Changes in the water demand and withdrawals, whether total or by sector, is key information for evaluating sustainability of development. Indeed, the changes illustrate simultaneously one of the main pressures on the environment and one of the primary conditions for Mediterranean development.

The recent updating of the database which was the basis of Blue Plan's prospective exercises on water was a way of gathering together current and historical data from a multitude of sources. These data sets outline the trends in previous changes, at least over the last two decades. Following this summary[7] a few remarks are deemed necessary:

1. There is little data dating back before 1970.

2. The data is not consistent. There are disparities between data referring to the same year but from different sources. Thus, historical sets of data could indicate as many variations in the state of knowledge as net water withdrawals, or yet again, inconsistent definitions. A few definitions are considered necessary (according to J. Margat):

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[7] BP/RAC-MEDO. *Données historiques sur les utilisations d'eau dans les pays méditerranéens*, gathered by J. Margat & D. Vallée from a number of national and international sources, unpublished, September 1994

- water withdrawals are the average water flows taken from the natural environment and diverted into the distribution systems.
- final consumption is that part of the withdrawals not returned to the natural environment (continental fresh water) after use.

3. The distinction between water withdrawals and water demand (water utilization or water demand) is not always clear. Indeed, the water demands (or the quantities used) may be:
- less than the water withdrawals when transport and distribution losses are significant (the general case for community and irrigation sectors),
- higher than the withdrawals when non-conventional supply sources are used (as in the case of Malta and Libya).

4. Data for each utilization sector is not always available. The distribution of withdrawals by sector does not distinguish, in all cases, the share withdrawn by industries and thermal power plants. Similarly, the term domestic demand often makes no difference between what is really domestic and what is withdrawn by public services and industries connected to the distribution network. Understanding the respective significance of the different human uses and establishing a natural account of the water resource would mean breaking up the information as finely as possible. For a thorough analysis of the different types of use, we would need to make the following distinctions:
- domestic withdrawals: 1) withdrawals from medium and large town households, 2) withdrawals from rural households (small towns),
- non-domestic withdrawals by public and private services: 3) community water withdrawals (schools, sanitary facilities, etc.), 4) service sector withdrawals (hotel swimming pools, leisure centers),
- industrial water withdrawals: 5) those of the companies connected to the network, 6) those of the industries using water directly from the natural environment, 7) those used for cooling thermal power stations.
- agricultural water withdrawals: 8) agricultural water withdrawals for irrigation, 9) agricultural water withdrawals for livestock.

The World Resources Institute data classify, for instance, in the "domestic withdrawals" category, the first four items. Statistics by the water distribution company in Tunisia (SONEDE) make a distinction between the various types of use in the distribution network by using a differentiated tariffication system.

5. In addition, this distribution may correspond to supplies alone (equal to demands) the sum of which is less than the evaluation for the indicated withdrawals (including losses) and in some cases there is a confusion between "demand" and "need", especially in the agricultural sector.

### *2.2.4. Pollution prevention*

Pollution affecting the quality of continental water has several socio-economic origins (domestic, industrial and agricultural) and is often localized. In the responses to MEDO questionnaire No. 1, all of the countries mention problems of the quality of surface water of chemical and bacteriological origin. For groundwater, the major identified problems are salinity (Southern countries and Malta), the presence of toxic products and the nitrate content. Information concerning means of preventing water degradation, established by these countries, is difficult to attain; the results lead to a number of remarks.

1. The effects of agricultural non-point pollution are difficult to quantify. Only a few concerned countries (in particular France) monitor this pollution and take legislative measures to reduce the consumption of fertilizers and pesticides. We have no information available about the public efforts made by other Mediterranean countries concerning the follow-up of agricultural pollution and their practical preventive measures (such as the reduction of agricultural inputs in intensive agricultural areas).

2. Pollution by urban (in particular) and rural communities, although irregularly measured, concerns all of the countries. Efforts for prevention through waste water treatment are being made in all of the countries. No assessment is available on urban discharges of the Mediterranean countries. Most of the figures available in the literature about such discharges are estimated on the basis of the urban population but the estimation method is not explained. In this context, a common definition of an urban population equivalent of waste water production, adapted to the Mediterranean context, would be particularly beneficial.

Comparing the levels of collected and treated sewage in the various countries is also difficult because the published data, or the data communicated in response to the questionnaire, are not always consistent. Moreover, the definition of the terms "collected" and "treated" sewage are not homogeneous. The definition of the "percentage of sewage collected" varies from country to country and is sometimes referred to as the "percentage of the population served by the sewage system" or sometimes confused with the "percentage of sewage treated" figures. Furthermore, the efficiency of the sewage system differs depending on whether it is individual or separated (domestic and independent rain networks). Finally, for this percent of sewage collected to have any meaning, it has to refer to a sewage network that is properly maintained and which has minimum leakage.

Information on the percent of sewage treated could only be gathered for a few countries (Spain, France, Greece, Israel, Italy, Morocco, Tunisia, Turkey) but is not comparable because it refers either to the national population served by a treatment station or to the overall coastal regional population or to a system of towns that are served. There is little information about the efficiency of the stations and their characteristics (primary, secondary, tertiary). To evaluate the pollution prevention performance in the Mediterranean, three types of evaluation are desirable. They refer to the volumes of waste water, the population and to the mass of polluting matter:

- the percent of sewage collected in a sanitation network or septic tank, defined as the ratio of collected sewage water volume to the volume of water produced with a differentiation between:
  - the percent collected in an individual network,
  - the percent collected in a separated network,
  - the percent treated in septic tanks,
- the percentage of the population served by the treatment plant i.e. the total and regional population numbers served by a sewage plant with differentiation according to the type of plant:
  - primary treatment (mechanical),
  - secondary treatment (mechanical and biological),
  - tertiary treatment (mechanical, biological and chemical treatment),
- the percentage of sewage treated: ratio between the quantities of polluting matter eliminated after treatment and that entering into treatment.

To go further into this question and obtain an image of the polluting loads and the means of prevention for the entire basin, questionnaire No. 2[8] was sent out by MEDO to the different countries.

3. Industrial pollution is identified as a problem by all of the countries. Only France, Malta and Israel process the greater part of industrial waste water. Albania, Algeria, Spain and Morocco rarely treat the effluent before discharging it into the natural environment. Many industries discharge their waste without pretreatment, into the domestic sanitation network (Egypt, Italy and Turkey). A few countries mention that they have set up legislation obliging industry to process their waste (for instance in Spain - 1993 standards) or that there are projects for the development of waste water treatment units within industries (such as in Turkey where a 35-year project is being developped, and at the present in Tunisia).

### *2.2.5. Recourse to non-conventional sources*

Among non-conventional sources, the first solution considered by most of the countries was to reuse waste water. The practice of reusing waste water in the coastal areas of the Mediterranean basin is not particularly widespread for the time being, except in some Southern countries such as Israel (waste water), Egypt (drainage water) and to a smaller extent Tunisia (waste water).

Desalination is a last recourse to be considered, because of its high cost. It is important in Malta where reuse is difficult, however, it is very low in the other countries. Libya covers 84% of its water demand through the exploitation of fossil aquifers but does not appear to have any policy for water reuse. There are no sets of historical data available that may suggest any trend in terms of the consumption of non-conventional sources.

[8] BP/RAC-MEDO. Questionnaire No. 2 regarding urban dumping and treatment and drainage in Mediterranean countries, sent out in April 95 with the summary of questionnaire No. 1, summary scheduled for June 1995.

In addition, in some cases, the share of demand covered by this type of supply source and its uses are not individualized. Demands may then exceed the resources in arid areas.

The state of knowledge, at it now stands, is a scientific base from which the countries are analyzing their problems and recommending means of action.

# 3. The problematics of water in the Mediterranean

## 3.1. Water in the Mediterranean environment: nature and resources

***A scarce and fragile resource, unequally distributed in space and time***

High irregularity

Because of the Mediterranean climate with its intense summer drought and with considerable variations from one year to the next, the water regime is irregular everywhere except for the major rivers whose sources are in wetter regions. Hence, a considerable amount of management efforts are needed to regulate surface water, as well as enhancing interests in groundwater for areas which tend to be arid.

An extensive division

Because of its geography and mountainous relief, the Mediterranean basin is split into many independent small or medium-sized river basins. Only a few measure more than 10,000 $km^2$, essentially in the wetter regions of some of the Northern countries (France, Italy, Western Balkans, Turkey). The sole exception is the Nile basin but a great deal of the yield formed upstream in the tropical area, does not reach the Mediterranean area because of "head losses". This subdivision requires the dissemination of water management.

Resources and threats

The sudden floods of Mediterranean water courses lead to serious risks of wide-scale flooding, worsened because of the concentration of populations and human activities in the low valley areas. Natural waters also aggress the environment: the erosive aspect of rainfall and surface runoff is high in the Mediterranean basin where erosion of soils, essentially fossil, has and will take place for many years, subsequently increasing the irregularity of runoff.

Relatively rare wetlands

Wetlands are mostly associated with the deltas of the main rivers (a specific aspect of Mediterranean hydrography). They only represent a small part of the basin making them more ecologically valuable. Their conservation, while requiring a flow that is reserved for the ecosystem, imposes local management constraints which may limit the utilization of water resources. It is particularly difficult to preserve them in arid countries that endeavor to mobilize most of the country's potential water resources.

Water of varying quality

Mediterranean waters have varying natural qualities which may reduce the volume of exploitable resources. The turbidity of flood water is often high, a main factor causing silting of dams . The salinity of surface and ground water makes it unsuitable for drinking or irrigation in many areas in the Southern countries.

Fragile resources

In the Mediterranean basin, the water regime is particularly sensitive to land occupation changes (deforestation, urbanization, etc.) the impact of which generally increases water irregularity. Furthermore, the relative weakness of regular runoff makes water even more vulnerable to pollution which tends to affect its quality.

Finally, in the very long term, the risk of a depletion in water resources due to possible climate change towards aridification should be kept in mind, especially in the Maghreb and Middle East, even if their scale and their possible date of occurrence are still uncertain.

In short, in Mediterranean nature, water is not only a raw material that is renewable but finite and irregular. It is also part of the environment, sometimes useful, sometimes a nuisance, threatened and threatening, whose evaluation and monitoring involve a number of criteria.

***More and more costly management***

The possibilities of restricted management

Sites available for water developments, in particular for regulating reservoirs, are of limited number in each of the countries. The easiest and least costly equipment has already been installed, for the greater part. Furthermore, the feasibility of the possible developments is, in the future, going to come up against social or ecological constraints to an increasing extent (preservation of sites, landscape or ecosystems).

Developments with a double goal: supply and safety

Surface water control must aim at a two-fold goal whenever possible: to facilitate water mobilization to meet demands (in particular to compensate for the offset between periods when demands are high and those when the resource is abundant), to forestall risks of flooding. This widens the number of water control objectives, in addition to the diversity of sectors using water. It complicates similarly the management of the infrastructures and the imputation of the costs involved.

Unequally sustainable developments

In a greater part of the Mediterranean basin, the efficiency of the controlling equipment (dams) is decreasing. Their life duration is reduced as their effective capacity is being depleted by silting. Efforts to prevent soil erosion in upstream basins are unable to neutralize this phenomenon but simply slow it down. Losses of 50% of the effective capacity of some reservoirs have been measured in Morocco. In most countries, the benefits of new dams have been cancelled out, or they will be sooner or later during the XXIst century because of such a loss in capacity. On the other hand, requirements of flow regulation have increased.

***A scarce resource under international utilization conditions***

Resources shared between several countries

Two thirds of the water resources of the Mediterranean riparian countries come from outside of their overall territory. For some trans-boundary Mediterranean basins, the problem of resource sharing is acute as in the case of the Nile basin, the Orontes between Lebanon, Syria and Turkey, Vardar-Axios between Macedonia and Greece, Struma-Strumon and Mesta-Nestos between Bulgaria and Greece, Evros-Ergene between Bulgaria, Greece and Turkey. There are fewer of such cases in the Maghreb (Guir between Algeria and Morocco, Medjerdah between Algeria and Tunisia).

In the Middle East, the question of shared water resource (essentially outside of the Mediterranean basin) is vital and has obvious geopolitical implications, such as: the Euphrates and Tigris basins between Turkey, Syria and Iraq and the Jordan basin between Israel, the independent Palestinian territories, Jordan and Syria. The question of the Litani basin in Lebanon and the Israel-occupied zone is another example of conflict concerning water in the Mediterranean countries. Lebanon can be described as the "Middle East water haven"[9]. These three examples clearly illustrate the increasing water crisis in the Middle East for the control of water supply sources.

Discussion on the topic of trans-boundary resources

When certain governments are capable of influencing their neighbors, the question of water resources is dominated by relationships of power. Strategic, political, economic, agricultural, demographic and environmental implications are intermingled. Technological progress (desalination, waste water treatment) only partly resolve the problems of water resource's rarefaction. The joint evaluations of resources and uses (common basis of reference) and common terminology are the initial bases for deliberation. This is one of the aspects of the work being carried out by the Water group formed as part of the peace process in the Middle East. Resolving the water question is above all political and must find a fair and lasting solution in the form of the co-management[10] of the common basins.

North Africa is counting on its groundwater resources and especially the deep aquifers outside of the Mediterranean basin. These large multinational sedimentary basin aquifer systems may be a potential source of conflict; they are more complex to share than runoff. Hence, the question is how to fairly share out what is available, and particularly in the non-renewable resources exploitation plans. In order to establish a basis of discussion, OSS is preparing evaluation and operational models in joint co-operation with the various countries concerned by the Nubia basin and the North Saharan basin.

Usage conflicts in a situation of scarcity

Despite some common aspects, water resources are very unevenly distributed in the Mediterranean basin. Not only between the North and South, having respectively 86% and 14% of the total natural water resources (600 $km^3$ in an average year[11] ) but also between the East and

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9 J. Margat & Henri Torrent. *L'eau au Proche Orient: gérer la pénurie et la partition,* (article to be published in Original Version), October 1994.

10 ibid.

11 1 $km^3$/year = 1 billion $m^3$/year

West, depending upon local climatic differences. This means that they are very unequally distributed between the countries (from 187 $km^3$/year in Italy to 0.7 $km^3$/year in Libya and 0.025 in Malta), in the parts located in the Mediterranean basin and between the different populations: from around 29,000 $m^3$/year per inhabitant in the former Yugoslavia to 230 in Libya and 70 in Malta.

### 3.2. Competing uses

The abundance or scarcity of water resources should be evaluated with less respect to the absolute terms than with respect to the demands. The scarcity of water is also unequal and spread out differently depending on climate and socio-economic development levels: from 4 to 5 l/day for a desert nomad to 500-800 l/day for a tourist in a luxury hotel with an average of 250 to 300 liters/day per inhabitant in Europe.

Irrigation plays a dominant role in the entire Mediterranean basin (73% of the demand in the Mediterranean and more than 80% in the Southern countries in 1990). The drinking water demand still represents only 12% of the demand but urban water consumption will increase from 40 to 60% in the Northern countries of the basin and will be multiplied by 4 in the Southern and Eastern countries of the basin in 2025.

The cost of water increasing irrigated agriculture will come into competition will other sectors making better use of water (drinking water and industry). Conflicts in uses do not only represent competition for sharing scarce water resources but also competition in terms of access to the resources costing least, that are easiest to mobilize and that offer the greatest security (permanent, internal and of high quality). Competition between utilization sectors, already started and localized in some regions. It will tend to spread out and become conflictual with the extension and aggravation of shortage: between urban and agricultural uses more particularly, but also between irrigation and hydroelectric production or between water utilization objectives and security, or the preservation of the environment. This will mean more arbitration in the future.

Water requirements with a strong seasonal component
Irrigation, as well as the share of tourism concentrated in coastal areas (100 million visitors today), contribute to determining important seasonal water uses, opposite to the seasonal variability of the resources: water demands are highest when the resources are lowest. This also appears on an inter-annual scale, emphasizing the risks of conjunctural shortages. The conflicts worsen in periods of drought which emphasize the scarcity of water, in areas where renewable water resources predominate and where population growth and changes in lifestyle increase sensitivity to drought.

A strong "coastalisation"
The demand for water is concentrated in coastal areas where a large part of the urban population is to be found (135 million people i.e. 35% of the

Mediterranean population, live on the 10% coastal areas of their country) as well as most of the industrial and tourist activities and a large part of the irrigated areas. This phenomenon diverts, to the benefit of the coast, a considerable share of the national resources, increasing the amount of discharge into the sea. This has three main effects:

- the volume of waste water returned to the natural environment after use is reduced, thereby also reducing the degradation of the quality of continental water,
- in urban areas, normally only 20% of the water withdrawals are consumed while 80% are returned to the natural environment, generally the sea. This volume discharged into the sea represents a loss of freshwater resources for the coastal area. 100% of the resources withdrawn are thus consumed while the waste water could constitute "second-hand water" suitable for agriculture,
- the pollution discharged into the sea has increased and affects the quality of coastal marine water ("land based pollution"). Urban and industrial discharges into the sea are rarely treated and are a risk to human health and to the marine coastal ecosystems.

These situations are worsened by insularity in several Northern countries (Cyprus, Croatia, Greece, Italy, Malta).

### 3.3. Technological innovations to manage these situations

Priority to transfers

To cope with conjunctural or structural water shortages, forecast in the short or medium term in many Mediterranean basin areas, the main current trend is to give priority to transfers between "excess" basins and "deficient" basins. In most countries, this priority is included in the water management plans and master plans, at least for planning for reference periods. In some cases, transfers from non-renewable resources (Libya) are used, meaning that the solution is not sustainable in the long term.

Recourse to non-conventional sources

If the resource is sufficient in the North of the Mediterranean basin, in the South, almost 1/3 of the population is short of water to the point where, as of now, countries are using non-conventional resources: waste water reuse for agricultural purposes (Israel), desalination (Malta), non-renewable groundwater (Libya). In Egypt, out of the 40 billion $m^3$ withdrawn, 8 to 9 are recovered. In Israel, it is intended that 85% of the waste water produced by the cities will be reused for agriculture. 47% of the Maltese water demands will come from desalinated water.

The quality of the treatment system is a primary condition for reuse to be contemplated. Therefore, treatment has two objectives: a sanitary objective and the objective of producing "second hand water".

International water exchange projects

Other solutions are being considered as a response to the problem of the scarcity of water, one of them being the establishment of a water exchange between countries where there is a deficit and countries that are rich in water. There are already projects for such exchanges of water from Albania to Italy; Turkey to Israel; Lebanon to other Middle Eastern countries. The practical method of exchange involves problems of setting a market value on water and this is one of the major elements of the discussions being held between Turkey and Israel.

### 3.4. Institutional and economic methods

Gradually, new institutional solutions are being set up in order to obtain integrated management of water resources. This objective comes through in the legislative framework which, in some countries, proposes the establishment of a national water consultative committee (in Morocco, the Higher water council, in Egypt, the Supreme Nile council). This body is appointed to co-ordinate the various water management policies of the ministries and organizations having responsibilities for this essential resource; in some cases, it may decide upon the major objectives to be achieved in terms of quality, for instance, the organizing of a water policy, economic aspects (distribution of money at the regional levels), public information activities, priority research activities, etc.

In addition, independent management organizations for each watershed are being set up. Countries benefiting from such organizations are France (6 water agencies founded in 1964 under the Ministry of the Environment), Spain (10 *confedaraciones hidrográficas* founded in 1926 under the authority of the Ministry of Public Works, Transport and the Environment), Italy (6 large national basins, 17 inter-regional basins and 15 regional basins managed by a water agency according to a 1989 law). Similarly, there are hydraulic planning regions in Morocco and Algeria.

In France, with the aim of establishing Water Development and Management Plans (SAGE) in the sub-units of the main watersheds, an original approach is proposed for the Mediterranean coastal area with the establishment of homogeneous zones that will comprise of watershed units and a maritime strip, as a water management unit.

The search for water savings has led some countries such as Tunisia to use a gradual tariff policy penalizing the biggest consumers. This measure has had good results but it is nevertheless limited in its scope as it lacks appropriate legislative framework.

If "being short of water for a nation means being in the sidelines of development and industrial progress!"[12], it is less the water shortage due to the physical scarcity of the resource that matters than the shortage accessible at an economically acceptable cost. The relative water

[12] Guy Leray, 1990, *Planète eau*, Press Pocket publications

shortage threshold depends therefore upon the development level: water shortage is as much a consequence as it is a factor of underdevelopment[13].

Demands are increasing pressures on the Mediterranean basin water resources, especially in the coastal area. There is no guarantee that recourse to technological innovations will be enough to ensure sustainable development. Such as recourse has to include a systemic analysis of the stakes and a genuine integrated policy of water economy and demand management.

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[13] Jean Margat, 1994, *Les ressources en eau: conception, évaluation, cartographie, comptabilité,* FAO, Land and water development division, to be published.

# 4. Water and sustainable development in the Mediterranean

## 4.1. Worries about the water supply: shortages in perspective

Renewable water resources of good quality and in sufficient quantity are deciding factors for sustainable socio-economic development. Retrospective statistical analyses demonstrate that there is more and more pressure on the initial availability as a result of increased agricultural and urban withdrawals designed to meet the water and food requirements of an increasing population, in particular in the coastal areas. The prospective studies in the Mediterranean, carried out in Blue Plan, conclude that the "water resources are already and will be tomorrow a factor limiting development for most of the riparian countries". One index defined as the ratio between the quantities of water withdrawn and the available resources exceeds 50% for many countries, requiring as of now stringent resource management.

The Mediterranean countries thus form three groups (illustrated in fig. 1):
- the countries where available water will be sufficient up to the year 2025 and beyond,
- the countries where available water will tail off considerably and require extensive new developments or inter-regional water transfers (costly in terms of energy with high social impact)
- the countries where available water is already running short and where the indexes of exploitation exceed 100% or will do so by the year 2000.

This uneven water availability, in quantity and quality between Northern and Southern Mediterranean countries is one of the major factors influencing possible futures. Some Mediterranean basin countries already suffer from a serious water shortage: "In North African countries, satisfying the water demand would mean consuming almost all of the fresh water present in the region"[14].

The contrasts will become more pronounced between countries needing to maintain high quality water resource and countries wishing to or having to manage "the scarcity"[15]. In this second case, the growing scarcity of available water will still require efforts to conserve water in the environment in order to guarantee the quality of the water supply for man.

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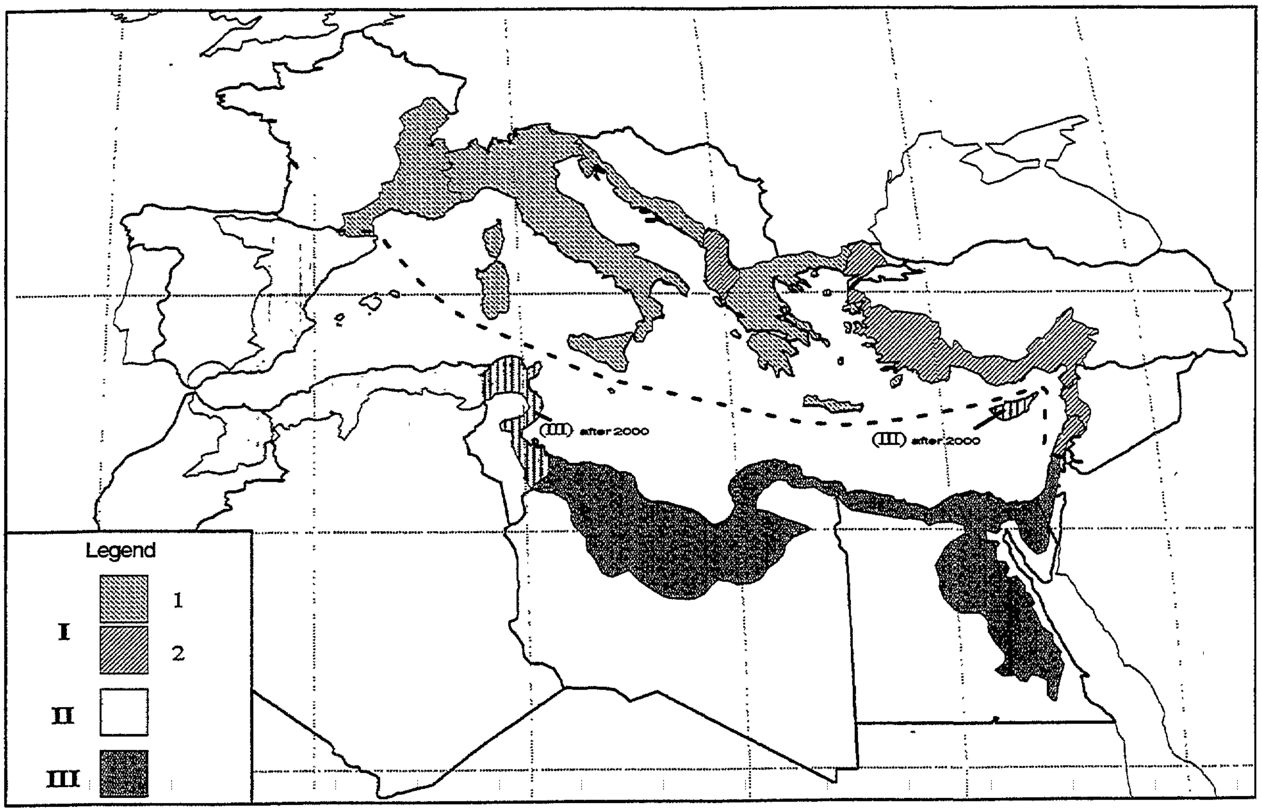
14 UADE. Fnal report, management of liquid and solid wastes in urban cenres in Africa, December 1993.

15 Scarcity is relative to demand and integrates the qualitative dimension to the purely quantitative aspect, and represents a comparison of the resource offered (amount available) and the demand.

*Figure 1: "Hydro-geo-ecological" subdivision of the Mediterranean basin*




(Source: Margat, 92)

I = Low to moderate quantitative pressures on continental water, (1) stable or (2) increasing pressures. Higher pressures, localized and extensive regarding qualities. Priorities to problems of security (supply, defence against water) and protection of water (resource and environmental component).

II = High quantitative pressures of continental waters, increasing as of now or (III) soon to reach a ceiling with intensified resource exploitation.

II & III = Pressures regarding quality that are more localized and concentrated. Chronic water shortage and vulnerability to drought. Priority to water savings, imports and recourse to non-conventional sources. The preservation of natural habitat is a low priority or it can be considered as a way to simply preserve the renewal of the exploited resources.

## 4.2. Water resources in a sustainable development perspective: a systemic analysis

The question of water in the Mediterranean is in the line of sustainable development problematics. Indeed, appropriate management of water resources should make it easier to meet the needs of the present generations (in drinking water but also for agricultural and plant production), nevertheless, it should not compromise, by more or less irreversible effects, (downgraded water regime, polluted or depleted groundwater, destruction of fishing resources, salinization of the land, etc.), the capacity of future generations to satisfy their own needs.

This approach, whose purpose is to produce evaluation and sustainable development tools and to implement action, draws on a systemic analysis. The water cycle is characterized by its many interactions, not only with ecosystems but also with the social system (legislation, institutional resource management and context, consumption ways) and the economic system (agricultural, industrial or domestic use). Blue Plan emphasizes the advantages of studying three type of interaction for sustainable development as illustrated in the following tables. These tables, also presented in the more theoretical approach of fascicle 5, are referred to here for comment with focus placed upon the question of water resources.

### *4.2.1. The pressure of human activities on the environment*

These are the effects upon water resources resulting more particularly from water uses (population, food industry, industry, energy, tourism) and various other activities using land (urban planning, dumping, transport, etc.).

The limited supply of water is more and more pressurized by developing agricultural and urban withdrawals designed to meet the water needs of the increasing coastal population (tourism, rural exodus). Wastage in urban drinking water distribution networks (average leakage factor: 25 to 30%) and within the irrigation systems are also considerable (losses estimated at 30% in Tunisia). In addition, water availability is reduced by disturbances of human origin (increasing irregularities, evaporation of impoundments, pollution). 10 billion $m^3$ evaporate each year from the Aswan Dam lake.

Human activities use water and the natural environment receives the organic and chemical pollution they produce. The main goal here is to maintain the natural water capital by efficient socio-economic systems with respect to the resource i.e. not to consume resources above the renewability level and not to waste a scarce resource. But it also means accepting socio-cultural and ecological constraints that prevent the use of a share of renewable resources that must always be reserved for ecosystems.

***The pressure of human activities on the environment***

| SOCIO-ECONOMIC ⇑ ENVIRONMENT | FOREST | SOIL | WATER[16] | BIODIVERSITY | AIR | COAST |
|---|---|---|---|---|---|---|
| POPULATION | – overconsumption of firewood<br>– growth of rural population | – increasing demand for food | – demand for drinking water<br>– demand for security<br>– production of sewage | – disruption of fauna<br>– withdrawal | – release of pollutants ($CO_2$ – $SO_2$) | – demand for urban housing<br>– discharge of waste water into sea<br>– waste dumping |
| URBANIZATION | – extension of constructed surface areas | – sterilization by soil concreting<br>– contamination by waste | – increased urban water consumption<br>– losses into supply network<br>– organic pollution | – destruction or fragmentation of habitats<br>– artificialization of environment | – concentration of pollutants | – concentration of settlements and activities (coastalisation phenomenon)<br>– discharge of waste water into sea |
| AGRICULTURE AND FOOD INDUSTRY | – overpasture<br>– extension of cultivated areas | – chemical degradation (fertilizers, irrigation)<br>– more pronounced hydric and wind erosion<br>– destructuration | – overirrigation<br>– chemical pollution of groundwater (fertilizer) and eutrophization of aquatic media | – overpasture<br>– replacement of traditional species by improved species<br>– standardization of ecosystems | – greenhouse gas release ($CH_4$) | – change of land use (forest clearance, drying out, etc.)<br>– diffuse pollution of coastal waters |
| INDUSTRY | – over exploitation of forestry resources<br>– acid rain | – loss of productive soils<br>– chemical contamination | – concentration of water greedy production<br>– concentration of polluting activities | – contamination of ecosystems | – release of pollutants ($SO_2$ – $NO_X$) | – consumption of space<br>– change in of landscape<br>– pollution by heavy metals of coastal waters |
| ENERGY | – over exploitation<br>– acid rain | | – construction of dams<br>– power station cooling water | | – release from domestic heating<br>– release from thermal power stations | – discharge of hot water into sea (proliferation of algae) |
| TRANSPORT | – acid rain | – sterilization by infrastructures<br>– chemical contamination | – chemical pollution | – partitioning of ecosystems<br>– contamination of ecosystems | – release of $NO_X$ – CO | – concentration of infrastructures<br>– modification of landscape<br>– chemical pollution by runoff |
| TOURISM | – forest fires<br>– over frequentation | – sterilization by infrastructures | – organic pollution<br>– seasonal peak water demand | – increased frequentation of natural sites<br>– trampling | | – increase of coastalisation phenomenon<br>– discharge of waste water |

[16] This availability is quantitative and qualitative as the two aspects are interconnected.

### *4.2.2. Environmental degradation pressures on the sociosphere*

The qualitative degradation of water resources due to pollutants of domestic and industrial origin is aggravated during seasonal periods when demand is greater, usually corresponding to low water periods. The amount of water available (of adequate quality) for human use and the ecosystem is still scarce. The term "scarcity" has a qualitative as well as a purely quantitative dimension, representing the gap between the resource offered and the demand.

One of the major objectives set by the various countries is the supply of drinking water and the preservation of public health. Today, industrialization and urbanization, at an increased pace on the Mediterranean coastal region, require a considerable amount of water and are placing excessive pressure upon the nearby groundwater resources. This phenomenon is particularly worrying as peri-urban areas are affected by uncontrolled urbanization with fast demographic growth, trends that are bound to continue.

The scope of the demands generated by these changes are causing social, economic and political tensions. Indeed, water resource degradations are causing water supply costs to rise in line with sanitation and management costs.

***Environmental degradation pressures on the sociosphere***

| ENVIRONMENT ⇓ SOCIO-ECONOMIC | FOREST | SOIL | WATER | BIODIVERSITY | AIR | COAST |
|---|---|---|---|---|---|---|
| HEALTH/ POPULATION | – increasing cost of firewood<br>– accidents connected to forest fires | – contamination of food products<br>– pathologies connected to pesticides<br>– increased damage due to natural hazards | – health problems connected to water contamination<br>– safety risks connected to flooding: affecting populations | – loss of amenities connected to disappearance of ecosystems or landscapes<br>– patrimonial losses due to disappearance of species | – respiratory pathologies | – over density generating violence and stress<br>– microbial pathologies |
| URBANIZATION | | – neglect of degraded land | – increased sanitation costs<br>– increased water costs | | – degradation of monuments and infrastructure | – degradation of the living standards |
| AGRICULTURE AND FOOD INDUSTRY | – recourse to purchase of forage for livestock | – drop in fertility and yield of crops<br>– increased costs of exploiting land areas<br>– costs of reha-bilitation of degraded land | – costs of modifying irrigation and drainage system<br>– increased water price | – lesser resistance of cultivated varieties and breeds reared against diseases | – product contamination | – speculation on agricultural land<br>– disappea-rance of traditional agriculture |
| INDUSTRY | – increased manufacturing costs of wood and derived products | – costs of restoration<br>– cost of contamination of soils | – increased manufacturing costs due to rise in water price | | – corrosion of equipments | – increased industrial concentration |
| ENERGY | – increasing cost of firewood | – shorter dam life | – cost of resource management | | – corrosion of power lines | – reinforcement of energy potential |
| TRANSPORT | | – costs of removing sediment from roads and navigation networks | | | | – saturation of infrastruc-tures |
| TOURISM | – effects upon leisure activities (hunting, walking) | | – effects upon leisure activi-ties (lakes and water courses)<br>– loss of well-being dueto consumption restrictions | – losses connected to degradation of natural sites | – loss of frequentation | – drop in frequentation<br>– risks due to quality of bathing waters |

#### *4.2.3. Environmental interactions*

Water interacts with vegetation which has a controlling and purifying role to play while nourishing the soil and having hydric erosion effects upon it. Erosion considerably aggravates the silting up of dams and therefore decreases the regulated resource even more. Eutrophization, the growing scarcity of water in wet ecosystems, is affecting biological diversity due to the disappearance of species and habitats.

The main goal is to preserve the integrity of the ecosystems, i.e. to maintain the quality of the water at levels protecting human life, its well being, as well as that of the fauna and flora in a sustainable manner.

| Interactions | Negative interactions | | | | | |
|---|---|---|---|---|---|---|
| ENVIRONMENT ⇓&⇑ ENVIRONMENT | FOREST | SOIL | WATER | BIODIVERSITY | AIR | COAST |
| FOREST | | – erosion<br>– desertification | – flooding and high water | – disappearance of species and habitats | – forestry depletion (acid rains) | – clearing (urbanization, infrastructures) |
| SOIL | – protection<br>– pedological quality | | – silting up of reservoirs<br>– desertification | – loss of species | – chemical contamination | – sterilization |
| WATER | – purification<br>– regulation of the hydric regime | – maintained fertility | | – loss of species | – chemical contamination | – concentration of polluting charge and solid flows |
| BIODIVERSITY | – preservation of species<br>– biological balance | – maintained biological quality | – habitat diversity | | – ecosystem contamination | – ecosystem destruction |
| AIR | – mechanical filter<br>– microclimatic regulation | | – microclimatic regulation | – purification by photosynthesis | | – concentration of pollution sources |
| COAST | – landscape quality<br>– life system quality | – landscape diversity<br>– agricultural potential | – maximum availability of the resource | – general biological balance | – quality of life | |
| | Positive interactions | | | | | |

To conclude, this systemic analysis quickly shows that the management of water resources with the objective of sustainable development involves:

– action on a complex resource system (used by most economic and social activities and forming a receptacle for the pollution caused by them) in a space depending on the quantitative and qualitative supply of water to a region and/or a country,

- explaining the simultaneous needs of use, improvement and protection of the resource to identify the major problems and any potential points of breakdown, so that the alternative priorities that could lead to a decision can be listed,
- identifying the multitude of actors involved (international, national, local, specialized institutions, companies, associations, communities, individuals) and their objectives, their activities then the frameworks of co-ordination, discussion and participation.

The major challenge to the Mediterranean countries in terms of sustainable development is to prevent and manage conjuncture-related and even structural long-term shortages so as to plan for the financial provisions and the resources needed accordingly.

The solutions to the "water scarcity" problems are essentially institutional, as recommended by the conference on water and sustainable development held in Dublin in 1992, but are also strongly influenced by the economic and socio-cultural situation in each country because of the size of the investments and the overheads related to the water supply and preservation and of the indirect investments (agricultural techniques and industrial technologies, economical on water and less polluting).

**Guidelines from the Dublin declaration on water and sustainable development**

1. Water is a finite and vulnerable resource, essential for maintaining life, development and the environment.
   Efficient management of water resources therefore presupposes a holistic approach to the resource allowing for economic and social development and the protection of ecosystems. The framework of the hydrographic basin is most appropriate to an integrated approach to the water/soil/vegetation relationship.

2. Water development and management should be based upon a participative approach involving users, planners and politicis at every possible level. It requires transparent information and democratization of decisions with the setting up of the project.

3. Women play a central role in the supply, management and preservation of water resources, that should be recognized. It is necessary to set up water management policies addressed to their specific needs and reinforcing their powers so that they participate at every level, including in decision-making and implementation, under the terms defined by them.

4. Water has an economic value in all its competing uses and should be recognized as an economic asset in its own right.
   Every human being is entitled access to drinking water and sanitation, at an affordable price. Recognizing the economic value of water is one of the conditions governing the efficiency and equity of its use that will encourage its preservation and its protection.

### 4.3. Means of action

More and more, international organizations and donors are emphasizing the need for rigorous management of water which has become a fragile resource and requires protection. This affirmation of the priority of water calls for a political will to establish integrated water resource management. A better balance between the objectives of "adding value on" and the protection of environmental water must be established. Some of the constraints limiting the water supply could be skirted around by well thought out and careful management, for which solutions are relatively well known today and can simplify arbitration that is almost always difficult between competing uses of water.

Integrated management is essential. It has to move from the stage of design and intents to that of reality. Its future must be considered regarding legislation, institutions, structures and instruments. The basic conditions for an integrated management system per watershed are, in actual fact:

- the capability to ensure technical water management with an institutional water management structure and the technical knowledge and means for multidisciplinary teams to function,
- legislative capabilities with a specific water law designed to complete the existing regulations,
- water rights capabilities, a set of legal and regulatory means (active policy: regulation of the use of water, regulation by objective; repressive policy: control system, penalties, fines after legal proceedings).

One of first requirements for an integrated management policy is to set up a legislative framework that defines the rights, powers, functions and levels of decentralization of each administration.

The hierarchy of water problems, the motivations for the preservation of water and the management choices depend upon the countries, their respective economic development and their respective water availabilities. This type of management is based upon proper training and information of the actors involved.

The actual realization of integrated management objectives means, more particularly, a few principles of action being put into effect:

1. The polluter pays principle is one of the principal ways of internalizing the external effects of water use in the process of economic decision-making. It establishes a mechanism of solidarity between the users of the same basin. It is not very widespread in the Mediterranean as yet. This principle could be supplemented by a "waster pays" principle, a method for stimulating water saving efforts (applicable for instance in urban areas).

2. The prevention principle: given the sluggishness of society combined with nature's inertia, it is above all in the long term that

significant preservation results can be achieved. Therefore, from a patrimonial point of view, preparing for them by preventive action starting as of now, with support from consistent water and environment policies is essential. This principle refers to the development of information systems (measurement networks, periodic survey operations, data banks) ensuring the observatory function of the resources and uses of water and reinforcing analysis capabilities (in the short and long term) of specialized study and research institutions working hand in hand with the management authorities and the public. The distribution of information and transparency of action are essential elements for the application of this principle.

3. The principle of integration aimed at integrating sectorial and teritorial policies on the water basin scale. This includes the institution of water management authorities equipped with judicial and appropriate financial means having the powers of orienting and co-ordinating the development and preservation of water and of acting upon its uses. The management of water resources has to be co-ordinated with the management of land cover, land occupation and land use development. This principle requires a systemic analysis and serious discussion between the actors at the various levels of decision-making and in the various sectors.

4. The principle of proximity and interdependence: this corresponds to the principle of "thinking globally and acting locally". This future water management has to derive from a veritable Mediterranean water policy which must be homogeneous and harmonious between the various economic, social, ecological goals relating to the resource. The present and future challenges facing water in the Mediterranean basin call for awareness at every level among people concerned with water in this basin and an effective political will among national and local authorities to face up to the choices that will be necessary. This principle calls for increasing solidarity to cope with the enormous challenges arising from water at the present time and in the future and therefore a will towards international co-operation obtained through the exchange of information, deliberation, the development of means to protect water resources and even international water exchanges.

These objectives and principles of action are those that MEDO wishes to promote and the studies which it would like to take further are aimed at the three cornerstones for integrated river basin management of the water resources: 1) a real political will, 2) effective water rights and 3) information to the public. The countries concerned by the MAP are a sort of life scale laboratory of the feasibility of this management method.

The guidelines that MEDO is following are in agreement with the recommendations of Agenda 21 (chapter 18) and in particular:

1. "The definition, reinforcement or creation of institutional, judicial and financial mechanisms that are appropriate to ensure that the water policy and its application are a catalyzer for social progress and

sustainable economic growth". The dispersion of skills without any real co-ordination is a major hindrance to the integrated management of water resources.

2. "The need to know the data gathering networks and to determine their performance, to reinforce the networks according to the guiding principles and to assist with local hydrological data processing". Accordingly, data analysis and presentation, and that of other information in the required forms by the different countries for planning, for the management of their socio-economic development and for use within the framework of strategies for the protection of the environment and for the design of projects concerning water, are set as priorities.

3. "The creation of interactive databases and forecasting methods and models, for economic planning for rational and sustainable management of hydric resources will mean the application of new methods such as geographical information systems for gathering, assimilating, analyzing and displaying multisector information but also to allow decision-making to be achieved under optimum conditions".

In particular this will call for the development of indicators – evaluation tools – in phase with the sustainable development principles and those of integrated management and which are synthesized into a common language between the different countries. This is specifically the purpose of the continuation of this document.

# 5. The indicators: support tools for integrated management policies

Indicators are the tools traditionally used in assessment, supervision, forecasting and decision-making because they synthetically depict an action, a situation and its evolution. MEDO is centering its work upon public policy assessment tools for sustainable development and, at the present time, is directing its research towards methods of development and selection of sustainable development indicators (ISD). The theoretical aspects of this research are outlined in fascicle 5.

## 5.1. Methodology for establishing sustainable development indicators for water

Here, we intend to apply the theoretical approach to the problem of water and its policies. The work underway to establish indicators for sustainable development has led to a panel of indicators as presented in table 6. This table is at one and the same time a grid for assessing the indicators and a grid for selecting the ISD system according to the specific needs of a user.

Column 1 suggests indicators each illustrating the constitutive subjects of the systemic analysis of water resources and of its uses. The subjects are numbered from 01 - population to 11 - tourism for socio-economic subjects and from 12 - water to 15 - biodiversity for environmental subjects.

The systemic analysis of paragraph 4.2 reveals that the main objectives for the sustainable use of water resources in the Mediterranean are principally those of checking the efficiency of the socio-economic systems with respect to that water resource (macro-economy, agro-food, industry, energy, transport, tourism) and thereby, anticipating any risks of degradation. Thus, within each subject, the indicators form three major categories according to their meaning: quantitative pressure on the water resource, qualitative pressure on the resource, public efforts towards management to forecast and reduce pressures.

Column 2 comments on the scope and interpretation of the indicator by supplying analysis keys regarding its utility to describe a state, a change, an unsustained situation beyond a given limit, a coastal/national comparison. Additional information needed for interpretation is suggested in the form of other indicators.

Column 3 indicates the direction of the interaction(s) illustrated by the indicator: pressure of the sociosphere upon the environment, pressure of environmental degradation upon the sociosphere or environmental interactions.

Column 4 indicates the tools used in establishing these indicators. There are several types of indicators, graded from 1 to 10: status indicators (single ratio, Gini index, aggregate index), indicators of change (relative elasticity or variation of two variables correlated with one another). There types of indicators are mentioned in fascicle 5 but since they are still under evaluation at MEDO, they are not described here.

For example, some of the indicators proposed in table 6 are classified according to their composition: simple ratio.

| Indicator type | Example | Interpretation |
|---|---|---|
| 1. Structural<br>Share (%) ratio of a variable to the whole | Agricultural water demand compared to total demands | This ratio is expressed as a % and indicates the structure of the water demand at a given time. It varies. |
| 2. Normative<br>Relationship between a variable and what is considered as the standard it should achieve | Indicator of change in water quality with respect to a reference value | This ratio indicates how far we are from the desirable situation |
| 3. Coastal (geocomparison)<br>Ratio between two variables expressing the same phenomenon but on different geographical scales | Index of coastalisation of water demand | With this ratio imbalance that exists between a local situation and a global situation can be assessed |
| 7. Elasticity connecting a socio-economic pressure to its environmental impact | Elasticity of water consumption for irrigation with respect to the agricultural value-added factor | 1% increase in agriculture value-added factor requires more than 1% increase in water consumption |
| 8. Elasticity connecting environmental pressure to its socio-economic impact | The elasticity of public expenses devoted to water with respect to all of the public expenditure | This ratio indicates the importance of the public effort for water |

The choice of tools is governed by the sustainable development principles that they should assess. This is the purpose of the following column.

Column 5 shows the principles to which the indicators respond to account for sustainable development. This is a matter of measuring the sustainability or non-sustainability of development paths. The indicators must comply with a number of characteristics:

- They are **multidimensional**. They illustrate relationships between the socio-economic activities and water but also the close relationships between water, soil and plant cover.
- They include **distributive** elements. The indicators must, for instance, indicate the distribution of water resource degradation problems among social categories and geographical areas.
- They allow **prospective applications**. The evaluation of sustainable development suggests that we are interested in both initial situations and in paths as described by the various variables. Therefore, the dynamics of the demands for urban and agricultural water with respect to a set water resource shows that there are risks of shortage and conflicts in use in the future.

- They are **normative**. They refer to a reference value and indicate uncertainties. The definition of reference values in terms of pollution reduction objectives or the minimum quantity of resource flow needed for self-purification of the environment, for instance, is important to evaluate the sustainability of water resource use.
- They reveal an **explicit mesh** revealing the cause and effect relationships of an interaction. For instance, over exploitation of coastal aquifers is often accompanied by saline invasion, a phenomenon that can be considered as irreversible on the human time scale.

None of the selected indicators correspond to all of these principles but a system of indicators must verify them and include status and change indicators in space and time to allow prospective applications as well as indicators measuring the deviation from a reference value and cross-referred indicators allowing for environment/socio-economical interactions.

Once the indicators of the system have been defined, their feasibility has to be verified in the short, medium or long term and on the desired scale, depending upon the availability of the basic data.

Column 6 indicates all of the environmental and socio-economic subjects to be considered in establishing the indicator or in interpreting it. The indicators proposed in table 6 are practically all cross-referred indicators incorporating socio-economic and environmental dimensions.

Column 7 shows the desirable geographical observation levels. The choice of observation level varies with the nature of the environmental problem, the purpose of the indicator and with the political-administrative organization of the country. The major difficulty of the water resource is that it consists of runoff. It is therefore impossible to assess the water resources within an administrative and territorial subdivision (unless the limits of a coastal region correspond to the limits of the watershed). Indicators relative to run-off measurements can be measured in the appropriate space i.e. the watershed or sub-basins, and can be approved nationally. Water consumption refers to administrative units.

Column 8 indicates the component elements of the indicators: the basic data needed for their achievement.

Column 9 illustrates the feasibility of the indicators according to the availability of the information at various geographical observation levels. Implementing a system of quantitative indicators for sustainable development requires a scientific knowledge base. This means that definition and data availability problems concerning the resources, the water demands, pollution prevention in the Mediterranean basin, as identified in chapter 2, considerably affect the feasibility of the indicators.

The availability of the information limits the effectiveness of any evaluation and is based on the political will to establish the means of having the available database. This information depends enormously upon the way the water actors are involved in terms of their use, distribution, management and supervision. Before any decision is reached, the decision-maker must assess the validity of the information he uses to make his choices. Analysis of the state of knowledge concerning water resources also involves qualitative information about the technical and human means available for gathering and synthesizing the data from measurement stations.

Table 6 is complex. Therefore an indicator is detailed by a line explanation: from its definition to its feasibility. An example of a comment on an indicator is given below.

**Cross-reference indicator (04 - macroeconomics, management)**
**Illustrating a political management effort**

Price-related political indicator consisting of a set of indices pointing to proportions in water volumes distributed at progressive, degressive and neutral tariffs.

**col. 2.** comment: the increase in a progressive tariff policy indicates a political will towards water savings;
**col. 3.** direction of interaction: this is a positive action of the socio-economic sphere towards the environmental sphere.
**col. 4.** ISD type: this is a simple ratio (structural);
**col. 5.** characteristics: this indicator is multidimensional (combining two socio-economic/environment and society/economic cross-references), distributive (pricing makes a distinction between user categories) and normative (referring to tariff levels);
**col. 6.** link with other socio-economic and environmental themes and concerning all the economic activities while having an indirect effect upon health: health, food industry, industry, energy, tourism, etc.
**col. 7.** geographical levels: the level varies according to the country depending upon the party in charge of the tariff policy which may be national, the watershed, regional or city-based;
**col. 8.** necessary data: volumes of water distributed at a degressive, progressive, neutral and unpriced tariff;
**col. 9.** feasibility: feasibility is possible in countries where the distributed water volumes are measured but where achievement requires the extensive collection of information from water distribution organizations.

*Table 6 : Development of Indicators for Sustainable Development for the water resources subject*

### *Legend*

**DIRECTION OF THE INTERACTIONS**

1= socio-economy => environment
2= environment => socio-economy
3= environmental interactions

**TYPE OF ISD**

1= strctural (simple ratio)
2= nomative (discard with a reference value)
3= coastal (ratio between a coastal indicator and a national indicator)
4= distributive (gini index)
5= aggregate index
6= subsitution elasticity
7= elasticity connecting a socio-economic pressure to its environmental impact
8= elasticity connecting an environmental pressure to its socio-economic impact
9= elasticity connecting society to economy
10= elasticity connecting environment to environment

**CARACTERISTICS**

1= multidimensional
2= distributive
3= prospective
4= normative
5= explicit mesh

**GEOGRAPHICAL OBSERVATION LEVEL**

1= national
2= watershed
3= coastal region
4= local (for water issues it can concern watershed sub-unit)
5= marine zone

**AVAILABILITY**

CT= indicator feasibility possible, in a national core set of indicators, with a regular periodicity, and with a standardized methodology for producing data.
MT= indicator feasability but not for all regions, it is due to the scatter of data sources and to non homogeneous methodologies for information collection, and monitoring
LT= relevant indicator, but difficulties for developping it due to problems of geographical data coverage or lack of monitoring system.

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|
| **SUBJECTS** | **COMMENTS** | **DIRECTION** | **TYPE of ISD** | **CARACT.** | **LINK with other subjects** | **GEOGR. LEVEL** | **DATA NECESSARY** | **AVAIL. of data** |
| 01 to 15 | | 1 to 3 | 1 to 10 | 1 to 5 | 01 to 15 | 1 to 5 | | |
| **01 POPULATION (human activities in general)** | | | | | | | | |
| **QUANTITY: offer** | | | | | | | | |
| indicator of average availability of resources: annual average resource per inhabitant | state and evolution, comparison coastal/national | 2 | 1 3 | 1 3 | 02 03 06 07 08 10 11 | 1 2 4 | annual average total resources, population (specified year) | 1: CT<br>2 4: MT |
| indicator of estimated availability of resources: average estimates resource per inhabitant | state and evolution, comparison coastal/national | 2 | 1 3 | 1 2 3 | 02 03 06 07 08 10 11 | 1 2 4 | average seasonal resources, population (specified year) | 1: CT<br>2 4: MT |
| indicator of availability of resources in dry years (decennial average): average resource per dry year per inhabitant | state and evolution, comparison coastal/national | 2 | 1 3 | 1 2 3 | 02 03 06 07 08 10 11 | 1 2 4 | average resources in dry years, population (specified year) | 1 2 4: MT |
| indicator of the availability of resources defined as usable within to ecological constraints: exploitable resource per inhabitant | state and evolution, comparison coastal/national | 2 | 1 3 | 1 2 3 4 | 02 03 06 07 08 10 11 15 | 1 2 4 | annual average total resource estimated exploitable, population (specified year) | 1 2 4: MT |
| **QUANTITY: demand** | | | | | | | | |
| exploitation index of water resources: withdrawals divided by annual average water resources | if>100%, see withdrawal share covered by non-conventional or non-renewable water sources, comparison coastal level and national level, follow evolution trends | 1 | 1 3 | 1 3 | 03 06 07 08 | 1 2 4 | total water withdrawals (all type of uses), annual average total resources in surface and groundwaters | 1: CT<br>2 4: MT |
| seasonal exploitation index of water resources: seasonal withdrawals dived by seasonal resources | if >100%, specific acuteness of human pressures on water resources in the coastal areas | 1 | 1 3 | 1 2 3 5 | 03 06 07 08 11 | 1 2 4 | seasonal withdrawals (all types of uses) nationally and coastally, seasonal low water flow | 1: CT<br>2 4: MT |
| exploitation index of water resources in dry years (decennial average): total withdrawals divided by driest years resources | if >100%, non-sustainable water use (in a multi-annual scarcity context which aggravate pressure), see indicator of over-exploitation of groundwaters and non-renewable waters | 1 | 1 3 | 1 2 3 5 | 03 06 07 08 11 | 1 2 4 | total water withdrawals (all type of uses), annual average total resources in surface and groundwaters in multi-annual dry years | 1 2 4: MT |
| exploitation index of exploitable waters: withdrawals divided by exploitable water resources | if>100%, non-sustainable water use, see over-exploitation indicator of groudwaters and non-renewable resources | 1 | 1 3 | 1 2 3 5 | 03 06 07 08 | 1 2 4 | total water withdrawals (all type of uses), exploitable resources (depending on some criterias: water management costs, minimal guaranteed flow into the sea, and into natural habitat...) | 1 2 4: MT |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|
| **SUBJECTS** | **COMMENTS** | **DIREC TION** | **TYPE of ISD** | **CARACT.** | **LINK with other subjects** | **GEOGR. LEVEL** | **DATA NECESSARY** | **AVAIL. of data** |
| 01 to 15 | | 1 to 3 | 1 to 10 | 1 to 5 | 01 to 15 | 1 to 5 | | |
| consumption index of water resources: final consumption divided by average water resources | if>80%, non-sustainable water use, see over-exploitation indicator of groudwaters and non-renewable resources | 1 | 1 3 | 1 3 | 03 06 07 08 11 | 1 2 4 | final consumption of all type of use (% of withdrawals consumed may vary with the sector of usage), total renewable resource (surface and groundwaters) | 1: CT 2 4: MT |
| part of the demand covered by non-renewable resources | if > 10% one can state that the exploitation of this type of resource is significant, and a shortage horizon is to be assessed | 1 | 1 3 | 1 3 4 | 03 06 07 08 11 15 | 1 2 4 | annual volumes exploited from fossil aquifers, total demand (all type of uses) | 1: CT 2 4: MT |
| over-exploitation index of groundwater: actual exploitation/theoretical exploitation | if ratio >100%, unsustainbility | 1 | 2 | 1 3 4 | 03 06 07 08 11 15 | 1 2 | annual volume withdrawn from aquifers, annual theoretical exploitable volume | MT |
| **QUALITY** | | | | | | | | |
| "deterioration" index: water returns (withdrawals - final consumption) divided by available resources (total resources – final consumption) | quantitative approach to water quality, state and evolution, compare coastal/national | 1 | 1 3 | 1 4 | 02 03 06 07 08 10 11 15 | 1 2 3 | annual volumes returned into continental waters (after consumption), total annual resources available after substracting final consumption by usage | 1: CT 2 4: MT |
| ratio of waste water treatment | indicate a saturation of the sanitation and treatment system, state and evolution, compare coastal/national, make a distinction between waste waters directly discharged into seawaters and into continental waters | 1 3 | 1 3 | 1 2 3 | 02 04 06 07 08 13 15 | 1 2 3 4 | ratio of people connected nationally and in the coastal areas, flow of organic matter discharged measured in inhabitant -equivalence (19 he = 1t/year in Europe) | 1: CT 2 3 4: MT |
| **MANAGEMENT** | | | | | | | | |
| ratio of population connected to the sanitation network | state and evolution, compare coastal/national | 1 3 | 1 3 | 1 3 | 02 03 06 07 08 11 13 15 | 1 2 3 | coastal, watershed and total population connected to sanitation system; coastal , watershed and total population | 1: CT 2 3: MT |
| part de the demand covered by non-conventional water resources | indicate a diversification of supply sources: state and evolution, compare coastal/national | 1 | 1 3 | 1 3 | 03 06 07 08 11 | 1 2 | waste water volumes reused, desalinated water volumes produced, total demand -all types of uses) | 1: CT 2: MT |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|
| **SUBJECTS** | **COMMENTS** | **DIRECTION** | **TYPE of ISD** | **CARACT.** | **LINK with other subjects** | **GEOGR. LEVEL** | **DATA NECESSARY** | **AVAIL. of data** |
| 01 to 15 | | 1 to 3 | 1 to 10 | 1 to 5 | 01 to 15 | 1 to 5 | | |
| **02 HEALTH** | | | | | | | | |
| **QUANTITY** | | | | | | | | |
| percent of waste water discharged into sea without any treatment | indicate public health hazard: state and evolution | 1 | 1 | 1 3 5 | 02 03 06 07 08 11 13 15 | 1 2 3 5 | total waste water volume into sea, waste water volumes treated before discharged into sea | MT |
| percent of waste water discharged into continental waters without being treated | indicator of public health hazard: state and evolution | 1 | 1 | 1 3 5 | 02 03 06 07 08 11 13 15 | 1 2 4 | total waste water volumes discharged into rivers, waste water volumes treated before discharged | MT |
| **QUALITY** | | | | | | | | |
| index of public health concern: percent of the population provided with water not conforming to WHO drinking water standards | indicate a national effort: state and evolution, compare coastal/national, make a distinction between rural and urban areas | 1 | 1 3 | 1 3 4 | 02 03 | 1 2 3 4 | number of people provided with water not conforming to drinking water standards, total number of people provided with drinking water | MTto LT |
| elasticity of public health spendings for waterborne diseases compared to spendings for sanitation | if e <-1, an increase of 1% of sanitation spendings leads to a decrease of more than 1% of public health spendings for waterborne diseases | 1 2 | 8 | 1 3 5 | 02 03 04 | 1 2 3 | evolution of public spendings for health devoted to waterborne diseases (cf. WHO International Decade for Drinking Water and Sanitation), evolution of public spendings invested into sanitation systems (treatment plants etc.) | MT to LT |
| **MANAGEMENT** | | | | | | | | |
| percent of public spendings for water aspects and for social matters (drinking water supply, sanitation and treatment) | state and evolution, compare coastal/national, | 1 2 3 | 1 3 | 1 2 3 | 01 02 03 | 1 3 | public spendings for drinking water supply and sanitation (all geographical level), total public spendings | ML to LT |
| **03 URBANIZATION** | | | | | | | | |
| **QUANTITY** | | | | | | | | |
| urbanization index of water demand: share of urban demand into total demand | state and evolution, compare coastal and national urbanization | 1 | 1 3 | 1 2 3 | 06 07 08 11 13 | 1 2 3 | total water demand (all type of uses) in urban area, total water demand (all type of uses) in all the territory | 1: MT<br>2 3: LT |
| coastalization index of urban water consumption: comparison of the water consumption per inhabitant in the coastal areas to the consumption per inhabitant of all the country | if ratio>100%, the coastal urban population consume more water than the total urban population | 1 | 1 3 | 2 | 06 07 08 11 13 | 1 2 3 | final urban water consumption (households + services + municipalities + industries) in coastal areas, in the whole country, coastal and national population | MT to LT |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|
| **SUBJECTS** | **COMMENTS** | **DIRECTION** | **TYPE of ISD** | **CARACT.** | **LINK with other subjects** | **GEOGR. LEVEL** | **DATA NECESSARY** | **AVAIL. of data** |
| 01 to 15 | | 1 to 3 | 1 to 10 | 1 to 5 | 01 to 15 | 1 to 5 | | |
| urban population in relation to the maximum capacity of supply of the distribution system | if ratio>100%, the drinking water supply is saturated and calls for investments to answer to future demands | 1 | 2 | 1 2 3 4 5 | 02 04 | 1 2 3 4 | estimation of the total number of inhabitants who can be satisfactorily supplied by the actual drinking water network, taking into account the domestic needs of the urban population and the technical alternatives (recycling, treatment etc.) | MT |
| index of municipal wastage of water: part of water produced that are paid for | state and evolution, coastal/national | 1 | 1 3 | 1 3 | 03 06 08 | 1 2 3 4 | annual volumes of water produced, water volumes paid for | MT to LT |
| elasticity of substitution between the agricultural water consumption and the urban water consumption | if e<0, an increase of the urban water consumption go with a decrease of agricultural water consumption and there is an allocation conflict | 1 | 6 | 1 2 3 | 01 04 05 06 | 1 2 3 4 | evolution of the urban final water consumption (households + services + municipalities + industries), evolution or agricultural final water consumption | LT |
| **QUALITY** | | | | | | | | |
| indicator of change in water qualities: absolute and relative margin between concentrations of variables (balanced by the volume of flow measured at the same location) presently measured and at a reference date | this indicator can also be revealed by changes of quality status within a conventional classification grid or system,<br>state and evolution, local level | 1 | 2 | 1 3 4 | 01 06 07 08 11 13 15 | 2 4 5 | evolution of a set of water quality parameters (BOD, COD, Nitrates...or specified quality categories) in comparison with a state of reference for each parameter, the water quality values are weighted against the river flow at the measurement location. | LT |
| index of efficiency of prevention measures: evolution of eutrophication compared to the evolution of domestic discharges of sewage | if i>1 an increase of urban and domestic sewage (measured in inhabitant -equivalent) leads to an increase of eutrophication factors | 1 | 7 | 1 2 3 4 5 | 01 15 | 2 4 5 | evolution of the concentration in nitrates and phosphates (of a monitoring network of measurement stations), waste water volumes discharged at these locations | 4: MT<br>2 5: LT |
| **MANAGEMENT** | | | | | | | | |
| share of urban population connected to a sanitation network | state and evolution, make a distinction between unique and separated systems | 1 3 | 1 3 | 1 2 3 | 06 07 08 11 13 15 | 1 2 3 | number of people connected to a sanitation network, distinguish unique and separated networks | MTto LT |
| part of urban population linked to treatment plants | state and evolution, make a distinction between mechanical, biological and chemical treatment plants | 1 3 | 1 3 | 1 2 3 | 06 07 08 11 13 15 | 1 2 3 | number of people connected to treatment plants (total), distinguish primary, secondary, and tertiary treatment plants | MT to LT |
| part of urban waste waters reused | reveal situations severe and also effort to develop "second hand" water supply | 1 3 | 1 3 | 1 2 3 | 06 07 08 11 13 15 | 1 2 3 | urban waste water volumes treated for reuse, waste water volumes produced | MT to LT |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|
| SUBJECTS | COMMENTS | DIREC TION | TYPE of ISD | CARACT. | LINK with other subjects | GEOGR. LEVEL | DATA NECESSARY | AVAIL. of data |
| 01 to 15 | | 1 to 3 | 1 to 10 | 1 to 5 | 01 to 15 | 1 to 5 | | |
| **04 MACRO-ECONOMY** | | | | | | | | |
| **QUANTITY** | | | | | | | | |
| elasticity of spendings dedicated to water aspects (all actors involved)/GDP | if e > 1, spendings increase faster than economic growth, the importance of water is increasing in the economy, state and evolution, national level, distinction of the various spendings | 2 | 8 | 1 3 | 02 03 06 07 08 11 | 1 3 | include public and private spendings: water development for security reasons, for water supply and distribution, spendings of the productive economic sectors (agriculture, industry, energy), spendings for water sanitation and treatment, GDP | MT |
| elasticity of public spendings devoted to water in comparison with total public spendings | indicate the weight of the water sector into the public spendings: state and evolution, national | 2 | 8 | 1 3 | 02 03 06 07 08 11 | 1 3 4 | public spendings in the water sector, public spendings in all economic sectors of activity | MT to LT |
| index of security performance: elasticity of costs due to floodings (insurance) in comparison with spendings for prevention measures | state and evolution, case studies analysis | 1 2 3 | 8 | 1 3 5 | 02 03 06 07 08 11 13 | 1 3 4 | costs of flood damages (assessed by insurance companies), spendings for security prevention (dams, dykes...) | MTto LT |
| comparison of the water consumption shares of each sector and of their shares into GDP | state and evolution, national levels for the following sectors: agriculture, industry, energy | 1 | 1 3 | 1 2 5 | 02 03 06 07 08 11 13 | 1 3 4 | sectorial water demands, share of each sector into GDP | MT to LT |
| **MANAGEMENT** | | | | | | | | |
| indicator of tariff policy: percentage of water distributed with a gradual, degressive, stable tariff | the % of water distributed with a gradual tariff system indicate a political willingness of water economy; state and evolution | 1 | 1 | 1 2 4 | 02 06 07 08 11 | 1 2 3 4 | drinking water volumes distributed with a gradual, degressive, stable, and no price tariff system | MT |
| indicator of public subsidies: comparison of the costs for water supply subsidized by the state and those covered by consumers (collectivities et farmers) | state and evolution, national, distinguish the costs for drinking water supply and those for water supply to public irrigated areas | 1 | 1 3 | 1 2 3 | 03 06 07 08 | 1 2 3 4 | public subsidies for drinking water sector and irrigation sector, consumers spendings for drinking water and irrigation water provision | MT |
| **05 EDUCATION/CULTURE** | | | | | | | | |
| | | | | | | | | |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|
| **SUBJECTS** | **COMMENTS** | **DIRECTION** | **TYPE of ISD** | **CARACT.** | **LINK with other subjects** | **GEOGR. LEVEL** | **DATA NECESSARY** | **AVAIL. of data** |
| 01 to 15 | | 1 to 3 | 1 to 10 | 1 to 5 | 01 to 15 | 1 to 5 | | |
| **06 AGRICULTURE & FOOD-INDUSTRY** | | | | | | | | |
| **QUANTITY** | | | | | | | | |
| comparison between the share of the agricultural area irrigated and the share of production from irrigated areas into the value-added of all the agricultural production | indicator of irrigation economical profit-earning | 1 | 1 3 | 1 2 3 | 04 13 | 1 2 3 | irrigated agricultural area, value of the production of irrigated areas, value-added of all the agricultural production | MT |
| area actually irrigated in comparison with total area equipped for irrigation | indicator of technical efficiency of irrigation, state and evolution, coastal/national | 1 3 | 1 3 | 1 3 4 | 04 13 | 1 2 3 | areas actually irrigated (specified year), areas equipped for irrigation | MT |
| elasticity of water volume used to irrigate crops in comparison with the value-added of the agricultural sector | if e>1, the increase of 1% of the crops value-added needs more than 1% increase in water consumption | 1 | 7 | 1 3 5 | 06 13 | 1 2 3 | evolution of the value-added of the main Mediterranean irrigated crops and evolution of their water consumption when irrigated | MT |
| coastalization index of agricultural water consumption: percent of agricultural water consumption in the coastal areas in comparison with the rest of the country | if ratio>100%, over-consumption of water in the coastal areas for agricultural purposes | 1 | 1 3 | 1 3 | 06 13 | 1 2 3 | final agricultural water consumption of the coastal zone and the country | MT to LT |
| **QUALITY** | | | | | | | | |
| elasticity of nitrates concentration rate in comparison with nitrate fertilizer consumption | if e>1, the increase of 1% of the nitrates fertilizers consumption leads to the decrease of more than 1% of the nitates concentration | 1 | .7 | 1 3 5 | 06 13 | 1 2 3 4 | evolution of the rate of nitrates in continental waters, evolution of the consumption of nitrate fertilizers | LT |
| **MANAGEMENT** | | | | | | | | |
| share of the areas irrigated with surface irrigation, spinkler irrigation, or micro-irrigation | indicator on the adequacy of the agricultural technology for water management, state and evolution, coastal/national | 1 | 1 3 | 1 2 3 | 13 | 1 2 3 | total areas irrigated by surface, sprinkler, and micro-irrigation technics | MT to LT |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|
| **SUBJECTS** | **COMMENTS** | **DIRECTION** | **TYPE of ISD** | **CARACT.** | **LINK with other subjects** | **GEOGR. LEVEL** | **DATA NECESSARY** | **AVAIL. of data** |
| 01 to 15 | | 1 to 3 | 1 to 10 | 1 to 5 | 01 to 15 | 1 to 5 | | |
| **07 INDUSTRY** | | | | | | | | |
| **QUANTITY** | | | | | | | | |
| elasticity of the costs of water in comparison with the other production costs | from 1% of the production costs, managers start taking into account the costs due to water use | 2 1 | 7 8 | 1 3 | 04 | 1 2 3 | evolution of spendings for water supply in the industrial production, total production costs | MT to LT |
| elasticity of the evolution of water consumption by various industrial sectors in comparison with the unit production volume | state and evolution on a watershed and distinguish the different industrial sectors which are water greedy | 1 2 | 7 8 | 1 3 | 04 | 1 2 3 | water consumption in the different industrial sectors, unit production volume for each type of industry | MT to LT |
| elasticity of the evolution of water consumption for different industrial sectors in comparison with the production value-added | state and evolution on a watershed and distinguish the different industrial sectors which are water greedy | 1 2 | 7 8 | 1 2 3 | 04 | 1 2 3 | water consumption in the different industrial sectors, value-added production | MT to LT |
| **QUALITY** | | | | | | | | |
| percent of industries (textile, iron and steel, cement factories, tanneries, paper factories) not connected to a depollution system: comparare coastal areas/national | if ratio>100%, acute risk of pollution in the coastal areas | 1 | 1 3 | 1 2 3 | 03 04 | 1 2 3 4 | percent of polluting industries connected to a depollution system | MT to LT |
| elasticity of polluting industries production in comparison with the GNP of industry | measure the evolution in structure of industries: if e>1, the production of polluting sectors grow faster than the total production, the evolution of the structure of industrial production will put more pressure on the environment | 1 | 7 | 2 3 | 03 04 | 1 2 3 | evolution of the production of the sectors of textile, steel and iron, cement, paper, leather, evolution of the GNP of industry ( all sectors) | MT |
| elasticity of the COD in comparison with the industrial production non-connected to a depollution system | if e>1, the decrease of 1% of the industrial production gets a decrease of more than 1% of COD | 1 | 7 | 1 3 5 | 03 04 13 15 | 1 2 3 4 | evolution of COD of continental waters, evolution of the production of the industries not connected to a depollution system | LT |
| **MANAGEMENT** | | | | | | | | |
| recycling rate: water volume which is recycled into the system in comparison with the volume which initially goes into the system and the water volume discharged in comparison with water supplied | indicates a measure towards a water economy, in general motivated by taxes on "pollution" calculated on the basis of the volume of discharges, supplementary by the frequency of renewal of water supply and the rate of system losses | 1 | 1 3 | 1 3 | 03 04 13 15 | 1 2 3 4 | water volume circulating in the reproduction system, water volume withdrawn, qualitative information on the condition of the production system, and the leakages, distinct of each type of industry | LT |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|
| **SUBJECTS** | **COMMENTS** | **DIREC TION** | **TYPE of ISD** | **CARACT.** | **LINK with other subjects** | **GEOGR. LEVEL** | **DATA NECESSARY** | **AVAIL. of data** |
| 01 to 15 | | 1 to 3 | 1 to 10 | 1 to 5 | 01 to 15 | 1 to 5 | | |
| **08 ENERGY** | | | | | | | | |
| | | | | | | | | |
| **09 TRANSPORTS/COMMUNICATIONS** | | | | | | | | |
| | | | | | | | | |
| **10 TRADE** | | | | | | | | |
| | | | | | | | | |
| **11 TOURISM** | | | | | | | | |
| **QUANTITY** | | | | | | | | |
| surplus of water consumption due to tourism in comparison with annual consumption of the coastal areas | if ratio>100%, the surplus of consumption is due to tourism | 1 | 1 3 | 1 2 3 | 02 04 03 | 1 2 3 4 | estimated water consumption of tourists (swimming pools; golf courses, hotels...) | MT & LT |
| ratio of the touristic population on the carrying capacity* of the drinking water and sanitation distribution system to be compared to the figure obtained with permanent population | if ratio>100%, the carrying capacity of the distribution system can not cover the additional demand due to tourism | 1 | 2 | 1 2 3 4 | 02 04 03 | 1 2 3 4 | tourist population, carrying capacity | MT & LT |
| **QUALITY** | | | | | | | | |
| elasticity of the seasonal organic matter flow into coastal waters in comparison with the increase of the touristic population in coastal areas | if e>1, an increase of 1% of the population of tourists has an impact of more than 1% on the organic matter flow discharged in the coastal waters | 1 | 7 | 1 2 3 5 | 02 03 04 | 1 2 3 4 | estimation of the OM flow discharged into the sea, evolution of the tourist population in coastal zones | LT |

* number of inhabitants whose needs are covered by the actual water supply of the existing distribution network taking into account the total domestic needs of the urban population and the technical strategies developped (recycling, water treatment etc.)

