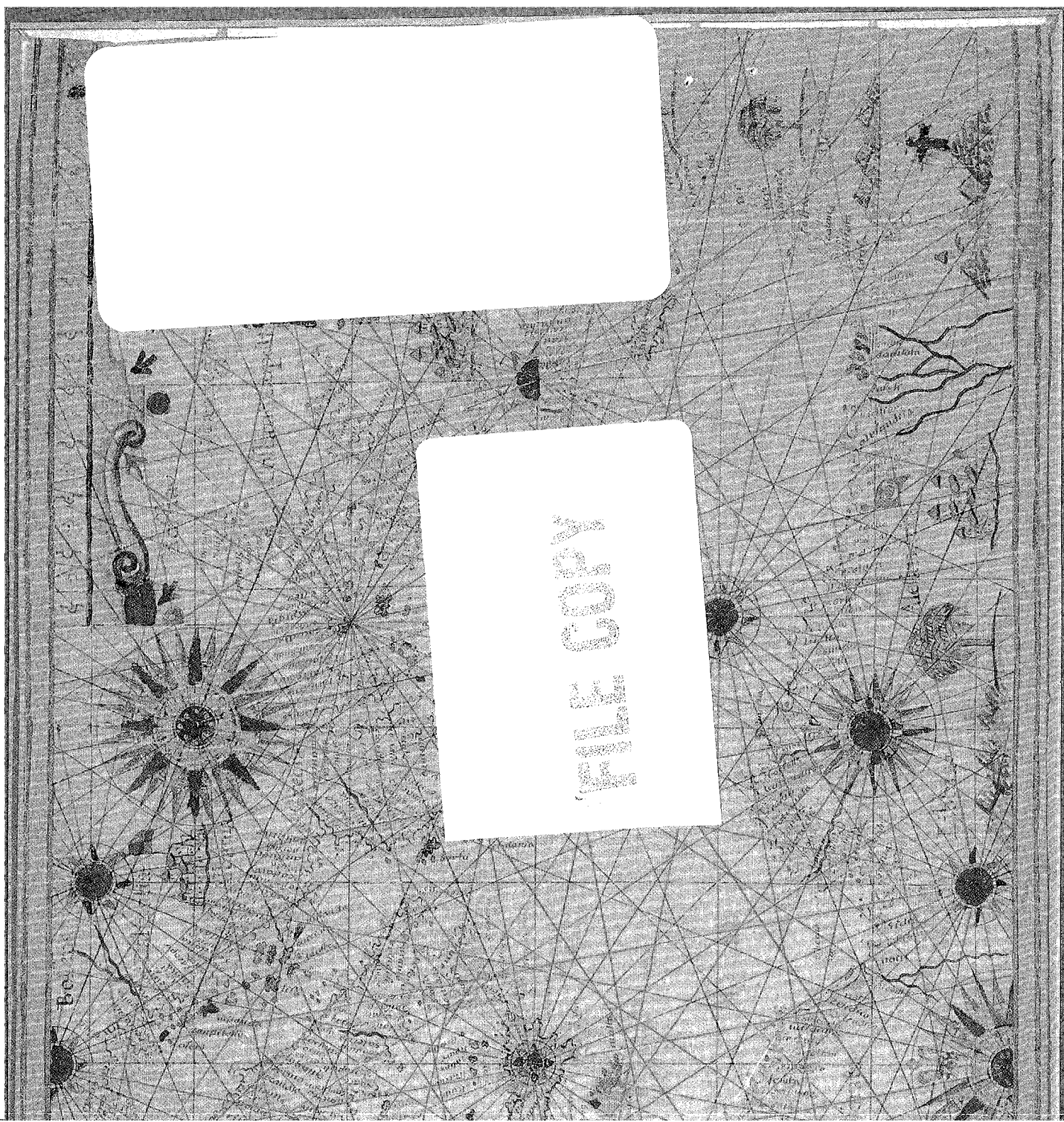


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The Environmental Program for the Mediterranean

**Preserving a Shared Heritage and
Managing a Common Resource**



The Environmental Program for the Mediterranean

*Preserving a Shared Heritage
and Managing a Common Resource*

The World Bank

The European Investment Bank

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Foreword

Protecting the environment is a central concern of the World Bank and the European Investment Bank. The commitment of our banks to the resolution of complex environmental issues has deepened in recent years as the links between environment and sustainable development have become increasingly clear. Both institutions have financed a number of projects for preserving and enhancing the quality of the environment, many of them in the Mediterranean region.


Environmental degradation in many parts of the Mediterranean region is already serious. With growing pressure on diminishing natural resources, such degradation will continue—damaging the quality of life and the ability of some countries to maintain adequate economic growth rates—unless greater efforts are made by the Mediterranean Basin states, backed by the international aid community, to safeguard the environment.

Pragmatic action-oriented approaches are needed to halt and reverse environmental degradation in the region. The formulation of such approaches is the main purpose of the Environmental Program for the Mediterranean (EPM), a special initiative launched by our two institutions to address the environmental policy, institutional, and investment-related needs of the Mediterranean countries. This report summarizes our assessment of the environmental priorities in the Mediterranean Basin. It also provides

the framework within which the World Bank and the European Investment Bank, with the support of the United Nations Development Programme and the European Community, will seek to translate these environmental priorities into an effective set of implementable policies and projects.

The EPM is a natural outgrowth of the strong desire of all eighteen Mediterranean countries to address their common environmental agenda. Under the leadership of the United Nations Environment Programme, all countries of the region have been cooperating on environmental matters for more than a decade. This has led to significant achievements. Through the EPM, our two institutions will promote further enhancement of these regional efforts and will foster the exchange of experience between the industrial countries of the northern rim of the Mediterranean and the developing countries along the southern and eastern rims.

The EPM provides a significant opportunity to bring an analysis of environmental issues into the heart of Mediterranean development—to preserve the region's heritage and to ensure its sustainable development. The EPM is also an important instrument for mobilizing the financial resources required to implement the broad range of actions needed to tackle the Mediterranean region's environmental challenges. We are confident that others will join us in these efforts.


Ernst Günther Bröder
President

The European Investment Bank



Barber B. Conable
President
The World Bank

This report has been prepared by staff from the World Bank and the European Investment Bank (EIB). The study program was jointly managed by Thierry Baudon of the World Bank and Michel Deleau of the EIB. Josué Tanaka was responsible for the overall preparation of the report, assisted by a core team consisting of Nicole Glineur, Ian Johnson, Stephen F. Lintner, Peter W. Whitford, and James O. Wright of the World Bank and Peter Bond, Guy Clausse, and George Toregas of the EIB. The study teams that prepared the background reports included Roger J. Batstone, Luciano Borin, Ann E. Elwan, John C. English, Warren D. Fairchild, Ezedine Hadj-Mabrouk, Colin W. Holloway, Jeffrey Lewis, Spyros Margetis, Hans J. Peters, Nadia Saad, June Taboroff, Gert Van Santen, and Mario A. Zelaya of the World Bank and Gianni Carbonaro, Cathal Cavanagh, Emilia Gallego Perona, Jacques Girard, Axel Hörhager, George Toregas, and Patrick Walsh of the EIB. Michel Batisse and Hellmuth Bergmann have been a source of continuous advice. The work was carried out under the general direction of Alain Prate, Wilfried P. Thalwitz, Willi A. Wapenhans, and Abderraouf Bouhaouala.

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Preface

In 1988 the World Bank and the European Investment Bank (EIB) initiated the Environmental Program for the Mediterranean (EPM) to address the environmental policy, institutional, and investment-related needs of the Mediterranean countries. In recognition of the demand from countries for early results and of the complexities of Mediterranean environmental problems, a three-phase approach was adopted.

Phase I was a diagnostic phase to assist the Banks in understanding the nature, extent, and causes of environmental degradation in the Mediterranean Basin. Wide-ranging studies, covering scientific and technical issues as well as economic and financial matters, were undertaken to define appropriate instruments and priority areas for intervention. Much of this work has benefited from the achievements of the Mediterranean Action Plan (MAP) of the United Nations Environment Programme (UNEP).

Phase II will identify and prepare investment projects and institution-strengthening activities and will define specific policy measures, all based on the priority areas identified in phase I. The centerpiece of phase II is the Mediterranean Environmental Technical Assistance Program (METAP).

Phase III will implement a broad array of regional and country-specific investment projects and policy measures. The World Bank and the EIB are committed to providing resources to address many of the problems identified. Both Banks will assist not only in policy and project implementation but also in attracting and coordinating other financing sources. Because of the need for early and concrete results, phases II and III will be concurrent.

This report concludes phase I of the EPM. It synthesizes detailed background papers prepared over the past eighteen months (see the List of Background Papers), assesses environmental problems in the Mediterranean region, identifies priority issues and instruments for addressing those issues, and outlines the next steps of the EPM.

As the study program progressed, it became increasingly clear that the complexity of environmental issues calls for a multidisciplinary approach. Accordingly, this report identifies a wide range of solutions, including economic, institutional, and regulatory reforms accompanied by increased investment. Although it contains some recommendations appropriate for immediate implementation, it does not yet identify a specific program of projects and policy measures. At this stage, it represents a policy statement of the World Bank and the EIB defining the priority areas for action and outlining the next steps of collaborative work required to formulate an implementable set of policies and projects.

The content of this report reflects the comments by representatives of the Mediterranean countries at the EPM workshop sponsored by the World Bank and the EIB in Paris on December 7 and 8, 1989. The objectives of the workshop were to obtain views on the conclusions of the report and to seek guidance on the future direction of the EPM. Representatives of both the environment and the finance or planning authorities of each country and of the Commission of the European Communities, the United Nations Development Programme (UNDP), and UNEP/MAP attended the workshop.

Definitions and Abbreviations

Definitions

- The Mediterranean countries are Albania, Algeria, Cyprus, the Arab Republic of Egypt, France, Greece, Israel, Italy, Lebanon, Libya, Malta, Monaco, Morocco, Spain, the Syrian Arab Republic, Tunisia, Turkey, and Yugoslavia.
- All dollars amounts are current U.S. dollars. A billion is a thousand million.

Abbreviations

BHC Benzene hexachloride
BOD Biochemical oxygen demand
CITES *Convention on International Trade in Endangered Species of Wild Flora and Fauna* (1983)
COD Chemical oxygen demand
DDT Dichloro-diphenyl-dichloro-ethane
EC European Community
ECE Economic Commission for Europe
ECU European currency unit
EIB European Investment Bank
ENVIREG Environmental Regional Program
EPM Environmental Program for the Mediterranean
FAO Food and Agriculture Organization of the United Nations
GDP Gross domestic product

IAEA International Atomic Energy Commission
ICBP International Council for Bird Preservation
IMO International Maritime Organization
IOC Inter-Governmental Oceanographic Commission
IUCN International Union for the Conservation of Nature and Natural Resources
MAP Mediterranean Action Plan
MAR POL Maritime Pollution Convention (Convention on the Prevention of Pollution of the Sea by Oil)
MED POL Mediterranean Pollution Monitoring and Research Programme
MEDSAP Mediterranean Strategy and Action Plan
METAP Mediterranean Environmental Technical Assistance Program
NGO Nongovernmental organization
OECD Organisation for Economic Co-operation and Development
PAP Priority Actions Programme
PCB Polychlorinated biphenyl
pH (An index of acidity)
UNDP United Nations Development Programme
UNEP United Nations Environment Programme
Unesco United Nations Educational, Scientific and Cultural Organization
WHO World Health Organization
WMO World Meteorological Organization
WWF World Wide Fund for Nature

Summary

The environmental degradation of the Mediterranean basin is already severe and is worsening by the day in many areas; in certain cases, it could become irreversible. To bring this degradation to a halt, the Mediterranean countries must find remedies for the underlying causes: harmful economic policies, weak regulatory and administrative systems, and insufficient popular awareness and political resolve.

The base for common action is solid. The Mediterranean Action Plan, initiated in 1975, has advanced understanding of the threats to the environment and has provided a forum for common approaches and agreements. Much, however, remains to be done to influence the formulation of economic policies and investment projects. To assist in this, the World Bank and the European Investment Bank (EIB) are contributing their expertise in policy analysis, project finance, and financial resource mobilization to the implementation of existing international accords.

This report, a joint effort by the two Banks, identifies priority areas and defines the broad instruments of intervention for mounting a responsive program of assistance—the Environmental Program for the Mediterranean (EPM). The report concludes the first of the program's three phases. The second phase will identify and prepare investment projects and institution-strengthening activities and will define specific policy measures. The third phase will implement these measures, projects, and activities.

Common Concerns and a Common Approach

The regional identity of the Mediterranean's diverse societies, shaped by a similar environment and by centuries of commerce, is strong. The eighteen countries that share the Mediterranean Sea and its coastal ecology face common environmental challenges and have much to gain from a joint approach to solving them. As pollution problems worsen and as the pressure on resources increases, transnational issues will multiply, heightening the need for common action by the Mediterranean states.

Pollution of the sea—particularly transnational problems such as oil pollution, persistent chemicals, and eutrophication—was the original focus of international concern. As scientific evidence made it increasingly clear that most marine pollution originates on land, concern about the sea broadened to include land-based environmental problems in the coastal zones and their watersheds. Land-based environmental degradation, in addition to causing marine pollution, threatens the sustainability of the region's development.

The main vehicle for joint action is the Mediterranean Action Plan (MAP), adopted at the 1975 regional conference in Barcelona and coordinated by the United Nations Environment Programme (UNEP). MAP established a forum for regional consultation and decisionmaking that has

induced Mediterranean countries to focus on priority environmental issues and define a common approach. It has also contributed to the formulation of an important set of regional agreements, including the Barcelona Convention, its four protocols, and the Genoa Declaration. In addition, it has established a scientific and information base for formulating policy, setting priorities, and defining action programs.

The Environmental Degradation of the Mediterranean Basin

Pollution threatens the Mediterranean's water, land, and air—and, consequently, its people. Sources of marine pollution include municipal and industrial wastewater, agricultural runoff, discharges from ships, and the inadequate disposal of solid wastes. In addition, many contaminants are transported to the sea through the atmosphere. Pollution is creating serious health risks in many places. For example, a 1988 sampling of 150 beaches in France, Greece, Italy, and Spain showed that 25 percent of them had pathogens exceeding safe levels. Of the chemical pollutants, tar, persistent organic chemicals, and heavy metals are of most concern. Large rivers transport the nutrients that are causing massive eutrophication in the northern Adriatic Sea and growing problems in other locations. The deliberate discharge of bilge and ballast waters from ships accounts for about 75 percent of oil pollution in the Mediterranean. Approximately 650,000 tons of hydrocarbons are released each year in the Mediterranean—about seventeen times the amount spilled by the *Exxon Valdez* in Alaska. Floating plastic and solid wastes from ships and coastal dumps also threaten coastal zones and wildlife.

Pollution and overexploitation have reduced fish yields, and fish stocks are down to 20 percent of natural levels in many areas. The region is now a net importer of fish. Each year an estimated 2 billion migratory birds come to Mediterranean wetlands for seasonal or migratory stopovers. Wetlands, essential to many marine species and to about seventy threatened bird species, have been systematically drained, contaminated, or developed (more than a million hectares in the past fifty years).

The depletion and degradation of fresh water threaten future development in several countries. With prices well below marginal costs, the demand for water is expected to grow beyond the ability of governments to supply it. Already, desalination plants provide half of Malta's water requirements—at about fifteen times the average cost of water in France. Some countries are drawing down groundwater resources faster than they are being naturally replenished. Moreover, three-quarters of the increase in demand for fresh water will be from the southern and eastern Mediterranean countries, where resources are most limited. With supplies dwindling, water quality is already seriously affected in twenty of the Mediterranean's twenty-nine drainage basins.

Arable land, too, is under intense pressure, especially in the south. Rich agricultural coastal lands are being rapidly urbanized, and the increasing use of water, fertilizer, and pesticides poses dangers to aquifers and to health. Each year, it is estimated, about 550 tons of pesticides are discharged into the Mediterranean. Salinization, often accompanied by waterlogging, affects 5 percent of the irrigated surface area of the Mediterranean Basin. The region's forests are among the most degraded in the world, and what remains is essentially concentrated in the northern countries.

Inadequate solid waste management is also widespread throughout the region, as evidenced by floating refuse at sea, soiled beaches, open dumps, littered city streets, and clogged storm sewers. About half a million cubic meters of waste are collected each day in the coastal cities, and these wastes are not always disposed of properly. Many waste sites are poorly designed, and uncontrolled leachate could contaminate groundwater. Industrialization creates hazardous wastes in nearly all the region's countries, but few programs are in place to manage these materials.

An increasing number of coastal urban areas are subject to significant levels of air pollution. Chromium and mercury enter the sea from the atmosphere in about the same quantity as from rivers, and up to 90 percent of the lead in the western Mediterranean Sea comes from the air. In many areas, air pollution from industrial

sources, motor vehicles, and domestic heating threatens public health.

Both the natural coastline and the urbanized coastline are undergoing a process of rapid degradation as the concentration of population and economic activities in coastal areas increases. Estimates show that the coastal population of the Mediterranean is likely to more than double by 2025, from a current figure of 82 million to between 150 million and 170 million. Tourism will put more strain on the Mediterranean environment; the number of coastal tourists is expected to more than double by 2025, to about 260 million. Unique natural and historic sites will be under increasing pressure from the building of infrastructure, industrial and tourist facilities, and housing. Urban growth will lead to intensified land use conflicts and, in many cases, to a reduction in environmental quality, with significant impacts on public health. As the urbanization of the Mediterranean coastline is unlikely to slow in the coming decades, environmentally sounder ways of developing the coastline must be devised.

The Causes of Environmental Degradation

Population growth is a principal cause of environmental degradation, especially when it is accompanied by inadequate environmental policies. This report emphasizes the need to manage the consequences of population growth and demographic change, especially the high urban growth rate. In addition, several countries of the region need to pursue strategies to reduce population growth and so alleviate pressures on limited natural resources. Other fundamental causes of the region's environmental degradation are inadequate economic policies, weak regulatory and administrative systems, and insufficient public awareness and political resolve. Designing balanced environmental programs requires a good understanding of each of these causes.

Inappropriate economic policies. Pricing distortions, which are already costly to several Mediterranean economies, add unnecessarily to environmental degradation. Low prices for energy and for industrial inputs encourage excessive

use and provide little incentive for enterprises to invest in resource recovery and reuse. Low output prices also reduce the incentive to recover wastes. In addition, the pricing of water below economic cost throughout the region discourages the treatment and reuse of wastewater, leading to rapid depletion of freshwater supplies. In many cases, less distorted prices, taxes, and trade policies can provide economic and financial incentives for reducing waste, pollution, and overexploitation.

Weak regulatory and administrative systems. The Mediterranean countries are active in the negotiations for environment-related international agreements and are party to most important agreements. There has also been progress in formulating and promulgating national laws and regulations. But many environmental laws and regulations on both sides of the Mediterranean have not been enforced owing to, among other things, unrealistic standards and lack of administrative capacity and equipment.

Fragmented authority also complicates national resource planning. Land management typically falls under several ministries, and the responsibility for managing hazardous substances is frequently unclear. In addition, development pressure and property rights often conflict with land use planning and environmental protection, especially in the ecologically delicate coastal areas and wetlands, but also in urban fringe areas and agricultural lands.

Insufficient public awareness. Increased public awareness is a key factor in building a constituency for environmental protection. Better understanding of basic environmental issues is important for stimulating stronger political action and environmental protection. The perception in much of the region is that untapped resources are still available for development and that new technologies will solve the problems of resource depletion. The reality is that the region faces severe resource limitations. Moreover, many sector-specific environmental issues are not fully understood—for example, the long-term implications of solid and hazardous waste disposal for groundwater contamination and public health. And because the fragility of coastal lands and ecosystems and the long-term economic im-

portance of these resources are not sufficiently appreciated, their continuing degradation is tolerated.

Since so many of the causes of environmental degradation are rooted in market imperfections, economic measures—especially pricing and other incentives—are likely to be effective instruments for addressing environmental issues. These instruments, however, need to be balanced with better regulatory measures, improved resource management, and specific environment-related investments. In determining the right mix of instruments, it is important to understand what actions are realistically within the capacities of the countries of the region and what the key criteria should be for setting priorities.

The Need for Environmental Action

The long-term costs of inaction will be severe, especially for the region's developing countries.

- Scarcity of water resources will affect the growth prospects of several countries of the region over the next decades. Unless drastic action is taken to manage freshwater resources more effectively, the depletion of known stocks will accelerate. By 2025 six countries may have to depend on expensive technologies for much of their water.
- The stock of habitable and arable land in the southern and eastern Mediterranean countries is limited (less than 25 percent of land area, except in Turkey), and developing new lands is for the most part not economically feasible.
- The countries of the southern rim will have to earn more foreign exchange to cover increased imports of food and energy. The development of specialized export industries and tourism will provide good opportunities for employment and foreign exchange earnings, but since most of these opportunities will be in environmentally vulnerable coastal zones, careful planning will be required. Industrialization, urbanization, and tourism, if improperly managed, could cause irreparable damage and severely limit the economic potential of coastal areas.

Today's difficult economic situation is likely to slow action in many Mediterranean countries. Most countries of the southern and eastern Mediterranean are highly indebted and have under-

taken ambitious reform programs involving reduction of public expenditures, pricing reforms, and institutional restructuring. Heavy debt burdens and reduced public expenditures hinder the adoption of environmental actions that are not perceived as priorities. This perception may also induce countries to shy away from policy actions that are less costly but politically difficult.

Despite the impediments, the Mediterranean countries are moving toward a balanced environmental program. Many of them have mounted environmental programs to address immediate priorities for reducing public health risks. Their efforts, however, are predominantly curative, with only a limited range of preventive actions. All Mediterranean countries need to improve the balance of their environmental programs and to put more emphasis on resource conservation. The developing Mediterranean countries also need to give more priority to longer-term goals, to protect against future economic stagnation from irreversible resource depletion. Preventive actions can support the sustainable use of resources and avoid future pollution, and they tend to be much less capital-intensive. These actions, however, require economic policy reforms, along with stronger regulations, greater political resolve, and better management. Generally, countries should avoid large, expensive investments in pollution control until major economic distortions that lead to inefficient resource use have been corrected.

Four considerations can be useful in allocating more resources and efforts to the pursuit of longer-term environmental priorities.

- Some environmental actions with important implications for long-run resource management will also yield high returns in the short run.
- Adequate pricing of natural resources and waste treatment is compatible with economic reform. Most important here is the elimination of biases against resource recovery, recycling, and conservation. Relaxation of controls on input and output prices can encourage water reuse, energy conservation, and product recovery. Pollution charges and tax incentives are also effective instruments.
- Nonprice measures, such as water rationing, can help achieve environmental goals when

full economic pricing is not politically feasible.

- Greater reliance on user charges would relieve public budgets. More extensive emissions charges based on the “polluter pays” principle could reduce the cost of curative programs to governments. This will require greater public awareness and stronger political will—a challenge for the region’s decision-makers, nongovernmental organizations, and mass media.

The Role of the World Bank and the European Investment Bank

The Mediterranean countries acknowledge the need for an appropriate mix of policy interventions, regulatory reforms, and investments to address their most urgent environmental concerns. To assist in this effort, the World Bank and the EIB will anchor their contributions in their areas of comparative advantage: project design and implementation, institution building, policy advice and formulation, and mobilization of financial resources.

Since 1980 the EIB’s environment-related loans in the Mediterranean have totaled almost \$3.3 billion—about half of its total environmental lending—and the World Bank’s loans for environmental protection in the region have totaled more than \$2.3 billion. Although the Banks’ support of projects for environmental protection and pollution control in the Mediterranean has brought significant improvements in selected areas, the analysis of interdependent environmental issues, policies, and institutions needs to be pursued more systematically. The EPM provides an opportunity for systematic regional analysis through exchanges of experience among the region’s countries and the translation of this experience into effective projects and policies.

To implement the recommendations of this report, many countries will require financial and technical assistance to strengthen country institutions responsible for planning, managing, and regulating the environment. Both Banks have staff with skills in a wide range of sectors relevant to the environment and with experience in project, sectoral, and macroeconomic work. More important, the two Banks have a broad ongoing dialogue with the region’s countries on project lending, sectoral, and macroeconomic

policy issues. They are well positioned to include an environmental dimension in that dialogue.

The Banks’ Support for Regional Environmental Action

The EPM reflects the corporate strategies of the two Banks in support of regional environmental action. It balances short-term and long-term objectives and recognizes the differing development needs of the Mediterranean countries. The EPM proposes action on three closely linked fronts:

- A multiyear Mediterranean Environment Technical Assistance Program (METAP). METAP, funded initially by the two Banks, the United Nations Development Programme (UNDP), and the Commission of the European Community, was launched in January 1990 as the main operational instrument for translating the EPM’s priorities into policy recommendations, institution-strengthening measures, and investment packages to be implemented during the third phase of the program. Its purpose is to accelerate the pace and deepen the impact of environmental activities in the Mediterranean region and thus to act as a catalyst for environmental investment.
- Increased emphasis by the two Banks on the identification and financing of environmental projects and environmental project components, some of which have already been programmed as a result of the EPM’s activities.
- Initiatives to attract resources from other multilateral and bilateral donors in support of METAP and EPM investment activities.

In promoting action on each of these fronts, the two Banks will encourage the development, preparation, and implementation of environmentally sound investment strategies at the country level. They will also support efforts to integrate environmental concerns into the mainstream of economic and social policy and will encourage the adoption of policy measures conducive to the efficient use of natural resources.

The Priorities of the EPM

The priorities for the second and third phases of the EPM include both curative and preventive measures and follow the balanced approach to

environmental action programming outlined in this report. These priorities were discussed at the December 1989 EPM workshop and reflect comments made by representatives of the Mediterranean countries.

Integrated Water Resource Management

Ensuring sustainable growth requires avoiding irreversible damage to aquifers and protecting freshwater resources. For public health reasons, particular attention also needs to be given to urban, industrial, and agricultural wastewater management issues. The EPM will support

- Integrated, long-term planning for surface and groundwater resources
- The adoption of least-cost solutions for development of water resources
- The conservation and protection of identified water resources through pricing and other measures (information, regulations, and incentives for water-saving technologies, recycling, and reuse)
- Institutional and legal changes to consolidate responsibility for water resource planning and management
- Improvement of responsible organizations' capabilities in data collection, monitoring, and analysis of management alternatives
- The adoption of coherent pollution reduction strategies for coastal and watershed areas; measures will include investments in least-cost systems, provision of incentives for adoption of water-saving technologies and for conservation and reuse, and improvement in the economic and regulatory aspects of policies to control water pollution
- Watershed management programs that have a significant effect on water availability (soil conservation, rangeland improvement, afforestation, fertilizer and pesticide management, and siting of industry and of solid waste disposal sites).

Management of Solid and Hazardous Wastes

Public health risks make waste management an immediate priority in many countries. The EPM will support

- The management of solid wastes, including collection, disposal, and recycling

- The identification of hazardous waste disposal sites, the investigation of potential high-risk sites, and the implementation of cleanup programs for priority sites and the development of proper disposal sites for future wastes
- The strengthening of enforcement and monitoring capabilities of regulatory agencies
- The development of incentives for encouraging low-waste technologies, by-product recovery, and recycling
- The adoption of the "polluter pays" approach for both public and private sources of wastes.

Prevention and Control of Marine Pollution from Oil and Chemicals

Prevention and control of marine pollution from oil and chemicals are critical for avoiding possible irreversible damage to coastal areas and ecosystems. The EPM will support

- The preparation of operational oil spill contingency plans for all countries; such plans will include the development of subregional and intercountry arrangements to maximize the efficiency of control and to coordinate actions against spills of hazardous materials
- The expansion and rehabilitation of port oil reception facilities, including floating facilities
- The adoption of incentives for improved deballasting
- The monitoring and enforcement of the Maritime Pollution Convention (MAR POL) and Barcelona Convention provisions on reducing marine pollution from ships and from land-based sources
- The preparation of complementary disaster preparedness plans for shipping accidents involving hazardous materials
- The training of personnel and the provision of adequate equipment in case of oil or hazardous material emergencies.

Coastal Zone Management

The rate of degradation of coastal areas must be contained to avoid both the irreversible loss of unique natural and historic assets and the further degradation of urbanized coastline. The EPM will emphasize the preventive side of these issues, since several Mediterranean countries and the two Banks already have significant curative

programs under way. Accordingly, the EPM will support

- The strengthening of national and local governments' capacity to plan and manage coastal area development
- The improvement of the capabilities of regional and local planning and environmental agencies to implement and monitor coastal zone planning in order to enable them to address the specific problems of each coastal zone development stage, including the improvement of urban environmental quality
- The upgrading of the data collection and planning capabilities of scientific and planning agencies
- The protection of the remaining ecologically sensitive coastal areas, especially wetlands, seagrass beds, and habitats of migratory species
- Activities for the conservation of biodiversity in the region
- The conservation of cultural heritage sites through sound management practices
- The adoption of incentives to influence land use decisions in the direction of protecting agricultural land and encouraging an environmentally sound development of urban, industrial, and tourism facilities
- The establishment of financing mechanisms to support the management and control of coastal zone development.

A Program of Technical Assistance

Given the complexity of their environmental problems, many countries are likely to require technical assistance to devise cost-effective and politically feasible solutions. To fulfill this purpose, METAP will support the development of a sound pipeline of environmental projects, the formulation and effective improvement of environmental policies and regulations, and the strengthening of the required institutional framework. This support will consist of:

- *Prefeasibility studies* of projects to be financed in the third phase of the EPM
- *Policy studies* that address key policy factors affecting the Mediterranean environment and make specific recommendations for implementation

- A coherent *institutional development program*, including specific recommendations for improving the environmental legislative and regulatory frameworks at the country, subregional, and regional levels; studies on strengthening institutions and organizations; training; seminars on topics of regional interest to disseminate the findings of the policy studies and information on other METAP activities; support for increased public awareness; and activities of regional relevance aimed at strengthening scientific and regional databases.

METAP's activities will be closely integrated with the regional operations of the two Banks. Through its support for project preparation, METAP will contribute to the strengthening of the environmental components of the lending program of both financial institutions. METAP will also collaborate with UNEP/MAP on activities that will contribute to the overall development of the EPM.

Financing Environmental Actions

In addition to increased mobilization of domestic resources, most countries of the southern and eastern Mediterranean will need external financing in support of effective environmental programs, but they will be constrained by their indebtedness. Many countries of the region already benefit from external assistance from the two Banks. In recognition of the importance of environmental issues for long-term development, the two Banks will raise the priority of lending for the environment within their own programs for the Mediterranean countries. They will also identify cofinancing opportunities with other funding sources.

In many cases the benefits from reduced environmental degradation accrue to both developed and developing countries in the region, but a significant share of costs would fall on developing countries. A strong case for extending additional resources on concessional terms could be made on the grounds that regional externalities are best dealt with by speeding up environmental programs in the Mediterranean's developing countries. The two Banks will thus promote collective international action to deal with the envi-

ronmental challenges of the region, supported by financing arrangements that embody the varying financial capabilities and prospects of participating countries.

The EPM is intended to strengthen the intellectual underpinnings and the operational nature of environmental action in the Mediterranean region and to mobilize appropriate resources in support of this action. By fostering the parallel

development of strong operational programs and effective financing instruments, and with the support of the Mediterranean countries and all other concerned parties, the EPM is poised to contribute to the preservation of the Mediterranean Region and its shared heritage and to the sustainable development of its common resources.

