

Technical Report No. 3

# Data Collected within the Framework of the Regional European Sea Conventions

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# 1. GENERAL INTRODUCTION

## 1.1. Objectives

The quality of the marine environment is a particularly delicate issue in current European social, economical and political agendas. However, genuine environmental concerns relating to the sea are often confused and ambiguous due of the absence of a steady supply of reliable information. Multi-national conventions have shown considerable commitment and versatility in redressing this lack via their provisions for continuous marine environmental monitoring. Such conventions have, through innovative administrative and scientific mechanisms, admirably met the complex task of co-ordinating a growing array of monitoring activities on the international scale in an effective manner.

The main regional conventions relevant to the European Union are:

- **the Convention for the Protection of the Marine Environment of the North-East Atlantic, 1992**, or the OSPAR Convention;
- **the Convention for the Protection of the Marine Environment of the Baltic Sea Area, 1974** (revised in 1992), or the Helsinki Convention;
- **the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean, 1995**, or the **Barcelona Convention**.

All three Conventions derive their founding principles from the UN Conference on the Human Environment held in Stockholm in 1972, where a 'master plan' for the protection of the world environment was developed. This report has been prepared by the European Environment Agency's Topic Centre on Marine and Coastal Environment (ETC/MCE) as part of its 1995 work programme. The report deals with the nature, organisation and information practices of these Conventions so as to review existing data resources and suggest common grounds for establishing collaborations between the Conventions and the European Environment Agency (EEA).

## 1.2. Marine Environmental Monitoring Programmes (MEMPs) In Europe

Depending on their scope, Marine Environmental Monitoring Programmes (MEMPs) in Europe can be divided into the following four broad classes:

- Global
- Regional
- Sub-regional
- National

The first class comprises the monitoring undertaken by European States to meet the requirements of global marine conventions, such as the London and MARPOL Conventions (both administered by the International Maritime Organisation), to which they are signatories. The second class consists of the monitoring programmes implemented within the framework of regional international conventions relating to the marine/coastal environment. Examples are the Baltic Monitoring Programme (BMP), the Joint Assessment and Monitoring Programme (JAMP) of OSPAR, the Arctic Monitoring and Assessment Programme (AMAP) which forms a part of the Arctic Environment Protection Strategy adopted by eight circum-polar countries in 1991, and the Co-ordinated Mediterranean Pollution Monitoring and Research Programme (MED POL). The third class encompasses the monitoring carried out under sub-regional schemes of environmental co-operation. Finally, national monitoring programmes of the single European States belong to the fourth class.

### 1.3. The Role of the ETC/MCE in the Context of the Marine Programmes

In the ETC/MCE Scoping Study (EEA, 1995), the following points regarding marine environmental assessments in the EEA maritime area were highlighted:

- regional conventions operating within the EEA maritime area have broad mandates for assessing the quality of the marine environment and considerable experience in developing and co-ordinating marine monitoring programmes;
- all European coastal states, and their territorial sea areas, are covered by regional conventions;
- there are widelyacknowledged deficiencies in current programmes due primarily to economic and socio-political factors, although limitations in scientific capabilities also contribute;
- existing, specialised, scientific support services can assist regional conventions to overcome technical problems encountered in marine monitoring and data management;
- capabilities and capacities for monitoring differ widely between countries, regions and sub-regions;
- there are legitimate reasons why priorities for monitoring, and associated deployments of available scientific resources, may differ between physically and environmentally distinct sea areas;
- the personnel requirements of marine monitoring activities currently impose heavy demands on the scientific and administrative capacities of national and international agencies and this may preclude any major increase in such activities;
- there are fundamental economic and scientific constraints to achieving, for the entire EEA maritime area, uniform coverage and comparability of environmental data and, at the same time, cost-effective use of scientific and administrative resources.

It is quite clear that, in spite of a number of inherent difficulties, effective information-gathering resources for marine environmental assessments already exist. The main problem lies in putting information from widely differing sources to work for the EEA. The ETC/MCE is collecting and reviewing available information so as to extract what is needed to provide a comprehensive picture of the status of the European marine and coastal environment. Maximum use will be made of secondary sources of information (e.g. reports) while primary sources will be accessed only when absolutely necessary. The ETC/MCE can also function as an effective bridge between the EEA and the data networks operating within the framework of the major regional marine conventions.

## 2. DESCRIPTION OF OSPARCOM

### 2.1. Background

OSPARCOM is an intergovernmental organisation which co-ordinates and monitors the implementation of the Convention for the Protection of the Marine Environment of the North East Atlantic.

Assessment of the quality of the marine environment and related monitoring activities are important aspects in the OSPAR Convention.

The main aim of the 1992 OSPAR Convention is given in Article 2 (§ 1a) :

*"The Contracting Parties shall, in accordance with the provisions of the OSPAR Convention, take all possible steps to prevent and eliminate pollution and shall take the necessary measures to protect the maritime area against the adverse effects of human activities so as to safeguard human health and to conserve marine ecosystems and, when practicable, restore marine areas which have been adversely affected".*

This aim also takes into account the results of the United Nations Conference on the Environment and Development in Rio de Janeiro in June 1992, with particular reference to the sustainable development of the oceans, seas and coastal environment in Agenda 21.

#### 2.1.1. Historical perspective

**The OSLO Convention**, or Convention for the Prevention of Marine Pollution by Dumping from ships and aircraft signed in Oslo in 1972, entered into force in 1974.

**The PARIS Convention**, or Convention for the Prevention of Marine Pollution from Land-Based Sources signed in Paris in 1974 came into force in 1978.

The purpose of the two Conventions are mentioned in Table 1, along with the relevant Contracting Parties.

**TABLE 1**

<p><b>OSLO CONVENTION 1972</b></p> <p><b>Signatories</b></p> <ul style="list-style-type: none"> <li>• Belgium</li> <li>• Denmark</li> <li>• Finland</li> <li>• France</li> <li>• Germany</li> <li>• Iceland</li> <li>• Ireland</li> <li>• Netherlands</li> <li>• Norway</li> <li>• Portugal</li> <li>• Spain</li> <li>• Sweden</li> <li>• United Kingdom</li> </ul>	<p><b>Purposes :</b></p> <p>To regulate dumping operations involving industrial wastes, dredged material and sewage sludge in the Convention area. Most of these operations have now been discontinued. Industrial wastes ceased to be dumped in 1995, and sewage sludge left off in 1998.</p> <p>To regulate incineration at sea. This practice was definitively stopped in January 1991.</p>
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<p><b>PARIS CONVENTION 1974</b></p> <p><b>Signatories</b></p> <p>the same as named above for Oslo Convention excluding Finland but including:</p> <ul style="list-style-type: none"> <li>• European Union,</li> <li>• Luxembourg.</li> </ul>	<p><b>Purposes :</b></p> <p>To prevent, and as appropriate, eliminate pollution of the Convention area from land-based sources: discharges from rivers, pipelines or directly from the coast.</p> <p>The discharges from offshore installation and via atmosphere are also considered as "land-based"</p>
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The Oslo and Paris Convention work through a joint secretariat based in London.

The two Conventions had complementary roles and objectives, until the general evolution of environmental policy in Western Europe demonstrated that it was time to revise the Conventions and merge them into a single new Convention: **the Convention for the Protection of the Marine Environment of the North-East Atlantic**.

This new Convention was opened for signature at the Ministerial Meeting of OSPARCOM in **Paris on 22 September 1992**. This Convention, which was signed by all of the signatories of the Oslo and Paris Conventions, and by Switzerland, will enter into force 30 days after ratification by all Contracting Parties to the Oslo Convention and Paris Convention. The status of the ratification amongst signatories to the OSPAR Convention is shown in Table 2.

**TABLE 2**

<b>OSPAR CONVENTION 1992</b>		
<b>Signatories</b>	<b>State of Ratification</b>	<b>Date</b>
♦ Belgium		procedure in progress
♦ Denmark	ratified	20 December 1995
♦ European Union		procedure in progress
♦ Finland	ratified	25 July 1995
♦ France		procedure in progress
♦ Germany	ratified	2 December 1994
♦ Iceland		procedure in progress
♦ Ireland		procedure in progress
♦ Luxembourg		procedure in progress
♦ Netherlands	ratified	6 January 1994
♦ Norway	ratified	8 September 1995
♦ Portugal		procedure in progress
♦ Spain	approved	25 January 1994
♦ Sweden	ratified	31 May 1994
♦ Switzerland	ratified	11 May 1994
♦ United Kingdom		procedure in progress
<i>N.B. Procedures in progress should finish at the end of 1996</i>		

### 2.1.2. General framework

The new Convention consists of a series of provisions for general application which, among others:

- require the application of:
  - the precautionary principle,
  - the polluter pays principle,

- best available techniques (BAT) and
- best environmental practice (BEP), including clean technology/ and
- enables the Commission established by the Convention to adopt legally binding decisions.

The new Convention consists also of Rules of Procedure of the Commission

- make allowance for the participation of observers, including non-governmental organisations, in the work of the Commission; and
- establish rights of access to information about the maritime area of the Convention.

The Convention also contains a series of Annexes which deal with the following specific areas:

- ◇ the prevention and elimination of pollution from land-based sources,
- ◇ the prevention and elimination of pollution by dumping or incineration,
- ◇ the prevention and elimination of pollution from offshore sources, and
- ◇ assessment of the quality of the marine environment.

The Convention also contains provision for additional annexes to be adopted to protect the maritime area of the Convention against pollution from other sources.

Proposals for a draft protocol amending the Convention are being discussed. It is expected to include, in a new Annex, protocols on the conservation of marine ecosystems and biological diversity.

Further to the adoption of the new Convention, it was decided that from 1994 OSPAR would work under a revised structure.

Two permanent committees were created.

#### **PRAM: PROGRAMMES AND MEASURES COMMITTEE**

The function of PRAM is to draw up programmes and measures for the prevention and elimination of pollution of the OSPAR maritime area and for the control of activities which may, directly or indirectly, adversely affect it.

#### **ASMO: ENVIRONMENTAL ASSESSMENT, MONITORING COMMITTEE**

The function of ASMO is generally to review the condition of the maritime area, the effectiveness of the measures being adopted, the priorities, and the need for any additional or different measures in accordance with Annex IV of the OSPAR Convention, 1992. (see paragraph 2.2.2)

The new working structure is detailed in Table 3.



TABLE 3

NEW WORKING STRUCTURE OF OSPARCOM Permanent Committees and Working Groups		
COMMISSION		
PRAM	ASMO	
DIFF	IMPACT	
NUT	INPUT	
POINT	SIME	RTT I
RAD	ACG	RTT II
SEBA		RTT III
		RTT IV
		RTT V
PRAM = PROGRAMMES AND MEASURES COMMITTEE DIFF = Diffuse Sources NUT = Nutrients POINT = Point Sources RAD = Radioactive Substances SEBA = Sea-Based Activities ASMO = ENVIRONMENTAL ASSESSMENT AND MONITORING COMMITTEE IMPACT = Impact on Marine Environment INPUT = Inputs to the Marine Environment SIME = Concentrations, Trends and Effects of Substances in the Marine Environment ACG = Assessment Co-ordinating Group		

Each committee manages 4 - 5 specialised «third tier» working groups; these are listed below with their links and main terms of reference.

#### THIRD TIER WORKING GROUPS OF PRAM COMMITTEE

##### Working Group on Diffuse Sources (DIFF)

DIFF draws up draft programmes and measures for the prevention and elimination of pollution of the maritime area from diffuse sources.

##### Working Group on Nutrients (NUT)

NUT draws up draft programmes and measures for the prevention and elimination of pollution of the maritime area resulting from anthropogenic inputs of nutrients.

##### Working Group on Point Sources (POINT)

POINT draws up draft programmes and measures for the prevention and elimination of pollution of the maritime area from land-based point sources.

##### Working Group on Radioactive Substances (RAD)

RAD draws up draft programmes and measures for the prevention and elimination of pollution of the maritime area as a result of anthropogenic inputs of radioactive substances, including wastes, using best available techniques for the reduction or elimination of inputs.

##### Working Group on Sea-Based Activities (SEBA)

SEBA draws up draft programmes and measures for the prevention and elimination of pollution of the maritime area from offshore installations, dumping and dredging activities.

### THIRD TIER WORKING GROUPS OF ASMO COMMITTEE

#### Working Group on Concentrations, Trends and Effects of Substances in the Marine Environment (SIME)

SIME has to arrange for the monitoring or collection of information on concentrations and effects of substances in the marine environment and evaluate this information with regard to spatial differences and temporal trends, in particular in order to contribute to the preparation of Quality Status Reports for the maritime area as a whole or for regions or sub-regions.

#### Working Group on Impacts on the Marine Environment (IMPACT)

IMPACT has to arrange for the collection of information on human activities (other than those leading to inputs of substances), and on their impact on the marine environment and shall evaluate this information with regard to the geographical distribution and temporal trends.

#### Working Group on Inputs to the Marine Environment (INPUT)

INPUT has to arrange for the monitoring of, or collection of information on, inputs of substances from all sources to the marine environment, and have to evaluate this information with regard to spatial differences and temporal trends.

#### Assessment Co-ordination Group (ACG)

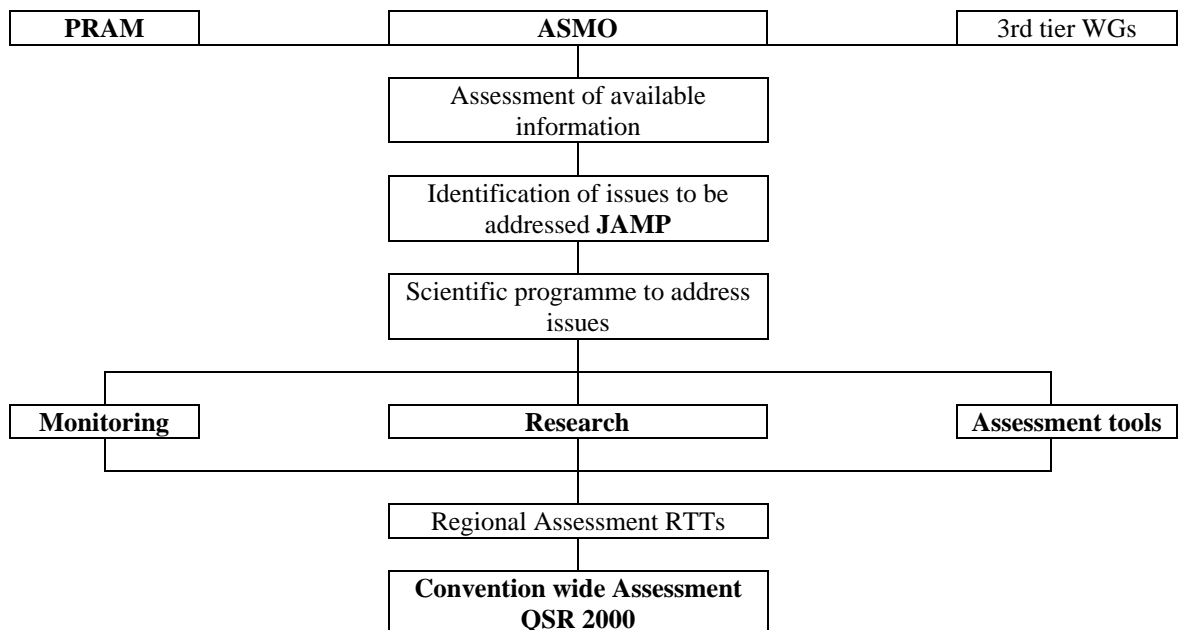
The Assessment Co-ordination Group (ACG), on the basis of regional and sub-regional reports, has to co-ordinate the preparation and review of a Quality Status Report for the maritime area.

The preparation of the Quality Status Report (QSR 2000) for the OSPAR maritime area and for its five specific sub-regions is the main work of ASMO.

A simplified outline of the strategy required to produce such an assessment is given in Table 4. As part of this strategy, the two groups, the Environmental Assessment and Monitoring Committee (ASMO) and the Programmes and Measures Committee (PRAM), of which ASMO has primary responsibility for the assessment, must work in close collaboration.

TABLE 4

STRATEGY FOR ASSESSMENT AND MONITORING OF OSPARCOM



An assessment for each of the five regions (Table 5) will be undertaken before the five reports will be combined to produce an assessment for the whole North East Atlantic.