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|
| **SUBJECTS** | **COMMENTS** | **DIRECTION** | **TYPE of ISD** | **CARACT.** | **LINK with other subjects** | **GEOGR. LEVEL** | **DATA NECESSARY** | **AVAIL. of data** |
| 01 to 15 | | 1 to 3 | 1 to 10 | 1 to 5 | 01 to 15 | 1 to 5 | | |
| **12 WATER** | | | | | | | | |
| **QUANTITY** | | | | | | | | |
| index of artificialisation of water courses: kilometers of water courses managed (dykes, dams...) in comparison with a threshold of acceptable artificilisation | is it possible to define such a threshold of artificialisation (water courses management), a level of ecological quality of water courses? artificialisation criteria are to be defined (this indicator needs to be worked on) | 1 | 2 4 | 1 2 3 4 | 03 04 06 07 08 09 11 13 14 | 1 2 4 | all the hydraulic developments, other data should defined as the « catagories of ecological management » of the river environment | LT |
| **QUALITY** | | | | | | | | |
| index of ecological situation of water courses: km of river categories based upon a classification grid of water quality, weighted by the water flow and compared to reference thresholds | state and evolution, location for quality and flow measurements in the hydrographic basin of a river | 1 | 2 3 4 | 1 2 3 4 | 02 03 06 07 08 09 10 11 13 15 | 1 2 3 4 | measurement of quality and flow at various stations along a water course, classification based upon a quality grid, calculation of the water courses kilometers in the different categories | LT |
| elasticity of evolution of river fresh waters input into the sea and evolution of the waste waters discharges directly into the sea | if e<-1, the freshwater input into the Mediterranean is mainly composed of waste waters (see the indicator of the treatment rate of waste waters discharged into sea) | 1 | 10 | 1 3 | 03 06 07 08 09 10 11 13 15 | 1 2 3 4 | outflow into the sea (sum of the outflow of the different rivers), waste water discharges into the sea | LT |
| index of degradation and depletion of groundwater: share of the surface area of aquifers measured in $km^2$ which have a content of more than 50 mg of nitrates | index of unsustainability of the use of groundwater, the effect of pollution can have a time scale of 10 years | 1 | 2 3 | 1 3 4 | 02 03 06 07 08 09 10 11 13 15 | 1 2 3 4 | measures of quality at diferent points, estimation of the surface coverage of groundwater | LT |
| **13 SOILS** | | | | | | | | |
| **QUANTITY** | | | | | | | | |
| index of degradation of the content capacity of dams due to silting: comparison of the useful capacity lost in the existing dams and of the additional useful capacity won when building new dams | index of unsustainability of flood water management and of development infrastructure weakness, state and evolution, comparison watershed/national | 2 1 | 1 3 10 | 1 3 | 04 08 | 1 2 4 | sum of existing individual dam capacity (year specified), sum of the useful capacity of forcasted dams | MT |
| **14 FOREST** | | | | | | | | |
| **QUANTITY** | | | | | | | | |
| index of water regulation: elasticity of the evolution of trees planting and the evolution of the annual flooding flow | indicate a reduction of risks of floods but tree planting in excess lead to risk of decrease of water resource in an average year | 2 3 | 10 | 2 3 5 | 04 | 1 2 4 | number of trees planted, annual average flow | LT |
| **15 BIODIVERSITY** | | | | | | | | |

The battery of indicators proposed for water resources in table 6 is not a sustainable development model. Furthermore, it must be completed by institutional information and elements of situational analysis (descriptors, cartography, etc.). Some of the situation analysis elements used for SDI interpretation are outlined below.

1. Physical constraint descriptors

Some descriptors describing the physical context supplement a system of conflict assessment indicators, referring to the natural and invariable constraints.

Mediterranean countries have always been confronted with shortage of because of its irregular availability in terms of time and space. A number of the descriptors illustrate this scarcity.

***Descriptors of constraints linked to water resources***

| Constraints | Basic data | Remarks | Indexes and variables |
|---|---|---|---|
| Theoretical water capital | mean annual runoff | physical flow of which only part can be exploited | total annual average flow (internal and external) |
| Natural irregularity and accessibility of resources | sum of annual regular runoff | risk of shortage at times in summer season | regular annual factor: regular runoff/mean annual runoff |
| Inter-annual irregularity in dry season | mean annual runoff of dry year with 10 years frequency | tendency towards aggravation of shortage | inter-annual regularity ratio: average runoff in dry year/average total runoff |
| Exploitability of renewable resources | runoff manageable according to certain practical and technico-economic criteria | theoretical reference value for development of water resource | availability ratio: exploitable runoff/total annual average runoff |
| Regularity (variable) | regular natural runoff, runoff regulated by dams | current reference value for managing the resource | regulation rate: sum of the regular and regulated runoff/average annual resources |

The concept of an exploitability factor is based on a number of common parameters including, in particular, different figures on the runoff, the cost of its development in terms of quantity (direct cost) and quality (adapting properties to demand), the technical possibilities for development, the minimum outflow to be guaranteed towards the sea and the flow-rate reserved for the environment.

Evaluating water resources is based upon the processing of hydrological data but is not confined to that sphere. The theme-based cartography on water resources offers situation information adapted to the needs of water development management planners. These items of cartographic data are: structural descriptions (hydrographic basins, aquifers, water courses), continuous regional variables applicable to part of the territory (average flow per unit of surface).

The exploitability of the water depends upon the quality criterion corresponding to the uses. Accordingly, an index of the local knowledge of the properties of water resources completes the analysis of the constraints to be taken into consideration. These qualitative aspects are evaluated by means of a set of variables measured at given points. This means that the cartography is an aggregate information support that is difficult to replace by a single evaluation in the form of a quantitative indicator.

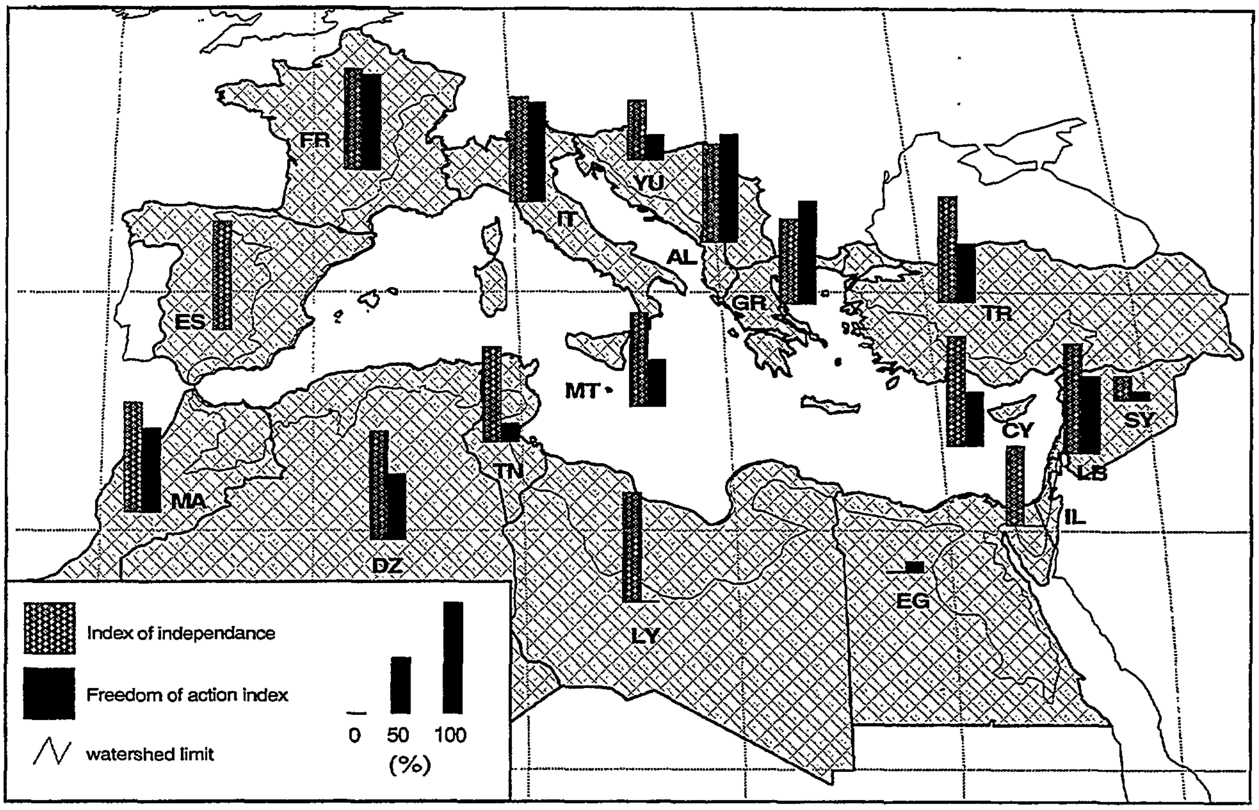
2. Geopolitical constraint descriptors

Some indicators are interesting because they present situations of dependence of certain countries with respect to other countries for their water supply, allowing international comparisons to be made. The situation of upstream or downstream countries with respect to the source of water can be described by the following indicators:

- the independence index, defined as the ratio of the internal renewable resources of a country to the theoretical renewable resources considered globally (internal + supplies from neighbouring countries). This illustrates the dependence of the country regarding its water supply with respect to countries located upstream.
- the freedom of action index, defined as the ratio of the average annual outflow to sea (not confluent to other neighbouring territories) to the total theoretical renewable resources. It gives a glimpse of the resources on which a country may draw freely, without affecting the supplies needed for countries located downstream.

An illustration of the hydro-political situation of the Mediterranean region is proposed in figure 2.

*Figure 2: Independence and freedom of action indexes at the national level, 1990*




3. <u>Qualitative descriptors of water resource management</u>

Every aspect connected to the management of water resources – distribution of responsibilities in water policy, legislative measures, price-related measures – are difficult to translate in the form of an aggregate indicator but their description is a qualitative evaluation tool needed for interpreting quantitative evaluation indicators.

4. <u>Descriptors concerning the development effort of the scientific knowledge base</u>

The evaluation of water resources is determined by the state of knowledge on which it is based and governed by questions that it attempts to answer. Reciprocally, the expected usefulness of the desired information motivates efforts towards the acquisition of data and the tailoring of the means, in particular financial, to this end.

Setting up monitoring and supervision stations is therefore an index of improved knowledge of water resources. The density of measurement networks in the watersheds of water courses and aquifers measures the

effort of knowledge of the resource management institutions. An indicator of the political response to the needs for knowledge can be illustrated by:
- the development of the monitoring system: numbers of measurement stations per $km^2$ of territory or number of piezometers per $km^2$,
- the development of human resources in charge of observation, analysis, information/training and research.

All these situation description elements are not IDSs but are rather complementary indications to a system of indicators.

The commented list of indicators in table 6 is not a system of indicators in itself. The selection of a structured and relevant IDS system has to correspond to concrete and specific goals (problem, actor, decision, geographical level, choice of measurable and dynamic tools). The choice of evaluation tools depends enormously upon the organization of the decision-making process for environmental matters and development, and on the participation of the actors specific to each country.

## 5.2. Examples of indicators specific to each actor

Not all of the indicators are useful for all the actors. MEDO is carrying out a study on the types of actors involved in the field of water in each of the Mediterranean countries. This analysis will make it possible to select the pertinent IDS systems for each of them.

In the meantime, we propose to illustrate, by a few examples, the diversity of the concerns and the need for information. This will outline the results to be expected after the theme-related analysis according to the methodology proposed in the introduction.

### *5.2.1. An international actor*

Donors base their choice of investments upon various types of information such as:
- knowledge of natural and social constraints of various countries (shortages, hydro-political conflict, etc.),
- knowledge of the quantitative and qualitative water problems of countries and their investment priorities,
- knowledge bases (means of follow-up, research, evaluation methods) to identify countries having reliable evaluation bases. The sizing of water development works is based upon these assessments, and so are the necessary investments,
- the technical, price-related and judicial means established by the various countries.

<u>Example 1: resources per inhabitant</u>
Some indicators represent constraints connected to the socio-economic context as is the case of resources per inhabitant which represents a tool for the classification of countries according to their water "wealth". An illustration is given below. Figure 3 is a schematic view of the regions in

the world where the situation in 1990 was tense. The Mediterranean basin appears as one of the world critical areas.

Forecast analysis, over the last few years, has been based upon the idea of a water poverty threshold or a "vital minimum" of water resources per inhabitant which, if crossed, would indicate a shortage. Such a threshold is essentially associated with the conception of minimum water requirements per capita but also involves an hypothesis regarding the mobilizable proportion of natural and renewable resources. The threshold of 1000 $m^3$/year/inhabitant, corresponding to a ceiling population of 1000 inhabitants per $m^3$/year of resources, proposed in 1986 by Swedish hydrologist Mrs. Falkenmark[17], is currently referred to by analysts and by several international organizations, including the FAO, and is widely spread by the media.

***Figure 3: Situation of the Mediterranean basin in the world in 1990***
*(Source: J. Margat, 1995)*

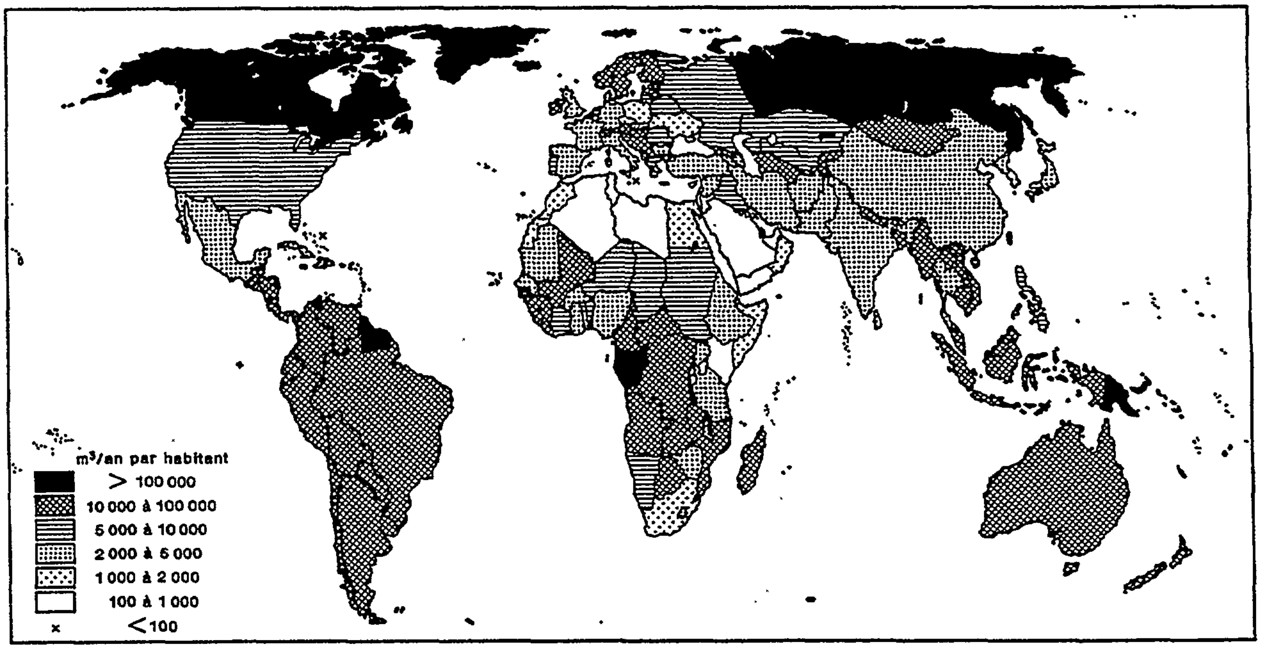



Figure 4 classifies the countries according to their demands per inhabitant and their wealth in water resources. Water is one of the most critical problems in the development of most of the Mediterranean countries, if only in terms of the investments needed for its mobilization in terms of quantity and quality.

[17] Falkenmark, M. & Widstrand, C. *Population and Water Resources: A delicate balance.* (Population Bulletin, 47, N°3, pp. 2-35, Population Reference Bureau, USA) 1992.

***Figure 4: Demand and wealth in water resources: the Mediterranean countries***

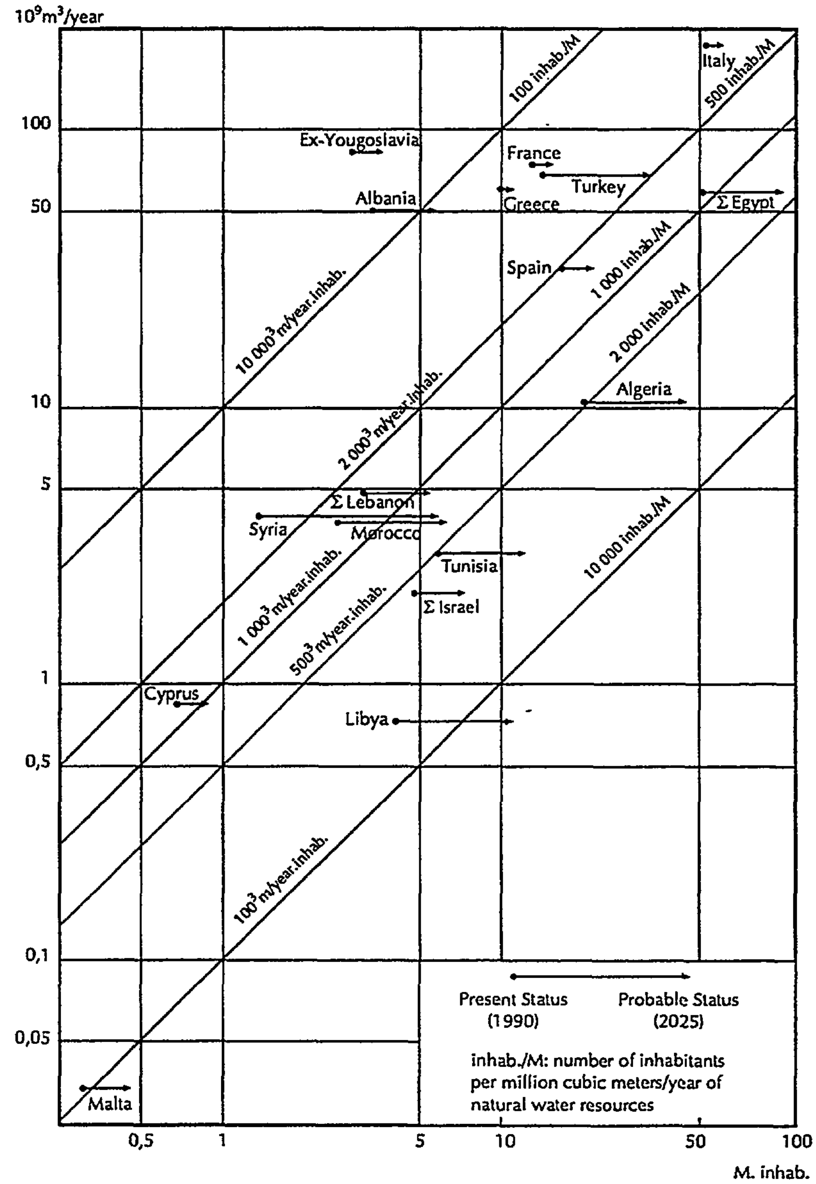
| Water Demands ($m^3$/year/inhab) | WATER WEALTH (Water resources in $m^3$/inhab) | | | | |
|---|---|---|---|---|---|
| | Very Poor **< 500** | Poor **500-2 000** | Quite Wealthy **2 000-10 000** | Wealthy **10 000-100 000** | Very Wealthy **> 100 000** |
| Very Low **<100** | Malta | | | | |
| Low **100-500** | Israel | Lebanon<br>Algeria<br>Marrocco | | | |
| Moderate **500-1 000** | | Cyprus<br>Syria<br>Tunisia | Spain<br>France<br>Italy<br>Greece<br>Turkey | Albania<br>ex-Yougoslavia | |
| High **1000-2000** | Libya | Egypt | | | |

Forecasts of the probable changes in water availabilities per inhabitant, as deduced from demographic projections, show a worsening of the pressures on these resources in the year 2025 (figure 5).

These forecasts cannot replace an analysis of demand, which depends not only upon populations but on many hypotheses organized in the form of scenario. The situations or forecasts of shortage are derived more from confrontations between supply and demand than from comparison of water resources per inhabitant projected to a "universal standard" value ratio. Shortage forecasts therefore refer to case by case analyses.

These thresholds can, at the very most, make us more aware of the increasing problems and of the need for efforts to resolve them, rather than to guide the method of programmeming or to orient demographic policies.

***Figure 5: Prospects applied to water resources according to an average growth hypothesis for 2025** (Source J. Margat, 1992).*




Legend: the vertical axis corresponds to the average flow of natural renewable water resource in km³/year while the horizontal axis is the population in million of inhabitants, both in logarithmic scale.

Note: water resources per capita and density of the population per unit of resource delimit the "zones" with acute growth in problems related to water and growing demand pressure over the water resources.

* according to Blue Plan median demographic projections

** only for those parts of the countries that are included in the Mediterranean catchment area.

Example 2: "wear index" (pressure index according to the water availability)

Some indicators synthetically represent qualitative pressure upon continental water resources as is the case of the "wear index" defined as the ratio between the sum of the restitutions (withdrawals – final water consumption) and the water availability after consumption (renewable resource – sum of final consumption).

This overall indicator depicts a wearing down of natural water quality. The main sectors of water "wear" are domestic and industrial. These areas dump considerable volumes of waste water into the natural environment. This index, as calculated for the watersheds, can be extended to the national level.

As an illustration, figures 6 and 7 show the wear indexes calculated nationally and for the Mediterranean watersheds of the various countries.

***Figure 6: Pressure index according to the water availability in the Mediterranean countries, in 1990***

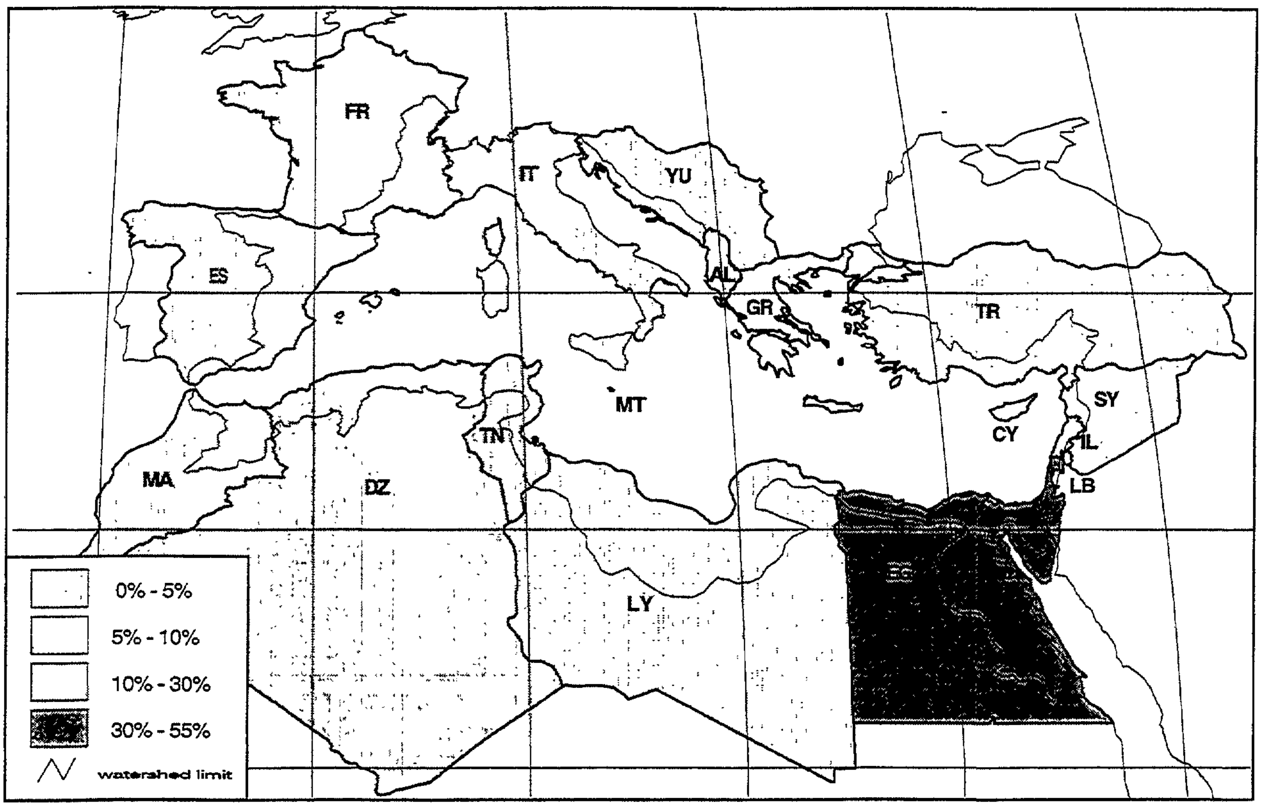
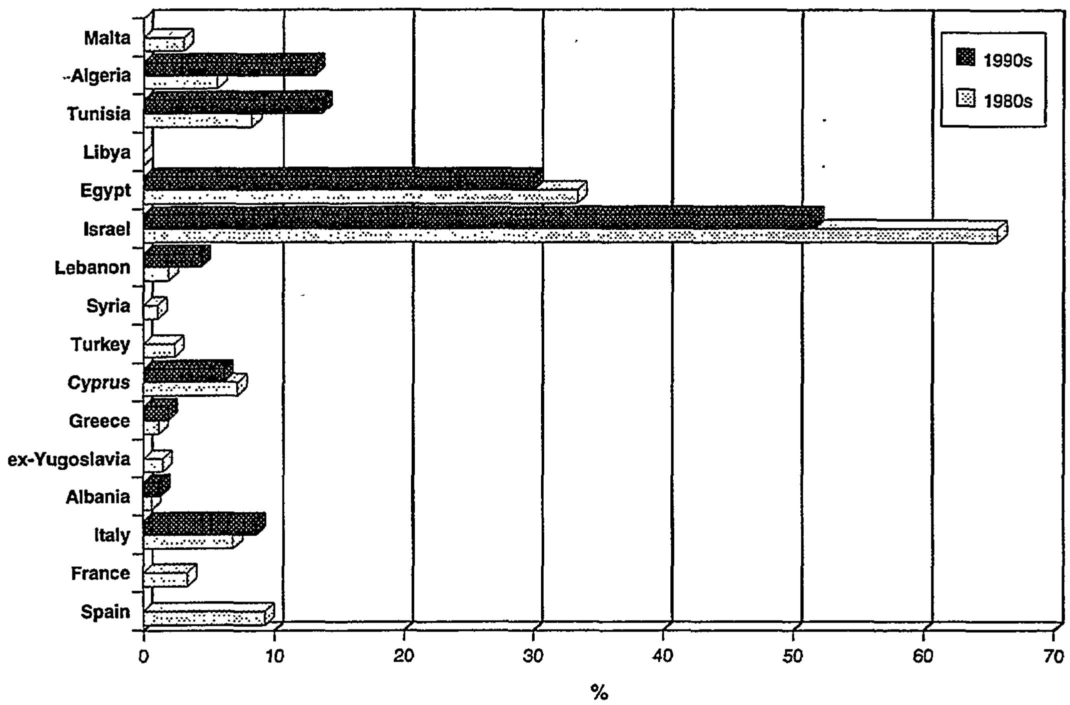


*Figure 7: Evolution of the pressure index according to the water availability in the Mediterranean watersheds*




A number of elements are useful to supplement the above, favouring the interpretation of pressure index according to water availability:

- the amount of discharged sewage returning into the natural environment, flowing directly into the sea. Discharge into the sea is considered as final consumption, consisting of water not returning into the natural environment. Therefore, the "wear index" is not relevant to islands where most of the waste water goes into the sea.
- the share of the demands covered by non-conventional water resources and the resulting discharge. The "wear index" is meaningless for countries where more than 50% of the demand, and therefore of the restitution, comes from non-conventional sources. Its interpretation is difficult in countries where 10 to 20% of the demand is covered by nonconventional sources.
- the share of dumping processed in a sewage treatment plant before being dumped into the natural environment. The degradation of water quality decreases as does the wear index. It is also indicative of a response to the problem of continental and coastal water degradation (if dumping is processed before actually being discharged into the sea).

This indicator does not take into consideration the treatment factor, limiting its range as regards international comparisons. It is possible to imagine a system of weighting the various waste water sources (domestic, industrial) by a waste water treatment coefficient before discharging into the natural environment. Nevertheless, this index offers an interesting breakthrough because it is multidimensional, distributive and reveals a cause and effect relationship (socio-economic pressure upon the resource).

### *5.2.2. An actor involved at the national level*

The Ministry of Agriculture is involved in water management in most of the Mediterranean countries. Among other things, it is responsible for agricultural and irrigation development programmes. It makes long-term investment and planning choices, defines provision criteria of between users (rights and dues) as part of the framework of the laws involved.

Certain items of information may guide it in its choices, in particular as regards:

- the population load to be satisfied and the increase in conflicts between utilization sectors,
- the emerging critical situation (shortage, safety risk) to define investment priorities and development areas in the medium and long term,
- the results of measurement networks as used for establishing standards,
- the performance in terms of specific policies or malfunctioning in order to evaluate the needs to reinforce the legislation.

Examples of useful indicators in decision-making are given below.

| Objectives | Example of decision aid indicators | Decisions |
|---|---|---|
| Policy and investment choice | The proportion of total resources consumed by withdrawals (exploitation index) is a due date indicator.<br>In the same way, the proportions of the drinking water supply between domestic and tourist users and the respective share of agricultural and urban needs in the future indicate a source of potential conflict | Decisions to transfer water, search for secondary sources... choices of development priorities |

Example 3: the distribution of uses in Tunisia

Some information allows the distribution of demand to be analyzed in a given country with respect to the national level, the Mediterranean basin level and the coastal level, and between different types of uses. This distribution of uses is illustrated with the example of Tunisia.

Figure 8 illustrates Tunisian demographic changes and shows that most of the people are in the Mediterranean basin and on the coast. Changes in demand per inhabitant in the country can be compared to those of the Mediterranean basin of that country. Figure 9 indicates that the water demand per inhabitant has been stable since around the 1980's.

Figure 10 indicates the significance of the agricultural sector in the country's water demand. The remaining water demand is shared between drinking water supply and direct withdrawals of industries in the natural environment (statistics for this particular industry sector, not connected to the distribution network, are unavailable).

With the upsurge of cities, industry and tourism, the inequality of social actors has become more pronounced with respect to access to water. Industry and tourism are significant in terms of the investments they require and their strategic role in the country's economy. Accordingly, industrial and urban consumption (including the tourist demand) was evaluated at 270 $hm^3$/year in 1990 by the General Directorate for Water Resources. A rapid increase in the demand for drinking water as a priority can be observed (figure 11) which is costly to meet, because it is remote from the resource areas.

Faced with this change in the need for water and space, irrigated agriculture is threatened and conflicts can only increase, in particular during high seasons, with the peak demand of tourism.

***Figure 8: Evolution of population since 1956***

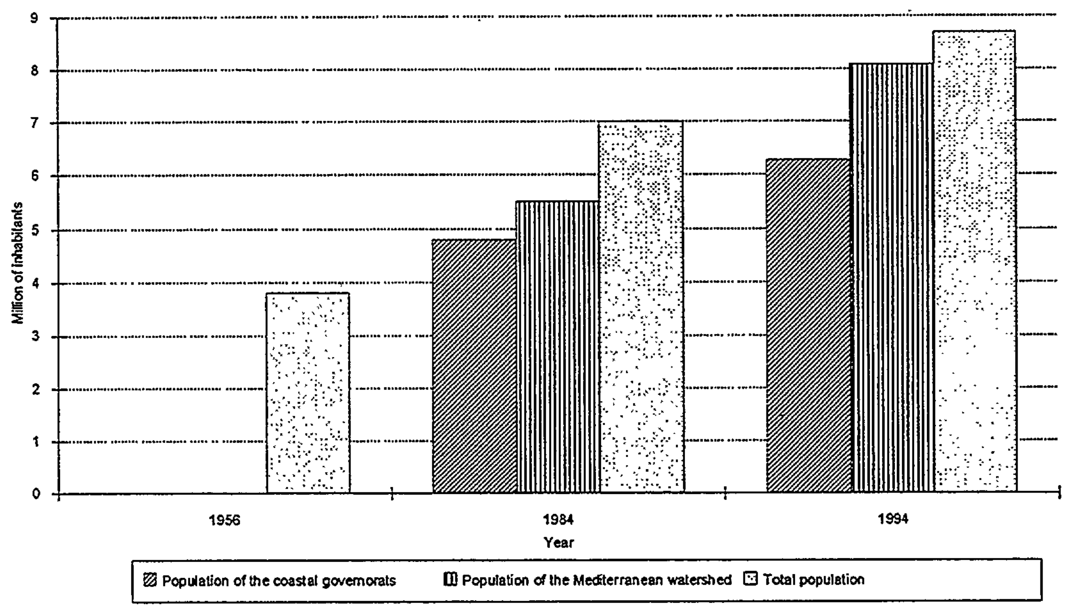
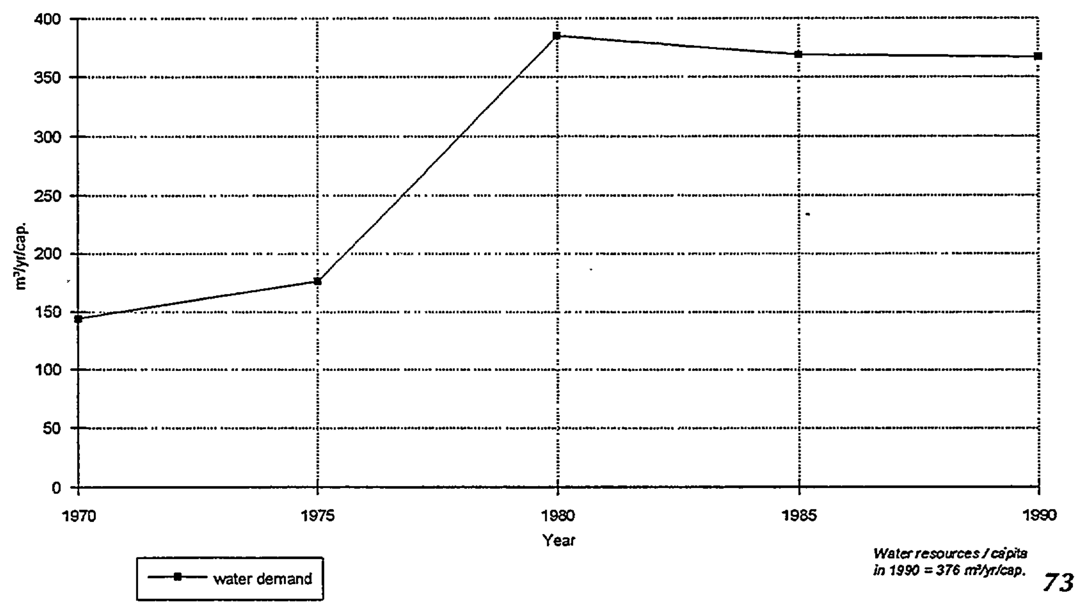



***Figure 9: Evolution of water demand per capita in Tunisia (all types of usages included)*** *(no evolving data for the Tunisian Mediterranean watershed).*




*Water resources / capita in 1990 = 376 m³/yr/cap.*

*Figure 10: Evolution os sectoral water demand in Tunisia*

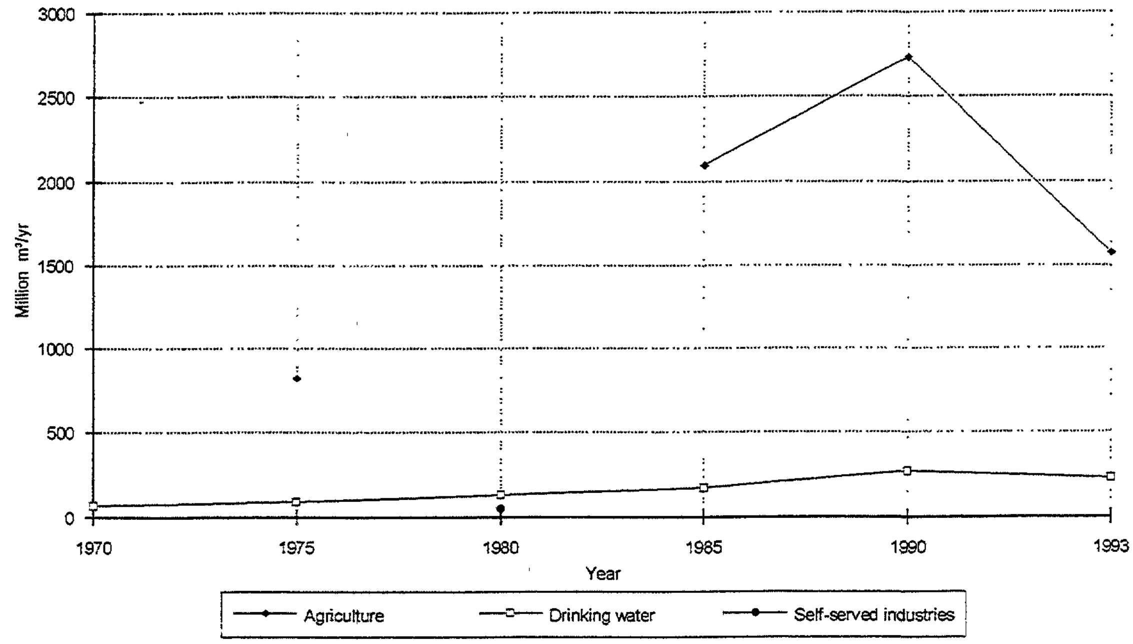
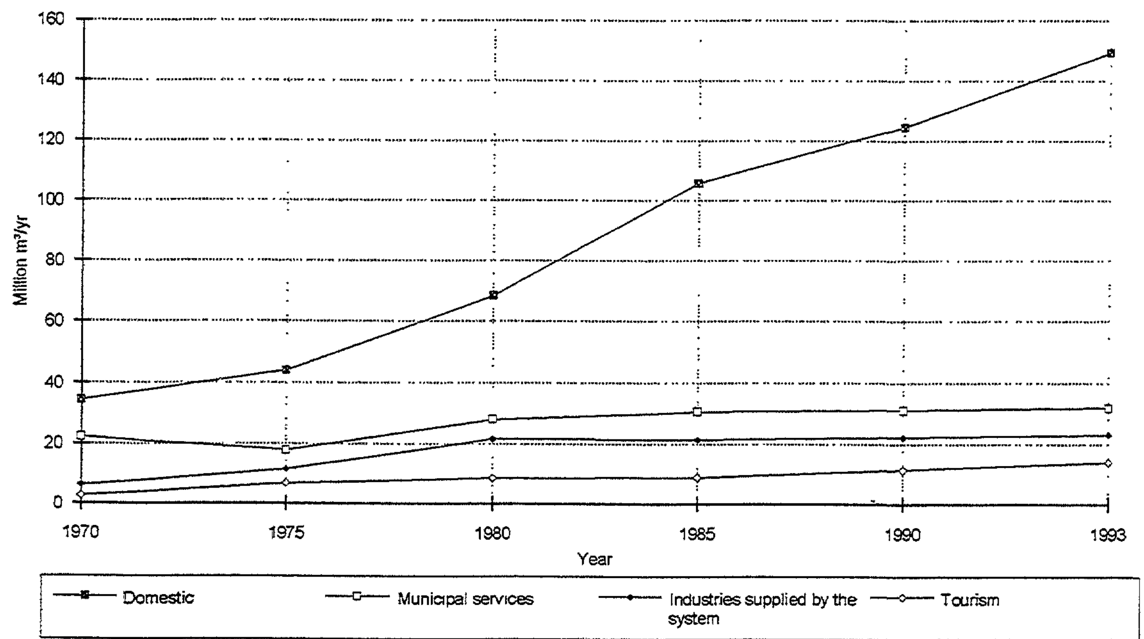



*Figure 11: Evolution of drinking water demand by sector in Tunisia*



### *5.2.3. An actor involved at the watershed level*

Let us look at the example of a watershed management structure (basin agency type). A basin agency may deal with evaluating the water resources of its territory, managing its capture and distribution, participating in improvement work on water systems, water courses, controlling water quality, managing the economic aspect of water (payment for services, financial incitation towards treatment), research and training of the public.

Therefore, it does more economic management than political work. The necessary information should help it cope with certain management objectives in the short term. This administration has to be able to manage problems of individual and structural shortages requiring arbitration or action. Therefore, among other things, information about the following is useful:

- risks of water supply shortage for irrigation, risks of water resource failure during the dry season (tourist period),
- risks of contamination due to polluting activity and the degradation of the available water resources,
- the effects of technical and economic measures (financial incitations) on user behaviour.

An example of a useful indicator for orienting the various decisions is shown below:

| **Objectives** | **Example of decision aid indicators** | **Decisions** |
|---|---|---|
| Management and arbitration | The distribution of the final consumption of water between the various sectors and the proportion of discharges attributed to them indicates pressure upon resource | Application of incitation measures as defined within a law framework (tariff, pollution fee measures) |

### *5.2.4. An actor of the local level*

The local level concerns individual users (industries) or grouped users (municipalities, user groups). It is at this level that technical aspects are most prevalent. Servicing, operation and sometimes even the development of hydraulic infrastructure are controlled at this level. Technicity may possibly be completed by administrative, economic and even legal aspects when it concerns local water resources (coastal aquifers).

This level varies from one country to another, although, in general, it almost always concerns the communities, they may or may not be put in charge of the work and the associations grouping them together may be attributed responsabilities concerning water resources. This responsabilities can be extended to the actual realisation of equipments: this is the case for Tunisian and Moroccan water unions and the watering unions in Spain.

The municipal political authorities in coastal areas are particularly sensitive, among other things, to indications concerning:

- risks related to sanitary or supply faults indicating that the treatment conditions are insufficient,
- risks of short term or long term saturation of the distribution network in relation with the expected increase in demand (according to a standard of consumption per inhabitant) that may lead to equipment decisions being made,
- signs of water saving by users. Reduced wastage will cut down on production costs and those of distribution in the municipalities.

The example below is a useful indicator for decision-making:

| Objectives | Example of decision aid indicators | Decisions |
|---|---|---|
| Water distribution in urban and periurban areas | The percentage of waste water reused in urban areas indicates an integrated management effort having an effect on the demand (by supplying both a secondary source for periurban irrigation) and on the resource (by reducing water discharge at sea and in the natural environment). | Decisions for treatment and processing equipment |

### *5.2.5. An actor at the coastal level*

Analysis of the actors interplay in a coastal configuration is important for Blue Plan's systemic and prospective analyses. The coastal development programmes (PAC), as produced by the MAP in various locations around the Mediterranean, are aimed at the integrated and sustainable development of those coastal areas. A system of indicators in the coastal region will be relevant to help developers, depending upon the constraints of the zone. This will be the subject of a specific study for each country and for each area committed to a PAC, using the analysis grid proposed in table 6.

All these examples show how diverse the information needs actually are. We need to identify and understand the various users to which ISDs are addressed, and the means of using them to inform these users.

## Conclusion

The develoment of indicators for sustainable development for Mediterranean countries is an enormous, meticulous and complex task, as shown by the methodology developed at MEDO and the initiation of its application for water resources.

Indeed, it is at the centre of:
- scientific research in a multitude of subject areas,
- field measurement, gathering and data processing programmes on the widest scale,
- precise knowledge of social, economic, environmental and institutional conditions prevailing in each country of the Mediterranean basin,
- and the systemic analysis and cross-interpretation capability concerning data and phenomena.

After a great deal of work, it will provide a system of indicators that are both short and easily understandable, feasible and reliable, cross-referred and particularly significant for each of the potential users, if possible when considered separately.

The success of this work will be measured by a particularly simple indicator: the effective and regular use of this system of indicators by as many actors as possible, at every possible geographical level and at every link in the decision and action chain.

This work of establishing ISDs, in particular the MEDO theme-related analyses, draws on all the methods and basic tools now being developed at MEDO, and on the more operational tasks that they are also carrying out. It has to be extensively multidisciplinary and particularly rigorous, sometimes calling for theoretical diversions such as those concerning the sustainable development concept used as a subject of scientific analyses.

It also involves extensive work as a network: network of scientific partners, international institutions, national and local Mediterranean partners, etc., more particularly to gradually validate the progress of the work. This is also the reason for the distribution of the present results, as yet incomplete, resulting from the thematic analysis that MEDO is carrying out into water resources.

Thus, its success depends upon the full co-operation of the BP/RAC partners during its development, then the adoption of the results by actors working on sustainable development in the Mediterranean and, more particularly, by actors living in Mediterranean countries.

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Mediterranean Action Plan
Regional Activity Centre for the Blue Plan

UNEP

# Observation and evaluation of environment and development in the Mediterranean (Preparatory phase)

Ninth Ordinary Meeting of the Contracting Parties to the Convention for the Protection of the Mediterranean Sea against Pollution and its related protocols

Barcelona, 5-10 june 1995

UNEP(OCA)/MED IG.5/Inf.5
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Original : FRENCH

1 The Mediterranean Environment and Development Observatory function

2 From problematics to indicators: water as an example

**3 Environmental institutions in the Mediterranean countries**

4 Follow-up of Agenda 21 for the Mediterranean countries

5 Methods and tools

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# Environmental institutions in the Mediterranean countries

## Contents

# Introduction

"The ability of a country to follow sustainable development paths is determined to a large extent by the capacity of its people and its institutions as well as by its ecological and geographical conditions. Specifically, capacity-building encompasses the country's human, scientific, technological, organizational, institutional and resource capabilities" *(Agenda 21, chapter 37 : National mechanisms and international cooperation for capacity-building in developing countries).*

Blue Plan's approach aiming to assist Mediterranean countries measure progress accomplished towards sustainable development, covers several fields of action. One of the major fields entails defining environmental and sustainable development indicators as elements of a common language. Indicators are currently being prepared which might orientate national environmental strategies in the Mediterranean basin.

However, all aspects of sustainable development can not be limited to their sole quantitative dimension. Indicators, which are, by definition, quantifiable elements, do not lead to an understanding of aspects inherent to choices of societies or nation states, of the way in which administrative authorities are organized, of specific perceptions of environment proprer to the countries. This is why indicator systems must be completed by qualitative information. The approach then becomes global. It not only covers socio-economic and environmental issues but also the institutional dimension since institutions are largely responsible for the success or failure of actions envisaged for environment and development.

The word "institutions"is used here in its widest sense. It covers institutional capacity of nation states to implement policies - ministries and governmental agencies - as well as the policy making process and the application means. The concept may also include the ways of people and territory participation by means of political (public local authorities) and non-political representative bodies (NGOs, professional associations).

The institutional approach then constitutes a major field of work in the deepening of the Blue Plan's general approach currently being undertaken. Most of the measures recommended in the Blue Plan's report *(Futures of the Mediterranean basin, Oxford University Press, 1989)* involved the role of the nation state. It had been demonstrated 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..."

Five years after publication, and two years after the Earth Summit of Rio, an institutional study program has been initiated at the Blue Plan. It is intended to identify keys for a better understanding of the evolution trends of the emerging environmental policies in the Mediterranean basin. At the same time, it seeks to improve knowledge on the decision-making bodies governing the various geographical units in the different Mediterranean countries.

### First phase: Mediterranean Institutional Country Profiles

The study program has begun by drawing up national monographies describing the diversity of contexts and existing institutions as well as the constraints and concerns proprer to each country. It is inspired, among other sources, by the OECD's Program of environmental performance reviews, implemented in 1991. The *Mediterranean Country Profiles: Institutions - Environment - Development* are one of the first provisionnal results of the study program. Some exemples of these national monographies are distributed during the Ninth Meeting of the Contracting Parties in Barcelona.

Each *Profile* is structured as follows:
- the first section recalls the geographical context of the country and its natural resources,
- the second section deals with the social and economic context, the main human activities and their impact on the environment,
- the third section describes the main public actors who are directly or indirectly involved in environmental issues, their fields of action and means, as well as the responses found to environmental concerns (planning, programs, legislation, international cooperation).

While the presentation of the various contexts is largely based on quantitative data, the institutional aspects are founded on qualitative information. The emphasis is put on initial conditions of reference, role distribution, aims, commitments, constraints.

Within the framework of MEDO activities, the Blue Plan encourages and assists national institutions in the Mediterranean basin to develop similar observation-evaluation functions in their respective countries. A technical and scientific partnership as well as a network of national environment observatories are set up, such as those existing or planned in Morocco, Tunisia, Turkey, Albania and France. This is why the first *Profiles* established refer to those five countries.

### Second phase: Comparative study of national institutional situations

On the basis of the national monographies, a comparative study of national institutional situations is being undertaken, and the first results are presented in this Fascicle n° 3.

This study, by no means exhaustive, notes how the implementation of environmental policies over the last two decades has changed the Mediterranean institutional landscape. It suggests items for reflexion, at the Mediterranean basin scale, to all those interested in following up national policies within a sustainable development perspective and to the Mediterranean decision-makers, who are directly concerned by the implementation of these policies and the related tools for environmental policies, i.e. observation, knowledge and evaluation.

The analysis undertaken initially emphasizes the role of public actors, mainly the nation state and sub-national public communities. "The responsibility for bringing about changes lies with Governments in partnership with the private sector and local authorities, and in collaboration with national, regional and international organizations [...] National plans, goals and objectives, national rules, regulations and law, and the specific situations in which different countries are placed are the overall framework in which such integration takes place... The overall objective is to improve or restructure the decision-making process so that consideration of socio-economic and environmental issues if fully integrated and a broader range of public participation assured" *(Agenda 21, chapter 8: Integrating environment and development in decision-making).*

Four issues, having been developed by MEDO institutional study program until now, will be dealt with:

- environmental central authorities in the Mediterranean countries,
- the role of autonomous agencies in the implementation of environmental policies,
- breakdown of environmental authority between the state and sub-national territorial units,
- national planning and trends towards sustainable development.

The comparisons to be made here do not aim at finding one or more models. The objective is to highlight means by which highly diverse situations can be better understood. Besides, it is difficult to avoid in the comparisons the distorsions resulting from specific cultural identities, different levels of development or administrative traditions shaped by national history and culture.

Out of the four above items, the most extensively dealt with is that one relative to the breakdown of roles between the states and the decentralized entities. It is here that the historical heritage mostly comes into play.

This intermediate report constitutes a first attempt of a global institutional approach at the Mediterranean scale. OMED current institutional study program will be enriched by work involving other aspects (legislative framework, international cooperation, environmental and sectoral policies, role of NGOs and other actors...) as well as by contributions from national and local Mediterranean actors.

# 1. Environmental central authorities

In most industrialized countries, environmental policies were only developed twenty years ago, while in the Southern countries they are even more recent. The implementation of environmental policies encounters difficulties which stem from their relative specificity in comparison with traditional administrative action, on the other hand, from the fact that environmental action is transversal and thus enhances difficulties in organizing public actions.

Between 1970 and 1990, national environmental policies in the Mediterranean basin have mainly consisted in preparing rules and setting up an environmental central authority as well as specialized agencies.

The creation of a Ministry of the Environment is the most visible sign of a political concern about environmental issues.

Initially, these ministries, or their equivalent bodies, are most often responsible for coordinating the different ministerial efforts and for grouping together separate services invested with environmental responsibilities. Over time - and after some conflicts over authority - they gain in importance by extending their field of responsibility and by obtaining more significant means.

Difficulties in the insertion of the ministry of environment in the central administration make this solution relatively instablé. In France, the core of an environmental policy has been constituted progressively, from 1971 to 1995, in a ministry in charge of the environment. About twenty Ministers and State Secretaries have followed one another to reinforce and optimize environmental structures in ministries which would have lend to dilute the concept of Environment in associating it with those of Culture, Quality of Life or Capital Works.

In the other countries of the Mediterranean Basin, awareness of the need to create a central authority or administrative services specifically responsible for environment-related issues, also appeared in the 70s. However, most ministries of the environment have been created fairly recently. And, as shown in the chart, all Mediterranean countries have not made the same choice.

The field of responsibility of the authorities involved is very briefly described in our chart. It rather corresponds to what is stated by legislation in each country. The analysis should be deepened in order to understand the real practice in the different countries so as to identify the major directions of administrative actions. However, this is not the object of this initial report. In any case, the underlying concept or concepts of environment are closely linked to the possible associations between environment and other governmental reponsibilities. Despite the diversity of situations, three institutional configurations can be observed.

***Central environmental authorities in the Mediterranean countries***

| *Institutions* <br><br> *Country* | *Central Authority* | *Date of creation*[1] | *Environmental structure attached to central authority* | *Fields of action* |
|---|---|---|---|---|
| Spain | Ministère des Travaux Publics, des Transports et de l'Environnement | (1977) <br> 1990 | Secrétariat à l'Environnement et au Logement | National coordination, environmental planning, outline-legislation <br> Protection of natural environment |
| France | Ministère de l'Environnement | 1971 | | Legislation, regulations, coordination, supervision and management. <br> Hazards and risks,natural resources, landscapes |
| Monaco | Ministère d'Etat, Département des travaux publics et des affaires sociales | | Service de l'Environnement | Management of Urban Environment, protection of marine environment, scientific research. <br> Urban environment, coastal zone |
| Italy | Ministry of the Environment | 1992 | | National coordination and planning, outline-legislation, approval of regional plans, supervision. <br> Creation and management of national parks, of natural and marine reserves |
| Malta | Ministry of the Environment | 1992 | | Planning, regulations <br> Pollution prevention |
| Slovenia | Ministry of Environmental Protection and Physical Planning | 1992 | State Secretariat for the Environment | Legislation, planning environmental policy |
| Croatia | Ministry of Civil Engineering and Environmental Protection | 1992 | Department of Protection of Environment Nature and Natural Heritage | Policy-making, legislation and regulation, ministerial coordination <br> Protection of Nature |
| Bosnia-Herzegovina | Ministry of the Environment | 1994 | | Coordination of policies at national level |
| Albania | Ministry of Health and Environmental Protection | (1985) <br> 1992 | Committee for Environmental Protection (CEP) | Interministerial coordination and planning, regulation <br> Hazards,Protection of Nature |
| Greece | Ministry for the Environment, Physical Planning and Public Works | (1976) <br> 1980 | Department of Environment | Planning, national coordination and supervision <br> Air pollution, land use planning, natural and cultural heritage |
| Turkey | Ministry of Environment | (1978) <br> 1991 | | Coordination, planning, legislation,supervision <br> Prevention of pollution, environmental protection, management of specially protected areas |

[1] The dates between brackets correspond to the implementation of the first administrative departments in charge of the environment. The other dates correspond to the date of creation of the present central authority for the environment.

| Institutions<br><br>Country | Central Authority | Date of creation | Environmental structure attached to central authority | Fields of action |
|---|---|---|---|---|
| Cyprus | Ministry of Agriculture, Natural Resources and Environment | 1981 | Environmental Conservation Service | Coordination of public programs, policy implementation, impact surveys |
| Syria | Ministry of State for Environmental Affairs | | | Implementation of global policies, regulations<br>Impact of pollution and biodiversity conservation |
| Lebanon | Ministère d'Etat à l'Environnement | 1990 | | National policy-making, resource management, international cooperation |
| Israel | Ministry of the Environment | (1973)<br><br>1982 | | Planning, coordination, legislation, regulation, management, supervision<br>Preservation of nature, pollution control, living environment |
| Egypt | Ministry of Cabinet Affairs Administrative Development and Environment | 1982 | Egyptian Environmental Affairs Agency | Interministerial coordination, planning,legislation<br>Protected areas, hazards, urban environment |
| Libya | Ministry of Public Works | 1984 | Technical Centre for Environmental Protection | - |
| Tunisia | Ministère de l'Environnement et de l'Aménagement du Territoire | 1991 | | Planning, legislation, regulation, coordination, supervision<br>Pollution control, land use planning, urban environment, promotion of nature conservation |
| Algeria | Ministère de l'Intérieur, des Collectivités locales, de l'Environnement et de la Réforme Administrative | (1975)<br><br>1989 | Direction Générale de l'Environnement | Planning and coordination, research, management<br>Land use planning, pollution control, nature conservation |
| Morocco | Ministère de l'Environnement | (1972)<br>1995 | | Policy-making, interministerial coordination, scientific research and information on the environment |

First, the system of autonomous ministries for the environment. Nine countries have rendered full independence to such environmental bodies : France, Italy, Malta, Bosnia-Herzegovina, Turkey, Syria, Lebanon, Israel, and very recently, Morocco.

In nine other countries, the environmental responsibility is exercised at a ministerial level but it coexists with other sectorial responsibilities. The association sometimes involves Public Works (Spain, Croatia, Greece), or Land Use Planning (Slovenia, Greece, Tunisia), or Agriculture (Cyprus) or

Health (Albania). In Egypt and in Algeria, the Environment is associated, within the same ministry, with more traditional public services.

Finally, in Lybia and Monaco, the governance of the environment is a matter of a subordinate unit under the authority of a traditional ministry (public works).

A comparison of the means available to each central authority could prove useful. The information at our disposal at this time concerning budgets and staff, is not yet sufficient to allow such a study. Furthermore, the budget itself is too imprecise a measure to compare the efforts of the Northern and Southern countries. The indicator can be useful when comparing European countries for example. But in the Southern countries, bilateral and multilateral cooperation must be taken into account, because of their importance in the implementation of environmental programs and projects. The same holds true of development actions. On the other hand, a much more relevant indicator relates to specialized agencies dependant on ministries of environment, since they constitute effective means of action. This point is further discussed in chapter 2 of this document.

Environmental administration, whether under the authority of a ministry for the environment or of a traditional ministry, essentially include bodies in charge of coordination, preparing legislation and regulations, undertaking research.

The global coordination function as the main mission endowed to some ministries expresses a specific approach of relationships between environment and development. This might be the expression of the view that it is not possible to define the environment as a sector which can be relatively isolated from public business. In this perspective, rather than creating a specialized sectorial authority, the targeted objective is that all sectorial administrations internalize environment-related concerns.

This concept integrates environmental and resource management issues with developmental options at the top degree of decision-making. But it implies a risk: the desired integration may remain theoretical. Indeed, there is often a conflict within the ministries in charge of development and economic issues, between their role as resource enhancers on the one hand, and protectors of the environment on the other. Due to the ministries' long-standing tradition in the field of resource enhancement as well as their favorable attitude towards development or rather, towards rapid growth, they spontaneously tend to place their environmental responsibilities after their first duties.

Consequently, the problem is to avoid under-appreciating the determinations bearing upon the behavior of public and private actors. According to Olivier Godard, "in the present economic situation, protection of the environment and implementation of sustainable resource management methods imply a constant battle against trends and mechanisms inherent to the organization of the market economy or to the administrative action. We can then think that the word coordination is not strong enough to describe what should be implemented."

As stated in Agenda Med 21 : "It is not sufficient to establish a body reponsible for environmental matters. The existing structures must integrate environmental aspects into their political and operational development decisions... Each state of the Mediterranean is asked to [...] make sure environment protection is systematically borne in mind when decisions are made on economic, tax, energy, social, commercial, transport and other policies" (*chapter 8,* already quoted).

### Fragmentation of environmental responsibility

The creation of a ministry for the environment can therefore only be just one aspect of the institutionalization of environmental policies. Its field of authority can only be limited in view of all public decisions involving the environment. On the one hand, some services, possessive of their competence, successfully resist the efforts to delegate their missions to the ministry for the environment. The result of this situation is an unavoidable spread of environmental responsibiliity amongst ministries, and within the ministries themselves, amongst services. Furthermore, much environmental competence is involved in wider-ranging policies, such as land use planning, urbanization, capital works, transports, agriculture, health, which could not be entrusted to the ministry for the environment without its then absorbing most governmental fields of authority.

In fact, no country has a central organization with the exclusive authority to define and implement complete environmental protection policies, not even countries where there is a ministry of the environment. In all Mediterranean basin countries, environmental authority is spread about several ministries : agriculture, capital works, industry, health, interior, merchant navy. Furthermore, in several cases, the role of ministries for the environment is limited to defining the general directions and ensuring coordination, whereas regulatory authority is entrusted to long-standing ministries.

The fragmentation of authority is particularly evident when it involves implementing policies in narrow fields. In the case of forest protection, most Mediterranean countries have an important number of organizations whose heads have difficulty harmonizing, when they rarely meet, the ways of forest use and conservation. In the case of natural sites such as coastlines, there is also a compartmentalization between the institutions in charge of promoting resources and those in charge of nature protection. Between 75 and 100% of the Mediterranean linear coastlines do not benefit from protection, which means that most coastal areas are submitted to careless use from multiple actors, impervious to environmental protection.

The spread of authority appears very clearly in the field of water policy. Three examples follow hereunder.

***France.*** The ministry for the Environment is responsible for coordinating water policy with the aid of its basin agencies; but some other ministries are in charge of specific forms of water use: Health for drinking water, Agriculture for farming water and rural land, the Interior for territorial collectivities and civil protection, Industry for water supply and energy production...

***Turkey.*** At least four ministries play a role in water management policies. The ministry of Public Works plays a major role in the field of water resource management and implements its policies through two large organizations under its authority. In cities of over 100,000 inhabitants, the General Directorate of State Hydraulic Works is in charge of resource development and of long-term supply of drinking, utility and industrial water. The Bank of Provinces is responsible for planning sewerage and wastewater treatment plants in cities with fewer than 100,000 inhabitants. The ministry for Agriculture in turn, is responsible for developing water resources, irrigation and supplying drinking water to rural areas. The ministry of Health controls and supervises the quality of drinking and bathing water. The ministry of Energy, through its specialized agency, intervenes in the building of large dams and energy production plants.

*Morocco.* The ministry of Public Works is in charge of planning, water resource management, drinking water supply and control of water quality. Three other ministries are also involved: Agriculture in the implementation of water management policies, the Interior in the supervision of local collectivities in charge of drinking water supply, the Environment and again Public Works for control of drinking and bathing water quality.

