# APPENDIX II

## STRATEGIC ACTION PROGRAMME TO ADDRESS POLLUTION FROM LAND-BASED ACTIVITIES

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# 1. Introduction

The riparian States of the Mediterranean Sea, *conscious* of the economic, social, health and cultural value of the marine environment of the Mediterranean Sea Area; fully aware of their responsibility to preserve and sustainably develop this common heritage for the benefit and enjoyment of present and future generations; recognizing the threat posed by pollution to the marine environment, its ecological equilibrium, resources and legitimate uses; and mindful of the special hydrographic and ecological characteristics of the Mediterranean Sea Area and its particular vulnerability to pollution, have agreed in 1975 to launch an Action Plan for the Protection and Development of the Mediterranean Basin (MAP) and, in 1976, to sign a Convention for the Protection of the Mediterranean Sea against Pollution (Barcelona Convention).

The Contracting Parties to the Barcelona Convention, *recognizing* the danger posed to the marine environment living resources and human health by pollution from land-based sources and activities and the serious problems resulting therefrom in many coastal waters and river estuaries of the Mediterranean Sea, primarily due to the release of untreated, insufficiently treated or inadequately disposed of domestic or industrial discharges; and *desirous* to adapt Mediterranean Action Plan, Barcelona Convention and their protocols to the development of the environmental international law, to the United Nations Conference on Environment and Development (Rio de Janeiro 1992), have adopted in Barcelona in 1995 the phase II of the Action Plan for the protection of the marine environment and sustainable development of the coastal areas of the Mediterranean as well as substantial amendments to the Convention and their Protocols. Furthermore, in Syracuse in 1996 a new revised Protocol for the Protection of the Mediterranean Sea against Pollution from Land-Based Sources and Activities (LBS Protocol) was signed, which takes into account the Global Programme of Action for the protection of the marine environment against pollution from land-based activities adopted in Washington in 1995.

## 1.1 Basis for the preparation of the Strategic Action Programme

In accordance with the 1996 LBS Protocol, the Contracting Parties (Art.1) agreed to take all appropriate measures to prevent, abate, combat and eliminate, to the fullest possible extent, pollution of the Mediterranean Sea Area caused by discharges from rivers, coastal establishments or outfalls, or emanating from any other land-based sources and activities within their territories, giving priority to the phasing out of inputs of substances that are toxic, persistent and liable to bioaccumulate.

To this end, they agreed (Art.5) to elaborate and implement national and regional action plans and programmes, containing measures and timetables for their implementation. As a result, regional action plans and programmes have to be formulated by the Secretariat and considered and approved by the relevant technical body of the Parties within one year at the latest of the entry into force of the amendments to the LBS Protocol.

The regional Strategic Action Programme presented in this document was therefore prepared by the Secretariat as part of a GEF PDF-B Grant with the financial participation of MAP. A first draft text was submitted to a Meeting of Government-designated Experts which was held in Ischia, Italy, from 15 to 18 June 1997 (UNEP(OCA)/MED WG.130/8). The Meeting examined the first draft document and agreed on a number of amendments and corrections/additions. The Strategic Action Programme was then submitted to a second Meeting of Government-designated Experts, held in Athens from 13 to 16 October 1997 (UNEP(OCA)/MED WG.136/4), and their comments and suggestions were also incorporated by the Secretariat who then submitted the

document for adoption to the Meeting of Contracting Parties to the Barcelona Convention (Tunis, 18-21 November 1997). The present programme was adopted by the Tenth Ordinary Meeting of the Contracting Parties according to the provisions of Art.5, 6 and 7 of the 1980 LBS Protocol. The Contracting Parties agreed that, once the 1996 LBS Protocol come into force, the Strategic Action Programme would be resubmitted for adoption according to the provisions of Art.15 of the 1996 Protocol. At that stage, a review of the Strategic Programme would be made to proceed to a possible revision of target dates and activities, if necessary.

This Strategic Action Programme is based on the preliminary findings of the regionally prepared transboundary diagnostic analysis that represents a regional synthesis of actions regarding the protection of the marine environment from land-based activities. The following Table presents the perceived major problems of the Mediterranean region and their associated transboundary elements. Seven major problems have been identified from a review of the results of the work of the Mediterranean Action Plan over the last twenty years, the work of related programmes and the reviews undertaken in the context of the present activity. Five main root causes are identified as resulting in the identified problems, although the relative importance of each cause differs in relation to the individual problems. In addition two major types of action are proposed to address each of the identified problems and again the relative importance of each area of action differs according to the nature of the problem.

The table is prepared on a regional scale. It is not anticipated therefore that all problems occur in each country, nor that the relative importance of the root causes or areas for action is the same in all countries. Rather this table represents a regional overview and perspective of the main problems, their root causes and the areas of proposed action at a regional level.

## Table 1.1 Perceived Major Problems and their Root Causes*

| MAJOR TYPES OF PROBLEMS | TRANSBOUNDARY ELEMENTS OF MAJOR TYPES OF PROBLEMS | MAIN ROOT CAUSES** | TYPES OF ACTION** |
|---|---|---|---|
| DEGRADATION OF COASTAL AND MARINE ECOSYSTEMS | C Damage to transboundary ecosystems, including loss in productivity, biodiversity and stability<br>C Reduction of regional values<br>C Decreased quality of life<br>C Degradation due to pollution and eutrophication<br>C Region-wide loss of revenue | MANAGEMENT<br>FINANCIAL<br>LEGAL<br>HUMAN<br>STAKEHOLDERS | PLANNING<br>RESOURCES |
| UNSUSTAINABLE EXPLOITATION OF COASTAL AND MARINE RESOURCES | C Impacts on habitats and biodiversity<br>C Impacts of physical changes on coastal and beach dynamics<br>C Loss of existing and potential income from fishing and tourism<br>C Conflicts between user groups | MANAGEMENT<br>FINANCIAL<br>STAKEHOLDERS<br>HUMAN<br>LEGAL | RESOURCES<br>PLANNING |
| LOSS OF HABITATS SUPPORTING LIVING RESOURCES | C Damage to migratory species and their habitat<br>C Endangered biotic resources<br>C Loss of values for development<br>C Habitat and food web changes | MANAGEMENT<br>FINANCIAL<br>STAKEHOLDERS<br>HUMAN<br>LEGAL | RESOURCES<br>PLANNING |
| DECLINE IN BIODIVERSITY, LOSS OF ENDANGERED SPECIES AND INTRODUCTION OF NON-INDIGENOUS SPECIES | C Loss of regional values<br>C Damage to endangered and endemic species of regional and global significance<br>C Loss of genetic biodiversity | MANAGEMENT<br>FINANCIAL<br>LEGAL<br>HUMAN<br>STAKEHOLDERS | PLANNING<br>RESOURCES |
| INADEQUATE PROTECTION OF COASTAL ZONE AND MARINE ENVIRONMENT AND INCREASED HAZARDS AND RISKS | C Reduction of regional values<br>C Loss or revenues<br>C High costs of curative interventions<br>C Decreased quality of life | MANAGEMENT<br>FINANCIAL<br>LEGAL<br>HUMAN<br>STAKEHOLDERS | PLANNING<br>RESOURCES |
| WORSENED HUMAN RELATED CONDITIOINS | C Human health impacts<br>C Costs of dealing with human migration<br>C Reduced human and institutional capacity<br>C Reduction of development potential<br>C Increased poverty with transboundary impacts | MANAGEMENT<br>FINANCIAL<br>LEGAL<br>HUMAN<br>STAKEHOLDERS | PLANNING<br>RESOURCES |
| INADEQUATE IMPLEMENTATION OF EXISTING REGIONAL AND NATIONAL LEGISLATION | C Ineffective protection of the marine and coastal environment<br>C Inadequate monitoring of pollution and consequently inadequate data interpretation for managerial purposes<br>C Poor public education and awareness regarding scientific and economic values and technical options | LEGAL<br>MANAGEMENT<br>FINANCIAL<br>HUMAN<br>STAKEHOLDRS | PLANNING<br>RESOURCES |

* The analysis in this table does not necessarily apply to all Contracting Parties to the Barcelona Convention.

** Main root causes and types of action are indicated in the descending order of significance.

| MAIN ROOT CAUSES | |
|---|---|
| **LEGAL**<br>Inadequate legal and institutional framework | • Inadequate cooperation on the regional level<br>• Inadequate legislation at the national level relevant to regional problems<br>• Inadequate institutional framework and capacity necessary for the implementation of legislation , ICZM and EIA<br>• Inadequate pollution compliance and trend monitoring<br>• Ineffective coordination between various governmental sectors and local and national level |
| **MANAGEMENT**<br>Inadequate planning and management at all levels | • Poorly coordinated intersectorial planning and management<br>• Lack of integrated watershed / coastal zone management plans<br>• Lack of application of ICZM and its tools<br>• Inappropriate harvesting practices in fisheries<br>• Inadequate pollution control strategies with monitoring |
| **HUMAN**<br>Insufficient human and institutional capacity | • Inadequate human and institutional capacity (at national and local level) for the implementation of the legislature and ICZM with its tools]<br>• Inadequate human and institutional capacity (at national and local level) for compliance and trend monitoring of pollution |
| **STAKEHOLDERS**<br>Insufficient involvement of stakeholders | • Lack of general environmental awareness<br>• Poor identification of stakeholders<br>• Lack of adequate participation of stakeholders in the planning and management of environmental problems |
| **FINANCIAL**<br>Inadequate financial mechanisms and support | • Lack of effective economic instruments<br>• Lack of internalisation of environmental costs<br>• Low monetary value assigned to environment within national economic policies |
| **TYPES OF ACTION** | |
| **PLANNING**<br>Integrated planning and management and reduction of pollution | • Improvement of legal and institutional framework at regional and national level for ICZM and associated tools<br>• Development of integrated management for river basin / coastal areas and for urban agglomerations<br>• Improved involvement of stakeholders in environmental decision-making<br>• Identification and elimination of pollution hot-spots<br>• Adequate compliance and trend monitoring<br>• Full implementation of relevant regional and national legislation |
| **RESOURCES**<br>Resources management | • Full implementation of relevant regional and national legislation<br>• Sustainable management of resources<br>• Protection of biodiversity, endangered, endemic and migratory species, habitats and sensitive areas<br>• Development of sustainable fisheries aquaculture and tourism |

## 2. Objectives

The Strategic Action Programme (SAP) aims at improving the quality of the marine environment by better shared-management of the land-based pollution. SAP also aims at facilitating the implementation by the Contracting Parties of the LBS Protocol. Therefore, it is designed to assist Parties in taking actions individually or jointly within their respective policies, priorities and resources, which will lead to the prevention, reduction, control and/or elimination of the degradation of the marine environment, as well as to its recovery from the impacts of land-based activities. Achievement of the aims of the SAP will contribute to maintaining and, where appropriate, restoring the productive capacity and biodiversity of the marine environment, ensuring the protection of human health, as well as promoting the conservation and sustainable use of marine living resources.

The specific objectives of the SAP Programme are:

- Formulation of principles, approaches, measures, timetables and priorities for action;
- Preparation of a priority list for intervention and investments ("investment portfolio");
- Analysis of expected baseline and additional actions needed to resolve each transboundary priority problem;
- Identification of the elements and preparation of guidelines for the formulation of national action plans for the protection of the marine environment from land-based activities; and
- Identification of potential roles for Non-Governmental Organizations in the implementation of the SAP.

Since the adoption of the Mediterranean Action Plan in 1975, important progress have been made by the Mediterranean countries for the protection of the environment both at the national and the regional levels. At the regional level the progress is made evident by the adoption of important amendments of the existing legal texts as well as the adoption of new legal instruments.

In view of the unequal starting point and of the different level of socio-economic development, the progress marked at the national level has not been homogeneous; however, the Mediterranean countries have all created competent institutions in charge of the protection of the environment, often at a very high political level, and have adopted legislative measures and regulations for the protection of the environment. Since 1973, the European Union countries have adopted five programmes for the protection of the environment, the last one being dated 1993, which have been the basis for a large number of provisions related to the protection of the environment.

The SAP is addressed to all Contracting Parties and proposes common objectives. However, it is evident that the implementation of the proposed activities should take into account the state of the environment of each country. The timing for targets and for activities may also be different for different countries, taking into account e.g. of the capacity to adapt and reconvert existing installations, the economic capacity and the need for development.

The 1995 Barcelona Resolution is an agreement made at ministerial level aiming at the elimination by the year 2005 of the greatest number of substances which are toxic, persistent and bioaccumulable and it was fully taken into account in the preparation of the SAP.

For the implementation of the SAP at the regional level, the MAP Coordinating Unit will make full use of the capabilities and the technical competences of its Regional Activity Centres and of other competent intergovernmental organizations.

## 3. Principles and Obligations

The Contracting Parties shall individually or jointly take all appropriate measures in accordance with the provisions of the Convention to prevent, abate, combat and to the fullest possible extent eliminate pollution of the Mediterranean Sea Area and to protect and enhance marine environment in that Area so as to contribute towards its sustainable development.

*In accordance with the provisions of the LBS Protocol, the Parties undertake to eliminate pollution deriving from land-based sources and activities, in particular to phase out inputs of the substances that are toxic, persistent and liable to bioaccumulate listed in annex I to the Protocol*

In order to protect the environment and contribute to the sustainable development of the Mediterranean Sea Area, the Parties shall:

a) *Apply the precautionary principle*, by virtue of which where there are threats of serious or irreversible damage, the lack of full scientific certainty should not be used as a reason for postponing cost-effective measures to prevent environmental degradation;

b) *Apply the polluter pays principle*, by virtue of which the cost of pollution prevention, control and reduction measures are to be borne by the polluter, with due regard to the public interest;

c) *Undertake environmental impact assessment* for proposed activities that are likely to cause a significant adverse impact on the marine environment and are subject to an authorization by competent national authorities;

d) *Accord priority to integrated pollution control* as an important part of the move towards a more sustainable balance between human activity and socio-economic development, on the one hand, and the resources and regenerative capacity of nature, on the other;

e) *Commit themselves to promote the integrated management of the coastal zones,* taking into account the protection of areas of ecological and landscape interest and the rational and sustainable use of natural resources;

f) In implementing the Convention and the LBS Protocol the Parties shall:

   i) *elaborate and implement, individually or jointly, as appropriate, national and regional action plans and programmes, containing measures and timetables;*

   ii) adopt priorities and timetables taking into account the elements set out in annex I of the Protocol and periodically revise them;

iii) take into account *the Best Available Techniques (BAT) and Best Environmental Practices (BEP)* including, where appropriate, clean production technologies, taking into account the criteria set forth in Annex IV of the Protocol;

iv) *take preventive measures* to reduce to a minimum the risk of pollution caused by accidents;

g) Ensure that, in compliance with the community right-to-know, their competent authorities shall *give to the public appropriate access to information* on the environmental state in the field of application of the Convention and the Protocols, on activities or measures adversely affecting or likely to affect it and on activities carried out or measures taken in accordance with the Convention and the Protocols. (article 15 of the Convention);

h) Ensure routine and standardized reporting of toxic emissions to air, water and land (including off-site disposal) by polluting facilities - private, state, or municipal. Ensure active public dissemination by the competent authorities of the data reported bearing in mind legitimate needs for business confidentiality.

The Strategic Action Programme will be consistent with the Global Programme of Action (Washington, 1995) and with the relevant provisions of the Convention on the Law of the Sea, of the Convention on Biological Diversity, of the Convention on Climatic Change and with the legal instruments and actions plans and measures adopted by the Contracting Parties to the Barcelona Convention.

States shall cooperate in a spirit of global partnership to conserve, protect and restore the health and integrity of the Earth's ecosystem. In view of the different contributions to global environmental degradation, *States have common but differentiated responsibilities*. The developed countries acknowledge the responsibility that they bear in the international pursuit of sustainable development in view of the pressures their societies place on the global environment and of the technologies and financial resources they command.

The new LBS Protocol means a change in the strategy selected for the protection of the Mediterranean environment; this new strategy is based on sustainability and its purpose is to achieve integrated prevention and control of pollution arising from land-based sources and activities, in particular through the application of clean technologies, Best Available Techniques (BAT) and Best Environmental Practice (BEP)**.**

# 4. Establishment of priorities for action

The proposed priorities for action are based on the results of MED POL and the Reports on pollution "hot spots", "critical habitats" and "sensitive areas" (areas of concern) and also take in account the LBS Protocol, which in Annex 1, states "*In preparing action plans, programmes and measures, the Parties, in accordance with the Global Programme of Action, will give priority to substances that are toxic, persistent and liable to bioaccumulate, in particular persistent organic pollutants (POPs), as well as to wastewater treatment and management".*

In general, priority actions for the prevention, reduction and elimination of pollution are established taking in account four pollution-related factors:

i) degradation of the marine environment;

ii) perturbation of the biological diversity;

iii) land-based origin; and

iv) transboundary nature (causes or effects).

# 5. Analysis of targets and activities

An analysis of targets and activities is needed to resolve each transboundary priority problem. These targets and activities would be national or regional and would be of legal, institutional or technical nature.

Taking into account the Global Programme of Action (Washington, 1995) and the LBS Protocol, the following categories of substances have been selected as priorities. The selected categories of substances cover urban environment and industrial development.

## 5.1 Urban environment

Large and even medium-size cities pose similar problems and should be studied in an integrated manner. Air pollution, generation, collection and management of solid waste products, collection and disposal of domestic wastewater, supplies of drinking water: in most cities these problems are usually made worse by small and medium-size industries located within the cities and by industrial agglomerations in the outskirts.

### 5.1.1 Municipal sewage

Recognizing variations in local conditions, municipal sewage improperly discharged into freshwater and coastal environments may present a variety of concerns. These are associated with: (a) pathogens that may result in human health problems through exposure via bathing waters or contaminated shellfish, (b) suspended solids, (c) significant nutrient inputs, (d) biochemical oxygen demand (BOD), (e) plastics and other marine debris, (f) ecosystem population effects, (g) heavy metals and other toxic substances, e.g. hydrocarbons, where industrial sources may discharge into municipal collection systems, and (h) influx of rain waters containing polluting substances.

Environmental effects associated with domestic waste water discharges are generally local with transboundary implications in certain geographic areas. The commonality of sewage-related problems throughout coastal areas of the world is significant. Consequently, domestic waste water discharges are considered one of the most significant threats to costal environments worldwide. In the Mediterranean region, this problem has been made worse by tourism and its seasonal nature, which makes it necessary to have treatment plants which are only used for a few months every year.

Most of the secondary treatment plants are not operated and maintained adequately due to insufficient financial resources and a lack of technical expertise. Many countries are now placing special emphasis on designing waste water treatment facilities to reuse effluents.

One of the most common and worrying environmental effects of urban wastewater discharges is the gradual destruction of habitats and, in particular, of meadows of phanerogames, with the resulting decrease in biodiversity.

**Proposed targets**

- *By the year 2025, to dispose all municipal waste water (sewage) in conformity with the provisions of the LBS Protocol.*

- *By the year 2005, to dispose sewage from cities and urban agglomerations exceeding 100.000 inhabitants and areas of concern in conformity with the provisions of the Protocol.*

**Proposed activities at the Regional level**

- By the year 2000, to update and adopt the 1986 guidelines for sewage treatment and disposal and, as appropriate, environmental quality criteria and standards.