For each region the process will involve an assessment of existing information and the identification of gaps of knowledge. For each region one or two countries took the lead to coordinate the work of the Regional Task Teams (RTTs). The designated lead countries listed below were selected to reflect the wishes to concentrate assessment and monitoring activities on their own areas.

**Arctic Waters (RTT I): Norway**

+ Denmark, Iceland and Sweden

**Greater North Sea (RTT II): The Netherlands**

+ Belgium, Denmark, France, Germany, Norway, Sweden and United Kingdom

**Celtic Sea (RTT III): United Kingdom and Ireland**

**Bay of Biscay and Iberian Coast (RTT IV): France and Spain**

+ Portugal

**Wider Atlantic (RTT V): Portugal and Iceland**

+ Spain

TABLE 5

REGIONS OF THE MARITIME AREA OF OSPARCOM	
Region I Arctic Waters	The region of the North-East Atlantic covered by AMAP from south of Greenland via Iceland, including the Faeroes and along 62°N to the Norwegian coast.
Region II Greater North Sea	As defined for the purposes of the North Sea Conferences (but extended to cover the Kattegat) i.e: - southwards of 62°N and eastwards of 5°W, at the north-west side, - in the Kattegat, northwards of the line from Hasenore Head (DK) to Spodsbjerg (DK) and from Gilbjerg Head (DK) to Kullen (S), - eastwards of 5°W and northwards of 48°N, at the south side.
Region III The Celtic Seas	Western boundary: following the 200 m depth contour to the west of 6°W along the western coasts of Scotland and Ireland from 62°N to 48°N; Eastern boundary: 5°W and the west coast of Great Britain from 62°N to 48°N.
Region IV Bay of Biscay and Iberian Coast	The region to the south of 48°N, to the east of 11°W and to the southern limit of the maritime area.
Region V Wider Atlantic	The region to the south of Region I, to the west of Regions II, III and IV and to the western and southern limits of the maritime area.

**2.1.3. Work programme**

As required by the OSPAR Action Plans, all the permanent working groups prepare and maintain detailed work programmes with a view to achieving the objectives of the Action Plans.

As an overall objective, OSPAR is working towards the reduction, by the year 2000, of discharges and emissions of substances which are toxic, persistent and liable to bio-accumulate, to levels in the marine environment that are not harmful to man or nature, with their complete elimination as the final aim.

Priority is given to organohalogen substances, PAHs, and nutrients.

Action Plans concern measures to be taken for land-based sources (joint and diffuse sources, nutrients, radioactive substances), dumping and offshore sources. Special Action Plans have been drawn up for Assessment and Monitoring.

The 1993 Action Plan, for example, specifies 27 activities, including:

- ◇ the collection of qualitative and quantitative information about the quality of the marine environment;
- ◇ the adoption of measures, development of BAT and BEP, and the identification of priorities, with respect to point and diffuse sources of pollution, nutrients and radioactive substances;
- ◇ the regulation of dumping of dredged materials;
- ◇ the control of emissions and discharges of oil, chemicals and contaminated cuttings from offshore sources;
- ◇ the assessment of compliance by Contracting Parties with, and the effectiveness of, the adopted programmes and measures.

#### **Detailed Action Plan Concerning Assessment and Monitoring**

- ◆ To work towards a quality assessment by the year 2000 of the whole maritime area by preparing a Quality Status Report 2000 which synthesises the information of regional Quality Status Reports to be established for:
  - ◇ the Arctic and Sub-Arctic zone (taking into account the work of the Arctic Monitoring and Assessment Programme (AMAP),
  - ◇ the Greater North Sea (taking into account the results of the North Sea Quality Status Report 1993,
  - ◇ the Celtic Sea (taking into account the work of the Irish Sea Science Co-ordination Group (ISSCG)),
  - ◇ the Bay of Biscay and the Iberian coast, and
  - ◇ the Wider Atlantic.
- ◆ To develop a new Joint Monitoring Programme for the OSPAR maritime area, to update and replace the present Joint Monitoring Programme (JMP) and Monitoring Master Plan (MMP).
- ◆ To develop new co-ordinated programmes for the determination of contaminant inputs to the maritime area, and continue the existing ones.
- ◆ To develop new co-ordinated programmes of assessment related research, and continue the existing ones.
- ◆ To exchange information on research, monitoring, technologies and means of regulation relating to extraction of marine aggregates from the seabed.

## **2.2. Strategy**

### **2.2.1. Purposes of monitoring**

Article 6 of the 1992 OSPAR Convention, entitled "Assessment of the Quality of the Marine Environment" requires that Contracting Parties shall :

- undertake and publish at regular intervals joint assessments of the quality status of the marine environment and of its development, for the maritime area and for regions or sub-regions thereof; and
- include in such assessments both an evaluation of the effectiveness of the measures taken and planned for the protection of the marine environment and the identification of priorities for action.

OSPARCOM aims to produce a Quality Status Report (QSR 2000) for the whole OSPAR maritime area by the year 2000. The QSR 2000 will synthesise the information contained in the five regional Quality Status Reports (QSRs): the Arctic Waters (Region I), the Greater North Sea (Region II), the Celtic Seas (Region III), the Bay of Biscay and Iberian Coast (Region IV) and the Wider Atlantic (Region V).

### **2.2.2. Organisation of the monitoring activities: the Joint Assessment and Monitoring Programme**

The 1992 OSPAR Convention defines monitoring as the repeated measurement of :

- the quality of the marine environment and each of its compartments, i.e. water, sediments and biota;
- activities or natural and anthropogenic inputs which may affect the quality of the marine environment; and
- the effects of such activities and inputs.

It was pointed out (Table 4) that the assessment of the quality of the marine environment may require monitoring, research and the development of assessment tools (modelling, criteria etc.). Before any Monitoring Programme is designed the issues must be clearly identified. In this respect, the Monitoring Programme should be based on specific questions or hypotheses, and on the information already available, so that the best monitoring, research and assessment criteria (or combination thereof) can be determined.

Issues to be taken into account in the development and implementation of the Joint Assessment and Monitoring Programme have been listed.

A matrix including 36 sections will cover six broad categories of the effects of human activities on the marine environment : **1. Contaminants - 2. Eutrophication - 3. Litter - 4. Fisheries - 5. Mariculture - 6. Habitats and Ecosystem Health**. An overview of these issues and the specific questions and hypotheses identified by the JAMP are given in Table 1 of the EEA report "Integration of Information" (EEA, 1997)

## **CONTAMINANTS**

### **Heavy Metals (Cd, Hg, Pb)**

- undertake trend monitoring of atmospheric, riverine and direct inputs and other sources where appropriate.
- monitor concentrations, develop background values and assessment criteria, compare concentrations with ecotoxicological assessment criteria.

### **Tributyltin (TBT)**

- establish standard methodology and quality assurance, assess the inter-relationships between concentrations, biological effects and shipping intensities, extend the imposex survey to the entire maritime area, compare concentrations with ecotoxicological assessment criteria.

### **Polychlorinated biphenyls (PCBs)**

- establish and assess sources and input pathways, improve methods for quantifying inputs.

- monitor the temporal trend of inputs.
- establish and assess concentrations, and temporal trends in concentration, in marine mammals (particularly, but not only, with regard to non-ortho and mono-ortho CB's), establish and apply assessment criteria.
- establish and assess concentrations in fish, mussels, birds and sediments.
- establish and assess concentrations in fish and shellfish for human consumption.

#### **Polyaromatic Hydrocarbons (PAHs)**

- identify sources and input pathways, monitor and quantify inputs.
- monitor concentrations in sediments, mussels and suspended particular matter, establish background concentrations, compare concentrations with background concentrations, establish assessment criteria, compare concentrations with ecotoxicological assessment criteria.
- undertake biological effects monitoring.

#### **Other synthetic organic compounds**

- establish a selection mechanism for identifying compounds of concern.

#### **Offshore chemicals**

- identify, quantify and assess inputs.
- undertake risk assessments, undertake biological effects monitoring.

#### **Chlorinated dioxins and dibenzofurans**

- assess existing information on inputs, assess existing information on the spatial distribution of chlorinated dioxins and dibenzofurans and the results of measures taken.

#### **Environmental transport and fate of pollutants**

- model transport routes, undertake research.

#### **Biological effects of pollutants**

- identify biological effects, and develop and apply reliable biological effects monitoring criteria and techniques.

#### **Oil**

- identify, quantify and assess river inputs, identify, quantify and assess other inputs, improve analytical methods for aromatics, establish and assess concentrations, establish and apply assessment criteria, assess effects on benthic communities and seabirds.
- establish and assess concentrations in water, undertake biological effects monitoring, compare concentrations with toxicity data.

#### **Radionuclides**

- assess the radioactive substances (RAD report).

#### **Accidents in the shipping and offshore industries**

- develop and apply models and risk assessment procedures.

### **EUTROPHICATION**

#### **Nutrients**

- assess temporal trends in inputs from all sources.

## **Phytoplankton**

- define satisfactory monitoring programme, model nutrient concentrations.

## **Eutrophication effects on community structure**

- monitor to detect and assess the occurrence of eutrophication effects, monitor appropriate community components, develop foodweb models.

## **LITTER**

### **Sources and occurrence**

- establish and assess sources, composition, occurrence and quantities of litter, define common monitoring methodology, trend monitoring.
- assess the effectiveness of measures.

### **Effects on birds and marine organisms**

- assess information on stomach contents in relation to health.

## **FISHERIES**

### **Impact of fisheries on ecosystems**

- assess available information on fish stocks and fishing intensities, particularly that relating to temporal trends, assess available information on fisheries discards, assess available information on by-catches.

## **MARICULTURE**

### **Genetic disturbance**

- establish the genetic composition of wild stocks.
- **Transfer of diseases and parasites**
- monitor diseases and parasites in wild stocks, undertake risk assessment.

### **Chemicals used**

- undertake a survey of concentrations/biological effects.

## **HABITATS AND ECOSYSTEM HEALTH**

### **Ecosystem health**

- develop background concentrations, develop and apply ecotoxicological assessment criteria, develop EcoQOs and identify suitable indicator species, define a biological monitoring programme in relation to EcoQOs.

### **Habitat changes**

- undertake habitat inventories.
- undertake literature survey.
- monitor benthic communities, coastal habitats and spawning areas.
- monitor coastal habitats, communities and species.

### **2.2.3. Supporting organisations**

The main supporting organisation in OSPARCOM activities, particularly in relation to the implementation of the Joint Assessment and Monitoring Programme (JAMP), is the International Council for the Exploration of the Sea (ICES).

In 1995, OSPARCOM adopted the text of a Memorandum of Understanding (MoU) with ICES, which specifies the co-operation between the two organisations and, in particular, the role of ICES as an advisory body to OSPARCOM and the collection centre for concentrations and biological effects of substances data to be collected under the Joint Assessment and Monitoring Programme (JAMP).

The MoU was signed in the same year at the 83<sup>rd</sup> Statutory Meeting of ICES (Aalborg, Denmark, 21-29 September 1995).

In addition, the marine scientific institutions in all the countries surrounding the North-East Atlantic contribute to OSPARCOM in the different Working Groups and as lead countries for specific topics.

On the other hand, in order to improve efficiency at both the national and international levels, further co-operation with HELCOM and AMAP has been established and is ongoing, particularly with regard to common procedures for reporting and managing data (use of GIS, electronic publishing methods, etc.).

The following organisations have observer status within OSPARCOM:

#### **Intergovernmental Organisations**

- ◇ United Nations Environment Programme (UNEP),
- ◇ International Council for the Exploration of the Sea (ICES),
- ◇ International Maritime Organisation (IMO),
- ◇ Baltic Marine Environment Protection Commission (HELCOM),
- ◇ Intergovernmental Oceanographic Commission (IOC),
- ◇ Organisation for Economic Co-operation and Development (OECD),
- ◇ Barcelona Convention,
- ◇ International Commission for the Protection of the Rhine against Pollution,
- ◇ Irish Sea Science Co-ordination Group (ISSCG),
- ◇ European Environment Agency (EEA),
- ◇ Common Wadden Sea Secretariat (CWSS),
- ◇ Arctic Monitoring and Assessment Programme (AMAP),
- ◇ Co-operative Programme for Monitoring and Evaluation of Long-Range Transmission of Air Pollutants in Europe (EMEP).

#### **Non-governmental organisations**

At OSPAR 1994, a revised set of Criteria and Procedures Governing Observer status of Non-governmental International Organisations at Meetings of OSPARCOM was adopted.

The following non-governmental organisations have observer status within OSPAR :



- Conseil Européen des Fédérations de l'Industrie Chimique (CEFIC),
- Oil Companies' European Organisation for Environmental and Health Protection (CONCAWE),
- Exploration and Production Forum (E & P Forum),
- The International Association of Ports and Harbours (IAPH),
- Friends of the Earth (FOE),
- Seas at Risk,
- GREENPEACE International,
- World Wide Fund for Nature (WWF),
- Advisory Committee on the Protection of the Sea (ACOPS),
- Central Dredging Association of National Fisheries Organisations,
- European Oilfield Speciality Chemicals Association (EOSCA),
- European Federation of Pharmaceutical Industries Association (EFPIA),
- EURO CHLOR Federation,
- European Fertilisers Manufacturers Association (EFMA),
- Union of Industrial and Employers' Confederations of Europe (UNICE),
- Confederation of European Paper Industries (CEPI).

#### **2.2.4. Supporting research**

Research programmes should be designed with common clearly identified objectives and testable hypotheses.

To be able to incorporate research results effectively into the assessment process, research activities are expected to cover at least these main areas:

- ◊ basic processes (biology, physics and chemistry) of the marine environment at different scales,
- ◊ development of methodologies,
- ◊ long -term changes and their causes, and
- ◊ cause-effect relationships.

In many cases, the co-ordination of research is carried out on a bilateral or multilateral basis by contracting countries.

In terms of international research co-ordination in the North Atlantic area in general, ICES and the EU play major roles. ICES, working through a network of committees, working groups, and steering groups involving a large number of senior marine scientists, has a key role in the determination of priorities in the research needed to understand the marine environment, the living resources, and human impacts. The EU has a strong role in supporting the development of marine science and technology (through programmes such as MAST) and funding research programmes in a growing number of fields related to the marine environment and its resources. In addition, within some working groups of OSPARCOM, there is considerable exchange of information and views on research activities that serves to assist member countries and avoid duplication of effort.

#### **2.2.5. Process for review and adaptation**

Action Plans are reviewed and updated by OSPARCOM on an annual basis.

For each region, the process involves an assessment of existing information and the identification of knowledge gaps. One or two countries at most, assume the responsibility for the co-ordination of the work of the Regional Task Teams (RTT's).

The Commissions meet once every year in June. The ASMO's Working Groups meet in autumn and very early spring; the outcome of these meetings includes draft work programmes for the forthcoming period (i.e. from June to June of succeeding years). The outcome also contains proposal for the next ICES Work Programme.

### 2.2.6. Parameters

A description of parameters is given in paragraph 2.2.2 and in Table 6.

TABLE 6

<b>SYNTHESIS OF THE DIFFERENT MONITORING ACTIONS IN JAMP</b>
<b>TEMPORAL TREND MONITORING</b>
<ul style="list-style-type: none"> <li>• Cd, Hg, Pb, PCB, NUTRIENTS INPUT FROM ALL SOURCES (atmospheric, riverine, direct)</li> <li>• LITTERS</li> </ul>
<b>BIOLOGICAL EFFECTS MONITORING</b>
<ul style="list-style-type: none"> <li>• TBT, PAH, OIL, OFFSHORE CHEMICALS,</li> <li>• OTHER GROUPS OF POLLUTANTS</li> </ul>
<b>MONITORING OF CONCENTRATIONS/SPATIAL DISTRIBUTION</b>
<ul style="list-style-type: none"> <li>• Cd, Hg, Pb</li> <li>• PCB IN MARINE MAMMALS (non-ortho, mono-ortho)</li> <li>• PCB IN FISHES, MUSSELS, BIRDS, SEDIMENTS</li> <li>• PAH IN SEDIMENTS, MUSSELS, SUSPENDED PARTICULAR MATTERS</li> </ul>
<b>MONITORING OF OTHER PARAMETERS</b>
<ul style="list-style-type: none"> <li>• OCCURRENCE OF EUTROPHICATION EFFECTS</li> <li>• DISEASES AND PARASITES IN WILD STOCKS</li> <li>• BENTHIC COMMUNITIES - SPAWNING AREAS</li> <li>• COASTAL HABITATS - COMMUNITIES AND SPECIES</li> </ul>
<b>MONITORING TO BE METHODOLOGICALLY ENHANCED</b>
<ul style="list-style-type: none"> <li>• PHYTOPLANKTON</li> <li>• BIOLOGICAL MONITORING OF HEALTH ECOSYSTEM</li> <li>• LITTER</li> </ul>

### 2.2.7. Operational features

The Oslo and Paris Commissions run a joint monitoring programme in which a large number of contaminants are measured by Contracting Parties at regular intervals on the basis of which concentrations of such contaminants in fish, shellfish, sea water and sediments are assessed.

