

European Topic Centre on Marine and Coastal Environment

Marine and Coastal Environment Annual Topic Update 1997

By G. Izzo, ETC/MCE leader

March 1998

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Cover design: Folkmann Design & Promotion

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Luxembourg: Office for Official Publications of the European Communities, 1998

ISBN 92-9167-100-2

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Printed on recycled and chlorine-free bleached paper

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1. BACKGROUND

1.1 The European Environment Agency

The European Environment Agency (EEA) was launched in 1993 with a mandate, defined by Council Regulation (EEC) No. 1210/90, to ensure the supply of objective, reliable and comprehensive information at European level, enabling the community and its member states to take the requisite measures to protect their environment, to assess the result of such measures and to insure that the public is properly informed about the state of the environment.

The geographical scope of the Agency's work is not confined to Member States of the EU; membership is open to other countries that share the concerns of the EU and member states and the objectives of the Agency. Current membership includes all 15 EU states, as well as Iceland, Liechtenstein and Norway.

The Agency carries out its tasks in co-operation with the European Information and Observation Network (EIONET). EIONET was set up and is co-ordinated by the Agency. EIONET consists of coordinating institutes (national focal points) and expertise centres (national reference centres) in the participating countries as well as European Topic Centres (ETCs). These ETCs work on behalf of EEA with the countries, the European Commission and other partners on specific environmental areas.

The Agency uses the existing capacities in member countries, but also co-operates actively with other bodies and international organisations to build synergy and avoid duplication of efforts.

1.2 The European Topic Centre on Marine and Coastal Environment (ETC/MCE)

The European Topic Centre on Marine and Coastal Environment was established in 1994 with the aim to help the European Environment Agency to carry out its work programme on these issues. This thematic consortium involves six European institutions.

- ENEA (Ente per le Nuove Tecnologie, l' Energia e l' Ambiente), CRAM (Centro Ricerche Ambiente Marino), in La Spezia, Italy (Lead Organisation)
- Laboratório Nacional de Engenharia Civil (LNEC), in Lisbon Portugal (co-leader)
- Institut français de recherche pour l' exploitation de la mer (IFREMER) in Brest and Toulon in France
- Norwegian Institute for Water Research (NIVA), Oslo, Norway
- National Institute for Coastal and Marine Management (RIKZ), The Hague, the Netherlands
- National Centre for Marine Research (NCOMR), Athens, Greece

Dr. Giulio Izzo was the ETC Leader for 1997. In early 1998 a decision from the lead organisation has been taken to replace the ETC Leader by Dr. Marcello Peronaci. He will be supported by a core team of 6 scientific and administration personnel in the lead organisation Institute in La Spezia.

In the ETC Management Committee, which consists of the contact persons from the participating institutes, the progress of work and plans for future work are discussed and endorsed. The Committee meets twice a year in a plenary meeting of the ETC. The European Commission and the Joint Research Centre will be invited to join the Management Committee in 1998.

The work of ETC/MCE performed in 1997 is described in general in the EEA Multiannual Work Programme 1994-1999, and, more specifically in the EEA Annual Work Programme 1997. The work is further specified in the technical annex to the agreement between EEA and ETC/MCE for 1996-97, where tasks, products and time schedules are defined in detail.

The work on each of the tasks is carried out by task teams composed of team members from different institutes, lead by a task leader who is responsible to the ETC Leader for the task and its deliverables.

Information on the work programme, progress and products of ETC/MCE in 1996 can be found in the Annual Summary Report 1996-EEA Topic Report 3/1997 (EEA 1997). The current report presents a summary of the results of the work in 1997.