The fragmentation of authority can be explained not only by the usual reluctance of administrations in charge of a specific field of action, refusing that their prerogatives be limited, but also, at least in some cases, by the deliberate will of political authorities to maintain task separation. In countries where water resources are scarce, water policies have an impact on economic growth; if powers in this field were concentrated, the responsible body would derive considerable amount of power from this situation, which is something authorities wish to avoid *(Cherot, Roux, 1988).*

**Interministerial coordination bodies in the environmental field**

"Governments, in cooperation, where appropriate, with international organizations, should strengthen national institutional capability and capacity to integrate social, economic, developmental and environmental issues at all levels of development decision-making and implementation. Attention should be given to moving away from narrow sectoral approaches and progressing towards full cross-sectoral coordination and cooperation" *(Agenda 21, chapter 8,* already quoted*).*

Functional and sectorial breakdown of environmental administrative authority requires a considerable coordinating effort to deal with the interdependence among the numerous artificially separated units. Firstly, it is necessary to implement what is generally known as horizontal integration.

Within a context underscored by an organization based on a sectorial breakdown (and territorial breakdown, cf. Chapter n° 3 of this document), coordination tasks can be carried out differently, either by creating specific bodies (an interministerial commission), by initiating hierarchical relationships between different administrative units, or by much more flexible and more or less informal procedures for exchanging and updating information (appointing an advisory committee or scheduling regular meetings between the representatives of different departments to examine issues of land or water management for example).

Action for the environment is, almost by definition, transversal. Thus, the environmental protection policies can not do without coordination at the interministerial level. All countries of the Mediterranean basin have set up interministerial committees or commissions for the environment, mostly under the authority of the Prime Minister.

However, administrations have been reluctant and have thus curtailed the efficiency of these coordinating bodies. In almost every case, these bodies' functions have been progressively weakened in actual practice. Instead of a means by which a policy of harmonization and integration can prevail, these bodies may become the arena for confrontation of sectorial approaches and of the interests represented by the different ministries.

As a matter of fact, sectorial administrations are reluctant, and maybe unable, to take on responsibility for interministerial options. "There may be a striking contrast between the efficiency displayed by sectorial administrative units in carrying out their own exclusive missions and the inertia with which they take responsibility for truly intersectorial missions. What seems to characterize the behavior of sectorial units is a sectorial integration pretending to be global. For example, officers of the Capital Works or Agriculture ministries often consider that they have always taken into account environmental concerns, even prior to the creation of the ministry for the Environment, while they obviously demonstrate different ideas on the subject" *(Godard, 1980).*

***Interministerial bodies in charge of coordinating environmental action (some examples)***

| ***Country*** | | ***Date of creation*** |
|---|---|---|
| Spain | Interministerial Commission for the Environment (CIMA)<br>*Environmental Advisory Council* | 1977 |
| France | Conseil national de la protection de la nature<br>Haut-comité de l'environnement<br>*Commission du Développement Durable* | <br>1982<br>1994 |
| Italy | *Commission for Global Environment* | 1992 |
| Greece | National Council for urbanization, land development and the environment<br>*Organizing Committee, National Strategy for Greek Nature* | 1976<br>1992 |
| Turkey | Council for the Environment<br>*Committee for the Implementation of Rio Agreements* | <br>under way |
| Egypt | Commission on Environmental Issues | 1982 |
| Libya | National Committee on Environmental Protection | 1984 |
| Tunisia | Commission nationale de l'environnement (CNE)<br>*Commission nationale pour le développement durable* | 1978<br>1993 |
| Morocco | Conseil national de l'environnement | 1974 |

Sources : Blue Plan, Earth Council, *Commissions in charge of Agenda 21 follow-up*

Since 1992, after the Rio Conference, many governments have joined forces to create a new generation of national committees, in charge of defining political action in compliance with Agenda 21. "Each of the states of the Mediterranean region should set up its National Committee on Sustainable Development, which should form the suitable framework of consultation for drawing up of Agenda 21 on the national scale; and ensure that [its] make-up is as representative as possible of all the components of civil society: central and local authorities, universities and research centres, trade and industry circles, professional organizations, national organizations, NGOs, etc."(*Agenda Med 21, chapter 37* already quoted).

In several Mediterranean countries, these new bodies have, among their members, representatives of the government, as well as of the private sector and of the civil society. According to the Earth Council, this is particularly the case in Spain, France, Italy, Tunisia...

It is to be hoped that the global visions inherent to this sort of structure, responsible for adjusting or even reshaping developmental options so as to include environmental concerns, will have significant impact on the major choices of public authorities in terms of economic development, and on the behavior of administrative agents who, in sectorial departments or at different territorial levels, should normally ensure the implementation of this global direction.

## 2. Autonomous bodies for the implementation of environmental policies

In addition to administrative services within a ministry, there exist other government bodies, more or less autonomous, being legal entities, with alloted means and resources. These bodies constitute the necessary and effective technical tools for a rational management of the environment, space and habitats.

In the Mediterranean basin countries, this institutional choice has been used for a long time in scientific research management concerning the environment among many other fields. There are also several semi-autonomous agencies under the authority of long-standing ministries (public works, agriculture...)

In the field of environment, the creation of this kind of bodies reflects the development of the administrative action. The importance of financial means available to them make these organizations a powerful means of stimulation and coordination of the entire system. Over and beyond budgets or staff at the ministry for the Environment, these agencies constitute a significant indicator as an accomplishment means of the ministries' missions.

The approach adopted by public authorities consists in setting up agencies responsible for the sectorial management of a specific field of resources or habitats, or for the transverse management of the environment. These agencies are in charge of leading and coordinating actions within a given environmental field. The solution makes possible to the Board of Administration of the autonomous organization, to ensure coordination and cooperation among several instances: ministries, territorial public communities, users, professional representatives.

In France, the number of government bodies is steadily growing. Eleven depend on the technical authority (non-exclusive) of the ministry for the environment. In the Mediterranean Basin, the most well known of them are the six *Agences de l'eau* (basin agencies) and the *Conservatoire de l'espace littoral et des rivages lacustres*. As regards water, Spain has similar structures for the management of hydrographic basins, the *Confederaciones Hidraulicas*, created in 1985. In the case of coastline protection, Tunisia has recently created the *Agence de protection du littoral*, inspired by the French body for coastline protection.

***Technical tools for the implementation of environmental protection policies (some examples)***

| *Country* | *Specialized agencies* | *Date of creation* | *Field of action* | *Staff* |
|---|---|---|---|---|
| ***France*** | Museum national d'histoire naturelle* | 1635 | conservation of natural heritage,research, distribution, museums | 2,000 |
| | Parcs nationaux | 1960 | 6 public agencies for national park management | |
| | Agences de l'eau (basin agencies) | 1964 | integrated management of hydrographic basins | 1,200 |
| | Office national des forêts* | 1965 | management of State and communal forests | 12,400 |
| | Office national de la chasse | 1972 | preservation and improvement of the cynegetic stock | 1,720 |
| | Conseil supérieur de la pêche | 1972 | preservation and improvement of the piscicultural stock and of the aquatic habitats | 760 |
| | Conservatoire de l'espace littoral et des rivages lacustres | 1975 | coastline protection through land ownership and land-use policies | 30 |
| | Agence de l'environnement et de la maîtrise de l'énergie (ADEME)* | 1990 | research and financial encouragements (waste, air and soil pollution, noise, clean technologies) | 600 |
| | Agence nationale pour la gestion des déchets radioactifs (ANDRA)* | 1991 | management of radioactive waste | |
| | Institut national de l'environnement industriel et des risques (INERIS)* | 1991 | research for prevention and limitation of industrial hazards, technical assistance to industry | 450 |
| | Institut français de l'environnement | 1991 | production of scientific and statistical data on environment | 40 |
| ***Italy*** | National agency for environmental protection (ANPA) | 1993 | promotion of research, environmental data, technical assistance in standard preparation | na |
| ***Albania*** | Committee for Environmental Protection (CEP) | 1991 | planning and coordination of national environmental policies | 25 |
| ***Turkey*** | Authority for Specially Protected Areas (ÖÇKK) | 1989 | conservation and use of natural habitats within specially protected areas | n.a. |
| ***Egypt*** | Egyptian Environmental Affairs Agency (EEAA) | 1982 | - environmental planning, coordination and regulations<br>- pollution control, land protection, nature conservation (protected areas) | n.a. |
| ***Tunisia*** | Office national d'assainissement (ONAS) | 1974 | operator for sewage, water pollution control, household and industrial waste waters, solid waste | 2800 |
| | Agence nationale de protection de l'environnement (ANPE) | 1991 | operator for all forms of pollution and hazard control, environment monitoring and control, financial encouragement | 62 |
| | Agence de protection du littoral (APROL) | 1994 | protection of sensitive natural coastlands through a land-use policy | n.a. |

**: Affiliated bodies with the ministry of the environment and other ministries*

There are other French environmental government bodies less well known: the public industrial and commercial bodies created from 1990 to 1991, dependant on the ministry of the Environment. Twenty years after its creation, having built up the necessary technical means to take on its responsibilities, the French ministry of the Environment has thus become a full-fledged ministry, covering the complete scope of its authority and ensuring its own management.

ADEME is an example of such a body: dependant on ministries in charge of Environment, Industry and Research, it is a research and expertise center, in charge of encouraging actors in the field of environment to promote clean technology, as well as information, training and advisory services for public or private entities. Its scope of action involves land and air pollution control as well as noise control, energy saving and promotion of renewable energies, limiting waste production.

Public industrial and commercial agencies are created in developing countries to ensure the management of major public services requiring heavy investments, such as sewage treatment, water production and supply. For instance, the two large governmental agencies in Turkey already mentioned (State Hydraulics Works and Bank of Provinces), ONEP (Office national de l'eau potable) in Morocco, ONAS and SONEDE (Société nationale d'exploitation et de distribution des eaux) in Tunisia...

Their status allows more flexible administrative and financial management: besides state subsidies, these organizations may have their own resources (service taxation, collection of control taxes, penalization of infringements...) and may receive external financial assistance resulting from bilateral and multilateral cooperation. This institutional arrangement works well and is often duplicated.

This option is also adopted to manage structures in charge of reinforcing, coordinating and stimulating the environmental policies of several Southern and Eastern Mediterranean countries, frequently even before the appearance of a ministry for the environment. This is the case of the following multifunctional agencies: CEP in Albania, EEAA in Egypt, ANPE in Tunisia.

In Tunisia, the scope of action of the ANPE has been redefined after the ministry was created. ANPE is the operator in charge of surveillance, control and awareness missions, and is more specifically involved in the control of all sources of pollution and hazards. In order to ensure pollution control and sanctions for environmental infringements, the agency has a group of experts and a legal department which follows up disputes in the courts.

## 3. Breakdown of environmental authority between the state and subnational territorial units

Agenda 21 invites countries to delegate "planning and management responsibilities to the lowest level of public authority consistent with effective action" (*chapter 8* already quoted).

"The overall objectives of endogenous capacity-building are to develop and improve national and related subregional and regional capacities and capabilities for sustainable development, with the involvement of the non-governmental sectors"(*chapter* 37 already quoted).

"Throughout the Mediterranean region, we have been witnessing the emergence of decentralisation and conferring of responsibilities upon local authorities. However, the methods and rate of progression differ from one country to another. Thus it would not be appropriate to propose common and uniform strategies for the approximately 3,000 municipalities on the Mediterranean littoral. However, in each country one could encourage the representatives of local authorities and local public institutions to play a more active part in the integrated management of the coastal areas and policies of sustainable development and environmental protection... Each state should involve the regions in the elaboration of national economic and social development plans"*(Agenda Med 21, chapter 28: Local authorities' initiatives in support of Agenda 21).*

For the Mediterranean basin countries, it is not possible to deal with the role played by the public subnational institutions in the implementation of environmental programs, without referring to the politico-administrative organization specific to the countries .

Since political regimes are heterogeneous, it has been decided to focus the analysis only on breakdown of responsibility between the central government and subnational territorial units. In order to better comprehend the dynamics at hand, the analysis deals with decentralisation, i.e., the transfer of responsibilities to elected autonomous authorities, and deconcentration, or handling over of some administrative authority to lower territorial administrative levels closer to the population.

The following chart shows the breakdown of responsibility between central authorities and subnational units in nine countries of the Mediterranean basin. The object is to highlight those factors which may lead to a better comprehension of the situations at hand. For example, we will see that the word "region"is in a way, a captive word, its meaning being different in the North or in the South of the basin. Behind this word with multiple meanings, lie the realities of Man, history and culture, separate from physical and economic reality.

Due to the diversity and complexity of national situations, only four levels are examined in order to facilitate comparisons. They correspond to the four levels of government existing today in decentralized countries: the nation state, the region, the province or department or governorate and the municipality[2].

***Territorial administrative units and sub-national communities in the Mediterranean basin countries** (nine examples)*

| **Nation state** | ***Intermediate units and communities*** | | ***Basic communities*** |
|---|---|---|---|
| ***Level 1*** | ***Level 2*** | ***Level 3*** | ***Level 4: the municipality*** |
| ***Northern basin countries*** | | | |
| Spain | 17 autonomous communities provided with legislative authority, elected local government (council, president, council members) and financial autonomy<br><br>Constitution of 1978<br><br>Average surface = 29,700 $km^2$ | 50 provinces with administrative autonomy; local authorities elected (province representatives) by indirect suffrage<br>Local tax system<br><br>Basic law on local status (1985)<br><br>Average surface = 9,730 $km^2$ | 8,000 communes with administrative autonomy; authorities elected (council and mayor) by direct suffrage<br>Local tax collection<br><br>Law of 1985 |
| France | 22 regions with elected authorities (regional councils)<br><br>Decentralisation laws (1982-1983)<br><br>Average surface = 24,800 $km^2$ | 96 deparments, public communities with elected authorities (general councils)<br><br>Average surface = 5,720 $km^2$ | 36,000 communes with local elected authorities (mayor) |
| Italy | 20 regions provided with political & administrative autonomy (legislative power) and elected regional councils<br>Limited financial autonomy<br><br>Constitution of 1948<br><br>Average surface = 15,000 $km^2$ | 103 provinces with statutory autonomy and elected local authorities<br><br>Law of 1990<br><br>Average surface = 3,170 $km^2$ | 8,100 communes with statutory autonomy and elected local authorities<br><br>Mayor elected since 1889<br>Law of 1990 |
| Greece | 13 regions being administrative districts for regional development planning:<br>- general secretary of the region is appointed by the ministry of Economy<br>- regional council (advisory role) composed of local representatives<br><br>Law of 1986<br><br>Average surface = 10,000 $km^2$ | 53 nomes, which are administrative districts<br>- the central body delegates a prefect to the nomes<br>- the prefectural conseil (advisory role) is composed of elected members and representatives of local professional associations<br><br>Average surface = 2,600 $km^2$ | 298 Demes or municipalities in the towns and 5728 communes: full-fledged communities, with local authorities elected by universal suffrage<br><br>Royal Decree of 1833, law of 1912, Code of 1954 Const. of 1975 |

2 These four levels correspond to national political and administrative organization. They do not always coincide with the levels defined by the European NUTS system (Nomenclatura of territorial units for statistics) where groups have been formed for statistics purposes. i.e. :
NUTS 1: German landers, groups of Italian regions, French economic and development zones...
NUTS 2 : Spanish autonomous communities, French regions, Italian regions, Greek development regions...
NUTS 3 : Spanish provinces, French departments, Italian provinces, Greek nomes...

| | | | |
|---|---|---|---|
| ***Eastern basin countries*** | | | |
| Albania | —— | 36 districts with elected authorities (executive councils)<br><br>Average surface = 800 $km^2$ | n.a. |
| Turkey | —— | 76 provinces where executive authority is detained by a delegate (governor) of the central government and legislative authority by and elected assembly<br><br>Average surface = 10,000 $km^2$ | 2027 municipalities in sites of over 2,000 inh. with elected authorities (mayor and council) Property taxes collected locally<br><br>Law of 1930, laws 3030 & 3194, law on municipal finance of 1981 |
| ***Southern basin countries*** | | | |
| Egypt | —— | 26 governorates where the main authority (governor) is appointed by the central authority<br><br>Average surface = 38,300 $km^2$ | .... municipalities with local councils |
| Tunisia | 6 development regions according to the national Scheme for land use planning, 1985<br><br>Average surface = 27,300 $km^2$ | 23 governorates with regional councils appointed by the central government<br><br>Organic law of 1989<br><br>Average surface = 6,700 $km^2$ | 246 communes, public communities with financial autonomy and elected local authorities (Municipal Council)<br><br>Law of 1975 |
| Morocco | 7 economic regions or deconcentrated administrative structures<br>Created in 1971 for economic planning and development, regions became local communities by the Constitution of 1992<br><br>Average surface = 65,000 $km^2$ | 43 provinces and prefectures with administrative and financial autonomy:<br>- Governor, delegated by central government<br>- provincial and prefectural elected assemblies<br><br>Dahir of 1963, Const.1972<br><br>Average surface = 10,600 $km^2$ | 1544 urban or rural communes, managed by an elected communal council<br><br>Const. 1972, Law of 1976 |

It would be not relevant to compare "average communities" since the concept in itself is not significant. However, a comparison should be made of their respective economic importance, populations and fields of authority, but such analysis extends beyond the scope of this initial study. Furthermore, this type of comparison is interesting in terms of the economics of geography, but not very meaningful when comparing public entities where the importance of history must be considerated. Consequently, the average dimensions of intermediate territorial units have been given only as indications. Their disparity is nonetheless striking. For level 2, the spread goes from 65,000 km2 in Morocco to 10,000 km2 for Greece. As for level 3, the range is equally large with two extremes: 800 km2 for Albania, 38,300 km2 for Egypt. The Egyptian governorates, due to their size, are comparable to the regions of the northern Mediterranean.

In the case of basic territorial units, the municipalities or communes, a sort of "common practice" can be highlighted. They are all full-fledged public communities, administratively independent.

On the other hand, the degree of self-government conferred to intermediate public communities allows to contrast the Eastern and Southern Mediterranean countries, where a more or less intense form of centralism prevails, with two Northern Mediterranean countries, Italy and Spain, where the regions benefit from extensive political and administrative autonomy. France is in the middle position, with its centralizing tradition, but having elected to transfer responsibility to the regions, departments and communes.

To better understand the diversity inherent to each situation, in terms of decentralization and deconcentration, we will successively describe five cases, clearly illustrating the different national dynamics.

## Political regionalization in Spain and Italy

In reaction to the Franquist regime and to fascism, both Spain and Italy adopted very flexible constitutions which grant wide-ranging regional autonomy. There would be a recognition of strong cultural, linguistic and geographical diversity .

### *Spain*

Spain's political unity, implemented at the dawn of Modern times (1492), included within the same political unit countries with greatly differing traditions, history, culture and sometimes, language. The centralizing efforts of the monarchy did not lead to the same degree of unification as in France and, except during generally prosperous periods, regionalistic trends remained very strongly in favor of autonomy or even independence *(Drain, 1993).*

Under Franco, the province was the basic district in the Spanish territory. This was modified in 1978. The solution in favor of autonomy had initially been designed to satisfy the demands of historical nationalities (Catalonia, Basque country, Galicia), but in the end, it was extended to the entire territory, divided into 17 *Comunidades autonomas*, regional entities endowed with legislative and executive powers, mostly shared with central government. The administrative decentralization was therefore accompanied by considerable transfer of authority and resources, and by the creation of regional entities with all the related symbolic attributes. The regions now have a political capital, where the regional parliament and regional ministries are located.

The size of the communities and their status are very different. The Constitution does not provide for total decentralization of the nation state, since the creation of each autonomous community does not depend on the Spanish Parliament but on a representative territorial assembly, which is responsible for preparing the statute on autonomy. These rules are as valid as constitutional or organic laws *(Morata, 1993).*

All autonomous communities have access to the following fields of authority: organization of regional administration, regional development (urbanization, housing, public works, environment), economic policies (industry, tourism, retail trade, agriculture and fishing, communications), social services and culture. Since 1983, autonomous communities have implemented their own regional development plans.

As regards the authority of the nation state, besides the fields typically reserved for central authority in the federal systems (diplomacy, currency, postal services, national defence..), the Constitution grants it the authority to set up basic rules, which can be completed by the autonomous communities (legal status of administrations, economic planning, territorial organization, environment, health, education...). The central state is also responsible for transposing the European Union's Directives into Spanish national law.

Central authorities are not competent to control the implementation activity of autonomous Communities when such activity falls under their exclusive authority. However, the central state has several deconcentrated external services in autonomous territories, which vary in number according to the degree of authority actually transferred to each community. For example, Catalonia, Basque country, Andalusia, Valencia, the Canary Islands and Navarre are directly in charge of managing education (including higher education) and social services, whereas the central administration is responsible for the same public services in the other regions.

Traditionally, as in the French administrative system, the territorial framework for organizing the state external services has always coincided with the province. The latter therefore detains the double characteristic of being a local community and a state administrative district. Despite the establishment of autonomous communities, the Constitution has maintained the province as being a territorial district for administrative purposes. Only endowed with administrative autonomy, the province is dependant on both the central state and autonomous communities.

Municipalities have not undergone any major changes. The municipalities are dependant on both the central state and the autonomous communities. The law of 1985 establishes their fields of authority: local police, trafic, civil protection, drinking water, public transportation, town planning and housing... Since 1979, the municipalization of local services is a heavy trend. For the past few years, the main economic services (town planning management, equipment...) have been covered by municipal firms or semipublic companies in order to enhance investment profitability. According to Francesc Morata, the role played by large and medium-sized cities in economic activities, in tight cooperation with the private sector, is one of the most remarkable novelties of the local sector in Spain.

### *Italy*

Italian geographical, economic and social situation has always been characterized by strong disparities. Strong environmental and historical differences exist between the Northern, Central and Southern regions.

The political unification in 1860 was not the result of a slow process of osmosis between different political traditions and cultures as was the case in other European countries. It had no effect on the specific cultural and historical background of the previous states. The new nation state was organized on the basis of a Napoleonian-inspired system, based on strong centralization. Very limited authority was attributed to the existing territorial communities - the communes - and later to the provinces. The election of the mayor by the electorate dates back to 1889.

The Constitution of 1948, laying the foundation of the Republic, established two fundamental principles: recognition of local autonomy and administrative decentralization. A new important level was added, the region, endowed with legislative authority and designed as a key element for the radical transformation of the unitarian state. There are 20 *regioni*, five of which have specific autonomy status based on their geographical or linguistic identities: Sicily, Sardinia, Trentino Alto Adige, Friuli Venezia Giulia, Valle d'Aosta.

After the nation state, the <u>region</u> is the most important community. It is endowed with extensive political and administrative autonomy, having legal authority in matters under its exclusive responsibility or being shared with the nation state. Since the Italian system is not federal, the authority of the regions is expressely attributed by the Constitution in such domains as police, sanitation, tourism, transports and public works of regional interest, town development, agriculture and forestry, crafts.

Regional decentralization was gradually applied from 1945 to 1970. After the reform of 1977, other fields and functions were assigned to regional authorities such as regulation and administrative organization, economic development, land use planning, site protection...

As regards the <u>nation state</u>, besides the typical functions such as public security, defence, etc., it has only maintained authority for policy guidance, outline-legislation, coordination as well as diplomatic affairs (including relationships with the European Union). Criminal law and civil law also fall under its exclusive authority.

However, regionalization in Italy is limited as far as financial resources are concerned. The Italian fiscal regime is characterized by highly concentrated tax collection and decentralized expenditures. Almost all tax revenues flow into the state treasury (96% of all taxes), which then transfers them to other institutions or communities such as the regions. 3/4 of public expenditure fall under the central government's control and the remaining quarter is determined by decisions made at the central level *(OECD, 1994).*

It is only in 1990 that the organization and functions of local communities, communes and provinces, were reformed. They were given autonomous statutory authority. This innovation has resulted in adapting the organizational structures of each local community to the particularities of local socio-political situations. The diversity of the 8,100 Italian communes can be seen in the chart hereunder *(Voci, 1993)*:

| Population of Italian communes (inh.) | Number of communes |
|---|---|
| - 5,000 | 5,900 |
| from 5,000 to 20,000 | 1,740 |
| from 20,000 to 50,000 | 317 |
| from 50,000 to 100,000 | 68 |
| from 100,000 to 500,000 | 40 |
| + 500,000 | 6 |

Another innovation involved the creation of metropolitan zones in urban areas. The territory of the nine largest municipalities in Italy (Turin, Milan, Venice, Genoa, Bologna, Florence, Rome, Bari, Naples) and the neighbouring communes, form a metropolitan zone, under the authority of the province.

Concerning environmental policies, while the major lines are defined by the central government, implementation is delegated to the lower levels which are free to interpret and follow-up the actions. According to the OECD, there would be fluctuating trends between regional decentralization and the desire of the ministry of the Environment to obtain wider-ranging scope of authority.

### Administrative decentralization in France

In France, after hundreds of years of highly centralized administration, inherited from the Revolution and from Napoleon, a strong decentralization movement in favour of the regions occurred in the 80s, closely linked to land-use planning issues.

The onslaught of urban development and economic growth after the Second World War lead to fear about increased unbalance between Paris and the French "desert". The government then decided to implement a land-use policy in 1963, by creating the DATAR (Délégation à l'aménagement du territoire et à l'action régionale). Until 1975, the context being growth-oriented, objectives were reached (control of Paris expansion, promoting other metropolitan areas' growth, industrializing while decentralizing...). As of this date, growth slowed down and recession put an end to the beneficial effects of land-use policies, while territorial communities disagreed on regional policies decided by the state *(Espaces pour 2050, 1993).*

With the laws on administrative decentralization of 1982-1983, a logic of an active participation of communities took the place of the state-control logic. Laws established a principle of co-responsibility in land-use planning since communes, departments, and regions participate with the nation state in land-use planning, economic, social, sanitary and scientific development, environmental protection and improvement of the quality of life.

The unitarian state nonetheless prevailed. It is always responsible and accountable for compliance with laws. It maintains reponsibility for defining and implementing major policies, operations of national interest, projects of general interest... But it has lost part of its power and therefore, the present French political and institutional landscape is split up.

Each level has been entrusted with a specific role corresponding to its traditional vocation *(Ta Thu Thuy, 1994).*

The regions, as territorial communities, have authority to promote land-use planning and to contribute to the economic development of their territory, for instance regional economic planning, major transportation infrastructures, financial assistance to businesses, professional training... They have no authority for regulatory control. The tools at their disposal remain essentially financial.

Departments, provided with a budget of their own but with no regulatory function, ensure a solidarity mission being in charge of rural facilities, policies for sensitive natural sites, sanitary and social services, school transportation, departmental roadwork...

Communes play a decisive role in proximity actions: setting up of land-use plans and delivering planning permissions, primary education, fiscal assistance to new businesses or to failing ones, assistance for the poorest inhabitants... The commune is the only local community, besides the state, having a police function concerning environment (sanitation, noise, air...).

The geographical limits of the basic entity, the commune, have remained practically unchanged. The national territory is thus subdivided into 36,000 communes; almost 29,000 have less than 1,000 inhabitants. Clauses were added in 1992 relating to intercommunal organizations (communities of communes or towns) in order to induce communes to group themselves so as to manage larger territories taking into account geographical reality.

At the financial level, decentralization has lead to the steady increase of financial autonomy. On the whole, local communities have been able to implement the management capacities required for greater autonomy. Apart from a few isolated cases, autonomy has not had the negative results initially expected. However, local financial systems are quite complex and the superposition of structures has lead to successive and insufficiently controlled withdrawals *(Commissariat Général du Plan, 1993).*

Theoretically, authority in environmental matters has not been decentralized. Regulatory authority in matters of pollution and hazards as well as nature and territory protection policies remain in the hands of the state. But decentralization of urban and spatial planning has in fact resulted in the entrustement of some environmental responsibilities to territorial communities. According to the first transversal law on environment, adopted by the Parliament in February 1995, a council for the environment, in charge of concertation and expertise, will be set up in the departments, whereas a committee for the environment may be created in the regions. The law also provides the grant of new financial means to the state and territorial communities.

In parallel, central administration has been deconcentrated, which has resulted in the creation of external services working with the *Préfet*, as delegate of central authority. Deconcentration has had a vertical impact, i.e. sectorial, ministry after ministry. Thus, in 1991, the ministry of the environment established relays at regional level, the regional Directorates, in charge mainly of compliance with national legislation. They are also in charge of elaborating regional indicators of environment, in close collaboration with IFEN (Institut français de l'environnement).

Thus, decentralization in France presents two particularities: it coexists with a state's strong presence in the field; it involves several levels of territorial communities which are independent and not organized into a hierarchy.

### Deconcentration in Turkey and Morocco

#### *Turkey*

Until the 1980s, the Turkish central authority, heir of a long-standing state-control tradition, was characterized by its strong political and administrative centralization. Although local authorities were given diversified responsibilities, such as the provision and operation of urban services, as well as implementation of physical plans and development control, the decision-making powers were exercised mainly by the central authority through the approval of plans, development regulations and programmes and finally through financial instruments.

For administrative purposes, Turkey is divided into 76 provinces and 829 districts. There exist three types of public territorial communities: provincial administrations, municipalities and villages[3]. This has not always been the case: the administrative structures of the Ottoman Empire were more complex having four or five levels *(Bazin, 1986)*.

At the provincial level, the executive power is exercised by the governor who is appointed by the ministry of the Interior. Governors usually act in line with the decisions made by the provincial general assembly, whose

[3] As regards Turkish institutions, their appellation has been drawn from different OECD reports (English and French versions) as well as from those used by a research team of the Faculty of Political Sciences of the University of Ankara in a report prepared for the Blue Plan (English version).

members are elected by universal suffrage for a four-year term. The governor is also responsible for the local administrative units in the province.

Municipalities are established in sites of over 2,000 inhabitants and in provinces and district seats regardless of population. The organs of the municipalities are the mayor and the assembly, elected by universal suffrage for a five-year term. The law on municipalities of 1930 established their authority in the following fields: public works, health, education, agriculture, economy and transports.

The scope of authority of the villages was established by law enacted in 1924. The Muhtar, executive body, is the representative of the village association whereas the council of elders has an advisory role. The villages are directly dependent on the government for their facilities (rural services of the ministry of Agriculture).

Local administrations are autonomous organizations. They may establish a union among themselves. However, central government has the authority to supervise them through the governor of the province.

In 1981, a new law on municipal finance marked the first step towards decentralization. Land taxes and a few indirect taxes are now collected by the municipalities, so that contributions to municipalities from the national budget hardly exceed 10%. With governmental approval, municipalities can also obtain funds from abroad; they can ask for an international loan for water treatment for example, as is the case for the municipality of Izmir with the World Bank.

The second step towards decentralization was the establishment of metropolitan authorities in the three major cities and the transfer of decision-making powers with regard to land-use planning to these authorities. In 1985, delegation of powers in this field to all local authorities was initiated. Municipalities are assigned fully responsibility for physical planning and implementation within their territories.

Concerning the deconcentrated services of the Turkish central administration, despite the fact that the territory has been subdivided into provinces, the ministries have established regional Directorates covering more than one province for reasons of rational organization of public services. Thus, at the end of 1992, the ministry of the environment created thirty regional branches in order to ensure a greater field coverage.

### *Morocco*

Morocco territorial units are essentially the region, the province or prefecture, and the urban or rural commune. As regards breakdown of environmental responsibility between the central authority and the lower levels, the Moroccan administration has remained faithful to its tradition of a strongly centralized management of most public activities, moderated by the existence of deconcentrated services, territorially disseminated whereas decentralization *per se* of environmental actions remains confined within relatively narrow limits *(Mekouar, 1988)*.

The regions are administrative deconcentration structures rather than territorial communities. They are in fact government relays, created in 1971, for economic planning and land-use policy purposes. The regional Assembly that serves as institutional support only plays an advisory role.

However, regions have been promoted to the rank of local communities by the Constitution of 1992. This could lead to changes concerning regional Assembly competence.

Provinces and prefectures are the intermediate level between central administration and basic communities. Prefectures were created to meet the increasing needs of urban areas. Furthermore, the rapid growth of major metropolises (Greater Casablanca, Rabat-Salé, Fès, Tétouan, Marrakech...) has lead to the creation of wilayas (nine in total), that is a group or a merging of prefectures. Acknowledged as legal entities under public law, provinces and prefectures have financial and administrative autonomy. They are managed by an elected prefectoral or provincial assembly. The Governor, appointed by central government, is the executive organ as well as the supervisory authority. Provincial decentralization is only in its early stages. In environmental matters, the Assembly, which participates in the definition of regional development programs, only has an advisory role.

At the lowest level, there are the communes, whether urban or rural, with an ever-growing role since the 1980s. They are financially and administratively autonomous, and manage their affairs through the communal Council, an elected body whose chairman has been granted authority over police matters (Law of 1976). Their means for action remain nonetheless modest.

It is in the communal framework that most environmental responsibilities are exerted. The communal council prepares commune land-use and development plans and establishes the conditions for forest management. Its authority also extends to other fields tightly linked to environmental protection, particularly in the cities, such as water supply, public transportation, collection and processing of domestic waste, sanitation, green areas. It is up to the president of the communal council to grant authorizations for opening of polluting establishments.

As regards the deconcentrated services of central government, and more specifically of the ministry of the Interior, there are regional Services for land-use and environment. Furthermore, regional environmental Councils are envisaged to ensure coordination of regional scale actions (within the framework of economic regions). But, according to Mr. Mekouar, regional environmental councils face two kinds of difficulty. On the one hand, the problems stemming from the geographical limits to their territorial authority. Regional division has been designed for economic purposes, without taking into account the physical lay-out of the natural environment. Therefore, economic regions do not correspond to ecologically homogeneous spaces. Environmental issues are of a more transregional nature, whereas councils are only regional. On the other hand, within each council, the wealthiest province has the most weight, thus marginalizing overall environmental issues.

### Summary of national dynamics

After this brief overview of implemented strategies, caution is of the essence. The contrast between the situations is striking. An optical illusion could stem from the existence of sometimes similar denominations for institutions. This is even aggravated by the necessary translation of terms or by the work of searching the equivalence of the names of institutions. The risk is to hurriedly confuse the name with the thing, the appellation with the object, without checking whether beyond the similar denominations, the institutions really do have common features. In reality, this is not the case, and any comparison must be made "contextually" to avoid hasty judgements and errors of appreciation.

The trend towards decentralization is strong in three countries of the Northern basin while in the Southern countries, it is only at its first steps. But responses are varied. History, politics, legal systems, mentalities, ideologies converge to diversify implemented policies. There is no exclusive solution but rather a range of possibilities determined by the constraints, the interests, and the values.

Spain, France and Italy, having had similar structures and organizations, derived from what is often called "the Napoleon administrative system", have evolved towards strong decentralization in favor of the regions. But different routes have been undertaken. And the differences can be considerable: quasi-federalism in Spain, Italian regionalism, administrative decentralization in France. In Turkey, municipalities gain autonomy; in Morocco, the decentralization movement could favor the regional level.

Everywhere around the basin, the autonomy of communes seems to be stronger, since they are the basis for the community life, both politically and economically. "Local authorites construct, operate and maintain economic, social and environmental insfrastructure, oversee planning processes, establish local environmental policies and regulations, and assist in implementing national and subnational environmental policies. As the level of governance closest to the people, they play a vital role..."*(Agenda 21, chapter 23: Preamble to Section 3. Strengthening the Role of Major Groups, and chapter 28, already quoted).*

But we are faced with a new problem, that is whether communal structures, sometimes more than a century old, are adapted to manage equipment and infrastructure as well as natural resources and *milieux*, the structure of which pertains to spatial logics different from the administrative or political logic. This is why the federating structures gradually being implemented are of most interest, such as metropolitan areas in Italy, intercommunal organizations in France, merging of local administration in Turkey, urban areas prefecture in Morocco.

As regards deconcentration of government services, despite national differences, the trend is present everywhere. In the field, these services become the indispensable tools for ministries which now have to deal with abundant legislation. It seems that decision-making in the Mediterranean basin countries seeks to be better adapted to local environmental conditions.

But, here again, there are various possible responses. External services of central environmental authorities are usually created according to the administrative logic, either at the regional level or at the lower levels (departments, provinces, governorates...). To our knowledge, there is only one country in the Mediterranean basin where the ministry for the environment has set up deconcentrated services on the basis of a geo-ecological approach. Tunisia has recently created six regional Directorates to cover the country's natural milieux: north coastline, central coastline, south coastline, high mesas and northern plains, steppes, southern Sahara.

This leads us to the question of spaces related to environmental problems. Natural environment, as well as development concerns, are not bound by administrative frontiers. It is a well-known fact that basin agencies for an integrated water management are established on the basis of hydrographical characteristics. In other environmental fields, no territorial division can satisfy all approaches neither can it meet at the same time ecological requirements, administrative or economic constraints, and historical traditions. Meanwhile, Nature spontanously creates some physical solidarity at the time of earthquakes or floods.

Accordingly, the following quote could prove useful to political or administrative organizations involved in environmental issues. "All issues do have local, regional and national aspects. Rather than splitting the decisional field into the different administrative levels and thus promoting hierarchical arbitration modes in case of conflict, the key question is to develop what could be called management co-responsibility, to be shared by the various territorial levels, and to avoid fields of exclusive decision-making authority" *(O. Godard).*

# 4. National planning and trends toward sustainable development

"Prevailing systems for decision-making in many countries tend to separate economic, social and environmental factors at the policy, planning and management levels. This influences the actions of all groups in society, including Governments, industry and individuals, and has important implications for the efficiency and sustainability of development. An adjustement or even a fundamental reshaping of decision-making, in the light of country-specific conditions, may be necessary if environment and development is to be put at the centre of economic and political decision-making, in effect achieving a full integration of these factors.

"The experience gained through existing planning exercises such as national reports for the Conference, national conservation strategies and environment action plans should be fully used and incorporated into a country-driven sustainable development strategy"*(Agenda 21, chapter 8 already quoted).*

"The national planning process together, where appropriate, with national sustainable development action plans or strategies should provide the famework for such cooperation and assistance [...] The programme should assist by shifting time horizons in programme planning and implementation for the development and strengthening of institutional structures to permit an enhancement of their ability to respond to new longer-term challenges rather than concentrating only on immediate problems"*(Agenda 21, chapter 37 already quoted).*

In 1987, the Bruntland report called upon each country to define a long-term sustainable development strategy. The Blue Plan report, prepared at the same time and published in 1989, called upon Mediterranean countries to change direction and turn towards more goal-oriented action requiring the adoption of physical planning and the formulation of national and regional environmental protection plans with deadlines set for objectives.

Since then, and particularly after the Rio Summit, initiatives have flourished. This chapter will deal with experiences in environmental planning implemented in the Mediterranean basin by discussing the efforts put in for a better knowledge of the state of the environment, the assessment of past actions, the prospective exercises and finally the planning experiences.

### Knowledge of the state of the environment

Knowledge of the state of the environment is a prerequisite for any policy preparation as well as a prior to any form of planning. Sources of information relating to the environment and natural resources are highly diverse today at the national, regional or international levels. They synthesize information available on the state of natural resources, highlight the main environmental issues, show the leading evolutions, and often suggest guidelines for resource management. Until recently, in developing countries, data collection was carried out upon request or at the instigation of the international organizations.

In the Mediterranean basin, national mechanisms are now being implemented or strengthened in order to collect and process data. As shown in the chart hereunder, national reports on the state of the environment are being produced extensively.

***National information tools on the state of the environment***
*(according to data available at the Blue Plan)*

| **Country** | **National report on the state of the environment** | **Compendia of environmental statistics** | **National report to the UNCED (Rio, 1992)** |
|---|---|---|---|
| Spain | 1st ed.: 1978<br>...<br>last ed.: 994? | | 1992 |
| France | 1st ed.:1976-77<br>...<br>last ed.: 1994-95 | 1st ed.: 1982<br>...<br>12th ed.: 1992-93 | 1991 |
| Monaco | | | 1992 |
| Italy | 1st ed.: 1989<br><br>last ed.: 1992 | 1st ed.: 1984<br>...<br>last ed.: 1993 | 1991 |
| Malta | | | 1992 |
| ex-Yugoslavia | 1983, 1987 | 1985 | |
| Slovenia | | | |
| Croatia | | | 1992 |
| Bosnia-Herzegovina | | | |
| Albania | 1993 | | --- |
| Greece | 1983 | | 1992 |
| Turkey | 1989, 1992 | 1st ed.: 1991 | 1991 |
| Cyprus | 1987, 1989 | | 1991 |
| Syria | in preparation | | --- |
| Lebanon | | | 1991 |
| Israel | 1st ed.: 1972<br>...<br>last ed.:1 994 | 1994 | 1992 |
| Egypt | | | 1991 |
| Libya | | | --- |
| Tunisia | 1993 | | 1992 |
| Algeria | 1985 | | 1991 |
| Morocco | in preparation | | 1992 |

Sources : Blue Plan, World Resources Institute, UNEP, IUCN

Notes : ed. = edition; --- = report unavailable

Fourteen Mediterranean countries prepare reports on the state of the environment. The objective is usually to make available to the public information on the state and changes of natural habitats and resources, to identify and analyze the causes, links and constraints, to reveal emerging concerns.

These reports are precious tools to evaluate actions diachronically at the national level as well as to carry out comparisons between countries at a global scale. They are also one of the fundamental bases for policy formulation. Many of them use the OECD approach : state of the environment and natural resources, pressure from human activities, political responses.

Several Mediterranean countries have long-standing experience in the preparation and updating of these reports (for example 1972 for Israel, 1977 for France), while others are faced with this for the first time now.

Compendia of environmental statistics are also currently produced. They are distributed by the national statistics institutions as in Italy and Turkey, or by the statistics departments of ministries for the environment as in France.

Most reports on the state of the environment are prepared by central environmental authorities. Very recently, institutions in charge of environmental observation and monitoring have been created. They correspond to a more global approach of environmental data.

It must also be observed that, at the subnational level, countries are setting up supporting mechanisms in order to improve knowledge of the state of local environment. This is the case in at least three countries, which have selected specific routes. In Spain, the initiative is that of the autonomous communities. Andalousia for example published in 1992 the fifth edition of the state of the environment. In France, deconcentrated services of the ministry of the environment are in charge of preparing regional indicators in cooperation with IFEN. In Morocco, in 1994, the SSEPE began preparing environmental monographies at the regional (economic regions) and local levels in several cities.

### Evaluation of actions

Our preceding chart reminded that most Mediterranean countries participating at the Earth Summit (Rio de Janeiro, 1992) had prepared national reports. To help countries with their tasks, the secretariate of UNCED had written up guides with propositions on the fields discussed: development trends, impact on the environment, responses to concerns (policies, legislation, institutions, programs and projects, international cooperation).

All Mediterranean countries had to carry out a. more or less critical evaluation of their actions undertaken for environmental protection. This assessment of the accomplishments and difficulties encountered is indispensable to the preparation of planning exercises. In this regard, the Tunisian national report at the Rio Summit is an interesting example. It involved a critical analysis of all environmental actions undertaken. For information only, we will herein mention the assessment of programmes implemented in two fields : protection of the marine and coastal environment within the framework of a policy of natural resource conservation, and the improvement of the living urban environment.

***Assessment of environmental programs and actions in Tunisia***
*(excerpts from the national report at the Rio Summit, 1992)*

| *Fields* | *Assets* | *Constraints* |
|---|---|---|
| Urban environment | – promulgation of legal texts and regulations adapted to Tunisian specific conditions (laws, rules)<br>– sewage : a high number of sewage treatment networks in major cities<br>– improvement of housing conditions (dedensification, improvement of kitchen appliances, sanitary works, electricity, drinking water, sewage)<br>– *rehabilitation of pollution-sensitive* areas (lake Nord and Tunis)<br>– efforts in domestic waste collection (equipment of public local communities) | – generally insufficient participation of citizens to improving cleanliness of cities<br>– proliferation of spontaneous habitats and difficulties in applying integrated planning to space management<br>– lack of infrastructures to eliminate domestic and industrial waste |
| Marine and coastal environment | – regulations adopted concerning the exploitation of halieutic resources<br>– monitoring network for bacteriological quality of coastal waters<br>– an inventory, still incomplete, on the state of coasts and coastlines | – lack of means to measure and control dynamics of coastal balance<br>– ack of integrated planning for coastline land-use and for implantation of economic and urban activities<br>– insufficient means to control the use of halietic resources<br>– no means available to control oil pollution<br>– lack of marine biology stations |

Three years after the Rio Summit, the national reports are expected to constitute the basis for building strategies of sustainable development.

### Prospective exercises

Because of the delays needed to obtain visible results in the field of environmental protection and restoration, it is necessary to mention the contribution of the prospective approach, upstream from the planning process.

The long-term reflexion work undertaken jointly by Mediterranean countries within the framework of the Blue Plan is a reference of a decision-aiding tool. Its objective was "to make available to the authorities and planners of the various countries in the Mediterranean information which will enable them to formulate their own plans to ensure optimal socio-economic development without causing environmental degradation ". The scenarios method was selected as a tool for exploring possible or desirable futures, in order to clarify the choice of decision-makers.

Between 1986 and 1991, eleven Mediterranean countries initiated, with varying degrees of success, the preparation of national scenarios in harmony with global scenarios built up by the Blue Plan, bearing on the development /environment interactions over the entire basin. Those countries were: Spain, France, Italy, former Yugoslavia, Greece, Turkey, Syria, Israel, Egypt, Algeria, Libya. The methods were different, according to the working teams, the financial means available, the higher or lesser degree of involvement of political authorities and the country-specific conditions. For example, Israel priviledged environmental scenarios, Spain implemented sophisticated models, France concentrated its exercise on the French Mediterranean regions... The objective of these national exercises was to set up trend and alternative scenarios for the horizons 2000-2025. Generally speaking, the prospective studies undertaken revealed the seriousness of trend evolutions and the need for more goal-oriented physical planning and policies that integrate environmental concerns.

### Planning exercises

In the industrialized countries, environmental planning appeared "at the beginning of the 90s as the favored tool for the transition from traditional environmental policies, limited to repairing damage, to adapted policies seeking to integrate ecological concerns within sustainable development" *(Theys, 1992)*.

In the Southern countries, the World Bank has encouraged and supplied technical and/or financial assistance for the preparation of "environmental action plans ". In the Mediterranean region, this is the case for the following countries : Albania, Algeria, Egypt, Tunisia, Turkey. These plans establish a framework to integrate environmental concerns within national strategies for economic and social development.

It is often said that planning exercises remain limited to defining objectives without dealing with the ways and means required for implementation. They are nonetheless a tool for orientation and coordination of all actions in the environmental field. While the plans usually have the same objectives (defining long-term mobilizing strategies, integrating policies, establishing priorities), they differ in their preparation processes as well as in their form and ambition: importance given to assessing past actions, traditional investment programs, rhetorical exercises with action lists, medium and long-term programmes including financial commitments and a hierarchy of priorities.

The chart hereafter indicates national planning schemes being implemented in several Mediterranean countries. These schemes are part of the so-called indicative planning, and are therefore voluntaristic exercises in the frame of liberal economies. Three types of plans are mentioned: those concerning general economic and social planning, the specific plans for environmental protection and finally, those which are part of a new generation of plans or strategies aiming at sustainable development. It was not yet possible to include large scale spatial planning proper to land-use policies, which often include a real environmental dimension.

***Development/environment planning in some Mediterranean countries***

| | *Economic and Social Planning* | *National Plans for Environmental Protection* | *National Plans for Sustainable development* |
|---|---|---|---|
| France | XI Plan : 1994-98 | 1990 | |
| Italy | | Triennial : 1989-91, 1994-96 | 1993 |
| Albania | | 1993 | |
| Turkey | VI Plan : 1990-94 | 1990 | |
| Egypt | | 1992 | |
| Tunisia | VIII Plan :1992-96 | 1990 | in preparation |
| Morocco | V Plan : 1988-1992 | in preparation | in preparation |

According to our data, seven Mediterranean basin countries have recently prepared national environmental protection plans, or are presently doing so. Environmental protection plans show increasing consideration of concerns in this field, but at the same time can be isolated and separate from general choices of economic policies, as long as they remain the sole responsibility of environmental authorities.

Since it is essential that environmental issues be included within economic and sectorial decisions in order to promote sustainable development, therefore, for a follow-up of the integration of environmental and economic decisions, to be undertaken in the near future, it will be necessary to analyze the connection between general and sectorial development plans and environment protection plans.

As regards national environmental plans, the French exercise grants special importance to institutional reforms. The National Plan for the environment was launched by the ministry in November 1989, discussed in the regions and then by the Parliament, and finally adopted at the end of 1990 by the Government. Twenty years after the creation of the ministry of the Environment, the plan drew up a state of the environment indicating the challenges ahead for the year 2000, defined the objectives of an ambitious policy covering the decade and made proposals for a thorough reform of public structures. The ministry of the Environment, and both its central and external departments, were placed high on the list of reform priorities, since the organization of the state was considered as the weak point of environmental policies *(Chabason,Theys, 1991)*. More recently, and following the recommendations of the Rio Summit, France implemented two working groups in charge of defining indicators for measuring development sustainability and of setting up sustainable development scenarios in order to orientate traditional economic activities (transports, agriculture, industry, energy, tourism...).

The Italian approach constitutes an interesting case as regards the process of plans elaboration and the setting up of time objectives. The Italian government launched a three-year plan for environmental protection (1989-1991). It included clearly stated priorities in various fields such as water treatment and waste management. Its implementation has been extended.

The second three-year plan (1994-1996) was approved at the end of 1993. Furthermore, in compliance with Agenda 21, the national plan for sustainable development was prepared through a process of interministerial discussions, in concertation with industry, unions and NGOs. Finally this lead to an agreement at the governmental level within the framework of CIPE (interministerial committee for economic planning). Approved in December 1993, it comprises medium and long-term objectives.

In Tunisia and Morocco, national strategies for sustainable development are also being prepared. In Tunisia, the task is the responsibility of the National Commission for Sustainable Development, created in October 1993. In Morocco, the definition of a strategy aiming at the integration of all development and environment stakes begun at the end of 1992, with UNDP and UNESCO support. Work should be completed during 1995.

Thus, following the recommendations of Agenda 21, a new generation of plans arises. Their aims are not only to continue environmental policies, but also and essentially to integrate environmental issues higher upstream in the public policies.

"Countries [should] adopt a domestically formulated policy framework that reflects a long-term perspective and cross-sectoral approach as the basis for decisions, taking account of the linkages between and within the various political, economic, social and environmental issues involved in the development process [...] Governments, in cooperation, where appropriate, with international organizations, should adopt a national strategy for sustainable development based on, *inter alia*, the implementation of decisions taken at the Conference, particularly in respect of Agenda 21. This strategy should build upon and harmonize the various sectoral economic, social and environmental policies and plans that are operating in the country. Its goals should be to ensure socially responsible economic development while protecting the resource base and the environment for the benefit of future generations"*(Agenda 21, chapter 8 already quoted).*

Anyway, we would like to emphasize the point that high-level guidance documents are not in themselves sufficient to ensure integration of economic and environmental decisions. Integration mechanisms must also be implemented at all administrative levels. This issue will be soon analysed by MEDO institutional study programme.

## Concluding remarks

The present fascicle has not exhausted the issues related to environmental institutions and to the process of policy-making and planning.

The objective was to provide the first comparative data available for illustrating the diversity of Mediterranean situations and the variety of efforts and responses put in by the different countries.

Since this fascicle is the product of studies being presently carried out, the results here presented are partial and somehow bitty. Blue Plan has nonetheless wanted to make them know since, even in their provisional state, they can prove useful. Furthermore, it is a means for the Blue Plan to call for comments and suggestions on the turns taken by its study programme on the Mediterranean environmental institutions.

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# Acronyms

| | |
|---|---|
| ADEME | Agence de l'environnement et de la maîtrise de l'énergie, France |
| ANDRA | Agence nationale pour la gestion des déchets radioactifs, France |
| ANPA | Agenzia nazionale per la protezione dell'ambiente (National agenc environmental protection), Italy |
| ANPE | Agence nationale de protection de l'environnement, Tunisie |
| APROL | Agence de protection du littoral, Tunisie |
| CELRL | Conservatoire de l'espace littoral et des rivages lacustres, France |
| CEP | Committee for Environmental Protection, Albania |
| CIPE | Comitato interministeriale per la programmazione economica (Interminis committee for economic planning), Italy |
| CNUED / UNCED | Conférence des Nations Unies sur l'environnement et le développe (United Nations Conference on Environment and Development) |
| EEAA | Egyptian Environmental Affairs Agency, Egypt |
| IFEN | Institut français de l'environnement, France |
| INERIS | Institut national de l'environnement industriel et des risques, France |
| OCDE / OECD | Organisation de coopération et de développement économiques (Organis for Economic Cooperation and Development) |
| ÖÇKK | Authority for the Specially Protected Areas, Turkey |
| OMED / MEDO | Observatoire pour l'environnement et le développement du Centre d'Act Régionales du Plan Bleu (Mediterranean Environment and Develop Observatory of the Blue Plan Regional Activity Centre) |
| ONAS | Office national d'assainissement, Tunisie |
| ONEP | Office national de l'eau potable, Maroc |
| ONG / NGO | Organisations non gouvernementales (Non Governemental Organization |
| PNUD / UNDP | Programme des Nations Unies pour le développement (United Na Development Programme) |
| SONEDE | Société nationale d'exploitation et de distribution des eaux, Tunisie |
| SSEPE | Sous-secrétariat d'Etat chargé de la Protection de l'Environnement, Maroc |
| UNESCO | United Nations Educational, Scientific and Cultural Organization (Organis des Nations Unies pour l'éducation, la science et la culture) |

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UNEP

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1 The Mediterranean Environment and Development Observatory function

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# Follow-up of Agenda 21 for the Mediterranean Countries

## Contents

# Introduction

In order to follow the achievements gained towards sustainable development, Agenda 21, Chapter 40, recommends that countries at the national level, and international governmental and non-governmental organisation s at the international level, develop activities leading to the identification of indicators for sustainable development (ISD).

A specific work programme has been initiated by the Division for Sustainable Development of the UN to bring together all the actors involved and to produce a set of indicators which meet the requirements of both the Commission for Sustainable Development (CSD), which was implemented by the UN after the Rio Conference of June 1992, and the member states. For reasons of clarity and continuity, this programme has focuses its attention on the four fundamental aspects of sustainable development (i.e., social, economic, environmental and institutional aspects) and on the related chapters of Agenda 21.

The Blue Plan, through the activities of the Mediterranean Environment and Development Observatory (MEDO), will contribute to the efforts of the international community by adapting ISD to the Mediterranean region. This contribution is the topic of a current and specific study within MEDO, called "FOLLOW-UP OF AGENDA 21 FOR THE MEDITERRANEAN COUNTRIES". The initial results are presented in this fascicle.

To evaluate the extent of the task and common aspects of methodologies used by the international community and Blue Plan, it is useful to refer to the UN's work programme.

### The work programme of the UN Division for Sustainable Development.

This programme involves three major categories of activity: those related to the list of basic indicators, those related to the development of highly aggregated indicators, and those related to research on crossed indicators. The sub-programme concerning the list of basic indicators is set out in 5 stages, which are:

- exchange of information and organisation of work meetings (1995 and after) between the numerous actors concerned by the issue of indicators,
- drawing up methodological files (1995-96) according to each selected indicator, under the responsibility of "lead agencies". These files should allow those Governments who so desire, to use these indicators in their national reporting to the fifth session of the CSD (1997),
- training and capacity-building (1995-98) to the attention of countries and other relevant groups who wish to use the indicators for monitoring progress towards sustainable development at a national level,
- monitoring experiences in a few selected countries (1996-98) in order to test the indicators selected,
- evaluation of the list of selected indicators (2000).

To initiate the meetings of Phase 1, an initial list of indicators was proposed which was organised according to the four aspects of sustainable development, related chapters of Agenda 21, and the "Driving force - State - Response" approach (concept which covers and extends the well-known "Pressure - State - Response" approach developed by OECD). The first core set of indicators have been developed according to the following criteria:

- primarily national in scale or scope (countries may also wish to use indicators at state and provincial levels);
- relevant to the main objective of assessing progress towards sustainable development;
- understandable in that they are clear, simple, and unambiguous;
- feasible within the capacities of national governments, given their logistic, time, technical, and other constraints;
- conceptually well-founded;
- limited in number, remaining open-ended and adaptable to future developments;
- capacity to broadly cover Agenda 21 and all aspects of sustainable development;
- representative of an international consensus, to the extent possible; and,
- dependant on data which are readily available or accessible at reasonable cost/benefit ratio, adequately documented, of known quality and updated at regular intervals.

The work which has lead to this initial set of indicators also revealed the insufficiencies facing the international community in its quest for ISD. This could motivate new research programmes. Future efforts may be summarised as follows:

- research of highly aggregated indicators, on which the SCOPE programme is already working in cooperation with UNEP;
- the identification and assessment of relationships between the four aspects of sustainable development previously mentioned, and hence between the basic indicators suggested in the list above (geared towards the proposition of crossed indicators);
- the proposition of grouping basic indicators into relevant sub-sets for the different potential users;
- scientific research to identify additional basic indicators in order to better respond to the preoccupations covered by Agenda 21.

The work programme of the Division for Sustainable Development must present its initial results at the third session of the CSD (1995).

### MEDO's study for the follow-up of Agenda 21

The studies specifically concerning Agenda 21, which began in early 1995, were possible not only because of Blue Plan's experience in both the collection of statistical and geographical data and prospective analyses, but also because it enlarged its research within environmental indicators, as this became implemented within the frame of MAP's activities a few years ago.

The chosen method is the following:

- according to the structure of the chapters of Agenda 21, several points have been selected which appear useful to direct MEDO's production of ISD. Since the objective is to contribute to the follow-up of sustainable development in the Mediterranean region, this selection of framework-themes is also based on Agenda MED 21 drafted for the Conference of Ministers of the Environment of Mediterranean countries (Tunis, November 1994).

- then, a set of initial indicators is proposed to be submitted to the Mediterranean partners of Blue Plan.
- finally, the first illustrations of these indicators will be developed and are to be gradually published for the countries and other organisation s wishing to use these indicators in order to follow up on the progress towards sustainable development in the Mediterranean.

MEDO is specifically concerned with the characteristics of the Mediterranean characteristics. In fact, some themes that may have little or no relevance to the Mediterranean are not studied, while Mediterranean characteristics of the indicators are thoroughly examined, particularly at the Mediterranean coastal regions.

All indicators are built up with the help of the "Mediterranean Information System for Environment and Development" (MEDIS), currently being implemented by MEDO. Amongst other methods and tools developed by the observatory, fascicle 5 will also present MEDIS in more detail. MEDIS will gradually make the indicators accessible.

Agenda 21 and Agenda MED 21 comprise of 40 chapters. An additional chapter on tourism has been added to Agenda MED 21. These chapters, except for the first in preamble form, are divided into four sections:
Section I. – Social and Economic Dimensions
Section II. – Conservation and management of Resources for Development
Section III. – Strengthening the Role of the Major Groups
Section IV. – Means of Implementation

The progress status of the study specifically concerning the follow-up of the Agenda 21 for the Mediterranean countries, presented in this fascicle, only include the following chapters :
Section I. – Social and Economic Dimensions

3. Combating poverty
4. Changing consumption patterns
5. Demographic dynamics and sustainability
6. Protecting and promoting human health
7. Promoting sustainable human settlement development

Section II. – Conservation and Management of Resources for Development

10. Integrated approach to the planning and management of land resources
11. Combating deforestation
14. Promoting sustainable agriculture and rural development
15. Conservation of biological diversity
17. Protection of the oceans, all kinds of seas, including enclosed and semi-enclosed seas, and coastal areas and the protection, rational use and development of their living resources
18. Protection of the quality and supply of freshwater resources: Application of integrated approaches to the development, management and use of water resources

Chapters within Sections III and IV are discussed in fascicle 3 involving the institutions for the environment within the Mediterranean countries.

More specifically, chapters of Agenda 21 which are analysed and exploited hereafter, in provisional form, successively include:
- commented excerpts from Agenda 21;
- commented excerpts from Agenda MED 21;
- recommendations on the priority themes to be examined in the Mediterranean context;
- recommendations on the indicators to be developed within the MEDO framework;
- indications on what is already available at Blue Plan; and
- to conclude, one or two initial illustrations of indicators will be included. These illustrations will be presented in the form selected by MEDO. Any graphic representation or map of indicators will be accompanied by comments and precautions for use.

## Note

The coastal countries and entities of the Mediterranean are referenced on the maps and graphics under ISO 2 Code shown in the following table:

| Countries or entities | ISO 2 Code |
|---|---|
| Spain | ES |
| France | FR |
| Italy | IT |
| Malta | MT |
| Monaco | MC |
| Slovenia | SI |
| Croatia | KR |
| Bosnia-Herzgovina | BK |
| Yugoslavia | YU |
| Albania | AL |
| Greece | GR |

| Countries or entities | ISO 2 Code |
|---|---|
| Turkey | TR |
| Cyprus | CY |
| Syria | SY |
| Lebanon | LB |
| Israel | IL |
| Gaza | GZ |
| Egypt | EG |
| Libya | LY |
| Tunisia | TN |
| Algeria | DZ |
| Morocco | MA |

The clockwise order that has been selected allows tables and graphics to be drawn up in French and English, avoiding the different alphabetical order between the two languages.

Concerning the individual entities of former Yugoslavia: Slovenia, Croatia, Bosnia-Herzegovina, Yugoslavia (Serbia and Montenegro), data at Blue Plan is not yet fully available. For all date prior to 1990, MEDO has used the data of former Yugoslavia also referenced under ISO 2 Code "YU".

Malta, Monaco, Gaza are not listed in all tables or graphics according to the availability of data and the relevance of international comparisons. For the same reasons, data on Morocco sometimes do not take into account the Western Sahara.

Data sheets in this report do not necessarily use the most recent data; this will be included later.

The designations employed and the presentation of maps and graphics do not imply the expression of any opinion whatsoever on the part of Blue Plan concerning the legal status of any state of the delimitation of their frontiers or boundaries.

# Chapter 3

# Combating Poverty

Agenda 21 proposes that the eradication of poverty should be the major challenge for all countries so as to "enable the poor to achieve sustainable livelihoods". This text stresses that "a specific anti-poverty strategy is therefore one of the basic conditions for ensuring sustainable development" while acknowledging that "poverty is a complex multidimensional problem with origins in both national and international domains". Sustained and sustainable economic growth, supported by strengthening employment and income-generating programmes, are among the suggested action principles.

Along with "immediate measures to alleviate poverty and to develop sustainability", Agenda 21 proposes integrated programmes with a long-term strategy for the most disadvantaged groups: women, children, refugees and migrants, indigenous people, as well as some low-income professions.

"The international community should make poverty alleviation a major priority" by ensuring that assistance and cooperation are dedicated to the practical aspects by addressing the root causes of poverty and by making social and environmental preoccupations a more integral part of the assistance and structural adjustment programmes.

Among the main activities broadly defined by Agenda 21 for combating poverty, which countries should implement or strengthen, the following activities should be stressed:

- aid and emergency measures (financial, integration, access to health care),
- training youth, to meet employment market demands,
- encouragement for employment generation,
- encouragement to the emergence of new professions (tourism, environment...),
- support to some traditional professions,
- reactivation of local and diversified agriculture, including sustainable agriculture (rural and peri-urban environment).

The social aspects in the eradication of poverty such as the creation of an efficient health care system, access to freshwater and to primary education (similarly covered in other chapters) are discussed in the corresponding chapters.

In order to implement these means of action, Agenda 21 recommends that "governments should improve the collection of information on target groups and target areas in order to facilitate the design of focused programmes and activities, consistent with target-group needs and aspirations". It also advises that these measures be coordinated by the establishment of a focal point for information exchanges and the implementation of transferable pilot projects.

Regarding the Mediterranean level, more specifically, Agenda MED 21 recommends inter alia "to refine appraisals of situations and socio-economic mechanisms leading to poverty", and "to promote all solutions which can ensure extra income to hinterland zones".

As a consequence, the Blue Plan proposes to focus on the impact of poverty within the coastal zones, while stressing the importance of rural areas in the hinterlands that are sensitive to economic depression, leading to desertification, migration towards urban poles, and an increase of the poor urban population.

The interest of geographical information concerning the distribution of population should be emphasised. Knowledge of this distribution is in fact crucial to efficiently share the available means, including emergency measures. The economic actors (public authorities, state-owned companies, small and medium enterprises, etc.) who are the necessary intermediaries for social integration and support for employment must be well covered in order to enhance awareness and effective utilisation.

The use of new indicators, such as HDI (Human Development Index) developed by UNDP, can be recommended. These indicators could be used and analysed at various geographical levels, according to the place of residence (urban/rural) and each population group. The HDI is an assimilated index which measures human development by combining three fundamental factors: life expectancy, knowledge and living standards.

The set of Mediterranean indicators to be developed by MEDO, in cooperation with countries, in order to examine the analyses and recommendations covered in this chapter of Agenda 21, could include the following indicators:
- GNP
- HDI
- GNP per capita
- GDP per capita in purchasing power parity
- distribution of households according to revenue
- poverty threshold
- percentage of the population under the poverty threshold

As of now, these indicators can be examined by the Blue Plan at the national level. However, a close cooperation with the Mediterranean countries is required in order to geographically rectify these indicators to the national, provincial (regional) and local levels, particularly the Mediterranean coast regions.

One example of indicators complying with the recommendations of Agenda 21, is presented hereafter in the indicator data sheet "GNP - GNP per capita".

## Comments

At the world level, countries can be categorised according to the value of GNP per capita. There is a widening gap between OECD countries and the poorest countries: the ratio between average GNP values per capita was 30 in 1970, and 56 in 1990. Furthermore, close to 80% of the worldwide GNP is generated by OECD countries (13% of world population).

The Mediterranean Basin, a transition area between developed and developing countries, reveals a wide range of GNP per capita and GNP values.

The ratio of extreme GNP per capita values has gone from 14 to 32 between 1970 and 1990, Egypt remaining the poorest country and France the richest. Since 1990, the economic liberalisation of Eastern countries and the crisis in the former Federation of Yugoslav Republics have worsened the situation , increasing the ratio of 1 to 65 between Albania and France in 1993. GNP in the new Balkan States has not yet been evaluated by the World Bank (except for Slovenia in 1993). The Mediterranean countries of the EU generate approximately 90% of the Mediterranean GNP (50% of the Mediterranean population). In the majority of countries, GNP growth has been constant since 1970. In the Southern and Eastern Mediterranean countries, the growth in GNP (greater than the population growth) has resulted in increased GNP per capita. This is not the case for Libya where GNP, since 1980, has been dropping jointly with a strong population increase; leading to a substantial drop in GNP per capita. The effect of the Algerian crisis since 1987-88 has shown a significant drop in GNP and GNP per capita. In 1993, mainly because of the international economic conjuncture, a slight drop in GNP and GNP per capita has occurred in three Mediterranean countries of the EU (Spain, France, Italy). The figures for Greece have remained unchanged or have increased only slightly. In Southern and Eastern Mediterranean countries, the growth of GNP has also not been sufficient to balance population growth, and GNP per capita has remained close to 1992 value.

The imbalance between North and South, although less pronounced than out the world, has considerable bearing since it exists on both sides of the Mediterranean and between countries of the EU and the Southern and Eastern Mediterranean countries. Persistent political crisis (Algeria, former Yugoslavian Federation, Middle East) is not favourable to a positive Mediterranean conjecture which would allow optimistic hypotheses for development.

## Precautions for use

GNP or GDP are the usual indicators which serve to measure and compare national economic activities. The choice between the two depends on national conventions. GDP is the indicator for all domestic production, whereas GNP is equal to GDP increased by net income earned abroad minus payments made to non-residents. The difference between GNP and GDP is generally of the order of 1%, but can be greater in the case of countries which heavily invest abroad. GNP is used much more often, with respect to the number of inhabitants, to compare revenue levels of the population. The ratio between GNP values per capita is not exactly significant of the standard of living ratio which must take into account the parity of purchasing power.