- To develop programmes for sharing and exchanging technical information and advice regarding environmentally sound sewage treatment and facilities, including the use of treated waste water and of sewage sludge.

- To promote research programmes to identify and validate sewage treatment technologies.

**Proposed activities at the National level.**

- To update and adopt, over a period of two years, national regulations concerning sewage discharges into the sea and rivers, which take into account the LBS Protocol and especially its Annex II and whenever appropriate, the common measures already adopted by the Parties.

- By the year 2005, to develop National Plans and Programmes for the environmentally sound Management of Sewage, (NPS), and to this end to ensure:

  i) By the year 2005, that the coastal cities and urban agglomerations of more than 100.000 inhabitants are connected to a sewer system and dispose all waste water in conformity with a national regulation system;

ii) To locate coastal outfalls so as to obtain or maintain agreed environmental quality criteria and to avoid exposing shell fisheries, water intakes, and bathing areas to pathogens and to avoid the exposure of sensitive environments (such as lagoons, seagrass beds, etc.) to excess nutrient or suspended solid loads;

iii) To promote the primary, secondary and, where appropriate and feasible, tertiary treatment of municipal sewage discharged to rivers, estuaries and the sea;

iv) To promote and control the good operation and proper maintenance of existing facilities;

v) To promote the reuse of the treated effluents for the conservation of water resources. To this end, infrastructural measures, treatment at source and the segregation of industrial effluents, shall be encouraged, as well as:

a) the beneficial reuses of sewage effluents and sludges by the appropriate design of treatment plant and processes and controls of the quality of influent waste waters in accordance with national regulations;

b) the environmentally sound treatment when domestic and compatible industrial effluents are treated together;

vi) To promote the separate collection of rain waters and municipal waste waters and ensure treatment of first rain waters considered particularly polluting;

vii) To identify the availability and sustainability of productive uses of sewage sludge, such as land-spreading, composting, etc.

viii) To prohibit the discharge of sludges into water in the Protocol Area.

### 5.1.2 Urban Solid Waste

Urban solid waste can affect the pollution of the sea in a number of ways: through the release of raw waste into the sea, directly or indirectly, especially plastics, and through emissions into the atmosphere of pollutants which may be generated by the combustion of these waste products.

**Proposed targets**

- *By the year 2025 at latest, to base urban solid waste management on reduction at source, separate collection, recycling, composting and environmentally sound disposal.*

- *By the year 2005 at latest, to base urban solid waste management on reduction at source, separate collection, recycling, composting and environmentally sound disposal in all cities and urban agglomerations exceeding 100.000 inhabitants and areas of concern*.

**Proposed activities at the Regional level**

- By the year 2000 to formulate and adopt guidelines for environmentally suitable and economically feasible systems of collection, including separate collection, and disposal of urban solid waste.

- By the year 2005, to develop programmes for the reduction and recycling of urban solid waste.

**Proposed activities at the National level**

- By the year 2000 to develop national plans and programmes for the reduction at source and environmentally sound management of urban solid waste.

- By the year 2005 to establish environmentally suitable and economically feasible systems of collection and disposal of urban solid waste in cities and urban agglomerations of more than 100,000 inhabitants.

- To promote the reduction and recycling of urban solid waste.

### 5.1.3 Air Pollution

Air pollution is found in most cities in the region with populations exceeding 1 million; air concentrations of particulate and lead often exceed WHO guidelines by a multiple of two to five and annual average SO2 levels reach more than 100 micro g/$m^3$ in many cities near refineries, and high sulphur near fuel-oil-fired power plants and industries. Vehicles are a major source of urban air pollution. Air pollution in cities has a substantial impact on health.

**Proposed targets**

- *By the year 2025, the levels of air pollutants in cities shall be in conformity with the provisions of the Protocol and other internationally agreed provisions.*

- *By the year 2005, the levels of air pollutants in cities exceeding 100.000 inhabitants and in areas of concern shall be in conformity with the provisions of the Protocol and other internationally agreed provisions.*

**Proposed activities at the Regional level**

- By the year 2005, to formulate and adopt air quality objectives for atmospheric pollutants.

**Proposed activities at the National level for mobile sources**

- To promote traffic management and give priority to the use of public transport.
- To promote the use of lead-free petrol and low-level aromatic hydrocarbons petrol.
- To improve the inspection and maintenance of vehicles and the renovation of the oldest vehicles (through economic incentives).
- To pursue increased regional and domestic natural gas development in order to substitute high sulphur fuel oil with natural gas and natural gas conversion for urban proximities.
- To promote the introduction of buses using gaseous fuel or other alternative forms of energy instead of diesel oil.
- To support and encourage the participation of the public transport services in the above activities.

## 5.2 Industrial development

The industrial development of the Mediterranean countries varies greatly and its capacity to generate pollution and cause damage to the environment is unanimously recognized. From the thirty sectors of activity primarily considered in the Annex I of the LBS Protocol, twenty-one are industrial.

On an international scale, priority has been given to toxic[1] persistent and bioaccumulable pollutants (TPBs) for their effects on human health, biodiversity and the preservation of ecosystems and long-term and long-distance effects, and less attention is paid to other pollutants, such as toxic and non-persistent or not-bioaccumulable substances, suspended solids, biodegradable organic matter and nutrients, because their effects are much more localized and less persistent. These pollutants are generated in large quantities by industries and their discharge into the environment can cause damage to human health, ecosystems, habitats and biodiversity.

Most countries in the region have an important public industrial sector which is composed of large industries. Despite the diversity of situations and problems, the public industrial sector in general includes: Energy production; Oil refineries; Petrochemicals; ; Basic iron and steel metallurgy; Basic aluminium metallurgy; Fertilizer production; Paper and paper pulp; Cement production.

[1] Toxicity includes endocrine disrupting effects

A programme concerning the reduction and to the fullest possible extent elimination of industrial pollution should be applied by all the industrial installations but it could start with the public sector enterprises, which would set an example and encourage private companies.

**Proposed targets**

- *By the year 2025, point source discharges and air emissions into the Protocol Area from industrial installations to be in conformity with the provisions of the Protocol and other agreed international and national provisions.*.

- *Over a period of 10 years, to reduce by 50 % discharges, emissions and losses of substances that are toxic, persistent and liable to bioaccumulate from industrial installations.*

- *Over a period of 10 years, to reduce by 50% discharges, emissions and losses of polluting substances from industrial installations in hot spots and areas of concern.*

The public industrial sector shall share these targets.

**Proposed activities at the Regional level**

- By the year 2005, to formulate and adopt guidelines for industrial waste water treatment and disposal.

- By the year 2010, to formulate and adopt, as appropriate, environmental quality criteria and objectives, and emission limit values for point source discharges into water or air.

- To develop programmes for sharing and exchanging technical information and advice regarding environmentally sound waste water treatment and facilities, including the use of treated waste water, sludge and waste.

- To promote research programmes to identify and validate waste water treatment technologies.

- To prepare guidelines for the application of BAT, BEP and clean technology for industries.

- To support the development and application of the Environmental Management and Audit Schema (EMAS and ISO 14000).

**Proposed activities at the National level**

- To make or update in as short a period as possible an inventory of point source discharges and emissions of pollutants in hot spots and areas of concern.

- To make or update in as short a period as possible an inventory of point source discharges and emissions of pollutants from the public industrial sector.

- To prepare or update and adopt, as soon as possible, national regulations concerning point source discharges of industrial waste water into the Protocol Area which takes into account the guidelines, common criteria and standards adopted by the Parties.

- To give priority to the environmental problems of small and medium-size companies, favouring the creation of associations in order to minimize waste generation and achieve a joint handling of their wastewater.

- To reduce discharges and emissions of pollutants as much as possible and, in order to do so, to promote the implementation of environmental audits and apply BEP and, if possible, BAT in industrial installations that are source of pollutants.

### 5.2.1 Substances that are Toxic, Persistent and liable to Bioaccumulate (TPB)

Substances that are toxic, persistent and liable to bioaccumulate include organic and inorganic substances. The former are called "Persistent Organic Pollutants" and the latter include some heavy metals (Hg, Cd and Pb) and some organometallic compounds.

#### a) Persistent Organic Pollutants (POPs)

Persistent organic pollutants (POPs) are a set of organic compounds that: (I) possess toxic characteristics, including effects on the function of the endocrine system, (ii) are persistent, (iii) are liable to bioaccumulate, (iv) are prone to long-range transport and deposition, and (v) can result in adverse environmental and human health effects at locations near and far from their source. POPs are typically characterized as having low water solubility and high fat solubility. Most POPs are anthropogenic in origin. Anthropogenic emissions, both point and diffuse, are associated with industrial precesses, product use and applications, waste disposal, leaks and spills, and combustion of fuels and waste materials. Once dispersed, clean-up is rarely possible. Because many POPs are relatively volatile, their remobilization and long-distance redistribution through atmospheric pathways often complicate the identification of specific sources.

POPs have long environmental half-lives. Accordingly, successive releases over time result in the continued accumulation and ubiquitous presence of POPs in the global environment.

The primary transport routes into the marine and costal environment include atmospheric deposition and surface run-off. Regional and global transport is predominately mediated by atmospheric circulation, but also occurs through sediment transport and oceanic circulation. Movements may also occur through a successive migration of short-range movements resulting from a sequence of volatilization, deposition and revolatization processes. Due to these transport patterns and chemical characteristics, there is growing evidence of the systematic migration of these substances to cooler latitudes.

Consistent with decision 18/32 adopted by the UNEP Governing Council in May 1995 and with the Global Programme of Action (Washington, 1995), the LBS Protocol states in Annex I:

(i) *"In preparing action plans, programmes and measures, the Parties, in accordance with the Global Programme of Action, will give priority to substances that are toxic, persistent and liable to bioaccumulate, in particular persistent organic pollutants (POPs), as well as to wastewater treatment and management";*

*(ii) "The following categories of substances and sources of pollution will serve as guidance in the preparation of action plans, programmes and measures: 1. Organohalogen compounds and substances which may form such substances in the marine environment. Priority will be given to DDT; Aldrin, Dieldrin, Endrin; Chlordane; Heptachlor; Mirex; Toxaphene; Hexachlorobenzene; PCBs; Dioxins and Furans*".

**a.1. Twelve Priority POPs**. The twelve substances identified by the LBS Protocol are organochlorine compounds and can be divided into three groups:

i) Pesticides: *DDT; Aldrin, Dieldrin, Endrin; Chlordane; Heptachlor; Mirex; Toxaphene; and Hexachlorobenzene.*

ii) Industrial chemicals: *PCBs (polychlorobiphenyles)* and

iii) Unwanted contaminants: *Hexachlorobenzene; Dioxins and Furans.*

**Pesticides.** The use of the nine pesticides mentioned above is almost completely prohibited in the Mediterranean Region. *Hexachlorobenzene* (HCB) is a fungicide which was used for treating seeds and for preserving wood. It is also an unwanted contaminant of the manufacture of industrial chemical products, such as *carbon tetrachloride, trichloroethylene and pentachlorobenzene,* and it is an impurity present in several pesticides, such as *pentachlorophenol* (PCP) and others.

**Industrial chemicals**. PCBs or *polychlorobiphenyles* are mixtures of chlorinated hydrocarbons which have been extensively used since 1930 as dielectrics in transformers and condensers and to a lesser extent as hydraulic liquids and nonconductors. Certain PCB substitutes are also dangerous and should be assessed.

**Unwanted contaminants: Hexachlorobenzene; Dioxins and Furans.** *Hexachlorobenzene* is also a contaminant resulting from the manufacture of some industrial chemical products, as indicated above (see “Pesticides”).

*Dioxines and Furans*. The terms *dioxins and furans* are used to describe two groups of environmental pollutants: *polychlorinated dibenzo-p-dioxins (PCDD) and polychlorinated dibenzofurans (PCDF)*. Of these 210 different substances, the real toxins are the 17 isomers with chlorine substituted in the 2,3,7,8 positions, the most toxic is the *2, 3, 7, 8-tetrachlorodibenzo-p-dioxin (2,3,7,8 TCDD)*, the toxicity of the other 16 compounds are related with the toxicity of this substance.

*Dioxins and furans* have no use as such, but they can be found as contaminants in some products and can be produced in combustion processes. The sources of *dioxins and furans* can be of natural or human origin. Natural sources include forest fires, volcanic eruptions or enzymatic and photolytic reactions. Studies of sediment cores in lakes near industrial centres have shown that *dioxins and furans* were quite low until about 1920. These studies show increases in concentration of *dioxins and furans* from 1920 to 1970. Declining concentrations have been measured since that time. These trends correspond to *chlorophenol* production trends. There is no doubt today that the presence of compounds of *dioxins and furans* in the environment occurs primarily as a result of anthropogenic practices.

The most important anthropogenic sources of dioxins and furans are:

i) Combustion installations: incineration of urban, industrial and hospital waste, combustion of residual sludges, fossil power plants;

ii) Small combustion sources: car engines, domestic heating;

iii) The manufacture and use of certain pesticides, especially *chlorophenoxyacids (2.4-D and 2.4.5-T), chlorinated phenols and PCBs*, in which they are found as impurities;

iv) Other processes, such as paper pulp bleaching, the metallurgy of metals, the recovery of metals, mainly copper wire and electric motors and copper and aluminium turnings;

v) Accidents: fires involving chlorinated materials, mainly chlorophenols and PCB.

**Proposed targets**

- *By the year 2010, to phase out inputs of the 9 pesticides and PCBs and reduce to the fullest possible extent inputs of unwanted contaminants: hexachlorobenzene, dioxins and furans.*

- *By the year 2005, to reduce 50 % inputs of the priority 12 POPs*.

- *By the year 2005, to collect and dispose all PCB waste in a safe and environmentally sound manner.*

**Proposed activities at the Regional level**

- To provide Contracting Parties with technical information and advice on the nine pesticides and PCB substitutes and make appropriate recommendations.

- To develop programmes for sharing and exchanging technical information and advice regarding the environmentally sound disposal of the existing quantities of the nine pesticides and PCBs. These Programmes should consider their progressive elimination, including the decontamination of equipment and containers.

- To prepare guidelines for the application of BEP and if possible BAT by the point sources of dioxins and furans mentioned in the preceding page.

**Proposed activities at the National level**

- To make, over a period of two years, an inventory of quantities and uses of the nine pesticides and PCBs, as well as of the industries which manufacture or condition them.

- By the year 2000, to phase out the use of the nine pesticides, except those uses which involve the safeguarding of human life when the latter is in danger or when a risk/benefit analysis is very conclusive, according to WHO recommendations.

- By the year 2000, to prohibit the manufacture, trade and new use of PCBs and by the year 2010 all existing uses of PCBs.

- To prepare pilot programmes aimed at the safe disposal of the PCBs; these programmes should consider their progressive elimination, including the decontamination of equipment and containers.

- By the year 2000, to organize the collection and environmentally sound disposal of the existing quantities of the nine pesticides.

- To reduce the emission of *HCB, dioxins and furans* as much as possible and, in order to do so, to promote the implementation of environmental audits and apply BEP and if possible BAT to the processes which generate these compounds, such as waste-incineration or recovery of metals, mainly copper wire and electric motors.

**a.2. Other POPs.** The Working Group on Strategies of the Convention on Long-Range Transboundary Air Pollution is preparing a draft Protocol on POPs and noted that, with one reservation, there was general agreement on the inclusion into the protocol of the 12 substances, named here "Priority 12", plus PAHs, *hexabromobiphenyl and chlordecone*, while *short-chain chlorinated paraffins, lindane and pentachlorophenol* required further examination.

**Polycyclic Aromatic Hydrocarbons (PAHs)**. The group PAHs contains hundreds of substances occurring naturally in oil in ppm levels. PAHs are also formed from the incomplete combustion of organic matter and this process is the main source of PAHs in air. PAHs with a molecular weight exceeding 228 are almost completely bound to particles in the air. Also in the aquatic environment PAHs are mainly bound to particles due to their low solubility in water.

In the preparation of the draft Protocol on POPs, the following definition for PAHs has been proposed: *Polycyclic Aromatic Hydrocarbons*, are organic compounds made of two or more condensed benzene rings; and the following six compounds have been proposed as reference substances : *fluoranthene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, indeno(1,2,3.cd)pyrene and benzo(g,h,i)perylene,* named the six Borneff PAHs. Other proposal expand the list to 10, 12, 15, 16 or 22 PAHs compounds. In general *benzo(a)pyrene* is the most commonly used reference substance for PAHs.

The most important sources of PAHs are:

a) Point source: Primary aluminium industry; Power generation; Iron and steel industry; Ferroalloy industry; Shipyards; Petroleum refineries; Creosote production; Production of creosote treated timber; Asphaltic plants and Coke ovens; Cable burning.

b) Diffuse sources: Road construction; Road traffic; Use of creosote treated timber; Domestic coal and wood combustion.

**Proposed targets**

- *By the year 2025, to phase out to the fullest possible extent inputs of PAHs.*

- *By the year 2010, to reduce by 25 % inputs of PAHs.*

**Proposed activities at the Regional level**

- To prepare guidelines for the application of BEP and BAT by the point and diffuse sources of PAHs mentioned in the previous paragraph.

- By the year 2010, to formulate and adopt, as appropriate, emission values for point source discharges and emissions of PAHs.

**Proposed activities at the National level**

- To promote the implementation of environmental audits in the industrial installations that are sources of PAHs mentioned in the previous paragraph and located in selected hot spots.

- To reduce the emission of PAHs as much as possible and, in order to do so, to apply BEP and if possible BAT to the processes which generate these compounds.

**b) Heavy metals (Hg, Cd, Pb) and Organometallic compounds**

**b.1. Heavy metals (Hg, Cd and Pb)**

The Working Group on Strategies of the Convention on Long-Range Transboundary Air Pollution is preparing a draft Protocol on Heavy Metals and noted that there was general agreement on the inclusion into the protocol of mercury, cadmium, lead and their compounds.

*Mercury*. The most important industrial sources of mercury are: combustion of coal in power plants; chlor/alkali production; manufacture and disposal of batteries; waste incineration and roasting and smelting in non-ferrous metal smelters.

*Cadmium*. The most important industrial sources of cadmium are: zinc and lead metal processing; electroplating; the production of cadmium compounds; pigment production; the manufacture and disposal of batteries; the production of stabilizers for plastics and phosphate fertilizers.

*Lead*. The most important industrial sources of lead are: lead metallurgy; the manufacture and disposal of batteries; additives for petrol; enamels and ceramic glazes and glass manufacture.

*Mercury, cadmium and lead* reach the environment through liquid discharges and atmospheric emissions.

**Proposed targets**

- *By the year 2025, to phase out to the fullest possible extent discharges and emissions and losses of heavy metals (mercury, cadmium and lead).*

- *By the year 2005, to reduce by 50 % discharges, emissions and losses of heavy metals (mercury, cadmium and lead)*.

- *By the year 2000, to reduce by 25 % discharges, emissions and losses of heavy metals (mercury, cadmium and lead)*.

**Proposed activities at the Regional level**

- To prepare guidelines for the application of BAT and BEP in the industrial installations that are sources of heavy metals (mercury, cadmium and lead).

- By the year 2010, to formulate and adopt, as appropriate, environmental quality criteria and standards for point source discharges and emissions of heavy metals (mercury, cadmium and lead).

**Proposed activities at the National level**

- To reduce discharges and emissions of heavy metals as much as possible and, in order to do so, to promote the implementation of environmental audits and apply BEP and, if possible, BAT in the industrial installations that are sources of heavy metals, giving priority to installations located in the selected hot spots.

