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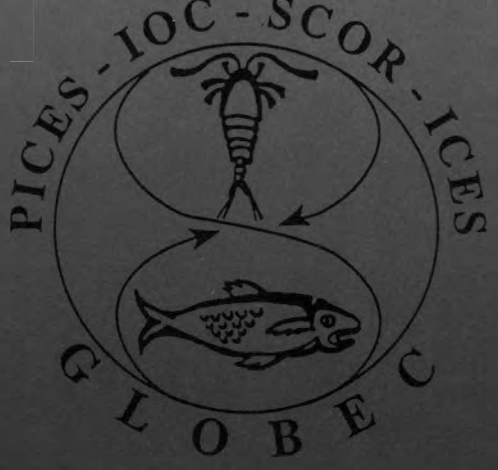
INTERNATIONAL COUNCIL OF SCIENTIFIC UNIONS
SCIENTIFIC COMMITTEE ON OCEANIC RESEARCH

OSLO and Paris Commissions

1995

THE JOINT ASSESSMENT AND MONITORING PROGRAMME

communicated by
G. PICHOT



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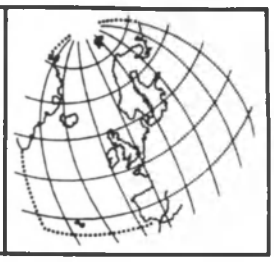

The Joint Assessment and Monitoring Programme

Contents

Preface

At the joint meeting of the Oslo and Paris Commissions, held in Karlskrona (Sweden) 13-17 June 1994, the Commissions agreed to develop a new joint monitoring programme for the maritime area of the Oslo and Paris Conventions, to update and take over from the Joint Monitoring Programme of the Oslo and Paris Commissions and the Monitoring Master Plan of the North Sea Task Force. The Commissions also agreed to work towards a quality assessment of the whole maritime area by the year 2000 by preparing a Quality Status Report 2000 (the 'QSR 2000'). The QSR 2000 will synthesise the information contained in five regional Quality Status Reports (QSRs); to be prepared for 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). The new joint monitoring programme, the 'Joint Assessment and Monitoring Programme (JAMP)', adopted by the Commissions at their joint meeting held in Brussels (Belgium) 26-30 June 1995, will form the basis of the regional QSRs and the QSR 2000.

This publication outlines the strategy for the implementation of the JAMP and lists the issues to be taken into account in the development and implementation of the JAMP.

At their meeting held in Brussels 26-30 June 1995, the Commissions also adopted Joint OSCOM and PARCOM Recommendation 95/1 on the Joint Assessment and Monitoring Programme which states that 'the Joint Assessment and Monitoring Programme should be implemented; this implementation implies provision by each Contracting Party of an appropriate level of resources to achieve the common intention'. The Recommendation also states that 'progress in the implementation of this Recommendation should be reported to the appropriate working groups of the Commissions on an annual basis'.

Guidance on the implementation of the JAMP in 1995 was published by the Oslo and Paris Commissions in September 1995[1]. The report on the implementation of JAMP will be updated and published by the Oslo and Paris Commissions on an annual basis.

[1] Implementation of the Joint Assessment and Monitoring Programme. London 1995. ISBN 0 946955 42 5

SECTION I

1. Strategy for a Joint Assessment and Monitoring Programme

1.1 Introduction

Assessments of the quality of the marine environment and related monitoring are important aspects of the new Convention for the Protection of the Marine Environment of the North-East Atlantic (the "OSPAR Convention"). This publication describes the proposed strategy to fulfil the monitoring and assessment requirements of the OSPAR Convention.

The main aim of the 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 and in particular with reference to the sustainable development of the oceans, seas and coastal environment in Agenda 21.

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

a. 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

b. 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.

At the 1992 Ministerial meeting of the Oslo and Paris Commissions, Ministers agreed to establish a programme for a quality assessment of the North-east Atlantic. The Commissions committed themselves to work towards a quality assessment of the whole maritime area by the year 2000 (cf. Figure 1 and Section 1.6 for a description of the maritime area and its sub-regions).

An outline of the strategy required to produce such an assessment is given in Figure 2. As part of this strategy the Oslo and Paris Commissions have established 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. ASMO will work in close collaboration with PRAM. ASMO will also need to take into account other topics such as those identified by other regional activities.

1.2 Assessment plan

An assessment of the quality of the maritime area or subregions thereof is defined as:

> "... a statement of the whole or part of the current knowledge of the health of the environment of a defined maritime area and its coastal margin. A complete statement includes an analysis of the region's hydrodynamics, chemistry, habitats and biota with an evaluation of man's impact over space and time against this background of natural variability. All aspects of man's influence on the area should be examined including inputs, concentrations and effects of contaminants, nutrients and radioactivity, dumping, transport, and the exploitation of biological and non-biological resources."