For further information, visit the Website of ETC/MCE:
<http://estaxp.santateresa.enea.it/www/etc/etc.html>
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1.3 National Primary Contact Points

Austria *	Wilhelm Vogel	Umweltbundesamt Wien, Dept. for water resources of karst areas/aquatic ecology
Belgium	Alain Derouane <i>NFP</i>	Cellule Interrégionale de l'Environnement/ Intergewestelijke Cel voor Leefmilieu - CELINE/IRCEL
Denmark	Mr. Peter Sandbeck	Danmarks Miljøundersøgelser, Afdeling for Havmiljø
Finland	Pentti Kangas	Suomen ympäristökeskus, ympäristötilayksikkö SYKE
France	Jean-Louis Weber <i>NFP</i>	Institut Français de l'Environnement IFEN
Germany	Anita Künitzer	Umweltbundesamt, Deutsche Kontaktstelle EEA für Meer/Küsten, FG II 2.2. UBA/DE
Greece	Mata Aravantinou <i>NFP</i>	Direction for Environmental Planning
Iceland	David Egilsson	Environment and Food Agency, Ocean pollution department
Ireland	John Wallace	Marine Institute, The Irish Marine Data Centre
Italy	Angela Spagnoletti <i>NFP</i>	SINA, Ministero dell' Ambiente SINA
Liechtenstein *	Felix Näscher <i>NFP</i>	Amt für Wald, Natur und Landschaft
Luxembourg *	Jean-Paul Feltgen <i>NFP</i>	Ministère de l'Environnement MiNENV
Netherlands	Adriaan Minderhoud <i>NFP</i>	Rijksinstituut voor Volksgezondheid en Milieu RIVM
Norway	Harald Loeng	Havforskningsinstituttet HI
Portugal	Ms. (Maria) Leonor Gomes <i>NFP</i>	Ministério do Ambiente, Direcção-Geral do Ambiente SINAIA
Spain	Argeo Rodriguez de León	Instituto Español de Oceanografía I.E.O.
Sweden	Ebbe Kvist <i>NFP</i>	Naturvårdsverket
United Kingdom	Andrew Franklin	MAFF Fisheries Laboratory

* These countries are only informed on the ETC/MCE actions as they do not have marine territorial waters
NFP indicates that the National Focal points have been designated the Primary Contact Point for this Topic

1.4 Topic Centre Goals

1.4.1 Achieving an "European Scale" Perspective

The main objective of the ETC/MCE is to provide reliable information linking the state and pressures of the marine and coastal environment of Europe. The way to provide such information is still evolving and has been the major challenge throughout the initial years of life of the ETC-Marine and coastal environment.

An effort towards harmonisation has been initiated by the ETC and is in continuous progress to achieve its final objective of providing reliable and comparable information.

The Topic Centre has also the mandate to progress in the development of appropriate tools and procedures to assess the quality of the environment. Such tools and procedures are aimed at achieving the harmonisation *a posteriori* of the information in order to obtain the required European scale perspective.

1.4.2 Environmental Assessment and Data Availability

In 1997 the Topic Centre carried on with the development of this "retrofit" procedure to harmonise the existing information; creating a set of indicators, a data base (built on the indicators data requirement) and an operational software of the European coastal zone to represent the state and pressures of this specific area. The frame and rationale of this "retrofit" approach is shown in Fig. 1 where the steps and the links among the activities of the Topic Centre are shown.