- To prepare National Programmes on the reduction and control of pollution by Heavy Metals.

- To adopt at the national level and apply the common measures for preventing mercury pollution adopted by the Parties in 1987 (releases into the sea, max. conc. 0.050 mg/l).

- To adopt and apply for the industries of the alkaline chloride electrolysis sector, as well as the previous standard, the maximum value of 0.5 grams of mercury in the water per tonne of chlorine production capacity installed.(brine recirculation), 5 grams of mercury in the water per tonne (lost brine technology) and, if possible, 2 g of mercury from total releases into water, air and products).

- To adopt at the national level and apply the anti-pollution common measures for cadmium and cadmium compounds adopted by the Parties in 1989 (releases into the sea, max. conc. 0.2 mg/l).

- To prepare environmental voluntary agreements to which authorities, producers and users are committed on the basis of a reduction plan.

### b.2. Organometallic compounds

Organometallic compounds are compounds where one metal atom is covalently bound to at least one carbon atom. These types of substances are often used as intermediates in chemical industries. Several organometallic compounds decompose rapidly in water and air and are thus less important as environmental contaminants, However, some organometallic substances are sufficiently stable and used as pesticides or stabilizers in other chemical products.

*Organomercuric compounds*. These compounds are used in dyes and as pesticides. The use of these compounds has been drastically reduced in the last 20 years and the input into the environment has therefore decreased.

*Organolead compounds*. Two compounds; *tetramethyllead* (TML) and *tetraethyllead* (TEL), are of major interest due to the large quantities used as additives to petrol. TML and TEL that evaporate from petrol are stable in air and almost insoluble in water, the degradation product trialkyllead is soluble in water and toxic.

*Organotin compounds*. These compounds are formed by a tin atom bound to one, two, three or four alkyl groups; of these, only the *three-alkyltin* is of commercial importance today. *Trialkyltin* compounds (e.g. *tributyltin oxide, tributyltin fluoride, triphenyltin hydroxide*) due to their biocide properties, are used as anti-fouling agent in paints for boats and wood construction in water. They are also used as pesticide in agriculture and as disinfectants in medicine, in cooling systems in industrial installations (power plants, oil refineries) and, due to their physico-chemical properties, as a stabilizing agent for PVC. *Trialkyltin* compounds are lipophilic, very toxic and stable, and their use as antifouling paints and in cooling systems is restricted.

**Proposed targets**

- *By the year 2010, to phase out to the fullest possible extent discharges, emissions and losses of organomercuric compounds and reduce to the fullest possible extent those of organolead and organotin compounds.*

- *By the year 2010, to reduce by 50 % discharges, emissions and losses of organometallic compounds*.

- *To phase out by the year 2005 the use of organomercuric compounds.*

**Proposed activities at the Regional level**

- To prepare guidelines for BAT and BEP in industrial installations that are sources of organometallic compounds.

- By the year 2010, to formulate and adopt, as appropriate, environmental quality criteria and standards for point source discharges and emissions of organometallic compounds.

**Proposed activities at the National level**

- To reduce discharges and emissions of organometallic compounds as much as possible and, in order to do so, to promote the implementation of environmental audits and apply BEP and, if possible, BAT in industrial installations that are sources of organometallic compounds.

- To promote the use of lead-free petrol.

- To make an inventory of the uses and quantities of organomercuric used.

- To adopt at the national level and apply the anti-pollution common measures for the organotin compounds adopted by the contracting Parties in 1989.

- To phase out the use of organotin compounds as anti-fouling agents in cooling systems.

### 5.2.2 Other heavy metals

Besides mercury, cadmium and lead, other heavy metals have characteristics that can represent a danger for the marine environment; they are zinc, copper and chrome and their compounds.

*Zinc*. The most important industrial sources of zinc are: zinc and brass metallurgy; covering of metallic surfaces; galvanizing of steel; manufacture of viscose; and rayon and the manufacture and disposal of batteries.

*Copper*. The most important industrial sources of copper are: copper metallurgy; covering of metallic surfaces; electric cables; and pesticides.

*Chrome*. The most important industrial sources of chrome are: chrome metallurgy; covering of metals; tanneries; textile and wool dyeing; corrosion inhibitors in closed cycle cooling systems.

**Proposed targets**

- *To eliminate to the fullest possible extent pollution of the Mediterranean Sea caused by discharges, emissions and losses of zinc, copper and chrome*.

- *By the year 2010, to reduce discharges, emissions and losses of zinc, copper and chrome*.

**Proposed activities at the Regional level**

- To prepare guidelines for the application of BAT and of BEP in industrial installations which are sources of zinc, copper and chrome.

- By the year 2010, to formulate and adopt, as appropriate, environmental quality criteria and standards for point source discharges and emissions of zinc, copper and chrome.

**Proposed activities at the National level**

- To reduce discharges and emissions of zinc, copper and chrome as much as possible and, in order to do so, to promote the implementation of environmental audits and apply Best Environmental Practice and, if possible, Best Available Techniques in industrial installations which are sources of zinc, copper and chrome, giving priority to installations located in the selected hot spots.

- To adopt at the national level and apply the common measures to control pollution caused by zinc, copper and their compounds adopted by the Parties in 1996 (releases into the sea, max. conc. 1.0 mg/l for zinc and 0.5 mg/l for copper).

### 5.2.3 Organohalogen compounds

Organohalogen compounds consist of a wide group of organic substances with different levels of chloration, and a very diverse uses, from plastics to pesticides. Some organohalogen compounds can be produced by living organisms, mainly microorganisms. However, their presence in the environment occurs primarily as a result of anthropogenic activities. The production and use of these compounds may have negative environmental effects. The most dangerous have been treated in the chapter on POPs. This chapter deals with the organohalogen compounds that can have negative environmental effects which require their reduction, control and monitoring.

The organohalogen compounds can be divided in:

#### a) Halogenated Aliphatic Hydrocarbons

**Chlorinated solvents**. Chlorinated solvents are commercially produced in large quantities; the most commonly used solvents are: *dichloromethane (methylene chloride); 1,1,1-trichloroethane; trichloroethylene; and tetrachloroethylene (perchloroethylene)*. European production of these four solvents was approximately 400.000 tonnes/year in 1994, and world production was around 1 million tonnes in 1992.

*1,1,1-Trichloroethane* has been a preferred solvent for the "cold cleaning" of components in a variety of industries. As a result of its ozone depletion potential, its use has been prohibited by the Montreal Protocol since 1996.

*Trichloroethylene* is very widely used as a solvent for metal surface preparation within the engineering industry and *Perchloroethylene* is the principal solvent used for dry cleaning and for degreasing metals.

*1,2-dichloroethane* is used in the chemical industry as an intermediary in vinylchloride production. This substance is also used in the pharmaceutical and rubber industries. *Vinylchloride* is used in the production of *polyvinylchloride* (PVC). The total PVC market in the world is about 20 million tonnes. Emissions of *1.2 dichloroethane and vinylchloride* takes place almost exclusively into the atmosphere.

The residue obtained after polymerization of *vinylchloride* is called EDC-tar *(ethylene dichloride tar*). Volumes of about 70.000 tonnes of EDC-tar may be produced every year in north-western Europe only. EDC-tar was, until mid-seventies, dumped in the Nord Sea and other seas. It is currently used to recover solvents and other chemical components before incineration. Incomplete combustion of EDC-tar results in the formation of new more stable chlorinated substances emitted as gas.

*Trichloromethane* (Chloroform). Most chloroform is used for the production of *chlorofluorocarbons* (CFCs). It is also used as a solvent in the pharmaceutical and bandages industries and as an intermediate in the production of paints and pesticides. The chlorination of swimming pools and drinking water also leads to the formation of trichloromethane, which is also formed by the decomposition of 1,2 dichloromethane in the exhaust fumes of motor vehicles and by the decomposition of trichloroethene in the atmosphere. Atmospheric emissions account for the largest part of the overall emissions and the chemical industry in particular is responsible for trichloromethane emissions.

**Chlorinated Paraffins (CP).** Chlorinated paraffins (CPs) are commercial products of polychlorinated alkanes with carbon chain lengths of C10 to C30. CP are lipophilic substances with very low water solubility.

The most important industrial uses of chlorinated paraffins are: plasticizers of paints and coatings; plasticizers of sealing products; fluids for working on metals; flame retardants for rubber, plastic materials and textiles. The world production of CPs is estimated at 300.000 tonnes.

This class of chlorinated aliphatic compounds is of low volatility and the distribution of CP is mainly due to aquatic transport where CPs are most probably are absorbed by particles and surface film. The CP more dangerous for the environment are the short-chain chlorinated paraffins, especially paraffins with a chain length of between 10 and 13, whose chlorine content is greater than 50% of their weight. CPs may contaminate the environment as such, but can also form other serious pollutants, e.g. when are processed at high temperatures.

**b) Halogenated Aromatic Hydrocarbons**

**Chlorobenzenes.** All chlorinated benzenes are used in chemical industries. *Mono-, di-, and trichlorobenzenes* was utilized as solvents and chemical intermediates in pesticides and pharmaceuticals. Large quantities of chlorinated benzenes are produced every year. *1,4 dichlorobenzene* is also used as a pesticide and air freshener, *tri and tetrachlorobenzenes* have been used as PCB replacement agents in transformers and capacitors and in heat transfer media.

Chlorobenzenes are also produced unintentionally in a number of industrial processes, e.g. in the manufacture of magnesium and in the manufacture of chlorinated solvents and pesticides. Clorobenzenes are mainly transported in the air due to their volatility and the risk to aquatic ecosystems is therefore considered to be negligible. *Hexachlorobenzene* has been treated as a priority POP.

**Polychlorinated naphtalenes (PCNs).** PCNs are still produced, even though large-scale production has ceased. Commercial PCN products are mixtures of naphtalenes substituted with 1-8 chlorine atoms. PCNs are used as insulating material in capacitors, fire retardants, wood preservatives and pesticides. *Polychlorinated naphtalenes* are formed by the

combustion of materials containing organohalogen material and during the production of magnesium.

**Polybrominated diphenyl ethers and polybrominated biphenyls**. *Pentabrominated diphenyl ether* (PBDEs) and *Polybrominated biphenyls* (PBBs) are used exclusively as flame retardants in electronics, textiles and engineering plastics. The worldwide production of PBDEs in 1990 was estimated at 4000 tonnes and the production of *decabromobiphenyl* is around 1000 tonnes.

The International Programme on Chemical Safety (IPCS) has made the following recommendations:

> *"Persistence in the environment and accumulation in organisms suggest that commercial PDBEs should not be used";*
>
> *"Human beings and the environment should not be exposed to PBBs in view of their high persistence and bioaccumulation and potential adverse effects at very low levels after long-term exposure. Therefore, PBBs should no longer be used commercially"*.

**c) Chlorinated Phenolic Compounds**

Chlorophenolic compounds are chlorinated aromatic substances with one or several hydroxy groups, bound to aromatic nuclei. Their acidic character influences the behaviour of these compounds in the aquatic environment considerably, depending on the pH- value of the receiving water bodies. *Chlorophenols* are toxic compounds effecting primarily the energy metabolism.

Chlorophenols, and mainly *pentachlorophenol,* have been used extensively- and are still used in many countries- as pesticides (mainly fungicides and bactericides) in wood protection. The main releases of chlorinated phenols into the aquatic environment are derived from the use of *pentachlorophenol* and from discharges of bleaching effluents from pulp mills. The two dominating factors influencing the formation of chlorophenols are the amount of elemental chlorine used and the lignin content of the unbleached pulp. This process in the formation of chlorinated phenols, guaiacols and catechols. Chlorophenols may be a source of dioxins.

**d) Organohalogenated Pesticides**

A number of different organohalogenated compounds are used as pesticides. All these compounds have some toxic characteristics and some of them can disrupt the endocrine systems of humans and wildlife and must be used with caution; the reduction of their use must therefore be a primary target. The POPs and chlorophenols that are used as pesticides are mentioned above. The pesticides not yet mentioned and identified as more dangerous for the marine environment are the Lindane and the Chlorophenoxy acids.

The insecticide Lindane is the *gamma isomer of hexachlorocyclohexane* (HCH). The alpha and beta isomers are also present in the raw product and contribute to environmental contamination. The beta isomer is the most persistent compound.

*Chlorophenoxy acids,(2,4 D and 2,4,5 T)* are widely used and have caused contamination of ground water. To date they have not been detected in samples from the marine environment. The relationship between these pesticides and dioxins is a matter of concern.

**Proposed targets**

- *To eliminate to the fullest possible extent pollution of the Mediterranean Sea caused by discharges, emissions and losses of organohalogen compounds.*

- *By the year 2010, to reduce discharges, emissions and losses into the Mediterranean Sea of organohalogen compounds*.

**Proposed activities at the Regional level**

- To prepare guidelines for the application of BAT and of BEP in industrial installations which are sources of organohalogen compounds.

- By the year 2010, to formulate and adopt, as appropriate, environmental quality criteria and standards for point source discharges and emissions of organohalogen compounds.

**Proposed activities at the National level**

- To reduce discharges and emissions of organohalogen compounds as much as possible and, in order to do so, to promote the implementation of environmental audits and apply Best Environmental Practice and, if possible, Best Available Techniques in the industrial installations which are sources of organohalogen compounds, giving priority to installations located in the selected hot spots.

- To prepare National Programmes on the reduction and control of pollution by organohalogen compounds.

- To adopt at the national level and apply the anti-pollution common measures adopted by the Parties.

- To regulate releases of organochlorines by the paper and paper pulp industries by limiting discharges measured as AOX (adsorbable organic halogen) to 1 kg per tonne of pulp produced and by reducing it further through the promotion of alternative bleaching to molecular chlore and the use of BAT and BEP.

- To make an inventory of the uses and quantities of chlorinated paraffins and to reduce the use of short-chain chlorinated paraffins.

- To make an inventory of the uses and quantities of pesticides.

- To reduce and control the manufacture and use of PDBEs and PBBs.

- To reduce and control the manufacture and use of certain pesticides, such as lindane, 2.4-D and 2.5-T herbicides, and tri-, tetra- and penta chlorophenols, used in the treatment of wood.

- To participate in the programmes and activities of international organizations, especially FAO on the sustainable use of pesticides and to promote integrated pest management.

- To participate in the OECD/FAO Pesticide Risk Reduction Project.

- To prepare environmental voluntary agreements to which authorities, producers and users are committed on the basis of a reduction plan.

### 5.2.4 Radioactive Substances

Radioactive substances have entered and/or are entering the marine environment, directly or indirectly, as a result of a variety of human activities and practices. These activities include the production of energy, reprocessing of spent fuel, military operations, nuclear testing, medical applications and other operations associated with the management and disposal of radioactive waste and the processing of natural materials by industrial processes. Other activities, such as the transport of radioactive material, pose risks of such releases. Radioactive materials can present hazards to human health and to the environment.

**Proposed target**

- *To eliminate to the fullest possible extent inputs of radioactive substances.*

**Proposed activities at the Regional level**

- To transmit to the Parties reports and other information received in accordance with the Convention and the Protocol.

**Proposed activities at the National level**

- To promote policies and practical measures including the setting of targets and timetables to minimize the generation of radioactive waste and provide for their safe processing, storage, conditioning, transportation and disposal.

- To adopt measures, including BAT and BEP, for the reduction and/or elimination of discharges, emissions and losses of radioactive substances to the Mediterranean Sea.

- To submit reports on: the authorizations granted, data resulting from monitoring, quantities of pollutants discharged from their territories and the action plans, programmes and measures implemented.

### 5.2.5 Nutrients and Suspended Solids

The effects of the enrichment of water by nutrients are enhanced productivity but these can result in changes in species diversity, excessive algal growth, dissolved oxygen reductions and associated fish kills and, it is suspected, the increased prevalence or frequency of toxic and other species algal blooms. This process is linked to the *"eutrophication"* phenomena.

Eutrophication can result from an augmentation of nutrient inputs to coastal and marine areas as a consequence of human activities. Marine eutrophication is mainly an inshore problem that affects lagoons, harbours, estuaries and coastal areas which are adjacent to river mouths of highly populated river basins and/or which receive sewage from coastal cities.

The main anthropogenic sources of nutrients are: a) Municipal sewage; b) Industrial waste water; c) Agriculture; and d) Atmospheric emissions.

a) **Municipal Sewage** (see point 5.1.1)

b) **Industrial waste water**

Many industries produce liquid waste with similar characteristics to domestic waste water. Their main pollutants are: Biodegradable Organic Matter, Nutrients (Nitrogen and Phosphorus), and Suspended Solids, which can be treated with similar techniques. Their pollution load may be reported to population-equivalent and measured as Biological Oxygen Demand (BOD) load.

The most important sources of these substances are:

i) manufacture of Food and Beverages: Slaughtering, preparing and preserving meat; Manufacture of dairy products; Canning & preserving of fruit and vegetables; Canning, preserving & processing of fish, crustaceans and similar foods; Manufacture of vegetable oils and fats; Sugar factories and refineries; Distillation; Wine production; Beer manufacture;

ii) Manufacture of Textiles: Wool processing and Cotton processing;

iii) Tanneries and the leather finishing industry;

iv) Paper and paper-pulp industry;

v) Phosphatic Fertilizers industry;

vi) Pharmaceutical industry: Basic substances (Fermentation and extraction processes;

**Proposed targets**

- *By the year 2025, to dispose all waste water from industrial installations which are sources of BOD, nutrients and suspended solids, in conformity with the provisions of the LBS Protocol.*

- *Over a period of 10 years, to reduce by 50 % inputs of BOD, nutrients and suspended solids from industrial installations sources of these substances.*

**Proposed activities at the Regional level**

- To prepare guidelines for the application of BAT and BEP in industrial installations which are sources of BOD, nutrients and suspended solids.

- By the year 2010, to formulate and adopt, as appropriate, environmental quality criteria and standards for point source discharges of BOD, nutrients and suspended solids.

- By the year 2010, to formulate and adopt guidelines for waste water treatment and waste disposal from industries which are sources of BOD, nutrients and suspended solids.

**Proposed activities at the National level**

- To reduce discharges of pollutants as much as possible and, in order to do so, to promote the implementation of environmental audits and apply BEP and, if possible, BAT in the industrial installations which are sources of BOD, giving priority to installations located in hot spots.

- To develop National Programmes for the environmentally sound management of waste water and solid waste from industrial installations which are sources of BOD, and to this end to ensure:

  i) by the year 2005, that at least industrial installations which are sources of BOD, nutrients and suspended solids, located in areas of concern, dispose all waste water in conformity with national regulation system;

  ii) To locate coastal outfalls so as to obtain or maintain agreed environmental quality criteria and to avoid the exposure of sensitive environments (such as lagoons, seagrass beds, etc.) to excess nutrient or suspended solid loads;

  iii) To promote primary, secondary and, where appropriate and feasible, tertiary treatment of BOD waste water discharged into rivers, estuaries and the sea;

  iv) To promote sound operation and proper maintenance of facilities.

  v) The reduction and beneficial use of waste water or other solutions appropriate to specific sites, such as no-water and low-water solutions;

  vi) The identification of the availability and sustainability of productive uses of waste water sludge, and other waste, such as land-spreading, composting, energetic uses, animal feed, etc.;

  vii) To prepare environmental voluntary agreements to which authorities, producers and users are committed on the basis of a reduction plan.