The purpose of an assessment is to provide both managers and scientists with:

- a concise summary of contemporary knowledge and current management;
- an identification of significant gaps in knowledge which can provide an authoritative basis for defining priorities for further scientific and other investigations; and
- a basis for judging the effectiveness and adequacy of environmental protection measures and for making any necessary adjustments.

In view of the objectives of the OSPAR Convention, its focus should be on the assessment of:

- whether and where contamination occurs;
- whether and where other adverse effects of human activities occur;
- whether human health is safeguarded;
- whether marine ecosystems are conserved;
- the effectiveness of the measures taken or planned for the protection off the marine environment; and
- priorities for action.

In summary, a marine environmental assessment, is a process by which information is collected and evaluated and which is undertaken periodically to estimate the state of knowledge. Its product is an assessment report which is a document synthesising information, presenting the findings of the assessment and making recommendations for action for future work. Section 1.4 provides further information on the scope and content of an assessment.

In 1994 the Oslo and Paris Commissions agreed to divide the Northeast Atlantic into five regions (cf. Figure 1 and Section 1.6):

- Region I (Arctic Waters)
- Region II (Greater North Sea)
- Region III (The Celtic Seas)
- Region IV (Bay of Biscay and Iberian Coast)
- Region V (Wider Atlantic)

An assessment will be undertaken for each of these regions. All 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 in knowledge. Throughout this process, the public will be kept informed and will have access to the final assessment report.

1.3 Scientific programme

The assessment of the quality of the marine environment may require monitoring, research and the development of assessment tools (modelling, criteria etc.). Before any programme is designed the issues which are to be addressed must be clearly identified. In this respect a programme should be designed on the basis of specific questions and testable hypotheses.

Based on the nature of the question or hypothesis and on the information already available, it can be determined which monitoring, research and assessment criteria or combination thereof are required.

Monitoring

The OSPAR Convention (Annex IV, Article 1) defines monitoring as the repeated measurement of:

a. the quality of the marine environment and each of its compartments, i.e. water, sediments and biota;

b. activities or natural and anthropogenic inputs which may affect the quality of the marine environment; and

c. the effects of such activities and inputs.

For the purpose of the assessment, monitoring for spatial patterns and temporal trends is carried out to determine and describe aspects of the quality of the marine environment. In particular, they will determine whether policy decisions are being reflected in improvements in environmental conditions; they will identify adverse impacts upon the maritime area and therefore indicate the need and scope for remedial measures. To be able to contribute effectively to the assessment process, monitoring can be expressed as follows:

a. to describe the spatial distribution of a range of physical, chemical, biological and other parameters (including demography, inputs, specific activities);

b. to determine temporal trends, either as a means of assessing the effectiveness of policy measures, or to assess, by the use of suitable indicators, changes and variability in the quality of the marine environment; and

c. to establish relations between anthropogenic activities and observed spatial and temporal trends in the marine environment.

On the basis of the questions and hypotheses identified the monitoring programme will be clearly defined in all its aspects, in which choice of matrix and sampling locations are of major importance. Of course, effects on living organisms are a prime aspect of the quality of the marine environment. This stresses the need for inclusion of biological monitoring (abundance and diversity studies, responses in animals within natural ecosystems and bioassays). In the definition of the programme the required covariables or normalisation parameters to reduce confounding variability also need specification.

It is necessary to know, from the outset of the programme, how the monitoring results will be assessed. This means that assessment criteria and procedures (statistics, who, when, form of product, result) need to be defined beforehand since these are fundamental to the design of the programme.

However well the programme is defined, if the quality of the information gathered is insufficient, the total exercise is useless. Therefore, when planning monitoring, careful attention must be paid to ensuring proper quality assurance. In this context, the Oslo and Paris Commissions adopted in 1990 a quality assurance policy, as at Section 1.5. 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 intercomparisons where necessary, but also to the sampling and assessment procedures, which should have a sound 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.

Research

Other information may be required that does not fall into the category of a monitoring programme. Examples of this type of information would be the development of methodologies, cause-effect relationships, or an understanding of the basic physical, chemical and biological processes which contribute to the variability in monitoring data. Such topics may be investigated on the basis of specifically designed research projects.

To be able to incorporate research results effectively into the assessment process, research activities should cover at least the following main items (in addition to monitoring activities and assessment tools):

a. basic processes (biology, physics and chemistry) of the marine environment at different scales;

b. long-term changes and their causes; and

c. cause-effect relationships.