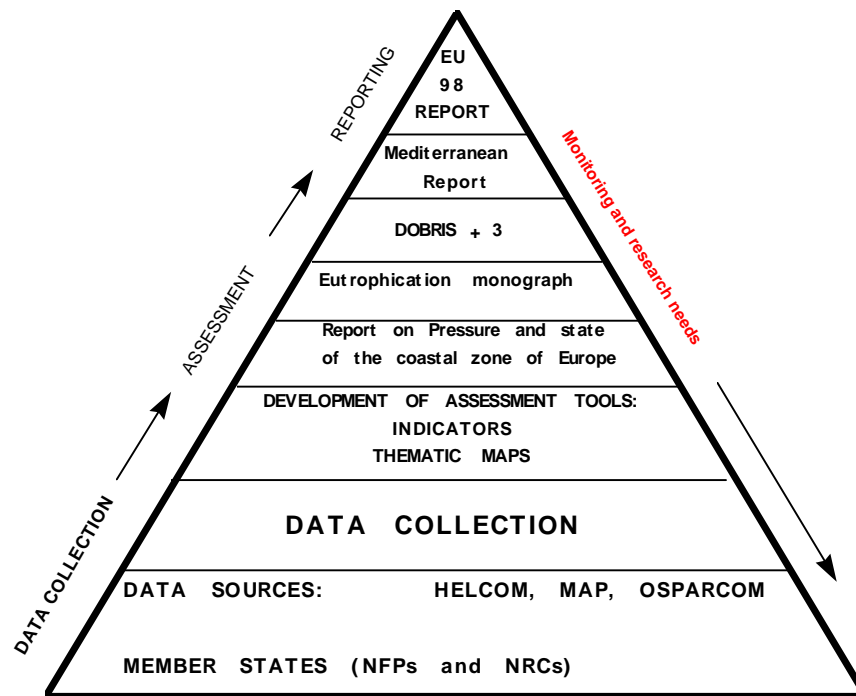


Fig. 1 - Schematic flow of the ETC/MCE activities

1.4.3 *Integrated Coastal Zone Management (ICZM)*

An important activity in which the Topic Centre is involved is support to Integrated Coastal Zone Management (ICZM).

There is a growing pressure on the European coastlines from many sectors with often conflicting interests. Managing such conflicting interests while taking into account long term vulnerability scenarios, such as for example those triggered by climate change, increasingly requires a process of Integrated Coastal Zone Management (ICZM). This approach is iterative, integrated and has an emphasis on communication. For the ICZM-building process, it is necessary that policy makers and the public understand the complex reality of coastal zone problems and their management and are informed about the pressures and the state of coastal systems. The European Topic Centres and the EEA are an important chain in the supply of such information and insight. For these reasons the ETC/MCE is working in the development of:

- Indicators that could link pressures and state of the environment, while helping to present information in a concise and reliable way.
- Computer models that can be used for various functions, such as organising data and simulating future scenarios in order to produce adequate response. Development of such models must focus on the characteristics of ICZM (iterative, integrated, communication). The integration that needs to be facilitated has institutional and sectoral aspects and also covering a better integration between science and policy development.
- A GIS system of the Coastal Zone of Europe to produce thematic maps on the State and Pressures on the European Coastal Zone, through the use of a pre-established set of indicators.

Progress on this activity is presented in the next section.

2. PROGRESS

2.1 General

Progress in the work was reported to EEA and EIONET in four quarterly reports. An Annual Summary Report 1996 was prepared by the ETC/MCE and published by EEA (EEA,1997).

Throughout the year, various contacts were maintained mainly with international organisations and conventions established through the Inter-Regional Forum.

Contacts were also made with the European Commission DGXI.D2 with regard to the indicators for coastal zone management and DGXI.D1 and JRC through the Inter-Regional Forum.

A special collaboration with UNEP/MAP was very frequent since the Monograph on the Mediterranean Sea is being prepared in 1997/98 as a joint venture between EEA/ETC-MCE and the Mediterranean Action Plan.

More details on the progress of each of the tasks and activities during the calendar year 1997 is described below.

2.2 Maintaining and Developing the Marine and Coastal Aspects of EIONET

Eight draft ETC/MCE reports, prepared in 1996, were submitted for comment to NFPs/NRCs, and useful comments were received and used for improvements.

The ETC organised the first ETC/EIONET Marine and Coastal workshop held in Rome on November 1997. The main objectives of the workshop were to discuss and review the work done so far by the Topic Centre, in order to facilitate current work, identify the missing elements and establish the case for continuation of work. The main achievement of this meeting was the establishment of new contacts between the countries and the ETC/MCE. The poor response of the countries on ETC's questionnaire relevant to the reporting activities of the ETC/MCE were discussed and new bases of future collaboration within this group were established. It was attended by representatives from 15 EEA member countries as well as EEA and ETC/MCE personnel. See Box 1 for more information on the recommendations of the workshop.