### c) Agriculture

The nutrient load from agriculture, mainly intensive agriculture, represents a high proportion of the total anthropogenic load of nutrients to the coastal zones.

Intensive agriculture, which encompasses high crop production or high density animal husbandry, can be a major contributor to nutrients due either to the use of large quantities of fertilizers, or the production of high amounts of solid and liquid manure by farm animals.

Intensive aquaculture can also be a source of nutrients through dispersion of food and excretions from the organisms.

Soil erosion and desertification are one of the most serious problems affecting the region and their contribution to the nutrient budget and sediment load may be important.

**Proposed target**

- *To reduce nutrient inputs, from agriculture and aquaculture practices into areas where these inputs are likely to cause pollution.*

**Proposed activities at the Regional level**

- To participate in the programmes and activities of international organizations, especially FAO, on sustainable agricultural and rural development in the Mediterranean.

- To participate in the FAO programme on the sustainable use of fertilizers and to encourage the preparation of national and regional strategies based on the controlled, appropriate and rational use of seeds, fertilizers and pesticides.

- To prepare guidelines for the application of BEP (including good agricultural practices) for the rational use of fertilizers and the reduction of losses of nutrients from agriculture.

**Proposed activities at the National level**

- To assess the quantities and types of fertilizers used.

- To assess the quantity of solid and liquid manure produced by farm animals.

- To promote the rational use of fertilizers and reduce the losses of nutrients by misuse of inorganic fertilizers and manure.

- To promote ecological agriculture and ecological aquaculture.

- To promote rules of good agricultural practices.

- To participate in the programmes and activities of international organizations, especially FAO, on sustainable agricultural and rural development in the Mediterranean.

- To promote the implementation of the Convention on Desertification.

**d) Atmospheric Emissions**

An estimate of the emissions of nitrogen (NOx and NH3) into the atmosphere from the territories of the Mediterranean countries is 4 million tonnes of N/yr, 50% NOx 50 % NH3. NOx emissions are strongly dependent on fossil fuel combustion, (93% of the total) including 54% from road transport. 80% of the atmospheric ammonia emissions are produced by the microbial decomposition of wastes from livestock and 10% of NH3 input is related to the application of nitric fertilizers. Deposition on the Mediterranean Sea of airborne nitrogen has been estimated at 1 million t/y, which is similar to riverine inputs.

An estimate of atmospheric deposition of phosphorus into the North-Western Mediterranean suggests that it could be about 16 kt/y, with the riverine input being 40.5 kt/y.

These important quantities of nutrients are spread on the Mediterranean Sea surface and an estimate of deposition on the Mediterranean of nitrogen and phosphorus in g/m2/y is 1.5 -+0.5 N and 0.15 -+ 0.05 P. From these figures it may be concluded that Mediterranean waters are not endangered by the atmospheric deposition of nutrients.

### 5.2.6 Hazardous Wastes

The definition of hazardous waste is complicate. The waste products which are normally considered to be hazardous are those listed in the annex or annexes to the legal documents in question e.g. the Protocol concerning transboundary movements of dangerous waste products, signed in 1996, or the Basel Agreement on the same subject.

Hazardous wastes may affect the marine environment through direct or indirect discharges of raw waste products into the sea, or through releases into the atmosphere or into water of pollutants which may be generated in the process of disposal or treating these waste products. Special attention should be paid to the proper management and disposal of stocks of obsolete chemicals.

**Proposed targets**

- *By the year 2025, to dispose all hazardous wastes in a safe and environmentally sound manner and in conformity with the provisions of the LBS Protocol and other international agreed provisions.*

- *Over a period of 10 years, to reduce as far as possible by 20 % the generation of hazardous waste from industrial installations.*

- *By the year 2010, to dispose 50 % of the hazardous waste generated, in a safe and environmentally sound manner and in conformity with the provisions of the LBS Protocol and other internationally agreed provisions.*

**Proposed activities the Regional level**

- To prepare a Mediterranean Strategy for the Management of Hazardous Wastes. This strategy will be based on the principles of prevention, reduction and reuse, and the application of Best Available Techniques and Best Environmental Practices for disposal; the regulation of transport and the remedial actions will be taken into account.

- To formulate and adopt common anti-pollution measures for hazardous wastes.

**Proposed activities at the National level**

- To prepare a National Strategy for the Management of Hazardous Wastes. This strategy will be based on the principles of prevention, reduction and reuse, and the application of Best Available Techniques and Best Environmental Practices for disposal; the regulation of transport and the remedial actions will be taken into account.

- To prepare National Plans for the Management of Hazardous Wastes. These National Plans will include an evaluation of the quantities of hazardous wastes produced and the financial resources necessary for their environmentally sound collection and disposal.

- The National Plans may include National or Regional Programmes for specific wastes, National Programmes for military establishments and National programmes for the public industrial sector.

- To establish facilities for the environmentally sound disposal of hazardous wastes.

- To prepare environmental voluntary agreements to which authorities, producers and users are committed on the basis of a reduction plan.

- To ratify and apply the “Hazardous Wastes” Protocol.

**a) Obsolete Chemicals**

Obsolete chemicals include stocks of banned organochlorine compounds, such as Dieldrin and DDT, and stocks of chemicals which are out of date or out of use for any reason.

**Proposed target**

- *By the year 2005, to collect and dispose all obsolete chemicals in a safe and environmentally sound manner.*

**Proposed activities at the Regional level**

- To develop programmes for sharing and exchanging technical information and advice regarding the environmentally sound disposal of obsolete chemicals. These programmes should consider their progressive elimination, including the decontamination of equipment and containers.

**Proposed activities at the National level.**

- To intensify training programmes for the identification, handling and disposal of obsolete chemicals.

- To promote national inventories of stocks of obsolete chemicals

- To prepare pilot programmes aimed at the safe disposal of obsolete chemicals; these programmes should consider their progressive elimination, including the decontamination of equipment and containers.

**b) Used lubricating oil (luboil)**

The definition of used lubricating oils in the terms of the LBS Protocol, is given as *"any mineral-based lubricating oils which, through use, storage or handling, have become unfit for the purpose for which they were originally intended, in particular used oils from combustion engines and transmission systems, as well as mineral oils for machinery, turbines and hydraulic systems".*

The most important sources of used lubricating oils are: primary metallurgies; finished metallic products; machinery; electrical materials; transport equipment; chemical products; rubber and plastic; and motor vehicles. Used lubricating oils can be divided into three categories:

i) Used lubricating oils which may be reused after treatment;

ii) Used lubricating oils contaminated by other substances (e.g. PCB); and

iii) Industrial waste products contaminated by lubricating oils.

**Proposed targets**

- *By the year 2005, to collect and dispose 50 % of used lubricating oil in a safe and environmentally sound manner.*

**Proposed activities at the Regional level**

- To formulate and adopt a standard on the maximum amount of PCB an oil may contain before it is considered to be contaminated (i.e. 50 mg/k).

**Proposed activities at the National level**.

- By the year 2000, to make an inventory of the quantities of the three categories of luboil.

- To prepare and adopt national pilot programmes for the collection, recycling and disposal of used luboils.

- To prepare and adopt national pilot programmes for the collection, recycling and disposal of used luboils from the public services sector ( air, road and railway transport, energy transport and distribution) and from military establishments.

- To adopt at the national level and apply the common anti-pollution measures for luboils adopted by the Contracting Parties in 1989.

**c) Batteries**

There are primary batteries and secondary or accumulator batteries. The first are designed to supply only a continuous or intermittent discharge and cannot be effectively recharged; secondary batteries can be recharged. The main types of primary batteries are: traditional zinc-carbon batteries (Leclanche batteries), alkaline batteries, mercury batteries, silver oxide batteries, zinc batteries, lithium batteries and nickel-cadmium batteries. Secondary or accumulator batteries may be of the lead-acid type, which are most commonly used in cars, or nickel-iron and nickel-cadmium alkaline batteries. Once batteries are used, they are either thrown away or collected in order to recover the metals. In both cases, harm may be done to the environment.

**Proposed targets**

- *By the year 2025, to dispose all used batteries in a safe and environmentally sound manner and in conformity with the provisions of the Protocol and other internationally agreed provisions.*

- *Over a period of 10 years, to reduce by 20 % the generation of used batteries.*

- *By the year 2010, to dispose 50 % of used batteries in a safe and environmentally sound manner and in conformity with the provisions of the Protocol and other agreed international provisions.*

**Proposed activities at the National level.**

- To promote national inventories of used batteries.

- To prepare Pilot Programmes for the collection, recovery and safe disposal of used batteries.

- To promote substitution methods and encourage the reduction of the use of batteries.

- To prepare and adopt National Pilot Programmes for the collection, recycling and disposal of used batteries from the public services sector ( air, road and railway transport, energy transport and distribution) and from military establishments.

## 5.3 Physical alterations and destruction of habitats

The increase of populations and economic activities in coastal areas is leading to an expansion of construction and physical alterations to coastal areas and waters. The building of ports and marinas, dredging operations, sand and aggregate extraction, the building of coastal defences, the installation of pipelines and coastal outfalls, the restoration of beaches, the erosion induced by inadequate land use and other activities linked to the urban, agricultural and aquacultural expansion, are giving rise to alterations of wetlands, shore lands, beachfronts and seafloors. Important habitats are being destroyed.

The damming of river systems may result in a reduction of freshwater and sediment loads, with possible changes in estuarine conditions.

**Proposed targets**

- *To safeguard the ecosystem function, maintain the integrity and biological diversity of species and habitats.*

- *Where practicable, to restore marine and coastal habitats that have been adversely affected by anthropogenic activities*.

**Proposed activities at the Regional level**

- To formulate guidelines for the preservation of habitats and normal ecosystem functions in coastal areas, particularly in the context of integrated coastal zone management.

- To develop programmes for integrated coastal zone management.

**Proposed activities at the National level**

- To support programmes for integrated coastal zone management.

- To undertake studies on the potential effects on the environment or Environmental Impact Assessment according to the importance of the physical alterations and the distruction of habitats related to management projects.

- To establish a system of previous authorization by competent national authorities for works which cause physical alterations of the natural state of the coastline or the destruction of coastal habitats.

# 6. Monitoring

Assessment of pollution-related problems makes it possible to reduce possible uncertainties when management decisions need to clarify links between inputs, concentrations and the effects of pollutants. An environmental assessment of the Mediterranean started in 1975 in the framework of MAP through its MED POL Programme. Through the adoption of MED POL Phase III in 1996, the Programme now covers all the aspects of monitoring, including trend and compliance monitoring and the monitoring of biological effects.

In order to improve the assessment of the inputs of pollutants into the Mediterranean Sea and to ensure compliance with the conditions laid down in authorizations and regulations, the Authorities responsible should establish systems of monitoring and inspection.

According to Article 6 of the LBS Protocol *"The Parties shall provide for systems of inspection to assess compliance with authorizations and regulations"*. In addition, *"The Parties establish appropriate sanctions in case of non-compliance with the authorizations and regulations and ensure their application".*

**Proposed targets**

- *By the year 2000, each Party will establish a monitoring programme of the inputs of the priority pollutants identified in this Programme and of the quality of the marine environment.*

- *By the year 2000, the Parties will be establish a permanent river water quality/quantity register.*

- *By the year 2000, the Parties will establish systems of inspection.*

- *By the year 2000, the Parties will establish a monitoring programme of discharges and emissions of the priority pollutants identified in this Programme and of the quality of the marine environment.*

**Proposed activities at the Regional level**

- To prepare guidelines for local air pollution monitoring programmes in cities and urban agglomerations exceeding one million inhabitants.

- To develop guidelines for river monitoring programmes.

- To promote the establishment of permanent registers of river quality and quantity accessible to all Parties for selected rivers (about fifty).

- To promote the establishment of a data bank on socio-economic indicators related to sea and river quality and pollutant fluxes associated with the Geographic Information System (GIS).

- To promote the establishment of an inventory of major point atmospheric sources following EMEP/CORINAIR guidelines.

**Proposed activities at the National level**

- The establishment of inspection systems to ensure compliance with the conditions laid down in the authorizations and regulations.

- The establishment of monitoring programmes to evaluate the effectiveness of actions and measures implemented under this Programme.

- The establishment and improvement of local air pollution monitoring programmes as a priority in cities and urban agglomerations exceeding one million inhabitants.

- The establishment and improvement of local and national monitoring programmes to control and assess effluents discharge and the quality of the marine environment.

- The establishment and improvement of river monitoring programmes.

- The establishment of permanent registers of river quality and quantity accessible to all Parties on selected rivers (about fifty).

- The establishment of a data bank on socio-economic indicators related to sea and river quality and pollutants fluxes associated with a Geographic Information System (GIS).

- Improve the inventory of major point atmospheric sources following EMEP/CORINAIR guidelines.

## 7. Capacity Building

The activities proposed aim to improve, inter alia: the scientific base, environmental policy formulation, professional human resources, institutional capacity and capability, both public and private, implementation of environmentally sound technologies, the implementation of policies for cleaner production and technical cooperation, including cooperation in the fields of technology transfer and know-how process. All these measures come under the heading of Capacity-building. As part of the above, the activities will be grouped into two categories:

- To support, promote and facilitate programmes of assistance in the area of scientific, technical and human resources;

- To support, promote and facilitate, as appropriate, the capacity to apply, develop and manage access to cleaner production technologies as well as the best available techniques (BAT) and the best environmental practice (BEP).

The activities to be implemented for each category are to be considered at both national and regional level. All the competent MAP structures will be used for their implementation.

## 7.1 To support, promote and facilitate programmes of assistance in the area of scientific, technical and human resources.

The primary objective is for each country, with the support of international organizations, as appropriate, to identify the state of its scientific knowledge and its research needs and priorities, in order to achieve, as soon as possible, substantial improvements in:

i) Environmental management institutions.

ii) The scientific base and strengthening of scientific and research capacities and capabilities in areas relevant to the environment and, in particular, to priorities established in the SAP.

iii) Environmental policy formulation, building upon the best scientific knowledge and assessments.

iv) The interaction between scientific groups and governmental institutions, by applying the precautionary approach, where appropriate, to decision-making.

v) Monitoring, inspection and information systems.

In accordance with articles 9 and 10 of the LBS Protocol, the Parties shall cooperate in scientific and technological fields related to pollution from land-based sources and activities. To this end, the Parties shall formulate and implement, at the regional level, training programmes, programmes of assistance and education in the area of scientific, technical and human resources.

**Proposed activities at the Regional level**

- To support the establishment of networks to improve the exchange of experience among Mediterranean experts, especially in the field of the priorities established in the SAP to prevent marine degradation.

- To formulate and support programmes of cooperation for capacity-building and the development of institutions, including relevant technology and management training, human resources (scientific and technical personal) and public education. These programmes should give assistance to, inter alia, environmental impact assessment, sustainable development planning, environmental auditing and management, environmental education, etc.

- To formulate and implement in the framework of MED POL capacity-building programmes related to the assessment and control of marine pollution.

- To assist in the formulation of projects eligible to be financed by international financial donors.

- To assist and advise on policies, strategies and practices that may contribute to the implementation of the measures and targets included in the SAP.

- To prepare a general manual with guidelines on urban policies directed towards energy saving, non-polluting forms of transport, waste management, the sustainable use of water and the creation of town amenities.

- To prepare a river monitoring manual by the year 2000.

- To prepare guidelines on linking socio-economic indicators to water quality indicators through GIS to check pollution control.

## 7.2 To support, promote and facilitate, as appropriate, the capacity to apply, develop and manage the access of cleaner production technologies as well as the Best Available Techniques (BAT) and the Best Environmental Practice (BEP).

The Parties should promote, and encourage the private sector to promote, effective modalities for giving access to cleaner production technologies and for the application the best available techniques and the best environmental practice with a view to preventing, reducing or phasing out inputs of pollutants from selected land-based sources and activities. To this end, the Parties should, at the national level, improve their up-to-date information, experience and technical expertise.

Furthermore, there is a need for favourable access to and transfer of environmentally sound technologies through supportive measures that promote technology cooperation and the transfer of the necessary technological know-how, as well as building up economic, technical and managerial capabilities for the efficient use and further development of transferred technology. Successful long-term partnership in technology cooperation necessarily requires continuing systematic training and capacity building at all levels over an extended period of time.

**Proposed activities at the Regional level**

- To facilitate and promote access, in particular for countries in need of assistance, to new and innovative technologies relevant to each selected land-based source and activity, including those causing physical degradation and the destruction of habitats.

- To promote new information technologies that facilitate the transfer of knowledge within countries and between States, including, in particular, from developed countries to countries in need of assistance.

- To prepare a general manual with guidelines on implementing cleaner technologies, cleaner production and cleaner materials.

- To prepare a general manual with guidelines on introducing alternatives to priority POPs.

- The establishment of networks to improve the exchange and transfer of environmentally sound technologies among Mediterranean experts, especially in the field of the priorities established in the SPA to prevent marine degradation.

- To enhance the access to and transfer of patent-protected environmentally sound technology, in particular to developing countries.

- To promote collaborative arrangements between enterprises of developed and developing countries for the development of clean production technologies.

- To promote join ventures between suppliers and recipients of technologies, taking into account policy priorities and objectives of developing countries.

- To assist and advise on environmental aspects of current technologies that may contribute to the implementation of the measures and targets included in the SAP.

- To assist and advise on the preparation of reports that are required for the LBS Protocol.

## 8. Public participation

Information and public participation are essential components of a sustainable development and environmental policy.

**Proposed targets**

- to provide to the general public access to the information available on the state of the environment of the Mediterranean and its evolution, and the measures taken to improve it;

- to enhance the environmental awareness of pollution, and create a common approach to the environmental problems of the Mediterranean;

- to facilitate public access to activities for the protection and management of the environment and to scientific knowledge;

- to mobilize and ensure the participation and involvement of the major actors concerned (local and provincial communities, economic and social groups, consumers, etc.).

**Proposed activities at the Regional level**

- to identify potential roles for Non-Governmental Organizations in the implementation of the SAP and to ensure that all relevant IGOs and NGOs have appropriate access to information concerning the SAP and its application;

- to implement coordinated information campaigns and special activities on environmental protection;

- to continue and expand publication and distribution of brochures, leaflets, posters, reports, newsletters and other information materials, as well as the use of the media in all its forms;

- to enhance and strengthen the exchange of information and experience on the environmental problems of the region, and to develop cooperation in this field.

# 9. Reporting

In accordance with Article 13 of the LBS Protocol *"The Parties shall submit reports every two years, to the meeting of the Contracting Parties, through the Organization, of measures taken, results achieved and if the case arises, of difficulties encountered in the application of the Protocol"*

**Proposed activities at the Regional level**

a) To prepare and apply a unified reporting system on the application of the provisions of the Convention, the Protocols and the SAP.

b) To collect information on the levels and trends of loads of pollution reaching the Mediterranean Sea.

c) To collect information on the state of the treatment and the disposal of liquid and solid wastes in the Protocol Area and to present such information to the Contracting Parties.

d) To publish a report on the State and Evolution of the Mediterranean Environment at regular intervals .

e) To develop public tracking and reporting systems of pollutants, known generically as *Pollutant Release and Transfer Register (PRTRs),* in cooperation with OECD.