# Chapter 4

## Changing Consumption Patterns

Agenda 21 specifies, in the introduction to this chapter that changing consumption patterns is addressed in several parts of Agenda 21, notably those dealing with energy, transportation, wastes and in the chapters on economic instruments and the transfer of technology. This section will cover production and consumption related to "dynamics of demography and sustainability" for which there are two modes of action:

- focus on the production and consumption patterns which are unsustainable in the long term; and,
- implementation of national policies and strategies to encourage changes in unsustainable consumption patterns.

The major objectives of the first type of analysis are:

- to promote patterns of consumption and production that reduce environmental stress and will meet the basic needs of humanity,
- to develop a better understanding of the role of consumption and how to bring about more sustainable consumption patterns.

In order to move towards these major objectives, countries must adopt a coherent international approach, and promote studies on consumption while developing new concepts for sustainable economic growth and prosperity.

The implementation of studies on consumption and identification of balanced and sustainable consumption patterns, require databases to be developed, as well as methodology and assessment of the relationship between production, consumption, environment, adaptation to technological innovation, economic growth and demographic factors.

Systems of national accountancy and sustainable development indicators should integrate new concepts of wealth which take account of lifestyles more respectful of the finite resources of the planet and countries involved.

Agenda MED 21 emphasises the differences of consumption patterns within the Mediterranean Basin, such as the share of revenue spent on food, and observes that local products (olive oil, hard wheat, etc.) are often disregarded in favour of exogenous products.

MEDO, within its set of sustainable development indicators, will consider in this chapter, economic indicators such as: "share of revenue spent on different consumption items (food, health, leisure)".

Among the indicators of production, consumption and trading of specific or local products local, the following can be given as typically Mediterranean examples:

- Production of olive oil,
- Consumption of olive oil,
- Export of olive oil,
- Import of olive oil

As an illustration of the indicators that may contribute to complying with the recommendations of Agenda 21, the "Energy consumption per capita" indicator is presented hereafter.

## Comments

Energy, undissociable from all production activities and modern societies, poses severe problems for the environment. Its effects are greatly varied: pollution and depletion of resources for fossil energies, contribution to the greenhouse effect for thermal energy, radioactive waste for nuclear energy, etc. Renewable energies cannot, alone, face the present and future needs of industry. Patterns of use and consumption will undoubtedly have to be modified.

This section will not serve to highlight the impacts of all forms of energy but rather to understand the situation and its impact on the Mediterranean environment with the gross indicator of energy consumption per capita. The relationship between energy consumption and GDP depends, amongst other things, on the structure of production and lifestyle; its analyses is rather difficult.

At world level, the differences in energy consumption per capita are considerable: it is close to 10 toe per capita in the USA, whereas in some African countries and on the Indian continent, it is only approximately 10 koe per capita.

In the Mediterranean Basin, the range is narrower but the ratio between Northern countries and Southern and Eastern countries nonetheless reaches 400 and more. In France, as a matter of fact, consumption has gone from 2,873 in 1971 to 4,016 koe/inh. in 1990; in the case of Greece, on the other hand, this value has gone from 948 to 2,378 koe/inh. over the same period. In the South, consumption per capita has gone from several hundreds in 1971 to under 1,000 koe in 1990 on the average. Only Israel and Libya demonstrate levels equal to those of Spain and Italy.

The energy situation (production, consumption) in the Mediterranean is quite contrasted: in the North, consumption is high but stable; in the South and East, consumption is low, but rapidly increasing; some of these countries export oil or gas. During the period between 1970 and 1990, the increase in total consumption of the Northern countries was 2.1% per year whereas in the South, it reached 6.6% per year.

Despite the implementation of less oil-guzzling technologies (in the North initially), the fact that consumption levels per capita in Southern countries are now almost equal to those in the North, will lead to a strong increase in total consumption (of the order of 42% between 1990 and 2010). Research for alternatives (renewable energies, nuclear; clean technologies) and enhanced Mediterranean cooperation are required to avoid shortage in resources and increased environmental stress.

## Precautions for use

The interpretation of energy consumption per capita must be weighted by the structure of consumption and energy production. Although the structure will not be discussed here, we can differentiate in the North, the case of France (where 75% of production and 33% of consumption involve nuclear energy and where total energy production has doubled between 1971 and 1990) from that of Italy (where nuclear energy has not been the national choice, and which consumes 92% fossil fuels, 59% of which is oil).

# Chapter 5

## Demographic dynamics and sustainability

According to Agenda 21, " demographic trends and factors and sustainable development have a synergistic relationship". Several fields for action are presented, the first being "developing and disseminating knowledge concerning demographic trends and factors and sustainable development" to allow "formulating and implementing integrated environment and development policies and programs, taking into account demographic trends and factors".

In point of fact, "there is a need to increase awareness among decision-makers at all levels of the links between demographic factors and environment and development, to provide better information on which to base national and international policies and a framework against which to interpret this information".

Actions proposed by Agenda 21 involve "research on the interaction between demographic trends and factors and sustainable development", which consists in particular in "identifying the interactions between demographic processes, natural resources and life support systems, bearing in mind regional and subregional variations deriving from different levels of development" and in "studying first the human dimensions of environmental change".

Among the means of implementation, information and public awareness are essential. This is why "socio-demographic information should be developed in a suitable format for interfacing with physical, biological and socio-economic data. Compatible spatial and temporal scales and cross-country and time-series information, as well as behavioural indicators, should be developed, learning from local communities' perceptions and attitudes". Furthermore, "awareness should be increased of the fundamental linkages between improving the status of women and demographic dynamics".

As regards the Mediterranean countries, Agenda MED 21, on the basis of the Blue Plan's conclusions, emphasises the major differences in demographic situations: "In the countries of the Northern Mediterranean, the rate of reproduction has dropped, and life expectancy is slowly but constantly growing. In the Southern and Eastern countries, demographic trends are highly diverse. Their potential gains in life expectancy remain quite high."

Agenda MED 21 stresses the interest in "initiating a comprehensive study to evaluate the carrying capacity of all Mediterranean ecosystems upon which populations depend: capacity of basic resources (in water and soil particularly) to sustainably satisfy the needs of the population". "MEDO should regularly update and disseminate information on demographic trends and prospective". Furthermore, special attention has been paid to coastal regions: "research should be undertaken on population concentrations (residential or touristic) as well as on their impact on resources and environment, particularly on the coastal regions...".

Thus, the Blue Plan, in cooperation with the countries involved, will focus its observations on regional differences and on the rural/urban environments. Among the many socio-economic data and indicators, the first proposed by MEDO are:
- Total population
- Population density
- Growth rate
- Period of population increase
- Stationary population values
- Index of economic dependence of population
- Fertility rate
- Rate of education for women
- Rate of activity for women
- "Littoralisation" index (ratio of density or ratio of populations)

Most demographic indicators at national level are well-known and used by the "Population" division of the United Nations to draw up forecasts. At subnational levels, statistic services in charge of population counts and surveys can supply detailed information. In this field, the Blue Plan already uses the indicators and work of INED (Institut National des études Démographiques).

Indicators on education and employment for women are emphasized in this chapter as major factors in the evolution of the fertility rate fertility. For reasons of commodity, these indicators are studied in the framework of Chapter 24 on the "international action in favour of women's participation to sustainable development".

As an illustration of indicators contributing to compliance with the recommendations of Agenda 21, the "Reproduction index - Economic dependence index" indicator is presented hereafter.

## Comments

The structure of a population, its breakdown into age groups, its rate of reproduction have strong impact on the possibilities of sustainable development.

The economic dependence index of the population is the ratio between the dependent population (youth under 15 years of age and people over 64) and the working age population (from 15 to 64). This index allows the identification of economic inertia of the age distribution for national populations. The economic dependence of a population mainly affects the budgets for education and the social system such as retirement pensions, according to the proportion of the under 15 year old population and that of over 64.

At global level, the value of this index (0.64) is essentially representative of the share of the young age groups (33%). It is necessary to stress the difference between the "old" countries of Northern Europe with 0.5 (20% under 15 and 15% over 64) and the "young" countries of Eastern Africa with 1.05 (48% under 15 and 3% over 64). Despite the drop in fertility rates, the economic dependence index will continue to increase due to the drop in child mortality and to the increase in life expectancy.

The situation in the Mediterranean is transitory. The value of this index in 1991 is between 0.5 and 0.6 for the countries in the North of the Mediterranean Basin and for Cyprus. For most Southern and Eastern countries, the index value is comprised between 0.7 and 0.9. Algeria and Syria are at the highest level with 1 and 1.1 respectively. These major differences are linked to the large number of young people in the populations of Southern Mediterranean countries. For example, the 49% of under 15 years of age in Syria are to be compared with the 17% in the same age group in Italy. Adversely, this difference is dampened by the population of over 64 years of age (14% in France and Italy, 4% in Syria).

The fertility rate, approximation of the number of children per woman, is the main population growth factor, and thereby it is an indicator of present and future populations. The population replacement value is equal to 2.1 children per woman (mainly due to the greater number of male births).

In industrialised countries, where demographic changes have occurred, the fertility rate values are often under 2.1 and even drop to 1.4 for Germany and 1.3 for Italy and Spain. Adversely, the number of children per woman is close to 8 for some African countries and even equal to 6.7 in Syria.

In the Mediterranean, the situation is still quite contrasted since in some North-West countries, such as Italy and Spain, values are the lowest in the world, whereas in the case of some Southern and Eastern countries, values are high (from 5 to 7).

## Precautions for use

The economic dependence index must be interpreted on the basis of the population groups under 15 and over 64. This indicator can be accompanied by the youth index, on the basis of the difference between the under 15 age group and the over 64 age group.

In this initial analysis, data from 1991 were used. More recent information is available, but its use would not fundamentally change results. The unstability of frontiers in the Balkans directed our initial choice towards pre-existing data.

# Chapter 6

## Protecting and promoting human health

By stating that "health and development are intimately interconnected", Agenda 21 insists upon " the linkages of health, environment and socio-economic improvements".

Amongst the action fields proposed, the following warrant thorough analysis: "meeting primary health care needs, particularly in rural areas; control of communicable diseases; protecting vulnerable groups". The other areas: "urban health and reducing health risks from environmental pollution and hazards" are covered in the chapters on urbanisation, pollution, waste...

"Sound development is not possible without a healthy population" is one of the fundamental principles of Agenda 21. In order to control communicable diseases, major emphasis is placed on measures aiming at water supply and sanitation". "The AIDS pandemic is expected to have considerable socio-economic impact for all countries" and should be the target of international and national programmes. Sustainable development requires protection and education of the groups most vulnerable to disease, i.e. infants and children, the young and women.

For the Mediterranean as a whole, Agenda MED 21 emphasises the progress in public health and hygiene of the past 20 years. This being said, there remain high levels of disparity due to the differences in lifestyles, population age group structures, health costs per capita...

Agenda MED 21 recommends the development of efficient national sanitary protection policies, development of community preventive care in parallel with curative care. Policies involving freshwater supply and sanitation must be strengthened. Special attention must be paid to the implementation of "regional health observatories, in particular those dealing with air pollution, noise and water quality" as well as the creation of exchange and cooperation networks. The various recommendations on waste and pollution impacting on health are also covered in other chapters.
Many health indicators, covering state of health and means and progress in the countries, can be studied by MEDO:

- life expectancy at birth
- male life expectancy at birth
- female life expectancy at birth
- rate of infant mortality
- rate of male infant mortality
- rate of female infant mortality
- mortality rate (by age)
- male mortality rate (by age)
- female mortality rate (by age)

These "demographic" indicators are significant of the population's state of health, taking into account the level of development.

Some diseases can be considered as health indicators, as well as indicators for hygiene:
- number of cases of typhoid
- number of cases of cholera
- ...

Indicators for other diseases present in the Mediterranean can be integrated later.

The means available for health care can be described by the following indicators:
- number of inhabitants per physician
- number of inhabitants per nurse
- number of inhabitants per hospital bed
- health expenses per inhabitant

Indicators to measure the adequation of means with vulnerable groups and diseases in the different regions and according to the rural/urban environment can be developed and refined.

Most data and information required in this chapter are available at WHO and in the countries according to the level of precision requested.

As an illustration of indicators contributing to compliance with the recommendations of Agenda 21, the "Infant mortality rate - Number of inhabitants per physician" indicator is presented hereafter.

## Comments

Amongst health and hygiene indicators, the infant mortality rate is significant for the sanitary situation of a country, since the poorest populations, rural populations, and children are the most endangered individuals. Furthermore, access to health care services, for which the initial indicator can be the number of inhabitants per physician, is one of the essential factors of the sanitary situation.

At world level, infant mortality varies from values over 100 per thousand in the less advanced developing countries to values of the order of 5 per thousand in the most industrialised countries. This disparity also exists in the countries according to the environment and economic conditions, as well as according to degree of access to health care means.

The number of inhabitants per physician varies from 400 on the average in industrialised countries to almost 7,000 on the average for developing countries, up to 36,000 in subsaharian Africa.

In the Mediterranean Basin, this disparity is not as great, but still exists between Northern countries and Southern and Eastern countries. The values and differences in the infant mortality rates have greatly diminished since 1970 and this trend will continue. There is hope that the current values of the order of 60 per thousand in Southern and Eastern countries will reach 20 in 2025. In the Northern countries, the drop should also continue, but in all countries, disparities between individuals will remain high.

Progress in access to health care is reflected in the strong diminution of the number of inhabitants per physician, mainly in Southern and Eastern countries. This progress is however hingent upon economic levels, social and sanitary policies and must be pursued. The Northern countries are in the average range and even under the average of industrialised countries.

## Precautions for use

Information on infant mortality greatly depends on national methods and customs of declarations and population census. The number of inhabitants per physician is calculated on the basis of the total number of physicians without taking into account their speciality or localisation .

Furthermore, forecasts on infant mortality rates are given indicatively, but more recent estimations will have to be considered.

# Chapter 7

## Promoting sustainable human settlement development

The introduction to this chapter of Agenda 21 states that "in industrialised countries, the consumption patterns of cities are severely stressing the global ecosystem" and that "in the developing world, human settlements need more raw material, energy, etc...". Furthermore, "Human settlements are deteriorating mainly as a result of the low levels of investment".

The recommendations of Agenda 21 in the field of human settlements aim at improving the social, economic and environmental quality of these settlements and the living and working environments and are organised around the following themes:
adequate housing for all,
- improving human settlement management,
- promoting sustainable land-use planning and management,
- promoting the integrated provision of environmental infrastructure: water, sanitation, drainage and solid-waste management,
- promoting sustainable energy and transport systems in human settlements,
- promoting human settlement planning and management in disaster-prone areas,
- promoting sustainable construction industry activities,
- promoting human resource development and capacity-building for human settlement development.

These areas vary in importance and are for the most part interconnected.
In the paragraph on "Improving human settlement management", Agenda 21 observes that one of the issues involves the fact that "some metropolitan areas extend over the boundaries of several political and/or administrative entities even though they conform to a continuous urban system. This item requires "strengthening urban data management systems".

Agenda 21 recommends "encouraging intermediate city development" while highlighting that "sound urban management is essential to ensure that urban sprawl does not expand resource degradation over an ever wider land area...". This form of urban management can only be implemented through "sustainable land-use planning and management" which requires the establishment of "a land information system in which land resources will be classified according to their most appropriate uses".

Agenda 21 also insists upon the integrated approach to such facilities as water, energy, etc. and the consideration of human settlements as ecosystems. Many principles, objectives and actions promoting sustainable energy and transport systems are covered in Chapter 10 on integrated approach to the planning and management of land resources and in Chapter 9 on protection of the atmosphere.

On the issue of human settlements, Agenda MED 21 focuses on "the urban pressure on the Mediterranean coastal areas", by insisting on the "protection of a significant part of these coastal areas" and on the integration of "urban policies within a balanced regional development policy". The issues related to urbanisation of the coastal areas are covered in Chapter 17 on the protection of the oceans and all kinds of seas - including enclosed and semi-enclosed seas - and coastal areas, and protection, rational use and development of their living resources.

MEDO will develop geographical information on urbanisation and infrastructures, for coastal areas in particular. Initially, the following indicators will be developed for the national and coastal levels:

- urban population
- rate of urbanisation
- population in the capital city
- Distribution of cities
- urbanised (artificialised) surface
- urban equipment such as:
    - services
    - transport systems
    - sanitation

These urban indicators and information, in particular for coastal cities, will be refined by using information available in such networks as "Medcities".

As an illustration of indicators contributing to compliance with the recommendations of Agenda 21, the "Urbanisation" indicator is presented hereafter.

## Comments

Ever-growing urbanisation in countries worldwide raises many issues for sustainable development.

Urbanisation rates give an indication of urbanisation, but it is also important to consider the multiplying factor of urban populations between forecasts for 2025 and existing levels.

On the global scale, rate of urbanisation will shift from 45% in 1990 to 65% in 2025; the urban population will grow from 2.4 billion to 5.5 billion and will be multiplied by 2.3. This increase will occur mainly in developing countries, where urban population will be multiplied by 3 and grow from 1.5 billion in 1990 to 4.4 billion in 2025. In industrialised countries, urbanisation rates, currently 73%, will reach 83% in 2025.

The different forms of urbanisation must also be taken into account, with the appearance of megalopolis where population levels are over 10 million inhabitants (Mexico 20 million, New York 18, Los Angeles 13.5, Cairo 13...), rural areas where populations are shrinking as well as urban sprawl over the coastal areas.

In the Mediterranean Basin, the urbanisation phenomenon is quite considerable. The urbanisation rate is already high in 1990, always over 50% (except in Albania: 35%) and even over 80% in small countries such as Lebanon, Israel and Malta. In 2025, all urbanisation rates will exceed 70% (except in Albania: 57%) and will reach 96% in Malta. While the population multiplication factor between 1990 and 2025, will reach 3.8% in Syria, average rates in the North will be approximately 1.2. The increase in urban populations in the Mediterranean Basin will reach 200 million inhabitants (of the order of 15 times the population of the city of Cairo!).

The Mediterranean coastal zones are highly urbanised: many cities will demonstrate strong population growth amplified by the attractiveness of the coastal regions, which in itself is a major area for concern and which is covered in Chapter 17.

## Precautions for use

Urbanisation figures are often controversial and difficult to compare because of the different national definitions: urban populations involve either the commune or agglomerations including several entities.

# Chapter 10

## Integrated approach to the planning and management of land resources

Agenda 21 considers that land, characterised by topography and spatial nature, must be associated with natural resources such as "soils, minerals, water and biota that the land comprises". As opposed to other resources, land is not extensible. Human requirements and economic activities are placing ever increasing pressures on land resources which create "conflicts resulting in suboptimal use of both land and land resources". Therefore, "it is essential to resolve these conflicts and move towards more effective and efficient use of land and its natural resources", an objective which should be achieved through an integrated approach finding "its expression in the coordination of the sectorial planning and management activities concerned with the various aspects of land use and land resources".

The object is to examine and define appropriate policies to ensure the most suitable use of land and sustainable management of land resources; to improve and strengthen land planning and management procedures; to strengthen institutions and coordinating mechanisms for land; to develop mechanisms which encourage active participation of all concerned, in particular local collectivities and populations, in the decision-making process in matters of land use and management.

Planning and management systems must promote the integration of environmental concerns by referring to territories or ecosystems such as catchment areas for example; frameworks will be implemented for the development of special and detailed sectorial projects; intersectoral consulting bodies will be required to rationalise project planning and implementation; agronometric inventories will be established...

Implementation tools will have to improve the integrated interpretation and analysis machinery for data on land and resources; evaluate pressures on the environment and the economic and social consequences, as well as the risks, costs and advantages of certain measures; analyse and experiment methods to integrate functions relating to land and ecosystems and value of land to national accounting systems.

Strengthened information systems must refer to the national and local levels for environmental, economic and social data related to land resources, land capability and land-use and management patterns. Systems will be used to collect and communicate comparable information on the status and processes of change of land resources, including soils, forest cover, climate and other elements.

Information and training systems will be designed within an international cooperation framework, with networks and other appropriate means for exchange of information on experiences with the process and results of integrated and participatory planning and management of land resources.

As regards the enhancement of the scientific understanding of the land resources system, priority should be given to:

- assessment of land potential capability and ecosystem functions,
- ecosystemic interactions and interactions between land resources and social, economic and environmental systems,
- developing indicators of sustainability for land resources, taking into account environmental, economic, social, demographic, cultural and political factors.

In the Mediterranean Basin, pressures of development impact most strongly on land and water resources. These pressures essentially involve a narrow and highly coveted coast, surrounded by desert regions in the South and by mountainous regions in the North. Land is sensitive to wind and water erosion and to overuse, thus endangering human use of land resources and the related environmental functions. Integrated management of land resources requires information on economic and environmental aspects of land since the degradation process of land resources leads to a decline in productivity which worsens the social issues in the area.

Agenda MED 21 recommends that each State "draw up, at the appropriate scales, the map of land and develop the required spatial planning policies" and "implement clear land occupation and use policies taking full account of their vocation, their degree of vulnerability and guaranteeing sustainability of productivity".

Agenda MED 21 also recommends at the scale of the Mediterranean Basin "to cooperate in order to make the Mediterranean Environment and Development Observatory operational, as the privileged tool for the follow-up of land evolution and impacting processes".

The indicators which can be proposed in relation to this chapter of Agenda 21 have special bearing on land degradation, whether chemical (salinisation , mainly), biological (land cover, mainly) or physical (erosion and land losses, mainly). These indicators may be representative of a state, an evolution or a risk. They are for the moment difficult to develop and to implement in a homogeneous fashion around the Mediterranean Basin. An indicative list can be presented:

- land carrying capacity
- land erosion
- eroded land
- river water loads
- land salinisation
- soil degradation
- erodable land
- soil quality
- slopes
- climate indices
- land cover
- land structures

Intimately interconnected with climatic, hydrological, topographical characteristics, the land-related indicators should be studied at the scale of the Mediterranean catchment areas or according to the corresponding administrative subdivisions. A distinction between coastal zones and hinterlands will have to be planned for.

It therefore appears that additional scientific research is required in order to more fully understand the definition, feasibility and operational implementation of these indicators. This is why MEDO has initiated a specific study program on this issue with the following objectives:
- to establish an initial review (1980) of all data related to land use and of the state of land degradation (erosion, salinisation ),
- to assess and ensure survey of land degradation, by using the appropriate indicators, collected from organisation s such as FAO or UNEP, or from national institutions,
- to survey soil and land degradation, indispensable prerequisites to develop more effective actions and decision-making processes.

FAO is without a doubt the organisation that has worked the most on the development of mapping documents and state and evolution indicators related to land use. The EU has drawn up land maps related to land use and soil degradation risks.

Concerning land degradation, FAO has developed maps associated to original methodological reflections: map on land degradation risks, world map on human-induced land degradation, methodological manual for erosion surveys. UNEP has produced or is currently producing several documents on surveillance of land degradation: the world map on desertification, "Reinforcement of the Regional and National Capabilities for Soil Degradation/ Desertification Assessment and for Soil and Terrain Database". However, few documents have taken into account the specificities of the Mediterranean Basin.

The MEDO studies related to land resources will be enhanced by knowledge of politico-administrative and legislative systems involved with land use management and protection, including land occupation planning.

As an illustration of indicators contributing to compliance with the recommendations of Agenda 21, the "Agricultural use of land" indicator is presented hereafter.

## Comments

At the world level, cultivated lands including arable land and permanent cultures represent 11% of the global surface of emerged lands. From 77% in Barbados, 86% in Bangladesh and 61% in Denmark, this percentage can drop to approximately 0.2% in some Middle Eastern countries, such as the Union of Arab Emirates, Kuwait and Oman.

In the Mediterranean Basin, agricultural land is one of the resources where the pressures of development are the strongest, particularly on a narrow and highly coveted coastal strip, bordered by desertic regions on the Southern coast. Mediterranean soils are under two types of pressure: on the one hand, urbanisation and infrastructures absorb an increasing part of arable land (occupation conflicts), and the agricultural pressure is strong on ever more vulnerable soils (degradation).

The systems for agricultural land use have evolved considerably over the past 40 years, due to technological, socio-economic, political changes and the emergence of environmental issues. Thus, in the North Mediterranean high-yield specialised monocultures have appeared, inducing gradual abandonment of marginal lands. In the Southern and Eastern Mediterranean, where demographic pressures are intense, cultivated surfaces continue to progress at the expense of forests and grazing lands.

The Used Agricultural Surface (UAS, in absolute value and in percentage of territory) is a state parameter. It illustrates real use of space (arable lands, cultures and permanent pasture). Its evolution gives a clear idea of the intensity of ecosystem use by man and illustrates the agricultural pressures on the environment. The map presents the surface of catchment area land, the most fertile, used for agriculture. When all fertile soils are used (as for example in Tunisia or in Egypt), agriculture usually encroaches on marginal soils (less fertile or more vulnerable). This form of utilisation increases the risks of soil degradation. In the North of the Basin, abandonment of terrace cultivation land, without reforestation or erosion control policies, can have the same effect.

In the Mediterranean countries, the percentage of cultivated land is very variable for different reasons, among which urbanisation and desertification of rural areas, the desert being sometimes close to the coasts. This percentage may be higher than 50% (51% on the Syrian coasts), around 20% (21% in Morocco, 20% in former Yugoslavia and France) but also close to 0% on the overall national territory (3% in Egypt and 1% in Libya).

## Precautions for use

The table presents the breakdown of lands used for agriculture in the Mediterranean regions during the 1980s. The data used here come from national reports. Regional figures are not always available. The figures for Egypt and Libya cover the entire national territory.

The map refers to the watershed adapted to the climatic characteristics (watersheds too much inland for the Ebro river, the Pô, the Nile, etc.. are excluded; the limit of the Southern watersheds is sometimes arbitrary).

On the map, fertile land is estimated on the basis of the FAO land map of 1978; according to this classification, they correspond to lands which do not severely limit fertility. Saline lands, poorly drained, in thin layers on strong slopes, are not included here, although they may be cultivated or used as grazing grounds in some countries.

The wording used by national administrations to characterise use of agricultural and/or forest land are not always compatible with FAO definitions. Also, some definitions vary from country to country (for example, permanent pasture, range land, fallow fields, etc..)

# Chapter 11

## Combating deforestation

All bodies involved in environment and development consider forests as one of the essential elements of the biosphere. Many processes indispensable to human survival depend on maintaining forests in a state of favourable conservation. Agenda 21 has recognised this crucial role and in Chapter 11, deals solely with combating deforestation.

It explicitly stresses that "the impacts of loss and degradation of forests are in the form of soil erosion, loss of biological diversity, damage to wildlife habitats and degradation of watershed areas, deterioration of the quality of life and reduction of the options for development".

The present situation calls for urgent and consistent action for conserving and sustaining forest resources. These actions, geared towards maintaining the multiple roles and functions of the Mediterranean forest, can involve:

- harmonising and improving policy formulation, planning and programming, legislative measures instruments,
- strengthening participation of the general public, especially women, indigenous people and youth,
- strengthening the roles of the private sector, local organisation s, non-governmental organisation s and cooperatives,
- improving information and public education programmes,
- strengthening forest-related administrations by making available the material and human resources adapted to the situation.

"Forest resources being renewable, they can be sustainably managed in a way that is consistent with environmental protection".

To reach this objective, Agenda 21 recommends the development of "assessment and systematic observations as essential elements of long-term planning for evaluating effects, quantitatively and qualitatively, and for rectifying inadequacies", to ensure management sustainability. Within the framework of the required strengthening of national forest-related institutions, Agenda 21 recommends that they should be enabled to "acquire the necessary knowledge for the protection and conservation of forests, as well as the capacities for effective development and implementation of policies, plans, programmes, research and conservation management and sustainable development projects for all types of forests and forest-based resources".

All forests of the Mediterranean Basin are threatened by uncontrolled degradation and conversion to other types of land use, influenced by increasing human needs. They are particularly endangered by agriculture expansion and environmentally poor management which encompasses, for example, the lack of adequate forest-fire control and anti-poaching measures, unsustainable commercial logging, overgrazing and unregulated browsing, harmful effects of airborne pollution, economic incentives and other measures taken by other sectors of the economy.

Agenda MED 21 advises every Mediterranean State to "draw up comprehensive inventories of the public and private forest domains with a view to efficiently control management, to ensure sustainability of use". At the global Mediterranean level, Agenda 21 states that "the development of a Mediterranean network of classified forests representative of the inherent wealth of the Mediterranean Basin would contribute considerably to biodiversity conservation".

Within the Mediterranean indicator system that MEDO is implementing, the following indicators are proposed to ensure follow-up on the actions covered in this chapter:

- surface of the Mediterranean forest and its evolution,
- nature of forest property (public and private),
- number of fires and burnt surface,
- ratio of forest surface versus number of inhabitants
- breakdown of forests according to major types of vegetation,
- sanitary status of forests,
- protected forest areas - breakdown and patrimonial importance

The development of these indicators and required information will be supported by the expertise of Sylva Mediterranea, Mediterranean Forest and FAO.

As an illustration of indicators contributing to compliance with the recommendations of Agenda 21, the indicators "Afforestation rate in the Mediterranean" and "Fires" are presented hereafter.

## Comments

Planet forest cover represents approximately 5 milliards hectares, or about 40% of emerged surfaces. Deforestation is considerable, mainly in tropical zones.

The forest in the Mediterranean region is fundamentally important because of its multi-functional role:
- economic: it represents a source of raw material, energy and grazing essential for many Southern and Eastern countries,
- ecological: it greatly contributes to land protection, water regulation, biological diversity sustainability and landscape quality,
- social: it meets the demands for natural space of more and more urban populations.

Forests of all Mediterranean countries cover approximately 82 million hectares (10% of countries surface). In the Northern countries, afforestation rates are high and reach 53% in Spain, whereas they are low (under 10%) in the Southern countries. Afforestation rates in Turkey and Cyprus are 18 and 16% respectively. The Mediterranean forest covers 31 million hectares, approximately 38% of the national forest surfaces. The afforestation rate reaches 15% in the Mediterranean, varying from South to North by several percentage points for Egypt and Libya to 44% in France.

The overall surface of Mediterranean forests and maquis is significant only in the countries on the Northern coast and in Turkey, it varies from 11% in the States of former Yugoslavia to 60% in Greece and 50% in Turkey. The forest in countries on the Southern coast is entirely of the Mediterranean type.

## Precautions for use

The forest cover considered for the map of the Mediterranean forest are more numerous than those used in the relatively stricter classifications of some organisation s (UNESCO-FAO-National Inventories). This choice is justified by the will to take into account surfaces, sometimes large in the South and East, of vegetation degraded to shrubbery or thickets, in order to enhance studies on the relationship between Man and the Mediterranean forest.

The following forms of vegetation are therefore grouped under the wording "forests" or "wooded land":
- natural populations completely or partially formed by trees over 6 meters in height,
- the series of degradation of the preceding formations,
- linear formations of wadi beds,
- reforestation,
- fallow lands or forest "accruals".

The following are not covered:
- alignment plantations,
- urban plantations and peri-urban parks,
- village plantations for firewood and fodder,
- oasis trees.

Furthermore the definition of vegetation formations in the forests varies slightly from country to country, a fact which must be taken into account for inter-country comparisons.

The limits retained for the calculation of Mediterranean forest percentage rates versus the total surface are the administrative limits of regions or provinces.

## Comments

Forest fires are not as severe in all parts of the world, since some forests are more or less dense, more or less vulnerable. Fires find a favourable ground in the Mediterranean: vegetation varieties, droughts and fire-spreading winds. For example, in France, approximately 75% of burnt surface involves the Mediterranean forest.

Although fires are a component of the natural life of the Mediterranean forest ecosystem, modification by man of the structure and flora composition of forests has increased the risk of fire.
Only 5% of the fires are considered to be of natural origin (essentially from lightning): this implies that the Mediterranean forest is submitted to extremely strong anthropic pressures. Among the causes of forest fires, there are agricultural activities, garbage disposal, smokers and neglect, electric cables...

The adaptation mechanisms implemented in the past to combat this pressure are today largely obsolete. This is why forest fires in the Mediterranean have become the major cause of degradation of forest cover in the Mediterranean Basin.

The surface subjected to repetitive forest fires fluctuates from year to year due to climatic changes in particular. The number of fires and the burnt surfaces may vary regardless as in Cyprus and Turkey.

Graphs highlight the average annual rate of burnt surfaces and the proportion of burnt surfaces versus the total surface of the Mediterranean forest. This information enhances the approach to the amplitude of the phenomenon in its spatial and patrimonial consequences.

## Precautions for use

Data are lacking for the following countries: Egypt, Lebanon, Libya, Malta, Monaco, Syria. In these countries, forest surfaces in the Mediterranean zone are inexistent (Monaco or Malta) or very limited.

The definition of forest fires varies slightly from country to country, making international comparisons uncertain.

The objective of the graphs included in the map of the Mediterranean Basin is the visualisation of the considerable annual variability of the "forest fire" phenomenon. The scales are different for each country, and comparisons are therefore not possible.

# Chapter 14

## Promoting sustainable agriculture and rural development

As the world population continues to grow, "the capacity of available resources and technologies to satisfy the demands of this growing population for food and other agricultural commodities remains uncertain". Production on land already in use will have to be increased since encroaching on marginally suitable land is dangerous for local and regional resources. Agenda 21 therefore focuses on "agricultural policy review, people's participation, improving farm production and farming systems, land-resource planning information and education for agriculture, land conservation and rehabilitation, use of water, conservation and sustainable utilisation of plant genetic resources for food and sustainable agriculture, integrated pest management and control in agriculture".

In this context, agricultural policies will have to overcome: lack of awareness of the environmental costs incurred by sectorial and macro-economic policies and hence their threat to sustainability; inadequacy of tools of analysis (environmental accounting for example) and monitoring; insufficient skills.

Data collection and information dissemination actions should be undertaken to: collect, continuously monitor, update and disseminate information on the utilisation of natural resources, living conditions, climate, water and soil factors, and on land use, distribution of vegetation cover and animal species, utilisation of wild plants, production systems and yields, costs and prices, and the social and cultural considerations that affect agricultural and adjacent land use; establish programmes to provide information, promote discussion and encourage the formation of management groups.

International and regional cooperation must, in order to promote the integrated use of land resources for agriculture, planning, data collection and diffusion of production simulation models, develop methodologies for the establishment of data bases, description and use of land resources and multiple goal optimisation . Development of data bases and GIS will allow: storing and displaying physical, social and economic information pertaining to agriculture, and defining ecological zones and development areas; selecting combinations of land uses and production systems appropriate to land units through multiple goal optimisation procedures, while strengthening delivery systems and local community participation; encouraging integrated planning at the watershed and landscape level to reduce soil loss and protect groundwater resources.

Agenda 21 acknowledges, in terms of land conservation and rehabilitation, that "land degradation affecting extensive areas is currently the most important environmental problem facing both developed and developing countries. The problem of soil erosion is particularly acute in developing countries, while problems of salinisation , waterlogging, soil pollution and loss of soil fertility are increasing in all countries. Land degradation is serious because the productivity of huge areas of land is declining just when populations are increasing rapidly ... Well-planned, long-term national and regional land conservation and rehabilitation programmes are now needed."

It is recommended to initiate or review national land-resource surveys, detailing the location, extent and severity of land degradation; to prepare and implement comprehensive policies and programmes leading to the reclamation of degraded lands and the conservation of areas at risk.

As regards data collection and information management, it advised to: conduct periodic surveys to assess the extent and status of national land resources; to strengthen and establish national land-resource databases, including identification of the location, extent and severity of existing land degradation, as well as areas at risk, and evaluate the progress of the conservation and rehabilitation programmes launched; collect and record information on indigenous conservation and rehabilitation practices and farming systems.

At the scale of the Mediterranean Basin, Agenda MED 21 proposes "to establish inventories and remote monitoring of the main Mediterranean agrosystems after harmonisation of national inventories" and "to cooperate in the development of balanced agricultural policies taking into account demographic trends as well as really available potential (land and water) minimising degradation of the environment and ensuring long-term sustainable development".

Consequently, MEDO, through the specific study programme on soils mentioned in Chapter 10 on the integrated approach to the planning and management of land resources, needs to obtain full knowledge on the agricultural and agrifood situation of the Mediterranean countries, including the interactions with water and land in watersheds and coastal regions.

Agricultural activities, considered to exert pressure on land resources, could be described by the following indicators:
- agricultural population
- economically active agricultural population
- agricultural productions, including:
    - cereal production
    - wheat production
- agricultural yields, such as:
    - cereal yields
    - wheat yields
- livestock
- agricultural fertilisers, such as:
    - fertiliser consumption
    - pesticide consumption
- mechanisation
- agricultural pollutions, such as:
    - estimates on evacuated nitrate
    - estimates on evacuated phosphate
- use of agricultural lands, such as:
    - loss of agricultural lands due to urbanisation

- extension of agricultural lands over range land or natural zones
- degradation of agricultural lands
- salinisation of agricultural lands

Indicators and data on agriculture and agrifood considerations, for the national level, are available at FAO and at ICAMAS (International Centre for Advanced Mediterranean Agronomic Studies). For subnational levels, data will be collected from specialised institutions, including the Ministry of Agriculture.

This information will be further enhanced by specific knowledge of agricultural land use in the coastal regions through agricultural surveys undertaken in many countries.

As an illustration of indicators contributing to compliance with the recommendations of Agenda 21, the "Fertiliser consumption" and "Irrigation – agricultural utilisation of water resources" indicators are presented hereafter.

## Comments

Fertiliser consumption is one indicator of agricultural efficiency, it is highly dependent on the nature and quality of agricultural soils and in turn affects the future quality of these soils.

Throughout the world, use of fertilisers varies enormously from country to country, and the smallest countries are the largest consumers, in proportion to agricultural surfaces, to optimise yields.

Agriculture in most Mediterranean countries has been modernised and intensified since 1970, but unequally around the basin. The increase in the demands of populations for food and other agricultural commodities in the Southern and Eastern countries enhances the need for intensified agriculture. A large part of this intensification in semi-arid countries involves irrigation and abandonment of dry farming. These modern agricultural systems require many varied industrial fertilisers: manure, pesticides, adapted machines, irrigation equipment...The increase in quantities of manure and pesticides reflects the evolution of agriculture towards specialised and intensive systems.

From 1970 to 1990, consumption of nitrate-based fertilisers has been multiplied at least by a factor of two in most Mediterranean countries. In less developed countries, agricultural techniques advance more slowly and manure consumption remains low - under 40 kg/Ha - except in the case of Egypt where irrigated cultures are predominant. In several countries, yields remain low whereas nitrates consumption has been multiplied by a factor of more than four in 20 years (Syria, Libya).

Nitrates and phosphates are often used in excess with respect to the mineral needs of plants. Loss of manure, difficult to assess, is a source of contamination for the environment. Eutrophication of groundwater resources and pollution of underground water by nitrates are already major concerns in European countries. In temperate climates, knowledge on the toxic effects of fertilisers is improving. This is not the case in the dry climates of the Southern and Eastern Mediterranean Basin countries. The contamination phenomenon of the environment could be a limiting factor for sustainable agriculture.

## Precautions for use

The map shows annual consumption averages for nitrogen-based fertilisers per hectare, crossed with a mechanisation index (number of tractors per thousand hectares). It is a partial illustration of the degree of intensification under observation. Enhanced information, required to appreciate the intensity of fertiliser utilisation with respect to the environment, the nature of production and the investment choices, is not as yet available.

## Comments

In many countries, land irrigation is vital to agriculture. Some countries, including Egypt, irrigate 100% of their arable lands, Pakistan 77%. In others, located in more temperate climates, over half of the arable lands are irrigated, as in Holland, New Zealand and Albania.

In the Mediterranean Basin, irrigated agriculture uses over 70% of water resources and over 90% in Southern countries. Surfaces equipped with irrigation material have significantly increased from 1965 to 1985 in all countries, except Egypt and Italy where irrigation is a very old process. The rate of development of irrigated lands, tied to the objective for food independence in some countries, exerts strong pressures on water resources, scarce in the Mediterranean Basin.

Furthermore, other constraints are involved:
- geopolitical: international planning and utilisation of resources (Nile, Tiger, Euphrates, fossil tables of Maghreb) imply downstream upstream regulation to ease tensions,
- financial and social: the costs of planning, through the creation of upstream infrastructures (dams, canals) and for the equipment per irrigated hectare, are high. Depreciation time for the investments can not be observed in case of resource shortage and arbitration in favour of the other freshwater consuming sectors (urban and tourist zones),
- natural: some dry countries (Tunisia, Libya), very poor in ground water resources, but rich in underground water resources, extensively use these reservoirs. In some cases, these are non renewable fossil aquifers.

Then, it is essential to attentively monitor the evolution of irrigated lands versus the availability of water. The percentage of the irrigated Used Agricultural Surface (UAS), the evolution of irrigated surfaces in the Mediterranean Basin and water consumption per hectare are indicators of pressure from agriculture on water resources.

Besides the impact on water resources, other factors must be considered:
- risks to health from the diffusion of toxic molecules and pathogenic germs when used water treatment is insufficient and affects the quality of ground water used for irrigation,
- risk of soil degradation from salinisation , alcalinisation or water clogging,
- regression of traditional agricultural systems, less demanding in terms of agricultural fertilisers and meeting the demands of biological diversity sustainability.

## Precautions for use

The potential development of irrigated surfaces is limited by the land resources suitable for irrigated farming and by water resources. Thus the evolution of the surfaces gives a partial idea of pressures on the environment. The global figure does not represent the differences in pressure according to agricultural intensity (depending on soil type), the efficacy of irrigation according to the techniques used, and the efforts in resource management (water savings and reuse of used waters).

The figures in the table only concern the watersheds of the Mediterranean Basin countries. They have been drawn up by aggregating data on elementary watersheds extrapolated over time and space. This involves the description of situations at a given moment in time by using parameters which, it is presumed, will only evolve slowly.

# Chapter 15

## Conservation of Biological diversity

This chapter of Agenda 21 "is intended to improve the conservation of biological diversity and the sustainable use of biological resources, as well as to support the Convention on Biological Diversity". The introduction clearly states that "biological resources feed and clothe us and provide housing, medicines and spiritual nourishment", but also that "the decline in biodiversity which we are currently witnessing is largely the result of human activity and represents a serious threat to human development".

Faced with the evidence of this increasing decline, urgent and decisive action must be taken. To be effective, actions aimed at maintaining biological diversity must be based on scientific knowledge. This is why Agenda 21 states that "capacities for the assessment, study and systematic observation and evaluation of biodiversity need to be reinforced at national and international levels".

Agenda MED 21 recommends that "the inventory be maintained at the scale of the basin for plant and animal species of the Mediterranean ecosystem" and proposes "to multiply the protected areas, particularly reserves for the biosphere" and "to institute underwater biological reserves on the coasts or continental shelf".

All Mediterranean Basin countries have signed the Convention on biological Diversity and eight countries have ratified it.

MEDO has included biological diversity in its priority study themes with, as its objective, to provide decision-makers with the data and indicators required to develop national strategies for the conservation of biological diversity and sustainable use of biological resources, as well as to integrate conservation strategies for biological diversity and sustainable utilisation of biological resources to strategies and national development plans.

The Convention on Biological Diversity plans to undertake country studies on conservation of biological diversity and sustainable use of biological resources, including costs and price analysis, taking into account socio-economic aspects particularly.

MEDO can contribute to these country studies by making available its methodology and existing data. It will also contribute to the establishment or strengthening of inventory and monitoring systems required for management and control of biological diversity.

In this field, MEDO is working in cooperation with specialised institutions such as UICN, WCMC (the World Conservation Monitoring Centre) and at Mediterranean level, with SPA/RAC (Regional Activity Centre for Specially Protected Areas) in Tunis.

Within the framework of MEDO's Mediterranean indicators, the following can be proposed:

- state and evolution of traditional livestock,
- total number of endemic species per taxonomic group
- number of extinct, vulnerable, endangered species
- changes in the breakdown of the most scarce or most endangered species and habitats
- state of progress of inventories on rustic races and traditional varieties
- breakdown of wild parents of cultivated plants
- erosion of genetic resources
- number and scope of conservation programmes for cultivars and rustic races
- annual number of visitors versus surface of protected areas
- total surface protected versus number of inhabitants
- percentage of threatened species in protected areas
- percentage of threatened habitats protected versus total habitat surface

The calculation of indicators and the collection of relevant data will be backed by the following information, in order to obtain a more objective view of the state of biological diversity conservation in the Mediterranean Basin:
- inventory of laws protecting nature and of their contents
- list of protected species per country
- conservation objectives
- map of national and/or international protected areas
- localisation of conservation organisations in situ and ex situ (botanical gardens, conservatories, gene banks, etc.)
- scope of collections kept by these organisations

As an illustration of indicators contributing to compliance with the recommendations of Agenda 21, the "Number of known species - Number of endemic species" indicator is presented hereafter.

## Comments

In the Mediterranean region, situated at the crossroads of three continents, biodiversity is specific since it is enriched by the species originating from these three continents. This region is the richest in the world, after the tropical regions.

Conservation of biodiversity starts by proper knowledge of the number of animal and plant species present on a given territory.

The current state of knowledge is still imperfect at global level and at the level of some well-documented countries, such as Spain or France, and does not allow specifying a significant figure for the entire living world. Nonetheless, some taxonomic groups are today well-known. The inherent species are described and classified. It can be used as a reference and illustrate the global wealth of the territory involved. For example:

- the total number of vertebrate species (except fish) and superior plants reflects the intrinsic wealth of the country as well as the diversity of its ecosystems and the extent of its territory,
- the number of national endemic species (i.e., species found only there and nowhere else on earth) is a good indicator of the originality of biological diversity in the zone. It is also an element which allows assessment of the degree of patrimonial responsibility in the country involved, survival of endemic species resting entirely with the country where the species are found.

The number of threatened species and future evolution will be good indicators of the global pressure on wild biodiversity. It must be confirmed by the monitoring of more specific parameters for each species or group of species, as for example: number of individuals, distribution, evolution trend...

There are approximately 25,000 plant species in the Mediterranean region of which 10% at least are endemic. This figure can be 20% in Spain and over 30% in Turkey. The number of endemic animal species is more limited, but the Mediterranean region shelters 2.5% of the world's reptile species on 1.3% of emerged surfaces.

## Precautions for use

Information only covers vertebrates (except fish) and vascular plants. Data is still missing for several taxonomic groups in Syria, Lebanon, Israel, Monaco, Tunisia, Libya, Algeria. The importance of these countries for Mediterranean biodiversity must be specified.

# Chapter 17

## Protection of the oceans, all kinds of seas, including enclosed and semi-enclosed seas, and coastal areas and the protection, rational use and development of their living resources

Considering that "the marine environment and adjacent coastal areas form an integrated whole", Agenda 21 recommends many fields of activities in the Mediterranean which involve MAP and its regional activity centres, including the Blue Plan.

The field of activity involving "strengthening international cooperation and coordination, particularly at regional level", where one of the objectives is "to integrate relevant sectorial activities addressing environment and development in marine areas at national, subregional, regional and global levels", recommends "strengthening the capacity of international organisation s to handle information and support the development of data and information collection systems".

The creation and activities of MEDO are directly in line with these objectives and recommendations, particularly with the participation of Blue Plan to Coastal Area Management Programmes coordinated by MAP, which comply with the recommendations of Agenda 21 for "Integrated management and sustainable development of coastal areas, including exclusive economic zones". In view of the extent and complexity of the littoralisation issue in the Mediterranean region, MEDO has initiated a specific study programme.

In terms of data and information, the recommendations of Agenda 21 are the following:
- "develop and maintain databases for assessment and management of coastal areas, and all seas and their resources,
- develop socio-economic and environmental indicators,
- conduct regular environmental assessment of the state of the environment of coastal and marine areas,
- prepare and maintain profiles of coastal area resources, activities, uses, habitats and protected areas based on the criteria of sustainable development,
- exchange information and data".

In compliance with these recommendations interpreted in a first stage at the level of Mediterranean priorities, MEDO is developing:
- indicators specific to coastal areas which can initially be designed for more general levels, and applied later to coastal zones only,
- "littoralisation" indicators of the indicator or density ratio type to assess overdensification and overutilisation of the coasts.

Many indicators in the preceding chapters are applied here, with particular emphasis on the "coastal" or "Mediterranean" characteristics.

Thus, the first set of indicators being developed involves:
- land resource utilisation (chapter 10),
- use of marine space, including the continental shelf,
- utilisation of coastal zones, including
    - artificialisation,
    - urbanisation,
- population characteristics including:
    - spatial breakdown of populations in the coastal region,
    - population specificities (coast/country),
- sources of pollution including:
    - industrial waste,
    - household waste,
- pollution of coastal waters including:
    - microbiological pollution,
    - pollution from phosphates and nitrates,
- water resources and use (chapter 18),
- the state and utilisation of forests (chapter 11),
- the state and conservation of biodiversity (chapter 15),
- human activities along the coasts including :
    - agriculture (chapter 14),
    - industry,
    - tourism.

The coastal zone covered by MEDO is composed of:
- the administrative coastal regions equivalent to level 3 of the Nomenclature of Territorial Units for Statistics (NUTS 3) of the EU (Eurostat),
- or of the coastal strip including a marine strip 45 to 50 meters deep approximately and a strip of land corresponding to the neighbouring watershed, approximately 10 kilometres wide or more in the delta zones and some coastal plains (Languedoc-Roussillon, Venetia).

The use of geographical information systems (GIS) is developed at this level, as well as data resulting from remote sensing in order to have a clearer spatial image of the state and management of coastal areas for decision-making purposes.

In order to enhance knowledge of coastal zones, MEDO is strengthening its ties with institutions specialised in GIS and remote sensing at international level, such as UNEP/GRID, the remote monitoring department of FAO (AFRICOVER Programme), the European Space Agency (ESA - Coastal Zone Earth Watch programme), the European Environment Agency (EEA - CORINE Land Cover and MEDGEOBASE), MEDIAS-France, the Regional Activity Centre for Remote Sensing Applied to the Environment (ERS/RAC), as well as with national centres.

As an illustration of indicators contributing to compliance with the recommendations of Agenda 21, the "Littoralisation Index" and "Quality of Bathing waters" indicators are presented hereafter.

## Comments

Littoralisation, or the concentration of human activities in a narrow strip of land along the seashore, is a worldwide phenomenon: approximately 60% of the world's population lives in coastal regions.

In the Mediterranean, this phenomenon is strongest in the North due to climatic conditions, and in the South and East, where there are deserts and where population migrates towards the major cities usually situated along the coasts. Pressures on the vulnerable ecosystems of the Mediterranean coasts and on the finite natural resources (water, agricultural land...) represent a threat for sustainable utilisation. The littoralisation index of the population is the ratio of the density of population in the Mediterranean regions versus the density of the population in the country. It can also be defined by the ratio of the part of the total population living on the coasts versus the surface of territory observed along the coast. This indicator clearly highlights the littoralisation phenomenon at national level.

The table thereunder presents data on the populations of the Mediterranean coastal areas and on the national populations for the last available year (population count or official estimation from 1981 to 1990). The index figures are under 1.2 for most countries in the Northern Mediterranean Basin and for Turkey. Former Yugoslavia is the only case where it is under 1. For Spain and Lebanon, the index is close to 2. It varies from 2.3 in Tunisia to 5 for Syria and it is equal to 22 for Algeria and 32 for Libya.

This index can be explained for most countries; two examples are given below:

- in Greece, the low index value (1.1) must not cover the importance of Athens and of its region which, with over 3 million inhabitants, represents one third of the country's total population,
- in Algeria, the widespread surface of the country, in majority desertic zones while Mediterranean regions form a narrow strip between the sea and the high mountainous areas, explains the very high index value (22). In fact, 44% of the total population live on 2% of the territory located along the coasts.

## Precautions for use

The value of the indicator can be strengthened by the percentage of total population living on coastal areas where surface is expressed as a percentage of total surface. This indicator is equal to 1 for the countries considered as completely coastal, as in the case of Malta, Monaco and Cyprus.

The specific national geographical characteristics strongly influence the value of the indicator, making inter-country comparisons difficult. For example, the administrative breakdown of the Greek coastal regions leads to considering 76% of the total country surface, which creates distortions when the index is calculated. In the long term, the index should be adapted to the specific situation of each country by taking into account inhospitable areas (deserts, high mountains).

## Comments

While chemical pollutants are mainly discharged by rivers and coupled to industrial and related effluents, microbial pollutants are discharged into recreational coastal waters, often by short outfalls of domestic sewage, that is often inadequately treated or not treated at all. Hence, mcrobioal pollution requires a stringent control of seafood, specially in shellfish growing areas, and the quality of bathing waters.

In practice, it is difficult to monitor pathogens routinely. But the organisms which characterise contamination from human or animal waste, such as Faecal Coliforms (FC) or Faecal Streptococci (FS), may be used to indicate a potential health hazard to human health because of the possible presence of human pathogens. These organisms are therefore used as bacterial indicators and their limited occurence (acceptable concentrations) are strictly required by the quality criteria proposed by the Commission of European Communities (CEC) and MAP.

Apart from 130 million inhabitants estimated to live permanently along the Mediterranean coastline, over 100 million international tourists visit this area annually and mainly during the summer season. Therefore, during this season the input of municipal sewage increases, resulting in a deterioration of water quality. On the other hand, a high water quality constitutes an important factor for the development of tourism, which is in turn one of the main economical vectors for the Mediterranean regions.

In the Mediterranean countries of the EU (Spain, France, Greece, Italy), bathing waters are controlled by national institutions during the summer (June to September). The results have been published in the reports of the EU since 1982.

The microbiological quality of shellfish production zones and of bathing waters was analysed by Mediterranean laboratories of the MED POL programme (Phase I) during the period of 1976 to 1981. The control zones were mainly located on the Italian western coast, the western Yugoslavian coast and the Israeli coast.. During the second phase of MED POL, the control zones were extended and the state of microbiological pollution was assessed by applying provisional criteria for bathing waters proposed by UNEP/WHO in 1983.

**Standards of Microbiological quality criteria for bathing waters**
**Faecal Coliforms (FC) :**

| | | | |
|---|---|---|---|
| CEC | 80 % of samples | ≤ 100 FC/100 ml water | Guideline value |
| | 95 % of samples | ≤ 2 000 FC/100 ml water | Mandatory value |
| MAP | 50 % of samples | ≤ 100 FC/100 ml water | and |
| | 90 % of samples | ≤ 1 000 FC/100 ml water | |

**Faecal Streptococci (FS) :**

| | | | |
|---|---|---|---|
| CEC | 90 % of samples | ≤ 100 FS/100 ml water | Guidelinevalue |
| MAP | 50 % of samples | ≤ 100 FS/100 ml water | and |
| | 90 % of samples | ≤ 1 000 FS/100 ml water | |

The number of conform or non-conform observation stations located on the Mediterranean coasts has lead to the estimation of bacteriological quality of coastal waters in each coastal region and to classify them in three categories: conform, non-conform and not available for countries and regions where there are no control stations.

## Precautions for use

In interpreting and using this indicator, it must be remembered that the number of control stations and geographical coverage are limited and variable from country to country. The quality criteria is based on two similar standards, that of the CEC for European countries and that of MAP for the others.

# Chapter 18

## Protection of the quality and supply of freshwater resources: Application of integrated approaches to the development, management and use of water resources.

Sustainable management of freshwater resources is based on the perception that water is an integral part of the ecosystem and a social and economic good, whose quantity and quality determine the nature of its utilisation. The general objective of freshwater resource management, as described in Agenda 21, is to "make certain that adequate supplies of water of good quality are maintained for the entire population of this planet, while preserving the hydrological, biological and chemical functions of ecosystems, adapting human activities within the capacity limits of nature and combating vectors of water-related diseases".

As a priority, Agenda 21 calls for "integrated water resources development and management", "water resources assessment", "protection of water resources, water quality and aquatic ecosystems", "drinking-water supply" and sanitation equipment, for urban and rural zones, and "sustainable food production". The last activity recommended is the study of the impacts of climate change on water resources.

These priorities, emphasized during the International Conference on Water and Environment held in Dublin (1992), set down the guidelines for MEDO's mission and the main action principles to be implemented are as follows:
- within the integrated water resources management, the relevant observation level is that of the watershed or sub-units,
- this type of management entails recognition of the interdependence of the elements which make up the fabric of the "water" system, through planning of utilisation, protection, and conservation, and through the design of economically efficient and socially acceptable projects, and through the strengthening of the appropriate institutional, legal and financial mechanisms, harmonised in the case of transboundary resources.

Water resources management must be integrated to global consistent policies in the following fields: 1) protection of public health, 2) food production, conservation and distribution, 3) preventive measures against hazards, 4) protection of the environment and conservation of the resource base (protection of the integrity of the ecosystem).

"Pursuant to the recognition of water as a social and economic good", sustainable use strategies must take into account overall costs for planning and development (benefits expected from investment and exploitation expenses, costs inherent to environmental protection and the opportunity costs reflecting the most valuable alternative use of water).

Water resources are finite and should be evaluated according to nationally defined objectives which take into account long-term planning needs as well as those with narrower horizons. In view of the need for more specific and more reliable information on water resources and the nature of their utilisation, it is necessary to deal with the lack of financial resources and with the fragmented nature of hydrologic services. Establishment of national data bases is therefore vital to water resources assessment and to the mitigation of the effects of floods, droughts, desertification and pollution. The design of inventories and water management assessment systems for agricultural and other purposes.

The most important means of implementation are the improvement of knowledge, design of interactive databases, forecasting methods, education and training programmes, and enhanced user awareness.

The main political aspects are: strengthening assessment capacities through education programmes at all staff levels; designing monitoring and assessment systems for the quality of water resources, and waste-receiving waters through the creation of continuous monitoring networks; implementation of preventive measures: applying the "polluter pays" principle to all types of sources, promoting the installation of treatment facilities for urban and industrial effluents, designing standards for effluent discharge into receiving waters, introducing the precautionary approach in water quality management.

Practical emphasis is placed on "the need to identify collection networks, assess their performance, strengthen these networks according to guiding principles, support specific hydrologic data processing, and to analyse and present data and other information in the manner requested by countries for planning and management of their socio-economic development, to be used within the framework of environmental protection and water project design strategies".

As regards Mediterranean countries, Agenda MED 21 emphasises the scarcity of water resources, further accrued by the exponential increase in demand during the past century. This phenomenon forecasts the structural depletion of water resources in the Southern Mediterranean countries. Agenda MED 21 recommends the development of "a national inventory policy, water resources mobilisation and management, which takes into account environmental protection and development sustainability". Planning of resource utilisation must entail appropriate pricing policies and an adequate institutional framework. The need "to maintain an efficient network for quantitative and qualitative monitoring of water resources as well as a data bank" is emphasized.

MEDO has therefore initiated a specific study programme on the issue of water resources in the Mediterranean Basin (the initial results are presented in fascicle 2).

Several indicators are being developed:

- state of knowledge and assessment of water resources for the implementation of sustainable development policies
  - total resources per capita
  - independence index
  - freedom of action index
  - resources specific to the ecosystem versus total potential resources
- consumption, and more specifically urban and agricultural consumption

- annual water consumption per capita
  - share of consumption covered by non renewable resources
  - annual consumption per sector of use
  - final consumption per sector of use
- tension in the system
  - use and consumption index for water resources
  - water availability depletion index
  - annual urban and industrial waste
  - share of consumption covered by non conventional resources
- political, economic and individual undertakings:
  - share of the population benefiting from collection and treatment systems
  - share of waste treated by secondary and tertiary systems

The interpretation of these indicators requires information on the means available for monitoring integrated and patrimonial management of water resources at national level (planning and policies), at the level of the watersheds and at coastal level (concentration of urban consumption).

Within this framework, the interest of federating projects for groundwater quality assessment implemented worldwide by GEMS/WATER, the implementation of a network of hydrologic stations launched by OMM under the name of MEDHYCOS, and of the international action plan on "water and sustainable development of agriculture", launched by FAO in cooperation with other international organisation s, should be emphasized.

As an illustration of indicators contributing to compliance with the recommendations of Agenda 21, the "Water resources exploitation index" indicator is presented hereafter.

WATER RESOURCES
IN THE MEDITERRANEAN BASIN
EXPLOITATION INDEX
OF WATER RESOURCES



## Comments

The world's water resources, an estimated 40 000 billion m3, are very unevenly distributed.

Water resources in the Mediterranean Basin countries represent approximately 630 billion m3. The scarcity, irregularity and uneven distribution of water resources in the Mediterranean Basin is a heavy burden on its future, and in some cases, represents a limiting factor for development. Available resources are finite and must be mobilised to meet the increasing demands. High rate of utilisation of water resources can result in overuse which may have irreversible effects (e.g..: intrusion of sea water in coastal aquifers).

A macroscopic index such as the water resources exploitation index illustrates the tensions between offer and demand (pressure indicator) on the one hand, and the current and potential degree of water management (response indicator) on the other. It is expressed by the ratio of the amount of samples (freshwater) over the average flow of renewable resources (aggregate of quantity of water received over an average year). Exploitation indices are quite different, from 2% in former Yugoslavia to over 100% in some Southern and Eastern countries (Israel 106%, Libya 157%). This index may be enhanced by the consumption index (ratio of final consumption/average flow of resources). These indices are different if they apply to the country as a whole. For example in Libya, the exploitation index reaches 644%.

In the Mediterranean Basin, the exploitation index illustrates highly contrasted situations in terms of both pressure and resources management. Interpretation is rendered difficult by its intimate interconnection to the evolution of socio-economic and political components; the following explanatory tools may be proposed:

| Value | Pressure indicator for water | Response indicator of water management |
|---|---|---|
| < 20% | – low to moderate pressures | – little or no management regulation |
| 20% à 50% | – average pressure revealing tensions for quantity and quality (used water returns increase with samples) | – security-oriented development and protection of water resources quality |
| 50% à 100% | – pressures are strong or limited (saturation risk for existing resources)<br>– strong localised pressure on quality | – intensification of development and more collective and directed management of water resources<br>– utilisation of non-conventional sources |
| >100% | – chronic shortage or global overutilisation<br>– reduction in the level of underground reservoirs: risk of irreversibility | – sequential space distribution of water consuming activities (e.g.. Israel)<br>– exploitation of fossil aquifers (e.g.. Libya) or possible importation |

Both indices reveal the extent of future problems in water management in a given region: more or less strong presumption of critical situations (shortages), either conjectural or chronic, relative impact of economic cost associated with water management, supply, sanitation.

## Precautions for use

This index gives average values at the level of the hydrographic basin in each Mediterranean country, where it may mask local and conjectural critical situations. Furthermore, its significance is different according to the size and physical and economic structures of water resources management in each country. Samples, and the related calculated index, refer to a specific year; the significance of such indices is weakened by the lack of synchronisation of data presented in the table (the value years vary from country to country from 1980 to 1990).