1

A Strong Regional Identity: The Guiding Principle for Collective Action

The Mediterranean Basin, with a recorded history of more than 5,000 years, is home to some of the world's oldest cultures. Despite their diversity, the peoples of the Mediterranean have much in common. They share not only the sea itself but also a natural environment that the historian Fernand Braudel has described as "far from fertile and often cruel, one that has imposed its own long-lasting limitations and obstacles."¹ Centuries of commerce and communication have strengthened the regional identity of the eighteen Mediterranean countries.

THE MEDITERRANEAN SEA: A COMMON RESOURCE. The Mediterranean Sea has three noteworthy geophysical and biological characteristics (map 1).

- The natural exchange and circulation of its waters are limited. The hot, dry climate of the region causes a high level of evaporation, only 75 percent of which is balanced by rainfall and by fresh water flowing into the sea from the land. The remainder is offset by water entering the sea through shallow and narrow openings at Gibraltar and the Dardanelles. The enclosed nature of the sea hinders tidal movements and currents, and a shallow undersea ridge running from Sicily to Tunisia further restricts water exchange. This limited circulation means that substances introduced into coastal waters are unlikely to be dispersed quickly; they can remain in the Mediterranean for close to a century.

- Because the Mediterranean Sea lacks a continental shelf and has a low level of suspended natural nutrients, it does not sustain abundant sea life. Mixing of warmer, less saline waters with deeper, cooler waters is limited, and so nutrients that move into deep water generally do not return to the surface.
- A large number of rivers—the Ebro, the Rhône, the Po, the Nile, and many smaller rivers—flow into the Mediterranean, carrying along pollutants, nutrients, and other materials. The deltas of these rivers are important natural ecosystems that are responsible for part of the Mediterranean's biological diversity.

A COMMON ECOLOGY: THE COASTAL AREAS. The Mediterranean region has hot, dry summers and mild, moist winters. Rainfall decreases sharply toward the south and east. The surface geologic features of the basin, standing on a layer of limestone deposited in a deeper and much more ancient sea, are remarkably consistent throughout the region. Soils are erodible and of low to moderate fertility in the coastal areas, except in the river deltas, and grade to richer upland soils in the north and to desert sands in the south. Crops such as wheat, barley, grapes, and olives are grown throughout the region—another indicator of its ecological unity.

A COMMON CONCERN: THE INCREASING PRESSURE ON SCARCE NATURAL RESOURCES. There are serious questions today about the Mediterranean

region's environmental ability to support its swiftly growing human population in the medium term. In the thousands of years during which humans have lived in the Mediterranean Basin—and especially in the past few decades of exceptionally fast development—civilization has profoundly influenced the region's ecology and degraded the environment. In ancient times thick forests often extended down to the shore. Today those forests have been largely replaced by dense scrub, or *maquis*. Depletion of resources, including fresh water, forests, rangelands, coastal areas, and marine fisheries, is a growing concern, as is pollution of the sea itself.

For the time being, pollution pressures on the environment are higher and more widespread in the northern Mediterranean countries. There, however, corrective actions of varying intensity have been under way for the past two decades. In the southern and eastern Mediterranean countries, pollution is at present more limited than in the northern rim countries, but it is severe in some localized spots and is expected to increase in the future. Furthermore, at this stage these countries have fewer financial and administrative means for dealing with environmental problems. More important, the limited water and forestry resources of the coastal areas are being rapidly depleted throughout the region. High rates of population growth accelerate the pressures on the resource base of the southern countries.

Demographic trends will have a great effect on the environmental future of the Mediterranean region. Significant structural changes are already under way. The Blue Plan, a component of the Mediterranean Action Plan sponsored by UNEP, gives a preview of the dramatic demographic changes that may take place by 2025 (box 1.1). The south, which had 32 percent of the Mediterranean countries' population in 1950, will account for about 60 percent in 2025—a 400 percent increase over only seventy-five years. These demographic shifts and the changes in economic activity and urbanization that accompany them are already having profound consequences for the environment of the region, particularly in the southern countries.

The urban population of the Mediterranean region more than doubled between 1950 and 1985. By 2025 the urban population in the south is likely to be growing twelve times faster than that in the north, and urban population growth

rates in coastal areas could be more than twenty times faster in the south. Even though the rural population is declining in relative terms, it continues to increase in absolute numbers, compounding the pressures on natural resources. Although the north has low demographic growth at the national level, the expected relocation of commercial enterprises, light industries, and retired people will increase population densities in coastal areas. Map 2 shows the urban population change expected between 1990 and 2025.

Tourism will also put more strain on the environment of the region. In 1984 coastal areas accounted for about 55 million international tourists (about 35 percent of worldwide tourism) and a roughly equal number of domestic tourists. Tourism is economically important—it accounts for 5 to 10 percent of gross domestic product (GDP) in many countries—and is a great asset to the region. But when a rapid increase in tourism is inadequately planned and poorly managed, it may have important negative consequences for vulnerable coastal areas. According to the Blue Plan, the number of coastal tourists could reach 158 million by 2000 and 260 million by 2025. This increase would put tremendous pressure on coastal land, energy, water resources, and wastewater treatment capacity.

The demand for tourist facilities also increases the value for development of marginal coastal areas and wetlands. Furthermore, the seasonal nature of international and domestic tourism—50 to 70 percent of yearly totals typically arrive in the summer—puts special burdens on the environment and requires added investments in infrastructure to meet peak demand. Although the general trend is upward, fluctuations in tourism flows make it difficult to forecast demand precisely and to plan and finance adequate infrastructure in tourist areas.

A COMMON PROBLEM: RISING TRANSNATIONAL POLLUTION. Several types of pollution and environmental degradation—including maritime pollution, some coastal water pollution, aquifer and air pollution, and the degradation of coastal and hinterland ecosystems—cross borders and follow transnational patterns. Oil pollution, mainly from the deliberate dumping of ship bilge and ballast waters, was what first drew the world's attention to the plight of the Mediterranean; it affects all the coastal states, especially those near the principal sea-lanes. Persistent

chemicals, pesticides, and heavy metals can accumulate in predator fish species such as tuna. Air pollution also crosses boundaries; there is already evidence that sulfur dioxide from western Europe is damaging forests in Yugoslavia. Recent experience in the Adriatic has shown that eutrophication (the overenrichment of the sea with nutrients such as nitrates and phosphates, leading to algae blooms), which was formerly localized, is becoming more widespread. Another instance of common concern, in this case extending beyond the coastal region to northern Europe, is the plight of migratory birds that depend on Mediterranean wetlands as stopover points between Europe and Africa. As pollution problems worsen and pressure on resources increases, examples such as these are bound to multiply. Table 1.1 illustrates the commonality of environmental issues in the Mediterranean region.

A COMMON INTEREST: SUSTAINABLE DEVELOPMENT IN THE MEDITERRANEAN REGION. In a sense, the social and political stability of the Mediterranean Basin will depend on the region's ability to sustain development while protecting the environment. Gross disparities in income levels, in population growth rates, and in pressures for migration could affect the region's stability. Without the active support of their northern neighbors, the countries of the southern and eastern Mediterranean will confront financial and technical obstacles to adopting more sustainable patterns of development. The United Nations Convention on the Law of the Sea—which, in addition to addressing marine pollution issues, proposes that every coastal state be allowed exclusive rights to all resources up to a distance of 200 nautical miles offshore—could also have implications for relations among countries of the Mediterranean. The willingness of the

Box 1.1. UNEP's Mediterranean Action Plan (MAP): Pioneering Efforts in Regional Environmental Cooperation

The first Mediterranean intergovernmental conference, organized by UNEP and held in Barcelona in 1975, adopted the Mediterranean Action Plan (MAP), which called on Mediterranean governments to draw up and adopt a series of legally binding agreements on environmental concerns. At a second conference, held in Barcelona in 1976, the Convention for the Protection of the Mediterranean Sea was adopted. These agreements provided a framework for a regional cooperation effort that now includes a program for pollution monitoring and research in the Mediterranean (MED POL), a socioeconomic program consisting of the Blue Plan and the Priority Actions Programme (PAP), a legal component consisting of the Barcelona Convention and four protocols (see table 1.2), and special programs concerning protected areas, oil pollution, historic sites, and institutional support.

MED POL, with the assistance of about 200 scientific groups from 83 institutions and 16 countries, gathers data on the state and trends of pollution in the Mediterranean. Participating laboratories monitor water quality, sediments, and marine organisms. Training in monitoring methods and intercalibration procedures has strengthened research capabilities in the region. A network of scientists and institutions has been created to exchange information, and by 1989 several hundred research projects had been carried out in seventeen countries. On the basis of data from MED POL and other

sources, UNEP is publishing a series of reports on the state of the Mediterranean.

The Blue Plan, launched in 1979 and recently completed, studied potential economic and environmental trends over the next forty years in the eighteen coastal states. Its findings indicate the possible environmental consequences of the intense competition for available resources as populations and economic activity grow. PAP, based in Split, Yugoslavia, has identified opportunities for immediate action in six areas: soil protection, water resource management, fisheries and aquaculture, human settlements, tourism, and renewable energy. Its objective is to foster cooperation and the exchange of new approaches to environmental management, such as a multisectoral approach to coastal zone planning. Regional demonstration projects are under way, including integrated planning studies in Syria, Izmir (Turkey), Split (Yugoslavia), and Rhodes (Greece).

Training programs in oil spill contingency planning and related subjects have been established at the Regional Oil Combating Centre in Malta. PAP helped to found the Seismic Risk Reduction Center in Genoa, Italy, which is now independent. Programs for ecologically sensitive areas are coordinated by the Regional Activity Centre for Specially Protected Areas in Tunis. MAP recently launched a new initiative to promote the use of a simplified environmental assessment process by member countries.

Table 1.1. Commonality in the Mediterranean Basin: Physical, Biological, and Socioeconomic Problems

COMMON PROBLEMS *are shared by two or more countries in the region and require collective action.*

Marine pollution
 Oil discharge and spills into the marine environment
 Discharge of nutrient-rich agricultural, urban, and industrial wastes, causing eutrophication and, as a result, algae blooms, oxygen depletion, fish kills, and odors
 Discharge of industrial pollutants, especially heavy metals

Floating plastic and other debris

Endangered species
 Loss of endangered marine mammal and turtle populations and reduction of habitat

Migratory birds
 Pressures on migratory birds, including endangered species, because of habitat destruction, especially in migration bottleneck areas, and unregulated hunting and trapping

Air pollution
 As indicated by initial studies, transboundary air pollution, especially in the northern Mediterranean, and forest death associated with acid rain

Fisheries depletion
 Depletion of many commercial fish stocks owing to poorly controlled fishing, destruction of habitat (for example, seagrass beds and coastal wetlands), and, to some extent, pollution

Tourism development
 Difficulty, because of international competitiveness, in taxing this growing industry to cover infrastructure costs and environmental improvement

Migration
 Semipermanent or seasonal migration of large numbers of people within the region

Regional trade
 Concerns, as regional trade increases, about protection of livestock and plant species from introduced pests and diseases and about pesticide and pharmaceutical residues in export crops

SIMILAR PROBLEMS *occur separately in several countries and may be addressed on a country basis, but the solutions to them may be transferable, given the countries' similar physical, biological, and social conditions and common heritage.*

Coastal pollution from urban and industrial sources

Water quantity
 Depletion of freshwater resources, which contributes to seasonal water scarcities and inadequate supplies, especially in coastal and island areas

Water quality
 Deterioration of quality of surface and groundwater owing to inadequately controlled discharges from urban, industrial, and agricultural sources; multiple-purpose use of available water complicates the situation

Degradation of drylands
 Deterioration of land resources in semiarid and arid portions of the southern and eastern countries owing to deforestation, overgrazing, and agricultural development of marginal lands. This leads to loss of fertility and erosion of drainage basins, with impacts on irrigated agricultural areas and coastal areas. In its extreme form this process ends in desertification

Coastal zone management
 Development pressures on many coastal areas, including beaches and wetlands. Much development is unplanned, with inadequate provision of services

Degradation of cultural properties
 Direct damage to or destruction of cultural properties (including archaeological and historic sites and traditional urban centers), owing to agricultural, urban, and tourism development, air pollution, and rising water tables

Solid and hazardous wastes
 Problems of varying severity in the collection, treatment, and disposal of wastes. Solid waste generation is increasing rapidly in urban and rural areas, often overwhelming local authorities' collection and disposal abilities. Hazardous and toxic wastes, principally from industrial and agrochemical sources, are frequently disposed of improperly, causing contamination of water supplies and posing direct threats to health

Mediterranean states to enter cooperative arrangements to protect their common resources is, consequently, a link that goes well beyond transnational environmental problems and affects the very future of the region. The final declaration of the Aspen Institute Italia Conference on the Mediterranean, held in Marseilles in December 1989, stressed the "absolute necessity" for North-South cooperation in environmental matters and for the "creation of a new solidarity to promote and to reinforce stability and global development."

A Framework for Regional Action: Genesis and Evolution

The original focus of international concern was the increasing pollution of the Mediterranean Sea. Over time, this concern has broadened as marine pollution has been recognized as only one symptom of environmental degradation in the Mediterranean Basin. Scientific analysis has shown that most marine pollution originates on land. Indeed, certain specifically land-based environmental problems (such as proliferation of hazardous wastes) threaten the sustainable development of the region at least as much as do wastewaters, which have a more obvious direct effect on the sea. In light of this fact, Mediterranean countries have been paying increased attention to the environmental management of coastal areas and their watersheds.

Work by UNEP and by other agencies argues for an expansion of the scope of action, since the resolution of most environmental problems requires the integration of natural resource management concerns into the formulation of national and regional economic policies. This need to broaden the range of concerns was specifically acknowledged by the Mediterranean countries in the Genoa Declaration of 1985, which addressed the problems of the depletion of fresh water and the degradation of coastal areas, wetlands, ecosystems, forests, and agricultural land. In conformity with the framework set by the Mediterranean countries themselves, the World Bank and the European Investment Bank (EIB) have recognized the need to go beyond marine and coastal issues and deal with broader problems of natural resource management in the Mediterranean region.

The Mediterranean Action Plan

Several legal instruments and declarations have acknowledged the existence of shared and similar problems and the need for collective stewardship (table 1.2). A regional conference held in Barcelona, Spain, in 1975 adopted a Mediterranean Action Plan (MAP), to be coordinated by UNEP, with mandates for scientific research and monitoring and for socioeconomic studies (see box 1.1). This work now involves many more activities and other international agencies, including the Food and Agriculture Organization of the United Nations (FAO), the World Health Organization (WHO), the United Nations Educational, Scientific, and Cultural Organization (Unesco), the International Atomic Energy Agency (IAEA), the World Meteorological Organization (WMO), the Inter-Governmental Oceanographic Commission (IOC), and the International Maritime Organization (IMO), all of which work on different aspects of environmental analysis and protection.

Establishing MAP was a key step in the development of regional initiatives, for three reasons. First, MAP created a forum for regional consultation and decisionmaking that has functioned continuously since 1975 and that has induced Mediterranean countries to focus on environmental priorities and define a common approach toward them. Second, MAP contributed to the formulation of an important set of regional agreements. The Barcelona Convention, with its four protocols, and the Genoa Declaration have heightened the commitment of participating countries to common actions for environmental protection and have made it easier to implement these actions. Third, MAP has produced a scientific and information base that has facilitated the definition of priorities and the setting of policies and programs. The large information base now available on the Mediterranean has been extremely valuable to the World Bank and the EIB in developing their corporate strategies for supporting environmental action in the region.

The European Initiatives

Parallel with its participation in MAP, the European Community (EC), a contracting party to the Barcelona Convention, has reinforced its concern

Table 1.2. UNEP-Sponsored Agreements in the Mediterranean

<i>Agreement</i>	<i>Date of adoption</i>	<i>Date of entry into force</i>	<i>Purpose or objective</i>
Mediterranean Action Plan (MAP)	1975	1975	Established Regional Seas Program for the Mediterranean; mandated legally binding agreements on protection of the marine environment
Convention for the Protection of the Mediterranean Sea against Pollution (Barcelona Convention) ^a	1976	1978	Provides the framework for cooperation under which subsequent protocols were adopted on dumping oil and other harmful substances from ships and aircraft
Protocol for the Prevention of Pollution of the Mediterranean Sea by Dumping from Ships and Aircraft	1976	1978	Followed an earlier global convention (London, 1972) on controlling the dumping of harmful substances at sea
Protocol Concerning Cooperation in Combating Pollution of the Mediterranean Sea by Oil and Other Harmful Substances in Cases of Emergency	1976	1978	Provides for cooperation in dealing with emergencies and any resulting damage. Under the protocol, UNEP has established a Regional Oil Combating Center in Malta to receive reports and coordinate action
Protocol for the Protection of the Mediterranean Sea against Pollution from Land-Based Sources	1980	1983	Applies to both the marine environment and brackish inland waters up to the limit of fresh water. Provides guidelines for municipal and industrial waste which may be discharged with proper treatment and for materials which should not be discharged because of their hazardous nature
Protocol Concerning Mediterranean Specially Protected Areas	1982	1986	Established a framework for designating protected areas of critical habitat for rare and endangered species. UNEP has established the Tunis Center to maintain an information base and coordinate activities
Protocol Concerning Pollution Resulting from Exploration and Exploitation of the Continental Shelf, the Sea Bed, and the Subsoil	Under review	Under review	Would limit potential adverse effects of mineral exploration
Genoa Declaration	1985	Intended as statement of objectives for second decade of MAP	Reaffirms member nations' commitment to protect the Mediterranean environment. Identifies ten target areas for the second decade of the Mediterranean Action Plan: (1) reception facilities for oily residues from ships; (2) treatment of urban sewage; (3) use of impact assessment; (4) reduction of risk of spills of hazardous substances in coastal areas; (5) protection of endangered species; (6) reduction of industrial and solid waste pollution; (7) protection of historic sites; (8) identification of marine and coastal reserves; (9) prevention of forest fires; and (10) reduction in air pollution

a. Ratified by the EC and by all Mediterranean countries except Albania. Albania presently has observer status in MAP activities.

for environmental protection. In 1973 the EC initiated an Environmental Action Programme to enunciate and enforce specific environmental policies and standards for the Community. The current program, the fourth one, covers the period 1987–91. These programs set forth and enforce specific directives on a wide range of environmental issues, such as noise, solid wastes, chemical products, pollution of sea and land water, and air pollution standards and abatement. Other measures include protecting natural sites and conserving the archaeological and architectural heritage (box 1.2.)

The EC ensures that environmental impacts for Community programs such as the Common Agricultural Policy are taken into account. Since 1988 it has required member countries to prepare environmental impact assessments for all important investments in infrastructure and industry. It has also adopted a medium-term action plan for environmental protection in the Mediterranean (MEDSAP) and a special program to support environmental investment in less favored regions of the European Community (ENVIREG).

The World Bank-European Investment Bank Program: A Complementary Step to Support Regional Action

The World Bank and the EIB have significant experience in financing projects with environmental objectives in the Mediterranean. Both Banks have financed the implementation of numerous projects in agriculture, forestry, wastewater treatment, control of industrial pollution, and urban development that have contributed to environmental improvement. Over the past ten years the two Banks have directed more than \$5.6 billion to projects aimed at environmental protection in the region.

In 1988 the World Bank and the EIB initiated the Environmental Program for the Mediterranean (EPM) to address the needs of the Mediterranean countries concerning environmental policy, institutions, and investments and to strengthen further their support for environmental activities in the region. To meet countries' demand for early results, and in recognition of the complexities of Mediterranean environmental problems, the Banks adopted a three-phase approach.

- In phase I the emphasis has been on identifying and diagnosing the nature, extent, and causes of environmental degradation in the Mediterranean countries. The Banks have defined priority areas for intervention and effective instruments with which to mount a responsive assistance program. The wide-ranging studies conducted in this phase cover technical issues as well as economic and financial matters. Much of the work has benefited from the achievements of UNEP/ MAP.
- Phase II will identify and prepare investment projects, define specific policy measures, and support institution-strengthening activities based on the priority areas identified in phase I. The centerpiece of the second phase will be the Mediterranean Environmental Technical Assistance Program (METAP).
- Phase III will consist of the implementation of a broad array of investment projects and regional and country-specific policy measures. The EIB and the World Bank will be active not only in policy and project implementation but also in attracting and coordinating other financing sources.

Because of the need for early and concrete results, phases II and III will not be strictly sequential, since many policy measures and projects have already been identified and are ready for implementation.

The EPM builds on the significant achievements and commitments to date and complements the activities of the eighteen Contracting Parties (seventeen countries and the EC) to the Barcelona Convention. It is premised on the existing broad regional approach among the Mediterranean countries as manifested in the unanimous political support for joint declarations and protocols in the context of the Barcelona Convention and MAP, the continuous participation and cooperation of the countries within MAP, and the regional approaches to the Mediterranean by the EC. In addition, the work accomplished to date by the Mediterranean countries provides the basic prerequisites for regional action, since it offers a forum for regional consultation, a rich scientific information base, and a consensus among countries on the need and main directions for joint action.

The analysis of environmental issues undertaken by the Mediterranean nations under the

leadership of UNEP has contributed significantly to a better understanding of the nature, severity, and causes of environmental degradation in the region. Along with its solid legal and scientific achievements, UNEP/MAP has had outstanding political success in that it has involved all Mediterranean countries in the pursuit of a common agenda. Although the programs of UNEP/MAP have advanced understanding of the threats to the Mediterranean environment, they have not yet had a large effect on projects or on policy formulation.

By contributing their project and policy analysis and their financing expertise to the existing set of scientific analyses and international accords, the World Bank and the EIB can play a clear complementary role. Both Banks maintain active dialogues with most countries of the Mediterranean and have long been project financiers. They are therefore in a unique position to assist the Mediterranean countries in translating the scientific and institutional framework of today

into investment projects and specific policies at the regional, subregional, and country levels.

In sum, the EPM will support cooperative action among the Mediterranean countries, the World Bank, the EIB, and other concerned international organizations such as UNEP, the EC, and the UNDP by:

- Translating the existing knowledge base into an effective set of policies and projects to address the environmental problems of the Mediterranean
- Establishing a platform of cooperation between two major financing institutions active in most of the Mediterranean region
- Providing a mechanism for mobilizing resources to finance priority environmental actions.

Note

1. Fernand Braudel, *The Mediterranean and the Mediterranean World in the Age of Philip II*, trans. Sian Reynolds, vol. 2 (New York: Harper Colophon, 1976).

Box 1.2. The Environment Policy of the European Community

The main objectives of the Environment Policy of the European Community are to protect and improve the environment, to contribute to better human health, and to ensure the prudent and rational use of natural resources. Its current priorities are set out in the Fourth Environmental Action Programme (1987–91), which places particular emphasis on the effective integration of environmental considerations with economic and social policies and the establishment of increasingly strict environmental standards. These objectives are crucial not only in the context of the integration of the European market in 1992 but also for achieving sustainable development on a global scale. The program also gives special attention to promoting environmental investment and providing financial incentives for actions that favor environmental protection.

During 1986–88, as part of its effort to formulate a strategy and action plan for the protection of the Mediterranean environment, the EC provided financial support for a series of demonstration projects. On the basis of the results of this preparatory phase, the Commission of the European Communities adopted two complementary programs for the protection of the Mediterranean environment: the Mediterranean Strategy and Action Plan (MEDSAP), which promotes community action for the protection of the environment in the region,

and the Environmental Regional Program (ENVIREG), for regional environmental measures undertaken on the initiative of the Commission. Both programs focus on the following priority action areas:

- Rational management of wastewater and solid wastes in coastal cities of fewer than 100,000 inhabitants
- Rational management of dangerous and toxic wastes and of sewage sludge from treatment centers
- Storage and treatment of ballast water and oil from shipping
- Integrated management of coastal biotopes of EC interest in a way compatible with the development of tourism.

The main task of ENVIREG is to finance investments and the related measures needed for preparing, implementing, and monitoring these investments, with particular emphasis on less developed regions within the EC. Protection of the environment is considered under ENVIREG as an element of regional economic development.

MEDSAP concentrates on regions or action areas within the EC that are not covered by ENVIREG. It encourages interregional and international cooperation and provides technical assistance for the environment in non-EC Mediterranean countries.

2

Taking Stock: The Nature and Extent of Environmental Degradation

Environmental degradation in the Mediterranean Basin has reached serious levels in recent years and is likely to worsen. There is a significant danger of irreversible consequences. In order to reverse the present trend, it will be necessary to study the nature and causes of this degradation and to undertake an appropriate program of action.

Most of the countries of the Mediterranean region share the environmental problems described in this chapter. Some problems are common or transnational and require international cooperation. These include maritime pollution, the loss of habitats for migratory birds and for such endangered species as marine mammals and sea turtles, and the overharvesting of migratory fish (map 3). There are also subregional instances of pollution and resource depletion that threaten more than one country; an example is the northern Adriatic, the subject of a recent agreement between Italy and Yugoslavia. These subregional problems, although currently limited in number, are growing more urgent. Other problems affect all individual countries to varying degrees and are likely to have similar solutions that could be implemented in parallel.

Marine Pollution

There are four main sources of marine pollution: municipal and industrial wastewater, agricultural runoff, oil and chemical spills from ships, and the improper disposal of solid wastes, especially plastics. Wastewaters and agricultural run-

off contain nutrients that lead to eutrophication and the associated problems. Many other contaminants come to the Mediterranean from continental sources by way of the atmosphere (table 2.1).

Municipal and Industrial Wastewater

A large amount of municipal wastewater—more than 70 percent of it untreated—is discharged in coastal areas, often from very short marine outfalls. Although levels of marine pollution have not been monitored scientifically over long periods, there is evidence that pollution from domestic and municipal sources is increasing in a number of places. The sight of sewage pollution is common in coastal areas. Where sanitary and storm sewer systems are combined, storm overflows can carry especially high concentrations of accumulated liquid and solid wastes.¹

Industrial wastewater—an important carrier of pollutants including, in many cases, hazardous wastes—is discharged directly or through municipal sewerage systems and uncontrolled disposal sites. Because of the types of pollutants involved and the damage that they can inflict on municipal systems, these discharges pose a particularly serious threat. Most industrial pollution comes from steel mills, tanneries, petrochemical and chemical plants, thermal power plants, oil refineries, and pulp and paper mills.

This problem is now most acute in the northern Mediterranean. According to one estimate, about 23 percent of total pollution in the Medi-

Table 2.1. Sources and Effects of the Principal Marine Pollutants in the Mediterranean Sea

<i>Type of pollutant</i>	<i>Principal sources</i>	<i>Environmental effects</i>	<i>Effects on living resources</i>
Organic wastes, including pathogens	Discharge of untreated or partially treated domestic wastewaters into rivers, estuaries, and the sea; some contribution from agricultural runoff and industrial wastewaters	Polluted bathing beaches, inshore waters, and bays; organic deposits in bays and sea bottom, including seagrass beds; increased turbidity; reduced oxygen levels in water; damage to wetlands and submerged vegetation	Human disease, including typhoid, eye and skin infections, polio, cholera, and hepatitis A; contamination of shellfish
Excessive nutrients, including phosphates and nitrates	Agricultural runoff (fertilizers) and domestic wastewater (detergents) discharged into rivers, estuaries, and the sea	Eutrophication of lagoons, bays, and semienclosed gulfs, often manifested by excessive growth of algae; red and green tides; fouling of beaches by decomposing algae	Death of aquatic life owing to lack of oxygen in water; dermatitis from contact with toxic algae. (If properly dispersed, nutrients can be beneficial to fisheries.)
Industrial chemicals (heavy metals, organic chemicals, and the like)	Discharge of untreated or partially treated industrial wastewaters into rivers, estuaries, and the sea; some contribution from domestic wastewater, urban runoff, solid wastes, and ship discharge; diffuse input into the air from industrial sources on a continental scale	Locally high concentration in sediments and seawater	Accumulation in shellfish, fish, marine mammals, and birds of mercury (from chloralkali plants and natural sources), cadmium (from electroplating and other industries), and other metals and persistent organic chemicals; potential health hazards for human consumers
Pesticides and other agricultural chemicals	Agricultural runoff into rivers and estuaries; some contribution from airborne fallout	Polluted inshore waters and bays; deposits in bays and sea bottom, including seagrass beds; damage to wetlands and submerged vegetation	Accumulation of DDT and other persistent organics in fish, birds, and mammals, causing hazards to predatory birds; fish kills and hazards to humans as a result of local concentrations of organophosphates
Petroleum hydrocarbons	Discharge from ships and from shore facilities; some contribution from industrial and urban sources by way of rivers, urban runoff, and direct discharge	Oil slicks on water; tarballs on beaches; tainted seafood; tar stains on clothing, surfaces, boats, and so on	Tar on bathers' skin; injury to fish and marine mammals; death of seabirds
Litter, including plastics, floating debris, and organic materials	Coastal dumps, discharge from ships, local dumping on shores by tourists and residents; some contribution from agriculture and fisheries	Floating and suspended litter in water; accumulation of aesthetically offensive litter on beaches and in harbors; clogged intakes of power plants and desalinization facilities	Death of fish, turtles, birds, and marine mammals owing to ingestion and entanglement
Silt and mining wastes	Erosion of poorly conserved agricultural soils, deforested hillsides, mine tailings, and metal-rich soils	Siltation of lagoons and coastal waters; increased turbidity; elevated levels of mercury and other metals near mining areas	Loss of productive wetlands in lagoons and deltas; accumulation of mercury in fish, with health risks to consumers of large amounts of fish

terranean is found in the northwestern part of the sea and originates in France, Italy, and Spain. The Adriatic accounts for another 35 percent, most of it comes from Italy. The northern countries have high levels of urban and industrial pollution, especially in their coastal areas, but they are mounting programs to meet EC standards on effluents and emissions. The southern Mediterranean suffers less from pollution today, but because 90 percent of the effluents discharged by southern nations undergoes no pretreatment, the potential for future pollution is high.

Industrial contaminants are generally found at low levels in the Mediterranean Sea. Marine pollution, however, reaches significant levels in many coastal areas, where it affects health, recreation, tourism, wetlands, fisheries, and coastal ecosystems. Pollution levels are greatest where discharges are into gulfs and bays with limited currents. For example, the two most polluted areas of the Adriatic Sea off Yugoslavia are in bays near the two most industrialized coastal cit-

ies, Split and Rijeka. Significant pollution also occurs in Portman Bay, Spain, owing to deposits in the sea from large-scale mining activities. In Turkey pollution is concentrated near the urban and industrial centers of Izmir and Istanbul and the industrial area surrounding Istanbul. Given the projected expansion of industrial development and the attempts by governments to situate industries in less developed areas, such as southern Italy, there is considerable need for preventive measures that will ensure the proper selection of industrial technology and of pollution control systems. There is also a need to develop proper facilities for handling solid and hazardous wastes.

Attempts to control chemical pollution have been effective in some cases. For example, a 1974 French regulation aimed at reducing mercury wastes from the electrolytic industry decreased the concentrations of mercury found in monitored animal species by 90 percent.