# 10. Guidelines for the Preparation of National Action Plans

## 10.1 Introduction

One of the SAP Programme objectives is to provide the basic elements for the formulation of guidelines for the preparation of national action plans (NAP) to address pollution from land-based activities.

States should, in accordance with their policies, priorities and resources, develop or review National Action Plans for LBS within 5 years and take action to implement these programmes with the assistance of international cooperation, in particular for developing countries. The effective development and implementation of National Action Plans should focus on sustainable, pragmatic and integrated environmental management approaches and processes, such as integrated coastal area management, harmonized, as appropriate, with river basin management and land-use plans.

In the countries where National Environmental Action Plans (NEAPs) have been adopted, the National Action Plans for LBS must be consistent with the NEAP.

The targets and activities identified in the SAP will be implemented through National Action Plans to be drawn up by Parties. The NAPs will be crucial in identifying projets that can be funded and implemented and therefore their formulation is the first priority.

## 10.2 Objectives

In general, the objectives of the NAPs are those of the SAP; in addition, countries can identify some specific objectives related to particular problems.

NAP objectives are:

a) The general objective of the NAP is, in accordance with article 5 of the LBS Protocol, *to eliminate pollution deriving from land-based sources and activities, in particular to phase out inputs of the substances that are toxic, persistent and liable to bioaccumulate listed in annex I to the Protocol.*

b) The specific objectives of the National Plans are:

- Formulation of principles, approaches, measures, timetables and priorities for action;

- Preparation of a national priority list for intervention and investment ("investment portfolio");

- Analysis of expected baseline and additional actions needed to resolve each transboundary priority problem;

- Identification of potential roles for Non-Governmental Organizations in the implementation of the NAP.

## 10.3 Principles and Obligations

The principles and obligations identified in the SAP are also valid for the National Plans. As part of them, the polluter pays principle may be immediately applied to new installations and, progressively, to existing ones. However, in most existing installations it will be necessary to facilitate economic interventions in order to apply the new standards and quality objectives.

The new LBS Protocol brings a change in the strategy for the protection of the Mediterranean environment. This new strategy is based on sustainability and its purpose is to achieve the integrated prevention and control of pollution arising from land-based sources and activities, in particular through the application of Best Available Techniques and Best Environmental Practice.

## 10.4 National Diagnostic Analysis

The identification and assessment of problems is a necessary process which combines five elements:

a) Identification of the nature and severity of problems.
b) Contaminants.
c) Physical alterations and destruction of habitats.

d) Sources of degradation.
e) Areas of concern.

## 10.5 Establishment of National Priorities for Action

The establishment of national priorities for action will take into account the results of the National Diagnostic Analysis and of the national reports on "hot spots", and "sensitive areas" and will also take in account the LBS Protocol which, in Annex 1, states "*In preparing action plans, programmes and measures, the Parties, in accordance with the Global Programme of Action, will give priority to substances that are toxic, persistent and liable to bioaccumulate, in particular persistent organic pollutants (POPs), as well as to wastewater treatment and management".*

Priorities for action should be established by assessing the five elements described above and should specifically reflect:

a) the relative importance of impacts upon food security, public health, coastal and marine resources, the health of the ecosystem and socio-economic benefits, including cultural values; and

b) the costs, benefits and feasibility of options for action, including the long-term cost of no action.

## 10.6 Institutional aspects

### 10.6.1 Authorization or regulation

In accordance with Article 6 of the LBS Protocol, *Point source discharges into the Protocol Area, and releases into water or air that reach and may affect the Mediterranean Area, as defined in article 3 of the Protocol, shall be strictly subject to regulation and if necessary to authorization by the competent authorities of the Parties*.

Regulations are needed for both point source discharges and releases into water or air that reach and may affect the Mediterranean Area, and authorizations are required for:

(a) Point source discharges of liquid effluents into the Protocol Area, that is the Mediterranean Sea and the rivers of its hydrologic basin, which may affect the Mediterranean Sea (municipal sewage discharges would not be included); and

(b) Point source discharges (emissions) into the atmosphere under the following conditions:

i) the discharged substance is or could be transported to the Mediterranean Sea Area under prevailing meteorological conditions;

ii) the input of the substance into the Mediterranean Sea Area is hazardous for the environment in relation to the quantities of the same substance reaching the Area by other means.

The Protocol allows one permit to be granted for liquid discharges and another for emissions into the atmosphere. The approach of this programme, in keeping with the spirit of the Protocol, is geared towards ensuring that the industrial installations which generate liquid, gaseous and waste effluents have a single permit which covers all the types of pollution or, should this not be possible, that the different permits are coordinated in order to avoid the transfer of pollution from one environmental media to another.

The Protocol indicates that the activities listed in its Annex I will be primarily considered for the preparation of action plans, programmes and measures, and it is logical to assume that their discharges should be subject to authorizations and regulations. That is why it is of prime importance to establish criteria to decide which industrial plants and which specific urban settlements generate precise discharges which should merit a permit or regulation.

During an initial stage, the system could be applied to all urban tourist settlements with a population of more than 1000 residents and to all industrial plants selected in the Annex I to the Protocol with more than 50 employees.

Point source discharges from existing installations and from new installations should be differentiated. For the former, national regulations should be gradually adapted and, for the latter, a system of prior authorization should be used taking into account the national regulations.

**Proposed targets**

- *By the year 2000, all point source discharges and emissions from new installations shall have prior authorization by the competent authorities.*

- *By the year 2010, 50 % of discharges of waste water and air emissions from industrial and urban installations shall be in conformity with national and international regulations*.

- *By the year 2025, all discharges of waste water and air emissions from land-based sources and activities shall be in conformity with national and international regulations.*

**Existing point source discharges and emissions**

**Proposed activities at the National level.**

- To prepare/review and adopt if necessary, over a period of one year, National Regulations concerning point source discharges of domestic and industrial wastewater into the sea and rivers, which take into account the common guidelines, standards and criteria adopted by the Parties.

- To prepare and adopt, over a period of two years, national regulations concerning point source emissions into the air from industrial installations which take into account the guidelines, criteria and standards adopted by the Parties.

- To make an inventory, in as short a period as possible, of point source discharges and emissions in the hot spots and areas of concern.

- To support the progressive implementation of national regulations by existing industrial installations.

**New point source discharges and emissions**

Discharges and emissions from new establishments (industries and human establishments) should have prior authorization listing the conditions under which releases may be authorized. The authorization should be negotiated during the initial phase of the project and Best Available Techniques and Best Environmental Practice should be taken into account. If the project is likely to have significant consequences on the environment, it will be necessary to evaluate the environmental impact.

The conditions imposed should take into account national regulations or the contents of Annex II, as well as the measures already adopted by the Contracting Parties.

For foreign companies the Parties will take into account Agenda 21 Chapter 19.52 d) *"Governments, at the corresponding level and with the support of the competent international and regional organizations, should: encourage large industrial companies, including transnational and other companies, to adopt policies and to undertake to adopt standards of application which are equivalent to, or no less strict than, those which are applied in their countries of origin, in relation to the ecologically rational management of chemical products".*

**Proposed activities at the National level.**

- By the year 2000, all point source discharges from new establishments shall have prior authorization by the competent authorities.

- To undertake Environmental Impact Assessment for proposed activities that are likely to cause a significant adverse impact on the marine environment and are subject to an authorization by the competent national authorities.

## 10.7 Analysis of targets and activities

Despite the expected diversity of problems, interests and priorities across the Mediterranean Sea, the targets and activities at national level identified in chapter 5 may be adopted by the Parties as part of their NAP. In carrying out activities, the Contracting Parties should take into account the objectives of:

- Supporting the development and application of the Environmental Management and Audit Scheme in the industrial sectors.

- Promoting water-saving and the rational use of water in industry.

- Promoting energy efficiency and the rational use of energy in industry.

- Supporting the development and application of energy-saving technologies and practices.

- Developing a policy geared to taking into account the life cycle of products and the development of cleaner products.

## 10.8 Monitoring and enforcement

In accordance with art.6 of the LBS Protocol *"the Parties shall provided for systems of inspection by their competent authorities to assess compliance with authorizations and regulations". In addition, "The parties establish appropriate sanctions in case of non-compliance with the authorizations and regulations and ensure their application".*

**Proposed targets**

- *By the year 2000, each Party will establish a monitoring programme of the inputs of the priority pollutants identified in this Programme and of the quality of the marine environment.*

- *By the year 2000, the Parties will be establish a permanent river water quality/quantity register.*

- *By the year 2000, the Parties will establish systems of inspection.*

- *By the year 2000, the Parties will establish a monitoring programme of discharges and emissions of the priority pollutants identified in this Programme and of the quality of the marine environment.*

**Proposed activities at the National level**

- The establishment of inspection systems to ensure compliance with the conditions laid down in authorizations and regulations.

- The establishment of monitoring programmes to evaluate the effectiveness of the actions and measures implemented under this Programme.

- The establishment and improvement of local air pollution monitoring programmes as a priority in cities and urban agglomerations exceeding one million inhabitants.

- The establishment and improvement of local and national monitoring programmes to control and assess effluent discharges and the quality of the marine environment.

- The establishment and improvement of river monitoring programmes.

- The establishment of permanent registers of river quality and quantity accessible to all Parties on selected rivers (about fifty).

- The establishment of a data bank on socio-economic indicators related to sea and river quality and pollutant fluxes associated with a Geographic Information System (GIS).

- Improve the inventory of major point atmospheric sources following EMEP/CORINAIR guidelines.

## 10.9 Capacity Building

The activities proposed aim to improve, inter alia: the scientific base, environmental policy formulation, professional human resources, institutional capacity and capability, both public and private, the implementation of environmentally sound technologies, the implementation of policies for cleaner production and technical cooperation, including cooperation in the fields of technology transfer and know-how process. All these measures come under the heading of Capacity-building. As part of the above, the activities will be grouped into two categories:

- To support, promote and facilitate programmes of assistance in the area of scientific, technical and human resources;

- To support, promote and facilitate, as appropriate, the capacity to apply, develop and manage the access of cleaner production technologies as well as the best available techniques (BAT) and best environmental practice (BEP);

### 10.9.1 To support, promote and facilitate programmes of assistance in the area of scientific, technical and human resources

The primary objective is for each country, with the support of international organizations, as appropriate, to identify the state of its scientific knowledge and its research needs and priorities, in order to achieve, as soon as possible, substantial improvements in:

i) Environmental management institutions.

ii) The scientific base and strengthening of scientific and research capacities and capabilities in areas relevant to environment and, in particular, to priorities established in the SAP.

iii) Environmental policy formulation, building upon the best scientific knowledge and assessments.

iv) The interaction between scientific groups and governmental institutions, using the precautionary approach, where appropriate, to decision-making.

v) Monitoring, inspection and information systems.

In accordance with Articles 9 and 10 the LBS Protocol, the Parties shall cooperate in scientific and technological fields related to pollution from land-based sources and activities. To this end, the Parties shall formulate and implement, at regional level, training programmes, programmes of assistance and education in the area of scientific, technical and human resources.

**Proposed activities at the National level**

- To support programmes on institutional capacity building in the field of environmental matters.
- To improve access to and availability of technological and scientific information at all levels.
- To develop training programmes on Environmental Impact Assessment.
- To develop training programmes on environmental auditing and management.
- To develop training programmes on environmental education.
- To organize sufficient training and educational programmes for local administration to operate and maintain sewage treatment facilities adequately.
- To facilitate the identification of opportunities for projects contributing to sustainable development in the private sector.
- To develop training programmes on the integrated management of coastal areas.
- To develop training programmes on the management of water demand.
- To develop training programmes on eco-tourism (to promote initiatives that are compatible with the environment and the social and cultural background).
- To support training programmes, using the integrated approach, on rural development.
- To develop training programmes on effective waste reduction policies and on the environmentally sound management of urban solid waste.
- To promote training programmes on the environmentally sound treatment of municipal sewage discharged to rivers, estuaries and the sea, or other solutions appropriate to specific sites.
- To develop training programmes on river monitoring.
- To develop training programmes on air pollution monitoring.
- To develop training programmes on effluent discharges, emission monitoring and inspection.

- To promotion and develop training programmes on ecological agriculture.

- To develop training programmes on monitoring and performance indicators.

### 10.9.2 To support, promote and facilitate, as appropriate, the capacity to apply, develop and manage the access of cleaner production technologies as well as the Best Available Techniques (BAP) and the Best Environmental Practice (BEP)

The Parties should promote, and encourage the private sector to promote, effective modalities for the access to cleaner production technologies and for the application of the best available techniques and best environmental practice with view to preventing, reducing or phasing out inputs of pollutants from selected land-based sources and activities. To this end, the Parties should, at national level, improve their up-to-date information, experience and technical expertise.

Furthermore, there is a need for favourable access to and transfer of environmentally sound technologies through supportive measures that promote technology cooperation and that should enable transfer of necessary technological know-how as well as building up of economic, technical and managerial capabilities for the efficient use and further development of transferred technology. Successful long-term partnership in technology cooperation necessarily requires continuing systematic training and capacity building at all levels over an extended period of time.

**Proposed activities at the National level**

- To support training programmes for the effective access to clean production technologies.

- To stimulate the research, development and transfer of clean production technologies, often through partnerships between the scientific and technological community, industry and Governmental institutions.

- To promote the cooperative interaction with private-sector groups and non-governmental organizations to introduce cost-effective and environmentally sound practices.

- To strengthen existing national institutions to assess, develop, manage and apply new environmentally sound technologies.

- To facilitate access to sources (public or private, national or multilateral) of technical advice and assistance with respect to particular source-categories and sectors.

- To promote cleaner production techniques and practices for production processes, for products and for services through training of industry personnel.

- To support the codes of good environmental practice which cover all aspects of the activity in the product's life.

- To promote a voluntary scheme/plan for the award of ecolable to products with reduced environmental impacts.

- To prepare programmes given priority to energy efficiency and renewable sources of energy.

## 10.10 Public participation

Public information and public participation are an essential dimension in the policy of sustainable development and environmental protection.

**Proposed targets**

- *to provide to the general public access to the information available on the state of the environment of the Mediterranean and its evolution, and the measures taken to improve it;*

- *to enhance the environmental awareness of the pollution, and create a common approach to the environmental problems of the Mediterranean;*

- *to facilitate public access to activities for the protection and management of the environment and to scientific knowledge;*

- *to mobilize and ensure the participation and involvement of major actors concerned (local and provincial communities, economic and social groups, consumers, etc.).*

**Proposed activities at the National level**

- to increase decentralization and public participation in environmental management by:

    i) gradually decentralizing the operational functions of environmental management to municipal and local levels;

    ii) disclosing information on environment;

iii) involving countries, the private sector, local NGOs and the media in decision making regarding specific environmental policies and issues through mechanisms such as public consultations and environmental audits; and

iv) identifying the potential roles of Non-Government Organizations in the implementation of the NAP and facilitating the implementation of their activities.

### 10.11 Reporting

In accordance with article 13 of the LBS Protocol *"The Parties shall submit reports every two years, to the meeting of the Contracting Parties, through the Organization, of measures taken, results achieved and if the case arises, of difficulties encountered in the application of the Protocol"*

**Proposed activities at the National level**

- Every two years, prepare and submit, to the meeting of the Contracting Parties report on application of the LBS Protocol. Such reports shall include:

  a) National regulations, action plans, programmes and measures implemented in application of the Protocol;

  b) Statistical data on the authorization granted in accordance with Article 6 of the Protocol;

  c) Data resulting from compliance monitoring;

  d) Quantities of pollutants discharged from their territories;

  e) Development of public tracking and reporting systems of pollutants, known generically as *Pollutant Release and Transfer Register (PRTRs).*

## 11. Investment Portfolio and Mobilization of Financial Resources

### 11.1 Mediterranean Hot Spots and Sensitive Areas

**An overall picture from the Country Reports**

The catalogue of Hot Spots and Sensitive Areas shown below summarizes the information contained in the individual Country Reports. The Country Reports were prepared on the basis of common questionnaires containing a set of criteria applied to all the countries included in the Project. The methodology for the identification of the Hot Spots and some elaboration of the country-level data on the land-based pollution sources associated with the identified Hot Spots are provided in the Regional Hot Spots Report.

Based on the data extracted from the Country Reports, the following annotated catalogue is constructed showing the identified Hot Spots and Sensitive Areas together with the proposed investments and estimated costs. The countries are listed in alphabetical order.

| | | |
|---|---|---|
| **ALBANIA**<br>- Durres<br>- Vlora<br>- Durres chemical factory<br>- Vlora PVC factory | Proposed investments include: WWTP and reconstruction of sewerage systems, sanitary landfill of mercury and toxic solid wastes, study of pollution source in (Drini) river basin and management plans and capacity building for coastal zone management and monitoring programmes for the sensitive areas | 133.5 Mill. US$ |
| **ALGERIA**<br>- Oran Ville<br>- Rouiba<br>- Ghazaouet<br>- Alger<br>- Mostraganem<br>- Bejaia<br>- Annaba<br>- Skikda | Proposed investments include: WWTP construction, reconstruction and extensions | 115 Mill. US$ |
| **BOSNIA AND HERZEGOVINA**<br>- Mostar<br>- Mostar alumina factory<br>- Neum-Klek golf<br>- Bosansko/Grahovo (Cetina river)<br>- Channel Mali Ston<br>- Canyon Neretva river<br>- Delta Neretva river | Proposed investment includes: design of NAP, capacity building, WWTP construction, monitoring of water quality, construction of sanitary dumping sites, management plans and monitoring programmes for coastal zone and sensitive areas and management and protection of critical habitats and ecosystems and endangered species | 250.8 Mill. US$ |
| **CROATIA**<br>- Kastella Bay<br>- Split<br>- Shibenik<br>- Zadar<br>- Pula<br>- Rijeka Oil Refinery<br>- Kastella Bay (Kaltenberg)<br>- Zadar (tannery)<br>- Rijeka<br>- Dubrovnik<br>- Zadar (Adria) | Proposed investments include: WWTP construction, reconstruction and extensions, sanitary landfill, and coastal zone management plans and monitoring programmes for the sensitive areas | 170.0 Mill. US$ |

| | | |
|---|---|---|
| **CYPRUS**<br>- Limassol (Old Port area)<br>- Limassol<br>- Vassiliko (Cement factory)<br>- Larnaca (Oil Refinery) | Proposed investments include:<br>WWTP, extension of sea outfall, installation of cement factory filters, separation of contaminated materials and incineration facility | 6.6 Mill. USD |
| **EGYPT**<br>- El-Manzala<br>- Abu-Qir Bay<br>- Rashied<br>- El-Mex Bay<br>- Alexandria<br>- Damietta | Proposed investments include:<br>WWTP construction and rehabilitation (El-Mazala) | NA |
| **FRANCE**<br>Hot Spots<br>- Marseille<br>- Toulon<br>- Cannes<br>- Freijus | Proposed investments include:<br>Secondary WWTP | 200.0 Mill. USD |
| **GREECE**<br>Hot Spots<br>- Thermaikos Gulf<br>- Inner Saronic Gulf<br>- Patraikos Gulf<br>- Pagasitikos Gulf<br>- Herakleon Gulf<br>- Elefsis Bay<br>- NW Saronic Gulf<br>- Larymna Bay<br>- Nea Karvali Bay | Proposed investments include:<br>Expansion of industrial effluent and WWTP, industrial feasibility studies, treatment plant and sea outfall (Patraikos gulf), secondary treatment plant (Inner Saronic gulf) | 207.4 Mill. US$ |