Based on the various issues of the five regions a common research programme has to be designed with clearly identified objectives and testable hypotheses. It will be necessary to develop common methodologies and ways to use results in the assessment process, in combination with monitoring and modelling activities/results.

Assessment tools

Effective tools are indispensable for assessing the significance of monitoring and research results with regard to the quality of the marine environment. Assessment criteria for monitoring data are one such tool. These criteria can be based on several approaches such as comparisons with background values or ecotoxicological assessment criteria. An understanding of the ecotoxicology of compounds is essential for establishing ecotoxicological assessment criteria. Assessment criteria for biological data, such as results from biological effects measurements or abundance and diversity data, can be based on a comparison of such results with, for example, Ecological Quality Objectives (EcoQOs). Other tools which are important are mathematical models and statistical techniques. Models are used to synthesise information from monitoring data, to make forecasts as a basis for counter measures and to make informative presentations of environmental data. From the environmental administrations' point of view, models should be developed with the following aims:

a. to provide an integrated picture of the environmental status of the different parts of the maritime area, combining information on e.g. concentrations, inputs, transport and biological processes and variability;

b. to provide a tool for planning and decisions;

c. to provide a basis for an improved description of causal connections; and

d. to provide a basis for the optimisation of monitoring systems.

The use of numerical models in conjunction with measured data constitutes a powerful tool which generates interpolated data in time and space. However, it should be realised that in applying

numerical models to simulate currents and mixing conditions in the sea, it is important to use a model that reflects the major physical forcing functions of the system and which is properly verified and validated. In order to validate a model, there is a need for long-term series of data on physical and chemical variables.

1.4 Scope and Content of a Regional Assessment and the Convention-wide Assessment

The following text shows what should be included in each section of a regional assessment and the Convention-wide assessment.

- **Executive summary**

- **Introduction**

  The goal and function of the assessment should be set out within the context of the work and the objectives of the Commissions.

- **Geography and scope**

  The geographical boundaries and scope (i.e. the environmental features and anthropogenic activities to be covered) of the assessment must be clearly defined at the beginning of the report. The definition of boundaries should cover the landward limits of the assessment, including its extension into rivers and catchment areas, as well as marine boundaries.

  The environmental features to be addressed should encompass the major components of the sea (i.e. seawater, sediments and biota) but might also include the overlying atmosphere and geological features beneath the surficial sediments and around the coasts.

- **Human activities**

  The first part of this section should summarise demographic data and trends in anthropogenic activities throughout the region. These could include the extent of urban and rural communities at the coast or dependent on the coast.

  Ideally, all anthropogenic activities within the coastal zone as well as its catchment, that have the potential to damage or modify the marine environment, should be identified. However, special attention should be given to practices that, due to their nature and scale, pose the greatest potential threats. It is therefore desirable to document activities such as port development, waste dumping and navigational dredging, industrial and domestic waste disposal, coastal construction (e.g. reclamation, causeways), tourism and recreational developments, shipping, forestry, fishing, aquaculture, agriculture (particularly agrochemical use), mineral exploration and exploitation and power generation.

- **Hydrography and climate**

  The first part of this section should summarise the water exchange and circulation and their temporal variability (e.g. seasonal) at both local and regional levels. Hydrographic and climatic (e.g. wind action, storm events) information should be used to estimate water movement across the geographical boundaries of the area (i.e. river discharges, transport to offshore areas and exchanges across marine boundaries) and to assess potential contaminant

dispersion. For completeness, a quantitative description of the precipitation-evaporation balance might also be included.

The second part of this section should contain an assessment of the movement and fate of particulate material within the system through mechanisms such as water circulation, river discharge, coastal erosion, sedimentation and sediment resuspension.

The third part of this section should contain a summary of specific anthropogenic activities that directly or indirectly have the potential for modifying the movement of water and particulate materials such as the construction of barrages, coastal engineering, dredging, urban development and deforestation. The potential for effects associated with climate change should also be considered.

- **Chemistry**

The main structure of this section should reflect the major categories within the JAMP matrix (cf. Section II):

- inorganic contaminants;
- organic contaminants;
- radionuclides;
- nutrients and oxygen;
- litter.