The implications of water pollution for health and tourism are suggested by a 1988 sampling of

Box 2.1. The Leading Environmental Health Risks in the Mediterranean Area

The health risks associated with pollution in the Mediterranean derive from biological agents and toxic chemicals. The most important biological pollutants—pathogenic bacteria, viruses, protozoans, and helminth eggs—can be found in polluted recreational areas, mainly beaches, and in shellfish. Bathers who come into contact with these pathogens may experience minor but unpleasant infections of the skin, eyes, ears, and respiratory system; they may also contract diarrhea, poliomyelitis, and rarely, typhoid fever or other diseases caused by salmonellae. Infections with cholera or other vibrios also occur. Contaminated shellfish can transmit typhoid fever, other salmonellae, and type A hepatitis. All these pathogens originate in untreated or inadequately treated wastewater discharged near shore.

The chemical pollutants of most concern are tar, polychlorinated biphenyls (PCBs), and heavy metals, notably mercury and cadmium. Tar, although of minor health importance, is unpleasant and is difficult to remove from skin and clothing. PCBs from electrical equipment are found in the Mediterranean in very low concentrations but are concentrated along the food chain by shellfish and fish. They appear to reduce seal fertility and may impair the reproduction of other mammals, including humans. Of the heavy metals, mercury

and cadmium are most hazardous, as they too become concentrated in shellfish and fish. Mercury can induce serious disorders in populations with high levels of seafood in their diet.

Nutrients in agricultural runoff and domestic wastewaters discharged into the sea can lead to the phenomenon of eutrophication, in which excessive growth of algae and other marine plants depletes oxygen levels in the water, resulting in cycles of overgrowth and decay. In severe cases eutrophication is manifested as green, brown, yellow, or red "tides" of microorganisms that foul beaches, contaminate shellfish, and may cause dermatitis in some bathers.

From a public health viewpoint, adequate wastewater treatment and disposal facilities are urgently needed to protect the coastal population and the more than 100 million tourists who come to the region each year. The discharge of industrial wastes and oil residues also poses health threats and should be reduced. These efforts will require constant monitoring using standardized sampling techniques. Special measures should be adopted to ensure the health of tourists, who are particularly susceptible to local endemic diseases, since they normally have lower levels of acquired immunity than local populations.

150 beaches in France, Greece, Italy, and Spain, 25 percent of which had pathogens exceeding the levels recommended for maintaining public health. Sampling methods based on a 1976 EC directive are providing ever more coherent comparative data on the quality of bathing water. The available information influences visitors when they choose which beaches to visit and thus acts as an incentive for improving coastal water quality and maintaining tourism levels. (See box 2.1 for details on major environmental health risks in the Mediterranean.)

Although municipal and industrial discharges into coastal waters are important local sources of pollutants, large rivers such as the Ebro, the Rhône, the Po, and the Nile that flow to the sea through industrial or agricultural areas probably contribute even more of the total pollutants in the Mediterranean. Land-based atmospheric fall-out also brings significant amounts of pollutants such as lead, PCBs, and chlorinated pesticides into the basin.

Pollution caused by metals such as mercury and by synthetic organic compounds such as PCBs and DDT has caused a great deal of concern in recent years. Although natural mercury levels in the Mediterranean are high, abnormally elevated levels have been noted near some industrial areas. For example, tuna in the western Mediterranean contain roughly twice as much mercury as do tuna in the eastern Mediterranean and the Atlantic. The Tuscan coast is another area of high mercury concentration, and in the Kastela Bay on the central Adriatic coast of Yugoslavia mercury levels are 30 to 100 times greater than in marine sediments located away from industrial discharges. Studies suggest that people in these areas, especially fishermen and others who eat large amounts of fish, may risk mercury poisoning.

PCBs from electrical equipment and various industrial uses enter the sea from industrial wastewater and from the atmosphere. High PCB levels have been found in shellfish, fish, birds, and mammals in the northern Mediterranean coastal areas. PCB contamination poses potential dangers to human health and reproduction, especially among fish consumers. (It should be noted that this concern is based on measurements from the 1970s and that PCBs are being phased out in most European countries. As a re-

sult of these measures, there is evidence that PCB levels have dropped in some parts of the Mediterranean.)

Eutrophication

Red, brown, green, and yellow tides and massive algae blooms have caused the depletion of oxygen in the water, disturbed fish and shellfish production, damaged tourism, and created serious aesthetic blight in several parts of the Mediterranean. These phenomena are severe manifestations of eutrophication—the result of excessive inputs of nutrients. High nutrient levels promote the growth of algae and some marine plants that deplete the available oxygen and kill other plant and animal life.

The most important nutrients responsible for eutrophication in the Mediterranean are nitrates derived from fertilizers used in agriculture and the organic matter, nitrates and phosphates in domestic sewage, detergents, and industrial wastewaters. Because the Mediterranean is naturally deficient in nutrients, inflows of these materials can be beneficial, especially to fisheries. Eutrophication usually creates problems, however, in confined bodies of water where currents are restricted. Areas heavily affected by eutrophication include the northern Adriatic Sea between Italy and Yugoslavia, the Golfe du Lion (France and Spain), Saronikos Bay (Greece), and Izmir Bay (Turkey). Eutrophication in the northern Adriatic, caused principally by agricultural and industrial runoff from the Po Valley, has led to widespread algae growth, severe oxygen deficiency, and damage to tourism (box 2.2). This problem also exists on a local scale in many coastal lagoons and small bays near municipal and industrial wastewater discharge points.

Oil and Other Maritime Pollution

Annual traffic in the Mediterranean of ships of more than 100 gross registered tons is estimated at 220,000 vessels. About 2,000 merchant ships are in the Mediterranean at any one time; 250 to 300 of these are oil tankers. Despite high tanker traffic and the increased risks resulting from the aging of the world's tanker fleet, the Mediterranean has been spared a massive oil spill. Nonetheless, there is a high level of oil pollution, most

of it caused by the deliberate discharge of bilge and ballast waters from tankers (map 4). These oil discharges now account for about 75 percent of the 650,000 tons per year of hydrocarbon pollution in the Mediterranean; land-based industrial and urban discharges account for most of the rest. Coastal discharge of lubricating oil is another increasing problem. The highest incidence of floating oil in the Mediterranean is in the Ionian Sea; the second highest is in the coastal waters of northern Africa. About 30 percent of the oil spilled in the Mediterranean forms tar that is deposited on beaches, especially in the eastern Mediterranean and in Algeria and Tunisia, and that causes damage to tourism, local

fisheries, coastal wildlife, and marine ecosystems.

Although oil pollution is a major concern, other types of maritime pollution are increasing in importance. With the growth of regional sea trade, the dumping of sludges from treatment plants and industrial residues has become more serious. Illicit disposal of hazardous wastes generated outside the Mediterranean may already be occurring. Moreover, increased sea transport of industrial chemicals means a growing danger of accidental spills of large quantities of toxic chemicals. Because of the damage that these products and the associated pollution can cause to human health and natural ecosystems and be-

Box 2.2. Wastewater Management in the Po River Basin

The Po is the largest Italian river, flowing about 600 kilometers. Its basin covers seven *regione* in northern Italy—about 25 percent of the country's territory—and includes about 3,100 municipalities containing roughly 20 million inhabitants, or 36 percent of the population. The Po Basin is one of the country's most prosperous regions. Its 200,000 industries have a significant environmental impact, producing as they do organic material equivalent to that yielded by a population of 60 million. These wastes, as well as municipal wastewater and agricultural runoff, are brought into the Po by its twenty-four principal tributaries.

About 60 percent of the population of the Po Basin is served by sewer systems, most of which are combined. Industries discharge into municipal networks or directly into the rivers. Municipal and industrial pollution has gradually led to a deterioration of water quality that affects municipal water supplies, recreation, agriculture, and other water uses. Because of high water tables, river pollution has also contaminated groundwater.

About 80 percent of the organic pollution in the northern Adriatic Sea can be traced to the Po. Eutrophication is the most critical water quality problem in the Adriatic Sea, and the Po is the main contributor of such nutrients as nitrogen and phosphorus. Eutrophication poses a serious threat to tourism and fisheries. For example, the Emilia Romagna region, at the mouth of the Po, has 130 kilometers of coastline on the Adriatic; this coastal area attracts more than 40 million tourists each year and accounts for 20 percent of Italian fishery yields. These two industries are now in jeopardy.

In 1980 the seven *regione* of the Po Basin initiated a program to combat pollution in their rivers and in the

Adriatic Sea. As part of this program, the EIB in 1983 began to finance improved wastewater collection and treatment facilities in Piemonte, Lombardia, and Emilia Romagna, the *regione* responsible for about 98 percent of the pollution in the Po. The estimated cost of the program is about ECU 10 billion (\$11 billion). Three sub-projects will be carried out over a twenty-year period to treat domestic and industrial wastewater discharged into municipal systems in these *regione*. The program also includes an effort to reduce pollution in the coastal zone of Emilia Romagna and in the Po Basin itself by, among other things, rehabilitating existing wastewater and storm water networks and improving or extending treatment facilities, with an emphasis on treating organic material and removing phosphorus. Wastewater from industries will be pretreated prior to discharge into municipal systems. A complementary EIB loan finances pollution abatement for industries that do not discharge into municipal networks. Other actions will be needed to reduce the input of nitrogen and phosphorus from agricultural runoff. In addition, measures to remove accumulations of organic-rich sediment and to harvest aquatic plants will need to be considered.

The program has required new administrative arrangements between the government and the *regione*. The recent creation of a Ministry for the Environment and the enactment of a law enabling the establishment of river basin authorities should help the project to move ahead. When implemented, the program will reduce discharge of nutrients into the Adriatic by about 50 percent.

cause proper control mechanisms are lacking, the potential risks are significant. Spills from the fast-growing number of pleasure boats also significantly threaten important tourist areas along the coast.

Plastics and Other Debris

Floating and suspended plastics and other litter from ships and from sources on land threaten marine wildlife and accumulate on beaches. A modification to the International Convention for the Prevention of Pollution from Ships (1973) that recently went into force banned the dumping from ships of all garbage except food wastes. This should lead to a reduction of garbage from ships, but refuse from land-based sources is also a problem. For example, garbage found on beaches in Cyprus, northern Lebanon, and Turkey has been traced to unregulated coastal dumps in Lebanese cities. Plastic mulch used in agriculture is also an important source of litter in the sea and on beaches.

The Degradation of Marine Resources, Wetlands, and Coastal Areas

Marine resources, wetlands, and coastal areas in the Mediterranean are being overexploited. Their continued survival depends on appropriate measures to restrict development to sustainable levels.

Marine Resources

In comparison with the Atlantic Ocean, the Mediterranean is relatively poor in fisheries. The 1 million tons of fish produced per year amount to only about 1.2 percent of the volume of the world catch. The fish, however, is of high quality and represents about 5 percent of the value of the world catch. About 38 percent of the total Mediterranean catch comes from the area west of Sardinia and Corsica; the central Mediterranean, between Sardinia and the Peloponnesus, yields 47 percent. Only 15 percent is caught in the eastern zone, owing to the decline in nutrients from west to east and, in particular, to the construction of the Aswan High Dam on the Nile, which destroyed productive sardine and anchovy fisheries. Sponges have economic value, but, as in the case of marine mammals and ma-

rine turtles, their critical ecological role is more important (see box 2.3 and map 5). Better management of nutrient inputs will permit increased aquacultural production of fish and shellfish in many Mediterranean countries. Aquacultural facilities, however, must be protected from pollution and must be compatible with wetland conservation programs.

Urban and industrial pollutants and the degradation of basic habitat have reduced fish harvests in some areas. For example, neptune grass (*Posidonia oceanica*), a native Mediterranean seagrass found near Egypt, Libya, and the principal deltas, produces large amounts of oxygen and provides shelter for small fish but is vulnerable to excessive sedimentation, sewage, trawling, and dredging. Overexploitation of fisheries is a more serious threat. Fishing of some stocks exceeds the maximum sustainable yield. Large marine species such as swordfish and tuna and small open sea species such as sardines and anchovies are overexploited virtually throughout the sea. Coastal species are heavily exploited in areas such as Turkey. Fishing is intense in the coastal areas of Italy, where the stock is only 20 percent of natural levels. Cyprus, in contrast, is making important headway in controlling fishing. The Mediterranean area has become a net importer of fish; recent FAO data show a combined regional fishery product consumption of 14.1 kilograms per capita per year, of which approximately 3.4 kilograms are imported from outside the Mediterranean.

Wetlands

Mediterranean saltwater and freshwater wetlands include marshes, shallow-water coastlines, estuarine and delta systems, rivers, and man-made wetlands such as reservoirs. Wetlands trap silt and receive organic matter and dissolved nutrients; estuaries also receive organic matter from adjacent salt marshes and from the open sea by tidal action. This supply of nutrients provides ideal conditions for plant growth, and the plant biomass supports diverse invertebrate and fish species on which many animals, including birds, feed. The diversity of food sources attracts large numbers of predatory fish and a wide variety of wildlife. Each year an estimated 2 billion migratory birds use Mediterranean wetlands as seasonal sites or migratory stopovers; of particu-

lar concern are waders and ducks that migrate between Africa and Europe and species that migrate from northern Europe to winter in the Mediterranean. Twenty globally threatened species live in the region, and seven of them breed in Mediterranean wetlands. This habitat hosts about seventy other species of birds whose populations are threatened in the region. (Map 6 shows the migration routes of soaring birds and congregating points on migratory routes.)

Since ancient times Mediterranean wetlands have been progressively drained for land reclamation and malaria prevention. In the Roman period approximately one-tenth of Italy, or almost 3 million hectares, was wetlands; by 1865 only 764,000 hectares of wetlands remained and by 1972 only 190,000 hectares. Buhairat el Manzala, a major Nile Delta lake in Egypt, which covered an area of 1,700 square kilometers in 1900, had been reduced to 900 square kilometers by 1981 and continues to be developed. There

has also been extensive drainage of river deltas for agriculture in Greece (Nestos) and Turkey (Buyuk Menderes, Ceyhan, and Seyhan). Deltas are maintained and grow through accumulation of silt transported by rivers and are thus susceptible to changes in land use upstream. The delta of the Ebro, for example, grew as a result of increased soil erosion in the watershed but is now shrinking owing to the construction of a large dam upstream. Construction of the Aswan High Dam has similarly contributed to loss of land in the Nile Delta. In the past fifty years more than a million hectares of artificial wetlands—mainly reservoirs—have been created in the region, but this only partly replaces natural wetlands.

The conversion of wetlands has reduced habitat for native wildlife and migratory birds, diminished the wetlands' buffering effect of capturing pollutants, sediment, and flood flows, and contributed to a decline in fisheries. The Mediterranean wetlands have been drained to such an

Box 2.3. Disappearing Species: The Case of the Monk Seal

The Mediterranean monk seal (*Monachus monachus*), once found along all shores of the Mediterranean and Black seas, the coasts of northwest Africa, and around Madeira and the Canary Islands, now heads the EC list of endangered species. The World Wide Fund for Nature (WWF) ranks it among the ten most endangered species in the world. Marine scientists contend that prospects for the future of this species are bleak unless conservation efforts are undertaken at once.

In the past twenty years the size and geographic distribution of the monk seal population has shrunk radically, until today only 400 to 600 animals survive. Today their greatest concentration is along the Turkish and Greek coasts and among the Aegean Islands, although small populations also exist in Algeria, Morocco, and Tunisia. They have been sighted elsewhere, but much of the remaining population is fragmented and below the density needed for propagation.

One of the largest of seals, weighing about 250 kilograms and measuring 2.5 meters to 3.0 meters in length, the monk seal is a reclusive animal that prefers coastal areas to open water. The average life span is ten years. Reproduction is slow; the gestation period is eleven months and a female has only three to five pups over her lifespan.

The main threats to the monk seal include habitat destruction, marine pollution, competition with fishermen

for food, and hunting. Recent coastal development has destroyed many areas that females once used for giving birth, forcing them to more remote spots. Marine pollution, especially the buildup of insecticides and heavy metals in tissues, may be responsible for reducing the survival of young, sick, and pregnant seals. Fishermen in many areas view the seals as competitors that damage nets and other fishing gear in search of food; sometimes seals are killed after they have been caught in fishing gear. They also present an easy shooting target as they sleep in caves.

In 1984 the European Parliament passed a Resolution on the Protection of the Monk Seal, and this species is also covered by the 1983 Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Conservation of the monk seal will require the protection of remaining wild populations, the establishment of effective protected areas, public education campaigns, and captive-breeding programs. Monk seal recovery plans have been proposed for Algeria, Greece, Morocco, and Turkey. In 1986 Greece established the Northern Sporades Marine Park as a protected area for monk seals, and several protected areas have been proposed in Turkey. UNEP's Action Plan for the protection of the Mediterranean monk seal was adopted by the Contracting Parties in 1987.

extent that drainage should be stopped immediately. A recent workshop of the EC-sponsored Technical Working Group on Mediterranean Coastal Wetlands concluded that there is “no wetland mass left” in the Mediterranean EC countries that “could be sacrificed for uses and functions other than in the form of wetlands.”

Coastal Areas

The concentration of population in coastal areas, which is accompanied by an increasing density of industrial and other economic activities, has led to high pressure on limited coastal resources and to irreversible changes in land use (table 2.2). Such changes have generally been associated with heightened environmental problems that affect the health of the population and the resource base required for sustainable development in the coastal areas. This situation is expected to worsen significantly; according to the Blue Plan the coastal population of the Mediterranean is likely to more than double by 2025—from 82 million at present to between 150 million and 170 million. To take Spain as an example, the country’s coastal area accounts for 17 percent of its land surface, but the share of the population living there has increased from 12 percent at the beginning of the century to 35 percent today. In addition, 82 percent of Spain’s tourists stay on the coast during the summer months.

The ecologically vulnerable coastal areas face threats from competing interests, such as urban development, tourism, industrial development, and agriculture, that affect delicate and valuable coastal ecosystems, coastal aquifers, wetlands, and archaeological sites. Environmental issues arising from the degradation of the coastline can be defined in terms of different stages of coastal zone development, all of which coincide at any given time. Such a typology makes it easier to specify concrete actions and reflects the differing approaches of various countries. For example, while some countries have focused on the protection of the natural coastline, others, such as Italy and Spain, have adopted a broader approach that includes the environmental problems of urbanized coastlines.

STAGE 1: THE NATURAL COASTLINE. The principal environmental issues with regard to the natural coastline include preserving and managing

unique natural and historical sites (map 7). Although the immediate threat may be limited, preventive measures are needed because—as coastal populations become increasingly dense—there is a great likelihood of future development along most segments of the Mediterranean coastline. The simple opening or paving of an access road may bring significant changes in the pace and nature of local development. Moreover, institutional capacity for managing or protecting important archaeological and historic sites is limited.

STAGE 2: URBAN SPRINKLING. The second stage of coastal zone development is a threshold phase: a large part of the coast remains undeveloped, but certain small urban areas are growing rapidly. The result is a sprinkling of small but swiftly growing urban areas along the coast. Tourism, which can increase local resources, can also degrade the coastal environment. All too often, local institutions pay little attention to managing urban growth and preserving unique natural and cultural sites (box 2.4). Urban areas tend to grow haphazardly and inefficiently. Except in France, Israel, Malta, and, more recently, Spain, most development is unplanned and unregulated. This is the stage at which local institutional structures, usually weak if present at all, are the least prepared to handle development pressures, and the stage at which the most can be lost environmentally. This, too, is when the maximum prevention can be achieved at the lowest cost. The southwest coast of Turkey is now in the midst of this stage.

STAGE 3: LARGE, STABLE URBAN AREAS. A significant amount of coastline has already been developed, with roads, ports, high-rise buildings, and industries. A characteristic pattern is a medium-to-large urban area with a moderate rate of growth and a few significant sources of pollution. Conflicts over land use intensify among industry, agriculture, tourism, housing, infrastructure, and historic or natural areas (map 8). Lower-density urban areas and periurban areas may be under pressure, and agricultural land, significant natural assets, and the quality of the urban environment may suffer.

STAGE 4: FULLY DEGRADED COASTLINE. This stage is typified by fast-growing urban areas

Table 2.2. The Consequences of Degradation of Land and Coastal Resources

<i>Activity</i>	<i>Effects</i>	<i>Environmental impacts</i>
<i>Intensification of land use</i>		
Planned and unplanned expansion of urban, industrial, and tourism development into agricultural land, coastal areas, and natural habitats. Includes expansion of energy and transport infrastructure	Conversion of land to medium-term uses; reduction of area available for agriculture, recreation, and natural habitats, including wetlands and forests. Secondary effects include shift of intensive agriculture into more marginal areas, displacement of traditional fishermen and graziers, and destruction of natural ecosystems	Irreversible loss of prime agricultural land, coastal areas, and natural habitat; conflicts between competing user groups; pressure to "reclaim" wetlands; significant increases in release of pollutants and their concentration in fragile areas; overcultivation and reduction in fallowing; rapid exhaustion of land; loss of organic matter and reduced water retention capability; destruction of fauna and flora; increased erosion, leading to siltation in rivers and sea
Increased demand for water for agricultural, urban, industrial, and tourism uses. Combines with underpricing, uncertainty of availability, and inadequate regulation	Competition for water among user groups, reducing availability for agriculture and natural habitats, especially wetlands; excessive use of groundwater; overapplication of water in irrigated agriculture; inefficient use by urban and industrial consumers	Disputes over access to water by competing user groups, with preference toward supplying urban, industrial, and tourism use at expense of agriculture and natural habitats; raised water tables and salinization as result of overapplication in irrigation. Excessive use of water by urban and industrial users requires additional investment in infrastructure to supply, treat, and distribute water and to treat wastewaters
Excessive or improper use and improper handling and storage of agricultural fertilizers and pesticides	Increased levels of nutrients and toxic substances in surface water, groundwater, and soils; increased agricultural production costs and decreased agricultural profitability	Hazards to human and animal health; reduced fish production; decreased potential of water bodies for multipurpose use (drinking water, irrigation, and so on)
<i>Extensification of land use</i>		
Dispersed development of coastal zone for tourism and residential development (for example, retirement homes); continuous cultivation of marginal soils; failure to keep soils covered when winds or rain are prevalent	Reduction of land in fallow; loss of soil, including nutrients, organic matter, and soil structure; loss of agricultural productivity; increased cost of urban services as result of low-density settlement	Transport of soil and deposition of sediment downstream; increase in airborne particulates and dust; increased cost of maintenance of irrigation systems; compensatory use of fertilizers
Expansion of cultivation to hill slopes, with inappropriate cultivation technologies	Loss of soils and soil productivity; deforestation	Transport of sediment downstream, blocking stream channels, depositing sediment in irrigation systems, and accelerating filling of reservoirs with sediment
Extension of agriculture into inappropriate areas; wasteful application of mechanization	Exhaustion of finite capacities of fragile lands to support agriculture; displacement of graziers into inappropriate areas. Mechanization accelerates process of land degradation	Exhaustion of soil capabilities; creation of conditions for soil erosion; lowered capacity to withstand shocks such as droughts and fires
Extension of livestock grazing into inappropriate areas; subsidies for livestock feed and water supply	Overuse of grazing areas; grazing in areas too fragile for livestock; increased incidence of fire, soil compaction, and erosion of soil by wind and water	Loss of habitat; change in species composition of vegetation; drawing down of groundwater resources to support livestock

with many significant sources of pollution. The natural coastline has almost completely disappeared. Environmental questions become graver as the population is affected by water and air pollution and as natural resources are heavily burdened. Municipal and industrial waste discharges can also pollute coastal waters. Solutions to these complex environmental problems are often elusive because of the requirements placed on the institutions responsible for addressing these issues. Problems cut across both administrative and sectoral lines. At this stage the two main concerns are therefore pollution control and abatement and the containment of further environmental degradation in the core and peripheral areas. The environmental problems become exacerbated if the urban concentration begins a process of urban decline, further reducing its capacity to take remedial action.

The urbanization of the Mediterranean coastline is unlikely to slow in the coming decades. The share of coastline at the intermediate and advanced stages of development is therefore bound to increase, underlining the urgent need for environmentally sounder development. This is particularly true for islands and estuaries with specific and fragile ecological conditions.

The Depletion and Degradation of Freshwater Resources

The depletion of freshwater resources for domestic, industrial, and agricultural purposes is likely to become the single most important environmental issue facing the Mediterranean countries and, in particular, their coastal areas. Even countries not yet facing water crises are likely to experience large increases in the cost of providing

Box 2.4. Environmental Degradation and the Loss of the Cultural Heritage

The Mediterranean is a unique repository of archaeological treasures, many of which coincide with important natural sites, and of historic buildings and settlements that embody the region's history and identity. More than forty cultural properties in the Mediterranean Basin—the largest number for any area in the world—have been approved for inscription on Unesco's World Heritage List. (Cultural properties are defined by the Unesco 1972 Convention Concerning the Protection of the World Cultural and Natural Heritage as monuments, groups of buildings, or sites that are of universal value from historical, aesthetic, ethnological, or anthropological points of view.) Under the Genoa Declaration countries participating in MAP agreed to identify 100 Coastal Historical Sites for special protection. Historic urban centers are also valuable parts of the Mediterranean topography and important tourist sites (map 7). Pollution and urbanization are causing irreparable damage to cultural properties, with the potential of their complete loss and the loss of tourism revenue.

During the past forty years decay and pollution have done more to destroy the cultural heritage in the region than the warfare and the wear and tear of preceding centuries. In some countries air pollution has displaced the combined action of frost, salts, and earthquakes as the principal cause of damage to the built heritage. Air pollution in Rome and Athens is so severe that sculptures have been taken indoors. Rising water tables and poor drainage and sewerage cause excess humidity, another reason for loss of historic buildings. Medieval Cairo is particularly hard hit. Almost everywhere in the

region—in Carthage (Tunisia), Paphos (Cyprus), the Giza plateau in Egypt, and other places—the demand for land for urban expansion, urban renovation, and tourism threatens archaeological sites. The expansion of agriculture into new areas and the adoption of land leveling is also destroying sites throughout the region.

The governments of the Mediterranean countries, often with international support, have concentrated their preservation efforts on highly visible monuments such as Abu Simbel, the Acropolis, and Topkapi. These campaigns have raised public awareness of both the vulnerability and the value of historic monuments, but thousands of relatively unknown monuments and historic settlements are less well protected. Most countries have made legal provisions for the protection of monuments and their surroundings, but enforcement is difficult. Poorly regulated urbanization and administrative neglect are also important causes of the loss of valuable historic structures. Inadequate attention has been given to inventorying cultural resources and integrating this information into the planning process. Often, projects are implemented without conducting an archaeological survey or obtaining legally required clearances from authorities responsible for archaeological and historic properties. The expert staffs of these offices typically have backgrounds in archaeology or architecture, but strong cultural preservation programs also require management, planning, and budgeting skills. As a result, opportunities for generating financial support for conservation through user charges and other means are often overlooked.

water to meet growing demand. Improving the planning, management, and conservation of water will be critical for economic development. Failure to protect freshwater resources will render existing water-based patterns of development unsustainable in a number of countries by significantly increasing the cost of water over time.

Although access to clean water is not a major issue in the north, close to one-third of the population of the south has inadequate potable water supplies, and a larger proportion lacks adequate sanitation. In many cases per capita water consumption is below the minimum considered necessary for drinking, basic hygiene, and disease prevention. What is more, water quality is below acceptable standards. These conditions prevail most frequently in rural and low-income urban areas.

Only Cyprus and Malta face immediate water crises. High-cost desalination plants provide about 50 percent of Malta's water requirements, but at a cost of about fifteen times the average cost of water in France. In Cyprus expensive surface water systems have been constructed to convey water across the country.

The endowment of freshwater resources varies considerably across the region: the northern countries and Turkey have water surpluses, whereas the southern countries and the islands have serious water resource constraints. Groundwater throughout the region represents about 20 percent of total resources. There are twenty-nine important freshwater river basins, but since topography restricts interbasin transfers, the distribution of water resources is highly skewed. Cyprus, Libya, and Malta already use groundwater resources faster than they are being naturally replenished.² Moreover, throughout the region groundwater is being locally exploited in excess of natural rates of recharge. In several important urban and industrial areas massive overexploitation has resulted in saltwater intrusion and land subsidence. To address present and projected shortfalls in water supply, many countries are embarking on high-cost water supply options, including interbasin transfer schemes, desalination of salt and brackish water, and the reuse of treated municipal and industrial wastewater.

The effective stock of fresh water—both surface water and groundwater—is also limited by

pollution. The Blue Plan estimates that water quality is questionable in twenty of the twenty-nine drainage basins that discharge into the Mediterranean. This is the result of pollution from industrial, domestic, and agricultural sources, much of it originating far from the coast. In the coastal zones of both the north and the south, industrial wastewater treatment is inadequate.

In the north groundwater is the principal water resource and is commonly overpumped and often polluted. In Naples groundwater is so toxic owing to industrial pollution that it is unusable for domestic purposes. Pollution of groundwater by nitrates and pesticides of agricultural origin has become a serious problem in the Po Basin. In the south the use of fertilizers has doubled over the past fifteen years, adding nitrate and phosphates to the groundwater. In Algeria, for example, a recent study showed that of seventy-two pumping stations monitored, 35 percent had nitrate levels that exceeded WHO guidelines. Once groundwater is polluted, it may require expensive treatment and may be unusable for a number of years. Other causes of groundwater degradation include accumulation of salts from agricultural drainage (and in some cases from natural salt deposits and springs) and overpumping. In Izmir, Turkey, overpumping has led to saline intrusion into the aquifer and to localized subsidence.

Agricultural, urban, and industrial water consumption has been rising rapidly in the Mediterranean region. Because of supply constraints, it is difficult to estimate the effective growth of demand in many countries. Both per capita consumption levels and patterns of consumption vary widely; irrigation accounts for a far higher proportion of total consumption in the south. Water demand is likely to rise rapidly in many countries owing to population growth, urbanization, industrial growth, per capita income growth, and low prices. A study, sponsored by the Blue Plan, of a sample of Mediterranean cities estimated that per capita water consumption will increase from 90 cubic meters per year in 1978 to 110 cubic meters–130 cubic meters by 2025; in the south it is expected to increase from 45 cubic meters per year to 65 cubic meters–82 cubic meters by 2025. Water supply, and hence investment, will need to rise rapidly to catch up with unmet demand. Tourism will increase the

consumption of water only marginally except on islands and in the principal tourist areas, but in those places—particularly in the south, where the tourist season and the dry season coincide—the impact of tourism can be significant. Across the region tourism will contribute to increased investment costs, since water systems have to be designed to meet peak demand.

More than 75 percent of the increase in the demand for fresh water will be in the southern countries, which already have fragile freshwater balances and severely limited resources. A Blue Plan study based on national statistics of the 1980s shows that the consumption index (the ratio of water consumption to estimated total available water resources) was 7 percent in the north, compared with 51 percent in the south.

In Algeria, Egypt, Israel, Libya, Morocco, and Syria, and in parts of Italy and Spain, the scarcity of freshwater resources is likely to be a significant brake on development. It has already had an influence in Cyprus, Israel, and Malta and is adversely affecting development on large and small islands throughout the region. As pressure on freshwater resources mounts, the possibility of both surface and groundwater pollution increases. Indeed, this can happen years before declines in volume become critical.