| | | |
|---|---|---|
| **ITALY**<br>Hot Spots<br>- Porto Marghera<br>- Genova<br>- Augusta<br>- Brindisi<br>- Gela<br>- La Spezia<br>- Milazzo<br>- Gulf of Napoli<br>- Ravenna<br>- Taranto<br>- Livorno-Rosignano<br>- Bari-Barletta<br>- Manfredonia<br>- Ancona-Falc. | Proposed investments include:<br>**>** Harbour/Industrial Sector<br>- Revised plan for product separation harbour facility (chemical, non-chemical, oil) - Protected connection system for vessel operation - Slop collection facility - Change of coastal anti-fouling system - Industrial organic coastal landfill - Ship emissions treatment plants<br>**>** Municipal Sector<br>- Revision and rationalization of WWTP on coastal cities and on cities discharging into continental waters | 1,500 Mill. US$ |
| **ISRAEL**<br>- Haifa Bay<br>- Akko<br>- Nahariya<br>- Gush Dan<br>- Ashdod<br>- Haifa Bay Industries | Proposed investments include:<br>WWTP construction and upgrading. For the complete solution of the Gush Dan hot spot, additional US$ 90.0 m. have to be considered. | 129.0 Mill. US$ |
| **LEBANON**<br>- Greater Beirut<br>- Jounieh<br>- Saida-Ghaziye<br>- Tripoli<br>- Batroun Selaata | Proposed investments include:<br>WWTP construction, industrial wastes master plan and capacity building actions | 405.1 Mill. US$ |
| **LIBYA**<br>- Zanzur<br>- Tripoli<br>- Bengazi<br>- Zawia<br>- Tobruk | Proposed investments include:<br>Industrial effluent TP maintenance, WWTP maintenance and extension (Bengazi & Tripoli) | 16.6 Mill. US$ |
| **MALTA**<br>- Weid Ghammieq<br>- Cumnija<br>- Ras il-Hobz | Proposed investments include:<br>WWTP construction and extension (Weid Ghummieq) | 48.0 Mill. US$ |

| | | |
|---|---|---|
| **MONACO** | (See General Observations below) | |
| **MOROCCO**<br>- Tanger<br>- Tetouan<br>- Nador<br>- Al Hoceima | Proposed investments include:<br>Domestic and industrial WWTP construction and extension (Nador) | 54.0 Mill. US$ |
| **SLOVENIA**<br>- Izola<br>- Demalaris<br>- Piran (submarine outfall)<br>- Rizana river | Proposed investments include: WWTP extension and construction of sewerage systems (extension in Delamaris and Koper) and management plan for Dragonja, Drnica and Rizana river basins | 113.5 Mill. US$ |
| **SPAIN**<br>- Barcelona<br>- Tarragona<br>- Valencia<br>- Cartagena<br>- Algeciras Bay | Proposed Investments include:<br>WWTP construction and upgrading, Urban solid waste management, Hazardous waste management, Land reclamation | 1,000 Mill. US$ |
| **SYRIA**<br>- Tartous<br>- Lattakia<br>- Banias<br>- Jableh | Proposed investments include:<br>WWTP construction, industrial wastes master plan and capacity building actions | 197.3 Mill. US$ |
| **TUNISIA**<br>- Gaber<br>- Lake of Tunis<br>- Lake Bizarte<br>- Sfax South<br>- Ghar El-Melh | Proposed investments include:<br>WWTP construction and extension, industrial WWTP construction, recycling or fluorine recovery facility & phosphogypsum disposal site (Gabes fertilizer ind.), feasibility study for treatment of exhaust gas (Sfux-South fertilizer ind.), construction of recirculation canal (Ghar El-Melh industries) | 298.0 Mill. US$ |
| **TURKEY**<br>- Icel Bay (Erdemli, Silifke, Tarsus)<br>- Adana city (Ceyhan)<br>- Antalya city (Alanya, Side/Manavgat)<br>- Antakya (Iskenderun, Dortyol, Kirikhan)<br>- Bodrum Peninsula (Marmaris, Datca) | Proposed investments include:<br>WWTP construction and sewerage construction and extensions | 774.5 Mill. US$ |

**General observations**

The following observations emerge from a review of the above catalogue and draw attention to key characteristics of the proposed investments:

- On the basis of the criteria proposed by the questionnaires prepared for the identification of hot spots and sensitive areas, Monaco was not included in such lists.

- Some countries did not send information about activities and costs.

- The proposed Hot Spots are very heterogenous, sometimes a town and even a bay with all their pollution sources industrial and domestic is proposed, other a single WWTP for a town or for a industry and even a particular problem of a particular industry is proposed.

- Wastewater treatment plants (WWTP) represent the predominant remedial action proposed reflecting the perception of municipal and industrial waste water as the main land-based source of coastal pollution risk. Of the total amount of 5,693.1 Million, about 2,000 is proposed for WWTP construction, reconstruction and extensions.

- The operation and maintenance costs of WWTP is not presented.

- Only 25 Million is proposed explicitly for feasibility studies, management plans and capacity-building actions.

- Urban solid waste management and Hazardous waste management are almost totally forgotten, only 12,5 Million are proposed for these activities.

- The activities to abate the levels of atmospheric, urban and industrial pollution are rare.

- Despite widespread awareness of the importance of prevention measures to reduce pollution, it is surprising that actions to improve the application of Best Available techniques (BAT) and Best Environmental Practices (BEP) are not proposed.

### 11.1.1 Estimated costs from country reports

**a) Hot spots**:

The available cost information for Hot Spots is summarized in Table 1 below, which shows the estimated cost by country.

**Table 1**

**Estimated investment costs for Hot Spots (million USD) proposed by the countries**

| Country | Number of Hot Spots | Estimated costs |
|---|---|---|
| Albania | 4 | 95.5 |
| Algeria | 8 | 115 |
| Bosnia and Herzegovina | 6 | 250.8 |
| Croatia | 8 | 164 |
| Cyprus | 5 | 6.6 |
| Egypt | 6 | 162.8 |
| France | 4 | 200 |
| Greece | 8 | 195.4 |
| Italy | 13 | 1,500 |
| Israel | 5 | 129 |
| Lebanon | 5 | 378.6 |
| Libya | 5 | 16.6 |
| Malta | 3 | 48 |
| Morocco | 4 | 54 |
| Slovenia | 4 | 113.5 |
| Spain | 5 | 1,000 |
| Syria | 4 | 191.3 |
| Tunisia | 9 | 298 |
| Turkey | 5 | 774.5 |
| TOTAL | 111 | 5,693.1 million USD |

**b) Sensitive areas**.

The list of Sensitive Areas shown below summarizes the information contained in the individual Country Reports. Fourteen countries identified 54 Sensitive Areas and only 6 proposed activities, with a total cost of 93.6 million USD.

**TABLE 2**

**Estimated investment costs for Sensitive Areas (million USD) proposed by the countries**

| Country | Number of Sensitive Areas | Estimated costs |
|---|---|---|
| Albania | 3 | 35 |
| Algeria | 6 | |
| Bosnia and Herzegovina | 4 | 5,1 |
| Croatia | 5 | 6 |
| Cyprus | 1 | |
| Egypt | 1 | |
| France | 3 | |
| Greece | 2 | 12 |
| Italy | 7 | |
| Lebanon | 2 | 26.5 |
| Malta | 2 | |
| Slovenia | 2 | 3 |
| Spain | 3 | |
| Syria | 5 | 6 |
| Tunisia | 1 | |
| Turkey | 6 | |
| TOTAL | 54 | 93.6 million USD |

## 11.2 Investment Portfolio Scenarios

### 11.2.1 "Do nothing"

Taking no action is evidently the highest-cost option from the environmental and social point of view, which should be excluded at the outset. Marine pollution from municipal and industrial wastewater, agricultural run-off, discharges from ships and the uncontrolled disposal of solid wastes is a major threat to the Mediterranean. Apart from the environmental costs, the strong economic-environmental linkages underlying the regional economy, due to the importance of environment-related sectors such as tourism, fisheries and agriculture, also imply direct economic losses in these sectors.

The report of the World Bank on Middle East and North Africa Environmental Strategy (1995) estimates the costs of poor environmental quality and natural resource management and includes: impairment of public health, agricultural and fishery productivity losses, reduction in

tourism revenues, degradation of historical sites and cultural property, degradation of ecosystems, loss of biodiversity and reduction in amenity values.

The total cost of environmental degradation and pollution are unknown. However, the estimate for the MNA region made by the World Bank and shown in the table below is between 11.5 and 14 billion USD per year or almost 3 percent of regional GDP. Although this should be viewed as a rough estimate and is likely to constitute a lower limit, given the exclusion of the other costs of environmental degradation and poor natural resource management, the figures in Table 2 are similar to the cost of environmental damage in Eastern European countries, such as Poland, and 2-3 times as much as comparable costs in OECD countries.

**TABLE 3**

**Real Cost of Environmental Neglect (billion USD) (Source: World Bank)**

| IMPACTS | Cost |
|---|---|
| Productivity cost of soil erosion, salination and deforestation | 1-1.5 |
| Health impairment from lack of safe water and sanitation, excessive air particulate and SO2 pollution | 7<br>(4.5 safe water)<br>(2.5 PM & SO2) |
| Disease treatment | 1-1.5 |
| Health impairment from lead pollution | 1.5-2 |
| Loss of tourism | 1-2 |
| **TOTAL** | 11.5-14 |

### 11.2.2 Try to do everything

At the other end of the scale, despite the evident urgency for action focused on the Hot Spots, the high investment cost, the variability of the Hot Spots in terms of source, consequence and transboundary effects, and the institutional and legal pre-requisites for the most effective use of national and international financial resources, require the definition of priorities. Trying to tackle all the Hot Spots, even over a period of time, is as likely to lead to inaction due to limited justification for equal attention to all the Hot Spots and the consequent failure to attract investment funds over and above national budget allocations. There is also the question of the need for additional data for a clearer identification of Hot Spots and the associated remedial actions. Screening is essential in order to build up a coherent framework for an outline Investment Portfolio.

The report of the World Bank on the MNA region Environmental Strategy (1995) presents a tentative order of magnitude of investment costs to promote more environmentally sustainable development for the MNA region (Table 4). A first estimate puts the total investment cost in the order of 58-78 billion USD over the next ten years, or about 1.3-1.8 percent of regional GDP if the investments are spread over a period of 10 years. This additional investment requirement is comparable to the expenditure on environmental protection of most OECD countries, which has been in the order of 1-2 percent of GDP for the last two decades.

**TABLE 4**

**Tentative Ten Year Investment Requirements
(billion USD) (Source: World Bank)**

| Action | Total Investment | Expected benefits |
|---|---|---|
| Env. institutional capacity building (including staffing, training, public inform. /particip. and lab. equipm. | 0.1-0.3 | More env. sustainable policy framework |
| Industrial sector clean up: air pollution: Fuel subst. of high (3%) by low (1%) sulphur fuel oils, or by natural gas | 4-6<br>4-5 | DALYs[2] reduced by 2 million from air PM and SO2 pollution |
| Industrial sector clean up: water pollution | 8-14 | Avoidance of additional unnecessary costs of supply of safe municipal and agriculture water |
| Industrial sector clean up: hazardous waste | 3-4 | Diminished health risks, including that of cancer |
| Full urban and rural coverage of safe water and sanitation, including 55% urban coverage of sewage treatment | 19-21 | DALYs reduced by 3 million |
| Natural resource management activities on 10 % of land potentially threatened by erosion | 10-15[3] | Reduced productivity losses, watershed protection and biodiversity conser. |
| Full coverage of safe municipal solid waste management | 4-6 | Reduced health risks and cleaner urban environment |
| Change to unleaded gas. for 50 % of consumption | 6-7 | Health impacts reduced by 65 % |
| TOTAL | **58-78** | |

The report to the EC DGXI on "Economic evaluation of air quality targets for sulphur dioxide, nitrogen dioxide, fine and suspended particulate matter and lead" (1997) estimates the costs for the reduction of emissions of air pollutants in EU cities at risk[4] in million ECU (Table 5):

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[2] Disability adjusted life years(DALYs) are a measure of the loss of healthy life due to both premature mortality and disability.

[3] This estimate is extremely tentative given the lack of data.

[4] The population of the cities at risk is: SO2, 13 cities (2 Med.) with 17.9 million (5.6 Med.); NO2, 22 cities (14 Med.) with 23.5 million (15.5 Med.); PM, 25 cities (4 Med.) with 16 million (1.58 Med.) and Pb, 10,000 to 30,000 people living near lead producing plants.

**TABLE 5**

**Required emission reductions in cities at risk and associated costs (Source: E.U.)**

| Pollutant | Emission reduction (thousand tonnes) (percent.) | Total annual cost (million ECU) | Type of measures and specific cost. Central estimate of emission reduction |
|---|---|---|---|
| SO2 | 50/(10%) | 21/(4- 48) | Reduction of process emissions. Use of low sulphur fuels |
| NOx | 70/(8 %) | 79/(5-285) | Traffic: road pricing and introduction of LPG/CNG buses (40 MECU). Other sources: various measures (e.g.low-NOx combustion techniques (39 MECU) |
| PM | 15/(50%) | 87-225/(50-300) | Traffic:road pricing and introduction of LPG/CNG buses (18 MECU). Application of fabric filters instead of Electrostatic Precipitators. But many other measure are applicable. (69-207 MECU) |
| Lead | Not quantif. | (12-40) | Various measures not separately identified |

Some of the measures that have been evaluated control different pollutants (e.g. NOx and PM) simultaneously. The cost-data presented in Table 2 did not account for this aspect.

## 11.3 Proposed Activities and Associated Costs

### 11.3.1 Hot spots

Taking into account the proposals made by the countries concerning the investments costs for the hot spots (table 1) as well as the activities proposed in the SAP, the Secretariat has prepared the list of activities and costs related to hot spots which is presented in table 6.

This list includes activities and costs for:

a) investments proposed by the countries according to Table 1;

b) activities and investments proposed by the Secretariat:

i) Pre-investment studies for each Hot Spot;

ii) Reduction of 350,000 ton/y of BOD, nutrients and suspended solids of industrial origin;

iii) Facilities for management of 1 million tonnes of Hazardous Wastes;

The list did not include operation and maintenance costs, amortization and interest.

### 11.3.2 Sensitive areas

Taking into account the proposals made by the countries concerning the investment costs for the sensitive areas (table 20) as well as the activities proposed in the SAP, the Secretariat has prepared the list of activities and associated costs for the sensitive areas which is presented in table 7.

This list include activities and costs for:

a) the investments proposed by the countries according to table 2;

b) the activities and the investments proposed by the Secretariat:

i) The formulation of action plans for the sensitive areas;

ii) Remedial actions and other activities not yet determined for other sensitive areas.

### 11.3.3 Cities

Taking into account the proposed activities and priorities defined in the SAP, the Secretariat has prepared the list of proposed activities and associated costs for the protection of the environment in Cities exceeding 100.000 inhabitants which is presented in Table 8.

This list include activities and costs for:

i) Urban solid waste reduction, management and disposal for 34 cities exceeding 100,000 inhabitants with a total of 18 millions people and producing 5,4 millions tonnes/year of urban solid waste.

ii) Inspection and maintenance of vehicles and renovation of old vehicles.

iii) Measures for air pollution reduction. These measures include regulatory instruments, such as vehicle-targeted measures, automotive and fuel standards and non regulatory instruments such as subsidies (to promote the use of less polluting transport modes or cleaner vehicles), taxes, regulations and traffic management.

### 11.3.4 Regional Sustainable Environmental Management Programmes

The priorities suggested above are only part of the required actions; Pollution control strategies are most effective when they are planned and implemented within an integrated environmental management programme which includes action focused on the need to ensure sustainable resource use and sound management. The essential elements for sustainable environmental action should include activities targeted on:

a) Capacity Building
b) National Plans and Programmes
c) Cleaner Production
d) Monitoring and Enforcement
e) Information and Public Participation

The linkages between wastewater projects and integrated environmental management should be an important element in the planning of strategic action for the Mediterranean environment. The following notes seek to strengthen this element and explain the inclusion of such programmes in the investment portfolio.

The quality of the environment in any part of the world reflects past and current practices in the "utilisation" of the environment by individuals, industrial and business organisations and public agencies in response to growing social and economic pressures for development. However, environmental degradation is not confined to low-income Mediterranean developing economies, which need to stimulate employment generation in order to cope with rapid urbanization and growth of uncontrolled settlements. Higher-income Mediterranean economies face equally serious degradation problems arising from income-induced increases in the use of materials, water, chemicals and technology, placing equally strong pressures on the environment. Environmental protection requires integrated policies and institutions capable of action to regulate production, distribution, consumption and disposal practices within a broader-based coastal zone strategy.

**a) Capacity-building**.

The capacity to plan and initiate environmental action across a wide range of activities is a gradual process based on a prior commitment to economic and social development policies built on cross-sectoral linkages and an effective networking effort across agencies and policies. Capacity building is needed to increase awareness of the economic and social value of the environmental resources likely to ensure that industrial and municipal organizations, consumers and policy-makers do not either disregard or give low priority to environmental risks.

Taking into account the proposed activities and priorities defined in the SAP, the Secretariat has prepared the list of proposed activities and associated cost for Capacity-building which is presented in Table 9. This list includes activities and costs for supporting training programmes on 13 different subjects over 10 years at a cost of 1 million USD each. From the 13 million USD, 25 % may be considered organizational costs and are considered as Regional costs.

**b) National plans, programmes and regulations**

Taking into account the proposed activities and priorities defined in the SAP, the Secretariat has prepared the list of proposed activities and associated cost for preparation of National Plans, Programmes and Regulations which is presented in Table 10. This list includes activities and costs for supporting the preparation by regional organizations of guidelines for sewage and industrial waste water treatment and disposal and the reuse of waste water and sludge, and also the preparation of Mediterranean Strategy for the Management of Hazardous Wastes and activities and costs at the national level for the preparation of national regulations, plans and programmes at a total cost of 3 million USD over the next two years. The estimated cost of these activities is 3 million USD over two years.

**c) BAT & BEP and Cleaner Production**

Taking into account the proposed activities and priorities defined in the SAP, the Secretariat has prepared the list of proposed activities and associated cost for preparation of guidelines for BAT and BEP and for activities for reduction of discharges and emissions by use of cleaner technologies which is presented in Table 11. This list includes activities and costs for supporting the preparation by regional organizations of guidelines for BAT and BEP for different pollutants. The estimated cost of these activities is 700.000 USD over two years. The estimated cost of national activities aimed at the reduction of discharges and emissions of priority pollutants is 460 million USD over 10 years.

**d) Monitoring and Enforcement**

Taking into account the proposed activities and priorities defined in the SAP, the Secretariat has prepared the list of proposed activities and associated cost for Monitoring and Enforcement which is presented in Table 12. This list includes activities and costs for supporting the establishment of inspection systems and monitoring programmes at the national level. The estimated cost for these activities is 32 million USD. A cost of 140,000 USD is estimated for supporting the establishment of inventories and data bank.

**e) Information and Public Participation** .

Taking into account the proposed activities and priorities defined in the SAP, the Secretariat has prepared the list of proposed activities and associated cost for Information and Public Participation which is presented in Table 13. This list includes activities and costs to enhance public participation and public information. The estimated cost of these activities is 2.98 million USD, including 1.3 million for the preparation of printed materials and TV spots.