### 2.2.8. Minimum performance criteria

It is well known that if the quality of the information gathered is insufficient, the total exercise is useless. Therefore, when planning monitoring, careful attention must be paid to ensure proper quality. In this context, OSPARCOM adopted in 1990 a quality assurance policy. Quality assurance must be an integral part of the monitoring programme. This relates not only to the quality assurance of chemical and biological analyses and tests, with inter-comparisons where necessary, but also to the sampling and assessment procedures, which should have a good statistical basis. Results of quality assurance procedures must be reported. Sampling, analyses, and the submission and validation of data must comply with agreed guidelines and timetables, otherwise results will not be included in the assessment.

#### Policy of quality assurance adopted in 1990 by OSPARCOM

♦ *Contracting Parties* acknowledge that only reliable information can provide the basis for effective and economic environmental policy and management regarding the Convention area;

♦ **Contracting Parties** acknowledge that environmental information is the product of a chain of activities, constituting programme design, execution, evaluation and reporting, and that each activity has to meet certain quality assurance requirements;

♦ **Contracting Parties** agree that quality assurance requirements be set for each of these activities;

♦ **Contracting Parties** agree to make sure that suitable resources are available nationally (e.g. ships, laboratories) in order to achieve these goals;

♦ **Contracting Parties** fully commit themselves to follow the guidelines adopted within the framework of the Commissions in accordance with this procedure of quality assurance.

The major quality assurance programme QUASIMEME, funded at the beginning by the European Commission (EC), was initiated to serve most of the quality assurance requirements in relation to monitoring marine contaminants. However, QUASIMEME, by itself, will not serve any more; the QUASIMEME Programme is no longer supported by EU funds and is being run as a subscription programme by Scottish Office Agriculture Environment and Fisheries Department (SOAEFD-Marine Biological Laboratory in Aberdeen).

There are also results of a number of ICES inter-comparison exercises and workshops.

As part of the data handling service to OSPARCOM, ICES has established a quality assurance (QA) data base. The QA data base has three components:

- a list of available reference materials, with their composition and concentration values,
- results of inter-comparison exercises,
- written documentation on storage and analytical procedures.

At present, an extensive list of reference materials is available in computerised form. Results of inter-comparison exercises are being entered in the ICES data base. However, the problem is that most of the relevant information is available as printed reports only.

As data comparability is still a long-term goal monitoring guidelines need to be reviewed and new guidelines on certain measurements have to be prepared. In OSPARCOM these are going to be prepared by SIME Working Group for the new Joint Assessment Monitoring Programme (JAMP).

### **2.2.9. Reporting**

Generally, paper formats and magnetic media (floppy discs, etc.) are used for submitting data.

- ♦ Physicochemical data are reported according to the ICES format.
- ♦ Data on harmful substances in biota have been reported according to the ICES Reporting Format for Contaminants in Marine Biota.
- ♦ Any data that Contracting Parties wish to provide on harmful substances in sediments should be submitted according to the ICES Interim Reporting Format for Contaminants in Sediments.
- ♦ Data on the Comprehensive Study on Riverine inputs and Direct Discharges are sent directly to the secretariat of OSPARCOM.

### **2.2.10. Communication among members**

OSPARCOM utilises the principle of the "lead country" where one country (or, at the most, two) is in charge of firstly, gathering information on data on a specific subject for particular Working Group Tasks, and secondly, disseminating this information among the other members.

### **2.2.11. Support and assistance to member countries**

OSPARCOM provides an institutional infrastructure for scientific and technical capacity-building in the North East Atlantic. It promotes and enhances the exchange of information, expertise and experience between participating countries through meetings, workshops, seminars, publications, etc.

## **2.3. Results**

### **2.3.1. Available database**

OSPAR has decided that ICES will serve as the data centre for the environmental monitoring data that will be collected under the new Joint Assessment and Monitoring Programme (JAMP) that replaced the JMP in January 1997. It is interesting to note that many of the data types particularly under the new JAMP are similar to those under the HELCOM-BMP. The data of the past OSPAR Joint Monitoring Programme (JMP) was also made available to ICES. Traditionally ICES maintains fisheries data bases. ICES is also in charge of environmental/pollution data bases with data gathered from different sources.

The databases consist of data on:

- contaminants in fish and shellfish,
- contaminants in sea water,
- contaminants in sediments,
- biological effects of contaminants,
- fish diseases,
- benthos.

One of the problems is the low quantity of data submitted by the OSPARCOM Contracting Parties to ICES. For example, in 1994, only 4 countries submitted data covering monitoring activities conducted in 1993. Of these, 3 data sets were submitted for contaminants in biota, 3 data sets for sea water, and no data were submitted for sediments and biological effects. Furthermore, very few data was submitted on nutrients, and no data was received for the various voluntary parameters identified for eutrophication characterisation.

The data are divided into three categories:

1. **Raw scientific data** resulting from monitoring activities (e.g., data on contaminants in biota, nutrients in sea water), ICES is in charge of these data;
2. **Data concerning inputs** of nutrients and contaminants to the marine environment from atmospheric deposition, rivers, etc... (part of this may be raw data, part aggregated), OSPARCOM is responsible for these data;
3. **Information on compliance** with Commission decisions by Contracting Parties (implementation forms or reports).

Concerning data handling, the OSPARCOM Working Group will discuss their requirements in the near future (decision is still pending).

### **2.3.2. Available documentation**

#### **♦ Advisory Committee on the Marine Environment ICES Co-operative research reports**

- N° 198, Report 1993, 84 pages, March 1994
- N° 204, Report 1994, 122 pages, September 1994
- N° 212, Report 1995, 135 pages, December 1995

♦ **Activities of the Oslo and Paris Commissions.** September 1992, 54 pages, Annual Report 1995.

♦ **Guide to the North Sea Quality Station,** Report 1993, London, 1994.

♦ **International Conference on the protection of the North Sea,** 4<sup>th</sup> Conference held in Esbjerg, Denmark, 8-9 June 1995.

Vol I, Progress Report, 247 pages.

Vol II, Ministerial Declarations, 129 pages.

Bremen Germany, 1984

London, United Kingdom, 1987

The Hague, The Netherlands, 1990

Vol III, Esbjerg Ministerial Declarations, 142 pages.

♦ **The Joint Assessment and Monitoring Programme Oslo and Paris Commissions,** 47 pages, 1995.

♦ **North Sea Task Force, Review and Evolution. The way forward,** Oslo and Paris Commissions, International Council for the Exploration of the Sea, 25 pages, September 1994.

♦ **Réunion ministérielle des Commissions d'Oslo et de Paris,** 306 pages, Commissions d'Oslo et de Paris, 1993.

♦ **Scientific Symposium on the 1993 North Sea Quality Status Report - Main Conclusions and Recommendations,** 18 pages, Ministry of Environment and Energy, Denmark, November 1994.

♦ **The Work of the Oslo and Paris Commissions and the new Convention for the Protection of the Marine Environment of the North East Atlantic 1992 ,** A brochure, 1993.

## 2.4. Discussion

### 2.4.1. Problems

OSPARCOM has now a new strategy with the Joint Assessment and Monitoring Programme (JAMP). The priority is the assessment of the quality of the marine environment. In consequence the monitoring is, from now on, a tool to answer specific questions to be assessed. Based on the nature of the questions or hypotheses and on the information already available, monitoring for spatial patterns and temporal trends will be implemented.

It is too early to conclude if such a new approach will be successful.

Nevertheless, some of the problems to be solved remain the same:

- spatial coverage of the monitoring in the past was quite poor, guidelines were often not followed, and in many cases, insufficient data were collected.
- even if new parameters (e.g. biological effects measurements) have to be incorporated, it is not sure that the techniques will be sufficiently well developed.
- it is always difficult to separate which chemicals are responsible for particular effects when there are many widely ranging effects due to different stresses.
- even if good analytical methodologies are used, the inability to distinguish between natural and anthropogenic inputs hampers their usefulness.
- due to the inability to provide funding for research projects, the research co-ordination activities of OSPARCOM via ICES will be virtually impossible.

- on the other hand a lot of assessment tools are indispensable for assessing the significance of monitoring. Assessment criteria for monitoring data should be based on several approaches such as comparisons with background values or ecotoxicological assessment criteria. Another assessment could be the Ecological Quality Objectives approach (EcoQOs) which is detailed in the ETC/MCE report 'Integration of Information' (to be made available in the Web site of the EEA). Other tools which are important for the integration of data are mathematical models and statistical techniques.
- assessment tools are indispensable for assessing the significance of monitoring. Assessment criteria for monitoring data could be based on several approaches such as comparisons with background values or ecotoxicological assessment criteria. Assessment criteria for biological data, such as results from biological effects measurements of abundance and diversity data, can be based on a comparison with, for example, Ecological Quality Objectives (EcoQOs). The EcoQOs approach is detailed in paragraph 2.1. of the ETC/MCE report "*Integration of Information*". Other tools which are important are mathematical models and statistical techniques.

All these aspects is being developed by OSPARCOM and ICES Working Groups, seminars, and specific workshops.

#### **2.4.2. Lessons learned by OSPARCOM**

The experience gained in the Monitoring Master Plan (MMP) of the North Sea Task Force (NSTF) is published by ICES in the Advising Committee on Marine Environment Reports. The lessons learned are being used to implement the new Joint Assessment and Monitoring Programme (JAMP) of OSPARCOM.

The published lessons have been synthesised as follows:

- *before designing a monitoring programme, the purpose of the programme should be clearly defined in terms of specific questions to be answered.*
- *the monitoring programme should be tailored to a predetermined method of assessment in order to ensure the provision of appropriate information which will permit an assessment of the identified subjects of concern.*
- *the choice of determinants and sampling locations should be related to the subjects under consideration. This can mean, for instance, that the monitoring programme is not necessarily uniform for the whole area, rather that certain determinants are considered relevant only for specific areas.*
- *when establishing an international monitoring programme, agreement should be reached on sampling, analysis and reporting protocols well in advance of beginning the monitoring activities. Agreement should also be reached in advance on quality assurance protocols to be applied for each set of parameters and no new parameters should be included in the programme until an adequate level of agreement in results has been reached among participating laboratories.*
- *programmes collecting data on the concentrations and effects of contaminants in the environment should be closely co-ordinated with programmes collecting information on the inputs of these contaminants from all relevant sources and similar standards of quality assurance should be applied to both programmes.*
- *a greater degree of international commitment is required for future monitoring programmes, even if this means allocation of new resources and a reduction of national priorities. Based on the experience gained in the implementation of the MMP, it would be useful in the future to obtain written commitments from all participating countries concerning the specific monitoring activities they will conduct, their adherence to monitoring and quality assurance guidelines, and the timetable for their work. Such written commitments are particularly important when the data are brought together for overall evaluation and assessment prior to inclusion in a Quality Status Report.*

## 3. DESCRIPTION OF HELCOM

### 3.1. Background

HELCOM is an inter-governmental organisation, the main duty of which is to keep the implementation of the Convention under continuous observation and to take decisions relevant to fulfil the objectives and goals of the Convention, i.e., the reduction and elimination of pollution of the marine environment of the Baltic Sea Area from all possible sources.

#### 3.1.1. *Historical perspective*

Concern for the state of the Baltic Sea, expressed at the First UN Conference on the Protection of the Human Environment in Stockholm, 1972, led to joint action by all the seven Baltic Sea States, Denmark, Finland, the German Democratic Republic, the Federal Republic of Germany, Poland, Sweden and the USSR, to protect their common sea area.

The Convention on the Protection of the Marine Environment of the Baltic Sea Area, the Helsinki Convention, was signed in 1974 and entered into force on 3 May 1980, after ratification by all the seven states. Through the Convention, the Baltic Sea States established a commission, the Baltic Marine Environment Protection Commission, also known as the Helsinki Commission (HELCOM), which initially worked on an interim basis from 1974 to 1980. Finland is the Depository of the Convention. The international Headquarters, the Secretariat, was set up in Helsinki in 1980.

In 1974, the Convention, dealing with pollution from all possible sources, was unique in the world.

The Helsinki Convention of 1974, established to protect the Baltic Sea, was the first international agreement to cover all sources of pollution, both from land and from ships. To accomplish its aim, the Convention calls for action to curb various sources of pollution.

In 1992, a revised, even more binding Convention was signed by the nine Baltic Sea States, Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Poland, Russia and Sweden and the European Economic Community (EEC). The revision work was initiated by HELCOM in order to bring the Convention in line with the development that had taken place since 1974. The new 1992 Convention superseded the 1974 Convention after it has been ratified by the Signatories.

The Baltic Sea Joint Comprehensive Environmental Action Programme (SCP), with the goal of ensuring the ecological restoration of the Baltic Sea, was adopted in 1992 and the Programme Implementation task force was established within HELCOM to implement the Programme. The Baltic Sea States, Belarus, the Czech Republic, Norway, the Slovak Republic and Ukraine all participate in the work, as do certain multinational financial institutions, international organisations and the negotiating NGO community.

#### 3.1.2. *General framework of HELCOM*

The Helsinki Commission works in close co-operation with other intergovernmental organisations and with non-governmental international organisations, in order to make use of the expertise of those organisations and to avoid overlapping action taken in other fora. Sub-regional agreements and bilateral activities also provide important contributions to the work of the Commission.

The main aim of the 1992 Helsinki Convention is to embody developments in international environmental policy and law, in order to extend, strengthen and modernise the legal regime for the protection of the marine environment of the Baltic Sea Area. The key elements of the 1992 Helsinki Convention concern:

- Inclusion of the internal waters of the Contracting Parties in the Convention Area (which were not included in the 1974 Helsinki Convention): The Contracting Parties undertake to introduce relevant measures in the drainage area of the Baltic Sea to prevent and eliminate pollution of the sea.
- Fundamental principles, including the "precautionary principle", the "polluter pays principle" and obligations to use the Best Available Technology (BAT) and the Best Environmental Practice (BEP).
- Detailed priority groups of harmful substances and lists of substances totally banned from use or restricted.
- Detailed criteria and measures for preventing land-based pollution, e.g. common principles for issuing permits for waste water discharge and air emissions.
- Detailed new measures for the prevention of pollution from offshore activities.

New provisions were introduced with regard to:

- Environmental impact assessment
- Prohibition of incineration
- Notification of and consultation concerning pollution incidents
- Nature conservation and biodiversity
- Reporting and the exchange of information
- Information to the public

The Helsinki Commission meets annually and some meetings are held at the level of Ministers of Environment in order to strengthen and facilitate the implementation of the Convention and the Sea Joint Comprehensive Environmental Action Programme - JCP. Ministerial meetings were held in 1984, 1988, 1992 and 1994. Decisions taken by the Helsinki Commission - which are reached unanimously - are regarded as recommendations to the governments concerned. These HELCOM Recommendations are to be incorporated into the national legislation of the member countries.

The Chairmanship of HELCOM rotates every second year in alphabetical order between the Contracting Parties

*The HELCOM Programme Implementation Task Force* (HELCOM PITF) plans and co-ordinates the implementation of the Baltic Sea Joint Comprehensive Environmental Action Programme (JCP). The PITF has an expanded membership, including International Financial Institutions such as the EBRD, EIB, NEFCO, NIB and the World Bank. The Programme consists of investment activities to control point and non-point sources of pollution and conserve environmentally sensitive areas and resources. It also comprises actions in the fields of legislation, policy and education. The Programme was prepared with a view to reduce pollution decisively, in order to restore a sound ecological balance to the Baltic Sea.

In the preparation of the Programme 132 "hot spots" were identified, 47 of which have been classified as high priority. Investment actions of the Programme will, to a great extent, focus on bringing pollution at these hot spots under control. The formulation of the particular actions and approaches required is based on a set of key principles.