The rapid depletion and degradation of freshwater supplies have three important implications:

- The real cost of supplying water is increasing over time because the rate of technological change cannot keep pace with the decreasing accessibility of new resources. For some countries, such as Algeria, Libya, Morocco, and Tunisia, the costs of additional new water supplies will be extremely high.
- The demand for urban water and sanitation will grow at rates well beyond the ability of governments to provide services, and the supply of potable water will remain well below effective demand. The public health and environmental effects of inadequate water supply and poor sanitation will be significant, especially for poor households in both urban and rural areas. Periodic outbreaks of water-related diseases already occur throughout the Mediterranean and are likely to worsen.
- Since water prices in every country are significantly below the marginal costs of supply, un-

economic decisions are often made concerning water resource use. In many countries water tariffs rarely cover operating and maintenance costs, leaving water utilities dependent on government subsidies to finance investment programs. There may also be equity issues at stake because groundwater access depends on sophisticated technology, and farmers who use large deep-well pumps are effectively preempting smaller and poorer farmers from drawing on the aquifers.

As noted earlier, the countries of the region vary in their water resource endowments. All countries except France and Yugoslavia are likely to experience year-round or seasonal water supply shortages at the national level or in specific areas of the country, often on the coast.

The Degradation of Land Resources

Arable land is a scarce resource in large portions of the Mediterranean region and is under intense development and population pressure. There is a tendency toward more intensive and extensive cultivation, especially in the south. Irrigated land is being cultivated year-round, with increasing applications of water, fertilizer, and pesticides. Simultaneously, large areas of fertile land are being taken out of production for urban, industrial, and transport needs, and land of low capability is being overused as herds overgraze ranges, marginal farmers cultivate low rainfall areas without adequate fallowing or fertilization, and forest products are harvested at rates far in excess of annual growth (map 9).

This pressure on the land is being felt in a region where the land surface itself is generally fragile, often already degraded, and subject to high levels of natural erosion exacerbated by severe storms and periodic droughts. Almost three-quarters of the region is mountainous or rolling terrain, and more than half is subject to erosion because of reduced vegetative cover. The evidence of land degradation is widespread and striking: little remains of the original forests that covered much of the region in ancient times, and large areas have gone out of cultivation. Degradation of vegetation and breakdown of irrigation schemes already occurred in Roman times, but these problems appear to have multiplied over the past few decades. The future development of

the region is likely to continue to place intense pressure on land resources.

The Loss of Agricultural Land

Direct loss of cropland is most acute in the southern Mediterranean countries, where fertile land is scarce and is concentrated in the narrow coastal strip and river valleys. In the irrigated areas close to the main urban centers, established agricultural land is being lost to alternative uses even as new land is being brought into production through reclamation. The productivity of the new land, however, is in many cases only a fraction of the old, and new land is being brought into production more slowly than old land is being lost. As a result, it may take several hectares of new land, reclaimed at high cost, to offset the loss of one hectare of old land. Reclamation also requires higher levels of water use, more sophisticated water management, and more intensive use of agricultural inputs. Moreover, since drainage is generally inadequate and the water table is perennially close to the surface, increased water use will increase the risk of salinization.

Soil erosion also degrades land capability and causes productivity to decline. About 35 percent of the farmland in the region experiences erosion of between 5 tons and 50 tons per hectare per year. The Blue Plan estimates that about 300 million tons of productive sediment are lost each year from agricultural land alone. According to the same source, the countries with the greatest areas of erodible surface are Israel (84 percent), Tunisia (76 percent), Greece (72 percent), and Spain (71 percent). In Morocco topsoil is completely lost from 22,000 hectares each year; in Tunisia the figure is 18,000 hectares. Although the aggregate data are weak, it appears that during the past twenty-five years increased cultivation of marginal land and poor management of rangeland have contributed to serious erosion problems and the loss of 2 million hectares of agricultural land in the North African countries.

The historical processes that have shaped the Mediterranean landscape are continuing, and at accelerating rates and great cost. Few areas with agricultural potential are not already in production, and new areas of cultivation are unlikely to compensate for the loss of the old. In Syria and Tunisia no net increase in cultivated land has

taken place since 1975. Nonetheless, expensive land reclamation and intensification efforts are proceeding as productive areas are irreversibly lost to urban and industrial uses. Where arable land area has been expanded, it has been at the expense of natural rangeland.

Rangeland Degeneration and Desertification

Soil erosion is one aspect of the complex process of desertification that, in the southern countries of the region, typically begins with intensive livestock grazing. Ruminant livestock, which account for up to one-third of agricultural income, depend for 60 to 90 percent of their total feed requirements on natural rangelands, crop residues, and fallow fields. Between the mid-1960s and the mid-1980s, as the livestock population of the south rose by 35 percent, the rangeland area decreased by 10 percent. Since range production does not meet the needs of current herds, especially seasonally and in unusually dry years, livestock systems either perform poorly on deteriorating native ranges or require feed supplements. To combat overgrazing in densely populated areas, new areas are being developed by drilling new wells or by transporting water in trucks to areas that could not otherwise support grazing. In North Africa and the Mediterranean Basin it is estimated that about 132 million hectares of rangeland have degenerated significantly and that additional vast areas have become deserts.

Overgrazing of marginal land compounds land degradation caused by increased use of these same areas for cultivation. Rainfed areas that are marginal in terms of climate, topography, and soils cannot support continuous cultivation without periodic fallowing and the systematic return of organic nutrients to the soil through appropriate crop rotation with deep-rooting, nitrogen-fixing forage crops. Without these practices, continuous cropping can exhaust soil fertility, destroy soil structure, and eliminate vegetative cover. Even with appropriate practices, crop yields will be highly variable owing to low and erratic rainfall.

By exposing the area to greater risk of erosion by wind and water, overcultivation also contributes to the onset of desertification. When overgrazing and overcultivation are combined with the use of fire to clear marginal lands for cultiva-

tion or to remove herbage and when droughts occur, the danger of desertification increases significantly.

Deforestation

The forests of the Mediterranean region are among the most degraded in the world. Forests that once covered most of the region now cover only 5 percent of the land surface, and the forests that remain are concentrated in the north. Moreover, the area of actual forest is considerably smaller than the area officially so classified. For example, 25 percent of the land area in Turkey—about 20 million hectares—is classified as forest, but 4 million hectares of this area are coppice and 6 million are degraded. Similarly, in Morocco less than 60 percent of the 8 million hectares classified as forest or esparto grassland is productive. As a result of poor soils, low to moderate rainfall, and periodic droughts, few of the region's forests are highly productive. Natural and man-made fires, together with poor forestry management and overgrazing, damage forest resources throughout the region.

Salinization

Salinization of irrigated soils is a result of lack of drainage and the evaporation of water, which cause salts to accumulate. These processes lower and then destroy the value of soils. Salinization can be reversed, but only at high cost. Evidence of salinization, often accompanied by waterlogging, exists throughout the region: 5 percent of the surface area of the Mediterranean Basin is believed to be affected, including large parts of formerly productive irrigated zones. In Egypt an estimated 32 percent of the Nile Delta and 30 percent of the Nile Valley are affected by salinization and waterlogging, lowering or totally eliminating their potential for crop production. Much of Egypt's salinization is recent, the result of excessive water use and inadequate drainage. (Formerly, the salt was leached out by the annual flooding of the Nile, which no longer occurs because of impoundment of the river waters by the Aswan High Dam.) In Syria 12 percent of the Mediterranean watershed suffers from salinization and waterlogging. This underscores the need for building appropriate drainage systems.

Fertilizers, Pesticides, and Herbicides

The excessive application of fertilizers is a problem throughout the Mediterranean and leads to contamination of surface water and groundwater. Runoff of agricultural fertilizers into fresh and marine water bodies is the primary cause of eutrophication. In 1977 about 90 tons per year of persistent organochlorine compounds, including DDT and benzene hexachloride (BHC), were estimated to enter the Mediterranean Sea by surface runoff. According to the Blue Plan about 550 tons of pesticides are discharged annually into the sea.

Pesticides are widely used in the region for crop protection in agriculture and for vector control in public health. Although these applications can be beneficial, the use of pesticides also causes contamination of surface and groundwater sources, damage to nontarget plant and animal populations and to natural ecosystems, and exposure of workers to toxic substances. An emerging issue is the exposure of human populations to pesticide residues on food products. The pesticide management problem in the region is complicated by the high level of production of specialty vegetable and tree crops, which traditionally are heavily treated with pesticides. Although most countries have become more selective in the pesticides they authorize, some still use chemicals that in other countries have been identified as hazardous and banned. The proper disposal of used pesticide containers and dated stocks of pesticides remains a serious problem. Control of aquatic weeds in irrigation canals for water management and health reasons can be achieved with low-toxicity herbicides, but there are acute environmental problems associated with improper storage, handling, and application of these materials. The use of water from irrigation channels for domestic needs in rural areas makes herbicide use especially problematic.

Solid Wastes and Hazardous Materials

The amount and composition of solid waste produced by Mediterranean coastal cities varies widely by location and income level. Estimates indicate that in the coastal cities of the region about 500,000 cubic meters of waste—10 liters of

waste per linear meter of the Mediterranean coast—are generated each day.

In most countries collection systems are fairly well managed, but disposal is a problem. In Tunisia and many other countries all types of waste, including hazardous materials, are disposed of together. Many sites are not well designed, and there is little control of leachate that could contaminate groundwater. In Turkey the city of Izmir has an effective recycling and composting system, but most smaller cities have open dumps and only informal recycling, rather than sanitary landfills. Refuse is often burned at the disposal site or in incineration plants that lack filters, and this impairs local air quality. As the location of landfill sites is becoming a serious problem in many countries, greater emphasis must be put on recycling and other waste reduction measures. In Algeria, for example, where 70 percent of the population resides in the fertile narrow coastal zone, it has been difficult to find enough appropriate landfill sites.

The results of inadequate solid waste management can be seen throughout the region: floating refuse at sea, littered beaches, dumps along roadsides and riverbanks, open burning, littered city streets, and clogged storm sewers. Even solid wastes that contain no hazardous materials can endanger marine life, pollute surface and groundwater resources, menace tourism, and spread disease.

A number of materials that pose serious hazards are widely used in industry, medicine, energy generation, and agriculture and even by households (table 2.3). The large-scale use, stockpiling, and improper transport and disposal of hazardous materials are growing problems in the region, and the long-term consequences could be serious. Hazardous industrial wastes are often mixed with municipal wastewater and solid wastes, stored in an unsafe manner on industrial sites, or dumped illegally. This increases the risk of exposure of workers, pollution of water supplies, and contamination of agricultural land. In Yugoslavia more than 200,000 tons of hazardous material are generated annually. Landfills in Rijeka, Split, and other cities are virtually exhausted, and hazardous wastes have to be stored on site.

The situation in Algeria provides a good insight into this regionwide problem. A recent

study found that significant amounts of industrial refuse, including hazardous materials, ends up in municipal dumps. During the rainy season wastes are washed into river basins, where they contaminate soil and groundwater. In addition to the current volume of wastes, the stockpile accumulated over the past two decades is currently estimated to include 600 tons of mercury waste, 150 tons of cyanide, 1,200 tons of PCBs, 3,000 tons of acids, 1,000 tons of solvents, 4,000 tons of paint sludge, 5,000 tons of dated pesticides, and an unknown amount of heavy metal sludge. The task of dealing with these stockpiles is especially difficult because they are spread throughout the country, are dangerous to handle and transport, and require specialized techniques for treatment and disposal.

Air Pollution

Air pollution is becoming a more widespread problem in the Mediterranean region. Most atmospheric pollutants are generated by industry, thermoelectric plants, residential heating, and motor vehicles (table 2.4). Atmospheric pollutants, although largely contained in large cities and major industrial areas, also have broader impacts. For example, pollutants such as chromium and mercury enter the Mediterranean from the atmosphere in about the same quantity as from rivers, and even larger proportions of lead in the sea come from atmospheric sources. In fact, about 90 percent of the lead that reaches the western Mediterranean arrives by way of the atmosphere.

High levels of sulfur dioxide, primarily from the use of coal, lignite, and heavy fuel oil for home heating, industrial uses, and power generation, can cause serious public health problems, particularly respiratory diseases. In Izmir, Turkey, winter accumulations of sulfur dioxide from home heating are almost double legal levels. Although the problem is less intense than in northern Europe, there is evidence of air pollution in rural areas and even of transboundary air pollution among the Mediterranean countries. Forestry production in the northern republics of Slovenia and Croatia in Yugoslavia has fallen owing to acid rain, mainly caused by sulfur dioxide emissions from the burning of low-quality coal and lignite in thermoelectric plants. These

plants account for more than 80 percent of current lignite consumption. It is estimated that about 13 percent of the sulfur in air pollution in Yugoslavia and 18 percent of that in Turkey originates in other countries of the region.

Air-polluting heavy industry has expanded recently in eastern and southern countries, and this growth is expected to continue. In Split, Yugoslavia, dust levels from cement manufacturing

normally exceed the WHO standard of 450 micrograms per cubic meter per 24 hours. The Institute of Public Health has found that this causes an above-average incidence of chronic lung disease. Air pollution from cement plants in Izmir has been measured at 250 micrograms per cubic meter; the legal maximum in Turkey is 200 micrograms per cubic meter. Furthermore, there is evidence that cement dust has reduced yields

Table 2.3. Hazardous Materials in the Mediterranean Region

<i>Type of pollutant</i>	<i>Principal sources</i>	<i>Environmental impact</i>	<i>Health and biological effects</i>
<i>Industrial</i>			
Heavy metal sludges and other wastes containing mercury, lead, chromium, zinc, cadmium, and copper	Chloralkali plants, batteries, gasoline, paints, pigments, leather tanning, chemical plants, electroplating, iron and steel, textiles, and mining	Accumulation of the metals in the food chain; concentration in fish, animals, and humans	Potentially serious illnesses among human consumers of fish and shellfish; neurological disorders in children as result of lead exposure; risk of cancers
PCBs	Electrical equipment, such as transformers	Persistence of residues in sediments and accumulation in the food chain	Potential for impaired reproduction; source of highly biologically active dioxin
Mineral oils, halogenated solvents, acids, lubricating oils, and cyanides	Petrochemicals, iron and steel, leather tanning, microelectronics, coatings, and pulp and paper	Corrosion of pipes, possible explosions and fires; slicks on water	Industrial accidents involving burns and exposure to toxic gases; risk of cancers from prolonged exposure; toxic effects on fish and wildlife
<i>Agricultural</i>			
Organochlorine compounds (for example, DDT, BHC); organophosphate compounds (parathion); herbicides; fungicides; residues from olive mills	Misuse or improper storage or application of pesticides; improper disposal of empty containers; oil-pressing plants	Persistence of organochlorine compounds in soils and sediments; accumulation in fish and mammals	Toxic effects of many pesticides on fish and invertebrates (most pesticides affect nontarget species if misapplied); acute toxic effects of organophosphates on farmworkers and bystanders; increased risk of cancer from long-term exposure
<i>Other</i>			
Pathogenic microorganisms; radionuclides	Medical wastes	Contamination of bathing waters and shellfish	Enteric diseases (such as hepatitis) from eating infected shellfish; sickness from drinking water or from direct contact
Toxic metals, dioxins, and harmful organic compounds in many industrial and municipal wastes	Solid wastes; municipal wastes; incinerators (unless emissions are well controlled)	Same as for industrial sources	Same as for industrial sources

Note: A hazardous substance is one that is flammable, highly reactive, explosive, radioactive, or toxic.

from local olive groves by about half. Airborne dust from the Helwan cement plant in Cairo exceeds Egyptian standards by a factor of eight and affects agriculture as well as human health. Steel is potentially a very heavily polluting industry; in particular, coking releases large amounts of sulfur dioxide, hydrocarbons, nitrogen oxide, and carbon monoxide.

In the northern countries the transport sector accounts for about half of air pollution; in Athens traffic is responsible for about 75 percent of the air pollution. The number of vehicles in the

Mediterranean countries roughly doubled between 1970 and 1980 and is expected to double again by 2000. Automobile emissions now account for a large percentage of air pollution in many cities throughout the region. These emissions contain carbon monoxide, hydrocarbons, nitrogen oxides, and lead, which are hazardous to human health and historic structures. Reactions of nitrogen oxides, hydrocarbons, and oxygen produce photochemical oxidants that can cause smog, eye irritation, respiratory illness, and damage to vegetation, stone, and metals. If

Table 2.4. The Principal Air Pollutants in the Mediterranean Region

<i>Type of pollutant</i>	<i>Principal source</i>	<i>Environmental effects</i>	<i>Health and biological effects</i>
Sulfur dioxide (SO ₂)	Power generation for electricity and industry; use of high-sulfur coal, oil, and, especially, lignite for home heating and other purposes	Precursor to acid rain, which corrodes metal, degrades marble and limestone, acidifies fresh-water lakes and streams, and causes stress to vegetation	Death of forests and lakes; eye irritation; aggravation of bronchitis and other lung diseases
Suspended particles and dust	Construction, cement plants, mining, natural and man-induced erosion, blasting, thermal power plants, and home heating	Poor visibility; decreased agricultural yields; damage to industrial facilities and vehicles	Reduced lung efficiency; respiratory diseases
Nitrogen oxides (NO _x)	Fuel combustion processes, especially motor vehicle exhaust	Formation of smog and photochemical oxidants	Damage to vegetation; aggravation of respiratory and cardiovascular illnesses
Hydrocarbons (HC)	Motor vehicle exhaust, paint shops, oil refineries, gasoline stations	Formation of smog and photochemical oxidants	Certain diseases (benzene, for example, is known to cause leukemia)
Carbon monoxide (CO)	Motor vehicle exhaust	Contributes to smog formation	Adverse health reactions through restriction of oxygen supply
Lead (Pb)	Motor vehicle exhaust, especially when fuel combustion is incomplete	Toxic effects on plants and animals; accumulation in the food chain	Neurological problems in children; accumulation in food chain
Ozone (O ₃)	Secondary pollutant formed by photochemical reaction with other pollutants	Smog formation	Increased susceptibility to infections, pulmonary disease, nose and throat irritation; damage to vegetation
Aldehydes, ketones, and polycyclic aromatic hydrocarbons	Diesel engines	Dust, dirt	Probable increase in frequency of lung cancer
Hydrogen sulfide (H ₂ S) and other odoriferous gases; methane (CH ₄)	Decomposition of organic material; naturally produced gases	Unpleasant odors; depletion of oxygen in water as result of decomposition; methane contributes to global warming	Death of aquatic life; shrinking of water bodies because of deposits of organic material

Note: The interaction of hydrocarbons, nitrogen oxides, and sunlight produces photochemical oxidants, the most prevalent of which is ozone.

concentrations of both sulfur and nitrogen together are high, they accelerate the deterioration of limestone and marble structures. This is already occurring in many cities with important archaeological and historic structures, especially Cairo, Athens, Rome, and Milan.

Notes

1. A complete inventory of the sources of the pollutants in the Mediterranean is not yet available. Several sets of esti-

mates based on limited data have been published but are acknowledged to be very rough owing to problems of data quality.

2. The Great Man-Made River Project in Libya, one of the largest and most costly water supply schemes in the world, illustrates how expensive water may become in the region. When completed, the system will carry 5.7 million cubic meters of water per day from underground reservoirs in the southern desert to the coast. The scheme, including infrastructure, is expected to cost about \$25 billion. More than 80 percent of the water would be used for agriculture.

3

The Causes of Environmental Degradation

The proximate causes of pollution and environmental degradation are well known—untreated sewage discharged close to shore, emissions from factories, the improper use of fertilizers and pesticides, and unplanned urban development in coastal areas (table 3.1). The considerable knowledge accumulated to date on the Mediterranean environment suggests, however, that most environmental degradation has more fundamental causes, such as inadequate economic policies, weak regulatory and administrative systems, and a lack of awareness and political resolve (table 3.2).

Population growth is a principal cause of environmental degradation, especially when environmental policies are inadequate. This report emphasizes the need to manage the consequences of population growth and of demographic change and especially the high urban growth rate. In addition to the short-term and medium-term responses identified in the EPM as necessary to protect the environment and the natural resource base of the region, many countries will need to pursue strategies to reduce population growth. A detailed examination of such strategies, which involve public health, education, family planning, and welfare transfers, is beyond the scope of this report, but it is clear that their pursuit over the long term is essential for alleviating pressures on limited natural resources.

Economic Policies

The links between economic policies and the environment, although not yet fully understood, are becoming better recognized. Inappropriate

economic policies are important determinants of environmental degradation. This is especially true of pricing policies.

Pricing Policies

INDUSTRY AND ENERGY. Industrial development is a critical element in the development strategies of many countries, but it can have negative environmental effects. Price distortions—which in any case entail significant costs to the economy—exacerbate these environmental impacts. Energy subsidies discourage efficient use of resources in such energy-intensive industries as iron and steel, nonferrous metals, cement, chemicals, pulp and paper, and fertilizers. Since in many of these industries energy represents 20 to 30 percent of operating costs, even small subsidies can be significant. Energy subsidies contribute to air pollution in Turkey and Yugoslavia, both of which rely heavily on low-quality coal. The power-generating process itself may be highly polluting, causing large emissions of sulfur dioxide and particulates. Lignite pricing is especially important in Turkey. There lignite represents more than 90 percent of all coal production, and production is expected to double between 1987 and 2000. Despite the need for demand management, lignite prices declined 20 percent in real terms between 1981 and 1987. Inadequate energy pricing acts to discourage improvements in technological efficiency in the electric power sector and provides no incentive for energy conservation. Efficiency in energy consumption is an important issue, especially in the south, where large aggregate increases in energy consumption will occur in the future.

Table 3.1. Environmental Degradation: Causes and Solutions

<i>Kind of degradation</i>	<i>Impacts</i>	<i>Causes</i>	<i>Possible solutions</i>
Coastal and marine water pollution	Closed beaches and lost tourism revenues; lost aesthetic value; health consequences; eutrophication; contamination of fish and shellfish	Shipping and oil spills; poor solid waste management (litter, plastic); water pricing and poor operation and maintenance of wastewater facilities; input pricing, regulations, and enforcement (industrial wastes); agriculture runoff; detergents	MAR POL and MED POL; solid waste management; water pollution control (municipal and industrial wastewaters); industrial input pricing (energy, water, hazardous materials, and the like); port reception facilities; treatment technology and administration
Depletion of freshwater resources	Depletion of groundwater; increasing marginal cost	Pricing regulations; perception of water as free good	Improved pricing; integrated watershed management; improved technologies
Degradation of quality of fresh water	Poor quality surface and groundwater; health impacts; cost of water treatment; high cost to industry; saline intrusion; increased marginal cost of potable supply	Industrial and urban pollution; pollution of groundwater; overpumping of groundwater	Revised pricing; regulation of groundwater extraction; integrated watershed management
Solid wastes	Health hazards; amenity impact; pollution of beaches and wetlands; groundwater contamination	Inefficient management (especially disposal); no market for recycled materials	Improved collection and disposal technology and management; recycling programs
Hazardous wastes	Pollution of ground and surface water; contamination of soils	Inadequate regulations and management; pricing of inputs into industries producing wastes	Licensing; recycling (changing pricing of inputs and outputs); improved collection
Land degradation	Poor drainage; erosion and siltation; desertification; loss of fertility	Deforestation; overgrazing; agricultural practices; pricing distortions affecting agricultural inputs and outputs; land tenure systems; enforcement of regulations	Sustained approach to management of agricultural production; soil conservation; improved markets
Degradation of coastal areas	Haphazard development; using up of beachfront (natural resources); pollution (sewage and litter); wetlands degradation	Low land prices in relation to long-term value; absence of planning controls	Measures to put incentives right (prices and taxes); better planning
Degradation of ecosystems	Damage to wetlands (rich genetic diversity, hydrologic aspects), plants, birds (breeding grounds for migrating birds), and shellfish	Water pollution; low market price for land in relation to true value; lack of controls on development; agricultural practices; solid waste disposal	Taxation; development planning and regulation; national preserves; activities of nongovernmental organizations
Air pollution	Health problems; damage to built environment	Urbanization; industrialization; increased vehicle ownership; home heating fuels	Preventive measures; enforcement of standards; emission charges; conversion from lignite as fuel

Table 3.2. Environmental Degradation: The Role of Public Policy and Political Leadership

<i>Causes</i>	<i>Impacts</i>	<i>Environmental effects</i>
<i>Inappropriate Economic Policies</i>		
Underpricing of natural resources, land, and environmental goods and services so that they are treated as free goods	Inefficient use of resources and abuse of the natural capacity of the environment to absorb wastes; underinvestment in efficiency of use, protection, and remedial measures	Accelerated depletion of forests, range, natural habitats, air, and water resources; inadequate investment for remedial measures; extension of agricultural and urban development into inappropriate areas, especially coastal areas
Use of subsidies that lead to negative impacts on environment—poorly planned coastal development, inappropriate farm mechanization, and overuse of agricultural chemicals, livestock feed supplements, and subsidized irrigation	Discouragement of cost-efficient solutions; tendency to overuse resources	Excessive use of pesticides that pollute ground and surface water and create health hazards; degradation of coastal areas, fisheries, forests, and rangelands; waterlogging and salinization
<i>Inadequate Environmental Management and Planning</i>		
<i>Land use and property rights</i>		
Weak or conflicting property rights to land and water resources; lack of access to institutional credit	Unwillingness to invest in conservation	Continued degradation of resources; inability to finance conservation or remedial measures
Imposition or adoption of inappropriate systems of rights	Conflicts between government and users; encouragement of short-term approaches to resource use	Inappropriate policies; heightened conflicts concerning use, with displacement of traditional and customary users; pressure on marginal lands
Complexity of rights (for example, simultaneous application of national, traditional, and religious legal systems)	Difficulty in reconciling competing uses of, for example, water and rangeland and conflicts over the rules in effect	Difficulty in transferring resources from one use to another; users' uncertainty about rights and tenure promotes resource depletion
Breakdown of traditional rights to land and water resources	Replacement of common property regimes by systems of individual maximization affecting, for example, fisheries and grazing	Resource depletion by overharvesting and overstocking; soil erosion; damage to sources of basic productivity
Strict maintenance of traditional and religious laws of land inheritance	Continuing landholding fragmentation; multiple ownership of parcels makes management decisions difficult and reduces incentive to invest in land	Overcultivation and overuse of water; inefficient use of agricultural chemicals; slow adoption of new technology and management systems
<i>Organization and management</i>		
Inadequate data and poor use of data for decisionmaking	Weak policy analysis and program development; inefficient targeting of resources	Ineffective implementation; limited information on outcomes, distribution, and status of resources; reactive management
Weak institutions	Poor data and planning methods; weak implementation; tolerance of inefficiency	Ineffective management; failure to enforce legislation; inability to raise resources
Lack of coordination; poorly defined institutional mandates	Gaps, overlaps, and conflicts in policy, planning, and implementation	Institutional friction; waste of resources; high-cost provision of inefficient services
Inappropriate or underdeveloped legislation	Ineffective laws and regulations	Lack of progress even on key environmental issues (discredits environmental management)

Table 3.2. (continued)

<i>Causes</i>	<i>Impacts</i>	<i>Environmental effects</i>
Inability of environmental and natural resource management agencies to retain user fees or to receive priority in national budgeting process	Underfunded agencies for environment and natural resource management	Continued passive approach to management
Inadequate use of physical and economic planning, especially in coastal zones and urban areas	Inappropriate land development; poor access to services; congestion; problems and higher costs in services	Irreversible destruction of resources, especially in the coastal zone; inefficient use of available land; unnecessary destruction of natural habitats
Underinvestment in research and development; limited use of applied research	Advocacy and use of inappropriate or outdated technologies; lack of scientifically based solutions to problems	High-cost solutions; public unwillingness to accept or inability to afford recommended practices
<i>Inadequate Environmental Awareness and Political Will</i>		
Weak public awareness of resource scarcity	Failure to recognize scarcity and the insidious effects of moving from higher- to lower-capability land; acceptance of short-term gains with inadequate attention to long-term costs	Acceptance of overuse of land and water resources and of irreversible change in land resources; inadequate attention to resource conservation
Perception that technology offers alternatives to resource depletion	Increased intensity of resource use; failure to recognize fragility and finiteness of such resources as coastal zones, wetlands, deep aquifers, wildlife habitats, and estuaries; emphasis on cure rather than prevention	Increased use of capital inputs (machinery, agricultural inputs, and water); failure to recognize critical points beyond which resource systems fail to recover (for example, critical size of fishery stocks)
Failure to recognize external costs, including transboundary issues such as air pollution and groundwater aquifers	Transfer of costs from one jurisdiction to another; incentive to pollute more; incentive to use resources to preempt use by others	Damage to health, soil, and vegetation from air pollution; inefficient use of regional aquifers; displacement of shallow wells by deep tubewells; overfishing
<i>Inappropriate Technologies</i>		
Combination of property rights issues, prices, and subsidies that makes inappropriate technologies attractive. Examples are deep tubewells in nonrecharging aquifers; deep tubewells in areas traditionally reserved for shallow wells; mechanization of marginal agriculture; feed and water supplements for livestock on nonproductive ranges; insufficient investment in drainage	Overpumping of groundwater	Excessive pumping of aquifers and poor water use, contributing to salinization; irreversible loss of resources; displacement of traditional shallow-well users
	Mechanized clearing and cultivation of areas unsuited to continuous cultivation	Depletion of nutrients, soil erosion, loss of land productivity, and desertification
	Movement of livestock into marginal areas	Rangeland degradation and loss of organic matter, creating preconditions for desertification
	Overuse of water; failure to drain irrigated areas	Waterlogging and preconditions for salinization

Adequate prices would encourage the efficient use of resources and would provide an incentive for the recovery and reuse of many types of materials, thereby reducing environmentally detrimental practices. For example, in Egypt adequate pricing of fertilizers could encourage the recovery of ammonia, ammonium nitrate, and other effluents. The cement plant in the Helwan industrial district of Cairo emits 10,000 tons of dust into the air every month because of inadequate dust collection. This reduces cement production by as much as 10 percent—well over \$10 million per year in lost output. Cement plants in Split, Yugoslavia, emit almost \$5 million worth of cement dust per year. It would be possible to capture and sell some of this lost cement, but since the price of cement is held artificially low, the plants operate at a loss and stand to realize no financial gain from resource recovery. The deficits and large fiscal losses brought about by low fixed output prices also leave few resources for abating pollution.

Higher output prices would encourage investment in pollution abatement. In Egypt the net budgetary burden of public industrial companies in 1984 equaled 22 percent of the fiscal deficit. In Yugoslavia some of the largest losses occur in the most highly polluting sectors. Losses as a percentage of sectoral output in 1984 were 21 percent for iron and steel, 16 percent for chemicals, and 7 percent for nonferrous metals. It is not surprising that only limited funds have been available for pollution control.

More detailed analysis is needed to evaluate more precisely how economic policies affect industrial pollution in individual countries and to identify the appropriate sectoral policies. It would be useful to analyze the impact of pricing policies on specific industrial sectors in different countries. Possibilities for in-depth assessment include coal in Yugoslavia, fertilizers in Algeria, cement in Egypt, and textiles in Turkey. Such studies might also point to economic investments in energy-saving and recycling activities.

WATER RESOURCES. Throughout the region, underpricing contributes to the rapid depletion and degradation of water resources and causes other environmental problems. Low water prices in many countries provide little incentive for conservation or for the treatment and reuse of wastewater. Moreover, excess water use can

spur the construction of unnecessarily large treatment plants and other facilities, with obvious effects on costs. In all countries—and particularly in Algeria and Egypt, where irrigation accounts for 75 to 90 percent of water demand—subsidies for irrigation water discourage both the reuse of treated industrial wastewater in irrigation and investment in water conservation techniques.