For each category the following topics should be covered:

inputs

This subsection should provide information on the inputs to the marine environment from both natural and anthropogenic sources, including atmospheric inputs. This should include information on the quantities and forms (i.e. dissolved/suspended) of individual substances as well as on trends and variability of inputs.

concentrations

This subsection should contain data on the spatial distribution and temporal trends in concentration of substances in appropriate matrices, e.g. dissolved and particulate forms of the substances in the water column, in relevant grain-size fractions of sediments, in appropriate tissues of edible marine organisms and in various trophic levels of the marine foodweb. Attention should be paid to the anthropogenic influence on the observed concentrations.

processes

This subsection should outline information on the transport, cycling and fate of the substances, and on the influence of anthropogenic activities upon these processes. This should be discussed within the context of the physical oceanographic features described in the preceding section of the document. This information should then be used to summarise contemporary understanding of the biogeochemical processes that determine the fate and pathways of natural / artificial substances introduced to the area.

assessment of human impact

The final subsection should relate the specific inputs of substances, and/or the influence of particular anthropogenic activities (e.g. dredging), to the effects observed on the marine

environment and on dependent life forms (e.g. the effects of oil on seabirds). Changes in the chemical characteristics should also be assessed in relation to (eco)toxicological information (assessment criteria, results from bioassays, human health standards) and background values.

- **Biology**

The first part of this section should provide an inventory of the biology of the area describing the major subsystems of the ecosystem (e.g. habitats and associated communities / key species).

In the second part of this section a description, focused on anthropogenic impacts, should be given for each major subsystem taking into account:

habitats

Spatial extent, sensitivity, variation and modification of particular habitats should be described as well as the degree and causes of observed natural or anthropogenic-influenced perturbations. These may have occurred in response to a particular activity (such as fishing techniques or coastal and inshore development) and may be manifested as the destruction of habitats (reefs or intertidal flats) or may be an indirect consequence of alterations to natural processes such as water exchange and sedimentation.

key species

This should review the ecology and the spatial and temporal variation in the populations of key species, including exploited marine species (fish, shellfish, seaweed etc.) and the displacement (or similar unusual events) of such key species from particular habitats. This information could be gathered from research as well as anecdotal evidence. In addition, information on the spatial and temporal variation of indicators of the health of organisms should be provided, such as biochemical parameters or the incidence of fish disease. Human health implications or other impacts resulting from the occurrence of particular species (e.g. phytoplankton, bacteria, viruses) or toxins should be evaluated. An attempt should be made to distinguish between natural perturbations and those that might result from anthropogenic activities. Deviations from defined criteria, e.g. EcoQOs, should be assessed.

processes and relationships

The ecology and sensitivity of communities should be described, e.g. in terms of diversity, predator/prey relationships, productivity and interdependencies between physical, chemical and biological characteristics. Spatial variation and temporal change of processes and relationships should be described and anthropogenic influences identified.

- **Overall assessment**

This chapter should identify the major problems and establish the priorities for action. Conclusions and recommendations for action arising from this assessment should be presented clearly and concisely.

The overall assessment should consist of a discussion and an analysis of the findings within the context of environmental management concerns and any agreed environmental goals and quality criteria. It should also address any new or impending problems revealed by the assessment including those that might arise from future development within the area concerned, such as the introduction of new industry and increased use of coastal resources. It should identify deficiencies in the scientific and socio-economic information necessary to

resolve these problems and concerns, and to improve the predictive capability and assessment of risks. The effectiveness of any previous management action taken to protect the marine environment should be evaluated. The need for new management action to address risks to human health and adverse effects on ecosystems and to restore marine areas which have been adversely affected should be specified.

1.5 Quality assurance

In 1990, the Oslo and Paris Commissions adopted the following policy of quality assurance (OSPAR 12/16/1, § 8.12):

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

b. 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;

c. Contracting Parties agree that quality assurance requirements be set for each of these activities;

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

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

1.6 Description of the Regions of the Maritime Area

In 1994 the Oslo and Paris Commissions agreed to divide the North-east Atlantic into the following regions:

Region I: Arctic Waters

The region of the North-East Atlantic covered by AMAP from south of Greenland via Iceland, including the Faroes 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.:

a. southwards of 62°N and eastwards of 5°W, at the north-west side;

b. in the Kattegat, northwards of the line from Hasenore Head (DK) to Gniben Point (DK), from Korshage (DK) to Spodsbjerg (DK) and from Gilbjerg Head (DK) to Kullen (S);

c. 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.