Finally, the strengthening of environmental management capacities throughout the Baltic Sea region, at all levels, will be the most important action in achieving the long-term goal of the Programme - the ecological restoration of the Baltic Sea.

Other subsidiary bodies of HELCOM include four committees and several working groups, expert groups and *ad hoc* working groups.



The Committees are:

*The Environmental Committee* works on joint monitoring programmes covering different sectors of the marine environment (the open sea, coastal waters, etc.), and co-ordinates activities related to nature conservation and biodiversity issues.

*The Technological Committee* works on restriction of discharges into waters and emissions to the atmosphere from the urban areas, industry and diffuse sources, including agriculture. Recommendations are prepared on banning or decreasing the use of certain substances or on reducing discharges and emissions. The Technological Committee also evaluates the waterborne and airborne inputs to the sea.

*The Marine Committee* takes measures against all kinds of operational pollution from ships and off-shore platforms and deals with facilities in ports to dispose of ships' wastes. It also co-ordinates the activities of the Baltic Sea States in matters concerning the protection of the Baltic Sea from pollution by ships.

*The Combating Committee* elaborates the rules and guidelines for co-operation in combating spillage of oil and other harmful substances. The Commission is assisting Estonia, Latvia and Lithuania to establish capabilities to combat marine pollution. All the Baltic Sea States are involved in the co-operation and provide these three states with expertise, equipment and financial support.

### **3.1.3. Work programme**

The work programme of HELCOM includes:

#### ***Monitoring of radioactive substances***

Since 1985, this work has been co-ordinated by the Group of Experts on Monitoring of Radioactive Substances in the Baltic Sea (EC MORS). According to the present terms of reference, the main duties of this group are:

- to compile available data on radioactive discharges to the Baltic Sea;
- to collect data from all compartments of the open sea and from coastal areas for the preparation of inventories and for showing trends, taking into account all aspects of quality assurance;
- to evaluate the collected data regularly;
- to assess the risks caused by direct discharges as well as long-range transboundary transports of radioactive substances to man and marine life, and the radiation burden to the population living around the Baltic Sea; and
- to develop models to predict radiation doses in the event of an accident.

To fulfil these duties, the Contracting Parties have set up a network of monitoring stations, some of them being the same stations that are used within the Baltic Monitoring Programme (BMP). The programme is based on HELCOM Recommendation 10/3 adopted by the Commission in 1989, and covers the different compartments (water, sediment, fish, aquatic plants, and benthic animals) of all sub-areas of the Baltic Sea. Measurements of several obligatory and voluntary radionuclides are included in the programme (e.g. radiocesium, Sr-90, K-40 and other gamma-emitters identified in the gamma spectrum).

The monitoring of the various compartments of the Baltic Sea is carried out in each country according to its technical capability and equipment. Finland, Germany, Poland and Russia carry out monitoring also at locations remote from the land, whereas Denmark and Sweden put more emphasis on coastal stations.

In addition to the environmental monitoring, annual monitoring of releases from nuclear facilities discharging radionuclides into the Baltic Sea are also included in this programme.

The results of this monitoring programme, submitted to the HELCOM data bases, is evaluated by consultants.

The quality of the monitoring data is also a key question of this monitoring programme. The International Atomic Energy Agency (IAEA) and especially its Marine Environment Laboratory (MEL) in Monaco, have been involved intensively in the work on quality assurance. The MEL has carried out some inter-comparison exercises on sea water and sediment analyses. One of the latest exercises showed that the quality of most of the results reported to IAEA was in excellent agreement among the laboratories submitting data for the MORS programme.

In addition to the exercises arranged by IAEA, an experiment on sediment sampling techniques and the analytical methods on different types of sediments was carried out in 1992. This experiment, co-ordinated by the EC MORS, aimed to show whether different sediment sampling techniques have significant effects on the final results. The MEL homogenised and distributed the sediment samples collected within the exercise and the samples is used also in a world-wide intercalibration arranged by IAEA.

### ***Open waters***

To follow up the effects of pollution in the marine environment outside the territorial waters of the Baltic coastal states, a joint monitoring programme has been co-ordinated by the Commission since 1979. For the programme, the Commission has published special guidelines, for example about station networks, parameters, methods to be applied in sampling, analytical methods, frequency of sampling and the reporting of results (Baltic Sea Environment Proceedings Nos. 27 A - D). The data are distributed annually to all Contracting Parties and the Commission has established a common data base for data processing.

Three overall evaluations of the state of the marine environment of the Baltic Sea have been based on the monitoring data supplemented by additional data from other research programmes. The first evaluation, published by the Commission in 1981, contained a summary and conclusions based on scientific results since the beginning of the century. New periodic assessments have been carried out and published every five years. At present the third periodic assessment is published by the Commission in spring 1997.

### ***Coastal waters***

For coastal waters, there has been no harmonised monitoring programme so far. The Contracting Parties have agreed, however, that national monitoring programmes in territorial waters should be established to supplement the joint monitoring programme for the open sea. National coastal assessments should have been provided by each Contracting Party since 1984, but the first joint assessment of the state of the coastal waters of the Baltic Sea was not published until 1993. Even though information about coastal waters has been heterogeneous, it is clearly evident that the coastal waters of the Baltic Sea are suffering from several problems.

The information on concentrations of metals in local coastal waters is limited due, for example, to lack of national data. When compared to the "background" values from the open sea, available values suggest that, in general, there are no major problems in the coastal areas.

The results from this first joint assessment of the coastal waters will be used when elaborating a harmonised monitoring programme for the coastal waters. This work is going on and is estimated to be finished by 1998 at the latest.

### ***Land based pollution***

The activities of the Commission to reduce pollution from land-based sources were extended to include different programmes concerning, for instance, the collection of input data, evaluation of the effects of different pollutants on the marine environment, identification of major pollution sources and further appropriate action to reduce pollution.

Harmful substances are, for the purposes of the Convention, divided into hazardous ("black list") and noxious ("red list") substances. With particular regard to hazardous substances, e.g. DDT and its derivatives, polychlorinated terphenyls (PTCs), the Contracting Parties have

undertaken to counteract their introduction into the Baltic Sea Area, whether airborne, waterborne or otherwise. As far as noxious substances are concerned, the Contracting Parties have undertaken to take all appropriate action to minimise pollution by these substances, e.g. by applying a number of enumerated criteria and measures.

With regard to the elimination of hazardous substances (DDT, PCBs and PCTs), the Commission adopted in 1982 and 1985 Recommendations that stipulated abandonment of the production, marketing and use of hazardous substances in the Baltic Sea countries.

In implementing the goals of the Convention, the Helsinki Commission needs reliable data on inputs to the Baltic Sea from land-based sources in order to develop its environmental policy and to assess the effectiveness of measures taken to abate the pollution. Such data are also required for evaluation of environmental data collected from the open sea and coastal waters.

The project dealing with the periodic evaluation of the pollution load entering the Baltic Sea from land-based sources (municipalities, industries and via rivers) was initiated by the Commission in 1985 when the preparation on the First Baltic Sea Pollution Load Compilation (PCL-1) started. The results of PCL-1 were published in BSEP Mo. 20 in 1987.

As the first stage of the project revealed an urgent need to harmonise the national pollution monitoring and evaluation methodologies, the harmonised methodological Guidelines were elaborated for the second stage of the project (PCL-2) aiming at the basic coverage of the major land-based pollution sources and defining the measuring period (the year 1990), pollution sources, parameters to be controlled, principles for flow measurements and sampling, methods of chemical analysis as well as calculation and estimation methods and reporting formats.

The results of the Second Baltic Sea Pollution Load Compilation were published by the Commission in 1993 (BSEP No. 45). The Report contains the generalised data characterising the major pollution sources and loads with respect to nine sub-regions of the Baltic Sea and the Baltic Sea as a whole.

Though the results of PCL-2 were not as profitable as expected, the second stage of the Project was a definite step forward as it provided more reliable data on total loads on the Baltic Sea than the first compilation. Moreover, in the course of the project it became possible to improve the reporting and to collect more detailed data than originally intended.

PCL-2 also provided a valuable experience to be taken into account in the preparation of the next stage of the Project, PCL-3.

One of the main lessons from PCL-2 was an urgent need to establish a quality assurance system before the next stage of the Project could start. The programme of Inter-laboratory Comparison Tests was, therefore, prepared and approved by the Technological Committee.

The Guidelines for PCL-3, which were performed during 1995-1997, were adopted by the Technological Committee in November 1993 and are aimed at preparation of the next Pollution Load Compilation that might serve to a wider extent the purposes of the HELCOM Programme Implementation Task Force, Technological Committee and Environment Committee.

The Project is co-ordinated by the **ad hoc** Expert Group on Pollution Load Compilation of the Baltic Sea (TC POLO).

### ***Airborne pollution***

Airborne pollution is mainly from land-based pollution. The Commission established a special monitoring programme for airborne pollution in 1985 which included, *inter alia*, a recommended list of parameters, a network of stations and the reporting of results using an agreed format. The programme has been up-dated from time to time. The HELCOM EC EGAP monitoring network consists of 27 stations. As a minimum routine, precipitation samples are analysed on a monthly basis for  $\text{NO}_3^-$ ,  $\text{NH}_4^+$ , Pb, Cd, Cu, Zn, total phases for  $[\text{HNO}_3 \text{ (gas)} + \text{NO}_3 \text{ (particles)}]$  and  $[\text{NH}_3 \text{ (gas)} + \text{NH}_4^+ \text{ (particles)}]$ , gas for  $\text{NO}_2$ . For quality assurance purposes,

concentrations in precipitation of the major ions (Na, K, Ca, Mg,  $\text{SO}_4^{2-}$ , Cl, pH and electrical conductivity) are required. On an experimental basis the samples are analysed for  $\text{HNO}_3$  (gas),  $\text{NO}_3^-$  (particles),  $\text{NH}_3$  (gas),  $\text{NH}_4^+$  (particles), Cr, Ni, As, Hg, HCB, dioxins, PAH, HCCH and PCB in precipitation and Pb, Cd, Cu and Zn in particles. The data are stored at NILU, which acts as a consultant to the Commission. HELCOM co-operates with EMEP for storage and processing of monitoring data, following a Memorandum of Understanding between HELCOM and UN/ECE.

## 3.2. Strategy

### 3.2.1. Purposes of monitoring

The aim of the Baltic Monitoring Programme (BMP) is to follow the long-term (annual and long periods) change (trends) of selected determinants in the Baltic ecosystem.

Monitoring data form a basis for the assessments of the state of the marine environment and for a forecast of possible man-induced changes. In order to register such man-induced changes, the natural changes of different elements of the ecosystem must be known. Therefore, monitoring will often include registration of more or less "natural" conditions. In its more restricted sense, the term is applied to the regular measurement of contaminant levels in relation to set standards, and it serves to judge the effectiveness of a system of regulation and control. Monitoring does not encompass experimental laboratory studies and scientific investigations, which, nevertheless, may be of importance in the planning of future monitoring activities.

### 3.2.2. Organisation of the monitoring activities

The Contracting Parties to the Helsinki Convention are invited to participate in the Baltic Monitoring Programme on a national, bilateral and multilateral basis in order to achieve an optimal spatial and temporal coverage of the Baltic Sea Area.

The Contracting Parties have agreed to implement the Baltic Monitoring Programme generally according to a responsibility principle reflecting their wishes to concentrate the main part of their monitoring activities on certain areas:

The Baltic Proper	Estonia, Finland, Germany, Latvia, Lithuania, Poland, Russia, and Sweden
The Gulf of Bothnia	Finland and Sweden
The Gulf of Finland	Estonia, Finland, and Russia
The Sound and the Kattegat	Denmark and Sweden
The Great Belt	Denmark
The Bay of Kiel and the Bay of Mecklenburg	Germany

Apart from their main responsibilities, however, the Contracting Parties are encouraged to participate in the programme in other regions of the Baltic Sea Area whenever practicable.

The stations are used for sampling hydrographic and basic hydrochemical determinants, harmful substances in sea water, and biological determinants as well as for sampling selected species for analysis of harmful substances. It is recommended that the determinants and methods included in the Guidelines should be used whenever possible. In addition, other determinants may be used when deemed necessary for the understanding of regional problems.

In order to achieve an appropriate assessment of the state of the marine environment of the Baltic Sea Area, the Contracting Parties are requested to report compiled results of coastal

monitoring in a generalised form. The status of coastal waters is reported on a voluntary basis every fifth year, in order to be available for the preparation of the periodic assessments. The first reports were available in 1993/1994.

### **3.2.3. Supporting organisations**

The main supporting organisations in the Baltic Monitoring Programme (BMP) are the International Council for Exploration of the Sea (ICES) and the experts of the Baltic Marine Biologists (BMB). In addition, the marine scientific institutions in all the countries surrounding the Baltic Sea contribute to the Helsinki Commission (HELCOM) through the BMP.

The work of HELCOM in general is reported by several observer organisations. In 1996, the following organisations were observers of the Helsinki Commission:

#### **Governments**

- Belarus
- Ukraine

#### **Intergovernmental organisations**

- Commission of the European Communities (CEC)
- Intergovernmental Oceanographic Commission (IOC)
- International Atomic Energy Agency (IAEA)
- International Baltic Sea Fishery Commission (BSFC)
- International Council for the Exploration of the Sea (ICES)
- International Maritime Organisation (IMO)
- Oslo and Paris Commissions (OSPARCOM)
- United Nations Economic Commission for Europe (ECE)
- United Nations Environment Programme (UNEP)
- World Health Organization, Regional Office for Europe (WHO/EURO)
- World Meteorological Organization (WMO)

#### **Non-governmental international organisations**

- Baltic Ports Organisation (BPO)
- BirdLife International
- Coalition Clean Baltic (CCB)
- European Chlor-Alkali Industry (EURO CHLOR)
- European Fertiliser Manufacturers' Association (EFMA)
- European Union for Coastal Conservation (EUCC)
- International Environmental Agency for Local Governments (ICLEI)
- International Network for Environmental Management (INEM)
- Standing Conference of Rectors, Presidents and vice-chancellors of the European Universities (CRE)
- Stitching GREENPEACE Council, GREENPEACE International
- Union of the Baltic Cities (UBC)
- World Wild Fund for Nature, WWF International.

***The Helsinki Commission is an observer of the following organisations***

- Intergovernmental Oceanographic Commission (IOC)
- International Baltic Sea Fishery Commission (BSFC)
- International Council for the Exploration of the Sea (ICES)
- International Maritime Organisation (IMO)
- International Oil Pollution Compensation Fund (IOPC Fund)
- Oslo and Paris Commissions (OSPARCOM)
- World Meteorological Organization (WMO)

***3.2.4. Supporting research***

Applied research is an element of the Environmental Action Programme and is finalised on building the knowledge base needed to develop solutions, and broaden the understanding of critical problems. Priority tasks include scientific issues, assessment of risks and impacts, key sector issues, and management of critical ecosystems.

***3.2.5. Process for review and adaptation***

***Quality assurance***

HELCOM has adopted a quality assurance policy, annexed also to this document, and all Contracting Parties have been asked to nominate a person responsible for quality assurance in all laboratories reporting to the monitoring programmes. Quality assurance advice and procedures are being worked out by the two ICES/HELCOM Steering Groups on Quality Assurance, one for chemical and one for biological measurements. It is recommended that all participating institutes/laboratories introduce a quality assurance system (based on the European Standard EN 45001) in their work, with the medium-term goal of obtaining formal accreditation. All institutes/laboratories should also participate in regular (annual) intercalibrations, arranged in the Baltic community, and chemical laboratories have to take part in proficiency testing schemes, e.g. QUASIMEME-II. Commercially available certified reference materials should be used by all participating institutes or laboratories. The results of intercalibrations and the analyses of certified materials should be reported together with the monitoring data according to procedures decided by EC MON 1/96.

The data are compiled into HELCOM databases and evaluated at regular intervals by experts from the Baltic Sea States in order to assess the environmental conditions.

The BMP data, once reported to the Commission, stored and controlled, are available to all the Contracting Parties (Governmental authorities) (HELCOM 6/16, Paragraph 4.7 and HELCOM 9/16, Paragraph 6.21). The Contracting Parties may in scientific work use data reported by other Contracting Parties - in addition to the use of these data in joint assessment work - subject to obtaining permission from the data originator according to the practices in common use. After the publication of the periodic assessment, data from the period covered by that assessment become available to all potential users.