If prices for water supply and disposal were equal to their long-run marginal cost, water consumption would be in better equilibrium with long-term supply. This is especially true for irrigation water, for which price elasticity is very high, and it holds to a lesser extent for industrial water. In most countries of the region, however, prices are far below marginal costs. In Algeria, Egypt, and Yugoslavia water prices are at most 20 percent of marginal costs and do not vary within the country to reflect differences in supply costs. In Izmir, Turkey, where groundwater accounts for 90 percent of industrial water, the municipality is not allowed to charge for water extracted from private wells, and firms pay only pumping costs, which are far below the cost of supplying additional water to the city from distant sources. In many cases a straightforward “rational” policy would even need to set prices well above current operating and capital costs because development of future water supplies will be expensive and may involve desalination, reuse, or interbasin transfer. The rapid adoption of such pricing policies, however, is likely to be impractical for several reasons.

- Water prices are far below economic costs in almost every country in the region, and in some countries the required price increases would be so large, especially for farmers, some industrialists, and low-income households, as to be politically untenable.
- In countries where groundwater is important (Algeria, Libya, Morocco, Tunisia, and parts of Turkey), increasing the price of public water supply will only encourage private pumping from aquifers.
- Many countries have legal and cultural precedents of free access to water.
- The long-term cost of water supply is uncertain. (Cost estimation, however, is more predictable in countries that are already experiencing water crises and have limited technical

options. For example, the future cost of providing water in Malta is directly related to the cost of desalination.)

Given the political difficulties of increasing water tariffs, more acceptable solutions will have to be devised. There is a need for nonprice instruments that can substitute for prices in influencing the efficiency of resource use ("proxy measures"). Such measures would include incentives or regulations to encourage the use of high-efficiency technology and cleaner transformation processes, as well as rationing mechanisms.

LAND RESOURCES. Limited empirical evidence suggests that land and related resources are underpriced in the region. Grazing on public lands is usually free. So is fuelwood, even when it is collected from public lands for sale. As long as fuelwood is free, the incentive to burn it frugally and to plant trees to meet future needs will be low. There is generally no charge for hunting or for gathering minor forest products. Most important, the economic cost of commercial timber is not systematically calculated, and charges are not routinely collected. The failure to charge for resource use perpetuates the beliefs that land resources have low value, that declining investment in management and conservation is justified, and that the continuing extraction of resources is acceptable. In Morocco, for example, it has been calculated, on the basis of national wood requirements, that a minimum of 40,000 hectares of forest needs to be planted in a year. As a result of funding shortages, however, less than half of this area was actually planted each year, on average, between 1970 and 1985.

Other Economic Policies

Other economic policies that might affect the environment include subsidized interest rates and overvalued exchange rates that may provide incentives for heavier and more polluting industries; trade policies that inadvertently promote investment in highly polluting industries; and taxes on agricultural activities that may encourage less than optimal cropping patterns and environmentally unsound agricultural practices. More analysis would help clarify the links between such policies and environmental concerns.

Environmental Laws, Management, and Planning

The countries in the region have participated actively in the negotiations for environment-related international agreements and are parties to almost all major agreements. Most of them have ratified the regional agreements related to the Mediterranean Sea and have to a large extent incorporated the substance of such agreements into their laws. The EC has an active policy of harmonizing environmental standards and approaches in many sectors, including water, wastewater, urban and industrial wastes, and air pollution. Nonetheless, many of the established regulatory systems need further improvement at the national level.

Regional and International Agreements

International concern about the Mediterranean environment focused initially on pollution from the discharge of bilges and ballast waters by oil tankers. Because of its intense oil tanker traffic and its peculiar oceanographic features, the Mediterranean Sea has been defined in the Maritime Pollution Convention (MAR POL) as a "special zone" in which discharge of hydrocarbons, chemicals, and other substances from ships is strictly forbidden. The convention obliges all Mediterranean states to establish port reception and treatment facilities and to verify compliance by visiting vessels. Its requirement that new, large tankers have separate ballast water tanks is already helping to reduce oil discharges. Although only nine Mediterranean states have ratified MAR POL, all but Albania are parties to the Barcelona Convention and its Protocol for the Prevention of Pollution of the Mediterranean Sea by Dumping from Ships and Aircraft, which go further in regulating these sources of pollution. Floating port reception facilities offer an economical and flexible solution that allows for involvement by the private sector. Pilot projects supported by the EC have been successfully implemented in Egypt, Greece, and Yugoslavia. The global picture nevertheless remains unsatisfactory: a review of sixty ports in fourteen Mediterranean countries showed that only thirty-five have reception facilities and that some of these are only partly adequate.

In addition, the Barcelona Convention and its 1976 Protocol Concerning Cooperation in Combating Pollution of the Mediterranean Sea by Oil and Other Harmful Substances in Cases of Emergency requires the Contracting Parties to establish national contingency plans for oil spills at sea. The United Nations Convention on the Law of the Sea also regulates marine pollution by hydrocarbons and other substances. Major oil spills have not yet been a problem, but preparedness is inadequate (box 3.1). The EC countries, Egypt, and Israel have national contingency plans for

oil spills; Yugoslavia and the North African states have yet to formulate plans. Even countries with plans generally lack the necessary equipment and trained manpower to carry them out.

In addition to regional agreements, several international conventions deal with the conservation of wildlife. Among the most important are the Ramsar Convention, which is concerned with the protection of waterfowl habitat and other internationally significant wetlands; the Bonn Convention, which deals with the conser-

Box 3.1. Potential Oil and Hazardous Material Spills in the Mediterranean Sea

To date, the Mediterranean has been spared catastrophic oil tanker collisions or breakups. But with 35 percent of the world's crude and refined petroleum movement taking place in the region, the risk of such catastrophes is high. Oil pollution in the Mediterranean comes from deliberate dumping in the course of deballasting, bilge washing, and other ship maintenance activities and from spills that occur as a result of navigation accidents (collisions or groundings) or accidents at terminals (tank ruptures or mishaps in transshipment). It is estimated that 650,000 tons of oil—about 17.5 times as much as was spilled by the *Exxon Valdez*—enter the Mediterranean each year; 65,000 tons are from accidents. The distribution of accidents is uneven; the concentration of tar in surface water is highest in the Ionian Sea, followed by the waters along the North African coast and the Tyrrhenian Sea (map 4).

In the past decade four accidents were recorded in which more than 10,000 tons were spilled. The largest of these spills involved the M/T *Irenes Serenade*, which released 40,000 tons of oil in Pilos Bay, Greece, in 1980. The localized impacts to beaches and ecosystems caused by this spill, occurring as it did in a bay, is comparable to the potential damage from major offshore spills such as that from the *Amoco Cadiz* off Brittany in 1978 (185,000 tons) and the *Exxon Valdez* off Alaska in 1989, which spilled 37,000 tons in an ecologically fragile area. The economic costs of an oil spill are staggering. In the case of the *Exxon Valdez*, the company estimates that cleanup costs will exceed \$1 billion, although the amount spilled was less than one-fifth that from the *Amoco Cadiz*. This cost covers only part of the damages; loss of revenues from fishing, tourism, and other livelihoods must be taken into account, and the cost of irreparable damage to flora, fauna, and landscapes cannot be easily calculated.

Heavy crude can smother animals such as seals and birds that pick up oil from the water surface. Oil slicks

seriously impede mature turtles making their way onshore to lay eggs and hatchlings trying to get to the sea. Domestic livestock that graze near the seacoast can also be harmed. Lighter oils such as naphtha and gasoline often have toxic effects on fish and on shellfish such as mussels and oysters, as well as on people who consume them. Because oil can sink to the bottom and accumulate in the sediment where shellfish live, a spill can have long-lasting consequences; studies have shown that the effects may persist for up to ten years. A large spill in the Mediterranean would seriously harm marine endangered species.

Spills of hazardous materials could also have devastating effects. Given the properties of these materials and the lack of appropriate knowledge and strategies, some experts consider that spills of hazardous materials could in the future represent a greater risk than oil spills.

Immediate response is crucial for containing an oil spill, and contingency planning facilitates early response. A contingency plan consists of a strategy for combating pollution, a range of combating techniques, a stock of equipment for containing and dispersing pollutants, adequate manpower and management skills, enough transport equipment to ensure mobility for pollution-combating task forces, and facilities for the storage and ultimate disposal of recovered pollutants. A vital element of any contingency arrangement is an efficient observation and communications network. The creation of regional contingency plans in cooperation with the existing Regional Oil Combating Centre in Malta could be an effective approach. It would take an estimated \$200 million to establish adequate and workable contingency plans for oil spills in all Mediterranean countries. Priority also must be given to including hazardous materials spills in contingency plans.

vation of migratory species; and the 1983 Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES), which limits trade in endangered species. Except for Egypt, none of the southern and eastern countries has ratified all these conventions.

Nearly all countries in the region have adopted the Unesco-sponsored World Heritage Convention, which designates sites of worldwide natural or cultural importance. Most of the countries are also parties to relevant international agreements dealing with pollution control and the management of fisheries. They participate in the General Fisheries Council for the Mediterranean, the Committee on Mediterranean Forestry Problems, and other mechanisms under the auspices of the FAO and the Economic Commission for Europe (ECE). Other recent conventions that are relevant to the region include the Law of the Sea Treaty and the Basel Convention on the Control of Transboundary Shipment of Hazardous Wastes. These conventions are, however, not yet in force.

The Legislative Base

The first efforts to develop national legislation for environmental protection were responses to immediate problems and were not fully effective. More comprehensive legislation generally followed, as occurred in Algeria and France, to fill gaps or eliminate contradictions. An exception to this piecemeal pattern was Turkey's Environmental Law of 1983, the country's first major attempt to address environmental problems. Some countries are using older related legislation, such as water quality or health laws.

Such early legislation, however, typically does not cover emerging problems such as air pollution, groundwater contamination, and disposal of hazardous wastes. Furthermore, pollution control typically has a higher priority than resource conservation. Only France, Israel, Malta, and, more recently, Spain have effective legislation on coastal land use. (Algeria and Syria are developing such programs.) Laws and regulations to protect wildlife and cultural property, although adequate in most EC countries and Israel, need improvement in most other countries in the region.

An important factor behind noncompliance with national legislation is the delay, once a gen-

eral framework law is adopted, in issuing the necessary supplementary decrees. Furthermore, the subsidiary legislation and regulations are often unenforceable because they are inappropriate or unaffordable. This is particularly true in the south, although it applies in the industrialized north as well. Enforcement agencies often do not have the capacity to enforce standards, especially in countries in which environment is not a political priority. Many countries have ineffective regulatory measures, such as fines that have not been indexed to inflation. These problems appear to be particularly acute where industry is primarily publicly owned.

Only recently have environmental impact assessment studies become a common element of the project preparation and approval process. The EC is implementing a strong directive that requires such impact assessments for public and private sector projects. Israel has a well-established system for environmental impact assessments and has applied it to a wide range of projects. Algeria, Cyprus, Egypt, Malta, Turkey, and Yugoslavia either use these assessments for selected projects or are developing more comprehensive systems. UNEP and the Priority Actions Programme of MAP have developed simplified impact assessment methods.

Until recently, few countries gave sufficient emphasis to environmental matters in their national administrations. Recently, Israel and Italy stressed their commitment to environmental protection by creating ministries of the environment. Most other countries have a special agency in the prime minister's office (Tunisia and Turkey) or in the ministry of public works (Greece and Spain), agriculture (Cyprus), interior (Morocco), or education (Malta). These ministries and agencies typically have a role in setting policy, although there is often a high-level council that makes final decisions and coordinates with other agencies. Some central agencies are also responsible for monitoring, but usually they share this function with other bodies.

Effective environmental management usually requires regional and local monitoring and enforcement, but it has sometimes proved difficult to balance responsibilities among central, regional, and local authorities. In Yugoslavia almost all functions are delegated to the republics and communes. In Italy, where environmental laws are national in scope and authority, most

implementation is delegated to regional and local agencies. In Turkey national capacity is still being built up, but the principal municipalities can do much within their existing powers. In Algeria and Egypt the devolution of some environmental responsibilities to local governments is gaining momentum. France, Israel, and Spain are following a similar path. Regional river basin authorities such as the *agences financières de bassin* in France are working effectively in both the allocation of water resources and the funding of pollution control measures (box 3.2). In most Mediterranean countries steps need to be taken toward the more active and effective enforcement of environmental laws and regulations. Ensuring that public sector industries comply with environmental standards requires particular attention.

Organization and Management

WATER RESOURCES MANAGEMENT. Several agencies (power, irrigation, and municipal authorities) typically share responsibility for water

resource management. This fragmentation of authority makes national planning difficult. In countries where water is scarce, there is a strong argument for bringing both surface and groundwater resources more directly under government control. Least-cost planning is needed at all levels, from basin development to urban supply.

Integrated planning of national water resources will require institutional and legal changes in a number of countries. Access to groundwater should be regulated and strictly enforced, and measures to protect fragile surface and groundwater systems from pollution and overextraction urgently need strengthening. Such actions are not without political cost, as government control of water resources may run counter to traditions of fairly free access. Institutions to manage water resources will need to be strengthened both in capacity and in mandate. Lead planning agencies that are independent of project implementation responsibilities will need to maintain and update information on all aspects of water resources and to adjudicate the allocation of water during periods of scarcity.

Box 3.2. The *Agences Financières de Bassin* in France

The general law of December 16, 1964, on water management and conservation—the first major “environmental” law in France—created six new organizations, the *agences financières de bassin*, or basin financial agencies. These agencies are responsible, at the level of a major hydrologic basin or group of basins, for supporting actions of common interest—mainly investments but also plant operation, monitoring, and research. They rely on their own resources from tariffs on water users and water polluters. Their creation and organization reflect the basic concept that water is a scarce economic resource and that its management requires a coordinating organization able to deal with associated externalities and to implement appropriate incentives. The 1964 law also set up for each basin a *comité de bassin* (basin committee) consisting of representatives of the state, regional and local institutions, and industries and other users. These committees act much as executive boards for each agency.

The Rhône-Méditerranée-Corse agency is implementing its fifth program, which covers 1987–91. It has a total budget of approximately \$1 billion, almost 70 percent of which is derived from charges for violating water standards. Eighty percent of expenditures for grants, ad-

vances, and interest rate subsidies is devoted to the prevention and abatement of water pollution. Recently there has been a significant shift from new investment to maintenance and operation (since the most necessary investments have already been made) and, within investment, from treatment plants to collection networks. The remaining expenditures are related to improvement of water resources, river rehabilitation, and scientific and technical assistance. Within their specific responsibilities, the agencies are playing a key role in French water policy not only through their support of consistent action at the basin level but also by developing general public awareness about the need for proper water management and by coordinating the different actors involved.

The greatest significance of the agencies for the other Mediterranean countries may lie in their ability to generate funds internally from pollution charges without relying on national budgetary support and in the implied threat of legal sanctions if charges are not paid. For smaller countries, such an organization could be national rather than basinwide. The representation of users on the basin committees is another feature worthy of study.

Property rights issues contribute to the over-use of irrigation water, since prior use typically determines future shares. Inappropriate laws and administrative practices create uncertainty about water rights, pose obstacles to reallocating supplies, and provide little incentive to conserve. Even when water-conserving technologies are available, water cannot be easily transferred from low-value to high-value uses. Similarly, common ownership of rural land, which is frequently the case in North Africa, is a disincentive to proper water management.

Problems of property rights are also linked to important questions of equity in the distribution of resources. For example, traditional users who obtain groundwater from shallow wells are coming into conflict with new capital-intensive farming methods using deep wells with pumps that draw so much water as to lower the water table beyond the reach of the old shallow wells. Lands cultivated by traditional means for generations thus fall into disuse, and large numbers of small farmers lose their source of livelihood. Ironically, the aquifers themselves may be put at risk by subsidy policies that encourage deep wells, farm mechanization, and the titling of public lands to new settlers.

Inadequate management hampers efforts to improve municipal wastewater treatment. Tariff revenues of wastewater agencies seldom cover the cost of operation and maintenance, leaving no funds for financing new investments. In many countries separate agencies handle sewerage and water supply. Tariff revenues for sewerage are limited arbitrarily. In Egypt, for example, sewerage fees are a 10 percent surcharge on water tariffs, far short of the costs of operation and maintenance. Political constraints on tariff levels throughout the region leave wastewater agencies dependent on government budgets. Financial problems are compounded when agencies must expand their staffs and cannot offer sufficient wages to attract qualified professionals, when spare parts are scarce, and when system maintenance is inadequate. Sometimes treatment facilities simply break down and are bypassed altogether. Many secondary treatment facilities in the region are designed to remove 90 percent of biochemical oxygen demand (BOD), but owing to a lack of skilled technicians, many plants actually remove less than 70 percent of BOD. Inefficient management of industrial

wastewater also creates problems. Hazardous or corrosive substances discharged without pretreatment into municipal systems can damage or even destroy those systems, leading to serious health risks.

SOLID AND HAZARDOUS WASTES. In many countries inappropriate allocation of responsibility affects solid waste collection and disposal. For example, in Tunisia solid waste disposal was ineffectively managed in most cities, and the National Sewerage Agency was therefore given responsibility for disposal in all the municipalities in the district of Tunis. The agency, however, lacked expertise in solid waste disposal, and the cities did not reimburse it for this service as had been agreed. Although the new arrangement was an improvement, institutional conflicts, poorly maintained equipment, and inadequate on-site management all hampered efficient waste disposal. As a result, the Tunisian authorities are considering alternative institutional arrangements for municipal waste transfer and disposal at the regional level.

Responsibility for managing hazardous substances is often not well demarcated. Many countries have not even defined hazardous waste in legal terms. Although individual enterprises often bear the legal responsibility, they do not have the capability to identify and manage disposal sites. In Tunisia there are no records of how hazardous waste disposal is being managed. In principle, industries are responsible for safe storage and disposal, but in fact no government agency monitors and enforces compliance. In Yugoslavia legislation concerning hazardous waste disposal is adequate, but the necessary regulations and procedures have not been established. For example, regulations in Slovenia specify which hazardous wastes must be incinerated and which must be treated and deposited in special landfills, yet there are no landfills, incinerators, or treatment facilities.

LAND DEGRADATION. Land degradation can be related to land rights issues. For example, in the forest and grassland areas of the south traditional local usage rights conflict with those established more recently by national governments, and in the absence of any clear incentive to conserve, these conflicting rights generally lead to the depletion of forests and pastures. The

contemporary forestry codes of Tunisia ignore traditional usage rights, but the state has little ability to regulate traditional uses even when the forests are being conspicuously depleted. Fragmented holdings also contribute to land degradation. Under population pressure, holdings become progressively smaller, fall below an economically viable size, and are prone to over-cultivation, which exacerbates soil erosion and desertification. This is a problem especially in the south.

COASTAL AREAS. Because of the intense pressure being placed on the land in coastal areas, development pressures and property rights issues frequently clash with land use planning and environmental protection. Governments often find it difficult to control land use effectively, especially in cases of acute conflict (box 3.3). Land use plans are often unrealistic, and governments lack the will and means to enforce them. These problems affect not only delicate coastal areas and wetlands but also agricultural land and disposal sites for solid and hazardous wastes. In most countries it is very difficult to find—and expensive to develop—sites that are acceptable to the public and not threatening to aquifers. For this reason, many coastal cities lack properly situated sanitary landfills.

The expansion of urban and agricultural areas increases the pressures on wetlands and other natural areas. As has happened in Egypt and Tunisia, governments often tolerate encroachment on public lands by small-scale private developers and only later regularize land titles. This leads to the exploitation of public lands that have either been reserved for other uses or that remain uninventoried on the government land register.

Compounding the property rights issues, coordination among land management agencies is often inadequate, local management is underdeveloped, and funding is insufficient. In some sectors jurisdiction over land management is split among several agencies, and good mechanisms for coordination are lacking. For example, in Egypt the Ministry of Agriculture and Land Reclamation and the Ministry of Irrigation share responsibility for irrigation. In Tunisia the Directorate of Forestry oversees grazing and grassland management and the Directorate of Soil and Water Conservation is responsible for

erosion control and catchment management. Turkey's Forestry Ministry has four directorates with overlapping jurisdictions for logging and timber management, afforestation and erosion control, forest village affairs, and national parks and environment. Responsibility for terrestrial and marine wildlife and for habitat protection is the most highly fragmented of all; it is commonly split among departments of agriculture, forestry, fisheries, tourism, parks, and recreation.

Except in France, Israel, Malta, and areas adjacent to some large cities, planning, zoning, and other forms of land management have largely been ineffective as means of controlling coastal development. Although plans are often technically consistent, they are generally formulated without consultation with public or private interests, they lack political realism, and they do not include adequate economic incentives or regulatory programs to prevent improper development. Without interaction, public and private parties have little sense of "ownership" of these plans, and this undermines their commitment to plan implementation.

The scientific and economic value of coastal lands and ecosystems has not been adequately inventoried or assessed. National parks, wildlife areas, and fisheries reserves have been created in the region, but there is little active management. Owing to inadequate knowledge about these resources and the lack of scientific management techniques, many resources are unprotected and are exploited quickly over the short term. The physical and biological degradation of wetlands and other coastal ecosystems by water pollution, small-scale oil spills, and local disposal of wastes compounds this exploitation. Rehabilitating these lands for continued use as natural habitats will require innovative techniques. Furthermore, the creation of well-managed national parks and wildlife areas—often overlapping with archaeological or historic sites—in conjunction with tourist facilities can bring economic and financial returns.

Environmental Awareness and Political Will

Increased public awareness is a key factor—perhaps as important as scientific knowledge—in building a constituency for environmental protection and in easing the political constraints on

tougher measures for conserving resources. For instance, environmental issues are often dismissed on the widespread assumption that untapped resources are available for development and that new technologies will make existing resources more productive. Although some development of new resources may be possible, as with expanded irrigation in parts of Yugoslavia, fisheries development off Tunisia, and sustainable timber harvests in Turkey, there are limits on both resources and technologies.

The ability of countries in the south to compensate for the depletion of land and water resources by increasing their food imports may

have delayed public awareness of certain of these issues. Between 1974 and 1984 cereal imports in the south almost doubled, from 13 million metric tons to 24 million metric tons per year, and food aid more than doubled. Public acknowledgment that this trend is unsustainable would make measures to conserve resources politically more acceptable.

The awareness and understanding of the long-term implications of improper disposal of solid and liquid wastes and, particularly, of hazardous materials remain limited. Because the related groundwater contamination and health hazards are still not well understood, especially in the

Box 3.3. Coastal Zone Management

The Mediterranean coast is everyone's favorite area. Tourists flock there, cities began there and continue to expand, and industries chose coastal sites for factories. In almost every country of the region, this land-water interface is under pressure from conflicting land uses. Because of the sensitivity of coastal ecosystems and the pressure arising from competing claims on their scarce resources, coastal zone management represents a critical challenge to environmental policymakers in the Mediterranean region.

Almost all the region's large cities are located on the coast, and this concentration will increase in the future. Blue Plan projections show a coastal urban population of 150 million to 170 million in 2025, as against the present figure of 82 million (map 2). Industry tends to locate in these same coastal areas for the obvious reasons of labor supply as well as for easy access to ports, raw materials, infrastructure, cooling water, and so on (map 8). This process of concentration is essentially irreversible—once coastal land has been developed for urban, industrial, or tourism purposes, it is almost impossible to return it to open space or agricultural land.

UNEP's Mediterranean Action Plan gives high priority to coastal zone management and is working closely with several Mediterranean countries to develop pilot projects that are likely to lead to major investments. Yet only a few countries have accepted the need to plan the use of their coastal land as a whole. France, Israel, and Spain have carried out detailed inventories of their coastal land and adjacent marine resources and are formulating plans for balanced development, with appropriate provisions for safeguarding natural resources, unique ecosystems, scenic values, archaeological sites and historic settlements, and leisure resources, as well as for urban and other needs. Algeria has launched a similar exercise—the *Plan Mer Bleue*—for its fourteen coastal districts, and Syria is discussing with the Priori-

ties Actions Programme of the MAP a pilot project for planning its coastline.

Coastal planning in France, which is intended to avoid uniform strip development along the coast, prohibits most construction within a minimum of 100 meters from the water's edge as well as in nature preserves. Other goals are to limit the construction of new roads and to guarantee public access to the shoreline. Land use and urban planning regulations support coastal zone management; they provide for master plans (*schémas directeurs*) and for more specific municipal land use plans (*plans d'occupation du sol*) that are compulsory in coastal areas and include provisions for environmental protection. Many planning regulations refer to the General Law for the Protection of Nature (Law 76/629 of July 10, 1976), which recognizes environmental conservation as being in the public interest and calls for environmental assessments for major investment proposals. The definition of the "maritime public domain" enables some shoreline to be acquired as public property. The *Conservatoire de l'espace littoral et des rivages lacustres*, founded in 1975 and similar to the British National Trust, has purchased coastal land of special ecological interest.

Inadequate development control in Spain's coastal areas has had detrimental consequences for the environment and has led to a blight of high-rise buildings in prime locations. About 42 percent of the country's 8,000 kilometers of coastline is still unoccupied, and a new coastal law (*Ley de Costas 22/88*) has been enacted to protect these areas from unregulated development. The new law reaffirms the traditional status of the coastline as public domain and defines more precisely the conditions for access to and use of coastal land. It identifies an inner coastal strip of 500 meters in which development is subject to more stringent rules than in the hinterland. Public access to the sea is guaranteed, and the few ex-

Box 3.3 (continued)

ceptions are narrowly defined. Regional or municipal regulations can be more stringent than the national law.

In Israel most of the 190-kilometer coast is either unoccupied or is used for activities that do not especially need to be near the water's edge. About 70 percent of the population lives within 15 kilometers of the coast. Today, demand for coastal recreation is rising, and pressure is mounting for development of coastal lands. At the same time, environmentalists are insisting on conserving parts of these lands, and policymakers are coming to appreciate the coast as a valuable resource. A multidisciplinary team commissioned by the Israeli Environmental Protection Service in the mid-1980s prepared a statutory land use plan for the coast which assessed suitability for tourist and recreation development on the basis of geologic, vegetation, and landscape surveys. The plan includes regulations for the protection of natural and man-made resources, for maximum visitor capacity, for beach services and accommodations, for the location of offshore structures, and for development of river mouths.

Very few examples of successful coastal zone projects exist. One is the South Antalya Tourism Project in Turkey, which was assisted by a World Bank loan appraised in 1976. The project included development of infrastructure (roads, water supply, sewerage, solid

waste disposal, electricity, and telecommunications) and tourism services (small-craft harbors, campgrounds, and beach facilities) to support private sector hotel development at four sites. Other components dealt with national park facilities, preservation of an archaeological site, and training and housing for employees. All this was done within the framework of a comprehensive coastal master plan.

In most of the Mediterranean Basin countries, an increasing portion of the natural coastline is under active threat from uncontrolled development. To avoid irreversible damage to these vulnerable areas, the following sequence of planning steps is suggested:

- (a) Identification of critical coastal zones
- (b) Mapping and resource inventories that extend to relevant hinterland and offshore areas
- (c) Preparation of land use and socioeconomic plans
- (d) Development of an appropriate legal and regulatory framework for implementing the plan
- (e) Implementation of the plan, including coordination of public and private sector efforts and of local, national, and international sources of funding.

Appropriate attention must also be given to avoiding the further degradation of urbanized coastlines.

south, the high costs of appropriate waste management and disposal are difficult to justify politically in the face of other priorities. Throughout the region lack of awareness of the fragility and economic importance of coastal lands, ecosystems, and cultural resources over the long term is also an important cause of mismanagement and degradation of these resources.

In fact, public awareness is a strong determinant of the political will to adopt and enforce environmental policies. Historically, environmental action has rarely been initiated by the public and private sectors, which usually focus on short-term concerns. Environmental issues often found their way onto government and private sector agendas and into industrial policies owing to the efforts of nongovernmental organizations, which, particularly in the European countries, have succeeded in articulating public concerns about environmental degradation. In the southern countries scientists and their organizations are striving to bring environmental issues to public attention, but public awareness still lags.

Environmental concerns are likely to be voiced in terms of increased demands for public health and social services, as environmental problems affect primarily the rural and urban poor. Governments, already challenged by rapidly expanding needs for education, housing, and health, will find it increasingly difficult to address environmental issues as immediate priorities drive out long-term needs. In the south good public understanding of and commitment to addressing environmental issues appear to be preconditions for significant progress toward resolving these issues. Environmental education has also been inadequate.

The Complexity of Environmental Degradation

Natural ecosystems are structurally and dynamically complex, yet, like their component populations, they can maintain and regulate themselves naturally. Agricultural ecosystems are also intricate, but their complexity arises primarily from

the interaction of socioeconomic and ecological processes. Within such systems, human actions at one level may produce reactions at other levels. Physical and ecological changes wrought by humans can therefore have important economic costs because they can lower the future productivity of resources not only in the immediate surroundings but also in remote downstream areas. In the absence of proper agricultural practices, the increasing density of population is a major factor in degradation. When lands are desertified or soils become saline, the economic damage can be irreversible. In addition, a disproportionate share of resource depletion costs is often borne by the poor. The aggregate size of these costs and their adverse distribution provide the rationale for public policy to prevent or correct land degradation.

This complexity of environmental degradation can be seen in the case of land and coastal resources. For example, when tree cover or rangeland is depleted, soils become more exposed to wind and rain, erosion rates are accelerated, runoff increases, and productivity declines. Through hydrologic linkages, soil erosion contributes to downstream sedimentation, which affects reservoir levels, river flows, the availability of water for irrigation and power generation, and the costs of maintaining channels and equipment. The loss of soil cover increases runoff, which may in turn increase river pollution by adding agricultural nutrients and hazardous chemicals and making rivers more turbid. Such changes can affect in-stream uses such as fisheries and off-stream uses such as domestic water supplies and can have negative implications for public health. In some cases even very small changes in water quality may make water unsuitable for industrial, domestic, or livestock use without costly treatment.

When rangelands are degraded, people burn them more frequently as a way of stimulating new growth. Excessive burning, however, can affect the species composition of the ranges and thereby diminish the predictability of seasonal productivity. Burning also reduces the amount of organic matter returned to the soil and lowers the soil's long-term productive potential. Chronic biomass removal by fire or by excessive collection creates the preconditions for desertification. Table 3.1 shows the causes of various problems of environmental degradation and some possible solutions.

Although similar ecological processes are at work around the Mediterranean Basin, the richer countries are better able to protect people from the damaging consequences of interruptions in ecological cycles. Responding to ecological linkages requires an understanding of system properties, including productivity, stability, sustainability, and resilience. (Productivity measures output, stability measures short-term variation in output, sustainability measures long-term trends in output, and resilience is an indicator of a system's ability to bounce back from shocks.) In addition, the actions that lead to land resource degradation tend to reinforce one another, which makes the reversal of degradation even more difficult.

Another cross-sectoral aspect of environmental degradation that—particularly in the south—affects the sustainability of growth and the quality of life is inefficient operation of the existing urban, industrial, agricultural, and transport infrastructures. This is generally a result of weak or nonexistent preventive maintenance. The deterioration of these capital assets, which are often financed through revenues from the export of nonrenewable resources, leads to economic loss and increased waste as well as more air, water, and soil pollution.