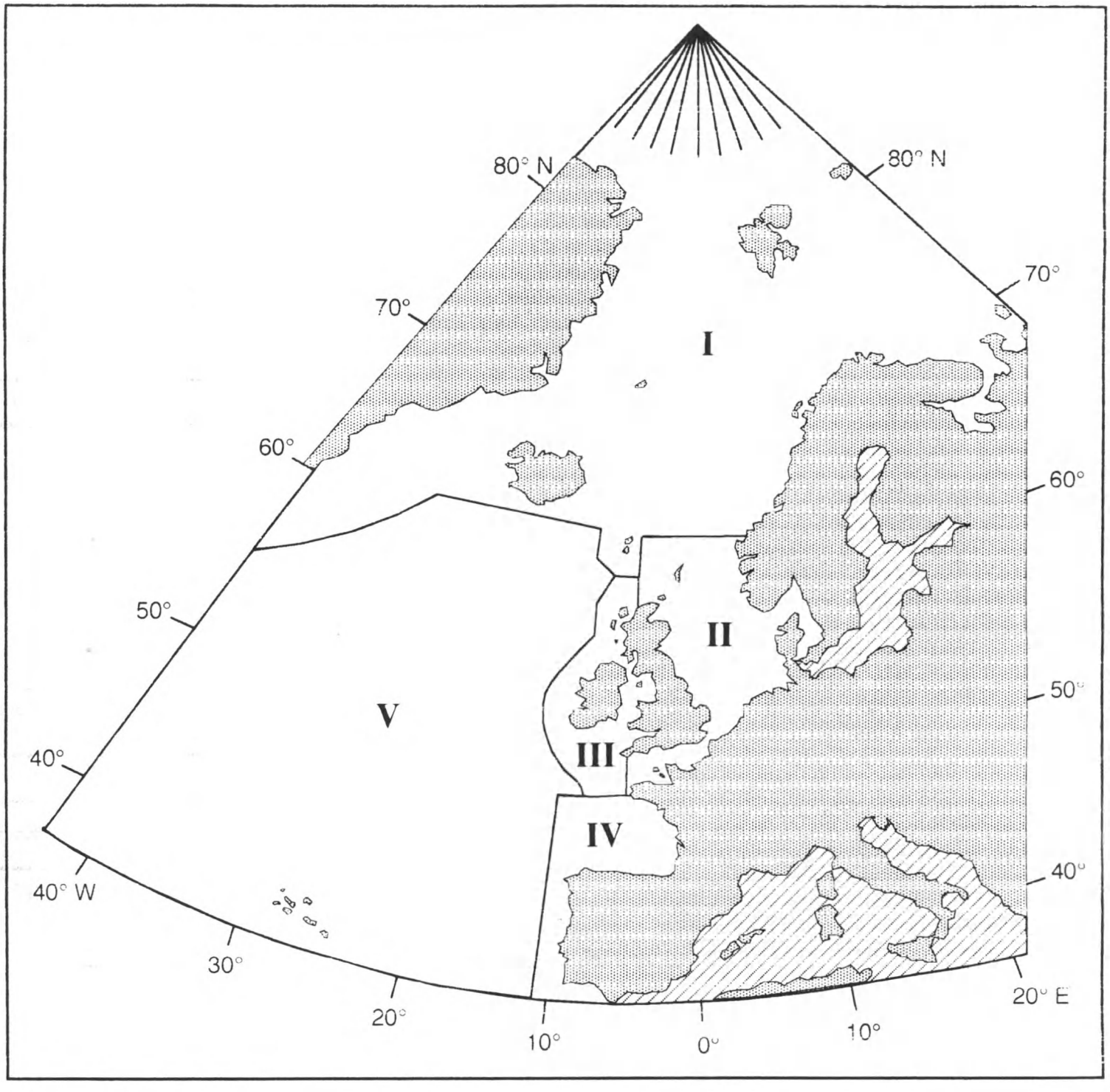

Figure 1: Regions of the maritime area

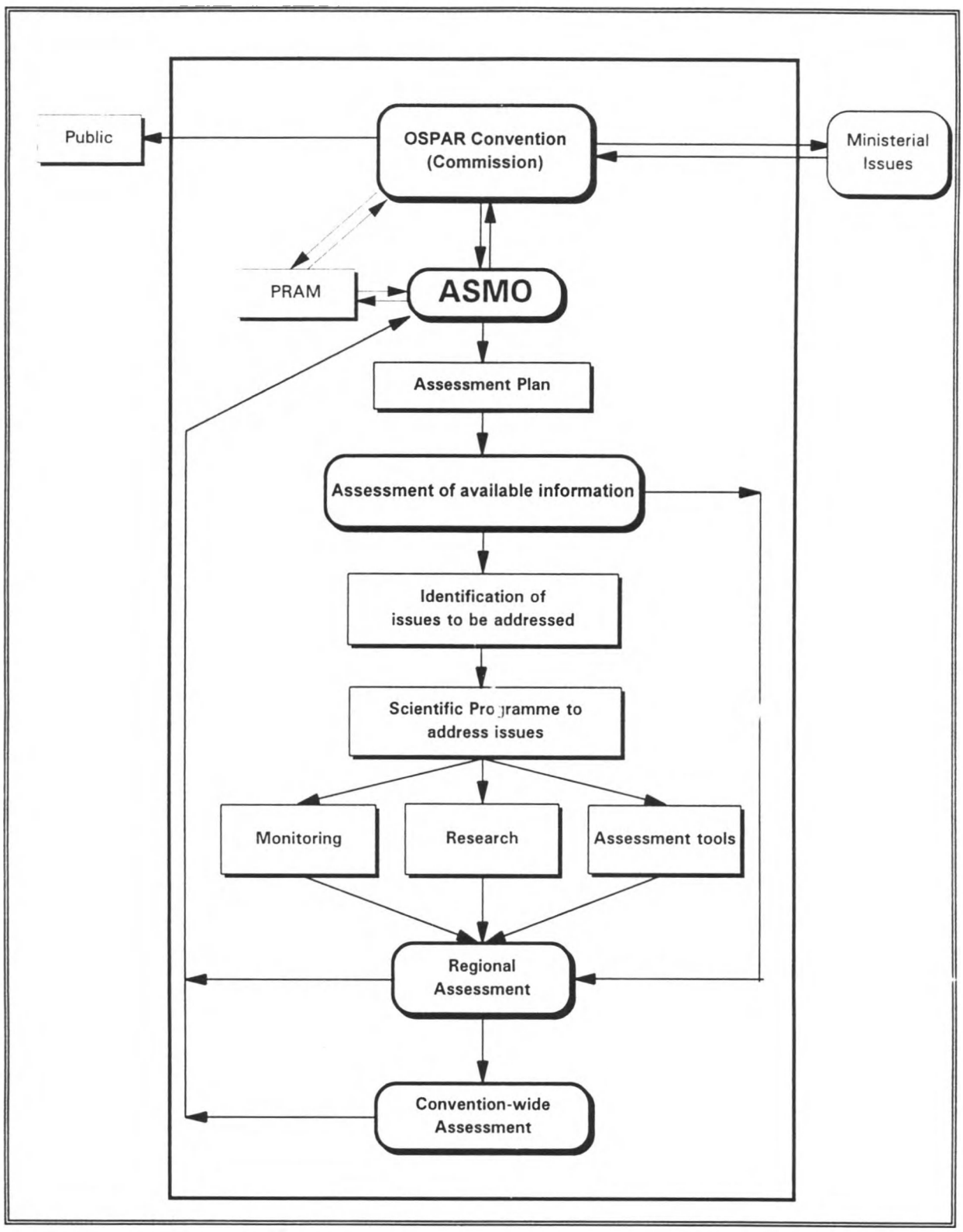

Figure 2: The Strategy for Assessment and Monitoring

SECTION II

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

2.1 Introduction

This section lists those issues which should be taken into account in the development and implementation of the Joint Assessment and Monitoring Programme (JAMP).

Monitoring and assessment procedures to address the issues listed are specified together with guidance on their implementation. For several of the issues actions have been agreed on a Convention-wide basis.

The issues listed should be used as a check-list by the Regional Task Teams (RTTs) for the definition and development of their regional assessments.

The RTTs comprise the following Contracting Parties to the Oslo and Paris Conventions:

Region	Lead country/countries	Participating countries
Region I	Norway	Denmark, Iceland, Norway and Sweden
Region II	Netherlands	Belgium, Denmark, France, Germany, Norway, Netherlands, Sweden and UK
Region III	UK and Ireland	UK and Ireland
Region IV	France and Spain	France, Portugal and Spain
Region V	Portugal and Iceland	Portugal, Iceland and Spain

2.2 Matrix

	Issue	Monitoring and Assessment Procedure	Action by (comments)
1. Contaminants			
Cd, Hg, Pb	1.1 Are agreed measures effective in reducing inputs?	• undertake trend monitoring of atmospheric, riverine and direct inputs and other sources where appropriate.	INPUT