**Programme des Nations Unies pour l'Environnement**
***United Nations Environment Programme***

**Plan d'Action pour la Méditerranée**
***Mediterranean Action Plan***

**Centre d'Activités Régionales du Plan Bleu**
***Blue Plan Regional Activity Centre***

PNUE

Neuvième réunion ordinaire des Parties contractantes à la Convention pour la protection de la mer Méditerranée contre la pollution et aux protocoles y relatifs

Barcelone, 5-10 juin 1995

UNEP(OCA)/MED IG.5/Inf.5
30 avril 1995

Original : FRANÇAIS

# Observation et évaluation de l'environnement et du développement en Méditerranée (Phase préparatoire)

# *Observation and evaluation of environment and development in the Mediterranean (Preparatory phase)*

## Indicateurs Méditerranéens

**Addendum au Fascicule 4 :**

## Le suivi de l'Agenda 21 pour les pays méditerranéens

Fiche 1 : Économie
Fiche 2 : Énergie
Fiche 3 : Population
Fiche 4 : Santé
Fiche 5 : Population urbaine
Fiche 6 : Utilisation agricole des terres
Fiche 7 : Forêts
Fiche 8 : Incendies de Forêts
Fiche 9 : Intrants Agricoles
Fiche 10 : Biodiversité
Fiche 11 : Littoralisation
Fiche 12 : Pollution des eaux côtières
Fiche 13 : Irrigation
Fiche 14 : Ressources en eau

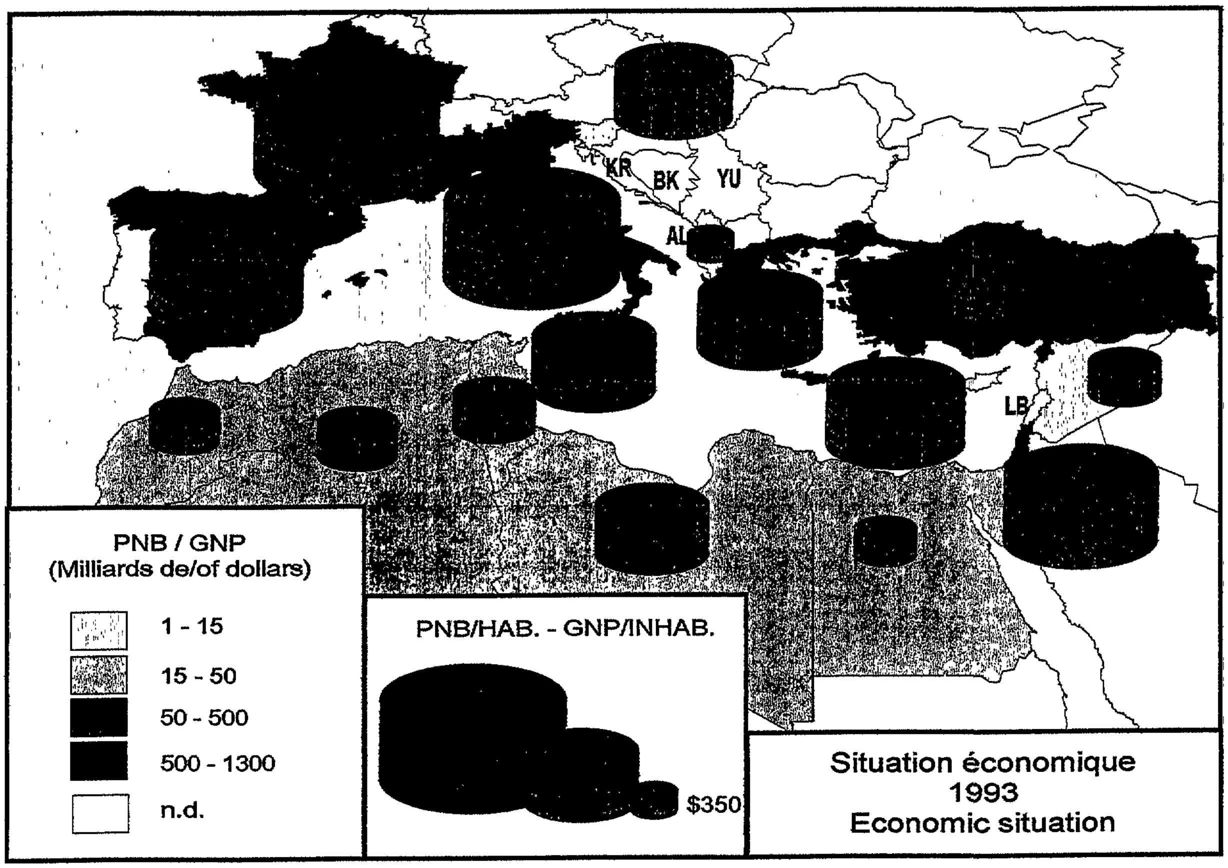
## *Mediterranean Indicators*

***Addendum to Fascicle 4:***

## *Follow-up of Agenda 21 for the Mediterranean Countries*

*Sheet 1 : Economy*
*Sheet 2 : Energy*
*Sheet 3 : Population*
*Sheet 4 : Health*
*Sheet 5 : Urban population*
*Sheet 6 : Agricultural Land Use*
*Sheet 7 : Forest*
*Sheet 8 : Forest Fires*
*Sheet 9 : Agricultural Inputs*
*Sheet 10 : Biodiversity*
*Sheet 11 : Littoralisation*
*Sheet 12 : Coastal Water Pollution*
*Sheet 13 : Irrigation*
*Sheet 14 : Water resources*

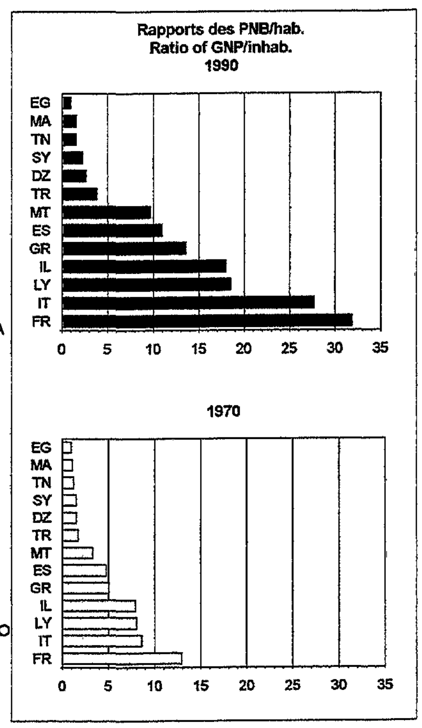
## Fiche 1 / Sheet 1



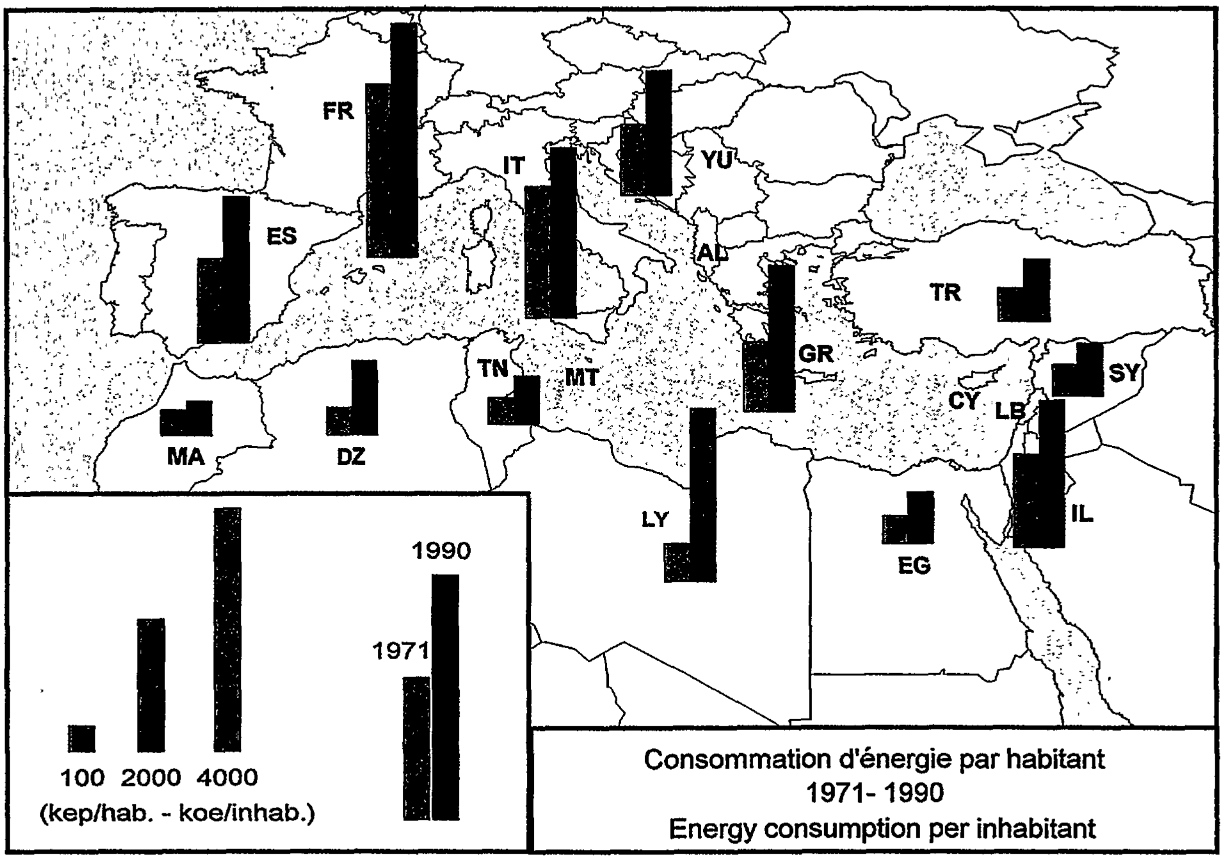

| | Produit National Brut<br>Gross National Product<br>(millions de dollars)<br>(millions of dollars) | | | Produit National Brut par habitant<br>Gross National Product per capita<br>(Dollars) | | | |
|---|---|---|---|---|---|---|---|
| | 1970 | 1990 | 1993 | 1970 | 1990 | 1993 | |
| ESPAGNE | 37 157 | 435 562 | 534 056 | 1 100 | 11 180 | 13 650 | SPAIN |
| FRANCE | 151 301 | 1 120 516 | 1 289 054 | 2 980 | 19 750 | 22 360 | FRANCE |
| ITALIE | 107 106 | 990 040 | 1 134 821 | 1 990 | 17 170 | 19 620 | ITALY |
| MALTE | 248 | 2 404 | 2 610 (2) | 760 | 6 790 | 7 310 (2) | MALTA |
| SLOVENIE | n.d. | n.d. | 12 576 | n.d. | n.d. | 6 310 | SLOVENIA |
| ALBANIE | n.d. | n.d. | 1 163 | n.d. | n.d. | 340 | ALBANIA |
| GRECE | 10 288 | 60 736 | 76 679 | 1 170 | 6 020 | 7 390 | GREECE |
| CHYPRE | n.d. | 5 904 | 7 259 (3) | n.d. | 8 410 | 10 110 (3) | CYPRUS |
| TURQUIE | 14 128 | 93 123 | 126 652 | 400 | 1 660 | 2 130 | TURKEY |
| SYRIE | 2 253 | 11 995 | 14 784 (2) | 360 | 990 | 1 180 (2) | SYRIA |
| ISRAEL | 5 442 | 53 418 | 72 667 | 1 830 | 11 500 | 13 760 | ISRAEL |
| EGYPTE | 7 602 | 32 504 | 36 792 | 230 | 620 | 660 | EGYPT |
| LIBYE | 3 694 | 24 348 (1) | n.d. | 1 860 | 5 540 (1) | n.d. | LIBYA |
| TUNISIE | 1 436 | 11 707 | 15 324 | 280 | 1 450 | 1 780 | TUNISIA |
| ALGERIE | 4 949 | 59 524 | 44 355 | 360 | 2 380 | 1 650 | ALGERIA |
| MAROC | 3 981 | 24 840 | 27 523 | 260 | 990 | 1 030 | MOROCCO |

(1) : 1889, (2) : 1991, (3) : 1992

Source : Banque Mondiale 1994 / World Bank 1994



## Fiche 2 / Sheet 2

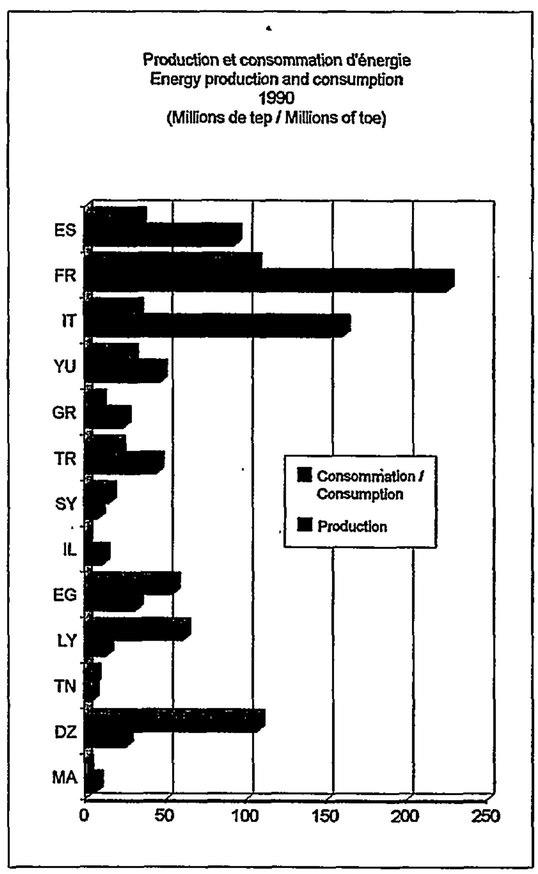



Consommation d'énergie par habitant
1971- 1990
Energy consumption per inhabitant

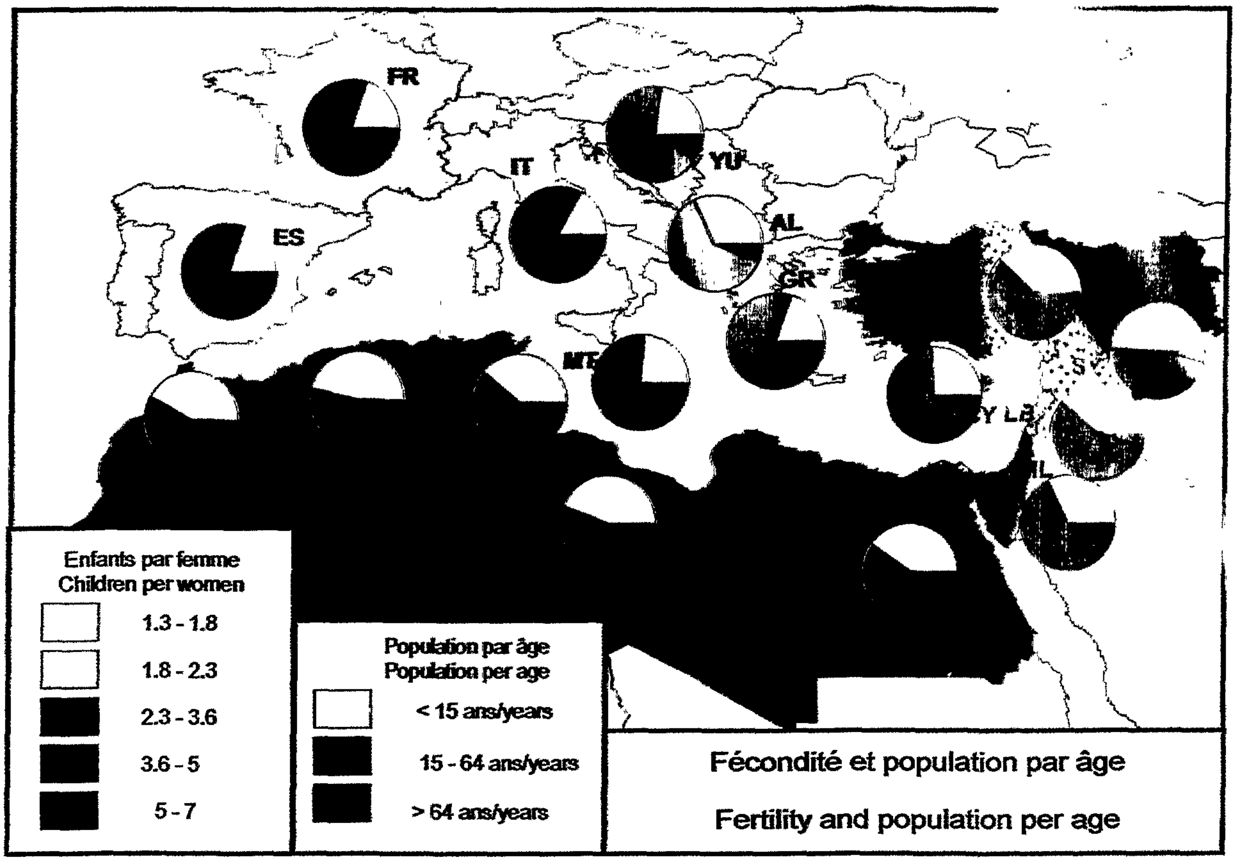
Consommation et production d'énergie
Energy consumption and production

| | 1971 | | | 1990 | | | |
|---|---|---|---|---|---|---|---|
| | Consommation / Consumption (Mtep / Mtoe) | Cons. par hab. / Cons. per inhab. (kep/habitant - koe/inhab.) | Production (Mtep / Mtoe) | Consommation / Consumption (Mtep / Mtoe) | Cons. par hab. / Cons. per inhab. (kep/habitant - koe/inhab.) | Production (Mtep / Mtoe) | |
| ESPAGNE | 48 | 1221 | 14 | 93 | 2381 | 33 | SPAIN |
| FRANCE | 161 | 2873 | 50 | 225 | 4016 | 105 | FRANCE |
| ITALIE | 120 | 2095 | 25 | 161 | 2816 | 32 | ITALY |
| EX-YOUG. | 23 | 953 | 15 | 47 | 1968 | 29 | EX-YUG. |
| GRECE | 10 | 948 | 2 | 24 | 2378 | 9 | GREECE |
| TURQUIE | 14 | 251 | 8 | 45 | 797 | 21 | TURKEY |
| SYRIE | 3 | 217 | 5 | 8 | 617 | 15 | SYRIA |
| ISRAEL | 6 | 1382 | 6 | 11 | 2392 | 0 | ISRAEL |
| EGYPTE | 8 | 150 | 16 | 32 | 601 | 55 | EGYPT |
| LIBYE | 2 | 348 | 137 | 13 | 2884 | 61 | LIBYA |
| TUNISIE | 1 | 122 | 4 | 4 | 532 | 5 | TUNISIA |
| ALGERIE | 4 | 148 | 40 | 25 | 1016 | 107 | ALGERIA |
| MAROC | 3 | 106 | 1 | 7 | 267 | 1 | MOROCCO |

Source : IAEA



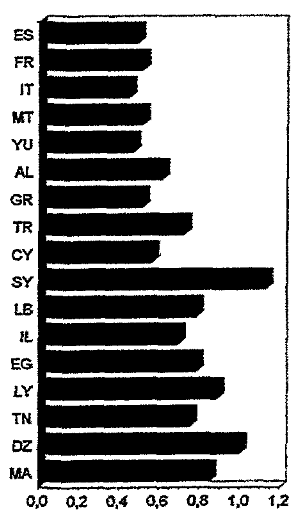
## Fiche 3 / Sheet 3




**INDICATEURS DEMOGRAPHIQUES / DEMOGRAPHIC INDICATORS 1991**

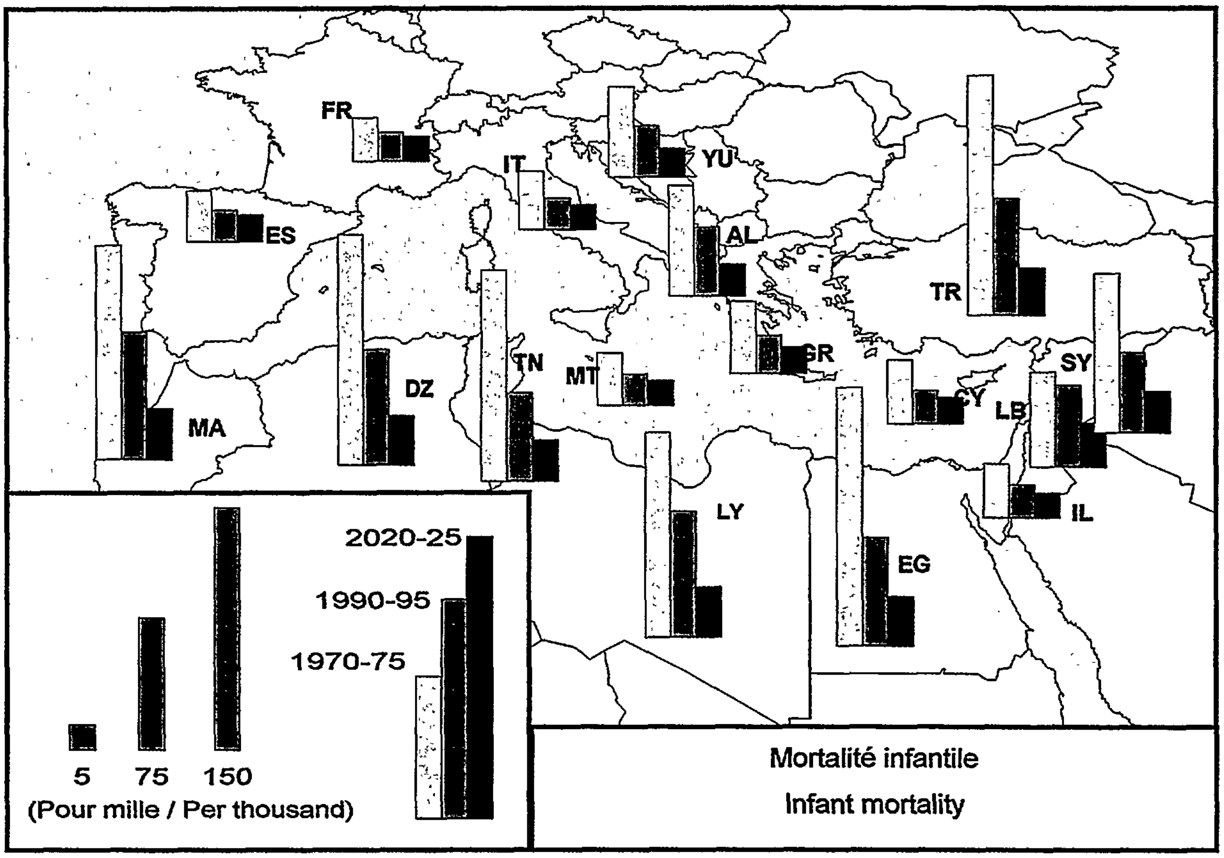
| | Population millions | Taux de natalité / Birth rate pour 1000 hab. / per 1000 inhab. | Taux de mortalité / Death rate pour 1000 hab. / per 1000 inhab. | Taux de mortalité infantile / Infant death rate pour 1000 naissances / per 1000 births | Indice synthétique de fécondité / Fertility rate enfants par femmes / children per woman | % inf 15 ans / % under 15 | % sup 64 ans / % over 64 | Espérance de vie / Life expectancy années / years | Densité / Density (habitants/km²) /(inhabitants/km²) | |
|---|---|---|---|---|---|---|---|---|---|---|
| ESPAGNE | 39,0 | 11 | 8 | 8,3 | 1,3 | 20 | 13 | 76 | 77 | SPAIN |
| FRANCE | 56,7 | 14 | 9 | 7,2 | 1,8 | 20 | 14 | 77 | 104 | FRANCE |
| ITALIE | 57,7 | 10 | 9 | 8,8 | 1,3 | 17 | 14 | 76 | 192 | ITALY |
| MALTE | 0,4 | 16 | 7 | 10,4 | 2,2 | 24 | 10 | 75 | 1 333 | MALTA |
| EX-YOUGOSLAVIE | 23,9 | 14 | 9 | 24,3 | 1,9 | 23 | 9 | 71 | 93 | EX-YUGOSLAVIA |
| ALBANIE | 3,3 | 25 | 6 | 25,2 | 3,0 | 32 | 6 | 72 | 114 | ALBANIA |
| GRECE | 10,1 | 10 | 9 | 9,8 | 1,5 | 20 | 14 | 77 | 77 | GREECE |
| TURQUIE | 58,5 | 30 | 8 | 62,0 | 3,7 | 38 | 4 | 64 | 75 | TURKEY |
| CHYPRE | 0,7 | 18 | 9 | 11,0 | 2,3 | 26 | 10 | 76 | 78 | CYPRUS |
| SYRIE | 12,8 | 43 | 5 | 37,0 | 6,7 | 49 | 4 | 69 | 69 | SYRIA |
| LIBAN | 3,4 | 28 | 7 | 48,0 | 3,6 | 39 | 5 | 68 | 340 | LEBANON |
| ISRAEL | 4,9 | 22 | 6 | 10,0 | 3,0 | 32 | 9 | 76 | 233 | ISRAEL |
| EGYPTE | 54,6 | 38 | 9 | 73,0 | 4,5 | 40 | 4 | 57 | 55 | EGYPT |
| LIBYE | 4,4 | 37 | 7 | 64,0 | 5,2 | 44 | 3 | 67 | 3 | LIBYA |
| TUNISIE | 8,4 | 29 | 7 | 48,0 | 4,1 | 39 | 4 | 64 | 51 | TUNISIA |
| ALGERIE | 26,0 | 35 | 8 | 74,0 | 5,4 | 46 | 4 | 64 | 11 | ALGERIA |
| MAROC | 26,2 | 34 | 9 | 75,0 | 4,5 | 42 | 4 | 62 | 59 | MOROCCO |

**INDICE DE DEPENDANCE ECONOMIQUE**
**INDEX OF ECONOMIC DEPENDANCE**
**1991**



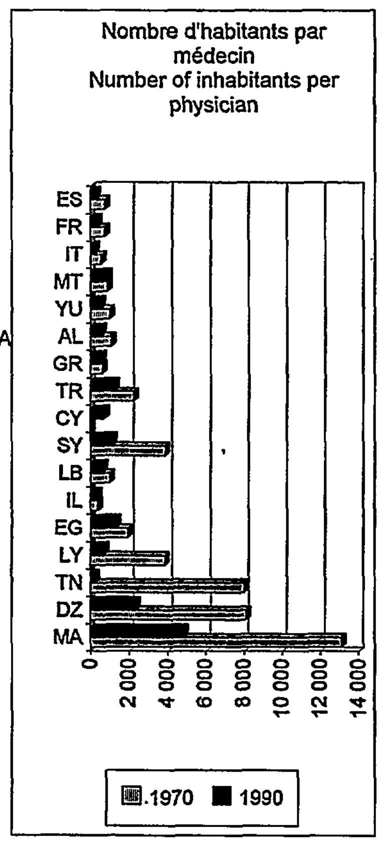

Source : INED Populations & Sociétés, Tous les pays du monde (1991), Juillet-Août 1991

## Fiche 4 / Sheet 4

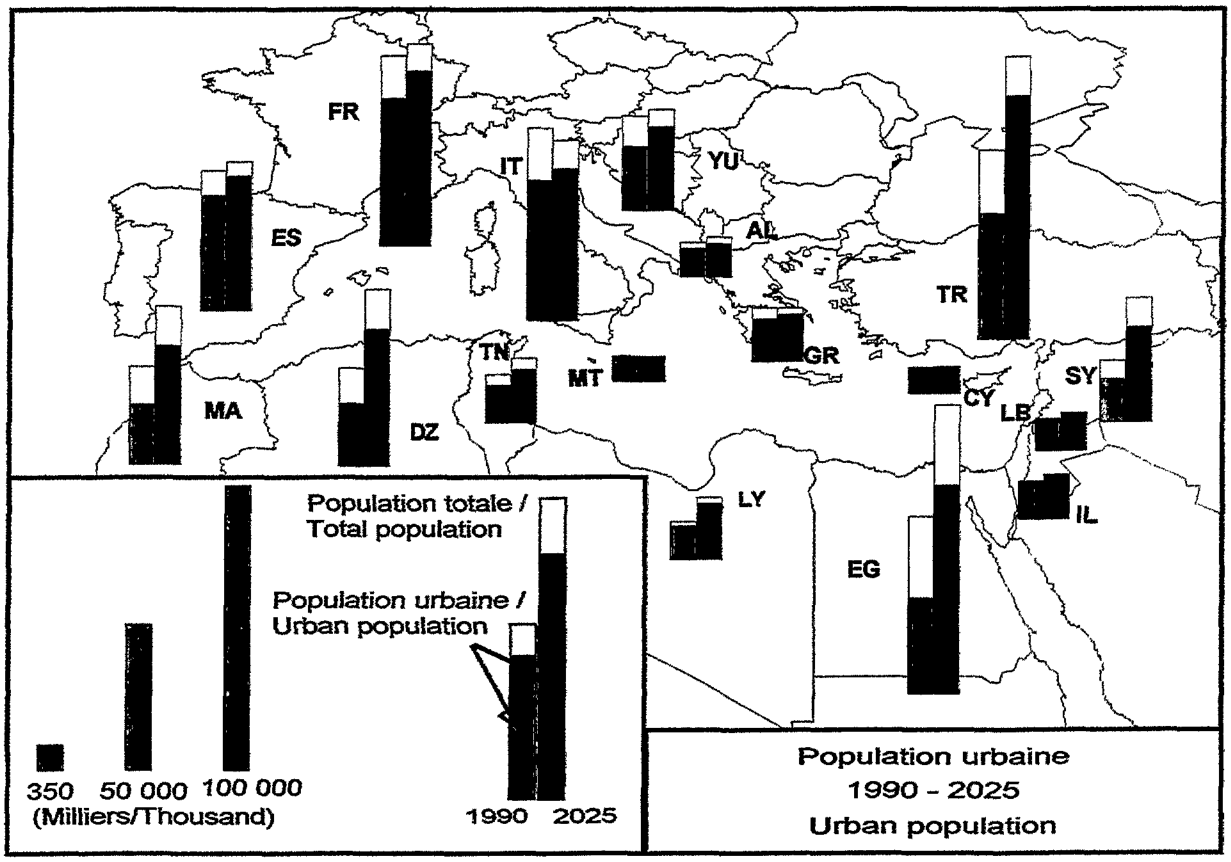



| | Mortalité infantile (Pour mille) Infant mortality (Per thousand) | | | Habitants par médecin Inhabitants per physician | | |
|---|---|---|---|---|---|---|
| | 1970-75 | 1990-95 | 2020-25 | 1970 | 1990 | |
| ESPAGNE | 21 | 9 | 6 | 750 | 280 | SPAIN |
| FRANCE | 16 | 7 | 5 | 750 | 350 | FRANCE |
| ITALIE | 26 | 9 | 5 | 550 | 210 | ITALY |
| MALTE | 22 | 9 | 5 | 900 | 877 | MALTA |
| EX-YOUGOSLAVIE | 45 | 21 | 7 | 1 000 | 549 | EX-YUGOSLAVIA |
| ALBANIE | 58 | 32 | 9 | 1 070 | 585 | ALBANIA |
| GRECE | 34 | 13 | 6 | 620 | 580 | GREECE |
| TURQUIE | 138 | 62 | 19 | 2 230 | 1 260 | TURKEY |
| CHYPRE | 29 | 10 | 6 | | 746 | CYPRUS |
| SYRIE | 88 | 39 | 15 | 3 860 | 1 160 | SYRIA |
| LIBAN | 48 | 40 | 17 | 1 010 | 670 | LEBANON |
| ISRAEL | 23 | 10 | 5 | 410 | 345 | ISRAEL |
| EGYPTE | 150 | 57 | 20 | 1 920 | 1 320 | EGYPT |
| LIBYE | 117 | 68 | 21 | 3 864 | 693 | LIBYA |
| TUNISIE | 120 | 44 | 15 | 8 000 | 230 | TUNISIA |
| ALGERIE | 132 | 61 | 20 | 8 100 | 2 330 | ALGERIA |
| MAROC | 122 | 68 | 21 | 13 090 | 4 840 | MOROCCO |

Source : U.N. World Population Prospects, World Bank

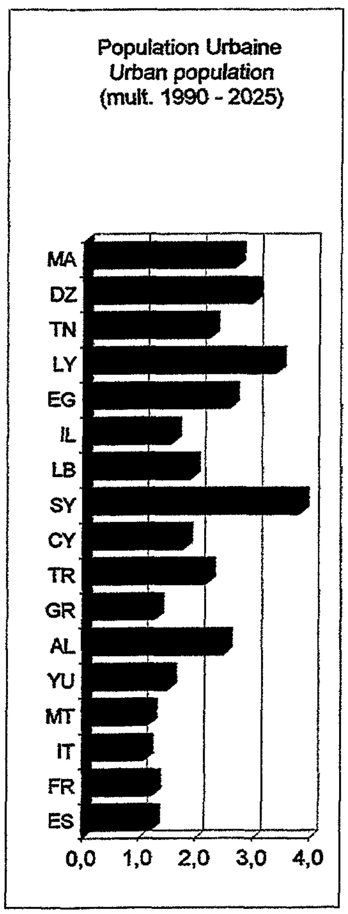


## Fiche 5 / Sheet 5



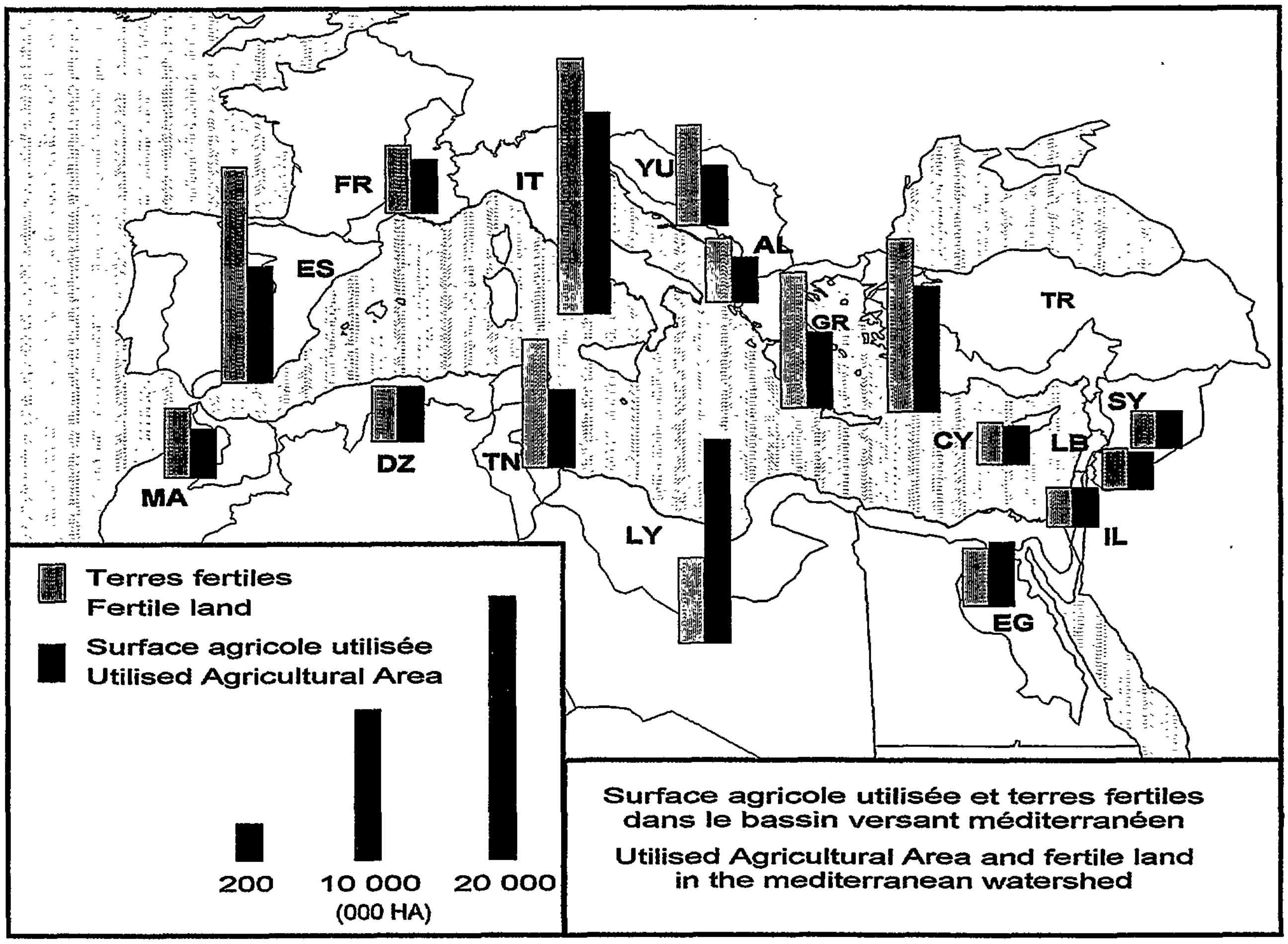

| | Population urbaine / Urban population (000) | | Taux d'urbanisation / Urban rate (%) | | Multiplicateur / Multiplier | |
|---|---|---|---|---|---|---|
| | 1990 | 2 025 | 1 990 | 2 025 | 2025/1990 | |
| ESPAGNE | 30 724 | 37 514 | 78 | 89 | 1,2 | SPAIN |
| FRANCE | 41 689 | 51 112 | 74 | 85 | 1,2 | FRANCE |
| ITALIE | 39 336 | 43 404 | 69 | 82 | 1,1 | ITALY |
| MALTE | 308 | 362 | 87 | 93 | 1,2 | MALTA |
| EX-YOUG. | 13 352 | 20 125 | 56 | 77 | 1,5 | EX-YUG. |
| ALBANIE | 1 143 | 2 834 | 35 | 57 | 2,5 | ALBANIA |
| GRECE | 6 276 | 7 960 | 62 | 79 | 1,3 | GREECE |
| TURQUIE | 34 274 | 74 588 | 61 | 85 | 2,2 | TURKEY |
| CHYPRE | 370 | 660 | 53 | 74 | 1,8 | CYPRUS |
| SYRIE | 6 321 | 24 109 | 50 | 71 | 3,8 | SYRIA |
| LIBAN | 2 261 | 4 303 | 84 | 91 | 1,9 | LEBANON |
| ISRAEL | 4 214 | 6 614 | 92 | 96 | 1,6 | ISRAEL |
| EGYPTE | 24 466 | 63 130 | 47 | 70 | 2,6 | EGYPT |
| LIBYE | 3 189 | 10 858 | 70 | 85 | 3,4 | LIBYA |
| TUNISIE | 4 445 | 9 898 | 54 | 73 | 2,2 | TUNISIA |
| ALGERIE | 12 912 | 38 470 | 52 | 74 | 3,0 | ALGERIA |
| MAROC | 12 033 | 32 231 | 48 | 71 | 2,7 | MOROCCO |
| TOTAL | 237 313 | 428 172 | 62 | 78 | 1,8 | TOTAL |

Source : U.N. World population prospects




Plan Bleu / Blue Plan 1995

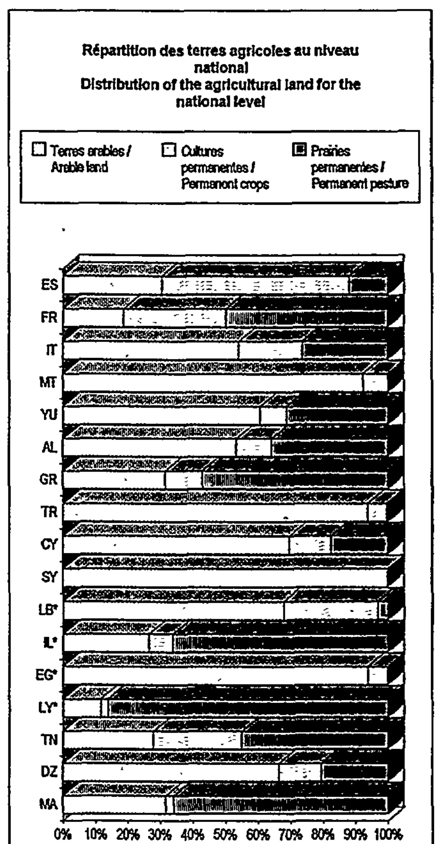
## Fiche 6 / Sheet 6



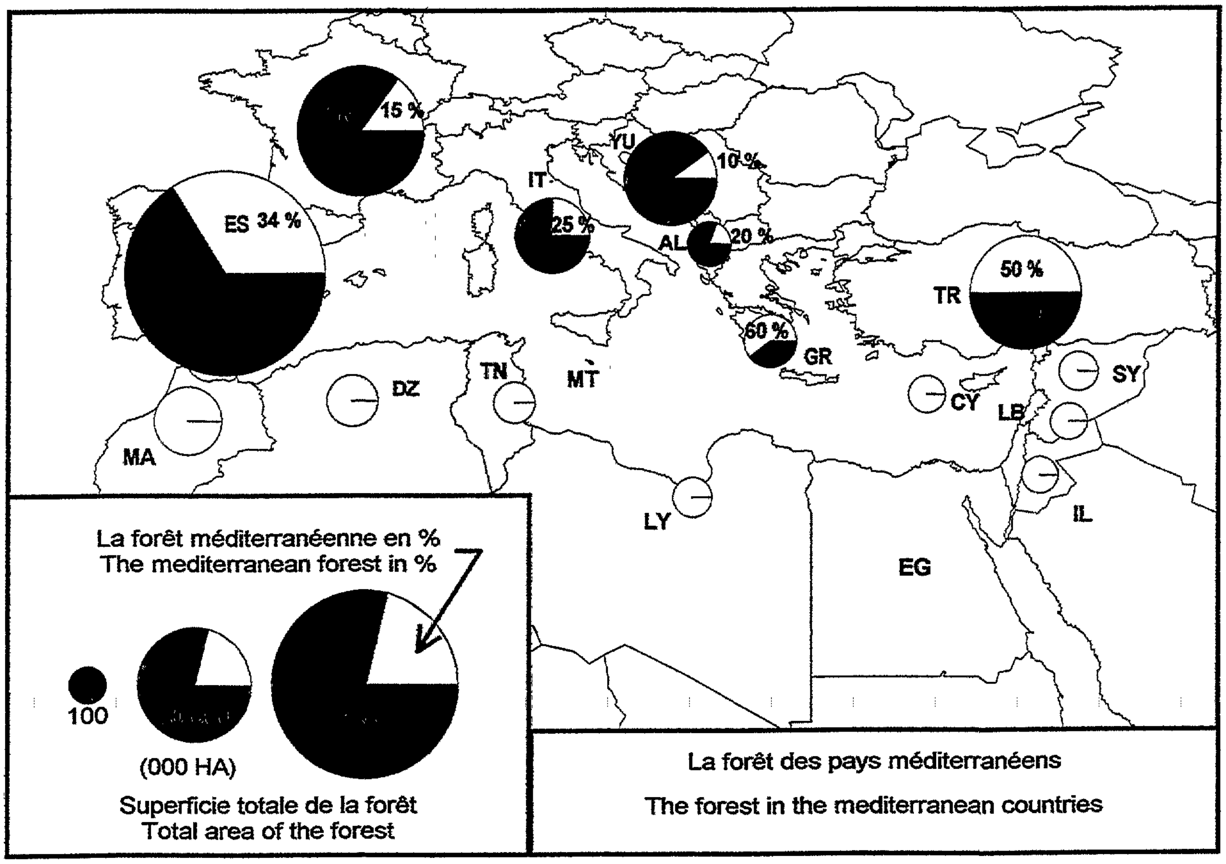

Utilisation des terres agricoles dans les régions méditerranéennes
Use of the agricultural land in the mediterranean regions
(000 HA)

| | Terres cultivées / Cultivated land (a+b) | % de la Superficie Totale / % of the total area | Terres Arables / Arable land (a) | dont terres irriguées / incl. irrigated land | Cultures permanentes / Permanent crops (b) | Prairies Permanentes / Permanent Pasture (c) | |
|---|---|---|---|---|---|---|---|
| ESPAGNE | 3 981 | 42% | 1 377 | 907 | 2 604 | 544 | SPAIN |
| FRANCE | 924 | 20% | 344 | 216 | 580 | 924 | FRANCE |
| ITALIE | 10 316 | 46% | 7 573 | 1 345 | 2 743 | 3 703 | ITALY |
| MALTE* | 13 | 41% | 12 | 1 | 1 | 0 | MALTA |
| EX-YOUG. | 2 224 | 20% | 1 961 | | 263 | 1 017 | EX-YUG. |
| ALBANIE* | 713 | 26% | 592 | 392 | 121 | 400 | ALBANIA |
| GRECE* | 3 940 | 30% | 2 900 | 1 099 | 1 040 | 5 271 | GREECE |
| TURQUIE | 7 560 | 34% | 7 112 | 1 146 | 448 | 34 | TURKEY |
| CHYPRE* | 432 | 47% | 365 | 94 | 67 | 93 | CYPRUS |
| SYRIE | 215 | 51% | 215 | 50 | 0 | 0 | SYRIA |
| LIBAN* | 300 | 29% | 210 | 86 | 90 | 10 | LEBANON |
| ISRAEL* | 418 | 21% | 327 | 271 | 91 | 818 | ISRAEL |
| EGYPTE* | 2 652 | 3% | 2 486 | 2 486 | 166 | 0 | EGYPT |
| LIBYE* | 2 127 | 1% | 1 787 | 234 | 340 | 13 300 | LIBYA |
| TUNISIE | 1 968 | 43% | 1 002 | 93 | 966 | 1 627 | TUNISIA |
| ALGERIE | 2 731 | 40% | 2 279 | 143 | 452 | 709 | ALGERIA |
| MAROC | 880 | 21% | 816 | 96 | 64 | 1 696 | MOROCCO |

Source : Publications nationales / National publications(années/years 80-85)
*niveau national / national level



## Fiche 7 / Sheet 7

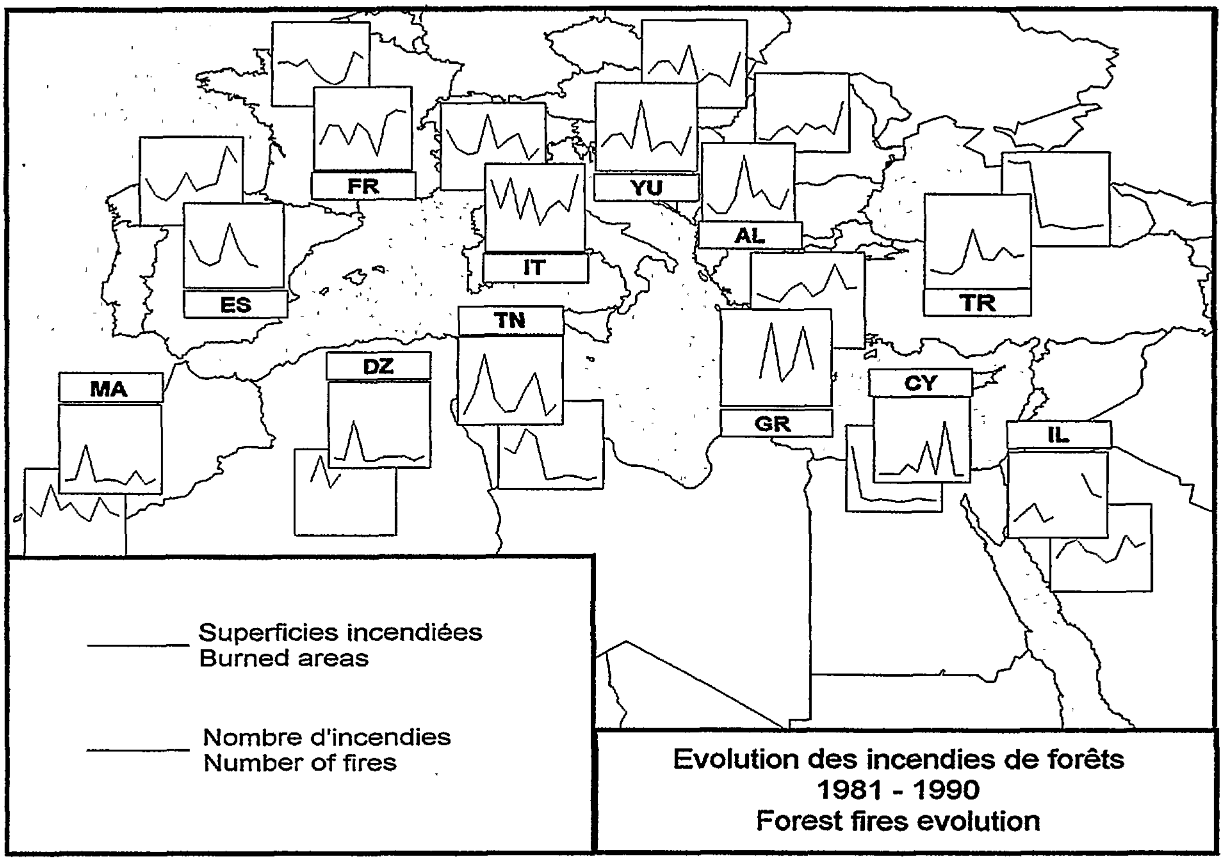



Etat de la forêt méditerranéenne / Status of the mediterranean forest

| | Total area<br>Surface Totale | Woodland<br>Terrains Boisés | Percent of land area forested<br>Taux de boisement | Area of the mediterranean zone<br>Surface de la zone méditerranéenne | | Area of mediterranean maquis and forest<br>Surfaces des forêts et maquis méditerranéens | Percent of land area forested in the mediterranean zone<br>Taux de boisement en zone méditerranéenne | Percent of mediterranean maquis and forest<br>Pourcentage des forêts et maquis méditerranéens | |
|---|---|---|---|---|---|---|---|---|---|
| | (1000 ha) | (1000 ha) | (%) | (1000 ha) | (%) | (1000 ha) | (%) | (%) | |
| ESPAGNE | 50 478 | 26 818 | 53 | 40 000 | 79 | 9 200 | 23 | 34 | SPAIN |
| FRANCE | 54 703 | 14 576 | 27 | 5 000 | 9 | 2 186 | 44 | 15 | FRANCE |
| MALTE | 71 655 | 5 190 | 7 | 30 000 | 42 | 5 190 | 17 | 100 | ITALY |
| ITALIE | 30 125 | 6 146 | 20 | 10 000 | 33 | 1 570 | 16 | 26 | MALTA |
| EX- YOUG. | 25 580 | 9 071 | 35 | 4 000 | 16 | 960 | 24 | 11 | EX-YUG. |
| ALBANIE | 2 875 | 1 250 | 43 | 2 000 | 70 | 248 | 12 | 20 | ALBANIA |
| GRECE | 13 200 | 2 608 | 20 | 10 000 | 76 | 1 568 | 16 | 60 | GREECE |
| TURQUIE | 75 058 | 12 273 | 16 | 48 000 | 64 | 6 051 | 13 | 49 | TURKEY |
| CHYPRE | 925 | 171 | 18 | 925 | 100 | 171 | 18 | 100 | CYPRUS |
| SYRIE | 18 518 | 440 | 2 | 5 000 | 27 | 440 | 9 | 100 | SYRIA |
| LIBAN | 1 040 | 95 | 9 | 1 040 | 100 | 95 | 9 | 100 | LEBANON |
| ISRAEL | 2 077 | 116 | 6 | 1 000 | 48 | 116 | 12 | 100 | ISRAEL |
| EGYPTE | 100 145 | 2 | 0 | 5 000 | 5 | 2 | 0 | 100 | EGYPT |
| LIBYE | 175 954 | 501 | 0 | 10 000 | 6 | 501 | 5 | 100 | LIBYA |
| TUNISIE | 16 360 | 840 | 5 | 10 000 | 61 | 840 | 8 | 100 | TUNISIA |
| ALGERIE | 238 174 | 2 424 | 1 | 30 000 | 13 | 2 424 | 8 | 100 | ALGERIA |
| MAROC | 31 | 0 | 0 | 31 | 100 | 0 | 0 | | MOROCCO |
| TOTAL | 876 898 | 82 521 | 9 | 211 996 | 24 | 31 562 | 15 | 38 | TOTAL |

Source : Marchand H., Plan Bleu 1988, Le Houérou H. N. 1980, Quézel P. 1985

## Fiche 8 / Sheet 8

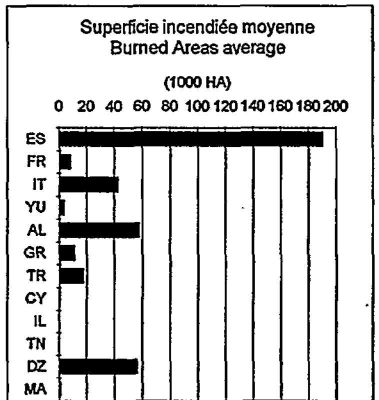


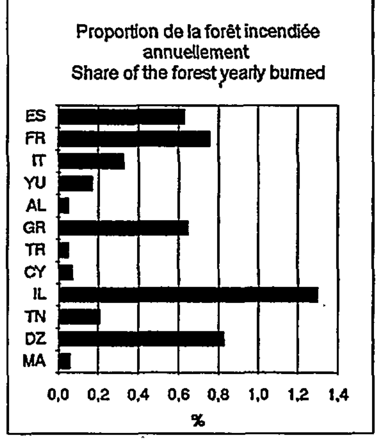

| | | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ESPAGNE | 1 | 282 730 | 143 290 | 107 080 | 139 490 | 403 887 | 226 113 | 122 270 | 101 130 | n.d. | n.d. |
| SPAIN | 2 | 10 882 | 6 443 | 4 880 | 7 224 | 12 284 | 7 574 | 8 679 | 9 595 | 19 405 | 15 141 |
| FRANCE | 1 | 27 710 | 55 140 | 53 720 | 27 200 | 57 370 | 45 340 | 10 390 | 67 010 | 75 560 | 72 700 |
| FRANCE | 2 | 5 173 | 5 308 | 4 659 | 5 672 | 3 732 | 2 646 | 2 115 | 2 827 | 6 743 | 5 878 |
| ITALIE | 1 | 86 660 | 48 620 | 89 990 | 34 130 | 75 810 | 26 700 | 48 490 | 59 210 | 44 650 | 95 160 |
| ITALY | 2 | 14 503 | 9 557 | 7 956 | 8 482 | 18 664 | 9 388 | 11 972 | 13 542 | 6 456 | 9 479 |
| EX-YOUG. | 1 | 12 170 | 19 360 | 20 590 | 10 310 | 42 790 | 8 970 | 14 180 | 14 890 | 6 390 | 25 300 |
| EX-YUG. | 2 | 759 | 1 063 | 1 080 | 729 | 1 514 | 501 | 746 | 668 | 408 | 1 327 |
| ALBANIE | 1 | 190 | 50 | 50 | 270 | 900 | 290 | 390 | 170 | 120 | 420 |
| ALBANIA | 2 | 42 | 35 | 96 | 119 | 71 | 134 | 102 | 121 | 70 | 269 |
| GRECE | 1 | 74 570 | n.d. | n.d. | 25 310 | 92 470 | 21 170 | 37 270 | 88 350 | 36 040 | n.d. |
| GREECE | 2 | 1 159 | 1 045 | 968 | 1 284 | 1 442 | 1 082 | 1 266 | 1 898 | 1 284 | 1 322 |
| TURQUIE | 1 | 5 470 | 4 020 | 3 560 | 7 360 | 26 010 | 11 040 | 10 750 | 17 030 | 12 350 | 13 000 |
| TURKEY | 2 | 9 820 | 9 510 | 9 680 | 1 430 | 1 790 | 1 530 | 1 310 | 1 370 | 1 630 | 1 730 |
| CHYPRE | 1 | 20 | 30 | 20 | 160 | 50 | 470 | 10 | 750 | 10 | 10 |
| CYPRUS | 2 | 800 | 100 | 60 | 80 | 70 | 50 | 60 | 90 | 70 | 60 |
| ISRAEL | 1 | 570 | 990 | 1 520 | 520 | 760 | n.d. | n.d. | 3 130 | 2 040 | 1 850 |
| ISRAEL | 2 | 730 | 1 120 | 1 230 | 910 | 830 | 600 | 720 | 1 350 | 1 020 | 1 130 |
| TUNISIE | 1 | 270 | 1 630 | 4 270 | 1 240 | 410 | 460 | 1 910 | 3 020 | 150 | 870 |
| TUNISIA | 2 | 920 | 760 | 1 410 | 1 210 | 80 | 110 | 180 | 160 | 60 | 120 |
| ALGERIE | 1 | 17 360 | 9 390 | 221 370 | 4 730 | 4 670 | 21 540 | 23 300 | 27 760 | 3 240 | 28 050 |
| ALGERIA | 2 | n.d. | 640 | 990 | 560 | 750 | n.d. | n.d. | n.d. | n.d. | n.d. |
| MAROC | 1 | 1 780 | 2 050 | 11 290 | 1 460 | 1 970 | 1 860 | 680 | 4 220 | 820 | 2 120 |
| MOROCCO | 2 | 230 | 180 | 350 | 210 | 250 | 180 | 150 | 280 | 200 | 180 |

1 Superficie incendiées / Burned areas (HA)

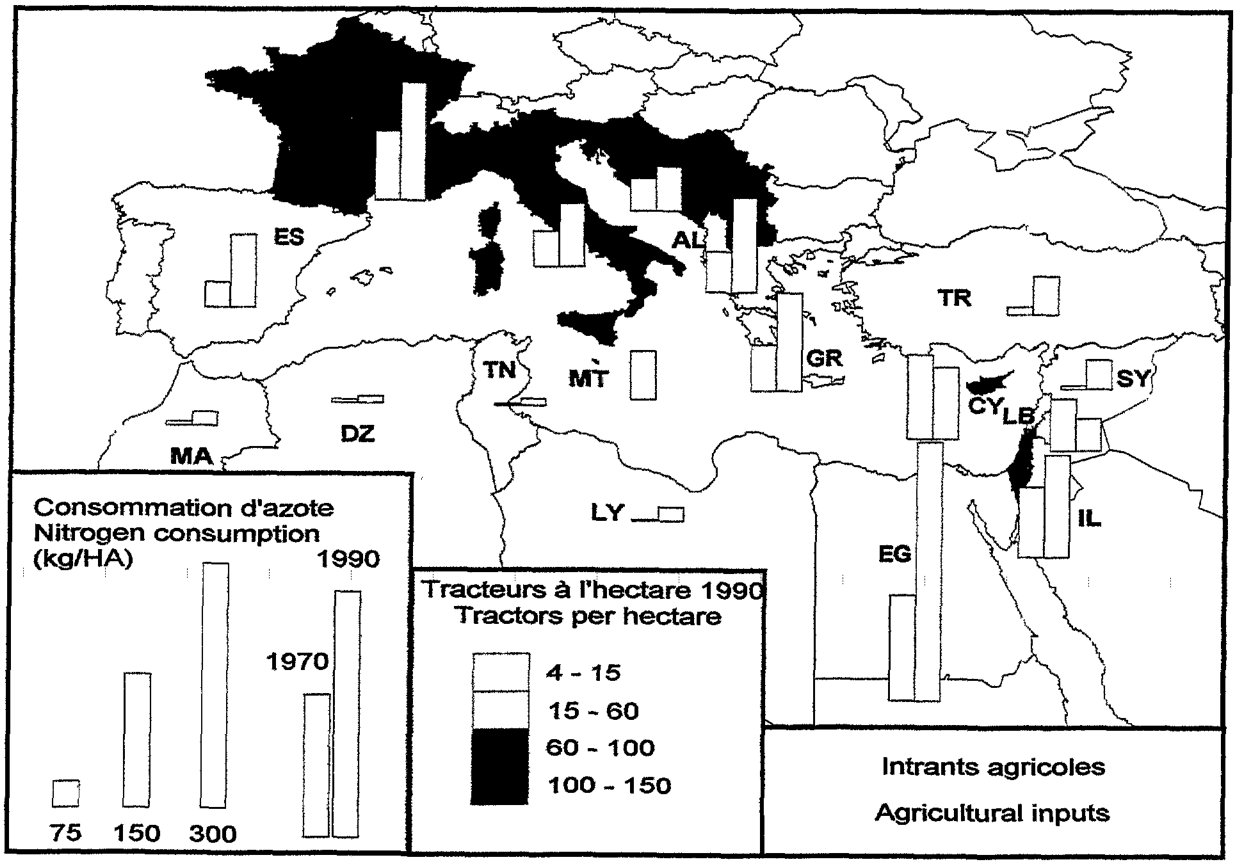
2 Nombre d'incendies / Number of fires

Source: FAO, Forestry Departement Publication



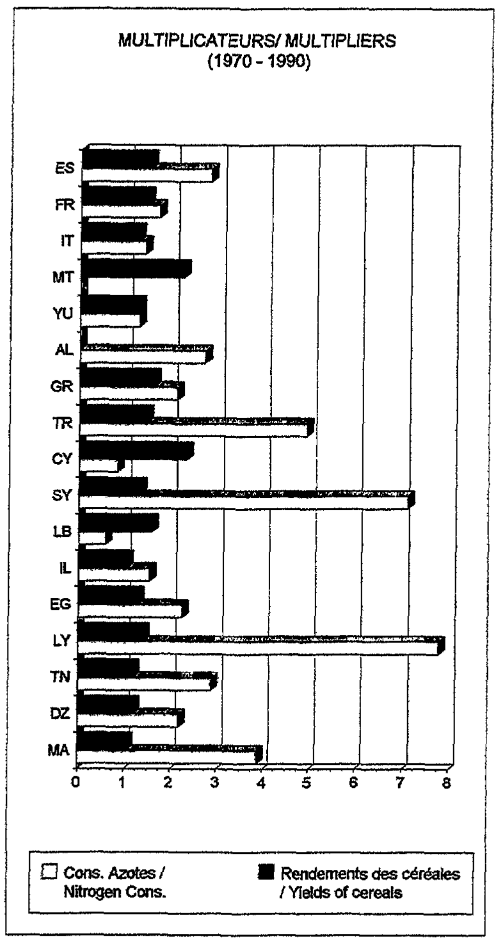
## Fiche 9 / Sheet 9



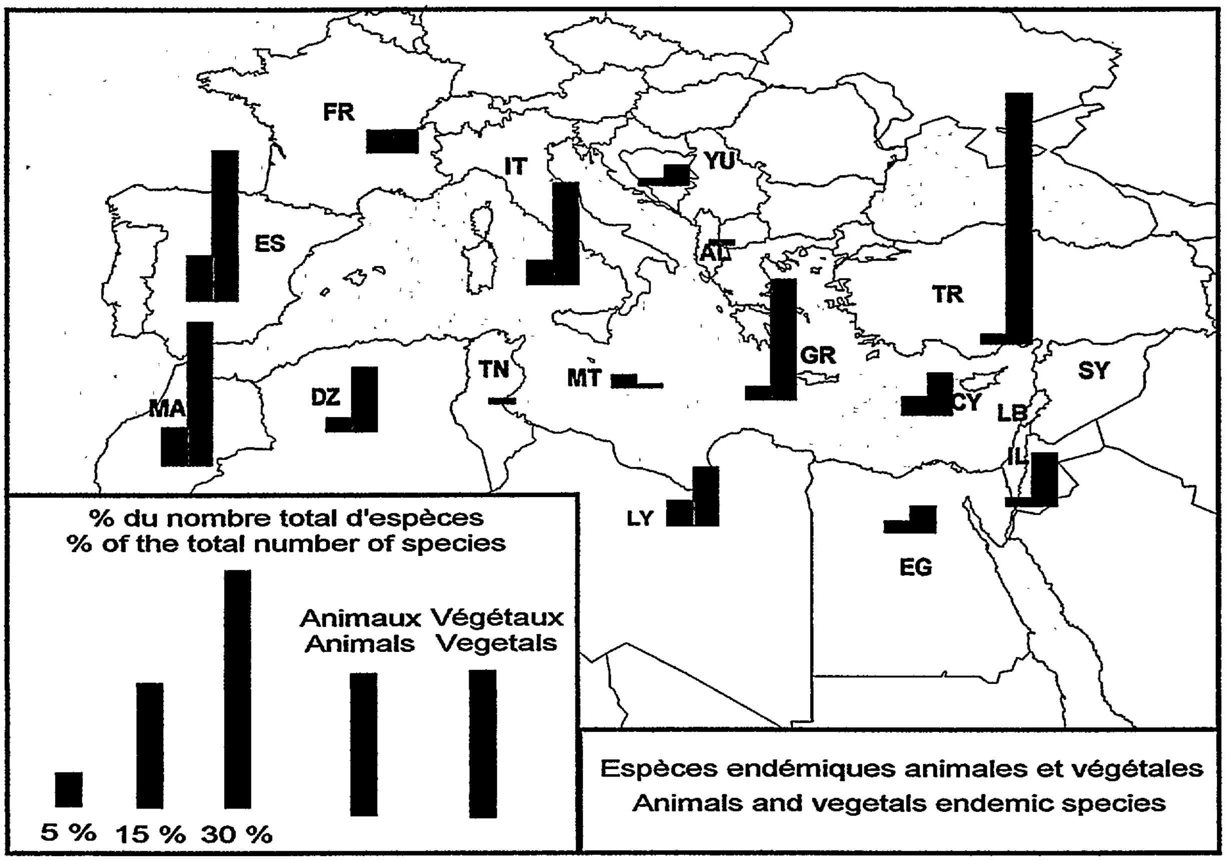

INTRANTS AGRICOLES ET RENDEMENT1990
AGRICULTURAL INPUTS AND YIELDS

| | Consommation d'engrais / Fertilizer consumption | | | | Tracteurs / Tractors | | Rendement / Yield | | |
|---|---|---|---|---|---|---|---|---|---|
| | Azotés / Nitrogen (kg/ha) | Multiplicateur / Multiplier 1970 - 1990 | Phosphatés / Phosphates (kg/ha) | Multiplicateur / Multiplier 1970 - 1990 | Tracteurs pour / Tractors per 1000 ha | Multiplicateur / Multiplier 1970 - 1990 | Céréales/ Cereals 85-90 (t/ha) | Multiplicateur / Multiplier 1970-75 - 1985-90 | |
| ESPAGNE | 80 | 2,8 | 26 | 1,2 | 36 | 2,8 | 2,6 | 1,5 | SPAIN |
| FRANCE | 129 | 1,7 | 70 | 0,7 | 76 | 1,2 | 5,9 | 1,5 | FRANCE |
| ITALIE | 70 | 1,4 | 59 | 1,4 | 119 | 2,3 | 3,8 | 1,3 | ITALY |
| MALTE | 54 | — | 3 | — | 34 | 3,1 | 4,5 | 2,3 | MALTA |
| EX-YOUG. | 49 | 1,3 | 25 | 1,1 | 141 | 13,7 | 3,8 | 1,3 | EX-YUG. |
| ALBANIE | 105 | 2,7 | 36 | 1,4 | 18 | 2,0 | — | — | ALBANIA |
| GRECE | 108 | 2,1 | 48 | 1,6 | 53 | 3,4 | 3,7 | 1,6 | GREECE |
| TURQUIE | 43 | 4,9 | 22 | 3,6 | 25 | 6,6 | 2,1 | 1,5 | TURKEY |
| CHYPRE | 80 | 0,8 | 53 | 0,8 | 88 | 2,2 | 2,1 | 2,3 | CYPRUS |
| SYRIE | 33 | 7,1 | 2 | 1,0 | 12 | 7,8 | 0,9 | 1,3 | SYRIA |
| LIBAN | 37 | 0,6 | 40 | 0,7 | 10 | 1,2 | 1,8 | 1,6 | LEBANON |
| ISRAEL | 114 | 1,6 | 47 | 1,4 | 63 | 1,7 | 2,2 | 1,1 | ISRAEL |
| EGYPTE | 286 | 2,3 | 78 | 5,1 | 20 | 3,1 | 5,1 | 1,3 | EGYPT |
| LIBYE | 16 | 7,8 | 85 | 24,6 | 15 | 8,6 | 0,6 | 1,4 | LIBYA |
| TUNISIE | 8 | 2,9 | 10 | 2,3 | 6 | 1,2 | 1,0 | 1,2 | TUNISIA |
| ALGERIE | 8 | 2,2 | 5 | 0,6 | 12 | 2,2 | 0,8 | 1,2 | ALGERIA |
| MAROC | 15 | 3,9 | 12 | 3,2 | 4 | 3,3 | 1,0 | 1,1 | MOROCCO |

Source : FAO



## Fiche 10 / Sheet 10



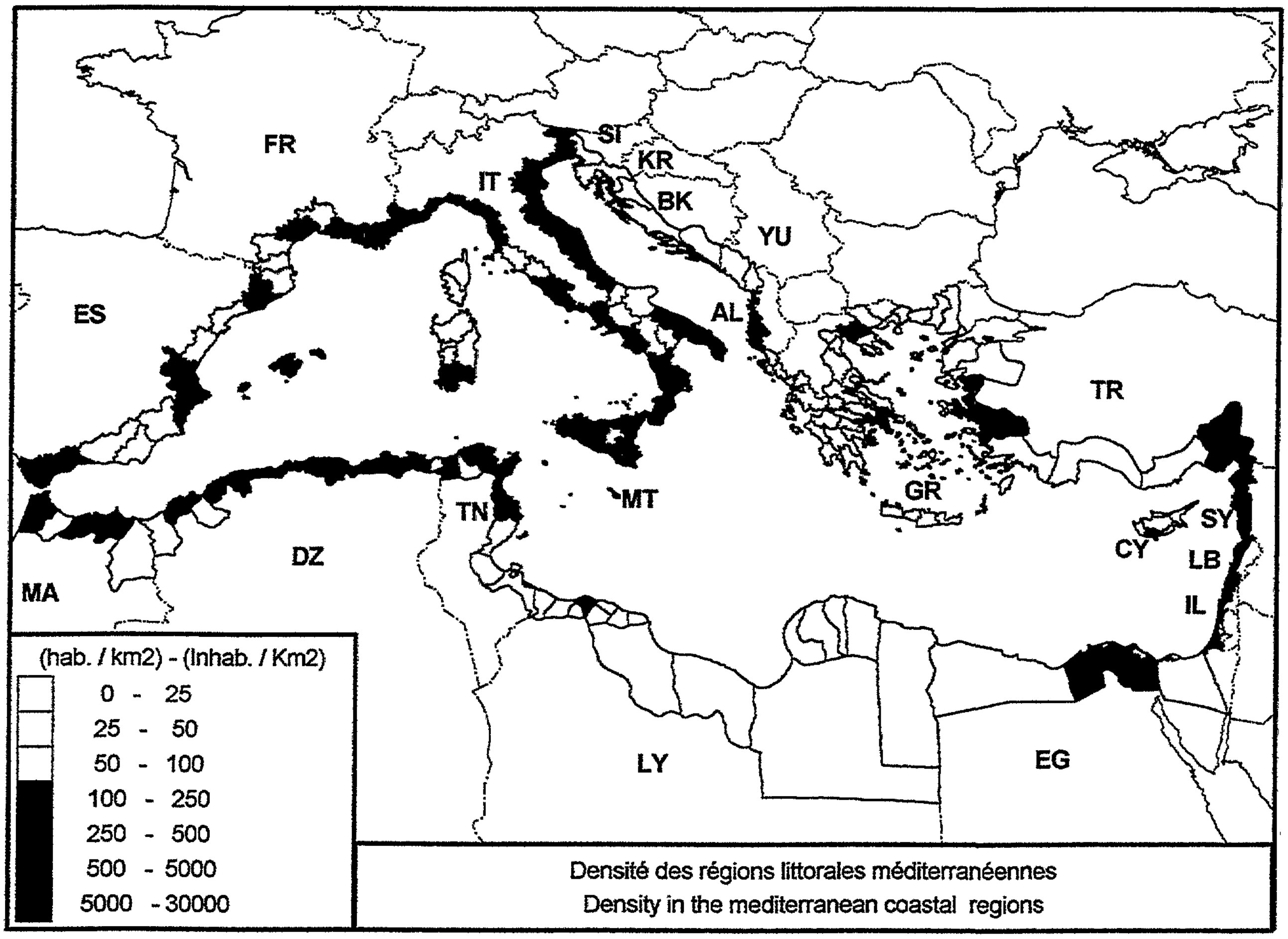

Nombre d'espèces connues et d'espèces endémiques

Number of species known and endemic species

| | Mammifères / Mammals | | Oiseaux/ Birds | | Reptiles | | Amphibiens / Amphibians | | Plantes / Plants | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Espèces connues / Species known | Espèces endémiques / Endemic species | Espèces connues / Species known | Espèces endémiques / Endemic species | Espèces connues / Species known | Espèces endémiques / Endemic species | Espèces connues / Species known | Espèces endémiques / Endemic species | Plantes à Fleurs / Flower Plants | Conifères / Conifers | Fougères / ferns | Nb. endémiques / Endemic Nb. | |
| ESPAGNE | 82 | 4 | 275 | 6 | 53 | 13 | 25 | 2 | 4916 | 18 | 114 | 941 | SPAIN |
| FRANCE | 93 | 0 | 267 | 9 | 32 | 0 | 32 | 3 | 4500 | 20 | 110 | 133 | FRANCE |
| ITALIE | 90 | 2 | 254 | 0 | 40 | 1 | 34 | 10 | 5463 | 29 | 106 | 712 | ITALY |
| MALTE | 22 | 0 | 28 | 0 | 8 | 1 | 1 | 0 | 900 | 3 | 11 | 5 | MALTA |
| MONACO | | 0 | | 0 | 6 | 0 | 3 | 0 | | 4 | 18 | 0 | MONACO |
| EX-YOUGOSLAVIE | 95 | 2 | 245 | 0 | 41 | 2 | 23 | 0 | 5250 | 23 | 78 | 137 | EX-YUGOSLAVIA |
| ALBANIE | 68 | 0 | 215 | 0 | 31 | 0 | 13 | 0 | 2965 | 21 | 45 | 24 | ALBANIA |
| GRECE | 95 | 2 | 244 | 0 | 51 | 4 | 15 | 1 | 4900 | 21 | 71 | 742 | GREECE |
| TURQUIE | 116 | 0 | 284 | 0 | 102 | 5 | 18 | 2 | 8472 | 22 | 85 | 2651 | TURKEY |
| CHYPRE | 21 | 0 | 80 | 2 | 23 | 1 | 4 | 0 | 1650 | 12 | 20 | 88 | CYPRUS |
| SYRIE | | 0 | 165 | 0 | | | | 0 | 2000 | 12 | 40 | | SYRIA |
| LIBAN | 52 | 0 | 124 | 0 | | | | 0 | 2000 | 12 | 40 | | LEBANON |
| ISRAEL | | 2 | 169 | 0 | | | | 0 | 2294 | 8 | 15 | 155 | ISRAEL |
| EGYPTE | 102 | 4 | 132 | 0 | 83 | 1 | 6 | 0 | 2066 | 4 | 6 | 70 | EGYPT |
| LIBYE | 76 | 4 | 80 | 0 | | 1 | | 0 | 1800 | 10 | 15 | 134 | LIBYA |
| TUNISIE | 78 | 1 | 173 | 0 | | 1 | | 0 | 2150 | 10 | 36 | | TUNISIA |
| ALGERIE | 92 | 1 | 192 | 1 | | 3 | | 0 | 3100 | 18 | 46 | 250 | ALGERIA |
| MAROC | 105 | 5 | 209 | 0 | | 8 | | 2 | 3600 | 19 | 56 | 650 | MOROCCO |