***3.2.6. Parameters***

The Baltic Monitoring Programme is described in the Guidelines (Baltic Sea Environment Proceedings Nos. 27 A - D), as follows:

- A. Introductory Chapters
- B. Physical and Chemical Determinants in Sea Water
- C. Harmful Substances in Biota and Sediments
- D. Biological Determinants

The list of determinants to be monitored is divided into two groups: determinants which are essential for inclusion in the programme (obligatory determinants), and determinants which are desirable, but for certain reasons cannot be made obligatory at this stage (tentative determinants). The tentative determinants include determinants for which suitable intercalibration among laboratories should be carried out successfully before their inclusion as obligatory in the general monitoring programme, and determinants which still require considerable effort with regard to both development of methods and intercalibration.

The species chosen as test organisms and the sampling procedures recommended for monitoring harmful substances in biota are intended to provide a picture of the levels of harmful substances in the organisms studied, and to determine trends in their levels over time.

Human health aspects associated with the consumption of contaminated fish are covered to a certain extent by the sampling of relevant fish species, but they have not been given primary consideration in the selection of sampling procedures for the BMP. The sampling requirements directly concerned with human health are generally different from those for the assessment of trends in contaminant levels in the marine environment and, therefore, both cannot be fully covered in the same programme. Thus, it has been assumed that human health aspects will be dealt with more directly in national programmes concerned with fish and shellfish taken for human consumption.

### GENERAL SAMPLING PROGRAMME

Determinants	Attempted frequency	Most important period of sampling
<b>1. Hydrography/Hydrochemistry</b>		
a) Long-term trend monitoring purposes	Four seasons	Nutrients: Winter time Oxygen: Late summer - autumn
b) In connection with biological determinants	See below for pelagic biology	See below for pelagic biology
<b>2. Harmful substances</b>		
a) In sea water: Organochlorines	Once a year	None
PHCs	Once a year	Summer
Heavy metals	Once a year	Research needed
b) In biota	Once a year	Late summer - autumn
<b>3. Pelagic biology</b>		
a) Baltic Proper	12 times a year	Summer time, but should be sampled throughout the productive season; winter less important
b) Other areas	6 times a year	
<b>4. Macrozoobenthos</b>		
	Once a year	Late winter - early spring

### OBLIGATORY AND TENTATIVE DETERMINANTS

#### Physical and chemical determinants in sea water

##### *Basic Hydrographic and Hydrochemical Determinants*

Only those methods which have been successfully intercalibrated have been accepted for the analyses of obligatory determinants.

- The determinants to be monitored are as follows:
- temperature
- salinity
- density structure <sup>1</sup>
- oxygen
- hydrogen sulphide

- pH <sup>2</sup>
- alkalinity <sup>3</sup>
- nutrients: phosphate, total phosphorus, ammonia, nitrate, nitrite, total nitrogen <sup>1</sup>, silicate <sup>4</sup>

## Physical and chemical determinants in sea water

### *Heavy Metals, Petroleum Hydrocarbons and Chlorinated Hydrocarbons in Sea Water*

The determinants to be monitored in sea water are as follows:

- heavy metals <sup>5</sup>(Hg, Cd, Zn, Cu and Pb)
- total tin and organic tin <sup>5</sup>
- petroleum hydrocarbons (PHCs) <sup>5</sup>
- chlorinated hydrocarbons (e.g. DDTs, PCBs, lindane) <sup>5</sup>

<sup>1</sup> tentative determinant.

<sup>2</sup> pH is obligatory only in combination with <sup>14</sup>C- primary production measurements and then in samples from the same depths as the production samples.

<sup>3</sup> alkalinity is a tentative determinant and should be measured as in <sup>2</sup>.

<sup>4</sup> silicate is a possible limiting factor for diatoms and should be determined at standard hydrochemical depths in the Kattegat, the Sound and the Belt Sea, whereas for other sea areas, silicate is regarded only as a tentative determinant.

<sup>5</sup> tentative determinant.

## HARMFUL SUBSTANCES IN BIOTA AND SEDIMENTS

### Harmful Substances in Biota

#### *Harmful substances in selected species*

#### Species to be sampled

- Herring (*Clupea harengus*) **obligatory**
- Cod (*Gadus morhua*) **obligatory** in areas where normally found
- *Macoma baltica* (only metals) **tentative**
- *Mytilus edulis* **tentative**
- *Mesidotea entomon* **tentative**

#### Substances to be analysed

The following harmful substances are selected to be analysed:

#### *Obligatory contaminants*

**pp'-DDT, pp'-DDE, pp'-DDD, PCBs**

Due to the greater accuracy of analyses using capillary column gas chromatography, it is recommended that the determination of individual chlorobiphenyl compounds (CBs) be made



obligatory by the end of the Third Stage, with quantification of the following CBs: IUPAC Nos. 28, 52, 101, 118, 138, 153, 180. These are substances for which the levels, despite some decreases, are still of significant magnitude in Baltic biota.

#### **Hexachlorobenzene (HCB), and hexachlorocyclohexane**

These are substances which can be determined with existing analytical competence and for which further information is useful.

#### **Total concentrations of Hg, Cd, Pb**

These are metals which are particularly relevant to coastal areas and dredge spoil disposal grounds.

#### ***Tentative contaminants***

##### **Chlordane's, dieldrin**

These are substances which can be of biological significance and for which more information is needed. Many Contracting Parties already have analytical programmes for these contaminants.

##### **Zn, Cu**

These have been tentative elements in the Second Stage of the BMP. However, because they are homeostatic elements in fish, it is doubtful whether the impact of their contaminant burden on the marine environment can be successfully monitored using open sea fish species.

#### ***Contaminants to be investigated in the future***

##### **Polychlorinated camphenes (PCCs, e.g. toxaphene), dibenzodioxins and -furans (PCDDs, PCDFs), PAHs**

Analytical methods for these groups of substances (all of them probably of biological significance) are not well developed and much work remains before comparable data will be obtained. It is important that research continues in order to determine their biological impact and to develop efficient analytical methods to be used for serial analyses.

## **BIOLOGICAL DETERMINANTS**

### **Biological determinants to be monitored**

- Phytoplankton primary production
- Phytoplankton chlorophyll-a and phaeopigments <sup>6</sup>
- Phytoplankton (species composition, number of counting units, biomass)
- Zooplankton (species composition, abundance and biomass of mesozooplankton, protozoa-plankton <sup>6</sup>)
- Soft bottom macrozoobenthos (species composition, abundance, biomass)

Micro-organisms <sup>6</sup> (total number and biomass of bacteria, production of bacteria, number of colony-forming bacteria).

<sup>6</sup> tentative determinants

**New sampling methods:** To improve the significance and reliability of pelagic sampling, the use of additional new sampling methods is recommended, such as automatic sampling and sediment trapping.

**Remarks:** It is essential that sampling of macrozoobenthos is accompanied by some hydrographic measurements to provide information about the hydrographic situation.

Therefore, as a minimum requirement, water should be sampled as close to the sea bottom as possible for determination of salinity, temperature and oxygen/H<sub>2</sub>S concentration. Preferably a complete hydrographic series should be taken.

### **Sampling depths**

The sampling depths are described in the Guidelines under the sections for each determinant.

### **3.2.7. Minimum performance criteria**

HELCOM recognises that in terms of joint or co-ordinated programmes, it can still be difficult to obtain results which are comparable from country to country. Such comparability should be a long-term goal associated with a co-ordinated monitoring programme and it should be facilitated by the use of good laboratory practice and quality assurance programmes, including the conduct of intercalibration exercises when appropriate. At present, emphasis can best be placed on the development of trend analysis in each country, which has been shown to provide very valid results.

### **3.2.8. Reporting**

Results of measurements carried out according to the agreed monitoring programme are reported and exchanged as follows:

The deadline for the delivery of data to the Secretariat is 1 May for hydrographic and hydrochemical data and 1 September for biological data and harmful substances.

Physical and hydrochemical data shall be reported according to the ICES format for hydrographic and hydrochemical data.

Data on harmful substances in biota should be reported according to the ICES Reporting Format for Contaminants in Marine Biota.

Any data Contracting Parties wish to provide on harmful substances in sediments should be submitted according to the ICES Interim Reporting Format for Contaminants in Sediments.

Biological data should be reported according to the Biological Data Reporting Format and the reporting forms given in the Guidelines.

The data should, if necessary, be supplemented with information on methods used, conditions in which measurements were carried out as well as other relevant data.

The Commission has established a unified follow-up procedure, which means that the Contracting Parties are obliged to report regularly on the pollution load entering the Baltic Sea from their territories. Furthermore, each Contracting Party must undertake to implement the measures for prevention and reduction given in the explicit HELCOM Recommendations.

### **3.2.9. Communication among members**

The Contracting Parties may in scientific work use data reported by other Contracting Parties - in addition to the use of these data in joint assessment work - subject to obtaining permission from the data originator according to the practices in common use.

### **3.2.10. Support and assistance to member countries**

The status report on ongoing monitoring activities (for each preceding year) are prepared by the Secretariat and the consultants annually, and submitted for consideration by the appropriate subsidiary issues of the Commission.

The complete set of data stored in the data base is distributed to the Contracting Parties on magnetic media.

In addition, inventories of data holdings and graphical presentations of the data are prepared by the consultant and submitted for consideration at appropriate meetings.

## **3.3. Results**

### **3.3.1. Available databases**

BMP data available from 1979 - 93. Airborne pollution load data 1986 - 91. Data on radioactivity 1984 - 91. PLC, 1991 data.

### **3.3.2. Available documentation**

Cf. the attached list of BSEPs.

1. The third Periodic Assessment of the State of the marine environment of the Baltic Sea, 1989 - 93, available most probably early 1997.
2. PLC-3: Available in late 1997.
3. Airborne pollution load: Available late 1997.

## **3.4. Discussion**

### **3.4.1. Problems**

Several problems have been identified as obstacles for implementation of necessary actions, which may be stated for most of the conventions:

- Lack of financial resources;
- Weak commitment to environmental questions at all levels of society, and particularly at the local and regional levels;
- Lack of experience and competence in project and enterprise management;
- Uncertainties concerning liabilities for past environmental damage.

In response, activities within the framework of the Helsinki Commission are focused on developing abilities to combat harmful substances other than oil and on improving aerial surveillance. One of the crucial topics to be dealt with by the Commission in the coming years is the co-operation with Estonia, Latvia and Lithuania, whose national capabilities to combat marine pollution and procedures for the implementation of HELCOM arrangements need to be established.

The Helsinki Commission will, in the years to come, put special emphasis on the co-operative efforts to reduce the pollution load entering the Baltic Sea from land.

Urgent curative measures are, to a large extent, described by the Joint Comprehensive Environmental Action Programme. It is evident that a decisive reduction of emissions to restore the Baltic Sea to a sound ecological balance will be derived mainly from investment activities in point and non-point source pollution under element 3 of the Programme, e.g. in

relation to poor waste water treatment, industrial emissions, agricultural runoff, etc. The implementation of the other elements of the Programme, although they are chiefly complementary and supportive, must be understood as equally indispensable to the achievement of the stated objective.

With the 1992 Helsinki Convention it is now possible to address, comprehensively, questions concerning the sustainable use of the natural resources of the Baltic Sea basin. A work programme on this issue was adopted by the Commission in 1993 and given several responsibilities, e.g. to review the national and general environmental situation, exploitation of the sea and coasts, existing trends and damage within the area; to review existing national legislation and other instruments to achieve the environmental and natural conservation goals; and to prepare a strategy and legal guidelines for protecting valuable nature types and biotopes.

At present there is a proposal under consideration concerning the protection of coastal regions, including, for instance, establishment of a number of protected coastal and marine areas and a list of coastal and marine biotopes and nature types with particular ecological value. A "Red Data Book" of threatened biotopes is proposed for the Baltic Sea region. Also, work related to management plans for coastal lagoons and wetlands has been initiated. The aim is to co-ordinate and facilitate the development of integrated coastal management plans for priority areas identified by the Joint Comprehensive Environmental Action Programme. The aim is also to co-ordinate the development of criteria and guidelines for the identification of the most important wetlands in the Baltic Sea region.

### **3.4.2. Lessons learned by HELCOM**

#### ***Modernisation for coming decades***

The 1992 Helsinki Convention incorporates a number of important changes in environmental perspectives and principles that have emerged and been widely accepted since the 1970s. Concepts such as the Precautionary Principle and the use of Best Environmental Practice and Best Available Technology are now included.

Furthermore, procedures for Environmental Impact Assessment, and a specific article on nature conservation and protection of biodiversity in the Baltic Sea drainage area, are new components of the 1992 Convention.

In 1994 the HELCOM Ministerial meeting decided inter-alia on the protection of the coastal strip and on the establishment of a system of coastal and marine Baltic Sea Protected Areas (BSPAs).

The principles and strategic approach of the Baltic Sea Joint Comprehensive Environmental Action Programme (JCP) were approved in 1992 by the Ministers of Environment in their Baltic Sea Environment Declaration.

The Programme includes some distinctively innovative features:

- A regional approach setting priorities for the Baltic drainage area as a whole;
- Based on an attempt to identify all major point sources of pollution (referred to as hot spots);
- Concrete proposals for remedial (preventive and curative) action at hot spots, based on pre-feasibility studies, carried out for each of the major sub-basins of the Baltic drainage area and for coastal areas;
- Major non-point sources of pollution are identified and appropriate principles to address these sources outlined;
- Rough estimates of investment costs, as well as of the anticipated reduction of the pollution load;

- A series of complementary and supportive activities which are intended, for example to help mobilise the necessary political commitment and public acceptance; and
- Programme activities designed in such a way as to facilitate international financial institutions, donor organisations and domestic funding authorities to take necessary decisions without undue delay.

### ***Key principles and specific elements***

The key principles of the JCP are to:

- recognise the importance of a long-term perspective for ecological restoration;
- take account of the important role of natural factors;
- harmonise economic and environmental objectives;
- undertake preventive and curative actions;
- control pollution at source;
- establish conditions for private sector participation;
- take action to overcome constraints and build local capabilities.

The Programme is expected to be implemented over a twenty-year period (1993 - 2012) at an estimated cost of 18 billion ECU.

Based on the key principles, the JCP is built around six elements which comprise broad areas of action, which also complement each other to form a coherent framework for concerted action.

### ***Hot spots for action***

In the preparation of the JCP, 132 particularly serious individual emission sources or activities around the Baltic Sea were identified.

A majority of these are municipal or industrial point sources, but areas with high agricultural runoff are also included.

These sources or activities were referred to as hot spots, and the 47 most problematic of these sources/activities were classified as priority hot spots. The investment actions of the Programme focus, to a great extent, on bringing pollution at the hot spots under control.

Two thirds of the hot spots are located in countries in transition, and more than 75 per cent of the estimated cost of the Programme is likely to be needed for the clean-up of these hot spots. Investments needed at the 47 priority hot spots have been assessed to be in the range of 6.5 billion ECU.

There are big differences in the industrial sectors between the countries around the Baltic. Industries in the northern and western countries have undergone gradual and sometimes radical changes necessary to maintain their competitiveness in a market economy, whereas industries in countries in transition are still, to a large extent, using technologies originally installed when the plants were constructed (in some cases as early as the 1930s).

Irrespective of these differences, the industrial sector as a whole has a significant impact on the environment throughout the Baltic Sea Region.

Of the original hot spots, 50 are industrial, and 38 of them are located in countries in transition. Nine of the industrial hot spots are classified as priority hot spots. Besides these distinct hot spots there are, however, many polluting industries in need of urgent attention in the countries in transition. As previously mentioned, it is a common practice to discharge industrial waste

water directly into the municipal sewer networks. Hence, several industrial sources of pollution are included among the municipal hot spots.

Pulp and paper industries, chemical industries and metal producing/processing plants have been identified as the industrial sectors in need of priority attention within the JCP.

It is quite evident that there has been considerably less progress in addressing industrial hot spots, particularly the priority hot spots, in countries in transition compared to progress made with municipal hot spots.

Non-point sources of pollution - agriculture and traffic - is the second sub-element under investment activities of the JCP.

Compared to abatement of point source pollution, where visible progress has been achieved, pollution from non-point sources is a much more complicated issue to handle as it implies significant legislative and infrastructure changes at the national level prior to investment activities.