	1.2 What are the concentrations and fluxes in sediments and biota?	• monitor concentrations; • develop background values and assessment criteria; • compare concentrations with ecotoxicological assessment criteria.	SIME
TBT	1.3 To what extent do biological effects occur in the vicinity of major shipping routes, offshore installations, marinas and shipyards?	• 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;[2] • compare concentrations with ecotoxicological assessment criteria.	SIME (contact IMO)
PCBs[3]	1.4 What are the sources and input pathways and how large are the inputs?	• establish and assess sources and input pathways; • improve methods for quantifying inputs.	INPUT (consult DIFF)
	1.5 Are agreed measures effective in reducing inputs?	• undertake temporal trend monitoring of inputs.	INPUT
	1.6 Do high concentrations in marine mammals disturb enzyme systems?	• establish and assess concentrations, and temporal trends in concentration, in marine mammals (particularly with regard to non-ortho and mono-ortho CB's); • establish and apply assessment criteria.	SIME (consult ICES)
	1.7 Do high concentrations pose a risk to the marine ecosystem?	• establish and assess concentrations in fish, mussels, birds and sediments.	SIME
	1.8 Do high concentrations of non-ortho and mono-ortho CB's in seafood pose a risk to human health?	• establish and assess concentrations in fish and shellfish for human consumption.	SIME