4

Toward a Program of Environmental Action

Chapter 3 described the numerous and complex causes of environmental degradation in the Mediterranean region. Many of these factors have been exacerbated by the failure of the economic system to take the costs of environmental degradation into account and to provide adequate incentives for environmental protection and the conservation of natural resources. In some areas, such as public health, these market failures have important short-term impacts, and they may have even more serious implications over the long term.

Every country of the region sees economic growth as a means of alleviating poverty and improving the welfare of its people. But disregard for the environment and the natural resource base could jeopardize the long-run prospects for that very growth. This is particularly true in the south, where the depletion of scarce natural resources could seriously limit economic growth unless greater efforts are made to hold the use of resources to the rate of regeneration.

Because so many causes of environmental degradation stem from market imperfections, economic measures—especially prices and other incentives—could be effective instruments for slowing or reversing degradation. Economic measures, however, must be balanced with appropriate regulatory measures and management improvements as well as with specific and properly conceived investment projects.

The Long-Term Costs of Inaction

Several environmental problems could seriously constrain long-term economic development, par-

ticularly in the south. They especially concern land, freshwater resources, and coastal areas.

Land

The south faces severe limits on available land, since only about 25 percent of the territory is habitable. Rapid urbanization is taking over prime agricultural land, and there is not much new land left to be brought into cultivation. By the early part of the next century all countries from Morocco to Syria will have reached the technical frontier for agriculture. In particular, the development of currently unproductive land will require an emphasis on water-saving irrigation technologies. Even under optimistic assumptions about efficiency gains from improved use of water, pesticides, and fertilizers combined with new, better adapted, and high-yielding crop varieties and species, agricultural output in those countries will grow only marginally. Eventually, economic returns from agriculture will stabilize and perhaps even decline, and agricultural production will probably not keep up with population growth. In the north localized land use problems may emerge, but they are unlikely to be a major constraint on development.

Water

Water shortages will also hold back economic growth in the south over the next thirty to fifty years. By 2025 perhaps six countries will depend on new and expensive technologies for large portions of their water supply. All countries will have to introduce water-saving technology,

mainly in agriculture and industry but also in domestic water distribution networks. There is less urgency in the north, although localized water shortages will increase in Italy and Spain (box 4.1).

Coastal Areas

Changes in exports of energy and industrial products will have important effects on coastal areas. Both Egypt and Tunisia are rapidly depleting their oil reserves (their main source of foreign exchange), and few Mediterranean countries except Algeria and Libya will remain net exporters of energy. The countries of the south will have to earn greater amounts of foreign exchange to cover increased food and energy im-

ports. Specialized export industries largely geared to European markets should provide employment and foreign exchange earnings. This, however, will require careful planning, as most of these industries, because of their export orientation, are likely to be located in environmentally vulnerable coastal zones. According to the Blue Plan, there are already fifty-eight oil ports, fifty-one oil refineries, and sixty-four thermal plants along the Mediterranean coastline. Tourism, another promising area for development, is also expected to have a significant impact on the coasts. The Blue Plan estimates that the land surface occupied by urbanization, tourism, industries, and the transport network could reach between 45,000 square kilometers and 59,000 square kilometers by 2025.

Box 4.1. Water Conservation: The Need for Coordinated Interventions

There is an urgent need for countries that have water shortages (Cyprus, Israel, Libya, and Malta) or water stress situations (Algeria, Egypt, Greece, Italy, Morocco, Spain, Syria, and Tunisia) to give the highest priority to the conservation and protection of water resources. Even countries that are not likely to suffer water scarcity (France, Turkey, and Yugoslavia) must emphasize improved management of water resources, since all countries face rapidly rising costs and increasing levels of investment—often as much as 20 percent of public investment. Water conservation is as important for the countries of the south today as energy conservation was for the northern countries during the 1970s and 1980s. The problem can be addressed only through the coordinated use of both pricing and nonpricing measures.

Tariffs should be adjusted to reflect the economic costs of supply, although poor consumers may require protection through direct subsidies. Tariff adjustments have an impact not only on the demand for water but also on the levels of investment required. A recent OECD report cites case studies demonstrating that water tariffs can help significantly in reducing demand. In countries where it is not politically feasible to raise prices rapidly, other means of conserving water resources should be identified. Water conservation programs that stress information, retrofitting, and technical standards, as well as pricing policy, remain a high priority. In addition, regulations and enforcement need to be introduced to penalize those who use water excessively. Technologies for irrigation and industry must be designed for optimal water consumption.

In many situations new technologies need to be considered. Water efficiency must be increased in all uses,

but especially in agriculture, which accounts for more than 70 percent of water consumption. It has been estimated, for example, that the agriculture sector in Egypt uses 60 percent more water than necessary. The main technologies for saving water are the use of buried pipe, drip, and sprinkler systems, which can achieve efficiencies of 90 percent. Modifications in the management of irrigation systems may also have a significant impact.

In Izmir, Turkey, industry draws on free groundwater and uses 70 percent more water than is technically necessary. The impact of conservation in these cases can be enormous. It has been estimated that the annual economic subsidy on water in Izmir is about \$17 million, equal to 20 percent of total annual municipal expenditures.

Recycling and reuse of water also require greater attention. Water that is not suitable for drinking can be used for other purposes, and water can be recycled numerous times. Such efforts need to be driven either by price incentives or by a strong regulatory and enforcement presence. In Israel, which has been at the forefront of implementing water conservation policies, the government sets water use standards for every industry. For example, the Hadera paper mill uses 12 cubic meters of water per ton of paper produced, compared with industry norms elsewhere of up to 120 cubic meters per ton. By 2000 about 16 percent of the country's water requirements will be met from reclaimed wastewater. Similar efforts elsewhere are likely to come about only through a mixture of strong regulatory and pricing measures, the development of competent enforcement organizations, and political will to back up the policies, especially those regarding pricing.

Short-Term Disincentives to Action

Short-term concerns often prevent countries from confronting longer-term environmental problems, even though most countries urgently need to address environmental degradation—particularly, the depletion of natural resources—as part of their economic development programs.

Most countries of the south face severe financial constraints; Egypt, Morocco, Syria, Turkey, and several other countries are highly indebted. Many governments have recognized the need to undertake systemic economic reforms. Algeria, Morocco, Tunisia, and Turkey have embarked on ambitious reform programs that typically involve difficult reductions in public expenditures, pricing reforms, and institutional restructuring. All these measures demand strong leadership and carry political risks. High debt and reduced public expenditures often make it difficult to justify spending scarce public funds on environmental initiatives.

Priorities for Environmental Action

Despite scarce financial resources and political constraints, most countries have begun to mount programs for environmental protection. The allocation of limited resources for environment-related activities reflects different priorities, with immediate and longer-term objectives. These priorities typically include:

- *Minimizing public health risks.* Public health and safety benefits justify broad and immediate action to protect against industrial accidents, hazardous waste spills, the contamination of water resources, and inadequate treatment of wastewater.
- *Ensuring sustainable growth.* Some forms of environmental degradation either cannot be reversed or can be reversed only at very high cost. The extinction of wildlife, the loss of cultural patrimony, pollution of aquifers, salinization, and desertification are examples. Decisions concerning economic development should be made with careful consideration of the impact of such degradation, given that unique assets could be permanently lost, at a cost that is hard to quantify. Protection against future economic stagnation as a result

of resource depletion is also a critical long-term priority.

The simplified framework in table 4.1 illustrates how these priorities can lead to a program of environmental action. The environmental priorities of the northern and southern countries reflect the differences in their problems. Northern nations tend to focus on pollution abatement, with a special concern for public health and the quality of life. Southern countries will have to address a broad range of complex issues that have longer-term implications; among these, the rehabilitation and sustainable development of productive resources (soil and water) and the saving of raw materials and energy are of the utmost importance. Public health priorities tend to involve curative actions that address immediate problems such as wastewater treatment and industrial pollution. It should be noted that certain types of investments intended to meet short-term priorities can also have long-term consequences. For example, wastewater treatment improves public health in the short term and can help protect marine ecosystems over the long term.

Instruments for Environmental Action

Table 4.1 also illustrates how different types of instruments might support these priorities. In the area of public health, investment in curative actions may dominate, although regulatory and economic policy measures will also be vital. Preventive actions related to the sustainable use of resources or avoidance of future pollution tend to be less capital-intensive and are also likely to be dominated by economic policy measures, regulation, and management.

Economic Policy Interventions

As was explained in chapter 3, pricing resources to reflect their true costs would improve resource conservation and utilization. In comparison with many other environmental policies, pricing measures tend to have a low cost and in many cases are fiscally positive. Nevertheless, measures such as water pricing have important distributional effects and require political support. As a start, countries should consider withdrawing subsidies for activities considered envi-

ronmentally destructive. Even where it is politically difficult to increase prices quickly, economic pricing concepts can provide guidelines for environmental policy—in choosing rationing techniques, for example. In the long term, appropriate resource pricing is a cornerstone for resource conservation and sustained development.

Effective pricing policy may incorporate the economic externalities of pollution and thus influence economic behavior. For instance, one low-cost method of reducing urban air pollution may be to set fuel prices to reflect the pollution impact of different fuels—dirty fuels such as lignite would cost more than cleaner fuels. This may be necessary in Turkey to encourage the substitution of cleaner fuels, such as higher-grade coal and natural gas, for lignite.

Until some progress in improving resource use has been achieved through economic and financial instruments, countries should be cautious about large and expensive investments in pollution control, which often involve imported technology. In many cases 50 to 90 percent of pollution can be traced to inappropriate and out-

dated production processes or to poor operation and maintenance. Large investments are not likely to be cost effective as long as much larger gains can be achieved through adjustments in economic policy.

Many examples in the industrial sector illustrate how improved economic incentives yield environmental benefits. Most important is the elimination of biases against resource recovery, recycling, and conservation. Relaxation of controls on input and output prices would encourage water reuse, energy conservation, and product recovery, and appropriate incentives could promote the development of appropriate environmental protection technologies in the southern countries. Administrative measures such as pollution charges, tax incentives, and subsidies might also be useful. For instance, taxes on hazardous industrial inputs would be an incentive for reducing their use. Such taxes would be difficult to avoid and could prove a source of revenue for financing waste disposal. Nevertheless, incentives for resource recovery will also need complementary capital investment.

Table 4.1. A Framework for Environmental Action Programs

<i>Objective</i>	<i>Problem</i>	<i>Instrument</i>	<i>Possible financing mechanism</i>
<i>Preventive actions (long-term implications)</i>			
Avoid irreversible damage	Discharges at sea; danger of potential oil and hazardous material spills	Management-contingency plan; investment in port reception facilities	Polluter pays
Avoid irreversible damage; ensure sustainable growth	Coastal zone degradation	Land use planning and regulation; economic incentives for land use; legal protection of key resources	Public budget; regulatory measures that affect economic rents and have large redistributive effects
Avoid irreversible damage; ensure sustainable growth	Degradation of freshwater resources	Pricing measures; nonprice conservation measures; better integrated water resource planning and management	Public budget; regulatory measures that affect economic rents and have large redistributive effects
<i>Curative actions (immediate implications)</i>			
Safeguard public health	Inadequate domestic wastewater disposal	Investment in treatment systems	Beneficiary pays
Safeguard public health	Industrial and water pollution	Investment in pollution abatement or clean-process technology	Polluter pays
Safeguard public health and protect against irreversible loss	Dangerous hazardous waste sites; pollution of aquifers	Investment in new site development; improved management; regulatory measures; market pricing of inputs and outputs	Polluter pays; some public budget support

Environmental Management and Planning

THE LEGAL AND REGULATORY FRAMEWORK. In some cases effective regulation is the main way of achieving environmental goals. In Cyprus, for example, the Ministry of Fisheries' enforcement of regulations guarding sea turtle nesting grounds has proved a successful way of protecting the species. In other cases balanced legal and regulatory systems are necessary to support investment programs and economic policy instruments.

All countries have gaps in their legislation, and these are often compounded by an inability to enforce the laws adequately. Most countries need to implement fully the existing legislation and to clarify responsibilities. Most also need to update their environmental legislation to take into account new scientific knowledge. Because environmental standards affect investment, polluters' recurrent costs, and monitoring requirements, they may have to be phased in carefully. Consultations between firms and environmental authorities are necessary to reach agreement on the types of analysis, measures, and timetable required to reach the targets stipulated by the standards. Regulations should clearly define the relationship between legal and administrative authorities and should be comprehensible to the public.

Coordinating international agreements is complex. The EC is implementing a wide range of directives on the environment that seek to harmonize regulations within and among member states. Countries seeking EC membership, such as Turkey, are beginning to bring their standards into line with those of the EC. Under the environmental program of the ECE, which includes France, Greece, Italy, Spain, Turkey, and Yugoslavia, international agreements calling for improved monitoring and management of transboundary pollutants in air and water are being reached. A few countries have yet to ratify important international conventions.

IMPROVED ORGANIZATION AND MANAGEMENT. There is no single "correct" institutional structure for managing environmental policy, although evidence suggests that overly centralized environmental management may be ineffective. Environmental management is complex by nature; it involves various ministries, agencies, and

regional and local government bodies and requires personnel with a broad range of technical and managerial competence, including administrators, lawyers, scientists, and engineers. In many countries training programs in the environment-related aspects of these disciplines need to be expanded.

Priority should be given to improving, at the national level, the planning and management of key natural resources, especially water. Most countries need to institute systems for managing hazardous materials by such means as permits to use and store hazardous materials, procedures for safe handling and transport, norms for proper storage of each material, and arrangements for disposal. The agencies responsible for hazardous waste management need to build up their monitoring capabilities.

LAND USE AND PROPERTY RIGHTS. Land use issues arise, in particular, in conjunction with coastal zone degradation and urbanization. In most countries there is a desire to control coastal development, but land ownership patterns, development processes, and the reasons for regulatory failure are not well understood. These issues need to be assessed carefully if coastal zone management is to be more effective.

Environment-Related Investments

Although this report emphasizes economic, regulatory, and management instruments because of their long-term importance to the environment and to economic growth, increased capital investment is also necessary. Investment is particularly vital for addressing the backlog of pollution abatement needs. Wastewater collection, treatment, and disposal continue to be appropriate priorities for both industrial and developing countries, but there should be greater emphasis on technically appropriate and cost-effective treatment and disposal.

Public health gains from wastewater treatment can be spectacular. In Marseilles, for example, one year after a major treatment plant was commissioned, the quality of coastal waters and beaches had been restored. Municipal wastewater treatment is high in cost, and cost recovery mechanisms need to be strengthened. Control of industrial pollution has clearly been improved in EC member countries through regulation of the

private sector and through various incentives for investment. Progress in the developing countries of the Mediterranean is likely to be slow, partly because of financial constraints but also because the most polluting industries tend to be in the public sector. The major restructuring of these enterprises as part of economic reform therefore offers important opportunities for reaching environmental goals. Hazardous waste management, which has significant investment implications, is a priority for all but the least industrialized basin countries.

The need for planning, management, and investment to attack natural resource management problems is more acute in the southern countries. Yet progress there is likely to be hampered by inappropriate policies, weak institutions, a lack of skilled manpower, and funding constraints. Furthermore, technical solutions have yet to be developed for such problems as dry-land management, which are most acute in the south. These constraints indicate a need for proceeding cautiously, using carefully monitored pilot projects and stressing involvement of beneficiaries and self-financing.

Awareness of the importance of improving the management of water resources has developed fairly recently. Considerable work is necessary to prepare feasible projects aimed, for example, at the conversion of gravity irrigation systems to sprinklers or the reuse of municipal wastewater effluents. Programs for reclaiming salinized irrigated land by means of appropriate drainage networks are proceeding and should be strongly supported.

In coastal zone management, institutional and policy measures will be the principal instruments for implementing integrated development plans for coastlines that are being urbanized. The efficient design of infrastructure networks can also be a tool for managing growth and can result in lower costs than uncontrolled development. Short-term investment requirements for meeting the curative and preventive needs of coastlines that are under pressure from urbanization are likely to be high. Projects to conserve wildlife or the cultural heritage are relatively inexpensive but often involve complex managerial or social issues. In many cases, nature and heritage conservation projects, if well designed, could be financially profitable.

Formulating Balanced Environmental Action Programs

Most countries need an environmental program based on a balanced set of policy, institutional, and investment priorities that reflect both public health objectives and concern for sustainable growth. But owing to their short-term economic problems and perceived political priorities, the developing countries of the Mediterranean tend to choose clusters of priorities and instruments near the bottom of table 4.1. Countries that are able to have a longer-term perspective tend to stress preventive action and resource sustainability.

All countries should be encouraged to improve the balance of their environmental programs to give more emphasis to resource conservation and sustainable development (box 4.2). The following possibilities and considerations should be kept in mind.

Actions with Multiple Impacts

Some environmental actions with important implications for long-term resource protection may also yield high returns in the short term and may therefore mitigate political repercussions—examples include programs for more efficient use of energy and water. Control of some types of high-risk industrial pollution, particularly if it is combined with recycling technologies, may help conserve resources over the long term even while it meets short-term political priorities.

Compatibility with Economic Reform Efforts

Long-term environmental concerns will probably be compatible with the economic reform programs currently under way throughout the region. Many countries are reforming their pricing systems to make resource allocation more efficient. More accurate pricing of scarce resources such as water and energy would be compatible with these efforts and with long-term growth. Indeed, attention to environmental matters during the period of adjustment may require—or may bring about—shifts in development patterns as the price system comes to reflect more accurately the real costs of natural resources and of their depletion.

Proxy Measures

Not all economic measures for resource sustainability are capable of being implemented. For example, although it may be possible to raise the price of water, it is unlikely to be politically

feasible to raise that price to match the long-term marginal cost. In such cases proxy measures such as water rationing or adherence to specified resource-saving technologies may help achieve environmental goals within existing political constraints.

Box 4.2. Future Environmental Challenges in the Mediterranean Region

The Blue Plan illustrates some of the dramatic changes that may take place in the Mediterranean region over the next thirty-five years. In about half a lifetime, the weight of population growth, urbanization, and industrialization will have shifted from the northern to the southern countries (map 2). While this shift will present important development opportunities for the south, it will entail further environmental risks.

With the growth of urbanization and tourism, urban wastewater volumes are expected to increase by about 65 percent in the north and will almost triple in the south by 2025. Solid waste generation in the coastal cities of the south could roughly triple, putting extreme pressure on waste collection and disposal systems.

A very different distribution of industry will emerge in the twenty-first century. In the north heavy industries are likely to enter a period of stagnation or decline, whereas in the south they will grow. The production of iron and steel in the Mediterranean areas of France, Italy, and Spain will remain almost constant, but in Turkey and the Arab Mediterranean countries, annual production could increase from 8.5 million metric tons in 1985 to more than 50 million metric tons in 2025. During the same period cement production could decline in the north by 25 percent and increase by more than 150 percent in the south. Similar changes are likely in petrochemicals and inorganic chemicals. By the early twenty-first century the weight of heavy industry will have shifted to the south, and with it will come greatly increased risks of water and air pollution. Cleaner industries, such as electronics and biotechnologies, are likely to develop in the north, but even these will present new risks related to hazardous and toxic wastes that will have to be carefully managed.

Oil-refining capacities could more than double in the south by 2000, bringing increased air and water pollution and the danger of major oil spills. Most countries except France will increase coal power generation about 50 percent by 2000, adding to the risks of air pollution. Trends in automobile ownership will increase the potential for air pollution, especially in the south, which has been relatively free of this problem. In 1970, 90 percent of the automobiles in the region were in France, Italy, and Spain; by 2000 the stock of automobiles will have quadrupled and only about 60 percent will be in

the EC countries, implying a large increase of automobiles and exhaust emissions in the south.

The change in population distribution in the region will be compounded by differences in age structures. In future decades most of the population in the south will be below age 20, whereas the proportion of young people in the north will be about 30 percent. This will create pressure for labor migration, especially if economic growth in the south is inadequate. In fact, between 1975 and 1980 alone, close to half a million Algerians obtained work permits in France, and well over half a million Turks went to work in the Federal Republic of Germany. The European countries intended labor migration to be temporary, but many migrants have become virtually permanent residents. The possibility of further migration adds an important dimension to the interdependence of the countries in the region. The impact of these demographic changes can only be a matter for speculation. It is clear that more land will be lost to the urban sector and that the demand for services—public health, basic water supply, and sanitation—will increase dramatically. What is less clear is whether economic growth will be high enough, economic policies sufficiently flexible, and resources adequate to ensure employment opportunities for new entrants to the work force.

A recent UNEP study of the Mediterranean climate assessed what would happen if the average temperature increased by 1.5 degrees centigrade by 2025 owing to the greenhouse effect. Melting glaciers and thermal expansion of oceans would place added stress on the Mediterranean environment. The major changes would include a reduction in the availability of fresh water; increased demand for irrigation water; inundation of portions of deltas and wetlands, bringing about changes in agricultural and fisheries production; increased beach erosion and salt water intrusion into coastal aquifers; impacts on coastal and marine protected areas and ecosystems; and, in some locations, the inundation of settlements. The deltas of the Ebro, Rhône, Po, and Nile rivers would be most susceptible to such problems. The extent and timing of these changes requires further scientific study, but countries need to recognize the possibility and prepare for rapid environmental change.

Implications of Financing

Obviously, how to finance environmental improvements is an important consideration in establishing a program. Curative environment-related investments are expensive. In many cases they are financed from the public budget, but there are ways to reduce this dependence. Many types of specific investment, such as sewerage systems, can be financed from beneficiary charges. Fees on tourism could be an important way of financing coastal zone improvements (given the international competitiveness of the tourism market, this may require regional accords). Three of the less developed countries—Tunisia, Turkey, and Yugoslavia—use the “polluter pays” principle to control emissions; the fees charged act as a disincentive to pollution and also finance pollution control activities. Increased use of such mechanisms could reduce the cost to the government of curative programs. Where large investments are required—investments to improve water conservation in irrigation, for example—they are likely to be financed by the public sector. Some countries may require external assistance to undertake this type of critical environmental program in support of sustainable development, and in some cases concessional terms may be justified.

Preventive programs tend to have a lower financial cost to governments. Improved pricing, regulation, management, and land use planning require effective administration but are generally inexpensive. These programs, however, often have large redistributive impacts that may upset politically powerful interests.

Environmental Awareness and Political Will

As noted in chapter 3, environmental awareness is a prerequisite to sustained political will. Although many instruments of environmental policy, such as setting prices correctly, have low economic and financial costs, they generally face serious political constraints and require a minimum level of public awareness to be implemented. The massive level of investments that industrial countries have made to treat their accumulated hazardous wastes reflects to a large

extent the public's concern with this issue. Successful environmental programs, such as that in Izmir, Turkey, are usually rooted in the environmental awareness of the local population and are driven forward by continued public involvement and political will (box 4.3).

Nongovernmental organizations (NGOs) and the mass media play an important role in raising public awareness. A growing number of NGOs are increasingly involved in environmental action. There are now national and local environmental organizations in almost all Mediterranean countries. International organizations such as the World Wide Fund for Nature (WWF) have national branches, while a number of local groups are concerned with specific issues such as ornithology, architectural preservation, and nature conservation. Clubs such as the Lions and Rotary are increasingly supportive of environmental activities. NGOs not only offer expertise and information in environmental fields but also provide impetus for responsible action. They should be encouraged and invited to participate in the formulation and implementation of environmental policies and action programs.

In addition to involving NGOs, one of the most effective and fundamental measures available to governments is environmental education. Public education through schools, organizations, and the media has low financial and political costs and can be a powerful means of increasing public awareness and thereby strengthening political support.

Several conferences on environmental education jointly sponsored by UNEP and Unesco have produced a wide variety of valuable educational material, much of it focused on the Mediterranean. These and other Unesco programs, such as Man and the Biosphere and the International Hydrology Program, offer guidelines and modules for environmental education from preschool through university. They have also produced materials for use by the media, which have expanded their coverage of environmental issues at a tremendous pace. Local media have covered such matters extensively throughout the region, but southern countries have generally not moved as quickly as their northern neighbors to take advantage of these opportunities. This is

mainly attributable to difficulties in access, language barriers, a lack of institutional initiative, and financial constraints.

Finally, another instrument for increasing public and private sector awareness of environmental issues is the calculation of the specific costs of pollution and natural resource degradation. Determining the impacts of inadequate water quality or hazardous waste disposal on public health would, for example, underline the financial and social costs of environmentally un-

sound practices and policies. Estimating the quantitative impact of water depletion on future economic growth could also help sensitize decisionmakers to the true economic implications of inappropriate environmental policies. Preventive programs often cost significantly less than do the curative programs that might be needed in the future. Quantifying this difference in the costs of prevention and cure could strengthen arguments for prevention.

Box 4.3. Izmir: The Implementation of an Industrial Pollution Control Policy

Turkey's environmental laws are based on the principle that the polluter pays—an important and universally held principle of environmental policy that is only rarely put into practice in most countries of the region. But effective pollution laws also depend on regulatory and enforcement procedures, appropriate incentives, and political resolve to implement difficult decisions. The city of Izmir has recently embarked on an aggressive campaign to deter industrial polluters—a campaign that is already showing results.

The program, launched in 1986, is managed by a newly created department of the city's water and sewerage authority which monitors and controls industrial effluents. Effluents from about 450 industries have been analyzed and placed in categories according to their respective levels of pollution. These categories have now been incorporated into a municipal regulation as standards covering biochemical oxygen demand (BOD), chemical oxygen demand (COD), pH, temperature, and heavy metals. When violations are detected, the municipality can take legal action to fine or close down the plant. A grace period is allowed if the company can provide evidence that it has invested or will invest in pretreatment. The threat of closure, usually brought about under a parallel public health regulation, has often brought results. Several companies have already been assessed large fines, and a number of tanneries have been closed down for six months.

Izmir also uses pricing policy to encourage reduction of pollutants. Companies are billed for water discharged, and recently introduced sewer use tariffs give special attention to COD, suspended solids, and other indicators. Industries that discharge good-quality water pay less.

Incentives have also been used extensively. The municipality provides assistance and financial incentives to industries willing to relocate from areas where the risk to public health is high. New industrial parks, located away from the main urban center, will provide better facilities and lower-cost pretreatment plants. So far, about 600 industries have decided to relocate. The municipality offers deferment of penalties for industries that plan to relocate within the next two years. To encourage cooperation between the authorities and the private sector, routine discussions take place between the municipality and the Izmir Chamber of Industries, which represents 6,000 private industries. These discussions seek pragmatic solutions to problems of compliance with the environmental laws.

Industries have found significant benefits in relocation, especially since the new industrial estates offer opportunities for expanding production, improving efficiency, and reducing pollution. Industries have also incurred significant penalties for not complying with the new laws. The program has not been without problems—the judicial process takes time, firms tend to move slowly, and the water and sewerage authority is relatively inexperienced in the field of pollution abatement. Nevertheless, Izmir's industrial pollution program is off to a good start. It demonstrates the importance of complementing national environmental legislation with effective local regulatory procedures, introducing incentives (especially in pricing), giving attention to urban land use planning, and securing full cooperation of the private sector with the local administration.

5

The EPM: How the Strategies of the Banks Will Support Regional Action

The Mediterranean countries have demonstrated their willingness to work together on the principal environmental issues of the region and have developed instruments for regional cooperation to make joint action a reality. They will need an appropriate balance of policy interventions, regulatory reform, and investments in order to address effectively their most urgent environmental concerns. The World Bank and the EIB believe that they can add impetus to this regional movement by focusing on the areas in which the Banks have comparative advantages: project design and implementation, institution building, policy advice and formulation, and mobilization of financial resources.

The Environmental Program for the Mediterranean was conceived and designed to express the corporate strategies of the two Banks in support of regional environmental action. It seeks to balance short- and long-term objectives and to recognize the differing development needs of the Mediterranean countries. In some countries and sectors conditions are right for beginning or accelerating large-scale investments in environmental protection. In others considerable efforts in policy and institutional development, as well as in testing of new technologies, project preparation, and establishment of financing mechanisms, will be needed to set the stage for large investments. The EPM has three closely linked strands.

- A multiyear Mediterranean Environmental Technical Assistance Program (METAP), launched in January 1990 with initial funding

from the two Banks, the UNDP, and the EC. METAP will be the action-oriented operational instrument for translating the EPM's priorities into policy recommendations, institution strengthening, and investment packages.

- An increased emphasis by the two Banks on environmental projects and project components. New environmental projects and project components have already been programmed as a result of EPM activities. METAP will provide additional support to further strengthen the environmental content of the Banks' lending programs.
- Initiatives to mobilize resources from other multilateral and bilateral donors to support METAP and EPM investment activities.

Both Banks believe that their assistance efforts should reflect their areas of expertise. The work undertaken by other international and national agencies in data gathering, scientific analysis, and the coordination of international agreements will need to continue and, in many cases, to be expanded. Economic and policy advice, project management skills, and assistance in identifying and securing sources of finance for carrying out an expanded environmental program could complement the work of these agencies. The Banks can provide integrated assistance at the regional, subregional, and national levels, drawing on the wide range of experience and technical resources available in the international community. Bringing together the scientists, engineers, economists, and financiers of the international community with environmental

practitioners and policymakers from the Mediterranean countries offers a significant opportunity for addressing the region's environmental problems.

The two Banks will concentrate on the following objectives:

- Encouraging the development, preparation, and implementation of environmentally sound investment strategies at the country level
- Ensuring compatibility between environmental programs and economic development and supporting efforts to integrate environmental concerns into the mainstream of economic and social policy
- Encouraging the adoption of policy measures conducive to an efficient utilization of natural resources.

Project Financing

The World Bank and the EIB both have a long history of financing projects with environmental objectives. The EIB has made many environment-related loans to the Mediterranean area (box 5.1), and since 1980 these loans have totaled almost ECU 3 billion (\$3.3 billion), about 50 percent of the EIB's total environmental lending. In the past ten years the World Bank has made loans of more than \$2 billion for environmental protection in the southern and eastern countries of the Mediterranean (box 5.2).

The environmental priorities of the two Banks have differed somewhat. The EIB has been relatively more active in water management, whereas the World Bank has also addressed rural and land management problems through a broad range of agricultural and forestry projects. The EIB has made some selective interventions in archaeological and historic preservation; the World Bank has been less active in this area. These distinctions largely reflect the differing priorities of the borrowing constituency of each Bank. Neither Bank has been particularly active in maritime sector issues or in the preservation of wildlands.

Although the financing of environmental protection and pollution control projects in the Mediterranean by both Banks has brought significant improvements in selected areas, systematic

analysis of interdependent environmental issues, policies, and institutions should be more actively promoted. The EPM provides an opportunity for such systematic analysis at the regional level because it facilitates the exchange of experience among the countries of the region and translates this experience into effective policies and targeted project activities.

Policy Dialogue and Institution Building

Many of the fundamental causes of environmental degradation are rooted in social and economic policies, regulatory systems, and institutional weaknesses. In order to implement the recommendations made here, many countries will need financial and technical assistance designed to strengthen country-level institutions responsible for planning, managing, and regulating the environment.

Most important, the World Bank and the EIB have a broad ongoing dialogue with the countries of the region on project lending, sector and macroeconomic, and policy issues. The Banks are well positioned to include an environmental dimension in this continuing dialogue. The partnership of the World Bank (which focuses on the southern and eastern parts of the Mediterranean region) and the EIB (with its strong activity in the northern rim) offers unique opportunities for strengthening joint action in the Mediterranean region.