The massive input of waterborne and airborne nitrogen, and waterborne phosphorus to the Baltic is the major cause of marine eutrophication, one of the most serious environmental problems in the Baltic Sea Area. In addition, agriculture causes pollution by other substances, including pesticide residues.

The most important pollution sources related to agriculture are:

- leaching of nitrogen and phosphorus from arable land;
- leaching of nitrogen and phosphorus from inappropriate storage of manure from animal production;
- atmospheric emissions of ammonia from manure (inappropriate storage and field application);
- leaching of pesticides due to inappropriate application techniques and storage facilities;
- inadequate treatment of waste water in rural areas.

## 4. DESCRIPTION OF THE MEDITERRANEAN ACTION PLAN

### 4.1. Background

The need for a Mediterranean Action Plan (MAP) was established from the recognition of the Mediterranean basin as a “high priority” area, by the international community, in terms of risks of environmental degradation. MAP exemplifies the regional approach to the resolution of global marine and coastal environmental problems, as enunciated in the United Nations General Assembly Resolutions and the United Nations Environment Programme Governing Council Decisions following the Stockholm Conference. Operating **in conformity with international law**, the MAP embodies a co-ordinated trans-national, trans-sectoral, co-operative response by countries fringing the Mediterranean Sea (Table 7) to a commonly perceived communal necessity - the effective protection and sustainable development of marine and coastal resources.

Table 7

List of Mediterranean Countries which are Contracting Parties to the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean, 1995.

- |                           |                         |
|---------------------------|-------------------------|
| - The European Commission | - Tunisia.              |
| - France.                 | - Algeria.              |
| - Monaco.                 | - Libya.                |
| - Spain.                  | - Morocco.              |
| - Italy.                  | - Cyprus.               |
| - Greece.                 | - Malta.                |
| - Turkey.                 | - Albania.              |
| - Israel.                 | - Croatia.              |
| - Lebanon.                | - Slovenia.             |
| - Egypt.                  | Bosnia and Herzegovina. |
| - Syria.                  |                         |

#### 4.1.1. Historical perspective

The Mediterranean, being virtually a semi-enclosed sea (its principal means of exchanging water is the Strait of Gibraltar), is particularly prone to pressures resulting from human activity. The reasons for its conspicuous susceptibility to anthropogenic pressures can be summarized as follows:

- topography (the relatively shallow sills between the Eastern and Western Mediterranean basins, and between the Mediterranean Sea and the Atlantic Ocean exercise considerable control on the circulation);
- a low flushing rate to the Atlantic Ocean;
- strong stratification of water masses, particularly in summer;
- a weak tidal regime;
- a very specific wind regime;
- a relatively small catchment area;
- a very narrow littoral zone;
- a densely populated coast and hinterland;
- intense tourist flow in the summer season;
- vicinity to the highly industrialised areas of Europe;

- large riverine, atmospheric and coastal inputs of pollutants;
- heavy maritime traffic.

All these factors have conspired to render the Mediterranean Sea one of the most seriously threatened key environments of the world.

The spread of environmental awareness at the grassroots level in the late 60s and the early 70s, particularly in the western industrialised countries, led to the revolutionary 1972 United Nations (UN) Conference on the Human Environment in Stockholm. Six months later, the United Nations Environment Programme (UNEP) was conceived to address chiefly problems relating to the world's environment. UNEP adopted a strategy based on the promotion of regional schemes of co-operation in order to achieve its aims, and the Regional Seas Programme (now called the Oceans and Coastal Areas Programme) was born (Appendix II). The first region selected by UNEP for its activities was the Mediterranean Sea.

In 1975, UNEP convened a meeting in Barcelona, Spain, where the Mediterranean coastal states were invited to adopt a framework for regional co-operation, to deal with issues relating to the marine and coastal environment. A year later, this framework was formalised by a convention, the **Barcelona Convention for the Protection of the Mediterranean Sea against Pollution, 1976**. This convention was subsequently revised in 1995 and renamed the **Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean** (henceforth referred to in this report as the Barcelona Convention). The historical development of the Mediterranean Action Plan (MAP) is outlined below.

#### ***4.1.2. A brief history of the Mediterranean Action Plan (MAP)***

**1975:** Adoption of the Mediterranean Action Plan (MAP) and launch of the Co-ordinated Mediterranean Pollution Monitoring and Research Programme (MED POL).

**1976:** Adoption of the Barcelona Convention for the Protection of the Mediterranean Sea against Pollution and two of its protocols (the Dumping and the Emergency Protocols). Establishment of the Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea (REMPEC) on Manoel Island, Malta.

**1977:** Launching of the Blue Plan (BP) and the Priority Actions Programme (PAP).

**1979:** Establishment of the Regional Activity Centre for the Blue Plan (BP/RAC) at Sophia Antipolis in France.

**1980:** Adoption of the Land-based Sources Protocol. Establishment of the Regional Activity Centre for the Priority Actions Programme (PAP/RAC) at Split in Croatia.

**1981:** Adoption and launching of the second phase of MED POL (MED POL - Phase II). Establishment of the Mediterranean Trust Fund (MTF).

**1982:** Transfer of the MAP Co-ordinating Unit (MEDU) to its permanent headquarters at Athens in Greece. Adoption of the Specially Protected Areas (SPA) Protocol.

**1985:** The "Declaration on the Second Mediterranean Decade" (the Genoa Declaration). Adoption of a first set of common measures for the control of pollution. Establishment of the Regional Activity Centre for Specially Protected Areas (SPA/RAC) at Tunis in Tunisia.

**1989:** Adoption of common measures for the control of pollution. Decision by the Contracting Parties to refocus the MAP on integrated planning and management of coastal areas.

**1990:** The Charter of Nicosia.

**1991:** Adoption of Annex IV of the Land-based Sources Protocol and the Action Plan for the protection of Mediterranean Cetaceans. Adoption of common measures for the control of pollution.



**1992:** The Declaration of Cairo. Presentation of the MAP at the UN Conference on Environment and Development at Rio de Janeiro. Establishment of the Historical Sites Regional Activity Centre (HS/RAC) at Marseilles in France.

**1993:** The Conference of Casablanca. Establishment of the Regional Activity Centre for Remote Sensing (ERS/RAC) at Scanzano in Italy. Adoption of common measures for the control of pollution.

**1994:** The Declaration of Tunis. Adoption of the Protocol for the Protection of the Mediterranean Sea against Pollution from Offshore Exploration and Exploitation of the Continental Shelf and the Seabed and its Subsoil.

**1995:** The Conference of Plenipotentiaries. Adoption of the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean. Adoption of the second phase of the Mediterranean Action Plan (MAP - Phase II). Revision (and renaming) of the Barcelona Convention for the Protection of the Mediterranean Sea against Pollution, 1976.

**1996:** Initiation of the third phase of the Co-ordinated Mediterranean Pollution Monitoring and Research Programme (MED POL - Phase III). Adoption of common measures for the control of pollution and a revised Land-based Sources Protocol.

#### **4.1.3. General framework**

MAP derives its conceptual underpinnings from the functional prerogatives of UNEPs Regional Seas Programme which, as is recorded, “was conceived as an action-oriented programme encompassing a comprehensive, trans-sectoral approach to marine and coastal areas and to environmental problems concerning not only the consequences but also the causes of environmental degradation. Each regional programme is shaped according to the needs of the regions concerned. The regional programmes promote the parallel development of regional legal agreements and of action-oriented programme activities as embodied in the action plans”. It was designed to help Mediterranean Governments to:

- assess and control marine pollution;
- formulate national environmental policies;
- identify options for alternative patterns of development;
- make better rational choices for allocating resources.

The organisational model adopted for the Plan comprises three **interwoven** relational elements: *comprehensiveness*, *contextuality*, and the *balanced development* of the main components. *Comprehensiveness* refers to the holistic nature of MAPs programmatic structure which is composed of three interdisciplinary components: the institutional, the normative and the technical. The technical component deals with all activities directed towards the assessment and management of the marine and coastal environment in the Mediterranean basin. The normative component covers the Barcelona Convention and its Protocols, and also the relation between this Convention system and other relevant Conventions or national laws. The institutional component covers the administrative infrastructure created by the Barcelona Convention to co-ordinate intergovernmental and inter-organisational policies and measures. The second element, *contextuality*, pertains to the multi-faceted pragmatic setting of MAP and its conditioning thereof by practical realities. The final element, the *balanced development* of the interdisciplinary components, is fundamental because such synergy is necessary to meet the stated goals, given the complexity of the issues that the Action Plan addresses.

MAP is, above all, an institutional framework that serves to concretise and implement environmental co-operation at a regional level in the Mediterranean basin. It is constituted by the Contracting Parties to the Barcelona Convention (Table 7) under the aegis of UNEP and is co-ordinated by a Co-ordinating Unit, the MEDU, which has its permanent headquarters in Athens, Greece. MEDU operates within the mandate and decisions of the Contracting Parties, under the authority of the Executive Director of UNEP. It works in conjunction with several

Intergovernmental and Non-governmental Organisations (section 2.2.3 of this report) and acts as a centre for the gathering and processing of information generated by MAP. The Unit, furthermore, co-ordinates the activities of MAPs specialised Regional Activity Centres (appendix 2). MEDU performs all the Secretariat functions that Article 13 of the Barcelona Convention formally assigns to UNEP. This includes most of the routine administration associated with the Convention and its Protocols such as the convocation and organisation of meetings and conferences, the transmission of notifications, reports and other information, etc. It is also responsible for the preparation of the biennial budgets and work-programmes of MAP. To liaise between State authorities, national institutions and the MAP Secretariat, the Contracting Parties have officially designated National Co-ordinators or Focal Points for each component of the Action Plan.

In the Action Plan, the highest decision-making authority is wielded by the Parties themselves. This authority is exercised primarily on the basis of consensus during the **Ordinary Meetings of the Contracting Parties**, where progress is reviewed and decisions are made regarding the programmatic aspects of the Plan. Such Meetings are held once every two years. UNEP, which is empowered to counsel the Contracting Parties on matters relevant to their duties within the context of the Barcelona Convention, presents a report on the implementation of MAP (the Report of the Executive Director) on these occasions.

The financial support for MAP is provided by a Mediterranean Trust Fund which was established in 1981, voluntary contributions from the EU and other countries, funds from the UN and other Agencies, and donations from institutions such as the World Bank and the European Investment Bank. The Mediterranean Trust Fund is actually managed by the Co-ordinator of MAP, although formal responsibility for its administration resides with the Executive Director of UNEP.

#### **4.1.4. Work programme**

The Work Programme of MAP is chiefly oriented towards devising a comprehensive strategy for protecting and managing marine resources without neglecting the developmental priorities, and the political, cultural and socio-economic realities of the individual Mediterranean coastal states. Its rational foundations can be summed up as follows:

- the scientific method, with its emphasis on deductive reasoning and working hypotheses, is the best approach available for clearly formulating environmental problems and rendering them resolvable by practical means;
- successful tutelage of the marine and coastal environment requires policies and measures that only multi-national political acceptance of this goal as a common responsibility can guarantee;
- the legal and policy basis, if it is to be effective, must be supported and enhanced by appropriate scientific and management tools.

The Programme creates, via a political integration scheme, a perpetual system of international co-operation in the Mediterranean region to address matters relating to the marine and coastal environment. The integration achieved at the political level is subsequently intensified by the balanced development of the Programme's legal, technical and institutional components.

## **4.2. Strategy**

The Work Programme is implemented through an "Action Plan" that consists mainly of the following four inter-dependent components:

- i) a co-ordinated programme for monitoring, research and information exchange aimed at:
  - providing regular, credible assessments of the state of the Mediterranean Sea;

- devising and evaluating adequate measures for protecting the Mediterranean marine/coastal environment in keeping with the declared objectives of the Barcelona Convention (the Co-ordinated Mediterranean Pollution Monitoring and Research Programme).
- ii) a socio-economic integrated programme for the development and management of marine resources in the Mediterranean region that safeguards environmental quality without compromising the developmental priorities of the individual States (the Blue Plan, the Priority Actions Programme and the Coastal Areas Management Programme).
- iii) a framework convention, the Barcelona Convention, together with its related Protocols and their technical Annexes, which commits the Contracting Parties to adopt adequate measures to deal with pollution and protect the marine environment. The main Protocols are:
- the Protocol for the Prevention of Pollution of the Mediterranean Sea by Dumping from Ships and Aircraft, in force since 1978;
  - the Protocol concerning Co-operation in combating pollution of the Mediterranean Sea by Oil and other Harmful Substances in Cases of Emergency, in force since 1978;
  - the Protocol for the Protection of the Mediterranean Sea against Pollution from Land-Based Sources, in force since 1983 and revised in 1996;
  - the Protocol concerning Mediterranean Specially Protected Areas, in force since 1986;
  - the Protocol for the Protection of the Mediterranean Sea against Pollution from Offshore Exploration and Exploitation of the Continental Shelf and the Seabed and its Subsoil, adopted in 1994, but not yet in force;
  - the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean, adopted in 1995, but not yet in force (this protocol, once ratified, will replace the existing Protocol concerning Mediterranean Specially Protected Areas).

The Barcelona Convention has been amended a number of times in order to adapt it to the precepts of the UN Convention on the Law of the Sea (UNCLOS), the 1973/1978 Convention on the Prevention of Marine Pollution from Ships (MARPOL) and the 1972 Convention on the Prevention of Marine Pollution by the Dumping of Wastes and Other Matter. Amendments were also introduced to bring the Convention into line with the principles outlined in regional declarations such as The Declaration of Genoa, 1985, the Charter of Nicosia, 1990, etc. The text of the Convention was revised substantially in 1995 to take into account the concepts expounded at the 1992 UN Conference on Environment and Development (Rio de Janeiro, Brazil).

- iv) a framework of institutional and financial arrangements relating to the structural and functional aspects of the decision-making and implement processes (Organs, Committees, co-ordination, etc.).

#### **4.2.1. Purposes of monitoring**

Only the environmental assessment component of the MAP is directly germane to the aims of this report. This component essentially consists of the Co-ordinated Mediterranean Pollution Monitoring and Research Programme, known more familiarly as the MED POL Programme. Its first phase, MED POL - Phase I, was implemented from 1975 to 1980. During this phase, the participating States acquired experience in marine pollution measurements and began to compile data on baseline levels of contaminants. The activities of Phase I were designed to pave the way for the second phase, MED POL - Phase II, a long-term research and pollution-monitoring programme. Phase II of MED POL was operational from 1981 to 1995. The third phase of MED POL, MED POL - Phase III, began in 1996 and will end in 2005.

Monitoring is a cornerstone of the MED POL Programme, where its principal function is to provide the Contracting Parties to the Barcelona Convention with the following:

- information required for the implementation of the Convention and its Protocols;
- scientific information which may lead to eventual revisions/amendments of the provisions of the Convention and its Protocols, and the formulation of additional protocols;
- information which could be used in formulating environmentally sound, national, bilateral and multilateral management decisions essential for the continuous, sustainable socio-economic development of the Mediterranean region;
- indicators and evaluations of the efficiency of the anti-pollution measures instituted under the Convention and the related Protocols;
- analysis of the sources, amounts, levels, pathways, trends and effects of pollutants in the Mediterranean Sea;
- compilation of consistent time-series of data on the sources, amounts, levels, pathways, trends and effects of pollutants in the Mediterranean Sea;
- periodic assessments of the state of the Mediterranean marine and coastal environment.

#### **4.2.2. Organisation of monitoring activities**

Monitoring, in the context of the assessment and protection of the marine environment, has been defined as the repeated measurement of an activity, a contaminant, or the direct or indirect impact of an activity or contaminant. Although there are considerable differences in the interpretation of the terminology used, three types of monitoring are generally recognised:

- monitoring for research purposes;
- trend monitoring;
- compliance monitoring.

The monitoring activity in MED POL is a combination of all three types. In MED POL - Phase I, it was directed mainly towards generating data that could be used for research purposes and in baseline studies. On the other hand, the monitoring in MED POL - Phase II was oriented more towards establishing trends and evaluating the effectiveness of the measures adopted for reducing pollution.