[2] Possible repetition of this exercise in the North Sea in due course.
[3] These are as follows: CB 28, CB 52, CB 101, CB 118, CB 138, CB 153 and CB 180.

PAHs[4]	1.9 What are the major sources and how large are the inputs?	• identify sources and input pathways; • monitor and quantify inputs.	INPUT (consult DIFF, SEBA, ICES)
	1.10 What are the concentrations in the maritime area?	• monitor concentrations in sediments, mussels and suspended particulate matter; • establish background concentrations; • compare concentrations with background concentrations; • establish assessment criteria; • compare concentrations with ecotoxicological assessment criteria.	SIME
	1.11 Do PAHs affect fish and shellfish?	• undertake biological effects monitoring.	SIME (consult ICES)
other synthetic organic compounds	1.12 How widespread are synthetic organic compounds within the maritime area?	• establish a selection mechanism for identifying compounds of concern.	SIME (consider DIFFCHEM results and work by EU and OECD)
offshore chemicals	1.13 Which chemicals are discharged and in what quantities?	• identify, quantify and assess inputs.	ASMO (consult SEBA)
	1.14 How and to what extent do the discharges affect marine organisms?	• undertake risk assessments; • undertake biological effects monitoring.	ASMO (consult SEBA)
chlorinated dioxins and dibenzofurans	1.15 What concentrations occur and have the policy goals (for the relevant parts of the maritime area) been met?	• assess existing information on inputs.	INPUT
		• assess existing information on the spatial distribution of chlorinated dioxins and dibenzofurans and the results of measures taken.	SIME (take account of NSCs)
environmental transport and fate of pollutants	1.16 What are the fluxes and environmental pathways? Where do persistent pollutants end up?	• model transport routes; • undertake research.	ASMO
biological effects of pollutants	1.17 Where do pollutants cause deleterious biological effects?	• identify biological effects monitoring techniques for important groups of pollutants; • establish quality assurance procedures; • identify, develop and apply biological effects monitoring criteria and techniques.	SIME (consult ICES)

[4] These are as follows: phenanthrene, anthracene, fluoranthene, pyrene, benzo[*a*]anthracene, chrysene, benzo[*a*]pyrene, benzo[*ghi*]perylene, indeno[*1,2,3-cd*]pyrene.

oil	1.18 What are the inputs and concentrations in the maritime area and what are the effects on benthic communities and seabirds? Are agreed measures (for the shipping and offshore industries) effective?	• identify, quantify and assess river inputs; • identify, quantify and assess other inputs; • improve analytical methods for aromatics.	INPUT (take account of other fora e.g. BONN)
		• establish and assess concentrations; • establish and apply assessment criteria; • assess effects on benthic communities and seabirds.	SIME
	1.19 What are the effects of aromatics discharged with production water?	• establish and assess concentrations in water; • undertake biological effects monitoring; • compare concentrations with toxicity data.	SIME
radionuclides	1.20 What are the sources, inputs and temporal trends?	• assess RAD report.	ASMO (consult RAD and EURATOM)
accidents in the shipping and offshore industries	1.21 What is the risk of accidental losses of oil and other chemicals to the maritime area? What is the risk of their transport to coastal and offshore ecosystems?	• develop and apply models and risk assessment procedures.	ASMO (take account of other fora e.g. IMO, BONN and IOPCF)
2. Eutrophication			
nutrients	2.1 Are agreed measures effective in reducing inputs?	• assess temporal trends in inputs from all sources.	INPUT
phytoplankton	2.2 Where do elevated nutrient concentrations or fluxes from anthropogenic sources cause an increase in the frequency and/or magnitude and/or duration of phytoplankton blooms and a change in species composition?	• define satisfactory monitoring programme.	SIME
		• model nutrient concentrations.	ASMO
eutrophication effects on community structure	2.3 How and to what extent does increased phytoplankton abundance and/or changed phytoplankton species composition and/or the presence of toxic phytoplankton species result in ecological disturbance?	• monitor to detect and assess the occurrence of eutrophication effects; • monitor appropriate community components.	SIME
		• develop foodweb models.	ASMO
3. Litter			
sources and occurrence	3.1 What are the sources, composition and occurrence of litter at the sea surface, on the seabed and along shorelines?	• establish and assess sources, composition, occurrence and quantities of litter; • define common monitoring methodology; • trend monitoring.	IMPACT (take account of MARPOL)
	3.2 Are agreed measures effective?	• assess the effectiveness of measures.	IMPACT (take account of MARPOL)
effects on birds and marine organisms	3.3 What are the effects of ingesting small plastic particles on marine coastal birds and other marine organisms?	• assess information on stomach contents in relation to health.	IMPACT