Source : WCMC 1992

# Fiche 11 / Sheet 11



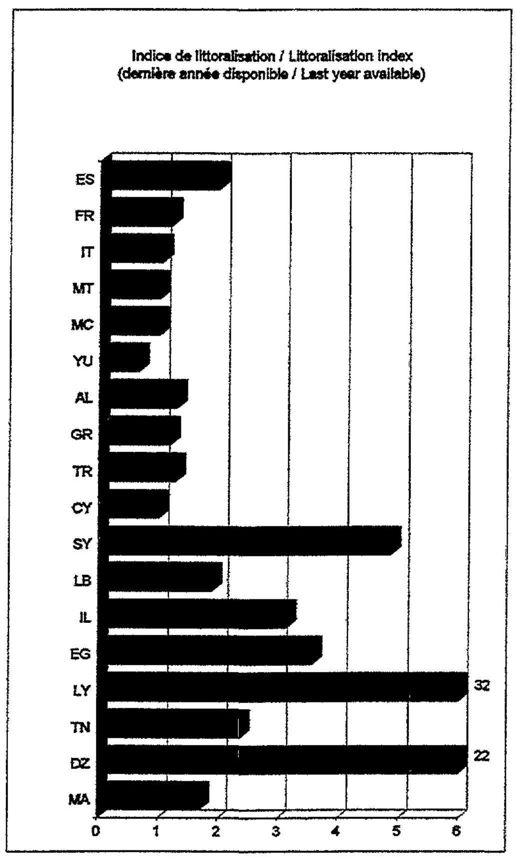

Densité des régions littorales méditerranéennes
Density in the mediterranean coastal regions

Population dans les régions littorales méditerranéennes

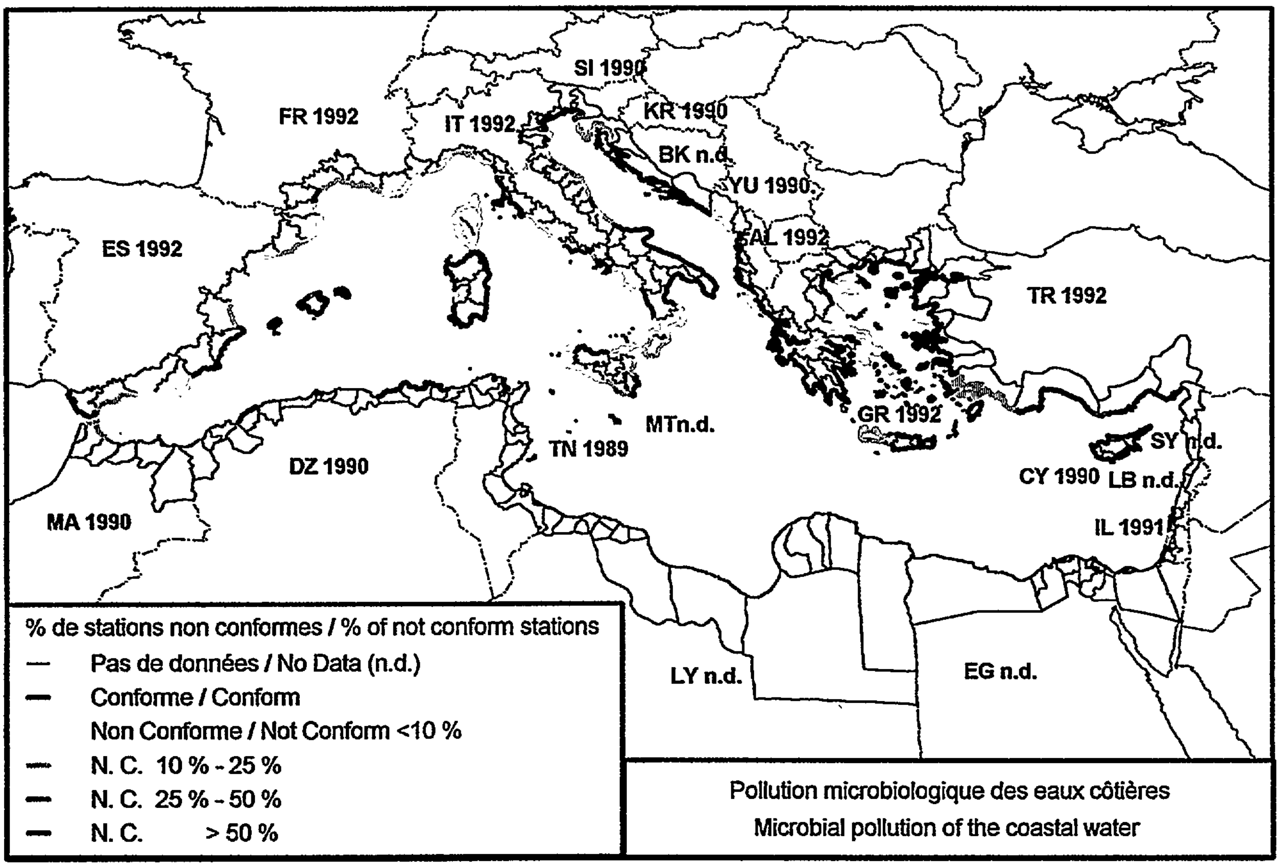
Population in the mediterranean costal regions

| | Dernière année disponible / last year available | Population (000 habitants) / (000 inhabitants) Pays / Country | Régions méd. / Med. regions | % Régions méditerranéennes/ Pays % Mediterranean regions / Country | Densité (hab. / km2) - Density (inhab./km2) Pays / Country | Régions méd. / Med. regions | |
|---|---|---|---|---|---|---|---|
| ESPAGNE | 1987 | 38 832 | 14 500 | 37 | 77 | 152 | SPAIN |
| FRANCE | 1990 | 56 556 | 5 839 | 10 | 103 | 124 | FRANCE |
| ITALIE | 1988 | 57 399 | 32 987 | 57 | 191 | 199 | ITALY |
| MALTE | 1988 | 346 | 346 | 100 | 1 094 | 1 094 | MALTA |
| MONACO | 1990 | 30 | 30 | 100 | 15 000 | 15 000 | MONACO |
| EX-YOUG. | 1981 | 22 425 | 2 421 | 11 | 88 | 57 | EX-YUG. |
| ALBANIE | 1990 | 3 256 | 1 325 | 41 | 113 | 146 | ALBANIA |
| GRECE | 1981 | 9 740 | 8 710 | 89 | 74 | 87 | GREECE |
| TURQUIE | 1990 | 56 473 | 11 336 | 20 | 72 | 92 | TURKEY |
| CHYPRE | 1982 | 503 | 503 | 100 | 54 | 54 | CYPRUS |
| SYRIE | 1988 | 11 338 | 1 251 | 11 | 61 | 298 | SYRIA |
| LIBAN | 1970 | 2 126 | 1 923 | 90 | 206 | 393 | LEBANON |
| ISRAEL | 1983 | 4 038 | 2 489 | 62 | 194 | 610 | ISRAEL |
| EGYPTE | 1986 | 48 205 | 19 784 | 41 | 48 | 172 | EGYPT |
| LIBYE | 1984 | 3 637 | 2 941 | 81 | 2 | 65 | LIBYA |
| TUNISIE | 1988 | 7 770 | 5 439 | 70 | 50 | 119 | TUNISIA |
| ALGERIE | 1987 | 23 039 | 10 105 | 44 | 10 | 215 | ALGERIA |
| MAROC | 1990 | 25 061 | 3 881 | 15 | 55 | 93 | MOROCCO |

Source : annuaires nationaux et recensements
national yearbooks and census

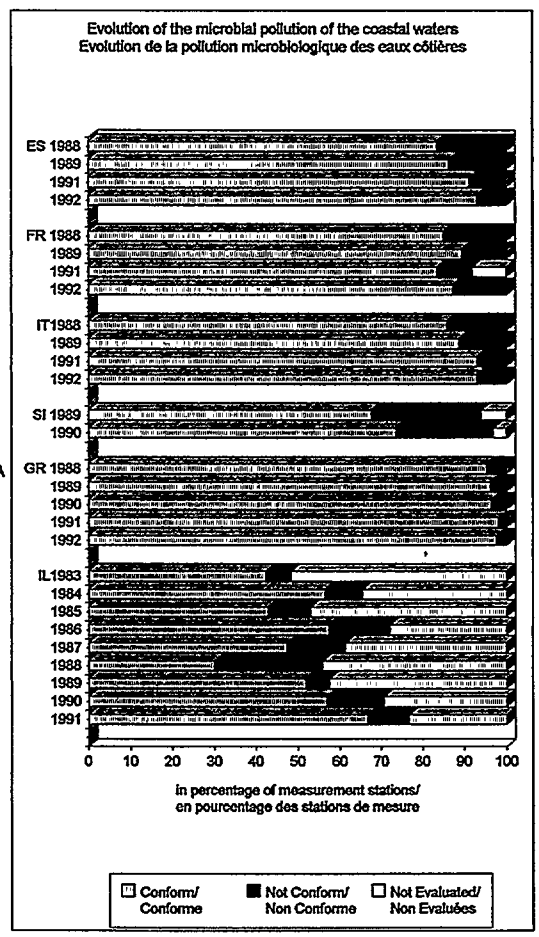


# Fiche 12 / Sheet 12

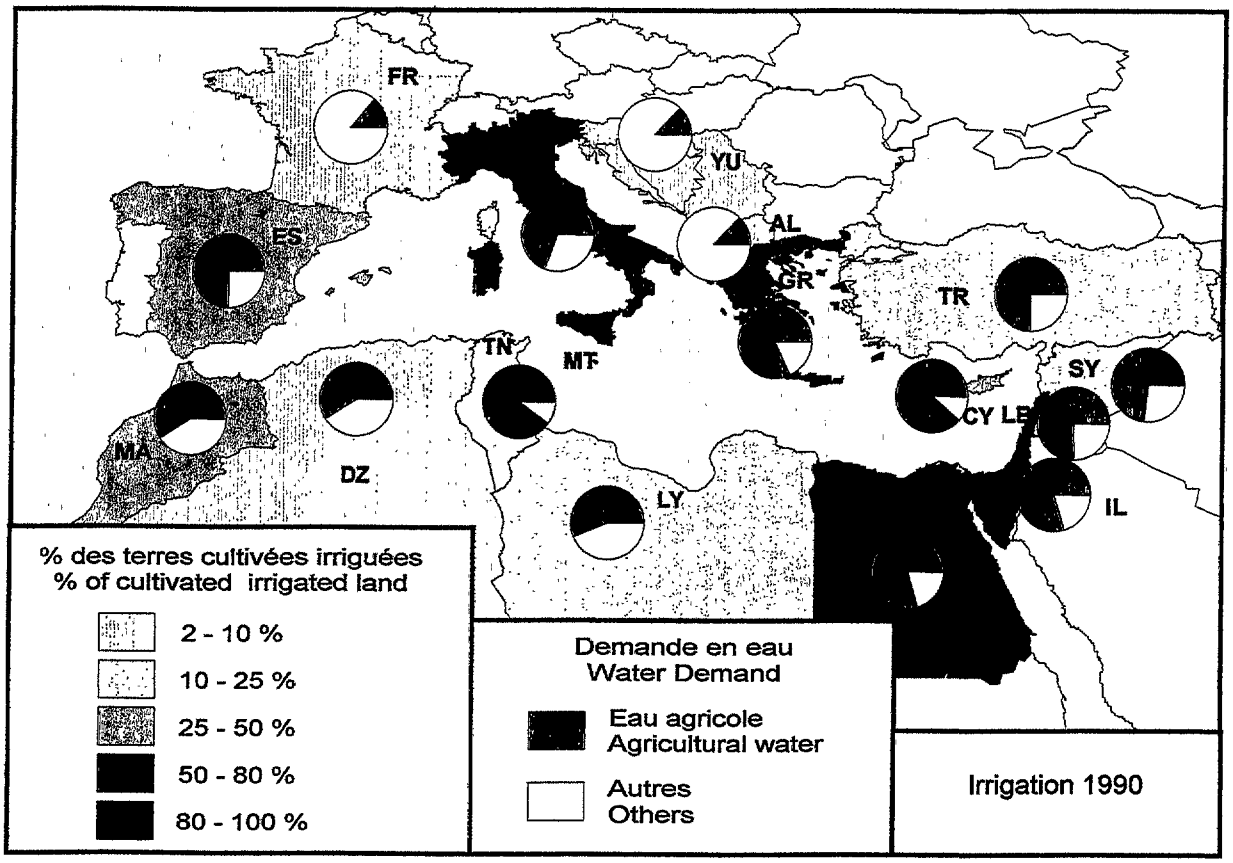



| | Année / Year | Nombre de stations de mesure / Number of measurement stations | % conforme / % conform | |
|---|---|---|---|---|
| ESPAGNE | 1992 | 1335 | 93,0 | SPAIN |
| FRANCE | 1992 | 1756 | 87,2 | FRANCE |
| ITALIE | 1992 | 4000 | 93,0 | ITALY |
| MALTE | n.d. | | | MALTA |
| SLOVENIE | 1990 | 34 | 73,5 | SLOVENIA |
| CROATIE | 1990 | 75 | 60,0 | CROATIA |
| BOSNIE-HERZEGOVINE | n.d. | | | BOSNIA-HERZEGOVINA |
| YOUGOSLAVIE | 1991 | 10 | 90,0 | YUGOSLAVIA |
| ALBANIE | 1992 | 44 | 22,7 | ALBANIA |
| GRECE | 1992 | 1197 | 97,7 | GREECE |
| TURQUIE | 1992 | 52 | 100,0 | TURKEY |
| CHYPRE | 1990 | 150 | 61,3 | CYPRUS |
| SYRIE | n.d. | | | SYRIA |
| LIBAN | n.d. | | | LEBANON |
| ISRAEL | 1991 | 69 | 66,7 | ISRAEL |
| EGYPTE | n.d. | | | EGYPT |
| LIBYE | n.d. | | | LIBYA |
| TUNISIE | 1989 | 12 | 42,0 | TUNISIA |
| ALGERIE | 1990 | 15 | 33,3 | ALGERIA |
| MAROC | 1990 | 24 | 37,5 | MOROCCO |

Source : Estimations Plan Bleu basées sur des rapports MEDPOL et CCE
Blue Plan assessment based on MEDPOL et CEC reports

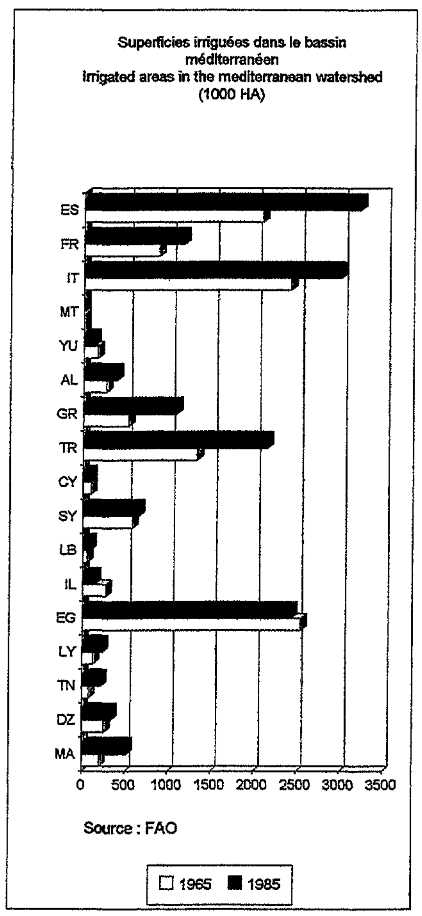


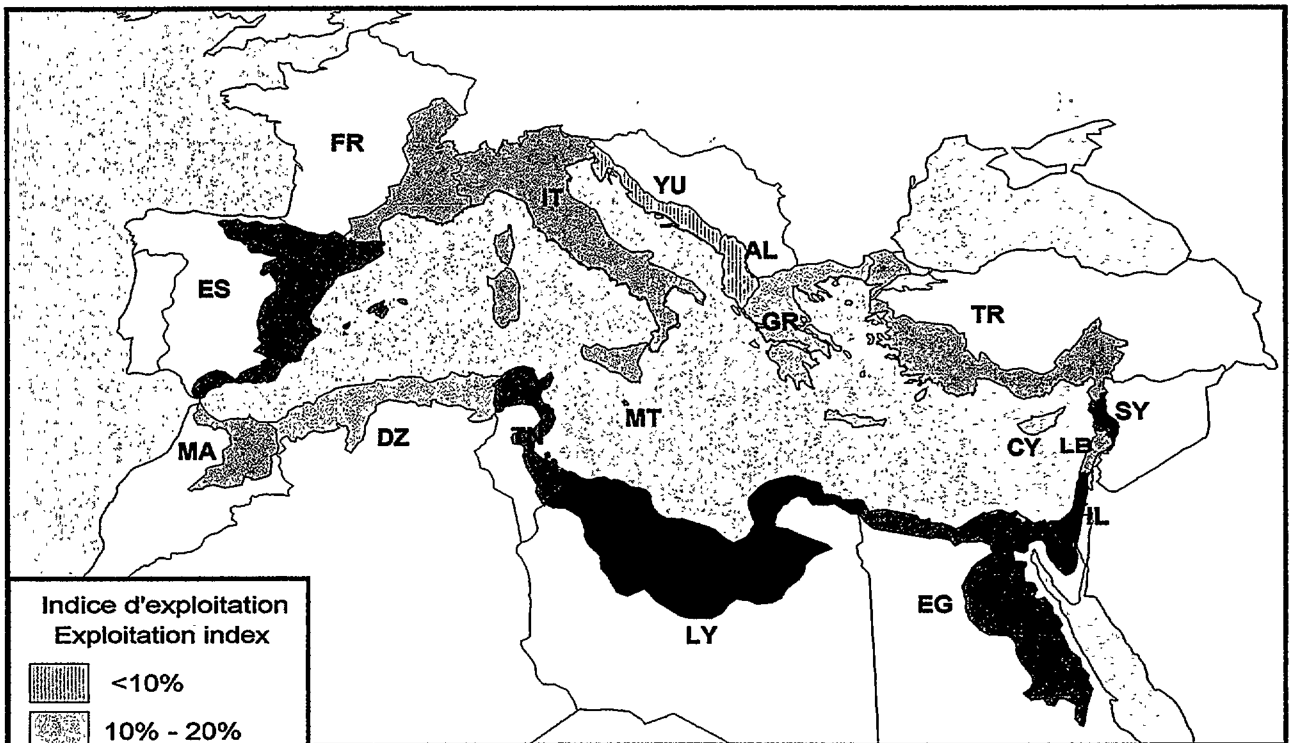
## Fiche 13 / Sheet 13




| | Ressource en eau totale / Total water ressource (Km3 / an - Km3 / year) | Ressource en eau / Water resource Per capita (m3 / an - m3 / year) | Demande en eau totale / total water demand (Km3 / an - Km3 / year) | Demande en eau totale / total water demand per capita (m3 / an - m3 / year) | Demande en eau agricole / Agricultural water demand (Km3 / an - Km3 / year) | Superficie irriguée récoltée / harvested irrigated area (100 HA) | Eau par superficie irriguée / water per irrigated area (hm3 / HA) | |
|---|---|---|---|---|---|---|---|---|
| ESPAGNE | 31,10 | 1 909 | 20,00 | 1250 | 15,00 | 2060 | 7 282 | SPAIN |
| FRANCE | 74,00 | 5 827 | 17,20 | 1274 | 2,40 | 350 | 6 857 | FRANCE |
| ITALIE* | 187,00 | 3 262 | 46,35 | 810 | 32,20 | 3625 | 8 883 | ITALY |
| MALTE | 0,07 | 200 | 0,03 | 97 | ε | ε | | MALTA |
| EX-YOUG. | 77,50 | 28 700 | 1,50 | 625 | 0,20 | 80 | 2 500 | EX-YUG. |
| ALBANIE* | 50,00 | 15 385 | 2,97 | 928 | 2,20 | 370 | 5 946 | ALBANIA |
| GRECE* | 58,65 | 5 836 | 7,00 | 736 | 5,75 | 1150 | 5 000 | GREECE |
| TURQUIE | 67,00 | 5 000 | 6,70 | 567 | 5,00 | 1150 | 4 348 | TURKEY |
| CHYPRE* | 0,90 | 1 286 | 0,38 | 548 | 0,34 | 110 | 3 055 | CYPRUS |
| SYRIE | 4,00 | 2 963 | 2,00 | 513 | 1,50 | 55 | 27 273 | SYRIA |
| LIBAN* | 4,00 | 1 380 | 0,80 | 322 | 0,60 | 95 | 6 316 | LEBANON |
| ISRAEL* | 1,00 | 371 | 1,50 | 437 | 1,20 | 240 | 5 000 | ISRAEL |
| EGYPTE* | 57,30 | 1 078 | 55,90 | 1208 | 48,70 | 4500 | 10 822 | EGYPT |
| LIBYE* | 0,70 | 230 | 1,60 | 728 | 0,85 | 240 | 3 542 | LIBYA |
| TUNISIE | 3,10 | 490 | 2,00 | 364 | 2,15 | 200 | 10 750 | TUNISIA |
| ALGERIE | 10,90 | 545 | 1,70 | 113 | 10,00 | 200 | 50 000 | ALGERIA |
| MAROC | 3,80 | 1 460 | 1,10 | 500 | 1,00 | 110 | 9 091 | MOROCCO |

* Données à l'échelle du pays / Data for the country
Source: Margat,1992






Indice d'exploitation des ressources en eaux naturelles renouvelables dans le bassin méditerranéen

Exploitation index of natural renewable resources in the Mediterranean watershed

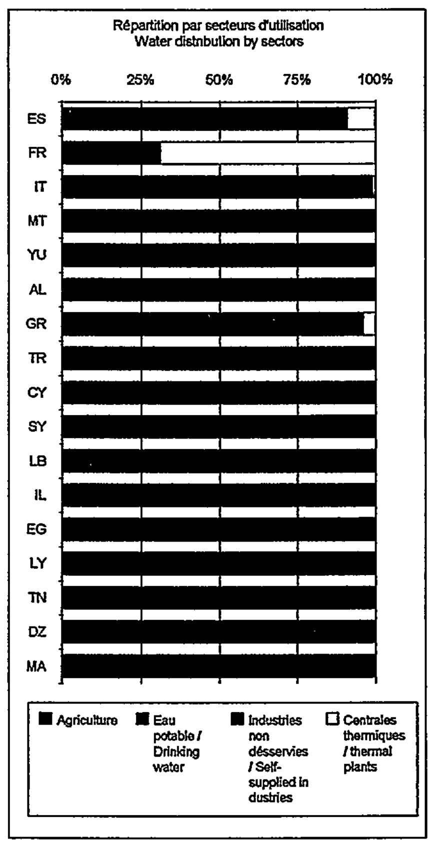
Ressources en eau et utilisations dans le bassin méditerranéen

Water resources and its use in the mediterranean basin

| | Ressources renouvelables / Renewable resources (km3/an) - (km3/yr) | | | Ratio (2)/(1) | Demande / Demand | | | Indices (%) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Ressources renouvelables / Renewable resources (1) | dont pays voisins / from neighbouring countries | Ressources régulières / Regular resources (2) | Indice de régularité / Regularity index (2) / (1) | Total (km3/an) - (km3/yr) | % par les eaux fossiles / % from fossil aquifers | Consommation totale (Km3/an) / Total consumption (km3/yr) | Indice d'exploitation / Exploitation index | Indice global de consommation / Final consumption index | |
| ESPAGNE | 31,1 | 1 | 7,5 | 24 | 20 | 1 | 12,2 | 64,3 | 39,2 | SPAIN |
| FRANCE | 74 | 12 | 35,2 | 48 | 17 | | 2 | 23,2 | 2,7 | FRANCE |
| ITALIE | 187 | 7,6 | 30,5 | 16 | 45 | | 14,85 | 24,1 | 8 | ITALY |
| MALTE | 0,07 | 0 | 0,03 | 43 | 0 | | 0,03 | 30 | 42,9 | MALTA |
| EX-YOUG. | 77,5 | 0 | 11,5 | 15 | 1,5 | | 0,28 | 1,9 | 0,4 | EX-YUG. |
| ALBANIE | 50 | 5,5 | 6,5 | 13 | 3 | | 1,1 | 5,9 | 2,2 | ALBANIA |
| GRECE* | 58,65 | 13,5 | 7,7 | 13 | 7 | | 3,75 | 11,9 | 6,4 | GREECE* |
| TURQUIE | 67 | 7 | 15,6 | 23 | 6,7 | | 3,2 | 10 | 4,8 | TURKEY |
| CHYPRE* | 0,9 | 0 | 0,27 | 30 | 0,4 | 10,5 | 0,25 | 42,2 | 28 | CYPRUS* |
| SYRIE | 4 | 0,6 | 2,32 | 58 | 2 | 2 | 1 | 50 | 25 | SYRIA |
| LIBAN | 4 | 0 | 2,8 | 70 | 0,8 | | 0,32 | 20 | ·8 | LEBANON |
| ISRAEL | 1 | 0,1 | 1 | 100 | 1,5 | 22 | 0,92 | 140 | 92 | ISRAEL |
| GAZA | 0,065 | 0,035 | 0,05 | 77 | 0,1 | 32 | 0,09 | 169 | 138 | GAZA |
| EGYPTE | 57,3 | 56,5 | 55,8 | 97 | 56 | 0,4 | 38 | 91,9 | 66,7 | EGYPT |
| LIBYE | 0,7 | 0 | 0,4 | 57 | 1,6 | 45,5 | 0,85 | 157,1 | 121,4 | LIBYA |
| TUNISIE | 3,19 | 0,6 | 1,5 | 47 | 2 | 15 | 1,3 | 62,7 | 40,8 | TUNISIA |
| ALGERIE | 10,9 | 0,03 | 2,5 | 23 | 1,7 | ε | 0,85 | 15,6 | 8 | ALGERIA |
| MAROC | 3,8 | 0 | 0,9 | 24 | 1,1 | ε | 0,58 | 29 | 15,3 | MOROCCO |

Source : PLAN BLEU à partir de rapports nationaux et internationaux et l'expertise de J.Margat
BLUE PLAN, compiled from national and internationa reports and the expertise of J.Margat

* Données nationales / National data



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Mediterranean Action Plan
Regional Activity Centre for the Blue Plan

UNEP

# Observation and evaluation of environment and development in the Mediterranean (Preparatory phase)

Ninth Ordinary Meeting of the Contracting Parties to the Convention for the Protection of the Mediterranean Sea against Pollution and its related protocols

Barcelona, 5-10 june 1995

UNEP(OCA)/MED IG.5/Inf.5
30 april 1995

Original : FRENCH

1 The Mediterranean Environment and Development Observatory function

2 From problematics to indicators: water as an example

3 Environmental institutions in the Mediterranean countries

4 Follow-up of Agenda 21 for the Mediterranean countries

## 5 Methods and tools

UNEP
Athens, 1995

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UNEP

EUROPEAN COMMISSION

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# Methods and Tools

## Contents

## Introduction

In order to respond to the scientific objectives that have been assigned to MEDO, several methods for analysis and working tools have been developed; they merit a detailed presentation. Finally, so as not to burden the presentation of MEDO's more operational results which are still being elaborated (already presented in the fascicles 2, 3 and 4), it was decided to regroup the methods and tools of the observatory in one specific fascicle.

Hence, this fascicle proposes the following:
- the conceptual and methodological framework which was specifically studied within the MEDO to permit a structured follow-up of sustainable development in the Mediterranean countries;
- the Mediterranean Environment and Development Information System (MEDIS ) which is being implementated and developed in the MEDO;
- the documentary tools which are progressively being elaborated in the MEDO for the its own use and attention of its partners.

These methods and tools, in themselves, constitute specific programmes of scientific research having a distinct theoretical character and conceived as the "primary layer" of the observatory's research work. They form the intellectual and operational basis of the observatory's activities ("second layer" of research work), of which fascicles 2, 3 and 4 have described the primary results.

Blue Plan's objective is to contribute to the reinforcement of the scientific capacities of the countries bordering the Mediterranean basin (particularly those south and east of the basin), with the view of orientating the national politics towards sustainable development, while still working in compliance with the international scientific community.

MEDO's research programmes on methods and tools seek an educational impact mainly targeted for developing countries, since these programmes should contribute to the building-up of the Blue Plan's "culture" to be shared with its team members and its partners. This is why they are presented here in relative detail, even though they are still in a stage of development and testing with respect to MEDO's more operational programmes.

# A

# MEDO'S CONCEPTUAL AND METHODOLOGICAL FRAMEWORK FOR A FOLLOW-UP OF SUSTAINABLE DEVELOPMENT

# 1. Which sustainable development in the Mediterranean?

Can sustainable development be applied at the scale of the Mediterranean Basin?

It is possible to question whether the global concept of sustainable development has any real meaning at the local scale. It is a paradigm, a philosophical, ethical and political idea to which national development strategies should subscribe in order to survive. Therefore, it is first necessary to examine the principles upon which it is based and then check their relevance for the Mediterranean Basin.

## 1.1. Elements for a Mediterranean definition of sustainable development

The various definitions of sustainable development are more often than not disputed rather than clarified. Available literature gives over 70 definitions of sustainable development, which does nothing to simplify matters.

Since any definition is bound to be restrictive, the best one is that of the Bruntland report: "to meet the needs of the present without compromising the ability of future generations to meet their own needs." We can also add FAO's interpretation, which is more pragmatic and extends beyond agricultural issues. They define sustainable development as "respectful of the environment, technically appropriate, economically viable and socially acceptable".

A more personalised definition of sustainable development in the Mediterranean could therefore be: "Development which is respectful of the environment, technically appropriate, economically viable and socially acceptable to meet the needs of present generations without endangering the possibility for future generations to satisfy theirs."

Sustainable development is first and foremost a model for integration; any reference made to it signifies accepting its underlying principles and the displaying stakes in the environmental, economic and social interactions and the way in which they are perceived and the manner in which to act upon them. <u>It is a process, not a state to reach.</u> It is only viable and imaginable at the global level, however, it is at the local level that actions should be taken to promote it.

Even if the operational contents of the concept are poorly defined, at least they correspond to one common denominator. The indicators called "indicators for sustainable development" assess to what degree situations and trends comply with the foundations of sustainable development. They do not lead to certainty on the sustainability of evolutions, but they can emphasize non-sustainability, in otherwords its long-term maintenance being achievable.

Clarifying the concept and its definition will help to set the ground for examining the basic principles summarized in the Declaration of Principles of the Rio Conference (June 1992).

It is these principles that must be placed in parallel with the general philosophy that has guided Blue Plan ever since its creation. Blue Plan's work does not only correspond directly with the sustainable problematics that appeared in 1980s , but it has also been the partial initiating element behind the problematics through the help of Serge Antoine's work.

### 1.2. Mediterranean Analysis of the principles of Agenda 21

It may be useful to recall the founding principles of the sustainable development concept highlighted during the Rio Conference and to relate them to those which have inspired the work of the Blue Plan. The principles of Rio can be classified into three categories: ethical or philosophical principles; political principles; and, methodological principles.

***Ethical or philosophical principles***

From a philosophical standpoint, the vision of the relationship between Man and nature is resolutely anthropocentric; a fact which is not stated often enough during interdisciplinary debates involving economists and environmentalists. The aim is to protect the environment to ensure the survival and preservation of human life; not only as it is today. This vision is in line with the general problematic of the Blue Plan as it analyses the relationships between human activities and the environment.

However, it would be interesting to open a debate on the approach to sustainability (or supportability) synonymous with the Blue Plan. Daly (1992) has highlighted two versions:

- slight supportability is ensured if the global stock of capital, i.e., manufactured and natural capital, is maintained constant over time. This approach rests on the hypothesis that technical capital is the ideal substitute for natural capital. In fact, it does not exclude the possibility of the future destruction of the environment, provided that the needs that it fulfilled could be replaced by manufactured capital. In other words, the postulate is that as the reserves of natural capital are being depleted, new technologies will be implemented to replace them.
- strong supportability consists in maintaining both natural and technical capital levels unchanged without either of them compensating for the other. This approach gives a larger consideration to the specificities of the environment.

These hypotheses could give rise to revisions of the scenarios integrating sustainable development, by differentiating two possible cases: strong or slight supportability. We can, however, observe that neither version truly involves social development; an aspect favored by the Blue Plan. Furthermore, in Agenda 21, intra and inter-generational balances are an integral part of the concept of sustainable development (Chapters 3 and 5). The Blue Plan implicitly covers the aspect of inter-generational balance in its scenarios through demographic data. The analysis of intra-generational balance is indirectly linked within studies of coastalisation (geographical disparity); differences between cities and rural areas (disparity of rural/urban standards of living); and, North/South cooperation.

### *Political principles*

On the political level, it is stipulated that countries maintain their national sovereignity in matters of environment (Chapters 2 and 13). This justifies approaches implemented by the Blue Plan at the national level.

Emphasis is placed on the participation of the global population (Chapter 10), which also clarifies the choice of several levels of observation (coastal regions, local levels). From a practical standpoint, Agenda 21 highlights the role of actors in society and more specifically the role of women, younger generations and minorities. This dimension was already covered by the activities of the Blue Plan in the beginning of the 80s[1].

Finally, international cooperation in research and development, and the full availability of information, in Agenda 21 (Chapters 9, 18, and 19), are favorable fields for supranational structures like the Mediterranean Action Plan (MAP). It is essential to deal directly with problems of North-South technology transfer and professional training in the Mediterranean Basin.

Divising the responsibilities between the industrialised countries; the countries in transition; and, the developing countries (Chapters 6, 7, and 11) is a recurrent subject in Blue Plan's activities, as demonstrated through the decision to appoint teams of two experts (North/South) to draw up expertise reports.

### *Methodological principles for study of the environment-development interface.*

Methodological principles were also covered in Agenda 21. It must be remembered that it is only through a holistic and integrated vision that environment-development relations (Chapter 4) can best be analysed. Is it necessary to stress that a global and systemic vision of this relationship has beenBlue Plan's inspiration since its creation?

1 Reports on the agrifood industry and health in the initial phase of the Blue Plan.

In this regard, more emphasis is usually placed on the consequences of human activities on the environment rather than on the consequences of environmental degradation on these activities, and yet, this factor is just or if not more important, as gives more incentive to decision-makers.

In its approach, Blue Plan is one step ahead in terms of sustainable development and quite familiar with the topics discussed in Rio. The Blue Plan's global approach corresponds to the paradigm of sustainable development. However, the moment has come to move from theory and principles to practical implementation. In this sense, the countries involved in MAP are a real scale laboratory, as noted in the preamble to Agenda MED 21[2]. However, this will require that tools of evaluation are developed in line with sustainable development principles, which is the specific objective of this report.

### 1.3. The Blue Plan's contributive approach to sustainable development

Several action principles must be implemented before the three major objectives of sustainable development are reached: economic efficiency with maintained natural capital, environmental integrity and social balance:

- the polluter pays principle is acknowledged today as a tool by which external costs are included to economic prices;
- the principle of integration, implies systemic analysis .and consultations;
- the principle of proximity and interdependence, based on relationships between global and local levels;
- the principle of precaution, which recommends prevention and caution in the absence of certainty.

The Mediterranean system as a whole and each of the Mediterranean countries are changing rapidly on our increasingly complex planet. Globalising the economy, information technologies and environmental factors makes it all the more difficult, and yet essential, to include these principles in reflective work.

Within this context, monitoring the present changes presupposes objective information on current situations that are predictible in the short term, and a vision of possible long term futures. Furthermore, the accelerating changes and increasing uncertainties point to several future possibilities. Prospective studies are based on information and analysis about a system submitted to internal and external variables; it can shed light on the future and be useful in setting up the strategic approach leading to a desirable situation.

2 "The Mediterranean and the countries that border on it are a good example of an "eco-region" likely to constitute a pilot area for a regional review of the decisions made in Rio on a worldwide scale."

Pierre Wack, in charge of the "prospective-strategy" department within Shell characterizes prospective contributions as follows: "I hear rapids. I do not know where they are, but my navigation has changed." In an uncertain framework, preparing sustainable development strategies and the related follow-up tasks rests on the simultaneous use of systemic methods of knowledge, assessment and exploration of specific situations. In this context, Blue Plan suggests two approaches:

- a regional approach leading to global comprehension and monitoring of the Mediterranean system over time, by enhancing relationships between environment and development to assess priority actions for sustainable development;
- a local approach which, from a prospective vision, aims to contribute not only to decision making but also for the integrated development and management of coastlines.

In each case, the Blue Plan uses systemic analysis highlighting relationships between the biosphere, sociosphere and technosphere (illustrated on the following diagram). These relationships are summarized in the following three tables:

- pressure of human activities on the environment;
- pressure of environmental degradations on the sociosphere;
- environmental interactions.

*The pressure of human activities on the environment*

| SOCIO-ECONOMY ⇑ ENVIRONMENT | FOREST | SOIL | WATER[3] | BIODIVERSITY | AIR | COAST |
|---|---|---|---|---|---|---|
| POPULATION | – overconsumption of firewood<br>– growth of rural population | – increasing demand for food | – demand for drinking water | – disruption of fauna<br>– withdrawal | – release of pollutants ($CO_2$ – $SO_2$) | – demand for urban housing |
| URBANIZATION | – extension of constructed surface areas | – sterilization by soil concreting<br>– contamination by waste | – increased urban water consumption<br>– losses into supply network<br>– organic pollution | – destruction or fragmentation of habitats<br>– artificialization of environment | – concentration of pollutants | – concentration of settlements and activities (coastalisation phenomenon) |
| AGRICULTURE AND FOOD INDUSTRY | – overpasture<br>– extension of cultivated areas | – chemical degradation (fertilizers, irrigation)<br>– more pronounced hydric and wind erosion<br>– destructuration | – overirrigation<br>– chemical pollution of groundwater (fertilizer) and eutrophization of aquatic media | – overpasture<br>– replacement of traditional species by improved species<br>– standardization of ecosystems | – release of greenhouse gas ($CH_4$) | – change of land use (forest clearance, drying out, etc.) |
| INDUSTRY | – over exploitation of forestry resources<br>– acid rain | – loss of productive soils<br>– chemical contamination | – concentration of water greedy production<br>– concentration of polluting activities | – contamination of ecosystems | – release of pollutants ($SO_2$ – NOX) | – consumption of space<br>– change in of landscape |
| ENERGY | – over exploitation<br>– acid rain | | – construction of dams<br>– power station cooling water | | – release from domestic heating<br>– release from thermal power stations | |
| TRANSPORT | – acid rain | – sterilization by infrastructures<br>– chemical contamination | – chemical pollution | – partitioning of ecosystems<br>– contamination of ecosystems | – release of NOX – CO | – concentration of infrastructures<br>– modification of landscape |
| TOURISM | – forest fires<br>– over frequentation | – sterilization by infrastructures | – organic pollution<br>– seasonal peak water demand | – increased frequentation of natural sites<br>– trampling | | – increase of coastalisation phenomenon |

3 The availability is quantitative and qualitative as the two aspects are interconnected.

*Environmental degradation pressures on the sociosphere*

| ENVIRONMENT ⇓ SOCIO-ECONOMY | FOREST | SOIL | WATER | BIODIVERSITY | AIR | COAST |
|---|---|---|---|---|---|---|
| HEALTH/ POPULATION | – increasing cost of firewood<br>– accidents connected to forest fires | – contamination of food products<br>– pathologies connected to pesticides<br>– increased damage due to natural hazards | – health problems connected to water contamination | – loss of amenities connected to disappearance of ecosystems or landscapes<br>– patrimonial losses due to disappearance of species | – respiratory pathologies | – over density generating violence and stress<br>– microbial pathologies |
| URBANIZATION | | – neglect of degraded land | – increased sanitation costs<br>– increased water costs | | – degradation of monuments and infrastructure | – degradation of the living standards |
| AGRICULTURE AND FOOD INDUSTRY | – recourse to purchase of forage for livestock | – drop in fertility and yield of crops<br>– increased costs of exploiting land areas<br>– costs of reha-bilitation of degraded land | – costs of modifying irrigation and drainage system<br>– increased water price | – lesser resistance of cultivated varieties and breeds reared against diseases | – product contamination | – speculation on agricultural land<br>– disappea-rance of traditional agriculture |
| INDUSTRY | – increased manufacturing costs of wood and derived products | – costs of restoration<br>– cost of contamination of soils | – increased manufacturing costs due to rise in water price | | – corrosion of equipments | – increased industrial concentration |
| ENERGY | – increasing cost of firewood | – shorter dam life | – cost of resource management | | – corrosion of power lines | – reinforcement of energy potential |
| TRANSPORT | | – costs of removing sediment from roads and navigation networks | | | | – saturation of infrastruc-tures |
| TOURISM | – effects upon leisure activities (hunting, walking) | | – effects upon leisure activi-ties (lakes and water courses)<br>– loss of well-being dueto consumption restrictions | – losses connected to degradation of natural sites | – loss of frequentation | – drop in frequentation |

| Interactions | Negative interactions | | | | | |
|---|---|---|---|---|---|---|
| ENVIRONMENT ⇓&⇑ ENVIRONMENT | FOREST | SOIL | WATER | BIODIVERSITY | AIR | COAST |
| FOREST | | – erosion<br>– desertification | – flooding and high water | – disappearance of species and habitats | – forestry depletion (acid rains) | – clearing (urbanization, infrastructures) |
| SOIL | – protection<br>– pedological quality | | – silting up of reservoirs<br>– desertification | – loss of species | – chemical contamination | – sterilization |
| WATER | – purification<br>– regulation of the hydric regime | – maintained fertility | | – loss of species | – chemical contamination | – concentration of polluting charge and solid flows |
| BIODIVERSITY | – preservation of species<br>– biological balance | – maintained biological quality | – habitat diversity | | – ecosystem contamination | – ecosystem destruction |
| AIR | – mechanical filter<br>– microclimatic regulation | | – microclimatic regulation | – purification by photosynthesis | | – concentration of pollution sources |
| COAST | – landscape quality<br>– life system quality | – landscape diversity<br>– agricultural potential | – maximum availability of the resource | – general biological balance | –quality of life | |
| | Positive interactions | | | | | |

The interactions here are complex and overlapping, and the scope covered, i.e., economic, social, and environmental aspects, clearly highlights the systemic features of the reality at hand.
Although each area is presented individually for ease of analysis, it must be clearly stressed that the issues discussed - erosion, degradation of water resources, deforestation, loss of biodiversity - can not in fact be dealt with separately and impact on each other. The indicators suggested for each issue can therefore, although indirectly, be as equally informative on the other areas.

These indicators can therefore only be interpreted for the system as a whole and not for the individual themes.

At this point, it is necessary to examine which indicators are best suited to understand sustainable development in the Mediterranean Basin.

## 2. Which indicators are adapted to the Mediterranean Basin?

In order to grasp the essence of sustainable development, the main feature of indicators must be their adaptability. This is why it is impossible to define one or more optimal indicators in all cases. However, the aim of this presentation is not to define the best indicators for a closed system, which would necessarily be limited in scope, but rather the procedure that can be used to build up indicators.

This report will successively cover the following: theoretical presentation of the characteristics inherent to indicators; the study of the main problems posed by their selection within the specific Mediterranean framework; the explanation of tool selection; their interest and their limits; and, in conclusion propositions to overcome these limits.

### 2.1. What is an indicator of sustainable development?

All data can not be qualified as indicators; they must be quantifiable, having an aggregate significance facilitating the interpretation of a situation or of a global component. Furthermore, it must be a compromise between often complex theoretical and scientific foundations and a request for concise information from the users.

Before indicators can be determined, it is necessary to know for whom and for what purpose these indicators may be required. This entails an initial identification of the important and significant problems in themselves, reflection on their degrees of relevance in space and time, and establishment of the level(s) at which the database must be created.

Finally, indicators must be adapted to the public for whom they are determined (eg. private or public decision-makers, public at large,...) and hence, they must be presented according to their possible usage; the less specialised the user is, the more concentrated and readily comprehensible the information will be.

As far as possible, it must be presented clearly in such formats as:
- maps, for geographical data;
- graphics, for visualization of initial situations and major trends, completed by figures to refine the analysis of these factors.

It is also essential to define all the concepts to avoid problems in the interpretation of results.

The answer to the question: "what are indicators useful for?" is self-evident in the case of sustainable development. The sustainabilty of development trends must be measured, and for this to be done it is necessary to identidy priority issues to be considered . Indicators must include characteristics which belong to the specificities of the concept:

- they must be multidimensional; they must be designed within the systemic context and consider economy as a sub-system of the surrounding sociosphere and ecosphere;
- they must include distributive elements, in the statistic sense of the word. The concept of sustainable development refers to the idea of equity and the assessing indicators must explicitly show which social categories or which geographical areas are affected by environmental degradation;
- they must be applicable to prospective approaches;
- they must reveal explicit relationships, in other words, they must determine and describe why environmental issues, or environment, technosphere and sociosphere are interrelated;
- they must express the uncertainty related to understanding the ways in which ecosystems and technosphere operate, without limiting this to an economic uncertainty, in other words to a quantifiable range of risk.

From a more pragmatic standpoint, these principles serve as guidelines to choose indicators.

1. Only a set of indicators can be multidimensional. A single aggregate-type accounting indicator, even when it is corrected to cover the damage inflicted on the environment, does not satisfactorily explain the interface between ecosphere, technosphere and sociosphere. It would tend to elude the qualitative aspects of the observed phenomena, by limiting everything to monetary issues.
It therefore seems justified to use cross-system indicators, combining elements belonging to all spheres (environment/society, environment/-economy, society/economy).

2. To highlight the distributive dimension, i.e., the spread over space and time of the damage to the environment and its effects on other spheres, relatively disaggregated data is needed. We must therefore not be content with information bearing on national levels which might not necessarily correspond to the scale required to deal with a specific issue.

3. The defined set of indicators must comprise threshold values. These may be standard indicators linking real objective development to a goal or to desirable conditions; or, to a past or future situation considered as more desirable than the current one or one which is estimated to be sustainable. The determination of standards does not only depend exclusively on scientific criteria, but on subjective elements and value judgements, as well. This can also involve standards, which are objectives of environmental policies, simply to assess the efficiency of the implemented measures. It is particularly important to institutionalise the standard defining procedures and define them as clearly as possible.

4. They must have prospective scope:

- they may be derived from scenarios or hypotheses on the future behavior of socio-economic and environmental variables. This is the case for the definition of sustainability standards.
- or, they are retrospective indicators giving information on forthcoming evolutions by cautiosly extrapolating on past trends.

In all cases, data on the initial state of variables and on their evolution must be available. It is indeed possible to evaluate in which direction the situation is evolving (degradation or improvement) on the basis of variations alone, but is is not possible to assess long-term sustainability of development. Degradation from a situation estimated initially as being relatively positive can yield the same results as improvement from a critical stage. Variables on state are not sufficient since they do not reveal the direction of change, which is of crucial importance to make forecasts and justifying actions.

5. They must be reversible and controllable processes, such as, for example, the pressures of the economy on the environment sensed by cross-reference indicators; upon which it is possible to act.

6. They must offer information without social bias (i.e., not stem from a narrow theoretical framework) so as to obtain international consensus at a scientific level and be socially acceptable for all countries. For example, indicators must not be restricted to western modes of consumption or be greatly dependent on the financial aspects of the considered elements. This is why physical indicators are preferred.

It must be stressed that these requirements involve the system of indicators as a whole and not each individual indicator.

Besides the specificities of the concept of sustainable development, the indicators are also determined by the context in which they are defined, their alloted function and the identity of their users. After laying down the theoretical postulates, we will now analyse how that can be applied to the Mediterranean Basin.

***What are the differences between indicators for sustainable development and the environmental indicators of the OECD?***

| | |
|---|---|
| The environmental indicators proposed by the OECD are geared towards the intergration of decision-making within environmental and economic issues.<br>Their objective is to aide member countries to improve their individual and collective performance within environmental management. | Indicators for sustainable development are geared towards the evaluation of whether a local situation is compatible with the principles of sustainable development. |
| The OECD PER (Pressure–State–Response) model tends to suggest a linear type of relations within the human-environment activity.<br>– lhuman activities exert pressures on the environment;<br>– indicators must clearly explain the environmental conditions, ie., quality pressure on the quality and quantity of natural resources;<br>– indicators of societies responses indicate how soceity reacts to the changes recorded in the environment and their preoccupations within this field. | Sustainable development supposes a systemic approach on the relations between economic, social and environmental spheres.<br>There is a loop effect within each sphere and between them:<br>– human activities exert pressures on the environment;<br>– but the environment also exerts pressures on human activities. |

## 2.2. Indicator development methodology for the Mediterranean Basin

Who will be receiving the information? These are people in charge of administrations (major national or international decision-makers) and actors in the field of land development and planning (States, local collectivities, businesses). These actors from the public and private sector of the Mediterranean Basin work at various levels. The first requirement for a system of indicators is therefore to comply with the plurality of observation levels and to examine more thoroughly the relevant levels of observation.

Then, instruments must be developed, in conformity with the indicator requirements, i.e., give information on state and evolution; allow prospective applications; and, comprise of distributive and standard elements.

Finally, the limits of these indicators must be examined, to assess how they may be completed, and which information systems are required to process them.

***Applying sustainable development to the Mediterranean Basin: at which observation levels?***

The users are different at each possible scale of observation which involves particular issues and a specific action (see the following charts: the environment from global to local, and spatial scales for several environmental issues).

Water, is a significant example in this regard. In the case of consumption, it is more interesting to assess consumption of coastal areas. If on the other hand, the issue is pollution of terrestrial and infra-coastal waters, information on the socio-economic activities at the scale of the catchment area is more appropriate.

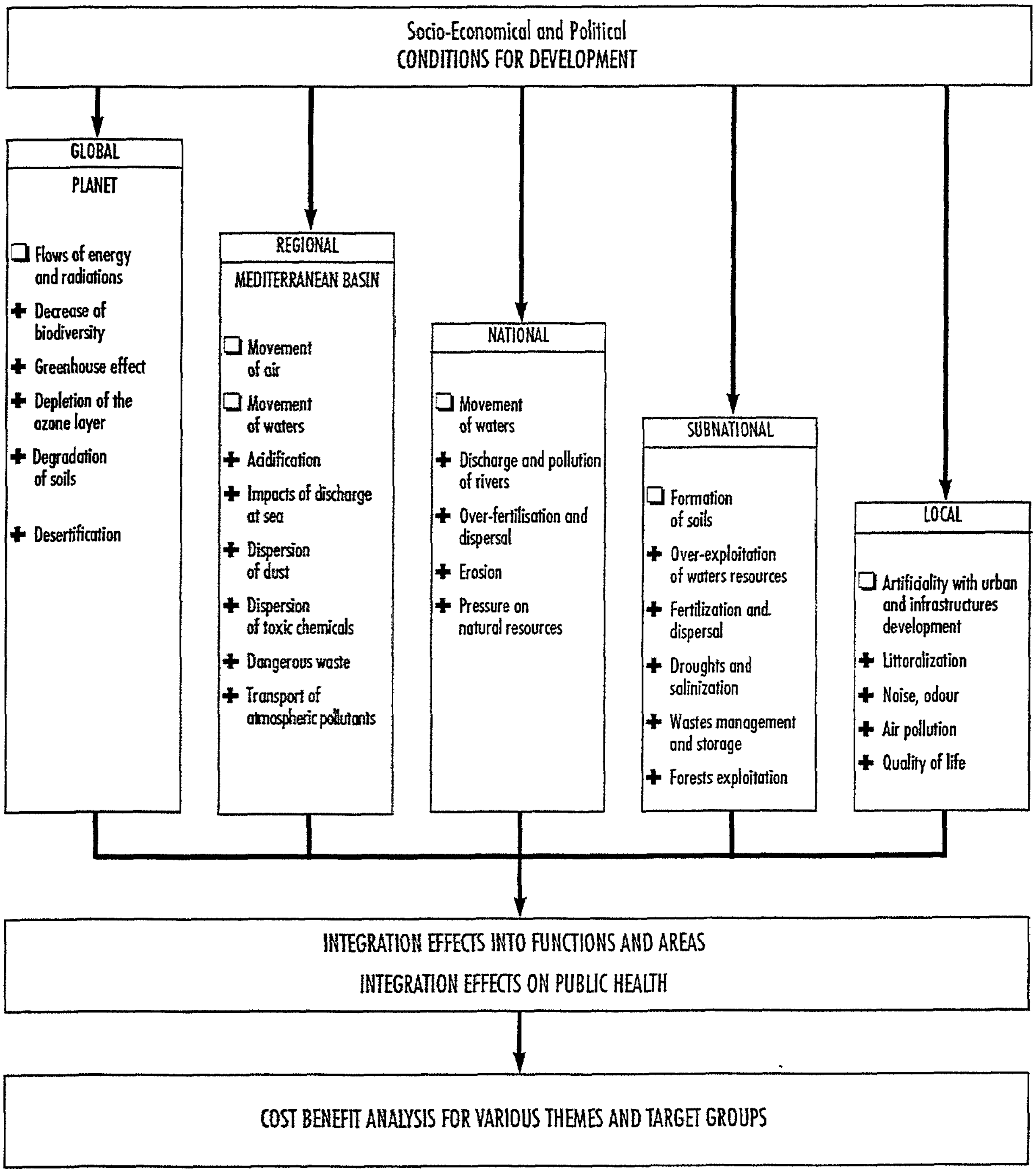
But the relevance of strictly economic variables is more global than that of environmental issues, with the exception of global phenomena, greenhouse effect and depletion of the ozone layer, observation scales do not usually overlap.

It is crucial, in terms of the relevance of indicators, to reflect on the level at which they are to be developed; type of information and ways in which it will be used. There are two ways in which to divide space which must be managed: the environmental field (the ecological window: division into catchment areas and the relationships between the coastal zones and the hinterlands), and the decisions having an influence over the environment (the socio-economic window: national, regional and local divisions).

Because of this complexity and in order to cover the entire field of sustainable development, the Blue Plan has retained several levels of observation:

*Spatial scales of some environmental problems*

(BP/RAC based on RIVM, 1989)




❑ : Physical Caracteristics, ✚ : Environment Problems.

*Combination of environmental "space and time" scales*

(Blue Plan according to Jacques Theys, 1990)

**ENVIRONMENTAL SCALES : FROM GLOBAL TO LOCAL**

| | very short term | medium term | long term |
|---|---|---|---|
| **Global and regional level** | • oil spill in the sea<br>• algae bloom<br>• nuclear accident | • transboundary water pollution<br>• discharge of toxic products<br>• transportation of hazardous wastes<br>• management of fishing areas | • increase of eco-toxicity<br>• global sea and soil pollution<br>• radioactive contamination<br>• climate change<br>• massive deforestation<br>• acid rain<br>• global drop of genetic diversity |
| **National level** | • poisoning by toxic products of national distribution<br>• transportation network saturation | • definition of national environmental policies<br>• natural reserves' management<br>• product control<br>• articulation between economic activities and environment<br>• species disappearance | • regional planning : coasts, mountains<br>• water resources management<br>• nuclear wastes<br>• sustainable development<br>• control of technologies |
| **Subnational level** | • chemical accident<br>• accidental water pollution<br>• invasion of species<br>• natural hazards (earthquakes, fires) | • impact of large equipments<br>• water supply for large cities<br>• national parks<br>• species management, fishing, hunting<br>• natural reserves | • forest management<br>• rural/urban balance<br>• soil and groundwater protection<br>• industrial waste (storage, treatment...)<br>• erosion |
| **Local level** | • setting up of an emergency plan for chemical pollution<br>• unplanned urbanization | • noise<br>• treatment of domestic waste<br>• cleaning of air and water pollution<br>• urban planning (green areas, pollution in working areas) | • setting and landscapes conservation<br>• long term planning of urban development<br>• clean technologies<br>• access to nature |

• The global level

This level has authority over issues such as indebtment and price determination, but it mainly deals with world trade regulations. These variables have an impact upon national economies and therefore indirectly on social conditions and use of natural resources in all countries, including those of the Mediterranean Basin. For the countries involved, these are specific exogenous parameters.

It is also at this level that indicators for the Mediterranean Basin are developed, in the form of prices for raw materials and revenues from exports. However, this level is not in itself an issue for indicators in this study. Indeed, the global variables determined at this level and the possibility to act upon them, do not only involve the Mediterranean Basin which is the substance of this report.

Furthermore, the global level is very important from an institutional, regulatory and political standpoint, however, these are qualitative influences and are not related to sustainable development alone.

At this global scale, in the future, it could be interesting to examine the contribution of Mediterranean countries to global environmental issues such as the ozone layer, greenhouse effect or biodiversity.

• The national level

This is where the environmental problems related to international exchanges and North/South imbalance occurs, not only with regard to pressure indicators (production, consumption modes, demographic data) and response indicators (with respect to co-operation), but also Mediterranean trade development or technology transfers within the Basin.

It is also usually at this level that most socio-economic data are collected or centralized which is interesting from the standpoint of information availability. This is where public decision-makers can play a role. This is why it is crucial that information be available at this level to assist the decision-making process.

When examining the other dimensions of sustainable development, it is obvious that dividing countries into territories is not appropriate, for instance when evaluating the demographic pressures on soil, water, or forests. Total natural resources/population ratios are certainly useful to briefly compare countries, but too much information is lost in countries where the availability of resources and population density vary tremendously from one region to the other (cf. water resources in Algeria, for example).

- The coastal level

The definition of coastal areas used in this report is the NUTS 3 administative system. This is where observation is particularly rich for analysis of development sustainability in so far as all environmentally impacting human activities are concentrated here:

- high population density;
- poorly controlled urbanisation;
- concentration of polluting or resource-guzzling industries: mining, steel and petrochemical industries, cement plants, food processing plants and leather industries;
- intensive agriculture;
- a high tourist population which affects consumption and production modes.

The Mediterranean coasts must be considered as a rare resource, which is used in conflicting ways; how can agricultural production, urban development, transportation development, industrial infrastructure, tourism and development of natural parks and protected areas, be conciliated in such a limited area?

Furthermore, it is relevant to specifically examine coastal regions. This notion covers both a real geographic and administrative situation, thus involving one or several administrative levels of decision-making, which is important for sustainable development; problems must be examined at a scale where action is possible.

In order to take the coastal specificities into consideration when developing indicators it is necessary to compare the coastal level with the national level, as is the case for the coastalisation index of the population.

$$\text{Population coastalisation index} = \frac{\text{density of coastal population}}{\text{density of national population}}$$

This type of indicator can be used differently to express the intensity of pressures exerted on coastal regions versus nationwide pressures and thereby determine the global pressure on the coast. These indicators must be adapted to assess the situation of countries with large inhospitable regions (deserts, high mountains,...)

- The local level: cities

As strongly recommended by Agenda MED 21, analysis must also involve the local level in so far as some cities or rural zones could in fact be true pilot areas for sustainable development. The urban environmental indicators are important because they involve the major feature of coastal areas, urbanization.

We have so far mainly examined levels corresponding to administrative divisions but there are other possible scales of observation which would probably be better adapted to the evolution of biophysical conditions around the Basin.

The debate on which scales to retain for the indicators occurs at each stage of their development, but these debates will be more acute if the degree of socio-economic relevance and the environmental scale are different, which is the case for most of the sensitive issues in the Mediterranean Basin.

Is it possible to cross socio-economic and environmental indicators assessed on different geographical contexts? Which scale should be chosen; the one corresponding to socio-economic data or environmental data scale?

- Level of catchment areas

Here, environmental issues may be examined from the more adequate standpoint of biophysical conditions. Within the Observatory approach, this level is used to develop indicators on two major environmental issues around the Basin: water and land resources.

- Level of maritime zones

This essentially involves working on the interface "Sea-Land", i.e., the infra-coastal, marine zone corresponding to the continental shelf. This zone is the most highly dependent on land-based emissions, the richest from an ecological point of view and the most attractive for a sea-oriented economy (fishing, fish farming, tourism). It is more difficult to determine at which scale the origin of sea pollutions should be examined.

Generally speaking, if we work within the distinction between the ecological context and the socio-economic context, can socio-economic activities on the coasts be considered as the main cause of overall degradation of catchment area environment? Or is it possible to say that the catchment area resources are consumed mainly by coastal regions?

If this is not the case, is it better to break environmental data down and relate it to socio-economic information at the coastal level, or should it be the reverse? Whatever the solution, it is crucial to enhance knowledge of the interaction between socio-economic activities around the Mediterranean Basin and their environmental consequences.

The answers to these questions will in fact vary according to the environmental factor under study and the choice of the level(s) retained will be specified for each indicator. Therefore, within an observatory, flexibility seems essential if work is to be done alternately within all divisions without difficulty.

Finally, the differences between environmental and socio-economic variables are encountered over time and space.

- Time scale

In general, economic decisions can be reversed, even if only at medium or long term, but this is not the case for some forms of environmental degradation. Economic variables are therefore generally considered as the control variables (those upon which it is possible to act in order to reverse a trend of evolution) within the indicators.

The time scale of decision-makers (often this is within the short term) does not correspond to the ecological scale (very long-term). It would be necessary to reconcile them, by extending the time scale currently used for economic calculations, which is one of the objectives of sustainable development. Indicators must enable prospective applications to evaluate the medium or long term impact of economic decisions.

Socio-economic pressures on the environment are subject to seasonal variations. For example, in the case of tourism, time is an essential characteristic regarding sustainability: a clear distinction must be made between the summer season and the rest of the year in determining tourism-related indicators. It would be interesting to calculate the quantity of additional water consumption related to tourists versus annual consumption in the region.

The relevant level of observation is chosen for each indicator according to several criteria:
- the nature of the environmental issue at hand;
- the role of the indicator: to describe a situation/evolution, to highlight interactions, to reveal which means of action or which political measures are available to deal with the problems.

## 2.3. Choosing the tools

The tools assessing sustainable development are chosen according to the principles under examination. It must be remembered that requirements must be met by the whole system of indicators and not by each one individually. The limits inherent to each indicator can be extended since the interpretation involves the entire system of indicators. Many indicators may be suggested but will not in themselves constitute a model of sustainable development and would require additional information, such as on the institutional factors.

Nontheless, they have common characteristics; they are are cross-reference indicators, ie., they integrate data from different dimensions of sustainable development (society, economy, environment). For each subject studied by MEDO, the system of indicators should include the following:

- state indicators and indicators of evolution, in order to permit prospective applications;
- indicators measuring the difference with regard to a reference value;
- cross-reference indicators taking into account two possible types of interactios between the environment and socio-economy: socio-economy/environment and environment/socio-economy.

On the basis of this concept, some tools have been retained by the MEDO for the development of indicators. Given that these these tools are still being tested, only a short list of these tools will be included here (the complete presentation of their definition and their usage will be published later):
- state indicators: simple structural ratios; simple normative ratios; simple ratios of coastalisation; Gini indices (presents the distributive characteristics of an indicator); aggregate indices...
- indicators of evoluttion: simple comparisons; elasticity of substitution; elasticity communicating interactions...

Diverse testing on the pertinence and validity of such indicators are also being made.

According to the major problem areas identified by the Blue Plan after long term prospective studies of the relationships between development and environment, these tools will essentially be used for early and preventive integration of environmental issues to the multiform and multiplayer processes of development and environment. Their utility is based on better knowledge of procedures and decision-makers, in charge of coastal evolution trends.

## 3. Which actors for which actions?

In order to clearly visualise whether situations and evolution trends in the Mediterranean Basin countries are in conformity with sustainable development, systemic analysis of all environmental dimensions must be undertaken, since they are clearly inseparable. Conclusions can not be drawn from the single study on water resources or deforestation since all environmental issues are interrelated and submitted to positive or negative socio-economic impact. The indicators which can be proposed for every selected priority subject in the Mediterranean Basin will not be self-sufficient; interpretation must be global.

Indicators usually offer a flexible and adaptable route to situation or evolution trend assessment. Quantification simplifies and facilitates access to composite data, and also facilitates interpretation. However, despite many advantages, it must be completed by more qualitative information.

A list of indicators in itself does not constitute a system: the indicators must be structured, and interrelated to allow single and global interpretation. Information necessary to build the system must be collected.

Qualitative comparison of Mediterranean countries efforts towards sustainable development requires <u>information adaptation to the specific context of each country</u>. Problems are country specific and the initial level of experience is not always comparable. This is why indicators must be reported and interpreted within the appropriate context, taking into account the specific ecological, geographic, social, economic and structural features of each country. For example, the relationship between expenditures for environmental protection and the state of the environment can only be assessed on the basis of the general national situation and additional information. If taken out of context, high expenditures could be interpreted as being used to deal with environmental conditions of mediocre quality or with a satisfactory level of quality which must be maintained.

Simultaneously, data must be available on institutions and decision-making instances in Mediterranean countries, and on the geographical level under their authority. This information is not only complementary to the pre-defined system of indicators, it is in fact the backbone of the system.

In matters of environment and development, the emphasis is most often put on technical factors and solutions. In fact, it is the institutions, through their presence or absence; capabilities or lack of capability; performance or non-performance, which determine whether these technical solutions will succeed or fail.