The long-term monitoring in MED POL is organised on four levels:

- monitoring of sources of pollution (to obtain information on the type and amount of pollutants released directly into the Mediterranean Sea);
- monitoring of coastal areas, including estuaries, influenced by pollutants from identifiable primary or secondary sources (to assess the effectiveness of the anti-pollution measures adopted under the Barcelona Convention and its Protocols);
- monitoring of offshore or reference areas which are not under the direct influence of pollutants from identifiable primary or secondary sources (to obtain information on the general trends in the level of pollution in the Mediterranean);
- monitoring of the transport of pollutants through the atmosphere (to obtain additional information on the pollution load reaching the Mediterranean Sea).

In cases where the pollutants are substances which have not been explicitly indicated in the MED POL Priority Pollutant Lists, pilot monitoring surveys are organised to obtain rapid, reliable assessments of the pollution.

### **4.2.3. Supporting organisations**

The main international organisations and UN Specialised Agencies which support MED POL/MAP are:

- the Intergovernmental Oceanographic Commission (IOC/UNESCO);
- the International Maritime Organization (IMO);
- the World Meteorological Organization (WMO);
- the International Atomic Energy Agency (IAEA);
- the World Health Organization (WHO);
- the Food and Agriculture Organization of the United Nations (FAO).

The activities of a number of Non-governmental Organisations (NGOs) such as GREENPEACE and the World Wildlife Fund (WWF), which have been granted Observer status within the Action Plan, also provide MED POL/MAP with opportunities for co-operation.

### **4.2.4. Supporting research**

The research priorities in MED POL are chiefly dictated by the overall requirements of the Programme, and hence tend to be moulded somewhat by the main needs of the monitoring activity. The main research topics/areas are listed below

#### **Research Topics in MEDPOL**

##### **Phase I:**

- effects of pollutants on marine organisms and their populations;
- effects of pollutants on marine communities and ecosystems;
- coastal transport of pollutants.

##### **Phase II (1982-1989):**

- sampling and analytical techniques/reference methods for monitoring the sources and levels of pollutants (with priority given to substances listed in the Dumping and Land-based Sources Protocol of the Barcelona Convention);
- reporting formats required according to the Dumping, Emergency and Land-based Sources Protocols of the Barcelona Convention;
- environmental quality criteria to be used in the development of emission standards, standards of use or guidelines for substances listed in Annexes I and II of the Land-based Sources Protocol of the Barcelona Convention in accordance with Articles 5, 6 and 7 of that Protocol;
- confirmation (or eventual revision) of the proposed environmental quality criteria (standards of use) for bathing waters, shellfish-growing waters and edible marine organisms;
- guidelines and criteria governing the application of the Land-based Sources Protocol of the Barcelona Convention, as requested in Article 7 of that Protocol;
- oceanographic processes, particularly surface circulation and vertical transport (with emphasis on understanding the distribution of pollutants through the Mediterranean and developing contingency plans for cases of emergency);
- toxicity, persistence, bioaccumulation, carcinogenicity and mutagenicity of selected substances listed in the Annexes of the Land-based Sources and Dumping Protocols of the Barcelona Convention;

- eutrophication and concomitant plankton blooms (with emphasis on assessing the feasibility of alleviating the consequences and damage from recurring plankton blooms);
- ecosystem modifications in areas influenced by pollutants, and in areas where ecosystem modifications are caused by large-scale coastal or inland engineering activity;
- effects of thermal discharges on marine and coastal ecosystems, including the study of associated effects;
- biogeochemical cycle of specific pollutants, particularly those relevant to human health (mercury, lead, survival of pathogens in the Mediterranean Sea, etc.);
- pollutant-transfer processes (i) at river/sea and air/sea interfaces, (ii) by sedimentation and (iii) through the straits linking the Mediterranean with other seas;
- jellyfish blooms in the Mediterranean.

#### **Phase II (1990-1995):**

- characterisation (identification of chemical or biological components) and measurement (development and testing of methodologies) of specific contaminants;
- physical, chemical and biological mechanisms (for example, atmospheric transport and deposition, water movements and mixing, biogeochemical cycling, etc.) relating to the transport and dispersion of potential pollutants (with priority given to the provision of quantitative information useful for modelling and contributing to regional assessments);
- effects of selected contaminants listed in Annexes I and II of the Land-based Sources and Dumping Protocols of the Barcelona Convention on marine organisms, communities and ecosystems or man and human populations (with emphasis on effects and techniques that can provide information useful for establishing environmental quality criteria);
- fates/environmental transformation of contaminants, including micro-organisms, in the marine environment (persistence or survival, degradation, transformation, bioaccumulation, etc., but excluding transport and dispersion);
- prevention and control of pollution (determination of factors affecting the efficiency of waste treatment and disposal methods under specific local conditions, and development of environmental quality criteria/common measures for pollution abatement).

As a rule, all research activity in MED POL is entrusted to national research institutes/laboratories.

#### **4.2.5. Process for review and adaptation**

The National Co-ordinators/Focal Points meet at least once every two years (usually halfway between one Ordinary Meeting of the Contracting Parties and the next) to review progress. A Contracting Party has to advise MEDU if it decides to modify its national monitoring programme in some manner. The alterations to the programme have to be concretised through a renegotiation of the terms of the agreement between the State authorities and MEDU that formalises the conditions governing the monitoring activity.

MEDU is responsible for the actual preparation of the budgets and work programmes of MED POL/MAP. These are then submitted to the Contracting Parties at their Ordinary Meetings for approval/adoption. Each budget and work-programme covers the biennium between two consecutive Meetings. Before being presented to the Contracting Parties, the budgets and work-programmes may be discussed and revised by ad hoc technical bodies.

Every two years, the general progress of the Action Plan is reviewed by the Contracting Parties during their Ordinary Meetings. Among other things, these Meetings serve to adapt the overall objectives, work programmes and budgets of MED POL/MAP to new realities. All changes must be formally approved by the Contracting Parties before they can be implemented.

#### 4.2.6. Parameters

The parameters monitored in the MED POL Programme are explicitly indicated in the Protocols and related Annexes of the Barcelona Convention. Priority is given to the substances listed in Annex I (the Black List) and Annex II (the Grey List) of the Land-based Sources Protocol.

MED POL parameters are grouped fundamentally into two main categories (Table 8):

- Category I (mandatory parameters);
- Category II (conditional parameters).

The monitoring of parameters belonging to Category I is obligatory. Category II, on the other hand, comprises additional parameters which can be included in individual national monitoring schemes when necessary and/or appropriate.

**Table 8**

<p><b>MED POL: examples of Category I monitoring parameters.</b></p> <ul style="list-style-type: none"><li>– Total mercury in organisms and sediments.</li><li>– Organic mercury in organisms.</li><li>– Cadmium in organisms and sediments.</li><li>– High molecular weight halogenated hydrocarbons in organisms and sediments.</li><li>– Faecal coliforms in recreational waters and bivalves.</li></ul> <p><b>MED POL: examples of Category II monitoring parameters.</b></p> <ul style="list-style-type: none"><li>– Basic oceanographic and meteorological parameters (wind, temperature, salinity, oxygen, chlorophyll, etc.).</li><li>– Floating tar balls and tar balls on beaches.</li><li>– Total Arsenic in organisms.</li><li>– Radionuclides in organisms.</li><li>– Pathogenic micro-organisms.</li><li>– Polynuclear Aromatic Hydrocarbons (PAHs) in organisms.</li></ul>
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#### 4.2.7. Operational features

The Barcelona Convention places a legal obligation on the Contracting Parties to monitor marine pollution in the Mediterranean region, according to art. 10 of the Convention, art. 4 of the Emergency Protocol and art. 8 of the Land-based Sources Protocol. Each Party is responsible for implementing a national monitoring programme along the lines that were formulated at Cannes in 1981 and subsequently amended in 1987. The national programmes, operating concurrently constitute the monitoring component of the MED POL Programme.

The particulars of the individual monitoring programmes are negotiated between the authorities of the different States and MEDU. The programmes are governed by agreements that are binding to a greater or a lesser degree, depending on whether the States have received funding for their monitoring schemes from the Unit. These agreements are formalised in documents which define the responsibilities of the parties involved, including those of the National Co-ordinators, and set down clearly the details of the work programmes such as the location of sampling stations, parameters, matrices, frequency of measurements, methods used, laboratories responsible for the analysis of samples, and the quality assurance and management of data. The State which undertakes a monitoring programme is committed to sending data regularly on a yearly basis to MEDU. Generally, a programme is not renewed if data are not submitted. The overall co-ordination for the monitoring component of the MED POL Programme is provided by MEDU.

The actual monitoring is carried out by national institutes and/or laboratories. The activities of the institutes/laboratories in each country are co-ordinated by a National Co-ordinator/Focal Point officially designated by the Contracting Parties.

#### **4.2.8. Minimum Performance criteria**

Target minimum performance criteria for chemical measurements are based on the recommendations of the Marine Environmental Studies Laboratory of the IAEA (IAEA-MEL/MESL) in Monaco, which implements a Quality Assurance/Quality Control (QA/QC) programme within the framework of MED POL/MAP. The IAEA-MEL/MESL has prepared guidelines for sampling, analysis and the QA/QC of chemical data. Standard reference methods have been adopted wherever possible. When standard methods are not available, techniques (for example, remote-sensing) have been indicated only after testing their ability to produce comparable data of satisfactory quality. Intercalibration exercises with standard samples are organised at regular intervals and the use of Certified Reference Materials (CRMs), Standard Reference Materials (SRMs) and Laboratory Reference Materials (LRMs) is encouraged. The IAEA-MEL/MESL helps individual institutes/laboratories to set up and maintain continuous internal QA/QC schemes. When requested, it also provides institutes/laboratories with technical assistance, in the form of visits by experts, to repair and upgrade analytical equipment. A similar QA/QC programme also exists for microbiological measurements in sea water and shellfish. This programme is implemented by WHO from its Project Office within MEDU in Athens.

#### **4.2.9. Reporting**

Generally, paper formats and/or magnetic media (floppy discs, etc.) are used for submitting data. The participating institutes/laboratories report to MEDU either directly, or through the National Co-ordinators/Focal Points or other specifically indicated international organisations. MEDU is responsible for the routine analysis, validation and management of data in the MED POL Programme.

#### **4.2.10. Communication among members**

At the decision-making level, the members communicate with each other during the Ordinary Meetings of the Contracting Parties. At lower levels, meetings of the National Co-ordinators/Focal Points and ad hoc technical committees offer opportunities for sharing information. The various conferences, workshops, seminars, study tours, etc., organised within the framework of MED POL/MAP also facilitate information interchange. The principal nodes of the communication network are constituted by the National Co-ordinators/Focal Points and MEDU.

#### **4.2.11. Support and assistance to member countries**

MED POL/MAP provides an institutional infrastructure for scientific and technical capacity-building in the Mediterranean basin. It promotes and enhances the exchange of information, expertise and experience between participating countries through conferences, workshops, seminars, study tours, fellowships, training courses, grants for attending meetings, etc. In addition, it furnishes needy national institutes/laboratories with a limited amount of funds for buying equipment.

### **4.3. Results**

#### **4.3.1. Available database**

The available MED POL marine pollution database is chiefly constituted by data on:

- halogenated hydrocarbons in biota sediments and suspended matter;



- heavy metals in biota sediments and suspended matter;
- microbial indicators of bathing water quality.

The data are generally in the form of tables, graphic charts and/or maps.

#### **4.3.2. Available documentation**

- The Mediterranean Action Plan Technical Reports Series.
- Methodological frameworks and guidelines.
- Environmental and Socio-Economic databases.
- Proceedings of conferences, seminars, workshops, etc.
- Reports of Meetings.
- Reports on Mediterranean Scenarios.
- Case studies.
- Training material.
- Catalogues.
- Brochures.
- MEDWAVES (the MAP information bulletin).
- Miscellaneous occasional publications.

### **4.4. Discussion**

#### **4.4.1. Problems**

Built around a simple idea, namely to save the Mediterranean Sea, MAP, given its scale and scope, is an undertaking facing many challenges such as dealing with the more advanced Northern Mediterranean countries and the developing countries of the south with a successful output. The obvious clash of development priorities represents a serious obstacle to concrete environmental action in the region. MAP acknowledges multinational political acceptance of common goals as a prerequisite for dealing effectively with environmental issues and, via the Barcelona Convention, supplies the necessary framework for formalising such co-operation in the Mediterranean basin. Emphasising consensual decision-making and cohesive policy implementation at the regional level, it permits developing nations to participate on an equal footing with their more advanced neighbours.

The Action Plan establishes an institutional infrastructure which guarantees, at least formally, the multidisciplinary, holistic approach that is essential for formulating sound environmental policy. The infrastructure can boast of a valuable asset, the MEDU, which handles the routine co-ordination of the Plan in an exemplary fashion. The MAP facilitates collaboration between scientists and politicians, assuring sensible measures of intervention; for example, the development of common pollution control measures (Table 9). It concretises the roles of marine monitoring and periodic environmental assessments in the integrated management of Mediterranean marine and coastal resources. The Plan develops guidelines and uniform reference methods for sampling, analysis and the quality assurance/quality control of data, an important achievement in a region marked by strong contrasts in scientific and technical capabilities. In addition, it gives impetus to the initiatives of individual States in setting up and implementing national monitoring programmes. The MAP provides the Mediterranean States with a convenient platform for voicing concerns and resolving disputes. It also constitutes a very efficient mechanism for scientific and technical capacity-building in the Mediterranean basin (section 2.2.11 of this report).

**TABLE 9**

**Common pollution control measures adopted by Mediterranean countries.**

- Interim Environmental Quality Criteria for Bathing Waters (1985).
- Interim Environmental Quality Criteria for Mercury (1985).
- Measures to Prevent Mercury Pollution (1987).
- Environmental Quality Criteria for Shellfish Waters (1987).
- Measures for Control of Pollution by Used Lubricating Oils (1989).
- Measures for Control of Pollution by Cadmium and Cadmium Compounds (1989).
- Measures for Control of Pollution by Organotin Compounds (1989).
- Measures for Control of Pollution by Organohalogen Compounds (1989).
- Measures for Control of Pollution by Organophosphorus Compounds (1991).
- Measures for Control of Pollution by Persistent Synthetic Materials (1991).
- Measures for Control of Pollution by Radioactive Pollution (1991).
- Measures for Control of Pollution by Pathogenic Microorganisms (1991).
- Measures for Control of Pollution by Carcinogenic, Teratogenic and Mutagenic Substances (1993).
- Measures for Control of Pollution by Copper and Zinc (1996).

As with other similar activities, MAP suffers from its share of weaknesses. Its objectives have not been defined with sufficient clarity and this has impeded, to some extent, the efforts of the participants to meet the overall goals of the Plan. Furthermore, in many cases, the institutional bodies created to aid MEDU did not function as planned. For example, in the first two phases of MED POL, many National Co-ordinators/Focal Points did not provide the national co-ordination expected of them. The quality and comparability of submitted data are serious problems in spite of the attention devoted to these topics (section 2.2.8 of this report) - sometimes, laboratories do not follow established guidelines and standard procedures. Undue interference in scientific decisions is another hindrance. The selection/funding of research projects is not always based on purely scientific considerations.

Preparing global environmental assessments for the Mediterranean Sea is still a major task because of limited/insufficient data and/or uneven/inadequate geographical coverage. Measurements on biological effects of pollutants were not included until recently. Proper baselines have yet to be established for various parameters, and it is hard to distinguish natural variations from anthropogenic ones. In addition, despite formal agreements, the national monitoring programmes in MED POL/MAP are often not fully implemented. There is also need for greater collaboration between developed and developing countries. Finally, the slow progress of the normative component of the MAP demonstrates a certain inflexibility on the part of the countries involved in responding to rapidly changing environmental realities.

**4.4.2. Lessons learned by MAP**

A number of important lessons can be learned from the MAP (Table 10). Generally, the lessons resemble those imparted by other similar undertakings such as the North Sea Task Force (NSTF), the Baltic Monitoring Programme of the Helsinki Commission (BMP/HELCOM), and the Joint Monitoring Programme of the Oslo and Paris Commissions (JMP/OSPARCOM).

**Table 11**

**Lessons learned from the Mediterranean Action Plan.**

- Regional multinational co-operation is essential when tackling environmental problems. Such an approach exploits the natural inclination of governments/populations to identify with issues when national interests are involved.
- Conflicts of interest are unavoidable in international undertakings, and this possibility must be factored into the planning of such schemes of co-operation.