4. Fisheries			
impact of fisheries on ecosystems	4.1 How and to what extent do fisheries (including industrial fisheries) affect stocks of target and non-target species and benthic communities?	• 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.	IMPACT (take account of work by EU,ICES and national programmes)
5. Mariculture			
Genetic disturbance	5.1 To what extent do cultured fish and shellfish stocks affect the genetic composition of wild stocks?	• establish the genetic composition of wild stocks.	IMPACT (consult ICES)
Transfer of diseases and parasites	5.2 What risks do cultured fish and shellfish stocks pose to wild stocks by possibly introducing diseases?	• monitor diseases and parasites in wild stocks; • undertake risk assessments.	IMPACT (consult ICES)
Chemicals used	5.3 In which areas do pesticides and antibiotics affect marine biota?	• undertake a survey of concentrations/biological effects.	IMPACT (consult ICES)
6. Habitats and Ecosystem Health			
ecosystem health	6.1 How can ecosystem health be assessed in order to determine the extent of human impact?	• develop background concentrations; • develop and apply ecotoxicological assessment criteria.	SIME
		• develop EcoQOs and identify suitable indicator species; • define a biological monitoring programme in relation to EcoQOs.	IMPACT
habitat changes	6.2 What are the areal extents, frequencies and inter-relations between the different types of habitat within the coastal and offshore environment?	• undertake habitat inventories.	IMPACT
	6.3 What are the roles of different habitat types in the ecological functioning and the integrity of marine and coastal ecosystems?	• undertake literature survey.	IMPACT
	6.4 How and to what extent do dredging and sand and gravel extraction affect communities (particularly benthic communities), coastal habitats and spawning areas?	• monitor benthic communities, coastal habitats and spawning areas.	IMPACT (consult ICES)
	6.5 How and to what extent do coastal protection schemes and land reclamation activities affect coastal habitats, communities and species?	• monitor coastal habitats, communities and species.	IMPACT (consult ICES)

Glossary

AMAP	-	Arctic Monitoring and Assessment Programme
ASMO	-	OSPAR Environmental Assessment and Monitoring Committee
BONN	-	Bonn Agreement for Cooperation in Dealing with Pollution of the North Sea by Oil and Other Harmful Substances, 1983
CAMP	-	Comprehensive Atmospheric Monitoring Programme
CORINAIR	-	Inventory of polluting atmospheric emissions into the air in the European Community
DIFF	-	OSPAR Working Group on Diffuse Sources
DIFFCHEM	-	Ex-OSPAR Working Group on Diffuse Sources (replaced by DIFF)
EcoQOs	-	Ecological Quality Objectives
EMEP	-	Cooperative Programme for Monitoring and Evaluation of Long-Range Transmission of Air Pollutants in Europe
EU	-	European Union
EURATOM	-	European Atomic Energy Community
HELCOM	-	Baltic Marine Environment Protection Commission
ICES	-	International Council for the Exploration of the Sea
IOPCF	-	International Oil Pollution Compensation Fund
IMO	-	International Maritime Organization
IMPACT	-	OSPAR Working Group on Impacts on the Marine Environment
INPUT	-	OSPAR Working Group on Inputs to the Marine Environment
JAMP	-	Joint Assessment and Monitoring Programme
MARPOL	-	International Convention for the Prevention of Pollution from Ships
NSCs	-	North Sea Conferences
OECD	-	Organisation for Economic Cooperation and Development
OSPAR Convention	-	Convention for the Protection of the Marine Environment of the North-east Atlantic
POINT	-	OSPAR Working Group on Point Sources
PRAM	-	OSPAR Programmes and Measures Committee
RAD	-	OSPAR Working Group on Radioactive Substances
SEBA	-	OSPAR Working Group on Sea-Based Activities
SIME	-	OSPAR Working Group on Concentrations, Trends and Effects of Substances in the Marine Environment
UN-ECE	-	UN Economic Commission for Europe