Mobilization of Financial Resources

Both Banks bring a new dimension to environmental work in the Mediterranean through their experience in international finance and resource mobilization. To date, the largest investments in pollution reduction in the region—including those undertaken by private enterprises in response to fiscal incentives and regulation—have been made by the northern industrial countries, particularly France, Italy, and Spain. The EIB has been an increasingly active financier of environmental projects in these countries. In contrast, although the developing countries are becoming increasingly aware of the costs of neglecting the environment, financial constraints have often limited effective action. This poses the danger of a widening gap in environmental actions be-

tween the northern and southern countries. The EPM should play an important role in reducing this gap.

In the recognition that the bulk of the investments and other expenditures on the environment must be borne by the countries in the region and that developing countries face severe resource constraints, both Banks should assist countries to mobilize additional internal and external resources in support of effective programs. Although improved policies and regulatory regimes and better planning make important contributions to protecting the natural resource base of the Mediterranean region, the need for additional investment and for other expenditures cannot be ignored. The main responsibility for financing these expenditures rests with the countries themselves. Greater emphasis on appropriate policies can be instrumental not only in inducing more rational environmental behavior but also in generating the domestic resources needed for additional funding for the environment. Domestic resources can be mobilized through charges and penalties that better reflect the "polluter pays" principle, appropriate prices for natural resources, especially water and energy, taxes on vehicles and other highly pollut-

ing equipment, and, possibly, taxes on tourism. Some domestic investment needs can be satisfied by the private sector if the correct regulatory and policy framework is in place.

Most of the countries of the southern and eastern Mediterranean will also need to borrow foreign exchange, but their ability to do so will almost certainly be limited by their indebtedness. Many countries of the region already benefit from external assistance from the two Banks to supplement their own resources. In recognition of the importance of environmental issues for long-term development, the two Banks will give more priority to lending for the environment within their own programs for the Mediterranean countries. The Banks stand ready to finance projects aimed at supporting effective environmental policies and programs and will also seek to identify cofinancing opportunities with commercial banks and bilateral funding sources.

A key justification for any additional funds will be the extent to which potential financiers view the Mediterranean as a shared and unique resource to be protected. The shared stewardship of the Mediterranean region implies a growing interest in protecting a common resource for generations to come. This can be done

Box 5.1. European Investment Bank Loan Finance to Protect the Environment

The protection and improvement of the environment is one of the main objectives of EIB lending policy. Investments can be located in all regions of the EC member states or in countries associated with the EC and benefiting from financial protocols with it—as is the case for most Mediterranean countries.

Loan finance for environment-related projects increased rapidly in the 1980s, particularly after the passage in 1984 of a resolution by the EIB Board of Governors in favor of increasing efforts in this field. Over the past few years this lending has reached about ECU 1.5 billion a year. In the Mediterranean Basin alone the EIB has granted a total of ECU 3.0 billion since 1980. Because these loans cover only part of the total investment cost, it is estimated that they have helped to cofinance a total project volume of ECU 6 billion to ECU 8 billion.

EIB loan financing now covers a broad range of environmental investment, including clean water supply,

wastewater catchment and treatment, disposal of solid wastes, reduction of air pollution, reforestation, urban environmental improvement, and protection of the architectural and natural heritage. Examples in the Mediterranean area include ongoing work on wastewater treatment plans for entire river basins such as the Po in Italy and the Segura in Spain, as well as sewage treatment stations for cities such as Algiers, Athens, Marseilles, and Nicosia, oil refinery depollution projects in Greece and Italy, and heritage conservation in Venice and Pompeii.

Aside from specifically environmental projects, all investment projects to be loan-financed by EIB (more than ECU 12 billion in 1989) undergo, in addition to technical, economic, and financial appraisal, a strict assessment of their conformity with EC environmental standards and legislation.

only at a cost in economic, financial, and human terms. Careful deliberation will be required to determine who should bear the cost, especially when the consequences of environmental degradation are felt across national boundaries. In a number of cases the benefits from reduced environmental degradation accrue to both developed and developing countries in the region, but the costs would have to be borne by the developing countries. A strong case for extending additional resources to the developing countries on concessional terms could be made on the grounds that regional externalities can best be dealt with by speeding up environmental programs in those countries. In such instances the two Banks will promote collective international action to deal with the problem, supported by financing arrangements that take into account the varying financial capabilities and prospects of participating countries.

The Priorities of the EPM

The priorities for phases II and III of the EPM are based on the findings of phase I, on the areas of

comparative advantage of the two Banks, and on an assessment of their past and ongoing lending activities. They include both curative and preventive actions and follow the balanced approach toward environmental action programming outlined in this report. These priorities were discussed at the December 1989 EPM workshop and reflect comments made by representatives of the Mediterranean countries.

Integrated Water Resource Management

Ensuring sustainable growth requires avoiding irreversible damage to aquifers and protecting freshwater resources. For public health reasons, particular attention needs to be given to urban industrial and agricultural wastewater management issues. The EPM will support

- Integrated long-term planning for surface and groundwater resources
- The adoption of least-cost solutions for development of water resources
- The conservation and protection of identified water resources through pricing and other

Box 5.2. World Bank Lending for the Environment in the Mediterranean Region

Environmental protection has figured prominently in the World Bank's activities in Mediterranean countries. These activities have been concentrated in the borrowing countries of the southern and eastern rim of the Mediterranean. The World Bank has been pursuing environmental objectives in the region not only through its lending program but also through its policy work, technical studies, and resource mobilization activities.

In the past ten years the World Bank has made thirty-seven loans totaling \$2.35 billion for projects directed at environmental protection in the region—8 percent of all its lending to Mediterranean countries. Of this lending, 74 percent was for water supply and sanitation.

Many projects in the agriculture sector have also focused on environmental improvement, especially forestry projects in Morocco, Turkey, and Yugoslavia, drainage and land reclamation projects in Egypt and Syria, range management projects in Turkey and North Africa, and research and extension projects supporting environmentally sounder agricultural practices through, for example, better land erosion control and pesticide use in Tunisia. Environmental issues associated with irrigation development are specifically considered in project design, as is the case in the Algeria West Mitidja

project, which is located in an area situated above an aquifer primarily used for drinking water.

Environment-related components have been included in several energy and industrial loans. These components seek to improve operational efficiency and to address energy conservation issues.

The World Bank has also made loans containing provisions for the restoration or conservation of archaeological or historic sites in Egypt, Turkey, and Yugoslavia. A project in Sarajevo, Yugoslavia, was directed at reducing air pollution, and several urban projects have sought to improve environmental quality in the cities of the region.

World Bank projects are submitted to an environmental assessment procedure to ensure the recognition of their environmental consequences early in the project cycle and the timely incorporation of environmental issues into project design. Although the environmental assessment procedure is mostly performed at the project level, regional and sectoral environmental assessments are also used to compare alternative regional development scenarios or for the design of sectoral investment programs.

measures (information, regulations, and incentives for water-saving technologies, recycling, and reuse)

- Institutional and legal changes to consolidate responsibility for water resource planning and management and improve the capabilities of the responsible organizations in data collection, monitoring, and analysis of management alternatives
- The adoption of coherent pollution reduction strategies for coastal and watershed areas; measures will include investments in least-cost systems, incentives for the adoption of water-saving technologies and for conservation and reuse, and improvements in the economic and regulatory aspects of policies to control water pollution.
- Watershed management programs that significantly affect water availability (soil conservation, rangeland improvement, afforestation, fertilizer and pesticide management, and siting of industry and of solid waste disposal sites).

Management of Solid and Hazardous Wastes

Public health risks make waste management an immediate priority in many countries, but the problem also has less-known but potentially large long-term implications. The EPM will support

- The management of solid wastes, including collection, disposal, and recycling
- The identification of high-risk hazardous waste disposal sites, the implementation of cleanup programs for priority sites, and the development of proper sites for future disposal
- The strengthening of the enforcement and monitoring capabilities of regulatory agencies
- The development of incentives for adoption of low-waste technologies, recovery of by-products, and recycling
- The adoption of the "polluter pays" approach for both public and private sector sources of wastes.

Prevention and Control of Marine Pollution from Oil and Chemicals

Prevention of pollution from oil and chemicals is critical for avoiding possibly irreversible damage

to coastal areas and ecosystems. The EPM will support

- The preparation of fully operational oil spill contingency plans for all countries; such plans will include the development of subregional and intercountry arrangements to maximize the efficiency of controls and to coordinate actions against spills of hazardous materials
- The expansion and rehabilitation of port oil reception facilities, including floating port reception facilities, with possible involvement of the private sector
- The adoption of incentives for improved deballasting
- The monitoring and enforcement of MAR POL and of the Barcelona Protocols on reducing marine pollution from ships and land-based sources
- The preparation of complementary disaster preparedness plans for shipping accidents involving toxic materials
- The training of personnel and the provision of adequate equipment in case of oil or hazardous material emergencies.

Coastal Zone Management

The rate of degradation of coastal areas must be contained in order to avoid both the irreversible loss of unique natural and historical assets and the further environmental degradation of urbanized coastlines through air pollution and other causes. The EPM will focus on the preventive end of the coastal management issue, since several Mediterranean countries already have significant curative programs under way. Accordingly, the EPM will support

- The strengthening of the capacity of national and local governments to plan and manage coastal area development
- The improvement of the capabilities of regional and local planning and environmental agencies to implement and monitor coastal zone planning in order to enable them to address the specific problems of each coastal zone development stage, including the enhancement of the quality of the urban environment
- The upgrading of the data collection and planning capabilities of scientific and planning agencies

- The protection of the remaining ecologically sensitive coastal areas, especially wetlands, seagrass beds, and habitats of migratory species
- Activities to support the conservation of biodiversity in the region
- The conservation of cultural heritage sites through sound management practices
- The adoption of incentives to influence land use decisions in the direction of protecting agricultural land and encouraging an environmentally sound development of urban, industrial, and tourism facilities
- The establishment of financing mechanisms to support management and control of coastal zone development.

The Mediterranean Environmental Technical Assistance Program: A Key Instrument of the EPM

Given the complexity of their environmental problems, many countries are likely to require technical assistance in devising cost-effective and politically feasible solutions. In January 1990, following the December 1989 EPM workshop, the two Banks launched a new assistance program (METAP) to strengthen national environmental efforts and promote regional cooperation. The purpose of METAP is to accelerate the pace and deepen the impact of environmental activities in the Mediterranean Basin and thus to act as a catalyst for environmental investment. To fulfill this purpose, METAP will pursue three basic objectives by supporting:

- The development of a sound pipeline of environmental projects
- The formulation and improvement of environmental policies and regulations
- The strengthening of the required institutional framework.

METAP will assist the contracting parties to the Barcelona Convention in undertaking environmental policy analysis applicable to the whole region as well as country-specific environmental activities, in particular in the southern and eastern Mediterranean. In pursuing these objectives, METAP will finance:

Pre-feasibility studies of projects to be financed in the third phase of the EPM. Priority and innovative environmental projects will be empha-

sized. They may be free-standing environmental projects, environmental components of traditional investment operations, or pilot projects that are expected to have a significant local or regional demonstration impact. METAP funds will act as a catalyst with respect to the quality and quantity of environmental projects.

Policy studies that address key issues of the Mediterranean environment and make specific recommendations for implementation. The studies will cover topics of interest for improving the formulation, implementation, and funding of environmental actions and regulations, preferably at the regional or subregional level. They will have an operational aim and should contribute to raising the efficiency of environmental investments. These carefully selected policy studies will draw on experiences throughout the region to address issues that require common action, such as tourism development, the conservation of wildlife habitats, coastal zone management, and the analysis of innovative financing mechanisms for environmental projects and programs. Country-specific policy studies can be financed under METAP if the conclusions address issues confronted by more than one country.

A coherent regional *institutional development program*. This will consist of:

- Specific recommendations for improving environmental legislative and regulatory frameworks at the country, subregional, and regional levels. Countries will be assisted in developing and implementing laws and regulations on environmental protection, including those adopted under the Barcelona Convention and its protocols.
- Design of packages to strengthen institutions and organizations. These packages will include organizational diagnoses, training, and twinning with external organizations. Throughout the region training will be provided in skills related to environmental planning, management, and regulation, drawing on existing expertise in the region. Where possible, specialized regional training programs will be introduced. The training and twinning programs will provide an opportunity for the countries of the region to share experiences in environmental planning and improvement.
- Organization of seminars on selected topics of regional interest to disseminate the findings of

the policy studies and other METAP activities and support increased public awareness

- Support of a carefully chosen set of activities of broad regional relevance to strengthen scientific and regional databases.

METAP will give priority to financing institutional development activities that directly support the implementation of policy actions and environmental project activities during phase III of the EPM.

METAP activities will be formulated in ways that ensure their close integration within the ongoing policy dialogue and lending activities of the two Banks in individual countries. A sufficient level of government commitment to METAP activities and objectives would naturally be a prerequisite. METAP activities will be fully consistent with country environmental priorities.

METAP provides direct assistance in the form of grants. To strengthen the regional character of the EPM, regional studies will address issues common to Mediterranean countries. It is expected, however, that METAP project preparation activities will focus mainly on the southern and eastern countries, where resource constraints—particularly lack of foreign exchange—are high.

At the December 1989 EPM workshop, representatives of the EC Commission pledged direct support to METAP through MEDSAP. Collaboration with UNDP on METAP has already been initiated. The Regional Bureau for the Arab States and Europe of the UNDP—fulfilling an important role in promoting sustainable development and environmental protection in the region—has from the beginning pledged support for METAP and has participated in defining its scope and priorities.

The magnitude of the requirements for technical assistance in the priority areas identified during phase I of the EPM suggests a long-term need for METAP as an important funding instrument to strengthen environmental activities in the Mediterranean. Accordingly, METAP is conceived as a rolling three-year program, subject to an annual review of financing requirements. METAP is initially funded by resources from the World Bank, the EIB, the UNDP, and the EC. Once the program has been consolidated, consideration could be given to including additional donors in its funding, on the basis of identified unfulfilled needs.

METAP is managed by the EPM Joint Implementation Unit, which is composed of the EPM units at the World Bank and the EIB. It is staffed by environmentalists, economists, engineers, and policy analysts. The METAP program will be finalized in the coming months in close consultation with the Mediterranean countries. The next stage of consultations will allow the Banks to obtain substantive information and views from a wide variety of interested parties and to define specific METAP activities for the next three years.

METAP will also be an instrument for strengthening the overall network of institutions active in Mediterranean environmental matters. By supporting the twinning and networking of institutions through its institutional development program and by tapping specific expertise within nongovernmental organizations, METAP will contribute to the transfer of knowledge and experience at the regional level.

Prospects for Joint Action with UNEP/MAP

METAP will collaborate with UNEP/MAP on activities that will contribute to the overall development of the EPM. A number of activities have already been identified as potential candidates for collaboration with UNEP/MAP over the next two years.

Policy studies, institution building, and monitoring

- Elaboration of oil spill contingency plans and disaster preparedness plans for hazardous material shipping, the goal being a full operational capability for the countries of the region
- Support for the implementation of the Protocol for the Protection of the Mediterranean Sea against Pollution from Land Based Sources (see table 1.2)
- Compilation and assessment of the environment-related legislative, regulatory, and institutional frameworks in the countries of the region, with special emphasis on their applicability and relevance in coastal areas
- Regional studies on linkages between environment and development with the economic team of the Blue Plan
- Development and implementation of an institution-strengthening program (training, twinning of marine pollution laboratories, and

provision of equipment) for marine pollution monitoring activities in the context of MEDPOL.

Project identification and preparation

- Updating of feasibility studies for port reception facilities
- Preparation of a representative set of pilot projects for coastal zone management. The criteria for selecting these pilot projects will include governments' commitment to effective implementation and applicability to other areas on the Mediterranean coastline.
- Site-specific studies for a limited number of specially protected areas (coastal and marine national parks and cultural heritage sites). These studies should, among other things, examine the institutional, financial, and economic aspects of the operation and protection of the sites.

Prospects for Increased Environmental Investment

Several countries in the region already have large and active investment programs for environmental protection. France was among the first to begin such a program and, after more than a decade of active concern, has achieved much, although the remaining needs are still great. Greece, Italy, and Spain have meanwhile recognized the necessity for investment and are now spending substantial amounts annually on pollution control. With support from the EC and the EIB these programs can continue to grow, but greater attention to managerial issues in the areas of operations, maintenance, and cost recovery is warranted. There is also scope for new initiatives in the northern countries in such areas as hazardous waste management, coastal zone management, and wildlife conservation.

Faced with less acute pollution problems but more widespread issues of sustainable resource use, the southern and eastern countries, despite their severe financial and manpower problems, have begun modest programs in most areas of environmental concern. Investment has focused on urban wastewater projects—a choice that reflects both the needs of the area and the availability of donor assistance. Although such investment undoubtedly should continue, programs must be broadened to encompass

other pollution and resource conservation projects.

As indicated in the Blue Plan and confirmed in this report, the longer-term economic prospects of the developing Mediterranean countries will be closely dependent on their ability to adopt and implement policies conducive to a sustainable use of their natural resources. Adoption of such policies will undoubtedly take time, and their implementation will require strong institutions. Progress on institutions and policies is also likely to lead to larger investment needs.

The international community agrees on the need to strengthen environmental protection efforts around the world. Industrial countries, which account for a major share of global pollution, have a special responsibility for carrying out and supporting these efforts. Beyond pollution abatement issues, developing countries are realizing the impact of environmental degradation on the sustainability of their local and national economic development. The capacity of these countries to conceive and implement effective programs is currently limited by often severe financial, managerial, and technical constraints. In particular, heavily indebted developing countries face difficult choices as they consider financing environmentally beneficial investments with funds borrowed at market rates. Additional funding on concessional terms, in tandem with increased local resource mobilization, could make a significant difference in stimulating the preparation and implementation of environmental activities.

METAP, and in a broader sense the EPM, should consequently be viewed as important instruments for positioning the highly indebted developing countries of the Mediterranean so that they can benefit from the ongoing initiatives to create a concessional environmental facility. METAP will assist Mediterranean countries through the gradual process of identifying and preparing investment opportunities for environmental protection. The preparation of a program of policy measures, investment projects, and institutional development activities will be a strong factor in mobilizing additional concessional funds for the environment.

The EPM will strengthen the intellectual underpinnings and the operational nature of environmental action in the Mediterranean region and

will help to mobilize appropriate resources in support of this action. In its first stage the EPM will allow the World Bank and the EIB to raise the volume of environmental financing in the region by increasing the share of their lending programs allocated to environmental activities. In recognition of the specific constraints of several Mediterranean countries, the EPM will also endeavor in its second stage to mobilize additional

concessional resources. By fostering the parallel development of a strong operational program and effective financing instruments, and with the support of the Mediterranean countries and all other concerned parties, the EPM is poised to contribute to the preservation of the unique shared heritage of the Mediterranean region and to the sustainable development of its common resources.

List of Background Papers

The following background papers, prepared as part of the Environmental Program for the Mediterranean, can be obtained from the Environment Division, Europe, Middle East, and North Africa Region, World Bank, 1818 H Street, N.W., Washington, D.C. 20433, U.S.A.

Pollution Problems in the Mediterranean: Approaches and Priorities

Comments on the relative importance of several pollution problems and other man-induced chemical changes in the Mediterranean Sea. Assesses the importance of marine pollution in relation to other environmental problems of the Mediterranean region and proposes programs for addressing priority needs.

Natural Resource Management

Summarizes current natural resource issues of land management and the conservation of biodiversity in the Mediterranean Basin. Describes land resources, natural habitats, wildlife, and fisheries; analyzes land use issues and the loss of habitats and biodiversity; and proposes selected remedial action.

The Urban Environment

Considers the impact of urbanization on water resource quantity and quality, inner city environmental quality, land use, and air quality in the Mediterranean Basin. Presents a program of policy, institutional, and investment actions.

Maritime Sector Assessment

Focuses on oil pollution issues but considers other kinds of bulk cargoes and wastes from ships and port facilities. Discusses deballasting, accidental spills, and contingency planning and proposes ways of rectifying deficiencies in marine pollution control and abatement.

Industrial Pollution in the Mediterranean

Summarizes institutional and legal issues concerning industrial pollution; presents data on sources and types of industrial, air, water, and hazardous wastes pollution; analyzes the role of economic incentives and their impacts on industrial pollution; and identifies possible projects. Includes individual country reports on Algeria, Egypt, Morocco, Turkey, and Yugoslavia.

Conservation and Management of Cultural Patrimony in the Mediterranean Region

Discusses the shortcomings of current archaeological and historic preservation measures and examines the principal causes of degradation and loss, the institutional and legal frameworks, financial and economic aspects, and tourism impacts. Emphasizes historic settlements as an ignored nonrenewable resource and proposes a program of action.

Private/Public Participation in Environmental Investments: The Example of Waste Water Collection and Treatment in Municipal Facilities

Looks at the question of public and private involvement in environmental activities from a pragmatic point of view by analyzing their interaction in a representative sample of wastewater projects. Evaluates the technical, environmental, economic, and financial elements that have a bearing on the overall performance of such systems, including the role of private agents in the process.

Environmental Study of the Mediterranean: EC Country Overview

Presents an overview of critical environmental issues in the Mediterranean area. Draws on existing literature on the topic, specific country studies, and interviews with experts and officials from the four EC member countries in the region. Includes a general survey followed by a review of developments in France, Greece, Italy, and Spain.

List of Participants

World Bank-European Investment Bank Workshop on the Environmental Program
for the Mediterranean, Paris, December 7-8, 1989

Keynote Speakers

H.E. A. Ebeid, Minister of Cabinet Affairs and Administrative Development and
Minister in charge of Environment, Egypt

H.E. Brice Lalonde, Secrétaire d'Etat auprès du Premier Ministre, Chargé de
l'Environnement et de la Prévention des Risques Technologiques et Naturels
Majeurs, France

Country Representatives

Algeria	Kamaledine Ben Habib, Chef d'études responsable du secteur hydraulique, Conseil National de la Planification
Cyprus	Andreas S. Pissarides, Head, Environmental Conservation Service, Ministry of Agriculture and Natural Resources Frixos Sorokos, Director, Finance and Investments Division, Ministry of Finance
Egypt	El-Mohammadi Eid, Chairman, Egyptian Environmental Affairs Agency Khedr Abou Koura, Senior Expert, Institute of National Planning
France	Serge Antoine, Directeur de la Mission Environnement/Développement, Secrétariat d'Etat auprès du Premier Ministre Chargé de l'Environnement Pierre Pissaloux, Chef de Bureau, Direction du Trésor, Ministère des Finances
Greece	Athena Mourmouris, Head, Division of Environmental Planning, Ministry of the Environment, Physical Planning and Public Works Alexandra Vlahou Spyridonos, Ministry of National Economy
Israel	Amram Pruginin, Deputy Director, Ministry of Environment
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	Antonio Tarelli, Chef du Département de l'Environnement, Direction Générale des Affaires Economiques, Ministère des Affaires Etrangères
Malta	Reno Camilleri, Economic Secretary, Office of the Prime Minister Lawrence Micallef, Head, Environment Division, Ministry of Education and Environment
Monaco	F. Doumenge, Directeur du Musée Océanographique de Monaco Etienne Franzi, Délégué Permanent Adjoint auprès des Organismes Internationaux
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Representatives of International Organizations

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Blue Plan	Michel Batisse, President Bernard Glass, General Director Michel Grenon, Scientific Director
UNDP	Lars Hyttinen, Deputy to the Director, European Office John Hendra, Programme Analysis Officer, Regional Bureau for Arab States

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 Giovanni Ravasio, Directeur-Général, Coordination des politiques structurelles
 Claude Pleinevaux, Chef de Division, Environnement, sécurité nucléaire et protection civile
 Maurizio Zampetti, Environnement, sécurité nucléaire et protection civile
 David McGlue, Coordination des politiques structurelles

Institut Européen
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Council of Europe Roberto Cacciola, Directeur Projets, Fonds de Réétablissement

Notes to the Maps

The nine maps that follow were compiled with the use of a Geographic Information System (GIS) and an electronic database of natural and cultural resources and economic activities in the Mediterranean region. The sources of this database include the FAO, the ICBP, the IUCN, the National Geographic Society, the Regional Oil Combating Centre, the U.S. Bureau of the Census, the U.S. Bureau of Mines, and the World Conservation Monitoring Center (WCMC). The maps, which were created from a composite analysis of the database, illustrate the physical environment, natural resource concentrations, demographic patterns, and resource conflict areas within the Mediterranean region. Explanatory notes for selected maps are provided below.

Map 1: Study Area

The EPM study area covers the sea itself, its coastal areas, and the hinterland within the watershed of the Mediterranean's major rivers.

Map 3: Ecologically Sensitive Areas

The locations of living natural resources in the Mediterranean region are plotted on this map, which is based on a simple overlay with no weighting of individual resources. For marine resources an area is classified as a very high sensitivity area if it contains two or more of the following categories: important seagrass areas, Mediterranean monk seals, sea turtles, or whale summer feeding areas. A high sensitivity area is an area that has any one of these marine resources. For terrestrial resources any area which is identified as a soaring bird migration or con-

gregating point is considered a very high sensitivity area, as is an area that contains all of the following resources: bird habitats, terrestrial areas rich in endemic species, and wetlands. An area with two of these three categories of terrestrial resources appears as a high sensitivity area.

Map 4: Maritime Pollution and Accident Sites

This map, based on data from the Regional Oil Combating Centre, indicates marine accident sites or wrecks between August 1977 and December 1987 and shows the location of deballasting facilities in the Mediterranean and the main petroleum traffic lanes.

Map 7: Cultural Patrimony

This map illustrates concentrations of archaeological and historic sites and locates individual World Heritage Cultural Sites. It is based on data from the UNEP/MAP List of 100 Coastal Historical Sites, Unesco, and the National Geographic Society.

Map 8: Resource Use Conflicts

The map identifies areas with the greatest coincidence of economic activities, urbanization, and valuable natural resources. These areas are ranked from highest intensity of conflict of activities to moderately high intensity. Eighteen maps were each given a numerical rating, from 1 to 10, according to potential environmental impact. The maps and their ratings are as follows: for human activities, shipping (2), petroleum-handling facilities (7), petroleum resource fields (3),

urban areas (5), urban growth areas (8), marine oil spill sites (2), hazardous mines (4), at-sea deballasting (0, as it is no longer practiced), port deballasting (if none, 7, and if inadequate, 5), port cities (9), and coastal cities (5); for living natural resources, sea turtles (9), seagrasses (7), soaring bird migration and congregating points (9), endemic areas (6), monk seals (8), important bird habitats (7) and wetlands (8). Only those areas in which human activity and biological re-

sources intersect appear as areas of resource use conflicts.

Map 9: Land Capability in the Mediterranean

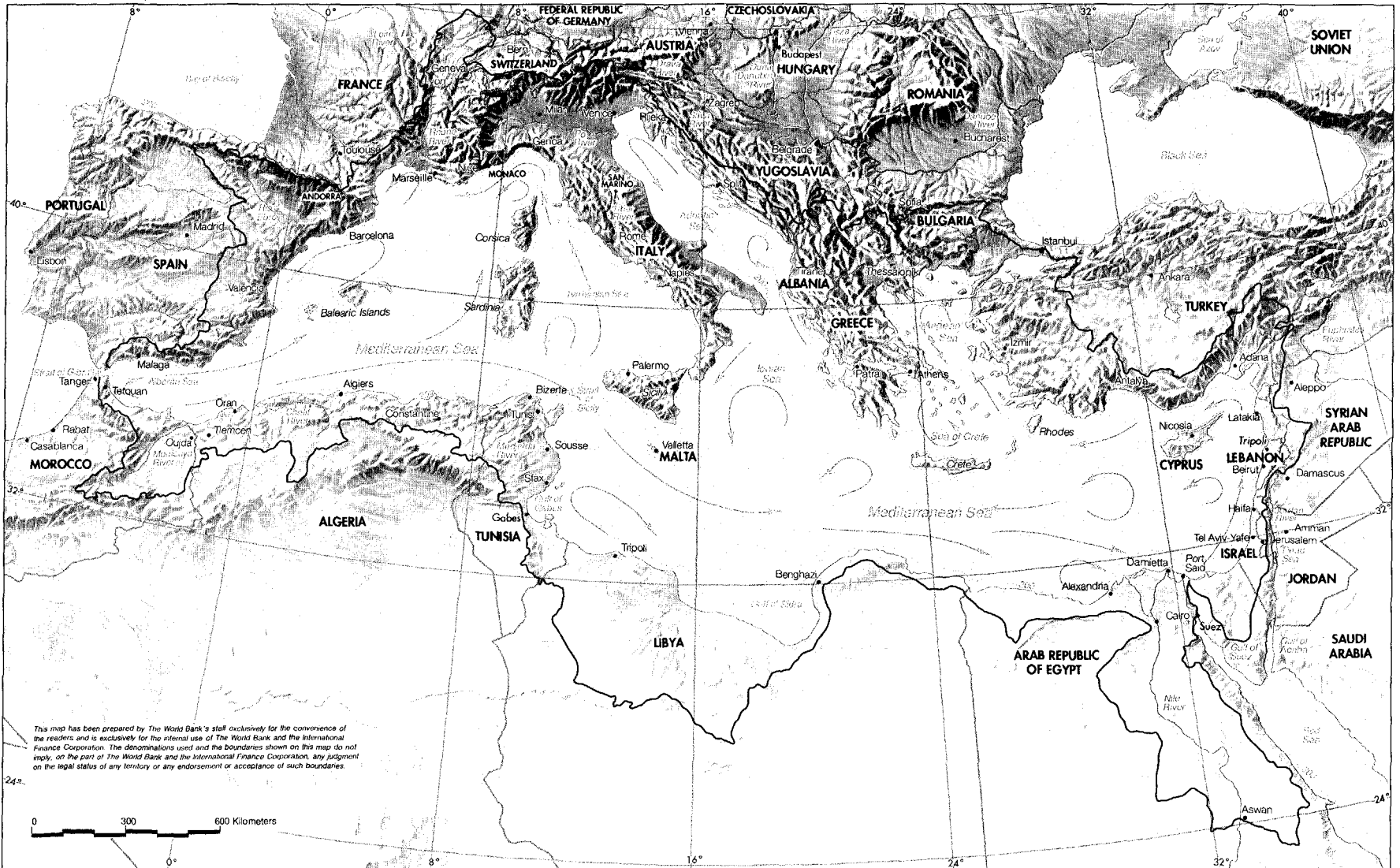
This map identifies areas of agricultural capability based on soil types. It is a reclassification of soil maps provided by the FAO and is based on ability to support agriculture. The map also shows areas with potential for limited agriculture, forestry, and pasture.