- Policy and management measures must be implemented coherently on the basis of reliable ecological impact predictions, after taking into account their technological and economic feasibility.
- Research and monitoring objectives must be identified separately. This reduces duplication of effort and optimises the utilisation of available resources.
- The research component, which must be results-oriented, should complement the monitoring activity and vice versa.
- The purposes of monitoring must be clearly defined, preferably in terms of specific questions to be answered.
- The monitoring programme must be amenable to assessment by a predetermined method. This ensures that the information generated meets the requirements of the declared objectives.
- The set of parameters to be monitored must be established on the basis of general consensus to avoid unnecessary delays and recriminations. The choice of determinants and sampling locations should depend on the objectives of the monitoring activity, and the nature of the phenomenon/process/effect under consideration.
- The Quality Assurance/Quality Control of data must be accorded high priority.
- Sampling, analysis, quality assurance and reporting protocols must be concorded between the participants well in advance of the initiation of the monitoring activity.
- For assessing pollution, trend/compliance monitoring must be closely co-ordinated with point/diffuse source monitoring.
- It is essential that unambiguous baselines are established in order to monitor for trends.
- Periodic independent evaluations of activities are useful to identify and deal with programmatic bottlenecks which may have escaped internal review procedures.

#### **4.4.3. *Impending and future developments***

The third phase of the MED POL Programme, MED POL - Phase III, began in 1996 and is scheduled to end in 2005. In this phase, a more integrated approach will be adopted in keeping with the new global strategy towards sustainable development, and the Programme will be brought closer to the other components of the MAP, in particular, to the Land based Sources Protocol and the more recent Coastal Areas Management Programme.

MED POL - Phase III has been designed to serve the Contracting Parties to the Barcelona Convention as their long-term programme for the assessment, prevention, mitigation and control of pollution. As such, it will be responsible for:

- i) assessing all (point and diffuse) sources of pollution, the load of pollution reaching the Mediterranean Sea, and the magnitude of the problems caused by the impact of pollutants on living and non-living resources, including human health, as well as on amenities and uses of the marine and coastal regions.
- ii) formulating and implementing measures for prevention and control of pollution, and measures for mitigation of impacts caused by pollution (with priority given to measures for the restoration of systems already damaged by pollution).
- iii) monitoring the effectiveness of the implementation of the pollution prevention, mitigation and control measures adopted.
- iv) assessing the trends in the quality of the marine and coastal environment attributable to pollution in particular, and acting as an early warning system for potential environmental problems caused by pollution.

Phase III of MED POL will be implemented via a series of interdependent and organically linked activities grouped into three main programme elements (Appendix I):

- the assessment of pollution-related problems;
- pollution control and management;
- supporting measures.

## 5. GENERAL CONCLUSIONS

The main goals of the European Environment Agency (EEA) are:

- to produce objective, reliable and comparable information for those concerned with framing, implementing and further developing European environmental policy, and for the wider European public;
- to give support to the European Commission, Council, Parliament and Member States in identifying, preparing and evaluating suitable environmental measures, guidelines and legislation;
- to co-ordinate the European Environment Information and Observation Network (EIONET) and publish a report on the state of Europe's environment every three years.

Additionally, EEA has to liaise with other relevant national, regional and global environmental programmes and institutions.

The similarity between these goals and those of OSPARCOM, HELCOM and MAP is remarkable. However, if the roles played by these bodies and EEA are considered in the context of their regional settings, a striking difference emerges. EEA is intended mainly as a central clearing-house for policy relevant information relating to the environment in the EEA and PHARE countries at the service of the general public, the EU Institutions, and those charged with framing and implementing European environmental policies. Unlike the Action Plans of the Conventions, which are action-oriented and operate in specific areas, EEA is chiefly engaged in managing data and supplying assessment and information for the full EU and European area in response to specific demands.

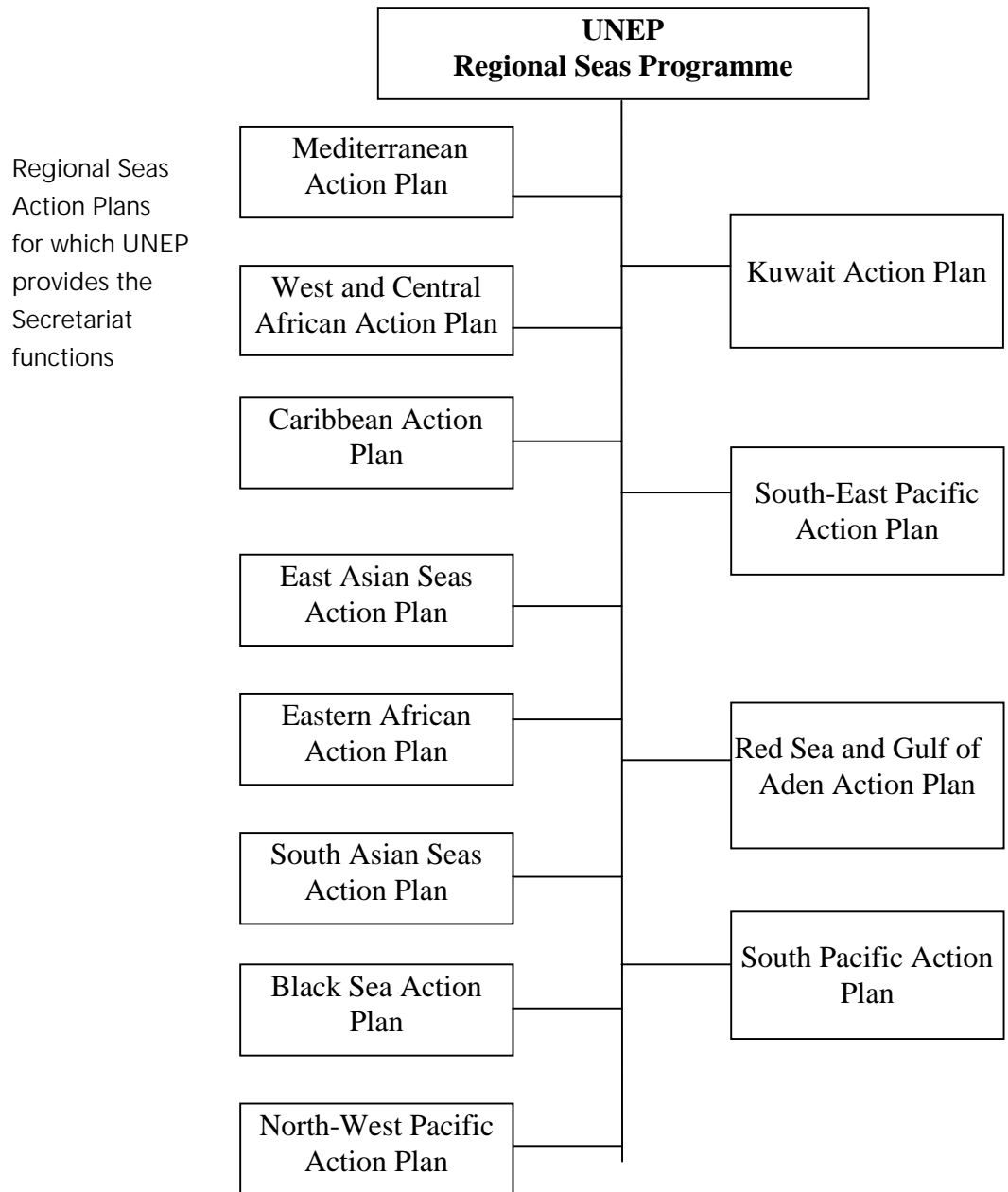
The Regional Commissions and Action Plans could offer EEA a ready-made pool of reliable information and expertise on the marine/coastal environment. Their strength is the good (but sometimes heavy) organisation, their participation in different committees and the good science that they could provide. The access to this information could be facilitated by the fact that the European Community itself is a Contracting Party to the Regional Conventions and EEA has observer status. Reality however, shows that sometimes European environmental assessment is difficult, since the information collected by the Regional Conventions is not always comparable. In addition their different and, sometimes, long cycle of data gathering and reporting, their bureaucracy and sometimes their complexity together with the different strategies of the monitoring programmes make the comparisons even more difficult. EEA could start merging the approaches and try to have the goal of comparable information from the European Regional Seas, the first step being the harmonisation of reporting among the Member States. The Regional Commissions could also provide EEA with a well-organised network for gathering and managing environmental information that can supplement the EIONET initiative. In addition, the periodic reports of the Commissions on the state of the marine and coastal environment can be of considerable use to the EEA in preparing its reports on the state of the European environment. Harmonisation and synchronisation of environmental assessments within EEA area will further add value to the work of both the Conventions and EEA.

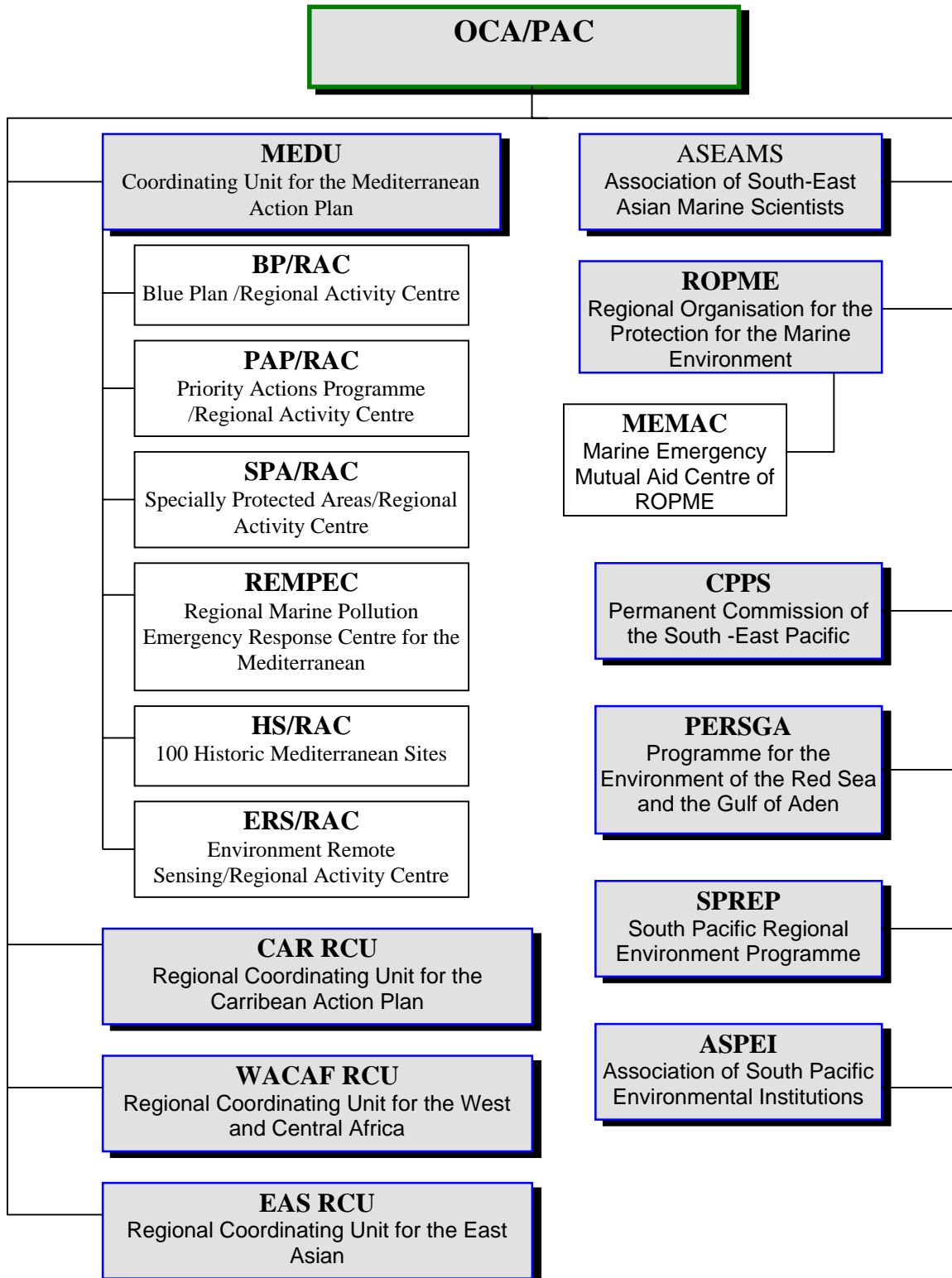
With regard to the Mediterranean Action Plan, it is important to highlight that any information produced will be determined by the needs of the Action Plan, and may not necessarily lend itself readily to the purposes of EEA in its original form/context. The European Topic Centre for Marine and Coastal Environment (ETC/MCE) can bridge this potential difficulty by serving as a conduit for this information, tailoring it as and when called for to meet the requirements of the Agency.

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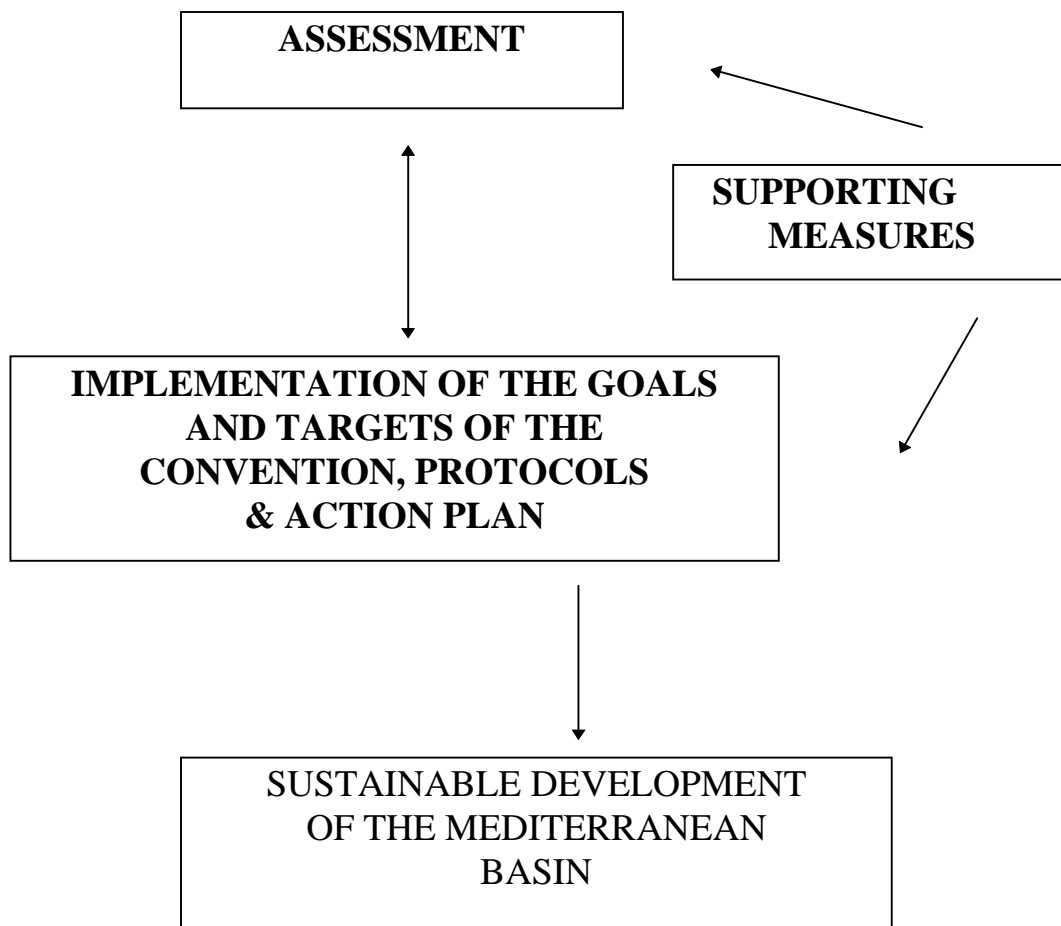
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## 7. APPENDIX I





Organisations and organisational units co-ordinating or associated with co-ordination of the Regional Seas Programme of the United Nations Environment Programme (adapted from *Directory of organisations and organisational units co-ordinating or contributing to the co-ordination of the action plans related to the Regional Seas Programme, Rev. 6, UNEP, 1993*).



Relationship of MED POL - Phase III to the goals of the Mediterranean Action Plan emphasises the feedback between assessment and pollution control (from *UNEP: MED POL - Phase III, Programme for the assessment and control of pollution in the Mediterranean region, 1996-2005, UNEP, 1995*).