The word "institutions" is used here in its widest sense, covering both the institutional capabilities created by the States to implement policies - ministries and governmental agencies - and the policy-making process and the application means. The concept can also include the forms of population and territory participation through bodies of political (territorial and local communities) and nonpolitical (NGOs) representation.

Institutional factors are, however, difficult to assess. The following criteria could serve to clearly analyse the diversity of situations.

- The breakdown of authority between the central State and territorial districts. It is necessary to distinguish deconcentration that is the exertion of the State authority at levels closer to the population (which does not imply any modification of this authority), from decentralization or the transfer to autonomous elected instances of responsibilities they will be expected to exert in the name of a public community other than the State.

- The existence of supervising administrative authorities, or local or national agencies specifically in charge of the environment. Their existence alone does not guarantee proper operation, but it does demonstrate a degree of awareness and involvement by public authorities.

- The hierarchical level of a governmental organization and its field(s) of authority have a strong impact on its efficiency. The problem is that the areas covered by these institutions change considerably, both over space and time. Therefore, it must be assessed whether management is the responsibility of one ministerial department or whether it is shared by several ministries and in this case, which are the existing coordination instances.

- The logic behind the creation of environmental institutions will have strong bearing on its action in the field of sustainable development. In the case of water resource management, it must be determined if these institutions stem from administrative authorities or if the river basin was the starting point for the resource management authority.

- The available means. Administration budgets or staff levels, while they are not revealing isolatedly, become significant when examined over time and highlight national efforts undertaken at different times.

- National plans and programs for environmental protection. At the beginning of the 90s, planning appeared the preferred tool in the transition from traditional environmental policies, limited to repairing damage, to adapted policies seeking to intergrate ecological preoccupations with sustainable development. It is a valuable tool for the identification of general trends, and scheduled or current action. Time objectives are often involved. These may be the targets of public policies, minimum limit threshholds which must not be exceeded to avoid severe and unreversible damage, or levels estimated as appropriate.

- Legislation mainly expresses intentions which can be far from real achievements. The fact that a law exists does not mean that it is enforced. Adversely, the absence of a law in a given field does not indicate that there are no forms of control, no regulations or directives replacing legislation. Laws also set the ground for analysis, in so far as they often are the first official answer to a given problem.

- The adoption of regional or international environmental obligations. International environmental policies naturally follow national policies when the challenge involves several countries or when the world's environment is threatened. International environmental policies are now a part of the foreign affairs policies and are gaining in importance. They are also a motivating factor for national environmental policies.

In fact, the last four criteria are related to indicators of societal responses. They show how society reacts to environmental changes and concerns. Most indicators of societal responses have a shorter history and are still in a phase of development, both conceptually and in terms of data availability. This must be remembered when they are used so as to avoid any errors in interpretation (OECD, 1993).

The assessment of the administrative and institutionnal features of a country requires a preliminary study on national situations and the existing institutions in order to clearly understand how roles are distributed and which action is currently undertaken in each country. The approach requires qualitative and not only quantitative analysis of the actors' interplay. This entails thorough knowledge of local situations. When dealing with coastal areas, a field study is indispensable.

It is therefore absolutely essential to collect information related to the institutional dimension very early in the process of building-up indicators. Indicators can be used when this additional information has been compounded so as to guide public policies and assess their performances.

The development of the whole system will entail knowledge of global evolutions in the Mediterranean system based on objective indicators, approved by all parties, and essentially, by the trends of national and local decisions, through public policies increasingly integrated within the sustainable development perspective.

This signifies that a global approach for overall observation and evaluation of the Mediterranean Basin only makes sense if it is interactive with coastal countries and coordinated within MAP. Decision-makers must be totally involved in this approach requiring constant mutual information feedback, and will be asked to participate in comparisons and verifications. Although established comparisons may include errors, they will be a motivating basis for action. The approach must therefore be transposable and useful at more appropriate scales which correspond to the reality of development levels.

It is with this aim in mind that methods and tools are being developed for the global and local approach by the Blue Plan, as its contribution to sustainable development in the Mediterranean.

Following the general principles for the building-up of MEDO, presented in fascicle 1, the theoretical concepts discussed in this section (fascicle 5A) which are somewhat shallow, constitute the conceptual basis for more concrete work that are presented in the following fascicles:

- fascicle 2 – From problematics to indicators: the example of water
- fascicle 3 – Environmental institutions in the Mediterranean
- fascicle 4 – Follow-up of the Agenda 21 for the Mediterranean countries

# B

# MEDO's Mediterranean Information System for Environment and Development (MEDIS)

## Introduction

The information system of an organisation consists of all of its human resources, equipment and overall methods of processing and communication of every type of information.

The creation of MEDO's information system required a detailed study of Blue Plan's organisation in general and of MEDO in particular, in relation with the most recent technologies in data collection, storing, processing and communication. Indeed, within the prospective studies at the Mediterranean Basin level, Blue Plan had already accumulated considerable quantities of data on Mediterranean countries, essentially those concerning the socio-economy.

During the design and organisation phase of MEDO, several objectives were identified in the field of existing and future data. These objectives are:
- to build and structure a statistic and geographic database on the state of environment and development, for all Mediterranean countries, and more specifically for the coastal regions,
- to develop a set of Mediterranean indicators for sustainable development,
- to set up the network of national observatories based on compatible systems for collection, processing and distribution of environmental and socio-economic data,
- to draft periodical reports on the state of the environment at the global scale of the Mediterranean Basin and coastal regions,
- to supply local and national decision-makers and the group of experts with reliable and objective data on the state of the environment and its interaction with development, in order to guarantee sustainable development in the Mediterranean Basin and its coastal regions.

The Mediterranean Information System for Environment and Development (MEDIS) is a simple and efficient tool created by MEDO to achieve the following objectives:
- to structure data available at the Blue Plan and to increase the access level to data scientific users,
- to assist in data analysis and development of relevant indicators,
- to draw up tables, charts ant thematic maps.

In the long term, MEDIS will also become:
- an assisting tool for systemic and prospective assessments,
- a modelling and simulation tool,
- a tool for data exchange between MAP centres, international institutions, and national observatories.

MEDIS thus complies with the recommendations of Agenda 21. In Chapter 40 the report stresses the need to strengthen local, provincial, national and international capacities to collect and use multisectorial information in the decision making process and enhance capacities to collect and analyse data and information for decision-making, particularly in developing countries. This chapter also emphasises the need to improve the collection and use of data through new techniques (of data collection), including satellite-based remote sensing and improved methods of data assessment and analysis.

"National and international data and information centres should set up continuous and accurate data-collection systems and make use of geographic information systems, experts systems, models and a variety of other techniques for the assessment and analysis data. These steps will be particularly relevant, as large quantities of data from satellite source will need to be processed in the future. Developed countries and international organisations, as well as the private sector, should co-operate, in particular with developing countries, upon request, to facilitate their acquiring these technologies and this know-how", and establish and strengthen their ability to set up electronic networks.

The objective of part B of the "Methods and Tools" fascicle, involves the presentation of provisional results; acquired knowledge; and, perspectives which can be obtained through the gradual implementation of MEDIS.

Implementing MEDIS involved the following major steps:

### *Feasibility study for MEDO*

This study was undertaken during the first 6 months of 1992. It involved long term analysis of the way in which Blue Plan could reinforce its prospective functions. At the end of the study, the financial application file for the global project "MEDO" was produced.".

The main directions proposed in the creation of MEDO involve the definition of the project contents; administration of the project in terms of responsibilities; the planification of workload and specific time limits; management of human resources and budgets; and, monitoring activities on progress and quality control.

The preparation or pilot phase for MEDO was then determined as a three-year period, beginning in April 1993.

### *Setting up MEDO's budget*

The budget lines of the project essentially involve the funding of observatory activities, staff, and investment in technical means and computer tools required for the implementation of the observatory during the pilot phase.

### *Investments and recruitment of staff*

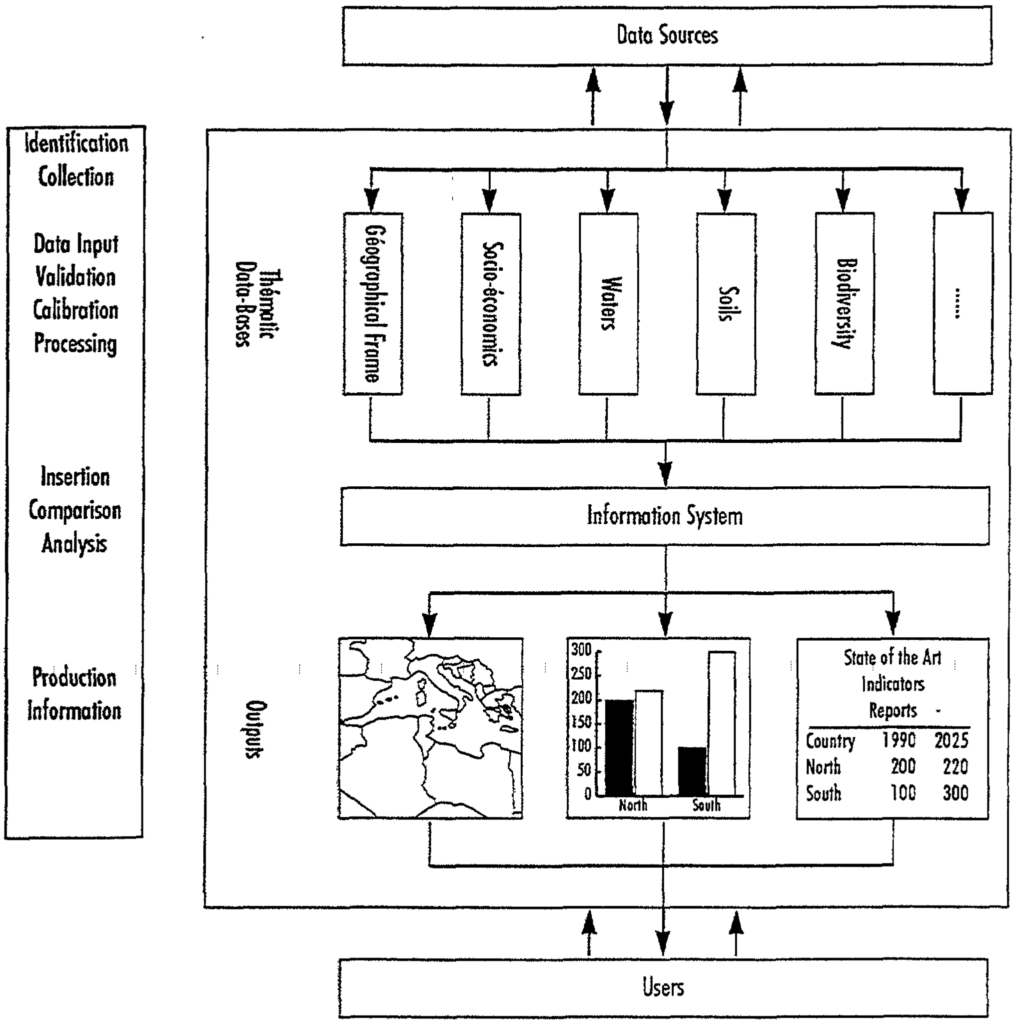
Staff, as defined in the financial application file, for the MEDO project was recruited during the first 6 months of 1993. The team in charge of developing the Mediterranean Information System today includes one data and computer expert and an engineer. It is backed up by student trainees and computer specialists under contract.

### *Implementation of MEDIS as required in the pilot phase of MEDO*

This operation began in June 1993 and involved three steps:

1. Detailed study of implementation, thorough analysis of Blue Plan organisation, drawing up of MEDIS specifications.
2. Structuring theoretical model of data, developing a theoretical model for processing.
3. Operational phase: acquisition of new computer equipment, installation and testing, development of user interfaces, statistical data transfer and entry, digitising and integrating mapping data, production of mapping products, development of new user-oriented computer tools.

*Figure 1: Functional diagram of MEDIS*



# 1. Contents of the System

During the detailed implementation study of MEDIS (operational diagram shown in Fig.1) all future or required elementary and sophisticated data were classified on the basis of discussions with users, consultation of administrative and other documents, and existing thematic printouts. This study gave a clearer view of the needs of user and decision-maker groups using the information system.
The user group includes all Blue Plan experts involved in the field of prospective studies, observatory and documentation. The answer to the needs of these users is presented in the form of tools for data input, analysis and processing, as well as decision-aiding products. This also meets the expectations of users from the other MEDO partner countries. The decision-making group, which comprises the team in charge of Blue Plan, makes decisions on long-term strategies, medium-term tactics and short-term operations. These decisions are made according to strategies related to Blue Plan financing bodies, amongst such bodies is the MAP.

The detailed implementation study of MEDIS, identified available data by listing parameters, sources, partners..., as extensively as possible. A directory of data was drawn-up to serve as a basis for theoretical analysis and more specifically for the structuring of statistic and geographic database.

## 1.1. Observatory levels

Following the 8th Meeting of the Contracting Parties to the Barcelona Convention (Antalya, 1993), and as a follow up to the preliminary presentation document for MEDO and Blue Plan meetings (Support Group for the Observatory, Blue Plan Bureau), the following observation levels were selected by MEDO:
- the "country" level;
- the "coastal regions" level;
- the "watershed" level;
- the "local" level.

### *The "country" level*

This level encompasses all the Mediterranean bordering countries on the national scale. At this level, the Blue Plan geographic framework covers the Mediterranean Basin as a whole, with 22 countries or geographic entities: Spain, France, Italy Monaco, Malta, Slovenia, Croatia, Bosnia-Herzégovina, Yougoslavie (Serbia and Montenegro), Albania, Greece, Turkye, Cyprus, Syria, Lebanon, Israel, Palestine, Égypt, Libya, Tunisia, Algeria, Morocco (clockwise order).

Other components are also involved:
- groups of countries (Mediterranean or not) of institutional (eg European Union, Arab Maghreb Union) or geographic (eg Middle East) nature,
- main countries representative of a given field, for example, China for population and Saudi Arabia for oil.

A problem which arises at this level is the determination of borders that are still not fully defined, such as:
- Bosnia-Herzeovina– Croatia– Yugoslavia (Serbia and Montenegro)
- Morocco – western Sahara,
- Israel – Palestine,
- Cyprus.

This situation results in practical difficulties for data collection, graphic representation, communication, etc...

In order to temporarily solve these difficulties, the Blue Plan, acting as a regional activity centre of PAM and therefore also of UNEP, applies the United Nations recommendations mentioned above.

### *The "coastal regions" level*

These regions correspond to a specific level of the administrative breakdown implemented in each Mediterranean country. This is the case for the European Union where the basic administration units correspond to Level 3 of the Nomenclature of Territorial Units for Statistics (NUTS 3).

In countries of the European Union, this breakdown involves 1,043 units, 115 of which border the Mediterranean.

***Table 1: Nomenclature of Territorial Units for Statistics of the European Union for the 4 countries bordering the Mediterranean***

| NUTS 0 | NUTS 1 | NUTS 2 | NUTS 3 |
|---|---|---|---|
| SPAIN | Groups NUTS 2 | Autonomous Communities | Provinces |
| FRANCE | ZEAT* | Regions | Departments |
| ITALY | Groups NUTS 2 | Regions | Provinces |
| GREECE | Groups NUTS 2 | Regions | Nomes |

* *Zone d'Etude et d'Aménagement du Territoire*

In agreement with most countries, the Blue Plan has attempted to apply the equivalent of NUTS level 3 to the Mediterranean Basin. This breakdown results in 221 coastal administrative units which unfortunately are not perfectly homogeneous.

These territorial units are still evolving in Southern and Eastern Mediterranean countries. The new administrative breakdown implemented by some countries makes it difficult to re-assess preceding data. This reassessment is usually carried out by institutes of statistics, but it sometimes requires years before new data is available. The other solution is to implement assessment methods based on statistic and mapping techniques.

*Table 2: Blue Plan's Mediterranean Regions*

| Geographic Unit | No. | Avg. Surf. Area ($km^2$) | Administrative Unit |
|---|---|---|---|
| Spain | 12 | 7959 | Province |
| France | 9 | 5250 | Department |
| Italy | 54 | 3071 | Province |
| Monaco | 1 | 2 | Country |
| Malta | 2 | 158 | Population census regions |
| Slovenia | 1 | 4395 | Group of communes |
| Croatia | 3 | 8588 | Association of communes |
| Bosnia-Herzeovina | 1 | 5930 | Group of communes |
| Yugoslavia | 1 | 6360 | Group of communes |
| Albania | 8 | 1132 | District |
| Greece | 41 | 2446 | Nome |
| Turkey | 10 | 12261 | Province |
| Cyprus | 6 | 1542 | District |
| Syria | 2 | 2100 | Mohafazat |
| Lebanon | 4 | 1223 | Governorat |
| Israel | 7 | 554 | Sub-district |
| Palestine (Gaza) | 1 | 373 | - |
| Egypt | 13 | 10433 | Governorat |
| Libya | 13 | ~1150 | Baladiva |
| Tunisia | 13 | 3516 | Governorat |
| Algeria | 15 | 3135 | Wilaya |
| Morocco | 6 | 6992 | Province |

* New Yugoslavia (Serbia and Montenegro).

In Algeria, for example, the administrative breakdown has been changed three times since 1950 (Initial basic reference for Blue Plan data). It increased from 4 to 15 departments in 1965, then to 31 in 1974 and 48 in 1984, while the number of coastal regions has gone from 3 to 14.

### *The "watershed" level*

The watershed of Mediterranean bordering countries are hydrological basins formed by all the drainage basins of those rivers flowing into the Mediterranean. In the case of the Nile, this watershed area is corrected as only the area downstream of the Aswan dam is being considered. Furthermore, the Blue Plan differentiates between two levels: elementary watersheds examined independently and those limited by frontiers (Table 3 and 4).

The transition from the "watershed" to "coastal regions" is an important part of Blue Plan's work. The most useful assessment procedure is based on the Geographic Information System.

*Table 3*

| The main elementary watersheds | Mediterranean countries | Other countries |
|---|---|---|
| Nile | Egypt | Ethiopia, Sudan, Uganda |
| Rhône | France | Switzerland |
| Ebro | Spain, France | |
| Pô | Italy | Switzerland |
| Moulouya | Morocco, Algeria | |
| Meric-Evros/Ergene | Greece, Turkey | Bulgaria |
| Cheliff | Algeria | |
| Büyük Menderes | Turkey | |
| Axios-Vardar | Yugoslavia, Greece | |
| Asi_Orantes | Syria, Lebanon, Turkey | |
| Medjerda | Tunisia, Algeria | |
| Ceyhan | Turkey | |
| Seyhan | Turkey | |
| Gediz | Turkey | |
| Jucar | Spain | |
| Tiber | Italy | |
| Strymon | Greece, Yugoslavia | Bulgaria |
| Segura | Spain | |
| Nertva | Yugoslavia | |
| Drin | Albania, Yugoslavia | |
| Adige | Italy | |

*Table 4*

| Country | The main Mediterranean watersheds | Other watersheds in the country |
|---|---|---|
| Turkey | Antalya, Asi, B.Menderes, Ceyhan, Gediz, K.Menderes, E.Mediterranean, Marmara, W.Mediterranean, Meric-Ergene, North-Aegean, Seyhan, | Akarçay, Aras, Burdur Lakes, Dicle (Tiger), Eastern Black Sea, Firat (Euphrates), Kizirmilak, Konya Closed, Sakarya, Susurluk, Can Closed, Western Black Sea, Yesilirmak, Çorum |

### *The "local" level*

The local level is in fact a list of Mediterranean sites such as the location of human activities (cities), industrial sites and ports, as well as natural parks and protected areas.

This list which focuses on the Mediterranean coasts, is extended to cover Mediterranean regions and watersheds according to the importance of the site.

The towns considered by MEDIS to be Mediterranean are:
- cities of over 10 000 inhabitants, located less than 10 km from the coast;
- cities of over 100 000 inhabitants, located less than 100 km from the coast, or in a watershed;
- capital cities of Mediterranean countries and those of coastal regions;
- as well as all Mediterranean country cities of over 1 million inhabitants.

### 1.2. Environmental parameters

Environmental data have been classified under themes, sub-themes and parameters according to the fields that MEDO considers as having priority status, these are: water, soil and biodiversity. For each of these, a list of partners and data sources has been identified for each level of geographic representation.

***Water***

MEDO separates the marine area from the continent:

- Theme: Inland waters
  Sub-theme: Rain - Flow - Stock - Development and consumption - Waste and sewage

- Theme: Coastline waters
  Sub-theme: Impact of pollutants

The collection of data on water is currently offered in hard copy from (statistical yearbooks, expert appraisals,...)

*Table 5*

| WATER | Identified partners and sources | | |
|---|---|---|---|
| | Mediterranean Basin/National level | Sub-national level watersheds/ coastal regions | Local level |
| Availability<br>rain:<br>flow<br>stocks<br>development | MEDU (Athens): working group on climate change<br>ACSAD: water resources in Arab countries International and national organisations monitoring and monographies<br>UNESCO/IHP/FRIEND/AMHY (regime and flow)<br>IOW<br>Blue Plan synthesis | Regional services (meteorology, hydrology) | Local services (meteorology, hydrology...)<br>CEMAGREF Lyon: (databases)<br>AMHY/FRIEND |
| Use and demand:<br>population/tourism<br>agriculture/irrigation<br>industry/energy | Blue Plan studies<br>International organisations (UNDP, BIRD,...FAO)<br>Ministries and national agencies (hydraulics, agriculture, forest, statistics...) | Monographs<br>Regional services and subdivisions such as basin agencies: regional statistics | |
| Constraints and effects natural risks impacts, pollution shortage quality | IME/MEDWAN: (drinking water and waste water)<br>UNEP/WRI & GEMS: quality of inland water<br>UNESCO/OSS: groundwater<br>MED POL: sources of pollution ministries of the environment, statistics, hydraulics..., aggregated maps and data | Network of pilot stations questionnaire to national partners, administrative breakdown, water police | Research organisations ex.: France:<br>RESALP: human impact on water in alpine areas<br>GIP Hydrosystemes<br>Network of coastal laboratories<br>Local emergency services (floods)<br>Network for monitoring water quality |
| Management and policy | IME/MEDWAN: management of ministry networks for water or environment: programmes and legislation | IME experts network<br>Administrations | |
| Coastal marine pollution | National Research Institutes: IFREMER: (France)<br>MED POL: maps of water quality and pollution | MED POL partners | Laboratories |

### *Soil*

Priority issues are defined as follows:

- land use;
- distribution of various soil types ;
- quality and degradation of soils;
- management and conservation.

*Table 6*

| SOIL | Identified partners and sources | | |
|---|---|---|---|
| | **Mediterranean Basin/National level** | **Sub-national level watersheds/ coastal regions** | **Local level** |
| Land use | EC/CORINE Land cover<br>National programmes underway: MEDGEOBASE (Tunisia, Morocco), Alys (Egypt)<br>Ministries of Agriculture and Forest and Statistics<br>OECD: changes in use (North Mediterranean and Turkey)<br>FAO: agriculture et forest<br>CIHEAM: Medagri and seminars (national examples) | CIHEAM: studies (agricultural and agri-food data)<br>Administrative breakdown: (evolution of land occupation) | Research organisations<br>University of Nice: evolution of land use<br>ORSTOM Tunis: remote sensing soil<br>ENSA, CNRS Montpellier |
| Soil characteristics | FAO: classification, soil type maps, and potential loads<br>ACSAD / Arab countries<br>National Ministries of Agriculture and Forest | FAO: regional studies<br>Regional services | Local FAO studies<br>Local services |
| Quality and degradation of soils | FAO & PAP/RAC methodological manual for monitoring erosion<br>MEDU (Athens): climate change<br>ISRIC(Holland)/GRID: degradation and human activities (world map)<br>ICONA (Spain): Lucdeme project: erosion status maps<br>Ministries of agriculture and/or forest: erosion status maps<br>Ministries or Agencies for the environment (thematic services)<br>Institutes for soil protection (national) | PAP/RAC: regional examples (erosion in coastal zones)<br>Research and training organisations: CIHEAM etc.<br>Regional services | Research organisations : ex.: in France<br>– CEMAGREF (salty soils)<br>– CNEARC: data on soils<br>– CNRS Montpellier (grazing)<br>Locale Administrations<br>Observatory of soil quality<br>(Ministry of the Environment, France) |
| Management and conservation | PAP/RAC: Work on national actions for soil conservation<br>Ministries for land development, infrastructure, agriculture, statistics, legislation and national programmes<br>UNESCO: biosphere reserves...<br>OCDE: work on effeciencyindicators of environmental policies<br>MEDIAS: interaction soil/atmosphere<br>Worldwatch Institute: work on METAP programme | Regional examples of PAP/RAC<br>Regional services | Local examples of PAP/RAC<br>Local services |

*Biodiversity*

The main topics under this heading, are fauna and flora. They are characterised according to IUCN's classification system of threats to taxons: "Extinct", "Endangered", "Vulnerable", "Scarce", "Undetermined", "Insufficiently known", "Threatened". Other topics are involved such as all the information related to "Protected Areas" "Wetlands" and "Forest".
For a framework of geographic reference, scientific work within the field of biodiversity is based on boundaries specific to each theme, sub-theme and parameters; these are geographical areas related to the data, revealing the absence or presence of the element being studied (e.g. the boundary of the olive tree, areas where reptiles are present, birds..., bioclimatic limits as defined by UNESCO).

A problem of quantification arises when data is converted from the boundaries of biodiversity and approved at the level of the "watersheds" and "coastal regions", except in the case of "Protected areas", "Wetlands" and "Forest" where information is actually space related.

*Table 7*

| BIODIVERSITY | Identified partners and sources | | |
|---|---|---|---|
| | Mediterranean Basin/ National level | Sub-national level watershed area/coastal | Local level |
| Conservation of species | IUCN<br>WCMC<br>SPA/RAC<br>Council of Europe | SFF (France)<br>ICONA (Spain<br>Goulandris Museum (Greece)<br>ANPE (Tunisia)<br>Ministry for the Environment<br>Organisation for Hunting and Fishing activities | Botanical gardens<br>Botanical museum<br>Universities<br>NGO |
| Domestic spicies | IBPGR<br>FAO<br>EU/DGXI – DGVI | Genetic Resources Bureau (France)<br>Ministry of Agriculture | Botanical museum<br>NGO |
| Habitats | IUCN<br>WCMC<br>Council of Europe<br>CORINE | SFF (France)<br>HISPANAT (Spain)<br>ANPE (Tunisia) | |
| Protected areas | IUCN<br>WCMC<br>SPA/RAC<br>International Federation of Parks<br>Council of Europe | Federation of Parks (France)<br>Ministry for the Environment<br>Ministry of Agriculture | National Parks<br>Natural Reserves |
| Forest | FAO<br>Silva Mediterranea | CEMAGREF (Aix/France)<br>Ministry of Forest (TR)<br>ICONA (Spain) | |

### 1.3 Socio-economic parameters

The socio-economic data for the themes and sub-themes are as follows

Theme: Population
Sub-theme: Demography – Migration

Theme: Health
Sub-theme: Personnel – Equipment – Disease – Accident
Theme: Urbanisation
Sub-theme: Urban Population – City

Theme: Macro-economy
Sub-theme: Economy – Employment

Theme: Socio-cultural
Sub-theme: Education – Culture

Theme: Agrifood
Sub-theme: Agriculture – Production – Livestock – Fishing – Woods – Agricultural inputs – Agricultural trade

Theme: Industry
Sub-theme: Production – Consumption – Mines – Production Industries

Theme: Energy
Sub-theme: Production – Consumption – Trade - Electricity – Coal – Oil and gas - Refining

Theme: Transports and communication
Sub-theme: Marine transports– Rail – Air – Road – Communications

Theme: Trade

Theme: Tourism

MEDO has selected and prioritised 250 socio-economic parameters. Socio-economic data refers to the country, the region (basic administrative unit) or to points such as an industrial site or city.

Calculation of socio-economic data for watershed requires the collection of data for all administrative units included in the watershed area (Level 3 administrative regions and communes). Adversely, the transition from points to the other levels is easier.

The data are currently collected in a hard copy form: national or regional statistics yearbooks as well as population census. The databases of FAO, World Population Prospect, World Tables, WRI... are received as machine-readable data sets. The list of the main partners and sources related to socio-economic issues are shown on the following table:

*Table 8*

| Socio-Economics | Identified partners and sources | | |
|---|---|---|---|
| | Mediterranean Basin/ National level | Sub-national level watershed area/coastal | Local level |
| Population | UN, Census | Census<br>*Statistical yearbooks*<br>INED and other demographic institutes<br>REGIO-Eurostat | |
| Health | WHO | Census<br>Statistical yearbooks | |
| Urbanisation | UN, Census | Census,<br>Statistical yearbooks | |
| Macro-economy | UN WB, IMF, EU, UNDP, OIT | Statistical yearbook and institutes<br>REGIO-Eurostat | |
| Socio-cultural | UN, UNESCO | Statistical yearbook and institutes | |
| Agrifood | FAO, ICAMAS | Statistical yearbook and institutes<br>REGIO-Eurostat | |
| Industry | UNIDO | Statistical yearbook and institutes | BRGM, UNIDO |
| Energy | UN, CPDP, UNIPEDE, OME | Statistical yearbook and institutes | CPDP, UNIPEDE |
| Transport and communications | UN, OECD, LLOYD'S | Statistical yearbook and institutes | CPDP, LLOYD'S |
| Trade | UNCED | Statistical yearbook and institutes | |
| Tourism | WTO | Statistical yearbook and institutes | Tourism Office |

## 1.4. Prospective studies

The Blue Plan's prospective studies were carried out at the global Mediterranean level and developed around socio-economic themes such as population, energy, tourism... and the interrelations between environment and development and more specifically the impacts of human activities on the environment and the Mediterranean coastal regions. Numerous statistical data were used to allow experts to analyse, compare and process series of prospective data, to make forecasts based on evolution and hypotheses determined according to different scenarios.

At the local level, the prospective studies of Blue Plan were essentially carried out on the Kastela Bay area (Croatia), the Isle of Rhodes (Greece) and Iskenderun Bay (Turkey). In addition to statistical data, experts used geographical information to illustrate the results of the scenarios.

Spatial analysis, use of digital field models, readjustment of mapping backgrounds to remote sensing information, modelling and simulation are all GIS functions which MEDO will gradually integrate within prospective studies. In this regard, a study is being carried out in the region of Sfax to develop prospective computer tools for the coastal level which will combine statistic, geographical, and digital data such as the results of remote sensing processing.

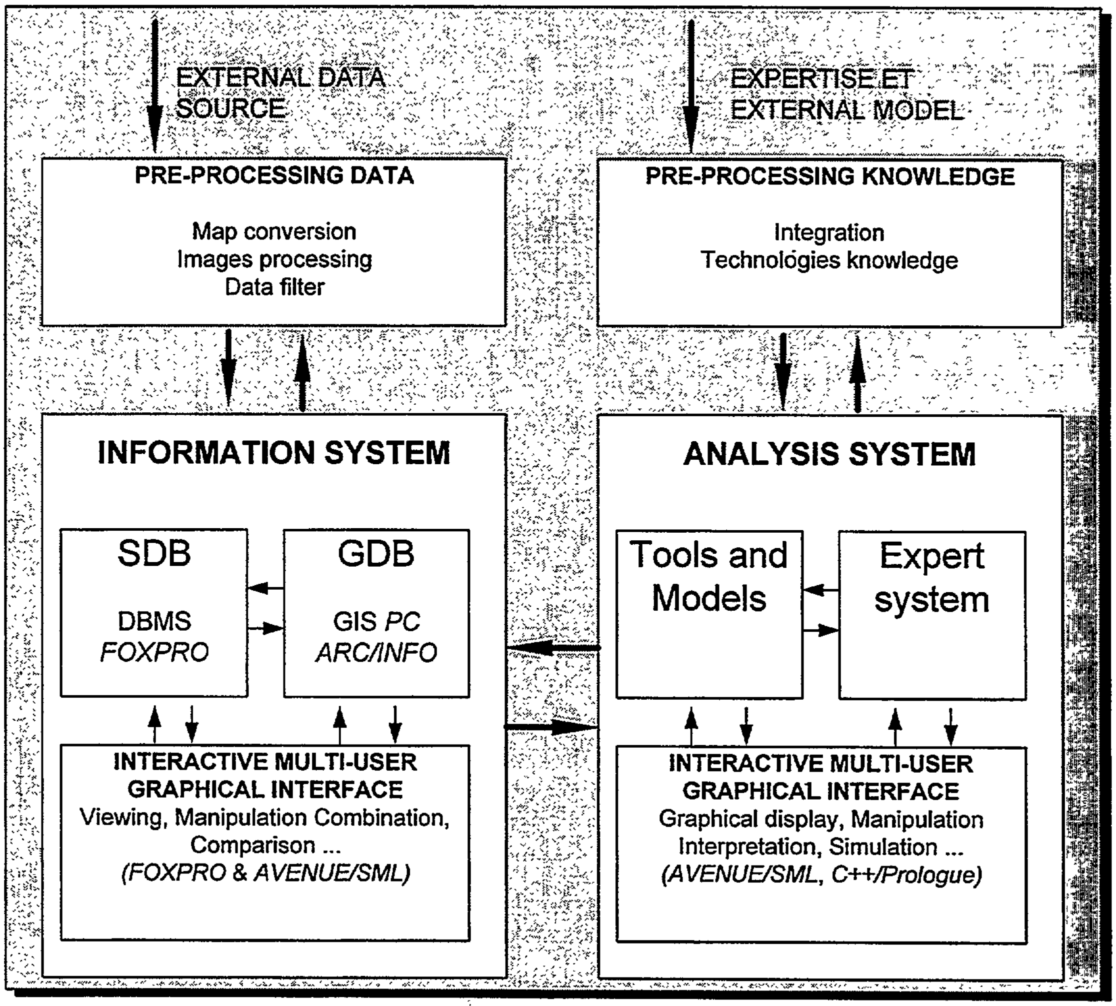
## 2. Analysis and structure

### 2.1. The theoretical diagram of the system

The analysis presented in Section 1 of this Chapter was used as basis for the development of the theoretical diagram of MEDIS presented in Figure 1.

With this diagram, all the parameters of environment and development can be structured into different databases, according to processing and technical knowledge required by the team of the Blue Plan. The system, designed as a decision-aiding tool, is shown hereunder:

***Figure 2 : The theoretical diagram of the system***



The "information system" is made up of both statistical and geographical databases.

The statistical database (SDB) that was developed through the use of a database management system (FOXPRO) is running under windows 3.1 and covers all socio-economic and environmental data which Blue Plan has treated at different representative scales. A "Man-Machine" interface has been developed. It gives the potential users the possibility of processing, storing and handling all data and downloading them to other types of software for analysis, state assessment printouts or map making.

The geographical database (GDB) comprises all the information that is related to geographical representations. It is currently used for developing mapping products. The development of a user interface with dynamic links to the SDB is scheduled during the second phase of the project after the pilote phase has been completed.

The implementation of the "analysis system" will also be carried out after the pilot phase. It will involve a number of operators, models and tools useful for data assessment and processing of prospective studies. Once they are integrated into an expert system they will facilitate processing operations.

## 2.2. The statistical database

The development of the statistic database represents the first stage of the operational development of MEDIS. Users will be able to process and store multi-temporal statistics (from 1950 to the present) on socio-economic and environmental topics working down from the global Mediterranean level to the coastal regions level.

### *2.2.1. Description of the user interface*

A "Man Machine" interface will allow the user to update, handle and visualise data. Such an interface has been created to facilitate the use, assessment and analysis of data by various users. This application was developed under DBMS Foxpro.

Special care was taken to make the screens user-friendly. The functions are ensured by scrolling menus, multiple windows, lists, keys and objects. The user is also constantly assisted by a line of text at the bottom of the screen (status line).

***First stage***

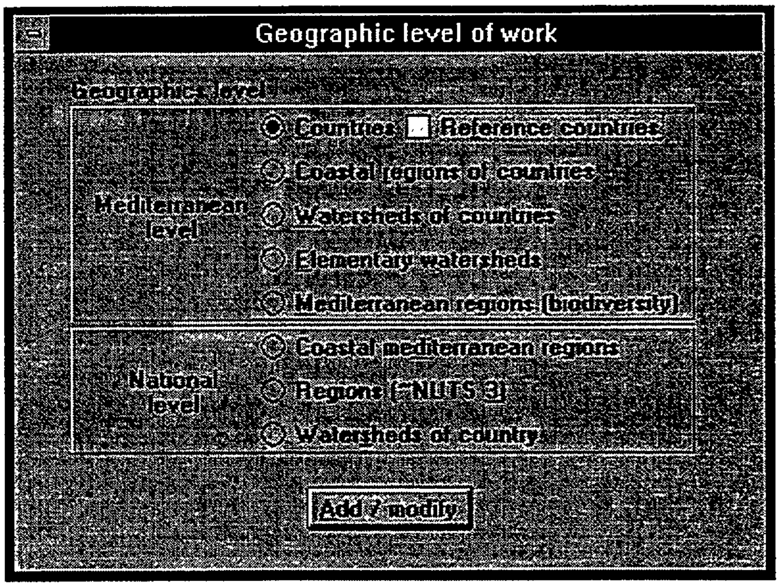
After the software is loaded, a window is displayed where the working language can be selected; either French of English. Another window then prompts the user to type in his name and password. User identification defines his right to access the various functions of the programme, i.e., database management, data input and use. Four priority levels have been defined. A menu bar gives access to the main functions.

***Second stage***

A. "Input/Modification" – "Consultation of data"

After selecting "Input/Modification" or "Consultation of data", from the menu bar, a window is displayed which allows the selection of a field within 2 main geographical levels (Cf. Figure 3).

***Figure 3***




These 2 levels are presented as follows:

– "Mediterranean level"
  - "Country": statistical data for the entire country
  - "Coastal regions: data on the whole of the coastal regions in one country
  - "Watershed": data on the coastal zones of watershed
  - "Elementary watershed": data on each elementary watershed, which can be shared by several countries (for example: the elementary watershed area of Medjerda is shared by Tunisia and Algeria).
  - "Mediterranean Regions for Biodiversity": data on bioclimatic zones, zones limited by olive trees... and broken down per country.

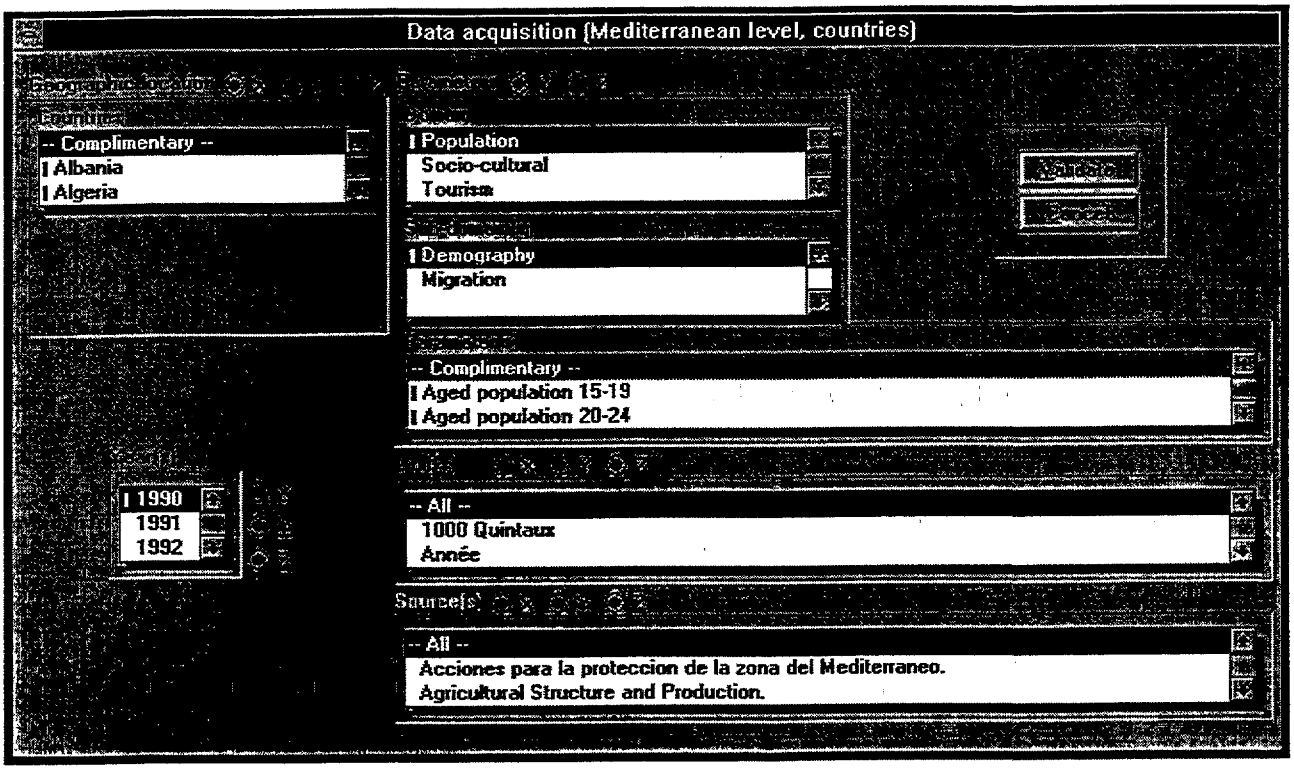
– "National level"
  - "Mediterranean coastal regions": these are the Mediterranean administrative regions of a country which correspond to Level 3 of NUTS for the European Union (NUTS 3).
  - "Regions (NUTS 3)": all the administrative units of the country.
  - "Watershed": all watersheds within a given country.

An option called "Countries of reference" enables the selection of reference countries, in addition to Mediterranean countries, within a specific field. For example:

- The United States, Japan, Germany for economy,
- China, India, the United States for population,
- Kuwait, Saudi Arabia, United Arab Emirates for oil products.

The selection of the geographical level is followed by the display of another window which enables the user to draw up spreadsheets for data input, modification, or consultation (Cf. Figure 4).

***Figure 4***




Parameters, sites, years, sources and units make up the subject matter of this multi-entity spreadsheet. Within this 5 dimensional presentation, it is easier for the user to insert, modify or extract data and print status reports. This is represented on the screen by keys X, Y and Z. The user must select two columns with X and Y. There are different forms of display such as: fixing other data by the key Z.

*Table 9*

| X (variable) | Y (variable) | Z (fixed) |
|---|---|---|
| 1. Parameters | Geographical Units (ex: country) | Year, Source, and Unit |
| 2. Parameters | Year | Geographical Unit, Source, Unit |
| 3. Parameters | Source | Geographical Unit, Year, Unit |
| 4. Parameters | Unit | Geographical Unit, Year, Source |
| 5. Geographical Unit | Year | Parameter, Source, Unit |
| 6. Geographical Unit | Source | Parameter, Year, Unit |
| 7. Geographical Unit | Unit | Parameter, Year, Source |
| 8. Year | Geographical Units | Parameter Source, Unit |
| 9. Year | Source | Parameter, Geographical Unit, Unit |
| 10. Year | Unit | Parameter, Geographical Unit, Source |
| 11. Source | Geographical Units | Parameter,Year, |
| 12. Source | Year | Parameter, Geographical Unit, Unit |
| 13. Source | Unit | Parameter, Geographical Unit, Year |
| 14. Unit | Geographical Units | Parameter, Year, Source |
| 15. Unit | Year | Parameter Geographical Unit, Source |
| 16. Unit | Source | Parameter, Geographical Unit, Year |

The user may select the data for each axis by clicking twice on the information listed in the spreadsheet.

Here, the user may draw up a spreadsheet and validate the selection. The result is displayed in the form of two windows. The first shows the selected data, and the other informs the user on the source, the unit and the remark related to the current spreadsheet cell (Figure 5).

When "Source" or "Unit" are selected as Z, the user may allocate a source or unit for:

- the entire spreadsheet;
- one or several lines;
- one or several columns;
- one or several cells.

This procedure is fulfilled according to the following steps: the programme displays the data on an Excel-type spreadsheet, adds a YY line and an XX line which will be used later to attribute a source or a unit to the data on each line for each column or for the whole spreadsheet.

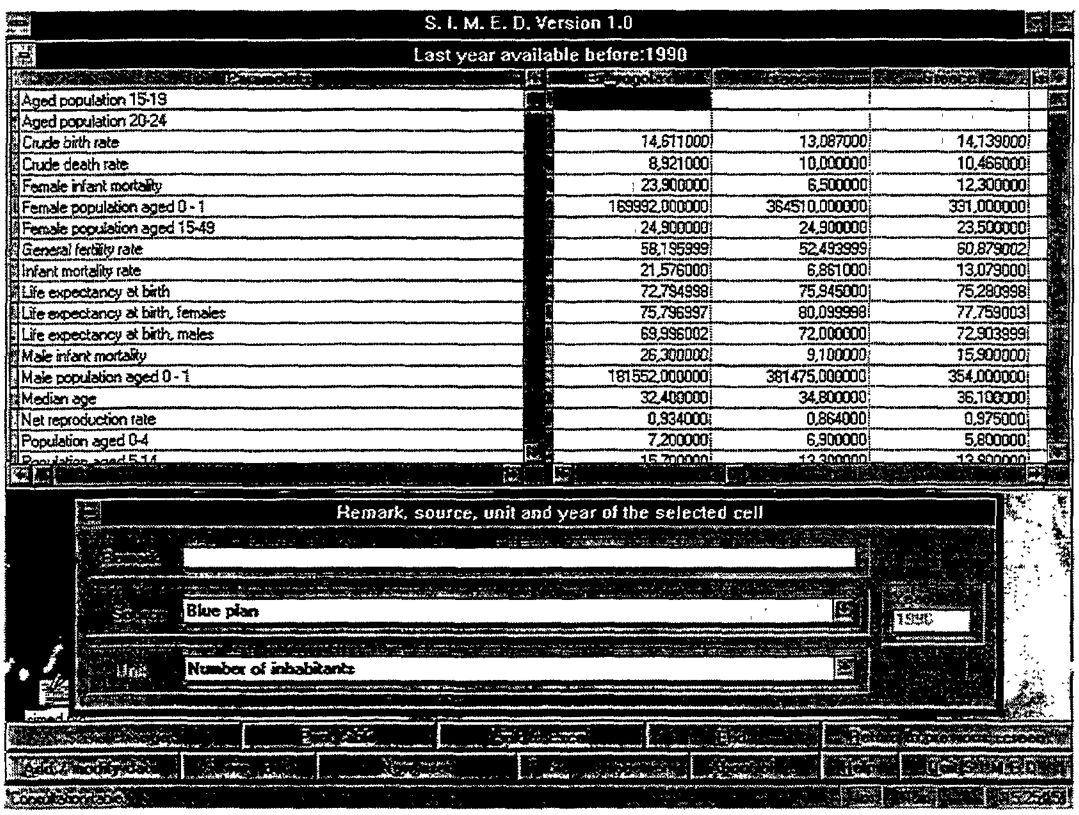
*Table 10*

| | C1 | ... | Ci | ... | Cn | XX |
|---|---|---|---|---|---|---|
| L1 | (L1,C1) | | (L1,Ci) | | (L1,Cn) | XX1 |
| ... | ... | | | | | ... |
| Li | (Li,C1) | | (Li,Ci) | | (Li,Cn) | XXi |
| ... | | | | | | ... |
| Lm | (Lm,C1) | | (Lm,Ci) | | (Lm,Cn) | XXm |
| YY | YY1 | ... | YYi | ... | YYn | XY |

1. Allocation of a source or a unit to a certain data is carried out through cells [(L1,C1) .. (Li,Ci) .. (Ln,Cn)]
2. Allocation of a source or a unit to a line or column is done respectively through cells (XX1..XXi..XXn] and [YY1..YYi..YYn].
3. Allocation of a source or a unit to the entire spreadsheet is done through a cell [XY]

Within the "consulting" mode, the user has an additional option when searching for a given date before a certain year: "Last available year". At this stage, and in the "input" mode only, the user may record, modify or delete new data.
A connection with Excel spreadsheet allows such functions as graphics, calculations, data comparison, statistical analysis, page lay-out and status reports to be made.

*Figure 5*



B. New user
This option allows a change of user without quiting the programme.

C. Table management
This option is available only for the database manager (priority level 1), who can input, modify or suppress one or several elements in the table displayed on the screen. The database can also be reorganised with this option.

### *2.2.2. Equipment requirements*

This application is a programme running under Windows 3.1 and can be distributed to potential users.

The equiment required to use the MEDIS software is an IBM PC/AT micro-processor or compatible computer with at least 8 megabytes of live memory, a disk drive and an 80 Megabyte harddisk.

Execution time of the MEDIS application strongly depends on the computer. The minimal system lay-out requires an 80486 processor, running at 33 MHz and a graphic interface with display resolution of 800*600 pixels in a 256-color palette.

Due to its user-friendliness, the software does not require extensive training.

### *2.2.3 Evolution of the user interface*

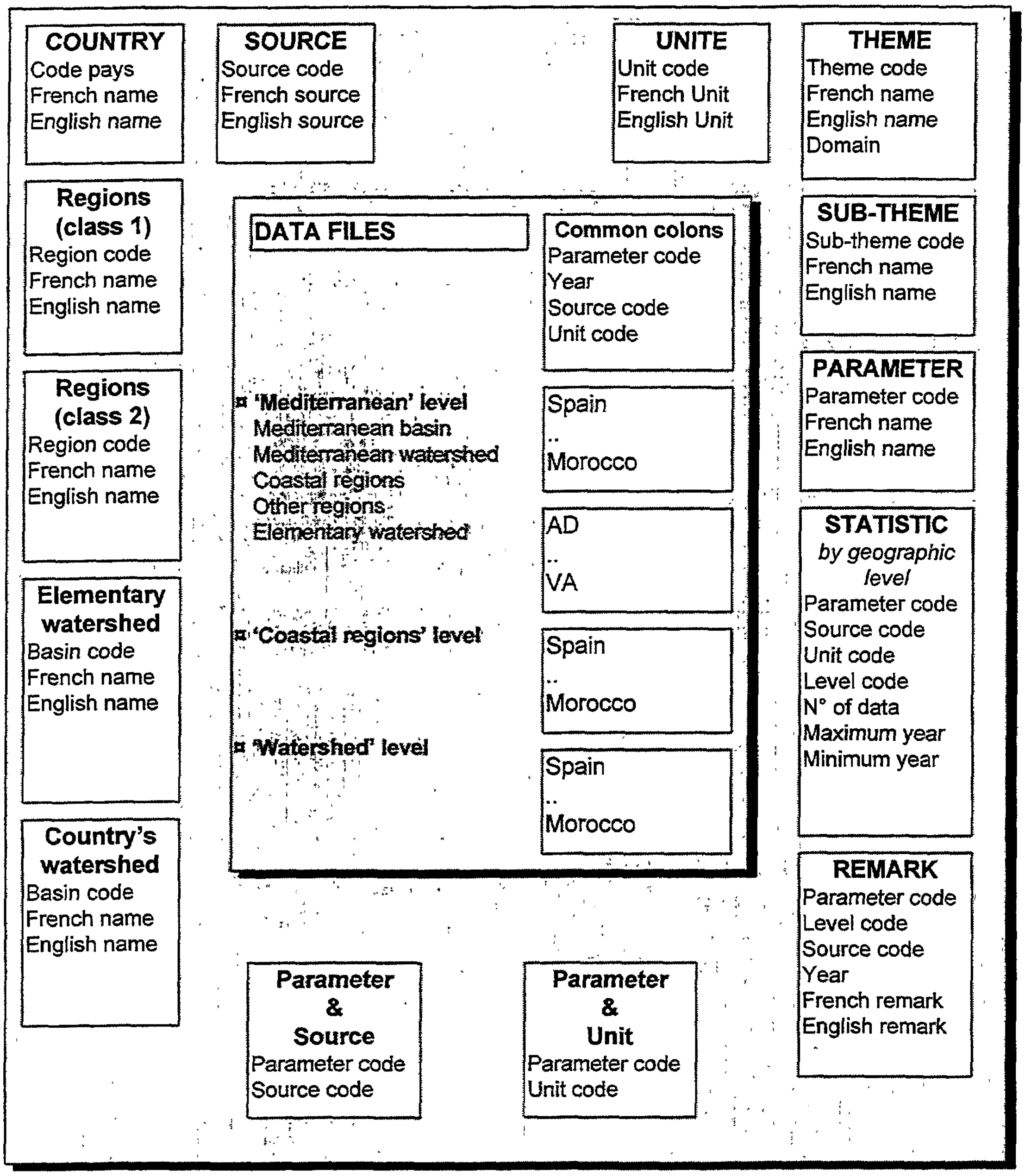
It is possible to add other function, such as the interactive request modules, import/export modules from and to external databases (e.g. FAO, WRI, World Bank, IUCN).

### *2.2.4 Structure of the data*

The theoretical phase for the implementation of the statistical database gave rise to a detailed analysis of the existing data, not only the data available at the Blue Plan but also the data used and managed by other organisations. This analysis resulted in the development of a theoretical diagram of data based on the relations model.

Relational databases are easy to use when accessing data in the application programmes, still maintaining confidentiality and security of the data.

*Figure 6: Simplified structure of the statistical database*




The statistical database of MEDIS is currently structured around four major fields: socio-economy, water, soil and biodiversity. In the database these fields are described with the files, "Theme", "Sub-theme" and "Parameter".

At the moment, the number of elements or records in each file is comprised of 15 for the themes, 52 for the sub-themes and approximately 600 for parameters of which half involve socio-economic information.

The code for the "parameter" comprises the "theme" and "sub-theme" codes, thus directly and permanently inter-connecting these files.

This is presented as follows:

*Figure 7*

| Code theme | Wording |
|---|---|
| 01 | Population |
| | |
| | |
| | |
| | |
| 02 | Health |
| ... | |

| Code sub-theme | Wording |
|---|---|
| 0101 | Demography |
| | |
| | |
| | |
| 0102 | Migration |
| | |
| ... | |

| Code parameter | Wording |
|---|---|
| 010101 | Global population |
| 010102 | Gross birth rate |
| 010103 | Gross mortality rate |
| ... | |
| 010201 | |
| | |
| ... | |

The parameter-related data are studied at several geographical levels:
- Mediterranean Basin level where data are collected by country;
- coastal region level;
- watershed.

These levels are represented by files for "Country", "Small regions" which includes the coastal regions, "Major regions" which represents the administrative breakdown equivalent to NUTS 2, "Elementary watershed" and "Watershed per country". The same principle of link for "Theme", "Sub-theme" and "Parameter" files is applied to files on "Country", "Regions" and "Watersheds".
Presently, there are 22 countries or entities, 221 coastal regions and 21 elementary watersheds of over 10 000 $km^2$

The "Statistics" file enables daily follow-up of the state of the data. It is related to "Source", "Unit" and "Parameter" files. It is also related to the geographical level through the "level code" which represents the "Country code", "Region code" (large or small regions), "Basin code" (elementary watershed or watershed in the country).

The "Remarks" file enables the allocation of remarks to inserted data. It is related to the "Parameter" and "Source" files as well as to the geographical levels in the same manner as the "Statistics" file.

In the "Source" file, there are two major categories:
- sources defined by and related to Mediterranean countries,
- global level sources, including international sources.

Among the 149 sources currently identified, this file contains 13 sources for the Mediterranean level and 136 for Mediterranean countries.

The "Source code" and the "Parameter code" enable management of the links between the "Parameter" and "Source" files through the "Source and Parameter" file.

The "Unit" file contains all units used by the Blue Plan.

The "Parameter and Unit" file constitutes the management file for links between "Parameter" and "Unit", as in the case of sources.

The data files are structured around the geographical level, which has lead to the creation of files divided into two parts:
- a common or "heading" part, composed of the "Parameter code", the "Source code", the "Unit code" and the "Year" enables a link with other database files("Parameter", "Source", "Unit"),
- the second part forms the "whole" of the files which changes according to the geographical level. It comprises the contents of the "Country code", the "Region code" or the "Basin code" and is presented in the form of a spreadsheet.

Among the socio-economic data which form 80 % of the current database, 90 % of the data represents the national level or "country" and are classified according to such themes as population, energy, agriculture, macro-economy and tourism, etc. The largest number of available data covering the period from 1950 to the present involves the time range 1960 to 1990.

The volume of the database, in its present state represents 10 Mo for 150 000 statistics.

## 2.3. Geographical database

The geographical database is organised around specific themes and comprises of several layers of information. This essentially involves data in the form of maps which are represented by the following three major types of objects:
- punctual objects: which correspond to localised information in the form of pixels,
- linear objects: which translate information presented in the form of individualised lines,
- polygonous objects: which represent information in the form of homogeneous zones.

Processing of this type of information requires using geographic information systems (GIS). The Blue Plan has two GIS stations: the first uses the Atlas GIS software distributed by Strategic Mapping Company, the second uses PC ARCINFO and ARCVIEW 2 software distributed by E.S.R.I. The two software share an A3 graphics tablet, a black and white HP 4M printer with 600 pixel resolutions by inch and a Canon CLC10 colour printer.

The decision to add PC Arc Info to Atlas GIS (acquired in April 1992) was based on several reasons:

- the volume of information to process;
- processing quality;
- quality of mapping products;
- tool standardisation;
- standardisation of geographical data format;
- budget limits.

### *2.3.1. Constitution of the set of mapping backgrounds*

The volume of information required to study the interrelations between environment and development data is quite significant.

The set of mapping backgrounds used by the Blue Plan has been structured using Atlas GIS for the entire Mediterranean level, and PC Arc Info and ARCVIEW 2 for coastal regions, watersheds or local levels. It is composed of a set of geographical and thematic layers from different sources. The data volume is currently 500 Mo.

The basic geographical layers

- International limits at a scale of 1:1 000 000 (Digital Chart of World)
- Coast lines at a scale of 1:1 000 000 (Digital Chart of World)
- Hydrographic network at a scale of 1:1 000 000 (Digital Chart of World)
- Level curves or hypsography at a scale of 1:1 000 000 (Digital Chart of World)
- Bathymetry at a scale of 1:2 500 000
- Administrative limits :
  - Turkey: 1:1 000 000
  - Tunisia: 1:500 000
  - Albania: 1:800 000
  - Spain, France, Italy, Greece: 1:3 000 000
- Limits of Mediterranean watershed
- Other backgrounds with different origins (UNEP/GRID, Blue Plan)

Thematic layers

- Map of Mediterranean soil, extracted from FAO data on Europe, Africa and Near East at a scale of 1:5 000 000 on PC ARC/INFO format.
- Request made for CORINE Land cover: Spain, France, Italy, and Greece.
- Site inventory:
  - Cities, Industries, Refineries
  - Airports
  - Ports (REMPEC date)
  - Protected areas (SPA/RAC)

Processing scale

Data are stored and processed at a scale of 1:1 000 000 for the global level, coastal regions, watershed and local level, between 1:25 000 and 1:100 000. Standardising scales per geographical level is essential to the future of data analysis, evaluation and assessment. In addition to space-related analysis in GIS (intersection, union, selection, overlapping of geographical levels, etc...), it is possible to assess data between geographical levels. A summary of scales and tools is shown in table 11.

*Table 11: Scales and processing tools*

| Theme | Type of information | Resolution/Scale | Processing tools |
|---|---|---|---|
| SOCIO-ECONOMY | Urbanisation<br>Tourism<br>Industry<br>... | 1/2 500 000<br><br>1/1 000 00 | Global level: Atlas GIS and ARCVIEW<br>Local level: ARCVIEW and PC ARC/INFO |
| WATER | Hdrographic Network<br>Navigability, categories<br>Water resources<br>Bathing water quality | 1/1 000 000<br>1/1 000 000<br>Localisation of station<br>Sectorial Representation | Global level: Atlas GIS and ARCVIEW<br>Local level: PC ARC/INFO |
| SOIL | Types of soils<br>Land use<br>Coastal erosion<br><br>Risk of soil erosion<br><br>Quality of soil<br><br>Slopes<br><br>Potential vegetation | 1/1 000 000<br>1/100 000<br>Basic file:<br>1/100 000<br>Generalisation<br>1/1 000 000<br>1/1 000 000<br>Combination of 4 data sources: soil, climate, slopes, vegetation<br>1/100 000<br>1/2 500 000 | Global level: Atlas GIS and ARCVIEW<br><br>Local level: PC ARC/INFO |
| BIODIVERSITY | Surface<br>(protected areas)<br><br>Species<br>ex: distribution of endemic species...<br><br>Aggregate data over 10 years | Global level<br>Local level: 1/25 000<br><br>Department level/<br>NUTS 3 | Atlas GIS and ARCVIEW<br>PC ARC/INFO, ARCVIEW<br><br>AGIS (NUTS 3 level)<br>PC ARC/INFO 1/25000 |
| Others | Climate<br>Cities<br>Coasts<br>Administrative limits | Localisation of stations | Global level: Atlas GIS and ARCVIEW<br>Local level: PC ARC/INFO |

Data acquisition and transfer

The import/export module enables retrieval of data from different software, such as in the case of the former geographical information background of Blue Plan, those obtained from UNEP/GRID, data from the Digital Chart of World database, FAO-SOIL data on soil types and MEDGEOBASE data for the region of Sfax in Tunisia for land cover.

Information is fed into the geographical database by digitising spatial data (polygons, lines, or points) through a map A/D converter.

Quality of processed data

Processing space related data, assessing data, drawing up summaries, and producing maps require that geographical data be consistent, reliable and of high quality.

Extraction of data, specific to the Mediterranean, from the Digital Chart of World database has proven to be difficult. The data are incomplete or incorrect. The hydrographic network, the rail and road networks, cities and their names are the main layers of information where the problem has been noticed. In the present state of things, corrections are being made on some information, particularly of data on the pilot countries of MEDO. In parallel, partner countries have been asked to give additional information.

Integration of data from remote sensing processing
The analysis of remote sensing images is always carried out to interpret the position of objects, their nature or functions. The interpretation process, whether visual or automated, transforms data contained in the image into information related to geographical sites. It is then easy to integrate information obtained through remote sensing to spatial information systems. Information may then be used, in a process of resource management, in combination with, for example, other socio-economic or ecological sources.

The integration of data resulting from remote sensing into the geographical database is considered from a global and local standpoint:

- Mediterranean Basin scale:
  Retrieval of processed images of the NOAA type via ERS/RAC, MEDIAS, AFRICOVER;...
- Coastal regions:
  Retrieval of aggregate data supplied by CORINE, MEDGEOBASE, national Observatories, and other organisations specialised in administrative units from images of the LANDSAT MSS, LANDSAT TM, SPOT XS and Panchromatic type.
- Local level:
  Detailed processing of study zones from LANDSAT MSS or TM, SPOT XS or Panchromatic images.

Finally, this integration of remote sensing data will be done regularly on the basis of standard, automatic and reliable processing methods in order to supply various databases and hence contribute to Blue Plan's systemic and prospective studies while fully complying with the recommendations of Agenda 21 Chapter 40.

### *2.3.2 Interactive graphic interface for mapping*

Its geographical interface is necessary. It will be developed around GIS PC ARC/INFO (SML or AML language) and ARCVIEW 2 (Avenue language); its objective will be to extend the use of the GIS tool to all thematic experts to simplify analysis and assessment of spatial data.

A dynamic connection with the statistical database will enable data extraction and integration. Visualisation will be in the form of statistic representations, such as diagrams, histograms, or in the form of specialised representations by combination with basic geographical units.

Structure of the geographical database

The database's structure is based on that of DCW with dynamic and interactive links to the statistical database. This will allow variables to be defined for the production of a certain type of map.

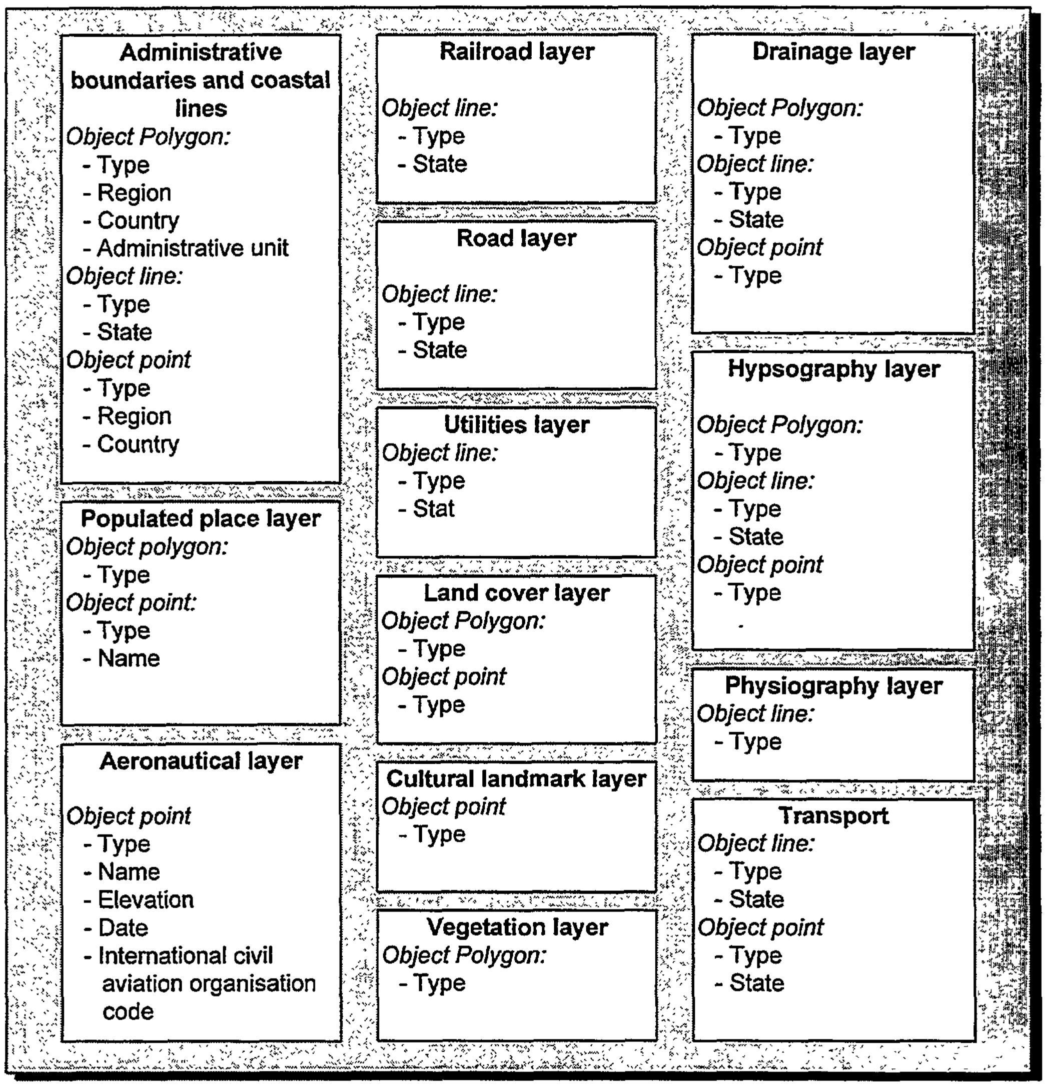
A multi-scale approach has been chosen. It is based on the following basic geographical levels; the Mediterranean level, the coastal regions level, the watershed level, and the local level. This approach will allow the user to work dynamically at all levels.

Partnership

Co-operation with data centres makes it possible to regularly supply the geographical database, particularly through:

- CORINE (EEA), for CORINE Land Cover projects (use of soil), CORINE Water (Resources and pollution), CORINE Air (Pollution), CORINE Biotopes, CORINE Soil (Resources and pollution) and erosion of coastal zones.
- MEDGEOBASE for current land cover data in Tunisia,
- WCMC (Cambridge, U.K) for its database on biodiversity: species, ecosystems and protected areas. It is developed around the ARC/INFO geographical data system and around the FOXPRO database management system.
- MEDIAS-FRANCE for:
  - the database on world ecosystems which covers plants, soil, climatic data, NOAA type satellite images (the scale of NOAA data processing is 1:1 000 000),
  - land cover in the form of GIV (global index for vegetation,
  - the African database including global change. (Médias-France is composed of a network of research laboratories and institutes for data updating).