Map 1

Study Area

- Watershed boundary
- Main currents

Environmental Program for the Mediterranean
The World Bank and European Investment Bank

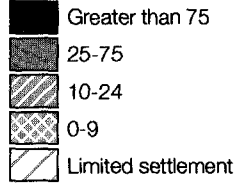


Map 2

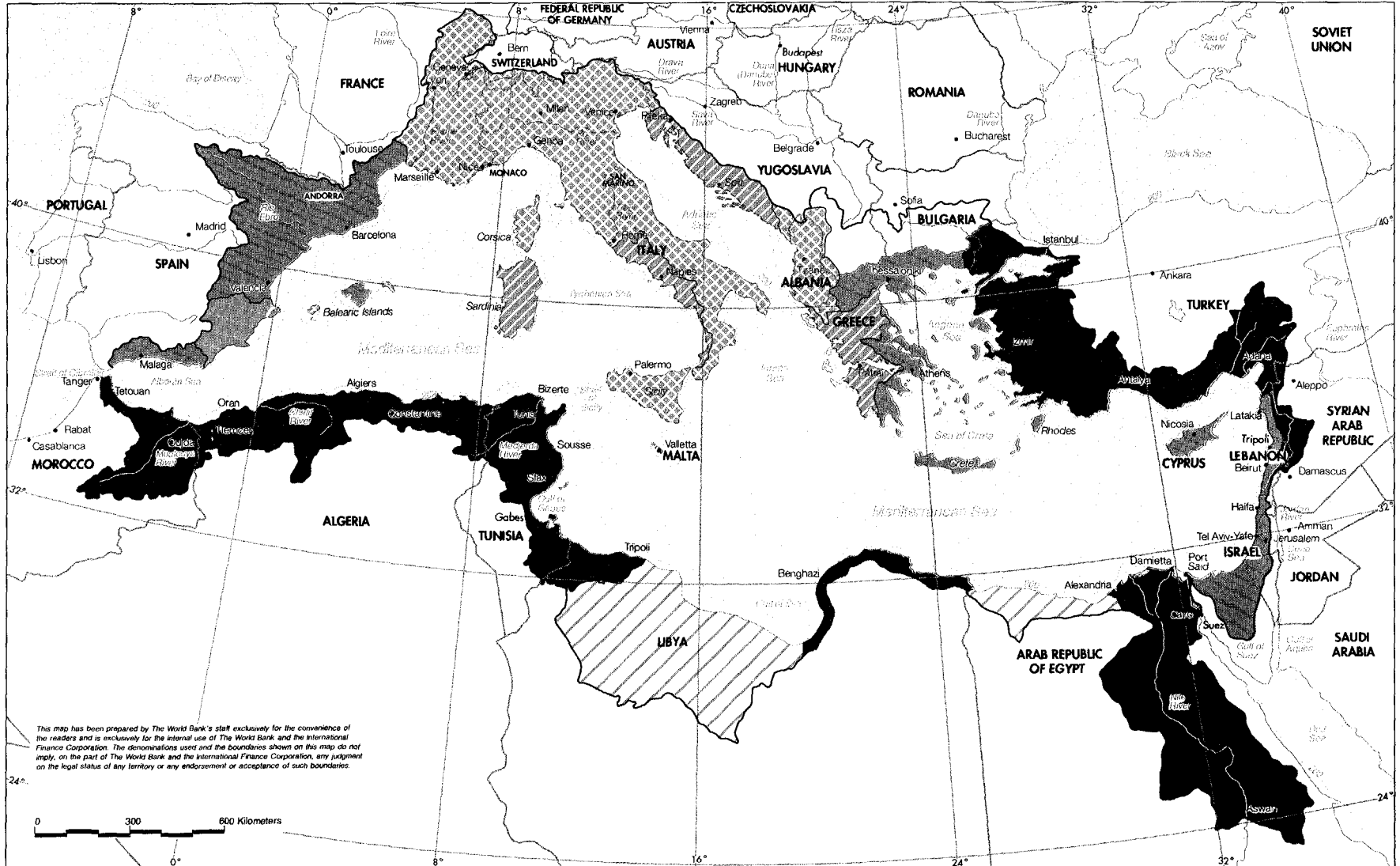
**Urban Population Change:
1990-2025**

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Percent population change (projected)



Watershed boundary



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Map 3

Ecologically Sensitive Areas in the Mediterranean

Marine Areas

- Very high sensitivity
- High sensitivity

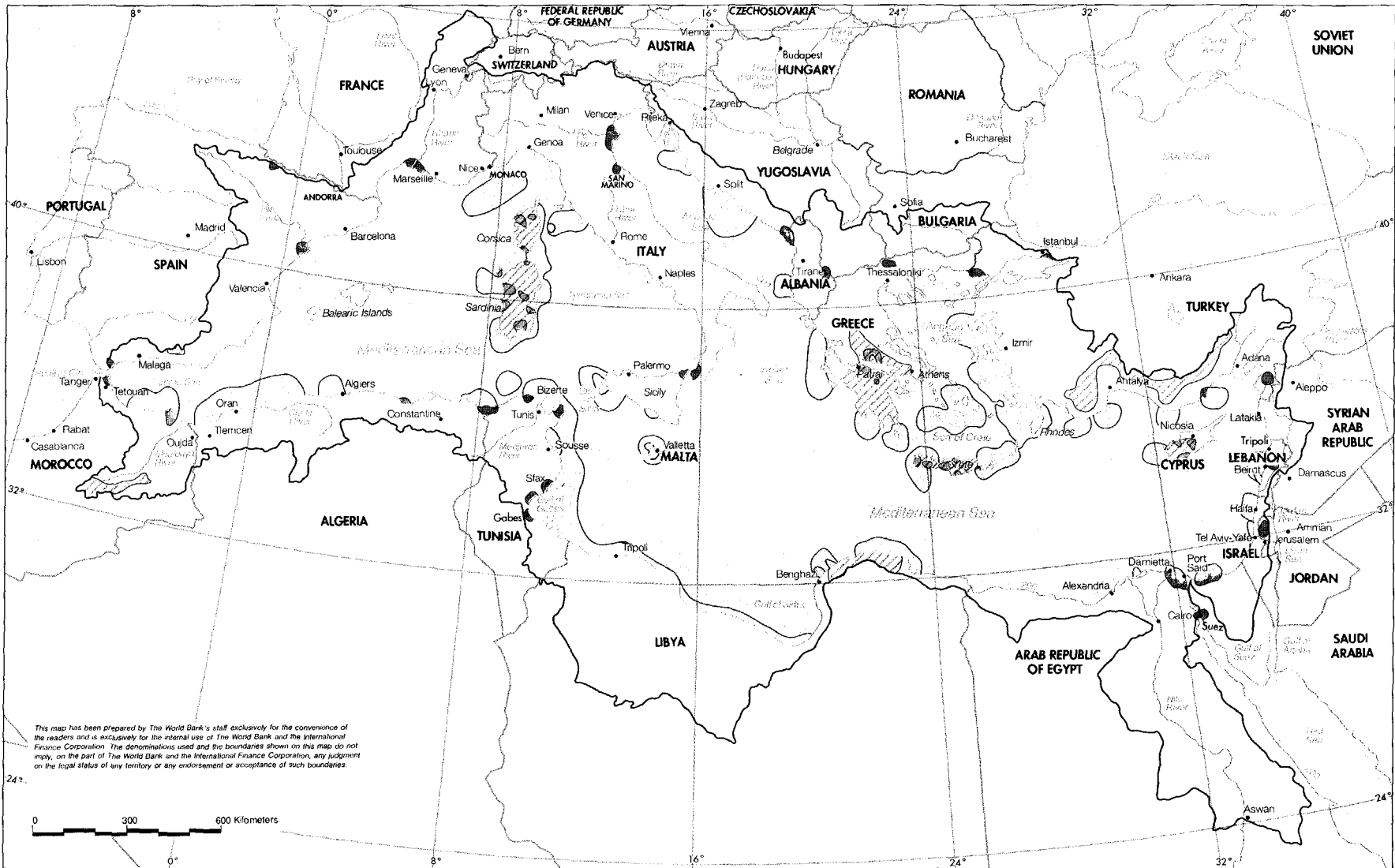
Watershed boundary

Terrestrial Areas

- Very high sensitivity
- High sensitivity






Areas of high plant diversity

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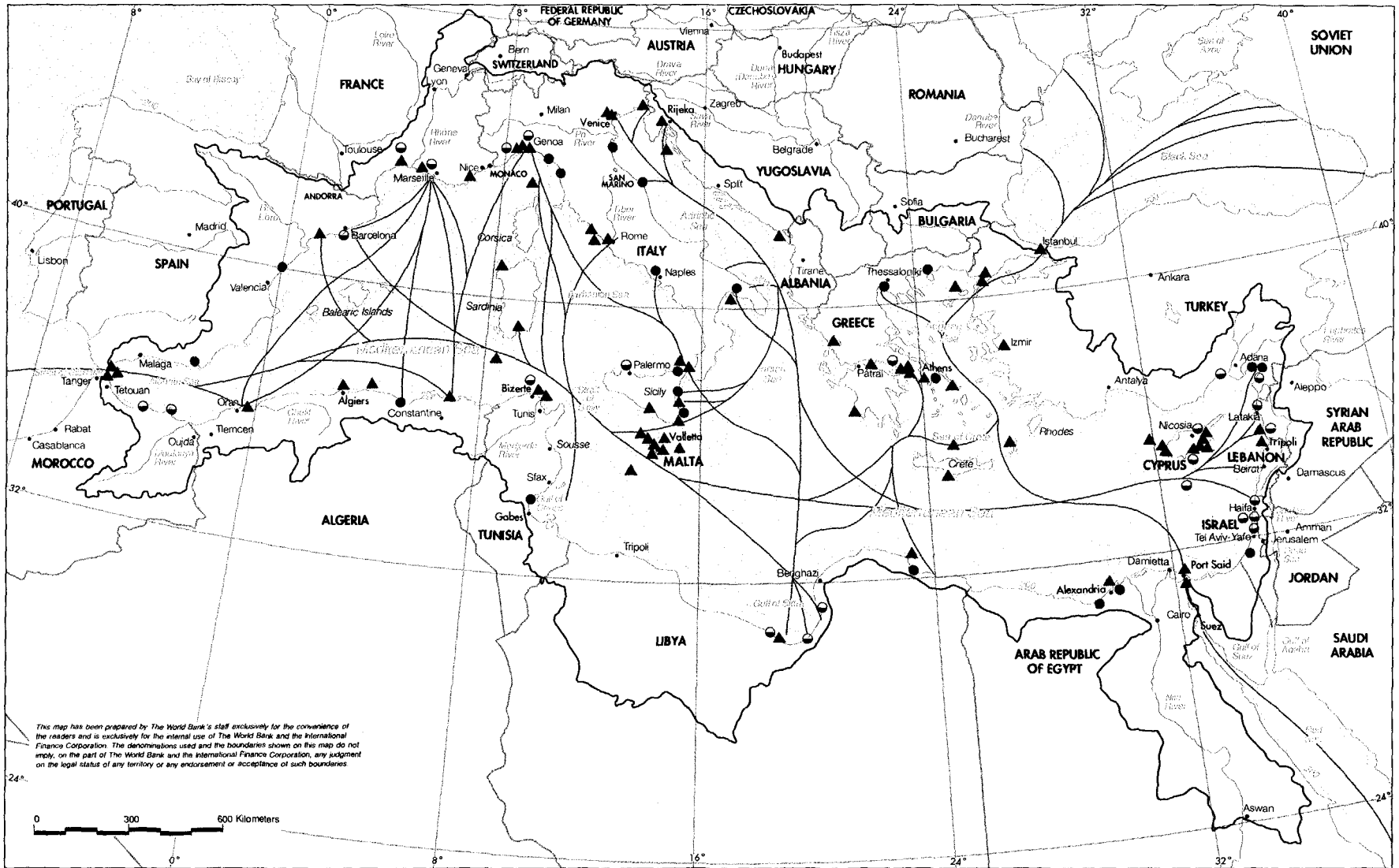


Map 4

Maritime Pollution and Accident Sites

-  Major petroleum traffic lanes
-  Marine accident sites or wrecks
-  Adequate deballasting facilities
-  Inadequate deballasting facilities
-  Watershed boundary

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Map 5

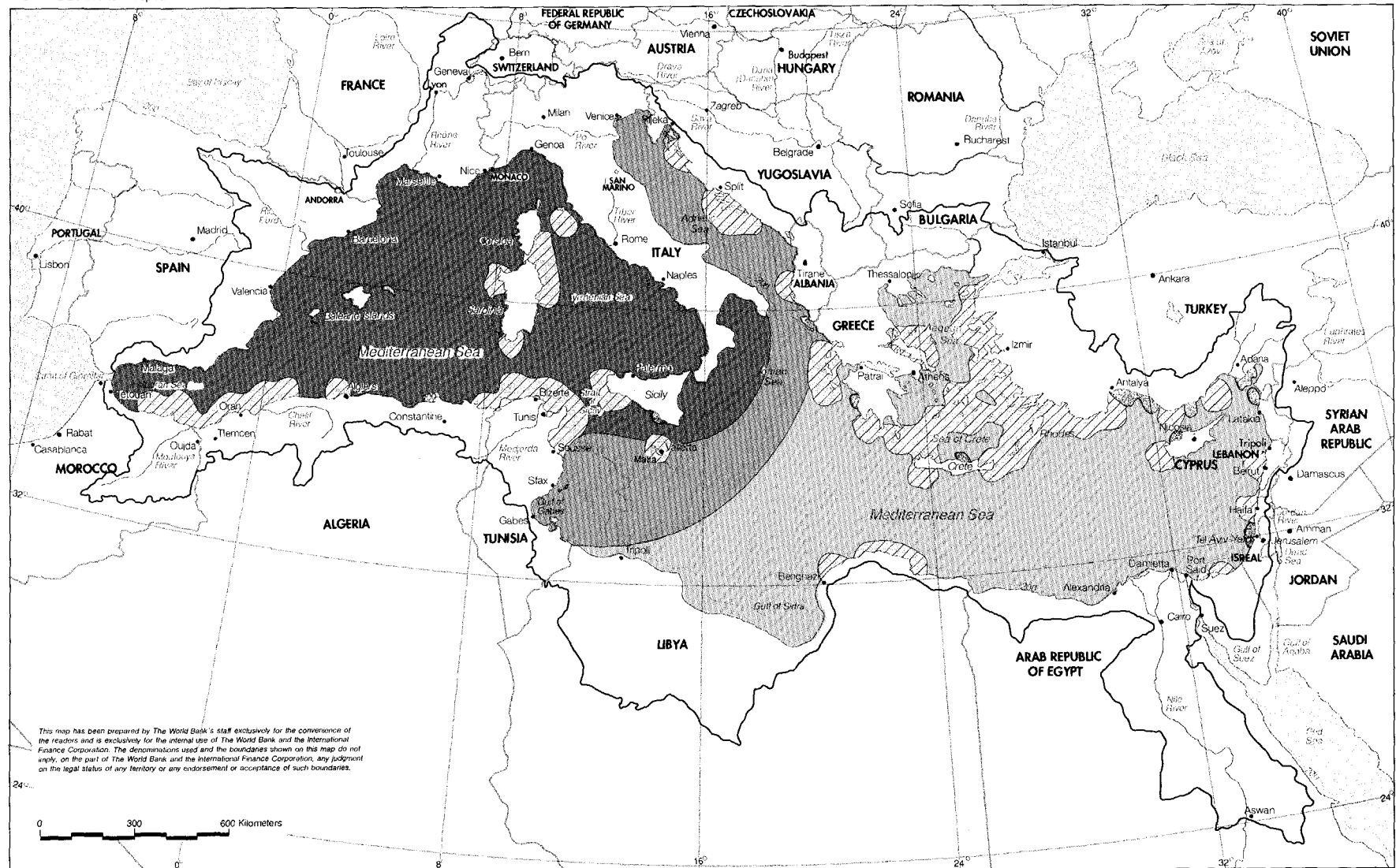
Marine Mammals and Turtles

Whales and dolphins

- All species present
- Many species present
- Few species present

- Sea turtle concentrations
- Monk seal concentrations
- Watershed boundary

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Map 6

Migratory Birds and Habitats

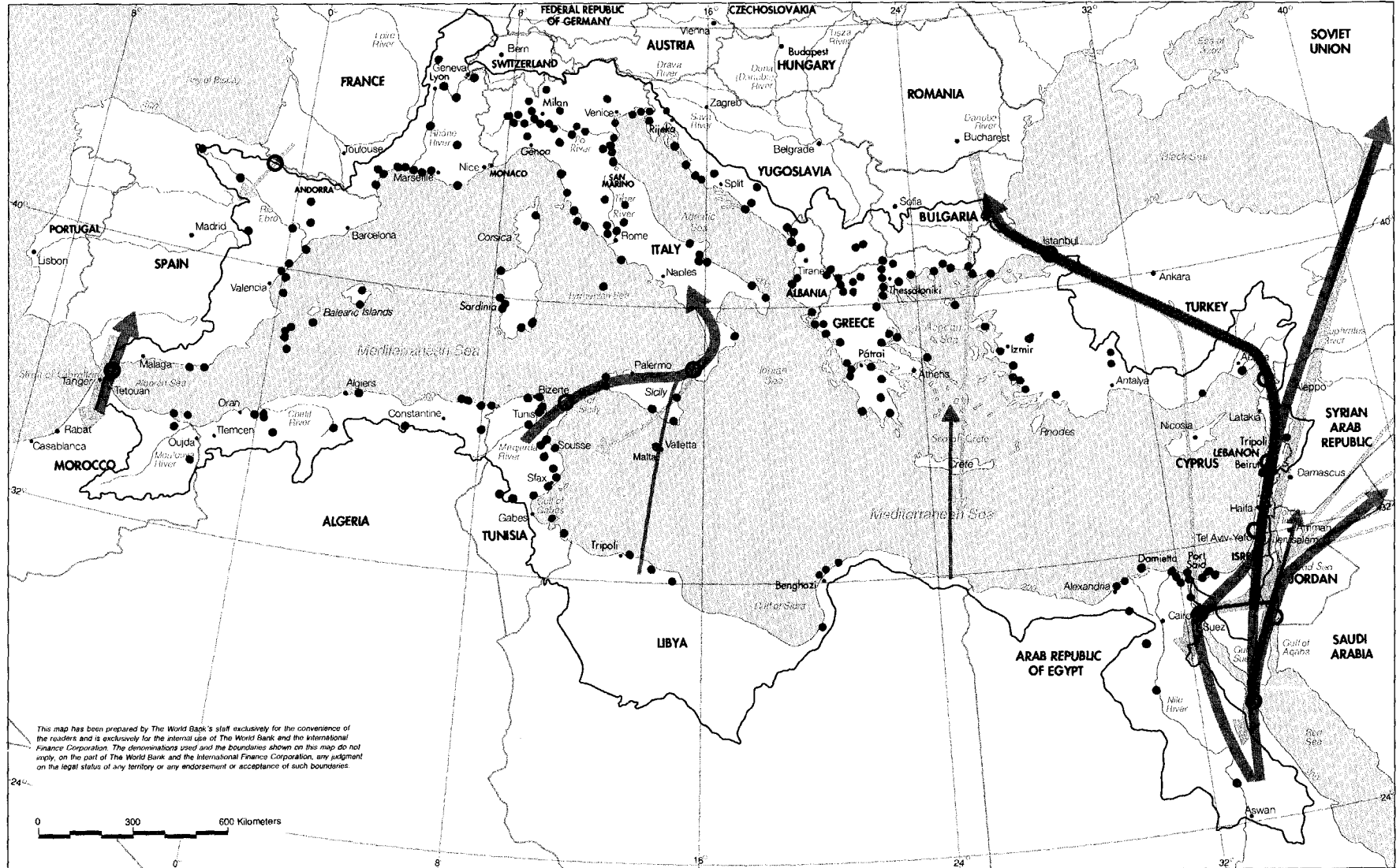
Soaring bird migration routes

- Autumn
- Spring
- Critical locations on migratory routes

Watershed boundary




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Important wetland habitats

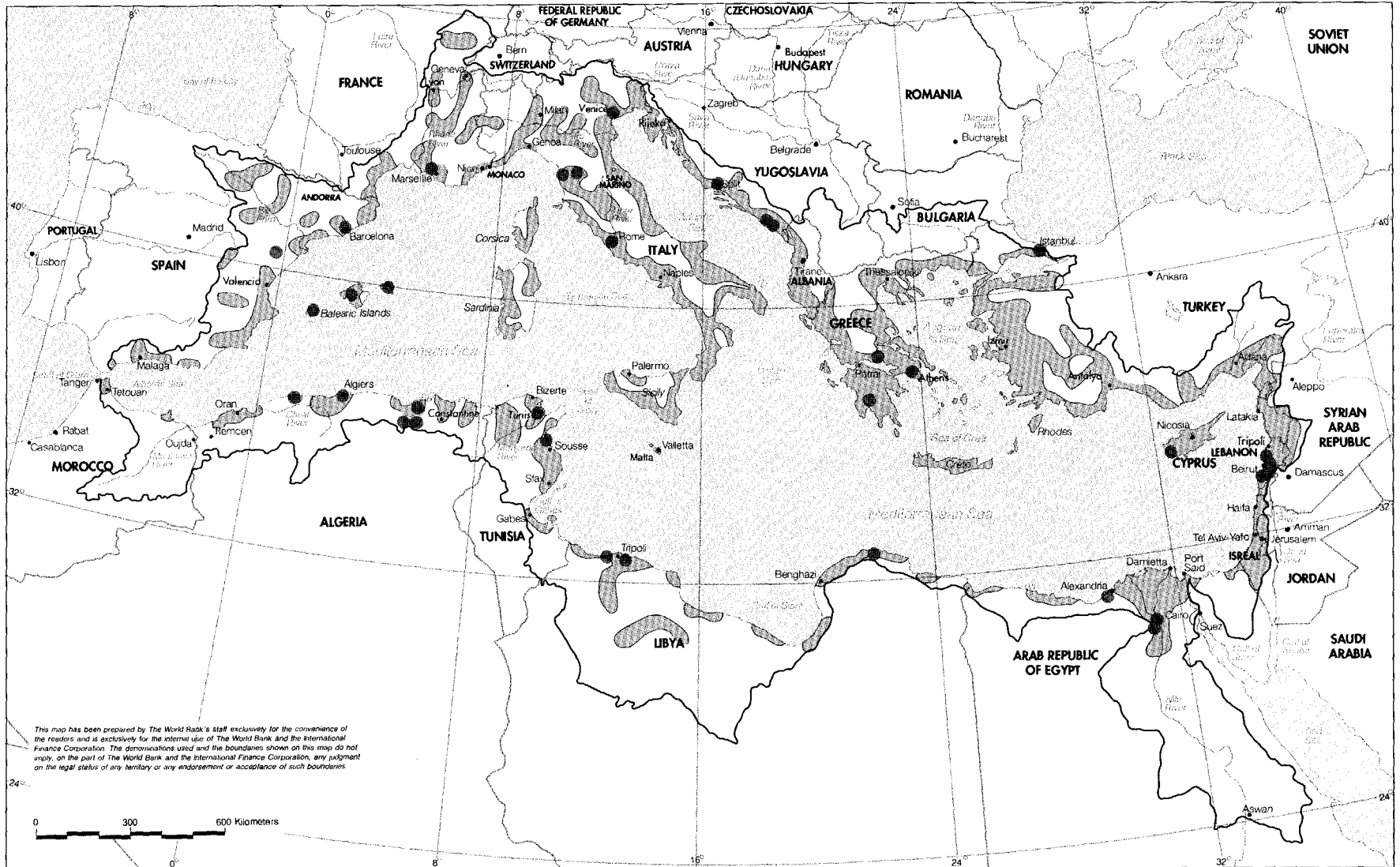


Map 7

Cultural Patrimony

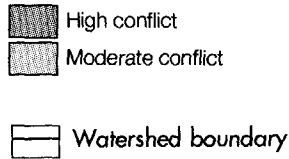
-  World Heritage Cultural Sites
-  Concentrations of archaeological and historical sites
-  Watershed boundary

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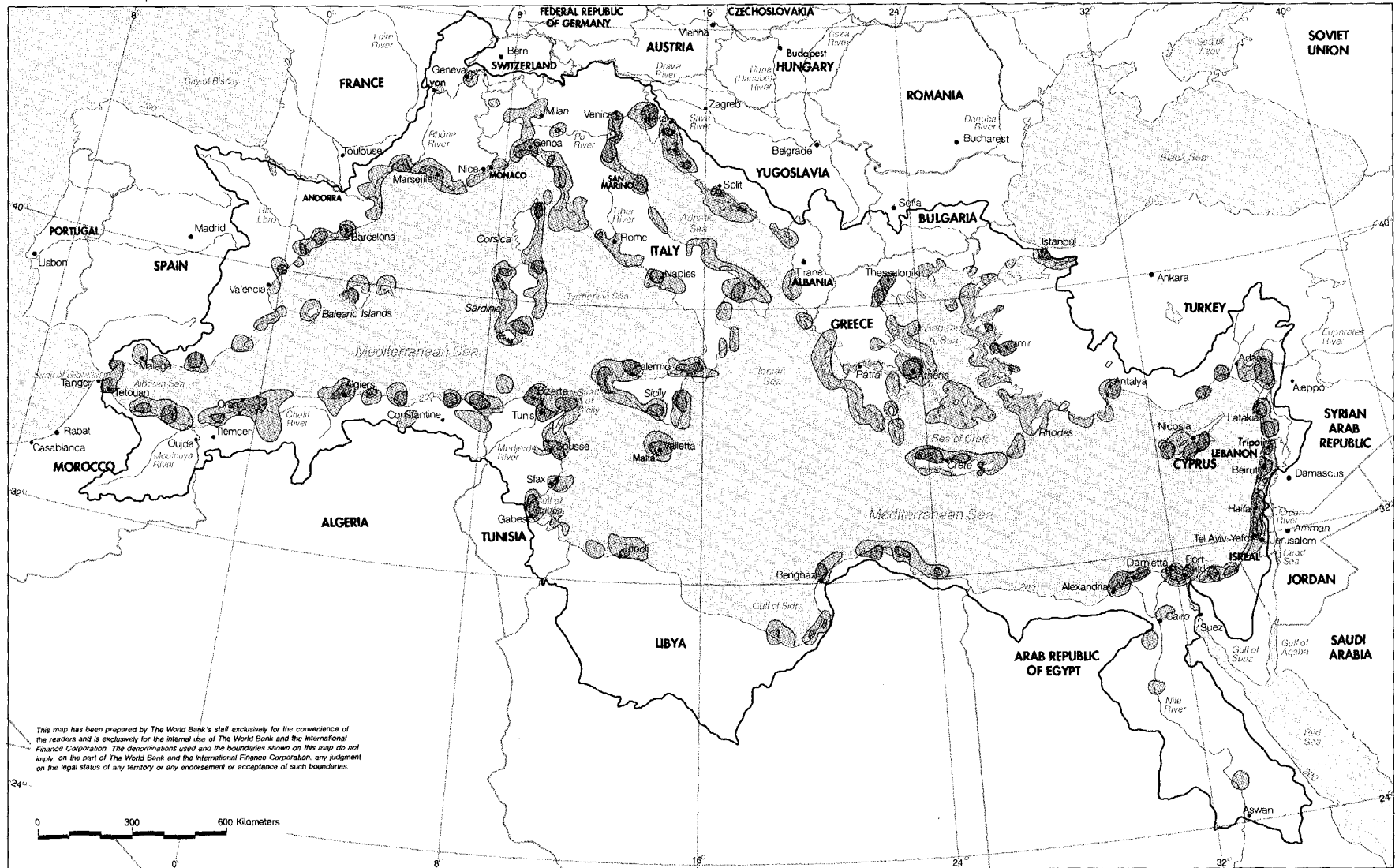


Map 8

Resource Use Conflicts

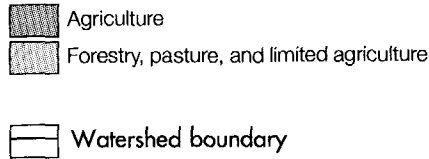


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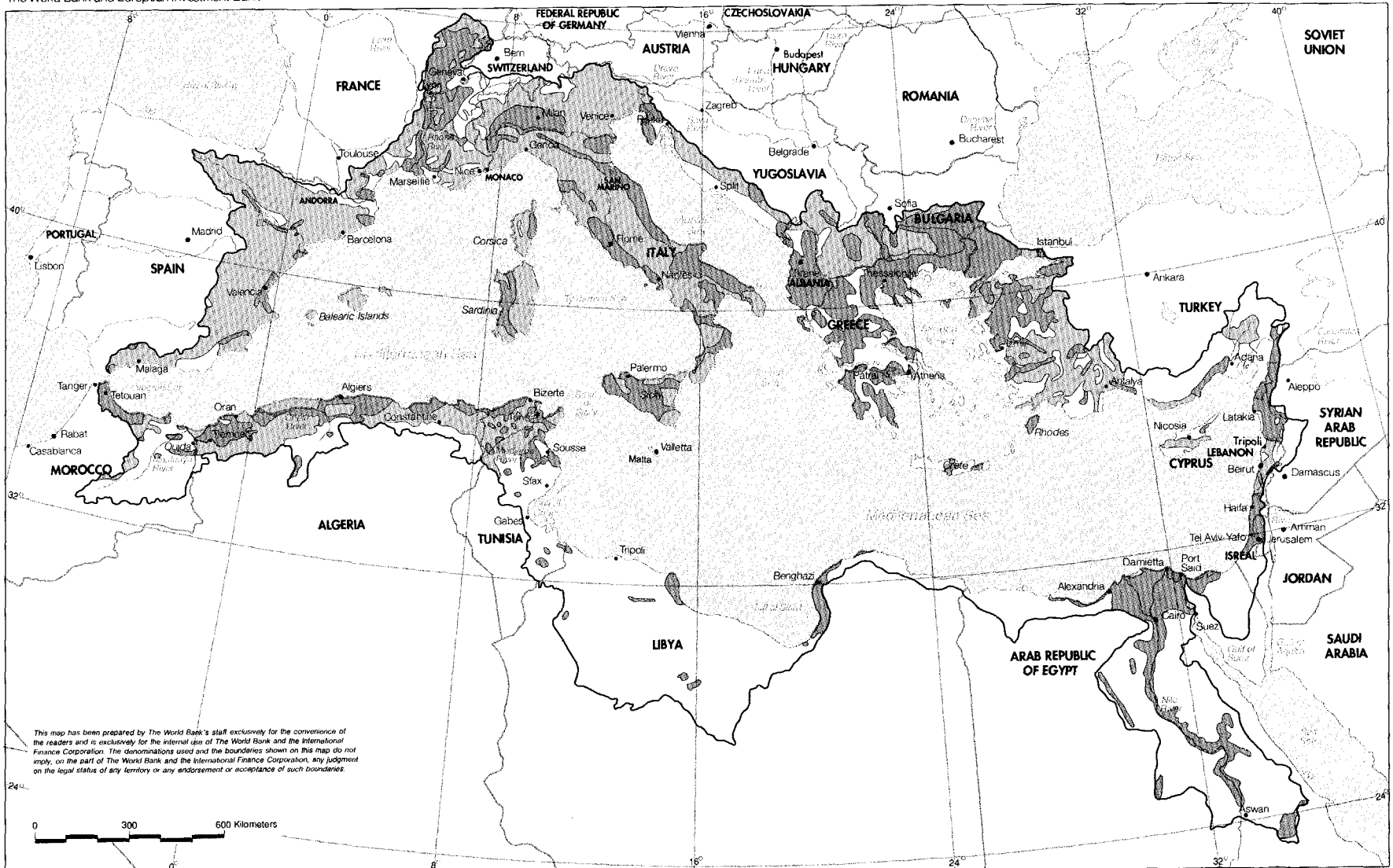


Map 9

Land Capability in the Mediterranean



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