**TABLE 6**
**List of proposed activities and associated cost for HOT SPOTS, prepared by the Secretariat**

| PROPOSED ACTIVITIES | COST UNIT USD | TOTAL COSTS million USD | DATE |
|---|---|---|---|
| List of 111 Hot Spots with main activities and first impact evaluation | 10,000 | 1.19 | 1997/1999 |
| Preinvestment studies for each 124 Hot Spots. | 100,000 | 11.9 | 1998 / 2000 |
| Prepare action plans for remedial actions in order to control pollution at 124 H.S. | 2,000 | 0.248 | 1998 / 2000 |
| Proposed investments by Countries | | 5,693.1 | 2001 / 2008 |
| Industrial WWTP (S.S., org. matter and nutrients; 350.000 t/y BOD, equiv.10,000,000 inhab. | 40,000,000 | 400 | 2001 / 2008 |
| Dispose 1 M tons of Hazardous Wastes in a safe and environmentally manner:<br>- 20 Temporary safe storage for Hazardous Wastes<br>- 5 physico/chemical treatment plants<br>5 integrated treatment plants<br>- 20 Permanent safe storage for Hazardous Wastes | <br><br>500,000<br><br>7,000,000<br>50,000,000<br>2,500,000 | <br><br>10<br><br>35<br>250<br>50 | 2001 / 2008 |
| TOTAL | | 6,453 | 2001 / 2008 |

**TABLE 7**
**List of proposed activities and associated cost for SENSITIVE AREAS prepared by the Secretariat**

| PROPOSED ACTIVITIES | ASSOCIATED COSTS million USD | DATE |
|---|---|---|
| List of 54 sensitive areas and env. audits | 0.54 | |
| Prepare action plan for remedial actions for sensitive areas | 1.08 | 1998/2000 |
| Remedial actions for sensitive areas proposed by countries | 93.6 | 1998/2008 |
| Development of the methodology for selection of sensitive areas and for determination of the cost of protection | 0.03 | 1998 |
| Remedial actions for sensitive areas | 100 | 1998/2008 |
| TOTAL | 195.25 | |

**TABLE 8**

**List of proposed activities and associated cost for Cities prepared by the Secretariat**

| PROPOSED ACTIONS | ASSOCIATED COST million USD | DATE |
|---|---|---|
| Urban solid Waste reduction, management and disposal in 34 cities (18 M inb) | 1,500 | 1998/2008 |
| Inspection, maintenance and renovation of the oldest vehicles.(1 M vehicles) | 500 | 1998/2008 |
| Measures for Air pollution reduction | 800 | 1998/2008 |
| TOTAL | 2,800 | 1998/2008 |

**TABLE 9**
**List of proposed activities and cost for CAPACITY-BUILDING prepared by the Secretariat**

| PROPOSED ACTIVITIES | ASS.COST REGIONAL | ASS. COST NATIONAL | DATE |
|---|---|---|---|
| Support programmes on institutional capacity building. | 250.000 | 750,000 | 1998/2008 |
| Develop. training programmes on EIA. | 250,000 | 750,000 | 1998/2008 |
| Develop. training programmes on environmental auditing and management. | 250,000 | 750,000 | 1998/2008 |
| Develop. training programmes on environmental education. | 250,000 | 750,000 | 1998/2008 |
| Develop. training programmes on monitoring and inspection. | 250,000 | 750,000 | 1998/2008 |
| Develop. training programmes on cleaner production techniques and practices. | 250,000 | 750,000 | 1998/2008 |
| Provision of training to local administration for operation and maintenance of WWTP. | 250,000 | 750,000 | 1998/2008 |
| Facilitation of access to sources of technical advice and assistance. | 250,000 | 75O,000 | 1998/2008 |
| Develop. training programmes on river monitoring. | 250,000 | 750,000 | 1998/2008 |
| Develop. training programmes on air monitoring. | 250,000 | 750,000 | 1998/2008 |
| Training programmes on cleaner production for industrial managers. | 250,000 | 750,000 | 1998/2008 |
| Training programmes on cleaner production for public sector responsibles. | 250,000 | 750,000 | 1998/2008 |
| Training and educ. programme on ICZM | 250,000 | 750,000 | 1998/2008 |
| TOTAL | 3,250,000 | 9,750,000 | 1998/2008 |

**TABLE 10**

**List of proposed activities and costs for the preparation of NATIONALPROGRAMMES prepared by the Secretariat**

| PROPOSED ACTIVITIES | ASS.COST REGIONAL | ASS.COST NATIONAL | DATE |
|---|---|---|---|
| Preparation of Guidelines for sewage treatment and disposal. | 100,000 | | 1998/1999 |
| Prep. of Guidelines for ind. waste water treat. and disposal. | 100,000 | | 1998/1999 |
| Prep. of Guidelines for reuse of waste water and sludge | 100,000 | | 1998/1999 |
| Prep. of Mediterranean Strategy for Management of Haz.Waste | 100,000 | | 1998/1999 |
| Prep. of Nat. Reg. on point source disch. of dom. and ind. w.w. into the sea and rivers. | | 200,000 | 1998/1999 |
| Prep. of Nat. Reg. on point sources emissions into the air. | | 200,000 | 1998/1999 |
| Prep. of Nat. Prog. for Sewage | | 200,000 | 1998/1999 |
| Prep. of Nat. Programmes for Urban Solid Waste | | 200,000 | 1998/1999 |
| Prep. of Nat.Programmes for Heavy Metals | | 200,000 | 1998/1999 |
| Prep. of Nat.Programmes for Organohalogen compounds | | 200,000 | 1998/1999 |
| Prep. of Nat.Programmes for SS, Organic matter and nutrients | | 200,000 | 1998/1999 |
| Prep. of Nat. Plans for H. W. | | 200,000 | 1998/1999 |
| Prep. of Pilot Progr. for PCBs. | | 200,000 | 1998/1999 |
| Prep. of Pilot Progr. for Obsolete Chemicals | | 200,000 | 1998/1999 |
| Prep. of Pilot Progr. for Luboils | | 200,000 | 1998/1999 |
| Prep. of Pilot Progr. for used Batteries | | 200,000 | 1998/1999 |
| Prep. of Pilot Project for manag. of H.W. from military establishments. | | 200,000 | 1998/1999 |
| TOTAL | 400,000 | 2,600,000 | 1998/1999 |

**TABLE 11**

**List of proposed activities and costs for BAT & BEP and CLEANER PRODUCTION prepared by the Secretariat**

| PROPOSED ACTIVITIES | ASS. COST REGIONAL million USD | ASS. COSTS NATIONAL million USD | DATE |
|---|---|---|---|
| Preparation of guidelines for BAT and BEP for main point sources of dioxins and furans and experts meeting. | 0.1 | | 1998/2000 |
| Preparation of guidelines for BAT and BEP for main point sources of PAH and experts meeting. | 0.1 | | 1998/2000 |
| Preparation of guidelines for BAT and BEP for main point sources of organometallic compounds and experts meeting. | 0.1 | | 1998/2000 |
| Preparation of guidelines for BAT and BEP for power plants and experts meeting. | 0.1 | | 1998/2000 |
| Preparation of guidelines for BAT and BEP for main point sources of organohalogens compounds and experts meeting. | 0.1 | | 1998/2000 |
| Publication of the 10 guidelines. | 0.1 | | 1998/2000 |
| Preparation of guidelines for BAT and BEP for main point sources of SS, organic matter and nutrients and experts meeting. | 0.1 | | 1998/2000 |
| Reduction of discharges and emissions of T.P.B. | | 150 | 2001/2008 |
| Reduction of the generation of Hazardous Waste. | | 150 | 2001/2008 |
| Reduction of emission of air pollutants by power plants. | | 150 | 2001/2008 |
| Support the development of alterative energies. | | 10 | 2001/2008 |
| TOTAL | 0.7 | 460 | |

**TABLE 12**
**List of proposed activities and cost for MONITORING AND ENFORCEMENT prepared by the Secretariat**

| PROPOSED ACTIVITIES | ASS. COSTS million USD | DATE |
|---|---|---|
| To support the establishment of a Inspection System to ensure compliance with national regulations. | 10 | 1998/2000 |
| To support the establishment of a Monitoring Programme to evaluate the actions. | 10 | 1998/2000 |
| To support the establishment of a monitoring programme for marine environment quality | 5 | |
| To support the establishment of air monitoring programme in 5 cities exceeding 1 M inhabitants. | 5 | 1998/2008 |
| To support the establishment of local monitoring programmes to control and asses effluent discharges. | 2 | 1998/2008 |
| To support the establishment of river monit. progr.for water flow, sediment load and pollution loads (50 rivers). | 5 | 1998/2008 |
| To support the establ. of Permanent Register of river data (50 rivers). | 0.05 | 1998/2000 |
| To support the establ. of National Data bank on socio-economic indicators of sea and river quality. | 0.05 | 1998/2000 |
| Elaboration of the Inventory of major air point sources. | 0.02 | 1998/2000 |
| Elaboration of the Inventory of point source discharges and emissions in the hot spots and areas of concern. | 0.02 | 1998/2000 |
| TOTAL | 37.14 | 1998/2000 |

**TABLE 13**
**List of proposed activities and cost for INFORMATION and PUBLIC PARTICIPATION prepared by the Secretariat**

| PROPOSED ACTIVITIES | ASSOC. COSTS REGIONAL | ASSOC. COSTS NATIONAL | DATE |
|---|---|---|---|
| Enhance env. awareness of the population | 20,000 | 200,000 | 1998/2005 |
| Prepare printed material and TV spots | 300,000 | 1,000,000 | 1998/2005 |
| Identification of potential roles for NGO in the implementation of the SAP Programme. | 50,000 | 200,000 | 1998/2005 |
| Collect information on the levels and trends of loads of pollution reaching the Med. Sea | 20,000 | 200,000 | 1998/2005 |
| Develop PRTRs in cooperation with OCDE | 20,000 | 200,000 | 1998/2005 |
| Collect information on the measures implemented | 20,000 | 200,000 | 1998/2005 |
| Development of institutions and processes facilitating public participation in env. management. | 20,000 | 200,000 | 1998/2005 |
| Preparation of the reports on application of LBS Protocol and SAP | 20,000 | 200,000 | 1998/2005 |
| Prepare and adopt if necessary national legislation on public information | 10,000 | 100,000 | 1998/2005 |
| TOTAL | 480,000 | 2,500,000 | 1998/2005 |

**TABLE 14**
**ESTIMATED COSTS OF THE ACTIVITIES FROM 1998 TO 2008**
**prepared by the Secretariat**

| | ESTIMATE COST (million USD) 1998 / 2000 | ESTIMATE COST (million USD) 2001 / 2008 | TOTAL |
|---|---|---|---|
| Hot Spots | 1,078 | 5,375 | 6,453 |
| Sensitive Areas | 1.62 | 193.63 | 195.25 |
| Protocol Area Cities | 245 | 2,555 | 2,800 |
| Capacity Building | 2.6 | 10.4 | 13 |
| National Programmes | 3.2 | 8 | 11.2 |
| Clean Production | 0.7 | 460 | 460.7 |
| Monitoring & Enforcement | 20.14 | 17 | 37.14 |
| Information & Public Participation | 1.18 | 1.8 | 2.98 |
| TOTAL | 1,352.4 | 8,620.8 | 9,973.2 |

## 11.4 Future Needs

It is evident that accurate and more comprehensive cost data will be needed as part of the follow-up activities in the context of further analysis of priority actions including the question of cost-effectiveness and more detailed project identification, both of which are essential elements for strengthening the scope of economic analysis in the formulation and implementation of the environmental action plan for the Mediterranean.

### 11.4.1 Need for "Resource-consciousness"

The importance of cost information in this context does not only depend on its accuracy. These initial cost estimates are a "first-shop attempt" to apply cost considerations to this activity which includes screening of proposed actions and guidelines for implementation choices. Part of the purpose of developing an Investment Portfolio Strategy is to introduce "resource consciousness" in the Regional Strategic Environmental Action Plan. "Resource consciousness", in this context, means closer project identification, concern for cost-effective options and a capacity to raise questions on how to take decisions on options and approaches which are technically and socially appropriate to particular country situations. This point of view is central to environmental investment planning where increased investments need to be diverted from other commercial sectors on the basis criteria which include identification of cost-effective projects. Issues that require more detailed appraisal will be more sharply revealed as a result of the preparation of this Investment Portfolio Strategy.

### 11.4.2 Need for An Investment Strategy

Apart from data gaps, cost estimates need to be related to wider economic and environmental considerations before used for action planning purposes. The main task at this stage is the interpretation and use of the available cost data to construct elements for the integration of the proposed remedial environmental action in an action-oriented investment strategy for future investment decisions. The development of an investment strategy involves various levels of analysis, each requiring increasingly more and better data according to the degree of detail needed. So far, cost estimates indicate an approximate set of financial requirements, totalized to give estimated investment requirements. Raw cost information needs to be analysed in relation to the impacts of the present pollution risks and the "value" of the expected benefits of the proposed investments in terms of the future reduction of these impacts on resources, such as human health, aquatic life, economic and social welfare, recreational activities, other beneficial uses and the quality of drinking water. This approach is instrumental in the effective mobilization and use of financial resources for a particular action plan.

## 11.5 Use of the Investment Portfolio

An investment portfolio is a framework for guiding investment choices and decisions, usually within changing environmental and socio-economic conditions. It is a process that leads to a demonstration of the economic implications of environmental actions, rather than a final statement for a single purpose. This investment portfolio should be used as a guide to develop deeper environmental-economic analysis in the light of funding and justification requirements at the regional and national levels. The elements outlined in this investment portfolio are intended as guidelines for future work.

Raw cost information is insufficient to support investment decisions. Costs need to be related to wider economic and environmental considerations before being used for planning purposes. The interpretation and use of estimated costs required construction of an investment strategy and options for future investment decisions. This document shows how cost data should be analysed in relation to pollution impacts and the expected benefits of proposed investments, to reduce impacts on resources such as human health, aquatic life, economic and social welfare, recreational activities, other beneficial uses and the quality of drinking water. This approach should be used to make cost information meaningful for effective resource mobilization and planning.

Investment planning has many levels of analysis and data requirements. The framework used in this document outlines possible approaches and suggests guidelines that are adaptable to specific contexts. Follow-up work will be needed in support of the implementation of priority actions. It provides the context for further analysis for sharper project identification and evaluation based on the parameters which have to be taken into account.

It shows how cost, impact, benefit and funding issues can be brought together to facilitate the development of locally relevant and nationally specific investment portfolios. It demonstrates how benefits are derived from the reduction or avoidance of pollution impacts on resources of social, economic and environmental value. This perception allows further work looking at the environmental impacts as they relate to valuable resources such as Human Health, Aquatic Life, Economy and Welfare, Recreation, Other Beneficial Uses and Quality of Drinking Water rather than mixing and generalising environmental information rendering difficult the identification of benefits from actions to address pollution risks.

The investment portfolio framework developed in this document should help improve the approach to environmental investment and the justification for increasing financial resources for

the environment. It is important to remember that environmental resources are often used (and misused) outside a market context and therefore their value is under-rated. The total benefits from their conservation through better use practices should be take into account (and when possible qualitative) in justifying the viability of environmental actions. This broader definition of benefits to include the conservation of resource for their existence (or non-use value) is one of the key elements to be used for the development of detailed project proposals put up for donor or national budget support.

In the follow up work in response to specific evaluation and investment planning needs, it is useful to focus not only on the availability of fund, or "can we afford to pay the cost of environmental action plans" but primarily on "whether it is worth paying the cost" relative to the expected benefits. This will create the need to show the total value of benefits which is typically many times greater than financial costs.

The cost/benefit approach is particularly appropriate in the context of environmental actions due to the diverse, long-term and social nature of benefits which are known to exceed by far the costs. In addition, a cost/benefit approach is more effective in mobilising funding sources for environmental actions because it focuses on the justification of environmental investment programmes which is central to the effort to attract funds from donors committed to sustainable environmental management.

Primarily, the importance of an investment portfolio lies in incorporating investment planning and economic analysis in environmental action plans. The added value of this integration is to support resource mobilisation and direction of local, national, regional and international opinion to needs for environmental action and cooperation. Funding requirements and investment options are best discussed in the light of scenarios showing to the decision-makers, NGOs and international institutions the urgency for actions in risk areas and the respective cost/benefit positions. Integrated environmental planning approaches, incorporating economic and financial concerns within the planning process, serves, among other things, to strengthen institutional capacities and to build up a common framework for communication on goals, objectives, constraints and visions essential for gathering official and popular support behind environmental proposals.

## 11.6 Mobilization of financial resources

The mobilization of resources is essential for the development and implementation of this Programme. However, it is important to clearly state that most of the resources should be national and that it is the polluters, the consumers, the users and the Governments which should provide the resources necessary for the application of the Programme, knowing that the benefits obtained could be greater than the costs involved.

Effective international cooperation is important for a successful and cost-effective SAP. International cooperation serves a central role in enhancing capacity-building, technology transfer and cooperation, and financial support. Moreover, effective implementation of the Programme requires efficient support from appropriate international agencies. Furthermore, international cooperation is required to ensure regular review of the implementation of the Programme and its further development and adjustment.

It will be necessary to look for external financial resources and to develop new innovative financial schemes taking into account that national financial resources are limited. To this end, there are two types of mobilization of resources:

- Mobilization of national financial resources;

- Mobilization of external financial resources and mechanism as well as other alternatives.

Financing needs fall into three categories:

- Funds for technical activities including studies; demonstration and pilot projects; planning, including operational planning; training, institutional strengthening; data collection and monitoring; programme design and implementation; and project identification, preparation, and feasibility studies.

- Funds for capital investment in facilities to reduce and control pollution and improve management of sectors.

- Funds for project implementation, including training and institutional strengthening and the recurrent cost of monitoring, operation and maintenance.

### 11.6.1 National financial resources

**Proposed activities at National level**

- To gradually change prices for the water uses in line with their economic costs to encourage more efficient water use, and to mobilize the funds needed for operation, maintainment and new investment.

- To establish and apply certain fees for the supply of municipal or industrial water according to the volumes consumed. These fees should gradually cover the costs of collection, treatment and distribution.

- To establish and apply a tax for the treatment of wastewater which gradually covers the costs of treatment and disposal. This tax should be applied to the users of domestic or industrial water.

- To establish a fee for the discharge of wastewater which complies with the regulations adopted for its discharge into public channels, rivers and the sea. This fee should take into account the volume of water discharged and its quality, and its ultimate aim should be to help maintain and monitor the quality of the receiving water.

- To establish a annual tax applied to the vehicles for their harmful emissions into the atmosphere and use of carburants.

In accordance with "polluter pay" principle:

- a)the users should, where appropriate, pay for the costs of collection and disposal of urban solid waste.

- b)to establish, where appropriate, a industrial waste management fees at rates that reflect the cost of providing the service and ensure that those who generate the wastes pay the full cost of disposal in an environmentally safe way.

- c)to establish a tax for air emissions from industrial installations. This tax would be higher in the case of industrial installations located in the "hot spots" and areas of concern.

- d)the producers of certain goods (paper, packaging, pneumatic,) should take responsibility for those goods once used or for the wastes that those goods are going to generate. These goods should be recovered (recycling, regeneration, reusing). The principal aim is that these used goods can be re-placed on the market.