*Figure 8 : Simplified structure for the DCW database*



## 2.4. System of Analysis

### *2.4.1. Tools and models*

Models involve essentially quantitative data. The models aim to obtain resulting variables as basic tools for decision making. Furthermore, the modelling for certain impacts of development on the state of environment, at the level of the coastal region, the country, or the Mediterranean Basin, will be facilitated by using information system techniques coupled with various applications and combining these with models and other simulation tools on specific scenarios and basic rules that have been predefined.
The initial work entails using "expertise" models considered to be operational, and which require crossing several thematic layers and resulting in territorial zoning.

For example, some models have been proposed by:

1) J. Dobbin Associates Incorporated:

Ecologically sensitive zones
This model is the result of the combination of eight basic maps of the natural resources in the Mediterranean region. It is used to identify sites of major ecological importance in order to establish priorities in protected zone programmes. These basic layers are:
- Route of migrating birds
- Largest algea surfaces
- Bird habitats
- Mediterranean monk seals
- Sea turtle egg-laying grounds
- Terrestrial zones rich in endemic species
- Whale feeding zones
- Wetlands.

Critical zones according to population growth
This model combines a given series on population growth up to a specific date (e.g. 2025) with other layers of information to identify the locations and degrees of critical zones resulting from population growth and natural constraints.
- Change in urban population from Year A to Year B
- Groundwater resources
- Map of the limits of use of agricultural resources
- Map of salinisation risk
- Map of mining risk
- Map of water-induced erosion risk
- Map of wind-induced erosion risk.

Hot spots
This model combines data related to urbanisation and economy with the availability of natural resources. It identifies zones with current or future potential for conflict between natural resources and human activities. It supports the manager in determining priorities for planning and development programmes, and covers environmental aspects.

- Marine transport
- Oil and loading ports
- Oil fields
- Urban zones
- Evolution of urban zones
- Oil spill sites in the marine environment
- Mining risks
- Sea dumping sites
- Port dumping sites
- Ports
- Coast lines
- Sea turtles
- Algea
- Routes of migrating birds
- Endemic zones
- Monk seal
- Most important bird habitats
- Wetlands.

2) EEA/CORINE

Risk of soil erosion
This model combines the maps concerning:
- Soil erodability
- Climate erosivity
- Slopes
- Land cover

3) Blue Plan

Urban development
This model is mainly based on the combination of:
- Land cover map
- Digital elevation model
- Hours of sunshine map
- Diagram of planning and development programmes.

### *2.4.2. Expert system*

This will entail gradual development of models according to the rationale of specialists in each field (socio-economy, water, soil and biodiversity) coupled with analysis and expertise of the Blue Plan's prospective function. This expertise, or know-how, raw material of the Blue Plan, constitute, along with all socio-economic and environmental data, the basis for Blue Plan's knowledge. To optimise the use of this knowledge, it must first be recorded, memorised, processed, used and then communicated.

Due to the fact that Blue Plan was heavily occupied during the pilot phase of MEDO, the Blue Plan does not foresee using expert system techniques for the moment. Participation from all team members and familiarisation with this type of tool are essential before starting the development of the expert system.

We must stress that this type of system is useful, mainly because of:

- the wealth of expert analysis;
- a certain independence of the system vis-à-vis people and a total availability of the system;
- fast and flexible processing with possible reproducibility.

In the long term, national observatories will systematically use remote sensing data, which will prove useful in the interpretation of satellite images and in their automatic updating in statistical and geographical databases. This type of application is highly complementary to projects such as CORINE Land Cover, MEDGEOBASE and AFRICOVER.

# 3 Lessons and perspectives

## 3.1. Information system

The main difficulties encountered during the implementation of MEDIS, stem from the way in which MEDO has been developed. As is the case for any major project, technical and scientific factors are difficult to measure in the pilot phase, which is why this is such an interesting stage.

Activity ranking and allocation
The main trends defined in the pilot phase of MEDO have proven to be insufficiently detailed to allow specific description of tasks and clear allotment of resources and means. To guarantee project feasibility and success, permanent scientific support and proper co-ordination and management of the Blue Plan team will be required.

Application of the information system within the organisation
The relevance of the information system to MEDO's activities, is its capacity to meet user demands swiftly and specifically. It also involves its capacity to manage and make readily available large quantities of information, required by Blue Plan prospective studies.

This is why it is absolutely essential that the Blue Plan team have thorough knowledge of the role and capacity of the computer tools currently developed, especially GIS, in order to establish sustainable development indicators and analyse the interactions between environment and development. Constant efforts must be made to train and inform users on the progress of the development of the information system.

*Specifications and gradual development of MEDIS*
Although a technical team has been appointed to specifically develop computer systems for the Blue Plan, MEDIS is the result of permanent multidisciplinary work between computer specialists and scientific users. The challenge facing the computer team is to relate the development of software of the new system with that of specific answers for users who are gradually discovering the tool and therefore, increasing their expectations to levels that are sometimes difficult for the technical team to reach.

These expectations are linked to the development of scientific methods specific to MEDO studies (Section A of this brochure and others) which were not sufficiently clarified prior to MEDIS's start-up. Their formalisation was therefore not included in rational specification when the computer system was designed. As a consequence, multidisciplinary teams hesitated as to their direction which is understandable during the pilot phase of MEDO.

Among the important points that have suffered from this state of things we can highlight the selection of geographical observation levels; the type and volume of data to manage and/or store within socio-economic and environmental data; the type of processing required particularly in the development of environment and development indicators; and, the quality and quantity of software products to develop in response to user needs inside and outside of Blue Plan.

To develop the work specifications of the observatory's studies and the Blue Plan in general in a compatible form with the activity programme of a MAP centre will permit the use of MEDIS to be improved. This will be more efficient as the user demands will be validated and coherent with the suggested work specifications.

***Supplying MEDIS with statistical and geographical data***

MEDIS essentially began with a foundation of socio-economic data which was based on Blue Plan's prospective studies done at a global scale and over a time scale of more than 10 years. To date, MEDIS has concentrated its efforts on structuring data in the computer framework and on their accessibility for a growing number of scientific users. Its has also focused on additional data collection and research, acquisition and introduction of environmental data into the MEDO database.

The information system, as structured and completed during the pilot phase, requires permanent improvement of data collection for each scientific field considered as a priority by MEDO. This is only feasible through the contribution of regional activity centres of MAP and national observatories - MEDO partners, supported by the usual database and other statistical yearbooks of international, national or regional organisations.

In view of the large quantities of data that need to be processed annually, data input is also an important issue for MEDIS. It must also be stressed that when such data exists they are often heterogeneous in quality and require validation by scientific users.

The constitution of geographical backgrounds is linked to the quality and quantity of physical and thematic maps to be digitised. This operation is a lengthy procedure which can sometimes lead to a time lag between data input operations and the development of statistic and geographic maps and other software products.

Using data from remote sensing at a fine scale and the proper interpretation of satellite images are intresting means for completing the information required by the activities of an "Observatory" type organisation. Integration of this type of information to geographical and statistical database will be a major asset for thematic processing of MEDO.

### 3.2. Networks and communications

At a time when information highways are invading the news, and gradually our lives, the Blue Plan, including the other regional activity centres of MAP and the national observatories, should not neglect these modern means of data transmission.

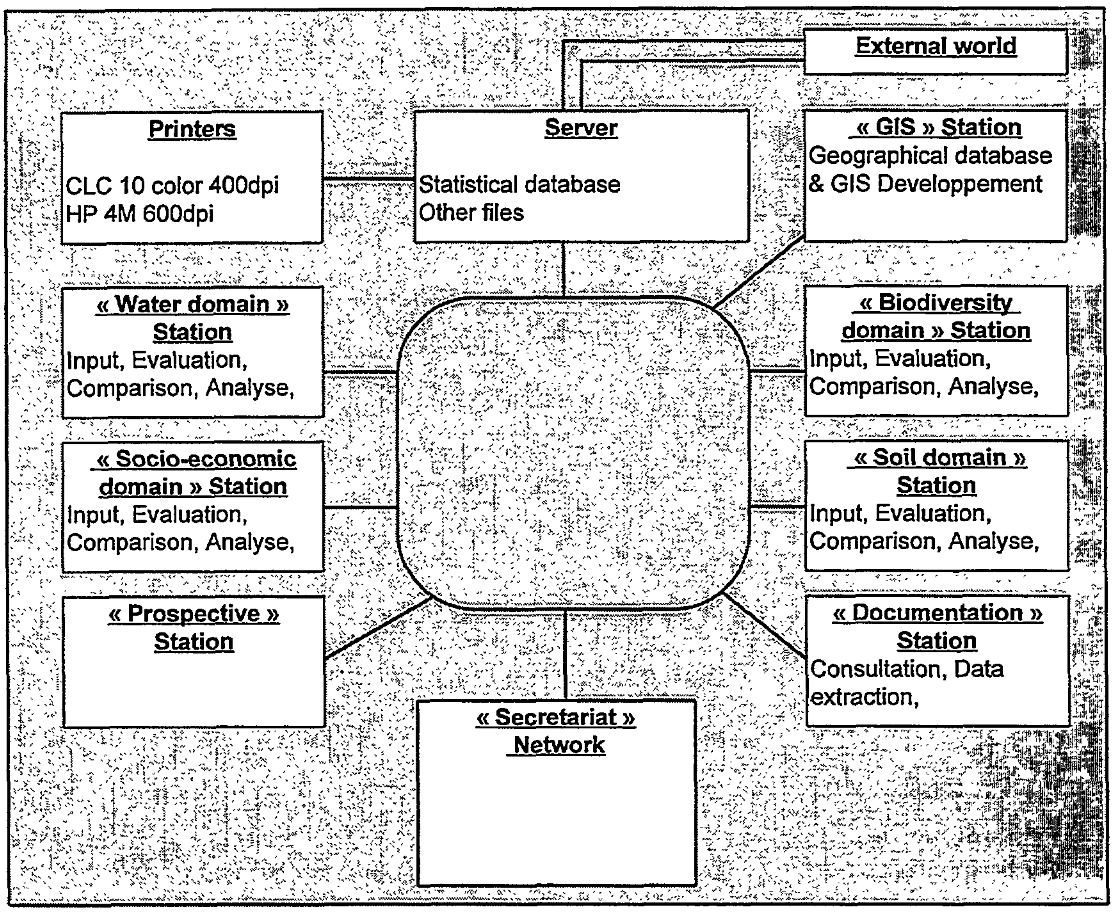
*Internal level : Proposition for the implementation of a local network*

Tests are currently being carried out at MEDIS on the transfer of information required for the implementation of a local network. Two workstations have been installed based on network boards of the Ethernet (Thinet) type and a network controller under Windows Workgroup 3.11.

The possible integration of another network controller such as Novell Netware, LAN Manager is under examination. The main goal would be to interconnect the different workstations and give them access to shared resources while enabling them to still remain autonomous.

Among the resources which can be shared, we can mention the utilisation of high quality printers (CLC 10 color printer); access to data files and programmes on a host station (this is the case for the interactive graphic interface under Foxpro DBMS); sharing of the streamer and compact disk drive (CD-ROM); sending or receiving E-mail; and, finally a connection with external world.

*Figure 9 : Proposition for the implementation of a local network*

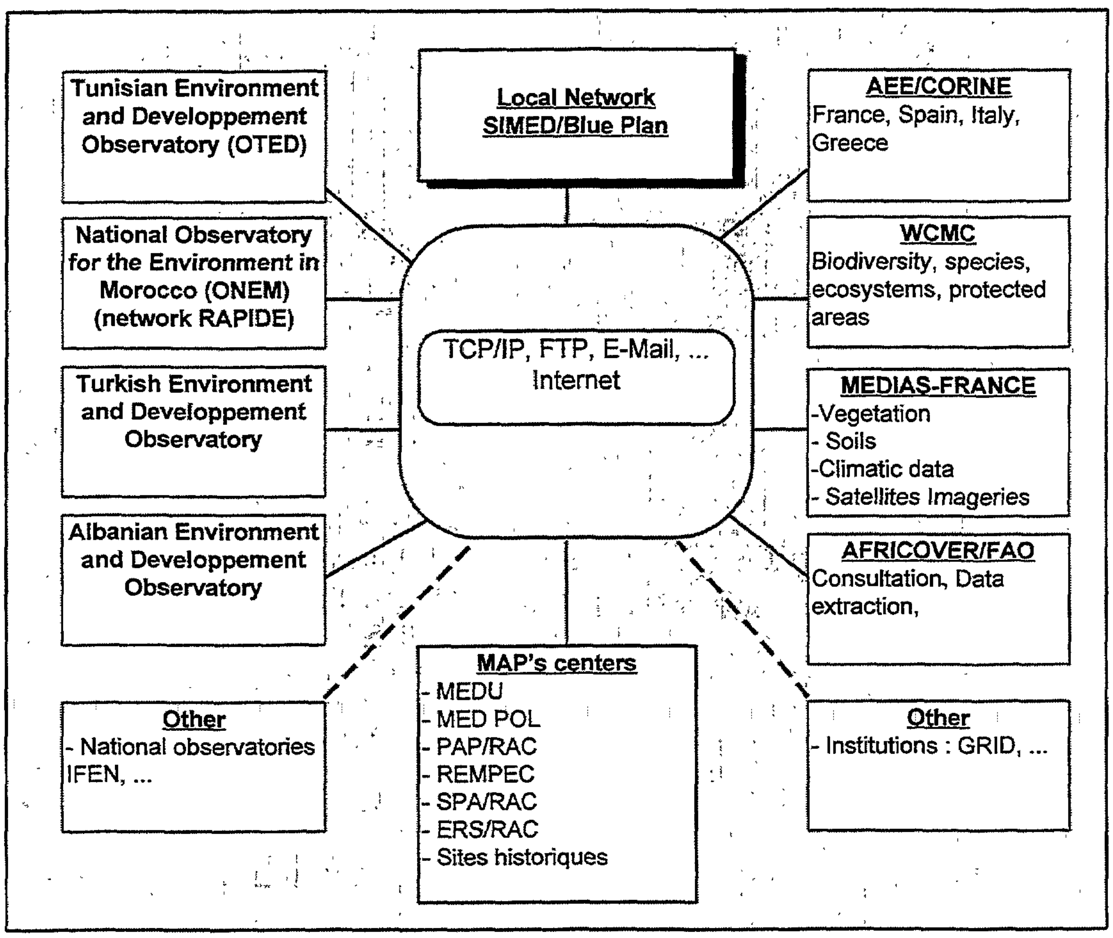


***Externel level : Proposition for the implementation of a global network in the short term***

Blue Plan temporarily benefits from a gateway under Internet through which, via a modem, it can launch mailings through E-mail, and transfer files using Internet's file transfer protocol module.

A connection proposition for the implementation of a global Mediterranean network is being examined. On the Blue Plan's side, the connection would be made through a 28-800 BPS modem in the Numeris network or the LAN network of the Sophia Antipolis research centres (R3T2). With concern to the MAP, given the information which we have, only the co-ordination unit is at present connected to the Internet. The other regional activity centres are investigating possible connections. The national Observatories of the four pilot countries are only at the implementation stage of their computing and data processing centres. Most of the other partner organisations, like WCMC and MEDIAS, are already connected. The connection stage for the different partners within MEDO to the Internet Network can thus develop quickly.

***Figure 10 : Proposition for the implementation of a global network in the short term***



# 4. MEDO's Partner projects

The development of MEDIS also entails studying and integrating data which is external to Blue Plan, issued from different suppliers and data centres illustrating the Mediterranean system. The Mediterranean geographical field, the diversity and integration of the topics followed by each of the MAP regional activity centres, national observatories and other projects impose the design of a common exchange and work strategy, if the intention is to:

- improve availability of comparable data on the scale of the Mediterranean countries, and in particular the coastal regions;
- organise information on the state of the environment and on Mediterranean development;
- make other projects compatible as far as concerns their data processing aspects (computers, peripheral archiving equipment, LANs, database management systems, geographical information systems...);
- exchange data through exploiting the most recent computer means and communication technology.

## 4.1. MAP's regional activity centres

With a view to and based on information available at Blue Plan from all RACs within MAP, an initial analysis has been produced on the present state of their respective computer systems, upgrading computer cooperation between centres. In fact, exchange of data and other results from analysis, between the different centres remains restricted at present.

The two main reasons are the lack of adequate computer means for this type of communication and the yet limited utilisation of management and data processing means, especially for the development of thematic databases.

To improve co-ordination of work and utilisation of data for all RACs, it would be foreseen to improve the computer system for the MAP co-ordination unit (MEDU) around workstations, database management systems, and high performance and powerful geographical information systems. This configuration would facilitate the storage, management and mass transfer of important data.

Some RACs are presently looking into an evolution of their respective computer systems. This process should promote how the different centres can complement each other (Table 12 on the programme of MAP activity centres). Regarding communication, a connection to the Internet Network is examined in all centres.

In this perspective, to improve the management and exchange of data between centres, a suggestion for the short term, with a view to reinforcing computer structures and cooperation, is illustrated in Figure 9. It is based on a common platform with PC Windows, in addition to the computer components specific to each center. This suggestion should be established within all the other RAC's by MEDU. This suggestion must naturally be discussed and improved. Thoroughly examined during thematic meetings between the co-ordination unit and all centres, it could lead to a quickly implementable and globally acceptable solution.

*Figure 11: Present state*

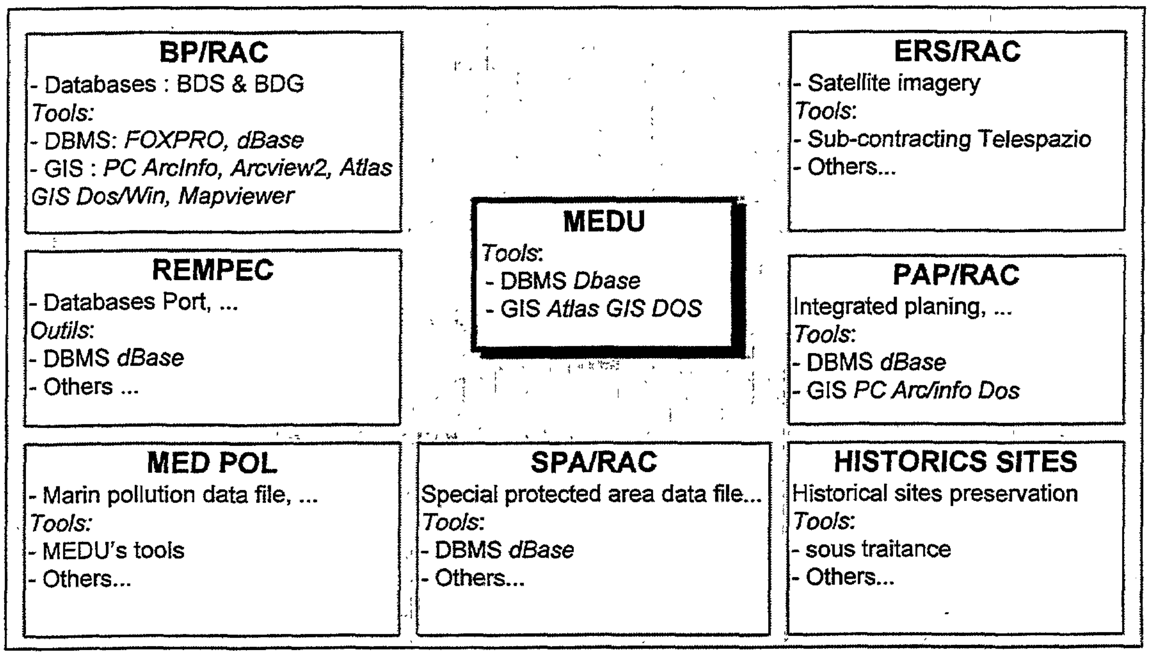



*Figure 12 : Propositions for the short term*

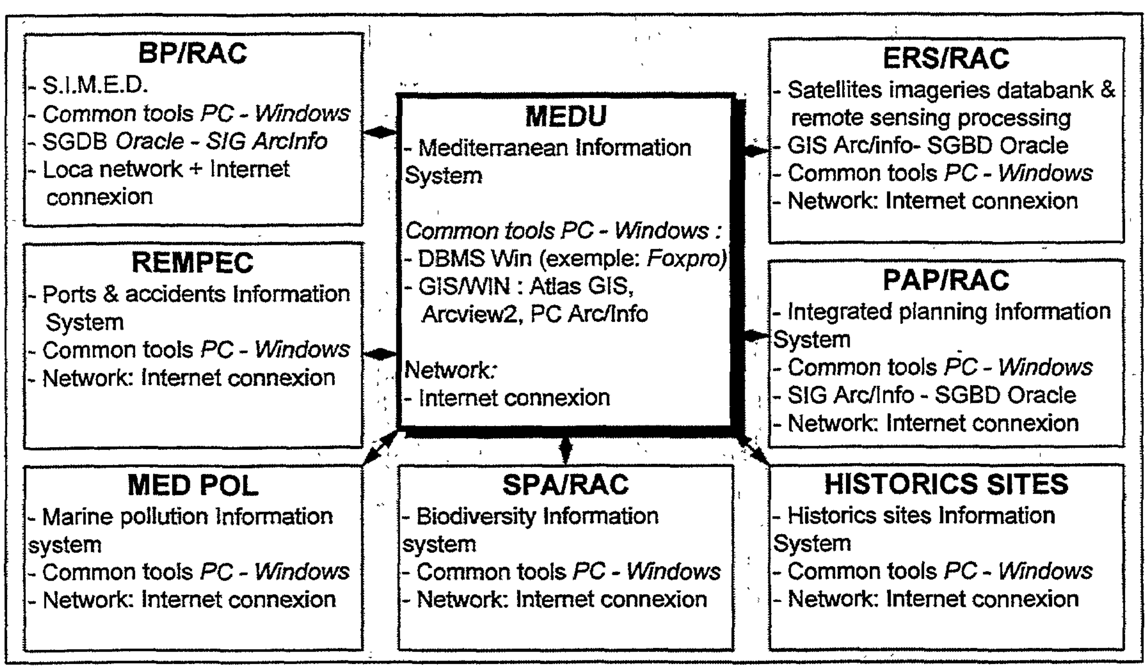


*Table 12: Programme of activities for MAP centres for 1994-1995.*

| (I) | Activities | Geographical field |
|---|---|---|
| MEDU<br>(Athens) | Coordinate the activities of MAP with the participating organisations and the activities of regional centres and allotment fund management | |
| MED POL<br>(Athens) | Continuous surveillance<br>– Assisting institutions involved in continuous surveillance programmes<br>– Assisting institutions of plankton and eutrophication surveillance<br>Assure data quality<br>Research<br>Evaluation of pollution<br>CAMP:<br>– Surveillance | Studies at the Mediterranean Basin level<br>National programmes |
| PAP/RAC<br>(Split) | Priority actions<br>– Integrated planning and management of coastal zones<br>– Implementation of the evaluation of impact on the environment<br>– Management of water resources<br>– Soil erosion<br>– Management, collection and elimination of solid and liquid waste<br>– Planning and environmental management of CAMP aquaculture<br>CAMP:<br>– Implementation of coastal area management programme with assistance from participating institutions<br>– Study of the impact of climate change on the Mediterranean coastal zone | Studies at the Mediterranean Basin level<br>Case studies<br>Studies at local level |
| SPA/RAC<br>(Tunis) | – Assistance in the creation and management of specially protected and ecologically valuable areas<br>– Implementation of action plans for the protection of cetaceous in the Mediterranean Sea, management of monk seals and for the protection of sea turtles<br>– Protection of other endangered species and ecosystems<br>– Assistance in the field of legislation dedicated to specially protected areas and to species conservation<br>CAMP:<br>– Specially protected areas | Studies at the Mediterranean Basin level<br>National programmes<br>Specially protected areas |
| REMPEC<br>(Malta) | Cooperation in combatting pollution in the Mediterranean Sea by oil and other toxic substances in case of critical situations<br>– Assistance to the development of national preparation and intervention devices<br>– Adoption of provisional models to the region under study and tools for decision-making<br>– Regional atlas for preparation and intervention in case of sea pollution<br>– Assistance to countries in case of critical situations (Unit of Mediterranean assistance)<br>CAMP:<br>– Application of common measures for emergency plans | Studies at the Mediterranean Basin level<br>Risk zones<br>Studies at local level |

| (II) | Activities | Geographical field |
|---|---|---|
| ERS/RAC (Palerma) | – Acquisition, classification and processing of satellite data<br>– Integration of satellite data with conventional data<br>– Modelling of environmental transformation phenomena<br>– Geographical information system<br>CAMP:<br>– Contribution of remote sensing | Studies at the Mediterranean Basin level<br>Local level |
| PATRIMOINE (Marseilles) | Preservation of historical coastal sites of common interest in the Mediterranean (cooperation programme) | Sites |
| BP/RAC (Sophia-Antipolis) | Systemic and prospective studies<br>– Improving and updating basin level studies<br>– Contributing to national scenarios<br>– Developing prospective tools for the coastal level<br>– Assisting local experts for the development of national scenarios<br>– Assisting local experts for planned systemic and prospective studies on a borderline coastal region of MEDO<br>– Improving, updating and communicating socio-economic and environment data<br>– Definition and application of environmental indicators<br>CAMP:<br>– Data collection<br>– Prospective analysis and development scenarios | Studies at the Mediterranean Basin level<br>National level<br>Local level |

This table on the main activities for 1994-1995, highlights several indications to establish in close cooperation, including data and information exchange between centres, while complying with the geographical and thematic specificities of each centre:

- PAP/RAC - BP/RAC
  Quality of soil, and water resources at the level of the Mediterranean Basin and at local level for CAMP.
  Collection, processing and formatting data by PAP/RAC and integration to the PAP/RAC and BP/RAC database for evaluation, analysis and evolution.
- SPA/RAC - BP/RAC
  Management of specially protected areas, endangered species and ecosystems. Collection, processing and formatting data by SPA/RAC and integration to the SPA/RAC and BP/RAC database for evaluation, analysis and evolution.
- MED POL - BP/RAC
  Evaluation of sea pollution by MED POL. BP/RAC is mainly interested in results and data on coastline waters.
- REMPEC - BP/RAC
  Database on Mediterranean ports by REMPEC with updates on commercial exchanges by BP/RAC.
- ERS/RAC - BP/RAC
  Analysis and processing of satellite data by ERS/RAC at global and local scales until data is integrated to GIS. It is interesting that other centres, mainly BP/RAC, benefit from the results in order to combine them with

other data sources, for background dressing to use them as mapping references and to develop new information plans.

### 4.2. National observatories

Among MEDO's main functions, the most important and difficult to implement is the support given for the creation of national observatories in the Mediterranean. This support is based on a compatible system for collection, processing and communication of environmental and socio-economic data.

To succeed in these operations, Blue Plan has decided to concentrate on four countries during the pilot phase of MEDO: Tunisia, Morocco, Turkey and Albania. Other countries, like France, Italy and Spain are regarded as references, due to the progress already made by their national and regional observatories or other equivalent institutions.

Over the past years, several national or regional observatories have been created in the field of environment and development. In France, for example, there is the French Institute for the Environment (IFEN) as the national observatory of follow-up and production of data on the state of the French environment. Its creation dates back to 1991 as initiated by the Ministry of the Environment. The main objective of IFEN is to collect and process environment data, making it available to decision makers in a form adapted for decision making.

Within a national network, IFEN federates scientific partners, agencies and administrations. These partners are either thematic at a national, institutional or a regional level (regional observatories, associations, territorial administration units). The information system of this institute has been defined around specific environmental priorities in France: air, water, soil, waste, fauna, flora and ecosystems, the territory and landscape, urban environment and economy. The management of all these themes is carried out through data banks where statistics and geographical information are determined.

Through its position as a focal point for the European Environmental Agency, IFEN can use space-related data, especially through the use of satellite images from the CORINE programme.

***Pilot country: Morocco***

The National Observatory for the Environment in Morocco (ONEM) was inaugurated in December 1994 under the authority of the Ministry of the Environment and the participation of UNDP, UNESCO and MAP (Blue Plan).

Its missions are:

- support for the integration of environment and development issues,
- management of environmental data,
- evaluation of the impacts of socio-economics activities on the environment,
- analysis of the incidence of environmental degradation on the economic growth of the country,
- study of environmental conditions and trends, at the national, regional or local levels,
- production of methodological decision-making tools,
- production and communication of environmental information,
- periodical printouts of reports on the state of the Moroccan environment,
- management of a network of acting partners, assuring the supply of environmental information and data. Included amongst these partners are the Ministries of Public Works, Energy and Mines, Agriculture and Industry as well as research centres and NGOs,
- constant surveillance of the environment.

This observatory has only recently become operational. Monographies have been made and regional studies carried out. An initial publication on the assessment of the current studies was communicated during the inaugural seminar of Rabat.

ONEM has set up membership rules for its network of players called RAPIDE.

Among the projects currently carried out by these partners, the following can be cited:

- the project involving know-how for new geographical information production and management technologies in the fields of land development, urbanisation and the environment,
- the development of geographical referential methods for the inventory and monitoring of the natural environment; the development of data input and processing methodology for space-related information; development of mapping and geographical database; the implementation of space-related information systems meeting the needs of rural space development; training and cooperation programmes in terms of GIS; models of the potential and risks of farm land degradation.
- the development of inventory maps for soil resources; models of the potential production and risks of farm land degradation in the Settat Province and Northwestern regions of Morocco, based primary on socio-economic data and satellite images.

***Pilot country: Tunisia***

The Tunisian Environment and Development Observatory (OTED) is a project funded by UNDP and the Tunisian government. It is implemented within the National Agency for the Protection of the Environment (ANPE), under the authority of the Ministry of the Environment and Territorial Development (MEAT).

Designed as a tool for decision makers through the development indicators concerning the state, progress and evaluation of the environmental and development interactions. It also contributes to the drafting of the national report on the state of the environment.

ANPE is the main operator of MEAT in this field, and it maintains close cooperation with MEDO in order to develop global methodology to create and follow up on the OTED Project.

To succeed in its mission, OTED works with the database created by the MEDGEOBASE project, the Sustainable Development Network project and national institutes, as well as other centres such as the National Centre for Remote Sensing (CNT) and the Regional Institute for Computer Science and Telecommunications (IRSIT).

The following are among the current projects undertaken by CNT:

- the development of an Information System for Urban Planning. Its main objective is the implementation of urban follow-up and planning methodology, based on a geographical information system for the Tunis area. As database, this project uses maps, the urban planning framework and satellite images.
- Digitising the maps of the "Forest and Grazing-ground Inventory" is carried out by the Forestry Institute (in cooperation with CNT). The objective of this project is to set up a geographical information system for the follow-up of forest and grazing zones over the entire Tunisian territory.
- It will allow the establishment of a map of 120,000 $km^2$ on the number of forests and grazing grounds, development of a general mapping framework and finally the design of a general development scheme.

IRSIT is incorporated in the implementation project of an information system concerning rural development. The objective is to obtain available data and required statistical and mapping analysis to direct the choices of decision-makers on activity planning programmes and to monitor the situation over the mountain ranges in the North-western part of Tunisia.

Finally MEAT has undertaken a project in association with CNT, INS (National Institute of Statistics) OTC and GDTA (The Aerospace Remote Sensing Development Group) (France) to the implementation of sustainable development.

All of these projects form an important basis for the operational start-up of the Tunisian observatory, where the main goal is to collect data, and cooperate closely with its national or regional partners.

*Pilot country: Turkey*

The objectives of the future observatory as defined in the memo drafted after the preparatory phase of the Turkish Environment and Development Observatory are:

- to facilitate the sharing of data with the organisations dealing with environmental and development issues,
- to increase private sector's and NGO's access of public data,
- to contribute to the improved comprehension of situations, implications, trends, and relationships between environment and development,
- to supply local, regional or national decision-makers with objective data to multiply actions in favour of sustainable development for economic interest zones,
- to structure the activities in relation to the systemic and prospective approach.

*Pilot country: Albania*

The Blue Plan has made initial contacts with UNDP and the European Union to prepare a national observatory in collaboration with Albanian authorities.

A project similar to MEDGEOBASE, and to CORINE Land Cover, is planned for the countries of Eastern Europe, including Albania. This project will be funded part by the European project PHARE.
The National Statistics Institute of Albania is presently working with the French Statistics Institute (INSEE) to implement new information collection procedures. Complete upgrading of the former system is also underway.

### 4.3. Other projects

*CORINE*

The main objective of this project is the co-ordination and harmonisation of information on the state of the environment and natural resources in the European Union. The CORINE programme covers the following:

- The priority to implement the programme
  - Identification and description of biotopes, essential to the essential to the protection of nature
  - Collection and organisation of relevant information on air emissions, and exploitation of all research undertaken in this field
  - Collection and organisation of relevant information on resources and characteristics of the environment most involved in development programmes: use and quality of land, soil erosion, quality of water and resources, seismic risks and coastal zone issues.

- Improvement of data comparability and availability, as well as of data evaluation methods
  - Organisation of a process for mutual information exchanges, development of an inventory of sources, categories and definitions of

data and information systems on the environment which will be regularly updated
- Transborder project for the improvement of data comparability
- Support to work undertaken by Member States and other international organisations
- Choice of methods for using remote sensing data
- Choice of management techniques for the information on the state of the environment and harmonisation of national or regional information systems.

This programme has lead to CORINE Land Cover, CORINE Soil, CORINE Water, CORINE Air and CORINE Biotopes. The CORINE programme is being pursued in the framework of the Environment European Agency (E.E.A.).

***MEDGEOBASE***

MEDGEOBASE is a result of CORINE Land Cover. Its application is initially scheduled for the Maghreb coastal regions with a possible extension to Egypt.

To date, its implementation has almost covered the entire Tunisian coastal region, using exploitation and processing methods as defined by CORINE. The nomenclature has been adapted to the specificities of the country, up to level 5 of the basic nomenclature of CORINE Land Cover.

The problem of automatically updating remote sensing data has arisen in this study, consequently it is impossible to compare data on two different regions at a given moment in time.

***AFRICOVER***

The AFRICOVER project (AFRican Inventory and Comprehensive Observation of Vegetation/Land Cover and Environmental Resources) is an FAO project. It entails the inventory and global observation of Land Cover, land occupation and environment resources, carried out at the level of five African regions : North Africa, East Africa, West Africa, Central Africa and South Africa.

The objectives of the project are:

- creating a map and implementing a geographic database of land cover and land occupation, while developing a geographic reference (toponomy, roads, rivers) at a scale of 1:250 000/1:200 000 and 1:100 000. This is all essentially prepared on the basis of remote sensing data and processed in GIS,
- reinforcing and updating national and sub-regional capacities to develop and regularly update maps on Land Cover, land use and changes in land use involving the African continent as a whole, with the possibility of larger scale maps (1:50 000) according to local priorities.

The launching of this project is very interesting for the Blue Plan in general and for the five countries in the Southern Mediterranean (Morocco, Algeria, Tunisia, Libya and Egypt) in particular. This closer cooperation between MEDO, OTED, ONEM and the AFRICOVER project would be very useful for for systematic and automatic updating of data from remote sensing processing.

## Conclusion

Blue Plan, as a result of its Observatory function, assures a role as a driving force and a coordinator for the development and setting up of national observatories and for the encouragement of meeting technical experts in view of harmonising data and products that will allow the comparability of the Mediterranean situation efficiently.

The exchange of knowledge and know-how, as well as assimilating practical experiences concerning the systems that have or are being established, represent an essential point for cooperation between Blue Plan , the national observatories and all the RACs within the MAP.

The information that has just been presented in this paper constitutes a description of the pilot phase of the MEDIS (Mediterranean Information System for the Environment and Development) and for this occasion MEDO has taken the opportunity to share this experience. In light of Blue Plan's experience, the following recommendations can be made:

- Set up the priorities of work by first identifying the problems, then users and their needs as data at the local, regional, national and Mediterranean scale.

- Implement a working group that can coordinate the Geographic Information Systems to be made availabe within the Blue Plan and its partners (i.e. national observatories, and regional activity centres).

- Assure the compatibility of the systems, the reliability and coherence of data in order to allow the data to be compared while giving the different partners a common language.

- Improve the collecting and evaluating techniques of data by using various tools, such as, the Geographic Information System, results of satellite imagery treatment, statistical analysis techniques, and other means of modelling and simulation that can facilitate decision-making.

- Supply varous users with such products as indiactors, regional and sectorial synthesis, state of environment reports, which are all adapted to their specific demands

- Set up the information and the format needed for developing the accessibility of the largest amount of users to the data, programmes or computers.

# C
## Documentary tools

Every 7 years there are published world-wide as many documents as have been published from Gutenberg to the present day. Each year, more than two million scientific articles are published, in other words more than 5,000 articles per day. This is not to mention the tons of reports of all kinds, theses or standards produced by laboratories or research centres[4].

At the time of setting up the documentary function at BP/RAC, these figures about what is kown as the information explosion help us get a clearer view of the problem.

The unit in charge of the documentary function was clearly individualized in Blue Plan in 1993 within MEDO framework. Accordingly, it was designed as a tool aimed at offering services to the Blue Plan partner network.

During the MEDO's current pilot phase, documentation-information work is being built around the following priority areas:
- study of the documentary collection at BP/RAC,
- identification of the various information sources in MEDO's fields of interest such as institutions, on-line data bases, general and specialized periodicals, institutional and scientific serials, libraries and documentation-information centres, etc.,
- definition of methods and tools needed for documentation management.

At the same time, an effort is put in order to better identify the expressed and latent needs of potential users, who are often geographically remote. Little by little, a documentary function has been established that is both subject-based and institution-based, the first results of which are outlined below.

[4] BOURE R., DARREON J.L. "Quand l'information était du pétrole gris...." In: *Sciences de la société. Les Cahiers du Lerass*, May 1993

# 1. Collection of institutional information

One of the Blue Plan's goals, in particular that one of MEDO, is to provide authorities and decision-makers, at the local, national or international levels, with objective elements of information so that they can DIRECT their action towards sustainable development in the interest of the entire Mediterranean area. To develop the Observatory function, Blue Plan must work in close collaboration with various partners such decision-makers in public bodies, international organization experts and specialists from scientific organizations.

Within this framework, the documentary function has to accompany and contribute to the development of Blue Plan's technical and scientific partnership and favor general Mediterranean inter-institutional cooperation. As it stands today, it is a tool for collecting and processing meta-data, that is referencial data on organizations. The objective is to disseminate the information or data gathered as a means of knowing "who is doing what" in the fields of development and environment in the Mediterranean.

### At the level of the Mediterranean countries

MEDO seeks to improve knowledge on the numerous institutions existing in each Mediterranean country and having responsibilities in the areas concerned with sustainable development.

Priority is firstly placed upon public administrative and planning systems on environment and development. The next step will be to identify the main national scientific institutions and non-governmental organizations that are most active in these areas.

To carry out this work, the first step was to draw out information from existing information tools. There is a wealth of tools available such as directories or catalogues. Many are drawn up and periodically updated by regional and international co-operation organizations such as Fondation René Seydoux in France, CEDARE in Egypt, OECD and two UNEP programmes: MAP and INFOTERRA. Generally speaking, these sources facilitate the task of identifying national research institutions working on land and marine environment as well as co-operation organizations in general. However, they only partially cover the national environmental administrative and management bodies.

That is why Blue Plan has decided to make an important effort to gather information about the environmental administrative bodies. In the Mediterranean countries, many of these structures are relatively new. Therefore, the goal is to identify structures that are gradually being set up in the various countries as a response to their environmental concerns. In parallel, Blue Plan experts carry out a more thorough examination in order to identify national programmes and monitoring networks in those environmental areas considered as having priority (coastline, water, soil, forest, biodiversity).

For the 1994-1995 period, attention was primarily placed on a few neighboring countries that are gradually setting up or reinforcing their environment observation-evaluation structures, that is Morocco, Tunisia, Turkey, Albania and France, the Blue Plan host country.

Collection of information is intended to accurately access the organization and operation of the administrative systems of the Mediterranean countries chosen as pilot countries. It includes at least:

- the functional flowcharts of the ministerial structures and departments in charge of implementing policies in the fields of development, environment and land use planning,
- for each ministerial department, data collected include the founding date, responsibilities, organization and bodies under control,
- the existence of territorial deconcentrated services,
- means available to the ministries and departments (budgets, staff, etc.).

In the years to come, this search for information will be completed so as to cover the entire Mediterranean basin. At the same time the search will be extended to the coastal level in order to identify not only public bodies in charge of coastal areas management but also private entities and actors of the civil society involved.

### At the international level (international organizations)

MEDO also intends to improve knowledge on inter-governmental organizations that have specific activity programmes in the Mediterranean basin or Mediterranean branches. As regards world or regional organizations, the divisions and departments dealing with the Blue Plan fields of interest will also be covered.

### The products under consideration

By gathering and processing these referencial data, MEDO has accumulated a considerable amount of top quality information. Initially, the idea was to produce a directory of institutions presenting notices on each organization, classified by country and accompanied by several indexes.

But the volume and the interest of the gathered information and the "philosophy" of the process put underway (described in chapter A of this Fascicle about methods) revealed the need to summarize and hierarchize the information so as to produce useful tools for Blue Plan's national and regional partners. This gave rise to the development of a specific research programme on the Mediterranean institutions concerned by sustainable development since the question, for a better organization of MEDO activities, is to produce information, methodologies and indicators targeted on users.

As a first phase of this new study programme, a series of national surveys has been initiated. They underline the diversity of contexts and existing institutions as well as the constraints and country-specific concerns. The *Mediterranean Country Profiles: Institutions – Environment – Development* derive from this work. They are structured as follows:

- the first part recalls the geographical framework of the country with an overview of its national resources,
- the second part presents the social and economic context, the main human activities and their pressure on the environment,
- the third part deals with the main public actors being directly or indirectly concerned with environmental issues, their fields of action and means as well as the responses found to environmental concerns (planning and programming, legislation, international cooperation).

Examples of this kind of survey have been produced for the countries mentioned above, Albania, France, Morocco, Tunisia and Turkey. They are distributed as individualized documents during the Ninth Meeting of the Contracting Parties in Barcelona (June 1995). Designed as reference tools, they provide basic synthetic information which will be periodically updated in close cooperation with the countries concerned.

A second phase consists on carrying out comparative institutional studies, the first results of which are presented in Fascicle 3.

## 2. Informative watch

The time when a documentation centre manager could feel proud of answering most demands by means of information that his department had itself processed, or the documents that it had gathered, is a thing of the past. A documentation unit is no longer a "library"; it is rather a window providing access to information no matter where that information is located.

Documentation centres have become diversified. Some of them, generally large departments, are specialized in data gathering and processing, systematically and exhaustively. In some cases, they can even dispense with contacts with the end user and work only with intermediaries (other documentation centres). Other smaller and more numerous units keep document acquisitions to the minimum (except at the heart of their speciality areas) and make large use of databases and services offered by the networks they are part of.

The Blue Plan documentation unit corresponds to this kind of small structure. Therefore, in order to set up a mechanism in charge of monitoring the Blue Plan's fields of interest, the novelties and new perspectives they may disclose, two complementary areas of work have been defined:

- creating a database intended initially to store then to disseminate the documentation available at BP/RAC,
- identifying and publicizing the on-line documentary databases that contain pertinent information about sustainable development and the Mediterranean area.

The Blue Plan's documentary data bases

The Blue Plan's documentary holdings consist of:

- ~ 500 reference works (dictionaries, directories, etc.), 300 of which are statistical yearbooks,
- ~ 8000 works and documents including printed books, technical reports, dissertations and theses, congress proceedings, etc.,
- 90 Blue Plan technical reports and publications,
- 87 MAP technical reports,
- 130 periodicals (including 77 current subscriptions),
- ~ 100 geographical maps,
- ~ 300 files on organizations,
- ~ 1000 subject-related files.

These documents are in French, English, Spanish, Italian, Arabic, Greek, Portuguese, Serbo-Croat, Turkish. Since the Observatory has been set up, the collection has been increasing at a rate of 500 documents per annum.

As far as data processing is concerned, computerization started in May 1993 with TEXTO software on a personal computer. A format corresponding to international standards (ISO, UNISIST) has been adopted. For the time being, the system comprises three bibliographical databases:

| Database name | Type of information | Current volume | End product – Periodicity |
|---|---|---|---|
| BLUE PLAN | BP reports and publications. Bibliographical description with summaries and key words | 90 references to work produced from 1983 to 1995 | *Compendium of Blue Plan works* with summaries – Annual (1st version published in September 93) |
| PERIO | Periodicals received at BP/RAC. Bibliographical description. | 77 references | *Catalogue of periodicals* – Annual (1st version published in October 93) |
| DOC | Books and documents received at BP/RAC. Bibliographical description with summaries and key words. | Prototype: 500 references. | Project: Subject-related bibliographies with key words. Product to be dissseminated. |

It is worth pointing out that the interest of this type of application is not based on the financial investment into hardware or data processing software which is quickly outdated, but on two other types of investment:

- the indexed data ; they are the fruit of a considerable amount of work and their longevity is based above all on the selection of the documents to be stored and on the quality of the key words used in indexing,
- the way the key words are grouped together to structure the useful information.

On the basis of all kinds of documents collected at BP/RAC, eg. grey literature, reports and notes, as well as conventional literature (books, articles of scientific periodicals, etc.), on the problematics of development, environment and land-use planning, it would be worthwhile to redefine the role of information. This one will have no value for a decision-maker unless it proves useful on his daily work in minimizing uncertainty about the future. It will be of interest only if it might affect the preparation of decisions.

It is by regularly feeding these databases that a Mediterranean thesaurus on environment and development could be developed. A thesaurus is a controlled language consisting of descriptors (uniterms or expressions) that can be combined together during indexing to express complex notions. A thesaurus goes far beyond a simple alphabetical list of key words which is a lexicon. Amongst the terms, it suggests semantic relationships of equivalence, hierarchy or association. In documentary databases, it is a fundamental tool that make indexing and searching operations consistent and reliable.

However, such an undertaking is a lengthy task. It could only succeed given particularly close co-operation with organizations having similar concerns. For the time being, documents are indexed on the basis of the OECD Macro thesaurus on economic and social development and on the

UNEP/INFOTERRA Thesaurus of environmental terms. Whenever necessary, the terms used by the authors are also selected.

As regards the products expected from the Blue Plan documentary database, the *Compendium of Blue Plan works* is an example. By distributing this Compendium, the dissemination of Blue Plan's written material (printed or not) has been improved. At the same time it has allowed to initiate cooperation with institutions of special interest to Blue Plan and its MEDO function.

### On-line databases

There is no way that a documentation centre can attempt to contain the whole useful knowledge within four walls and stock every necessary document on its shelves. To some extent, it must operate in the virtual mode. Emphasis must be placed more on the knowledge of external sources, no matter where they are, than on the capacity to acquire and possess documents or even to process them. Today, within the limits of its often restricted space, a documentation-information unit does not exhaust the documentary function of the organization where it belongs. Documentation extends far beyond the documentation centre itself.

To gain access to the external information of an organization, besides using the conventional methods employed by specialists (direct contacts with source institutions, personnel networks formed by scientists forming "invisible colleges"), recourse is often made to on-line data bases. The advent of data bases has opened up access to global information. Gigantic treasures of data of every type are now accessible through a simple micro-computer and modem.

Of the 5500 data banks now available on-line in the world, containing more than 5 billion[5] records, a significant number contains information of documentary nature: full text (29%), bibliographical information (25%), meta data (15%).

As regards the Blue Plan fields of interest, the International Institute on Sustainable Development (IISD), in mid-1992, obtained 1700 references to the concept of sustainable development in 121 bibliographical databases queried, and approximately 3000 citations in 74 press databases interrogated[6]. However, there is no on-line documentary base specifically devoted to the Mediterranean basin.

MEDO has then undertaken the task of exploring the subject-related databases in order to evaluate the quality and reliability of the information offered in the field of development/environment on the one

[5] 5 milliard

[6] International Institute on Sustainable Development (IISD). *Sourcebook on sustainable development*. Winnipeg, Manitoba (Can), 1992

hand, and to investigate their coverage of the Mediterranean basin on the other.

In early 1994, a preliminary study was made to select on-line databases of potential interest to MEDO. Thirty documentary systems were chosen for exploration. They are representative of the scientific and technical information supply in the following areas: agriculture, land use planning, development, water, energy, environment, geography, sciences and techniques in general, and social sciences.

Preselection was guided by the following criteria: areas covered, producer's reputation, number and nature of documents accessible on-line (with particular attention given to the place of "grey literature" or non printed material in these systems), accessibility of files and of primary documents. Current data banks produced by the press as well as those containing factual-numerical data were purposefully discarded.

The tables on the following pages show the selected data bases. They are classified by major areas. Multidisciplinary databases are omnipresent. Since most of them have a particularly broad subject-related coverage, it was interesting to anticipate what could be found during test querries. The column "Fields" indicates between parentheses the number of references found on sustainable development and on the Mediterranean area. This figure is purely indicative. It is the result of two queries: the first one concerning French data bases available via Minitel was carried out by the Blue Plan, while the other concerning databases distributed by Dialog, the American host, was conducted by IISD.

Although the exploration work is not yet complete, some remarks can be already done.

The place that these systems offer to "grey literature" is relatively small. And this is an important aspect for bodies working within the realm of international organizations and NGOs. The experts of these institutions make extensive use of governmental reports, research reports and miscellaneous technical reports. Knowledge and access to this kind of literature go through contacts and cercles established among experts far more than through references found in bibliographical databases, moreover with some delay. Besides, the grey literature produced in the Southern and Eastearn Mediterranean countries is rarely listed in international databases.

Nonetheless, documentary databases may be of interest when aiming an exhaustive bibliographic research concerning published scientific material as long as indexing (key words for retrieving information) is pertinent and thorough enough. The exploration work of on-line documentary bases will be continued so as to obtain more conclusive results.

## Access to on-line information systems

The last column of the table indicates the different distribution ways: access *via* professional hosts or *via* Télétel, the French general audience network, or *via* electronic networks such as Internet. The corresponding file numbers are indicated between parentheses. In order to complete information, reference is also made to the " printed option ", that is CD ROMs and diskettes. Each way of access has its own specific costs.

The host ensures data processing implementation and database marketing. It provides computers and mass memories, supplies the interrogation software and manages communications and invoicing. The invoice includes costs of telecommunication and interrogation of the various data bases. In addition to the connection time, there are also displaying and printing costs, depending upon volume and form of the information generated (on screen or as a captured file).

Consultation costs, on average, work out to 100 dollars per hour. For a search to be profitable, that is, to have a short on-line search resulting in an optimum number of pertinent references, it is necessary the query before connecting to the host. A preparation time from 10 to 60 minutes is necessary to obtain a fruitful interrogation lasting 10 to 20 minutes. Recently, some hosts have been using an interesting commercial policy: they only invoice the amount of information obtained as is the case with ESA-IRS, one of the biggest European hosts.

The organization of the on-line information industry make that users can set up contractual relations with one or two organizations instead of 40, use a single access procedure and query language for gaining access to an enormous number of data bases, obtain co-ordinated services from the host center (eg. user manuals, pricing, regular information, access to primary data). This aspect is particularly important as regards bibliographic databases: the user can send on-line orders for documents; orders will be passed on by the host to the producer.

The French Télétel network (better known under the name of the Minitel terminal), offers access to French documentary data bases and to a few international data banks. One of the advantages is that the user does not need to subscribe (and therefore has no password). All the invoicing is based on the telephone bill. France Télécom pays the hosts (who in turn pay the producers) their dues. Furthermore, the network is very easy to practise since users are guided by menus designed with a tree-logic, that make possible to refine a query gradually.

On the other hand, the Minitel user-friendly menus are unsuited to documentary research requiring fast and high performance multi-criterion Boolean queries. This makes the process slow and thus the bill higher.

A more interesting option is access to electronic networks initially used in the academic world. These networks were developed in the 80's to meet the communication needs of scientific institutions, for instance Internet in the United States, Janet in Great Britain, Renater in France. The most widespread is Internet which was founded in 1983. Internet is in fact the interconnection of several networks adopting a specific communication protocol (TCP/IP) whiwh was initially developed for exchanges among scientists. Today, more than one million computers are connected with a very high proportion of American seats and a strong increase in Europe.

This information highway offers access to many services such as electronic mail, data exchanges, electronic forums and what interests us here, the interrogation of distant resources (Telnet service)[7]. Telnet gives access to more than 300 computerized catalogues of the biggest libraries on several continents, to public data banks (those developed on laboratory computer centers) as well as private data banks which are distributed by commercial hosts. *Via* Internet, big hosts such as Dialog and ESA-IRS offer access to their products. The data banks are priced at the usual rates and protected by passwords but the network costs are covered by the attachment node which is in turn subsidized. This considerably reduces consulting costs. As another example, Echo, the European Union host offers free on-line access to all its databases *via* Internet.

Several on-line databases are also available on CD ROMs. These disks are capable of storing approximately 600 Mega-bytes of data, that is the equivalent to 30,000 pages of text. Such a disk can only be read; therefore, it is suitable for stable types of information such as image banks, encyclopaedias, historical data, etc.

When information needs to be updated periodically, as is the case of bibliographical databases or directories, these disks are on sale in subscription form (annual, six-monthly). Out of our selection of 30 systems, 13 are also available on such media. CD ROM constitute an alternative to the high cost of on-line interrogations. Once the disk has been purchased, its use is unrestricted. However, costs of purchase or subscription are high and are only justifiable for intensive use; data are not as fresh as in the case of on-line access. In our table, it can be seen that the updating of on-line documentary databases is generally carried out weekly or monthly.

7 CHARTON G. " ST et réseaux lectroniques de la recherche : quels enjeux ? In: *Documentaliste Sciences de l'Information,* N° 2, 1993

| Database name | Producer | Origin | Fields (Ref. on Sustainable Development) | Informations | Volume and annual Δ | Updating | Publications | Access |
|---|---|---|---|---|---|---|---|---|
| | | | AGRICULTURE | | | | | |
| AGREP | European Commission | 1975 | Agro-food: current research on animal and plant production in developing countries, carried out in EU countries | Inventory of current research | 50.000 records<br>500 /year | Quarterly | Permanent Inventory of Agricultural Research | – Dimdi<br>– Datacentralen<br>– Echo (?) |
| AGRICOLA | National Agricultural Library (USA) | 1970 | Agriculture and related fields: botany, entomology, fertilizers, forests, soils, etc.<br>World coverage<br>(SD = 70) | References to:<br>– government documents<br>– 5000 periodicals<br>– research reports<br>– proceedings | 2.900.000 ref.<br>100.000/year | Monthly | Bibliography of agriculture | – Dialog (10, 110)<br>– CD ROM |
| AGRIS | FAO (coord.) and the 190 national and international centres of the network | 1975 | Agriculture and rural development, food production, environment...<br>World coverage<br>(SD = 107) | References to:<br>– articles of periodicals (75%)<br>– publications (12%) | 2.000.000 ref.<br>120.000/year | Monthly | Agrindex (monthly) | – Dialog (203)<br>– ESA-IRS (29)<br>– CD-ROM |
| CAB Abstracts | Commonwealth Agricultural Bureaux (GBR) | 1972 | Agriculture, biology, agricultural economy<br>World coverage<br>(SD = 178) | References to:<br>– 8500 periodicals<br>– publications, reports, theses, proceedings... | 2.900.000 ref.<br>120.000 /year | Monthly | 26 abstract journals | – Dialog (50, 53)<br>– ESA-IRS (16, 124, 132)<br>– Internet ?<br>– CD-ROM |
| RESAGRI | Network : Minist. Agriculture, INRA, Crédit Agricole, ... (FRA) | 1974 | Agriculture, forestry : economy and techniques, law, environment<br>France<br>(SD = 14 ; Mediterranean = 160) | References to:<br>– 900 periocials (70%)<br>– grey literature (20%) | 300.000 ref.<br>25.000 /year | Weekly | | – Sunist<br>– Télétel (3617) |
| | | | LAND USE DEVELOPMENT | | | | | |
| URBAMET | Urbamet network (FRA) | 1976 | Urban planning, local development , ecology, landscape, urban sociology, demography,...<br>France, Europe, developing countries (30%)<br>(SD = 62 ; Mediterranean = 77) | References to:<br>– art. of periodicals (46%)<br>– reports (31%)<br>– maps, slides, photos... | 160.000 ref.<br>10.000 /year | Monthly | – CD Villes en développement<br>– Current bibliography on developing countries | – Questel<br>– Télétel (36 29 00 15) |

| Database name | Producer | Origin | Fields (Ref. on Sustainable Development) | Informations | Volume and annual Δ | Updating | Publications | Access |
|---|---|---|---|---|---|---|---|---|
| **DEVELOPMENT** | | | | | | | | |
| World Bank | Public Information Center, World Bank | 1994 | Project financed by the World Bank in member countries since January 1994 | – documents & reports related to WB projects<br>– WB publications | | | – Project Information Documents, Environmental Data Sheets,... | Internet |
| IBISCUS | Ibiscus (network) (FRA) | 1973 | Developing countries. Economy, society, co-operation | – art. of periodicals (65%)<br>– publications (20%)<br>– grey litterature (15%) | 65.000 ref.<br>6000 /year | Weekly | Bibliographies | – Sunist<br>– Télétel (3615 ou 36 28 00 12) |
| **WATER** | | | | | | | | |
| AQUALINE | Water Research Centre (GBR) | 1960 | Water : resources, treatment, quality and monitoring, pollution... | References to:<br>– 600 periodicals<br>– proceedings, publications, government reports | 130.000 ref.<br>8000 /year | Bi-monthly | Aqualine abstracts | – Orbit<br>– ESA-IRS (51) |
| Aquatic Sciences and Fisheries Abstracts (ASFA) | FAO | 1978 | Water, oceanography, biology, ecology: marine environment and fresh water management | References to:<br>– art. of 5000 periodicals (71%)<br>– proceedings (21%)<br>– technical reports, books | 400.000 ref.<br>25.000 /year | Monthly | Aquatic sciences and fisheries abstracts (ASFA) | – Dialog (44)<br>– ESA-IRS (52)<br>– CD-ROM |
| EAUDOC | Office International de l'Eau (FRA) | 1970 | Water, environment: technical, economic and legal aspects (SD = 26 ; Mediterranean = 109) | References to:<br>– 350 periodicals (80%)<br>– publications | 100.000 ref.<br>5000 /year | | Information eaux | – ESA-IRS (73)<br>– Internet ?<br>– Télétel (3617) |
| Water Resources Abstracts | Water Resources Scientific Inf. Center (USA) | 1968 | Water cycle, quality, water resource planning, law Coverage: USA (to be checked) | peridical articles, reports, publications by research bodies (local and federal levels) | 230.000 ref.<br>12.000 / an | Monthly | Selected Water Resources abstracts | Dialog (117)<br>ESA-IRS (237) |

| Database name | Producer | Origin | Fields (Ref. on Sustainable Development) | Informations | Volume and annual Δ | Updating | Publications | Access |
|---|---|---|---|---|---|---|---|---|
| | | | | **ENERGY** | | | | |
| Économie de l'énergie | CNRS-INIST (FRA) Network of 8 organizations | 1979 | Energy, economic and legals aspects (SD = 5) | References to:<br>– publications, proceedings, reports<br>– 140 periodicals | 33.000 ref.<br>800 /year | Quarterly | Bulletin Économie de l'énergie | – Questel (Francis)<br>– Télétel (36 29 36 01)<br>– CD-ROM<br>– diskettes |
| Energy Science and Technology | Department of Energy (USA) | 1974 | All energy sources, energy policy, environment... (SD = 102) | – periodical articles (50%)<br>– reports (28%)<br>– books (16%)<br>– patents, theses, ... | 2.600.000 ref.<br>160.000 /year | Bi-weekly | Energy abstracts for policy analysis, ... | Dialog (103) |
| INIS | International Atomic Energy Agency (IAEA) | 1976 | Nuclear physics and energy. Economic and environmental aspects of energy sources other than nuclear | Bibliographical references coming from 80 national centres and 17 international organizations | 1.500.000 ref.<br>90.000 / an | Bi-weekly | INIS atomindex (bi-weekly) | ESA-IRS (28) |
| | | | | **ENVIRONMENT** | | | | |
| ENREP | European Union | 1975 | Environment. Current research in EU countries: polllution, solid wastes, chemical wastes | Inventory of projects by 5000 institutions in Europe | 50.000 records | Yearly | | – Echo<br>– Internet |
| ENVIROLINE | R.R. Bowker (USA) | 1971 | Environment : science, technology, management, planning, economy, legislation... (SD = 68) | References to:<br>– 5000 sources including 3000 periodicals<br>– reports, proceedings, patents... | 190.000 ref.<br>14.000 /year | Monthly | Environment abstracts, ... | – Dialog (40)<br>– ESA-IRS (11)<br>– Internet ? |
| Environmental bibliography | Environmental Studies Institut (USA) | 1973 | Animal ecology, human ecology, pollution (air, water, soil, noise), erosion, planning, ... (SD = 224) | References taken from 350 specialized periodicals | 400.000 ref.<br>40.000 /year | Monthly | Environmental periodical bibliography | Dialog (68) |
| Pollution abstracts | Cambridge Scientific Abstracts (USA) | 1970 | Environment : quality of the environment, pollution sources and control, air, water and soil pollution, noise, pesticides, waste water treatment | References to:<br>– 5000 periodicals (60%)<br>– publications (15%)<br>– proceedings (15%)<br>– governemnt and research reports (10%) | 160.000 ref.<br>9000 / an | Bi-monthly | Pollution abstracts (bi-monthly) | – Dialog (41)<br>– ESA-IRS (18) |

| Database name | Producer | Origin | Fields (Ref. on Sustainable Development) | Informations | Volume and annual Δ | Updating | Publications | Access |
|---|---|---|---|---|---|---|---|---|
| | | | | **GEOGRAPHY** | | | | |
| GEOBASE | Elsevier Science Publishers (GBR) | 1980 | World-wide documentation on physical and human geography, ecology, environment... (SD = 375) | 3000 periodicals | 430.000 ref.<br>40.000 /year | Monthly | – Geographical abstracts<br>– International development abstracts<br>– Ecological abstracts | – Dialog (292)<br>– ESA-IRS (233)<br>– Internet ?<br>– CD-ROM |
| | | | | **SCIENCES AND TECHNIQUES** | | | | |
| NTIS | National Technical Information Service (USA) | 1964 | Multidisciplinary including agric., biology, economy, env. and pollution, natural resources and earth sciences, social sciences, transports... (SD = 42) | References to technical reports from 300 American gov. federal agencies | 1.600.000 ref.<br>70.000 /year | Bi-weekly | Abstracts newsletter | – Dialog (6)<br>– ESA-IRS (6)<br>– Internet ?<br>– CD-ROM |
| PASCAL | CNRS-INIST (FRA) | 1973 | Exact sciences, biology, earth sciences (SD = 120) | – 7200 French and foreign periodicals (90%)<br>– scientific reports, theses ... | 10.000.000 ref.<br>500.000 / an | Monthly | 63 bibliographical publications | – Dialog (144)<br>– ESA-IRS (14)<br>– Questel<br>– Télétel (36 29 36 01)<br>– CD-ROM |
| Scisearch | Institute for Scientific Information (USA) | 1974 | Sciences and techniques World coverage (SD = 106) | References to citations made in articles from 4500 periodicals | 10.000.000 ref.<br>670.000 /year | Weekly | Science citation index | – Dialog (34, 434)<br>– CD-ROM |
| | | | | **SOCIAL SCIENCES** | | | | |
| FRANCIS | CNRS-INIST (FRA) | 1972 | Social sciences: geography, sociology, administrative science ... (SD = 28 ; Mediterranean = 809) | References to articles from 2300 French and foreign periodicals (89%) | 1.500.000 ref.<br>75.000 / an | Quarter-ly | Bibliographie géographique internationale, ... | – Questel<br>– Télétel (36 29 36 01)<br>– CD-ROM |
| Social Scisearch | Institute for Scientific Information (USA) | 1972 | Social sciences, multidisciplinary World-wide coverage (SD = 125) | – References to citations made in articles from 1500 periodicals<br>– selection of articles in Social sc. from 3000 periodicals in Life sciences | 2.200.000 ref.<br>130.000 /year | Weekly | Social sciences citation index | – Dialog (7)<br>– CD-ROM |

| Database name | Producer | Origin | Fields (Ref. on Sustainable Development) | Informations | Volume and annual Δ | Updating | Publications | Access |
|---|---|---|---|---|---|---|---|---|
| | | | ALL AREAS | | | | | |
| BNBMARC | British Library (GBR) | 1950 | Works published in Great Britain since 1950 | References on all types of publications | 900.000 ref.<br>40.000 /year | Weekly | British national bibliography | Blaise |
| LC Mark-Books | Library of Congress (USA) | 1970 | Library catalogue (SD = 99) | Works | 4.500.000 ref.<br>40.000 /year | Weekly | | Dialog (426) ;<br>Internet? |
| Current Contents Search | Institute for Scientific Information (USA) | 1990 | Sciences and techniques, social sciences<br>6 months to 1 year of periodical contents<br>(SD = 213) | periodical tables of contents | 1.500.000 ref.<br>760.000/year | Weekly | Current contents : agriculture, life sciences, biology & applied sciences | – Dialog (440)<br>– disquettes (Weekly) |
| SIGLE (System for information on grey literature in Europe) | – European Association for Grey Literature Exploitation<br>– CNRS-INIST | 1980 | Grey literature produced in EU countries in sciences & techniques, economy and social sciences including agriculture, biology, earth sciences... | References to non conventional literature, 60% of which are reports | 290.000 ref.<br>40.000 /year | Monthly | | – Blaise<br>– Sunist<br>– Teletel (3615 Sunk + Sigle)<br>– CD-ROM |
| UNESBIB | Unesco | 1972 | UNESCO documents and publications<br>Sciences & techniques, social sciences | Proceedings, mission reports, articles from periodicals published by UNESCO | 82.000 ref. | Daily | List of UNESCO documents and publications | – Echo<br>– Internet<br>– Télétel (3621 Echo21)<br>– CD-ROM |

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## 3. Towards the establishment of a Mediterranean documentary network

Given the explosion of information, documentation centres can no longer manage all the information flows. Indeed, scientific information is expensive and not always adapted to the specific and immediate needs of the users, in most cases due to a lack of resources. It is only by working within a network that these costs can be spread and shared, at the same time ensuring, by establishing substantial documentary reservoirs, that users have an access more suited to their varying needs.

Aiming to a future network of documentary activities on the Mediterranean, a co-operation work has been started with other documentary units in order to increase knowledge about studies and publications on the Mediterranean and to better inform each other on the access ways to publications and documents in general.

This initiative is even more necessary as regards grey literature. Due their rarity, these documents are difficult to gather and it is only by being close to the source that they can be found. Therefore, their collection is only possible by working on a network. Furthermore an informative watch can be better achieved by working in co-operation.

Contacts have been made to better know " who is doing what " in MEDO's fields of interest and what their achievements are in the documentary field (methodology, tools, thesauri). At the present time, emphasis is being placed on the exchange of publications. The following table shows the institutions with which a co-operation has been established and should be strengthened.

| Fields | France | Mediterranean region | Europe | International coverage |
|---|---|---|---|---|
| Development | Ibiscus | Enda Interarabe | | IISD<br>OECD<br>UNDP |
| Environment | IFEN | MAP/RAC<br>World Bank<br>National Ministries | Union européenne<br>BEE | UNEP/Infoterra |
| Water, soil | OIE | CIHEAM | | FAO<br>UNESCO |
| Nature, forests, biodiversity | CEMAGREF | | Centre Naturopa | FAO<br>UICN<br>UNESCO |

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