- To prepare environmental voluntary agreements between authorities, producers and users of hazardous waste and substances that are toxic, persistent and liable to bioaccumulate, for the reduction of pollution.

- Both public and private sector should set up a fund from which advances to support markets of recycling goods.

- To introduce economic and financial incentives to encourage the use of less pollution goods. For example, encourage the use of unleaded petrol.

- To introduce economic and financial incentives to encourage the use of cleaner production techniques.

- To introduce pollution fees and fines to reduce the environmentally harmful impacts of certain activities. Pollution fees and fines also can be used as a source of funds for environmental activities.

Efforts to mobilise local and national resources for environmental protection through user fees or pollution charges are expected to yield results very gradually. National or local loans is not a major factor in the short term because national or local capital markets and banks have not been developed to support environmental improvements and services. National or local private investment is constrained by historical barriers to private ownership, a limited national banking and financial sector, and inexperience of potential investors with the types of activities proposed in the SAP.

### 11.6.2 External financial resources

The external financial resources serve a central role in order to support and complement the efforts of the Parties for the successful implementation of the SAP. Their use must be well planned and properly coordinated.

Details are given below about some of the financial resources and instruments for implementation of the SAP. Three criteria are taken into account: available financing sources, type of financial institutions and geographical scope. The principal sources of external financial resources are:

1. Grant and concessionary assistance from the GEF and the UNDP.

2. Loans from multilateral and regional banks.

3. Financial instruments from the European Union.

4. Multilateral Programmes: The Mediterranean Environmental Assistance Programme (METAP).

5. Bilateral agreements.

6. Alternative funding sources.

**Grant and concessionary assistance from the GEF and the UNDP.**

**The Global Environmental Facility (GEF)**

GEF has a special role to play in providing new and additional grant and concessional funding to meet the agreed incremental costs of measures to achieve agreed global environmental benefits in the following focal areas: climate change; biological diversity; international waters; ozone layer depletion. It is a cooperative venture among national governments, the World Bank, UNDP and UNEP. The GEF also supports international environmental management and the transfer of environmentally sound technologies.

Funds provided through the GEF offer countries the opportunity to demonstrate how development projects can integrate environmental concerns. A project usually must not be economically viable without support from the facility. Most GEF funding will be for investment projects. Other types of projects include technical assistance, pre-investment and feasibility studies, scientific research and training.

Moreover, UNDP, UNEP and the World Bank play an important role in the implementation of GEF-financed activities within their respective sphere of competence and in facilitating cooperation in GEF-financed activities by multilateral development banks, United Nations agencies and programs, other international institutions, national institutions, local communities, etc.

**United Nations Development Programme (UNDP).**

Environment and natural resource management were selected by UNDP`s Governing Council as one of the six areas of concentration of UNDP`s fifth cycle program (1992-1996).

A number of technical assistance initiatives have already been launched at both country and regional levels. UNDP`s support ranges from preparation of sound strategies for environmental protection and implementation of national environmental plans to the design of programs for environmental education.

Other regional initiatives included the establishment of collaborative networks in the area of water management including supplementary irrigation and water management at the farm level, range management, and sand dune stabilization.

UNDP will play the primary role in ensuring the development and management of capacity building programs and technical assistance projects.

**Loans from Multilateral and Regional Banks**.

Loans may come from multilateral banks, mainly the European Investment Bank; the European Bank for Reconstruction and Development (EBDR); and the World Bank. The World Bank and regional banks can provide loan finance for larger projects and technical assistance directly, and for smaller projects through financial intermediaries in the borrowing country, normally at rates lower than those obtainable on the commercial market.

The amounts available for environmental projects depend on their country and sectoral priorities and the recipient`s borrowing capacity. These banks are guided by the priorities and resource allocations of governments. Environmental investment by these banks depends on the priorities of the borrowing country, its level of borrowing or indebtedness and the anticipated economic conditions it can support, the balance in investment activities among priority sectors, the quality of the proposed investment, and the borrower or project sponsor. When assessing project financing proposals, these banks focus in particular on the sponsor or borrower, and on their capacity and planning for repayment of the loan. The funds of the international financial banks are lent at or near market terms, for frequently longer maturity and with longer grace periods than those available from other sources. Their use is contingent upon the willingness of the borrower to agree to service the loan and the willingness of the state to provide guarantees for repayment that some of these institutions require. The EBRD is also able to lend to viable projects on a limited resource basis. In general, loans from international banks cover foreign currency costs only while local currency funds must be found from other sources. The possibility of blending loan and grant money in a single project should always be examined. Maximising the involvement of the private sector takes the burden off central government and effectively implements the polluter pays principle.

**The World Bank**

The World Bank can provide loan to assist countries to set priorities, improve environmental assessment, capacity building, and implement programs for sound environmental stewardship. It can also provide advice and help countries for the preparation and implementation of National Action Programmes, and can ensure that Bank lending incorporates environmental concerns at every stage of preparation, and design and implementation of projects that supports. The Bank participates in the Global Environmental Facility`activities.

The World Bank environmental activities involve policy dialogue, lending, technical assistance, research and aid coordination. The World Bank lending to the Mediterranean region is increasing for country-level institution building and for the management of critical natural resources such as forests, watersheds, freshwater, wild-life and soils.

**The European Investment Bank**.

The protection of the environment is among the key priorities of the EIB`s lending policy; it thus acts in line with the objectives of the European Community, which puts an increasing

emphasis on safeguarding the environment and achieving sustainable growth. The EIB`s interest in environmental protection is pursued through three complementary components:

a) for each investment scheme, the Bank takes into account the overall environmental impact.

b) the EIB provides funds for projects aimed exclusively or primarily at environmental protection, including pollution control equipment in industrial plants, or projects aimed at improving urban environment; and

c) in appropriate cases, the Bank supports feasibility studies and technical assistance schemes in order to help identify priority investment needs and design cost-efficient solutions.

The main aim of the EIB is to support projects that produce one or a number of the following benefits: improvements in drinking water supplies and waste water treatment; the introduction of environmentally sound techniques to process solid, in some cases toxic, waste; a reduction of atmospheric pollution, especially from power station and industrial plant; the promotion of environmentally sound industrial processes and products; and the protection of the environment and the improvement of the quality of life in urban/coastal areas.

**Financial Instruments from European Union**.

Various sources of funds from the European Union can be mobilized in favour of environmental projects in the Mediterranean region. They consist of grant programs funded by the EC and loans from the EIB. Bilateral aids have not been taken into considerations and neither have the specific characteristics of the countries of the Mediterranean belonging to the group of Eastern countries (Albania) which benefit from other instruments such as PHARE.

**The LIFE Programme**: The revised regulation (EC nº. 1404, OJ L 181/1 of 20/07/96) adopted in 1996 contains some adjustments in view of pursuing the action between 1 January 96 and 31 December 1999.

From this second phase onwards, the LIFE programme has been subdivided into three parts according to fields of action: LIFE-Environment (applicable in the Union territory); LIFE-Nature (also applicable in the Union territory); LIFE-Third countries (applicable to Mediterranean countries).

LIFE-ENVIRONMENT: Eligible actions for the 1996-1999 period are the following: innovatory or pilot actions to promote sustainable development in industrial activities; pilot and promotional actions as well as technical assistance to local communities to foster integration of the environment into land planning and promote sustainable development; preparatory actions for the implementation of the Community environmental policy and legislation. 46% of the total LIFE budget are earmarked for actions within the framework of LIFE-Environment.

LIFE-NATURE: The aim of LIFE-Nature is nature conservation in the widest sense by supporting actions “required to preserve and restore natural habitats and populations of animal and plant species in a favourable state of conservation. The LIFE-Nature indicative budget for the 1996-1999 period amounts to 27 MECU.

In principle, all the actions proposed under LIFE-nature must be carried out within the EU. However, there is an exceptional possibility of including actions in third countries if the project concerns a habitat or a species of Community interest. The amount of the action outside the EU does not exceed 10% of the planned budget.

LIFE-THIRD COUNTRIES: The aim of LIFE-Third countries is to implement technical assistance actions and pilot actions in the Mediterranean third countries[5] in the following areas: technical assistance for the establishment of the necessary administrative structures in the field of the environment and for the development of environment policies and actions programmes; the conservation or restoration of important habitats hosting endangered flora and fauna; pilot actions to promote sustainable development.

Among the criteria applicable to actions in third countries, it should be mentioned that these actions must contribute to an approach fostering sustainable development at international, national or regional levels and bring solutions to well-spread environmental problems in the region or field concerned. It must be noted that proposals should have an immediate practical application (which leaves out studies, research projects, etc.). The budget allocated to LIFE-Third countries for the 1996-1999 periods amounts to 36 MECU.

Decentralized cooperation: A budget line for "decentralized cooperation" (B7-5077) was created in 1992, targeting all developing countries without distinction. This line has been provided with a very small budget: 6 MECU in 1996 and 5 MECU for 1997. The regional distribution of funds is very irregular, the Mediterranean being the area benefitting less from Community funds.

Environmental Actions in Developing Countries**:** The budget line "Ecology in developing countries" (line- B7-5040) was created in 1982 to fund actions in the Mediterranean countries, as well as Africa, Latin America or Asia, always in relation to geographical priorities. In the Mediterranean area, priority has been given to pollution control. Three types of action can apply for support: those aiming at the integration of environmental aspects into cooperation, including training actions and environmental impact assessments; those with the objective of helping partners of developing countries to improve the institutional capacities required for the formulation and implementation of projects; those making it possible to test and promote innovatory approaches and techniques though pilot projects dealing with urban environment or coastal ecosystem. The allocated budget in 1996 amounted to 15 MECU.

MEDA Financial Instrument: The main objective of the MEDA instrument is "to contribute to common interest initiatives in the three areas of the Euro-Mediterranean Partnership: to strengthen political stability and democracy, to set up a Euro-Mediterranean free trade area, to develop economic and social cooperation, and to take into account the human and cultural dimension" (Council Regulation (EC) nº. 1488/96 of 23 July 1996).

The guidelines for the indicative programmes under MEDA are, among others: the complementarity between bilateral and regional programmes; the "multiannual" nature of programming, which allows for middle-term intervention; the need to make indicative programmes focus on a limited number of priority sectors; the need for regional cooperation to deal with the three domains of the Euro-Mediterranean Partnership, etc. The MEDA budget line

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[5] In the Mediterranean area, eligible third countries are the following: Albania, Algeria, Bosnia-Herzegovina, Cyprus, West Bank and Gaza, Croatia, Egypt, Israel, Jordan, Lebanon, Malta, Morocco, Syria, Tunisia and Turkey.

was provided with 4,125 MECU for the 1995-1999 period, of which 100 MECU are reserved to the reduction of interests from loans granted by the European Investment Bank in the field of environment.

**Multilateral Programmes**: **The Mediterranean Environmental Technical Assistance Programme (METAP)**.

The aim of the METAP Programme is to identify actions, through feasibility studies, which could be supported by investments from the World Bank, the EIB, the UE, national governments, etc. The final objective is to curb environmental degradation in the Mediterranean area.

METAP entered in a new phase in 1996. The joint definition of indicators for sustainable development in the Mediterranean area will be one of the priorities of METAP III, which plans to assist Mediterranean countries in the implementation of a reliable framework of specific indicators and related reference points that can be used to monitor and assess the impact of policies, programmes and projects, including METAP activities, the priorities of which are capacity building and integrated water management as well as holding pollution in check and preventing it at "critical spots".

METAP III plans to continue its work upstream by providing funds and technical support to medium-term activities leading to the setting-up of policies and a series of investments to restore the environment. Until now, METAP has already granted some 25 MECU in support of 121 technical assistance activities. These activities have helped in turn to identify and set up investments for the environment amounting to more than 1,5 billion ECU. Under METAP III, cost estimates for identified activities amount to some 91 MECU, which constitutes a significant increase.

**Bilateral agreements**

Bilateral agreements have proved to be an important mechanism of cooperation between developed and developing countries. The European Union and many States members have signed bilateral cooperation agreements with Mediterranean countries. Environment and sustainable development are an important part of these agreements. Other OCDE countries have also signed bilateral agreements with Mediterranean countries with the same interests for environmental matters.

**Alternative funding sources**

Export credit agencies: These are a source of shorter-term project financing, especially for specialized equipment.

Debt-for equity swaps and eco-conversion programme: Creditors agree to convert the debts owed to them into local funds to be applied for environmentally beneficial expenditures.

Foundation grants: Private or public foundations may use their resources to support innovative approaches to environmental management or the development of human resources.

Private funding: Voluntary contributions through non-governmental channel or NGOs.

Investments from private sector institutions: Loans may be taken out from private sector institutions in the same way as from equivalent national institutions.

### 11.6.3 Clearing-house mechanism

As a means of assisting and mobilizing technical scientific and human resources, including access to cleaner production technology as well as the application of the best available techniques and the best environmental practice, States should establish a collaborative network (a clearing-house mechanism) to enhance the transfer and cooperation among developing countries and between developed and developing countries.

It would be a mechanism for responding to requests on scientific, technical and human resources from national Governments, organizations, institutions, firms and/or individuals. The clearing-house would consist of three basis elements:

a) A data directory, with components organized by source-category, cross-referenced to economic sectors, containing information on current sources of information, practical experience and technical expertise;

b) information-delivery mechanisms to allow decision makers to have ready access to the data directory and obtain direct contact with the sources of information, practical experience and technical expertise identified therein (including the organizations, institutions, firms and/or individuals most able to provide relevant advice and assistance);

c) Infrastructure- the institutional process for developing, organizing and maintaining the directory and delivery mechanisms.

This mechanism should be established on existing subregional, regional or national research centres which are already linked with national institutions and NGOs.

**Proposed targets**

- By the year (2000), to develop a clearing-house mechanism.

**Proposed activities**

- The functions of the clearing-house will include:

- To collect, treat and disseminate information as well as data on available technologies, their sources, their environmental risks and the broad terms under which they may be acquired.

- To disseminate information on concrete cases where environmentally sound technologies were successfully developed and implemented.

- To advise, assist and suggest guidelines, for instance for policy integration, capacity building, technology transfer, etc.

- To facilitate other services, as for instance source of advice, training, technologies and technology assessment.

- To allow decision makers to have ready access to the data and obtain direct contact with the sources of information, practical experience and technical

expertise identified therein (including the organizations, institutions, firms and/or individuals)

The Clearing-house, in the implementation of their functions, should be coordinate, and not replicate, the work of the organizations such as the World Bank, the United Nations Development Programme (UNDP), including the UNEP International Cleaner Production Information Clearing House (UNEP/ICPIC), the International Atomic Energy Agency (IAEA), the International Maritime Organization (IMO), etc. They should in addition make full use of the work of other regional networks as well as intergovernmental and non-governmental organizations and private sector.

## 12. Gaps, Problems and Follow-up

The present Strategic Action Programme was prepared by the Secretariat in response to specific requirements of the 1996 LBS Protocol (Art.5 and Art. 15). The PDF-B grant of GEF assigned to MAP for its preparation was an opportunity given to the Contracting Parties to fulfil an important provision of the Protocol at low cost for MAP and in a very short time. In addition, the preparation of the Transboundary Diagnostic Analysis and the Report on Pollution Hot Spots, required by GEF as a basis for the formulation of the Strategic Action Programme, provided MAP in a record time with a collation of a very large number of information on the main pollution problems of the region and on the possible remedial actions and their costs. In general terms, it is possible to say that the process initiated through the GEF-sponsored activities is providing the Contracting Parties with a solid basis for planning and eventually implementing the long-term pollution control strategy needed for the implementation of the LBS Protocol.

The Strategic Action Programme proposes a very comprehensive and ambitious exercise for the Contracting Parties. Although the programme provides a large number of information, at the end of this first phase of the GEF-sponsored project the following gaps and problems can be easily identified:

(a) Project and programme specification

- to look much more closely and critically at the catalogue of Hot Spots and Sensitive Areas presented by countries. The proposed interventions should be clearly specified and the technological options involved critically examined;

- to focus on the socio-economic context of the Hot Spot areas and identify the population, employment, social and cultural structure of the areas for better analysis and sharper understanding of the impacts and benefits underlying the proposed interventions;

- to examine critically the basic economic policies applied in selected groups of countries with important regional Hot Spots to catalogue economic measures (subsidies, loan priorities, taxes, etc.) encouraging directly or indirectly pollution as part of export, import substitution, rural development policies and specific assistance to particular development projects (energy, agriculture, transport, tourism). Economic policy biases and distortions are often serious background sources of pollution which make it difficult to identify if "point sources" are separated from the rest of the economic policy context;

- to review opportunities for the mobilisation of private sector resources and the scope for the use of incentives, measures to influence private sector decisions and behaviour related to the environment.

(b) Appropriate cost/benefit studies

- to develop a practical framework for cost/benefits study of the main priority projects and programmes based on regionally relevant evaluation techniques, issues and data, and utilising to the maximum the few existing case studies;

- to prepare more accurate cost estimates for priority projects to be used for pre-investment analysis needed by potential donors;

- to identify more sharply and measure the main benefits to accrue from the implementation of the key priority projects, including proposals for overcoming data and specific measurement problems;

- to prepare a more detailed investment portfolio focusing on the cluster of priority projects and programmes aiming at the incorporation of elements concerning the social justification for donor support, the beneficiary population, funding and investment recovery mechanisms and national participation capabilities.

(c) Financing capabilities at the regional and national level

- to collect information on regional multi-lateral and bi-lateral funding sources and national expenditure on environmental programmes for the purpose of identifying "national" and "incremental" investment needs;

- to analyse “affordability” and cost-recovery issues in relation to the diversity of national economic and social conditions which may entail specific country-based social impacts caused by the implementation of capital-intensive environmental facilities and the consequent introduction of user charges.

As a result of the above, it is evident that if on the one hand the proposed Strategic Action Programme shows the way to follow for an efficient long-term solution to land-based pollution, on the other hand it represents only the starting point of the process. In order to achieve the final goal of the Programme, it is therefore necessary to plan a step-by-step approach which should keep into account the available resources and opportunities at the national and international levels.

At the present moment, the provision of the 1997 GEF grant, which includes possible follow-up activities, is a concrete opportunity given to Contracting Parties to initiate the process indicated by the Strategic Action Programme. The GEF initiative foresees first the adoption of the Strategic Action Programme by the Contracting Parties. After that, a full GEF project could be prepared in conjunction with the convening of a Meeting of potential donors to examine the support required by developing countries for the implementation of the Programme. The project could cover the next phase of implementation of the activities which could include a sum between 4 and 6 ml US$ on the assumption that a percentage of that sum (a minimum of 20-25 per cent) could be covered by additional donors (national and international including MAP). This sum, which alone cannot obviously solve the existing problems identified through the GEF initiative, should be utilized in the most effective way, i.e. to prepare the ground for the concrete implementation of the interventions proposed.

As a result, the full GEF project, aiming at funding the costs of addressing transboundary issues and problems and achieving regional benefits, could include firstly the selection of a number of priority hot spots of transboundary significance for detailed feasibility study and cost analysis and, secondly, a number of regional level activities of the Strategic Action Programme designed to leverage both national support to the execution of the Programme and donor support for specific activities in developing countries. The GEF project should also include an incremental cost analysis including an estimate of the existing baseline, and indication of the additional funding that would be applied by national Governments to address issues and problems identified as priority.