Box 1. First EIONET Workshop, Rome 10-11 November 1997

A lengthy and constructive discussion brought forward the following main recommendations:

1. *To improve the future activities of the ETC/MCE:*

- the ETC/MCE should focus mainly on two or three major tasks on which to reach excellence in order to build its credibility at a European level.
- the ETC/MCE has to work on a "contract" basis and therefore with a well defined and limited time span, while keeping a view to the future;
- the ETC/MCE should apply a "policy of presence";
- the ETC/MCE could distribute the future Technical Annexes directly to the NRCs for comments before being approved by the NFPs and ask the countries what they want to receive back from the ETC;
- the ETC/MCE needs to be supported both in terms of funding and human resources by the National Authorities (e.g. the Environment Ministries);
- finally, it was suggested that the ETC/MCE, following the example of the Inland Water Topic Centre, could establish the "Euro-Sea Water Network" in order to better focus future activities.

2. *To improve the future relations between ETC/MCE and NFPs and NRCs.*

- It has been widely recognised that close and fruitful relations have to be encouraged and improved in the mutual interest: while it is obvious that the work done by the ETC/MCE is partly based on the data/information provided by each EEA member state, it should be taken into account that the ETC/MCE can in turn provide the NFPs and NRCs with information, assessment tools and access to databases they need in their current work, for national purposes;
- The only relations between ETC/MCE and NFPs and NRCs, up to now, have been through the questionnaires; the ETC/MCE agreed that these tools have to be improved: as the questionnaires appear still to be the way to get demand driven information, they should be short, precise and agreed in advance with correspondents (as an example through preliminary questionnaires, direct contacts, etc.).
- Already published data at a European level can be used by the ETC/MCE, but NFPs and NRCs should be aware that published data cannot always be utilised for the work under contracts and that the timing for data collection must be compatible with the timing of the contracts; therefore the co-operation of NFPs and NRCs is essential to a good response of the ETC/MCE requirements.
- The discussion of data collection targets and questionnaire formulation with NFPs and NRCs can improve relationships and can be useful to assess the feasibility of a target and the availability of data.
- As a final consideration, the people-to-people network seems to be the key issue to a close co-operation between ETC/MCE and NFPs and NRCs; knowing and trusting each other enough to stimulate and respond effectively to each other actions. This Workshop has been a milestone in such direction.

2.3 Ad-hoc Technical Support to EEA

The ETC/MCE participated in the Meeting of the Sub-Group on "Water Statistics" of the Working Group "Statistics of the Environment (April 28-29 1997 Kirchberg, Luxembourg) and made a presentation on the work to be done on environmental pressure and state indicators.

The ETC contributed to the project regarding the Bathing Water Directive which was discussed in the Sitges Workshop on the Feasibility of "A Priori" Measurement Approach to Manage the Quality of Bathing Waters (April 26-29 1997).

The ETC participated in the AMAP International Symposium on Environmental Pollution (June 1-5 1997 Tromsø, Norway) where the State of the Arctic Environment Report 1997 was presented.

The ETC also participated in the European Seminar on Implementing the Habitats Directive (June 22-24 1997 – Morecambe, UK) where the implementation of the Habitats Directive in marine and coastal areas was discussed.

Finally during 1997 the ETC/MCE represented EEA in the Bureau of the Committee for the Activities of the Council of Europe in the field of Biological and Landscape Diversity on the proposal for a model-law on the sustainable management of coastal areas (December 18-19 1997, Strasbourg, France).

2.4 Second Meeting of the Inter-Regional Forum

The Inter-Regional Forum held its second meeting on 6-7 November 1997, in Rome, Italy. Based on background work by a small steering group and two specific working papers, prepared by collaboration of the ETC/MCE and the regional conventions, the meeting concentrated on two major issues identified in the first meeting of the Forum: the use of assessment tools and research needs to improve assessment. Wide consensus was reached on a number of common actions to be carried out by the regional conventions/action plans and other Forum participants.

Within the ETC/MCE, the Inter-Regional Forum has two main objectives: to facilitate the exchange and possible integration of existing data and information produced by European-level regional conventions/action plans with the EEA and the ETC/MCE; and to improve working relations and task sharing. These regional bodies are the Oslo and Paris Commission (OSPARCOM), the Helsinki Commission (HELCOM), the Mediterranean Action Plan (MAP), the Black Sea Environment Programme (BSEP) and the Arctic Monitoring Assessment Programme (AMAP). Other Forum participants are: the ETC/MCE partners, the International Council for the Exploration of the Sea (ICES), the Topic Centres on Inland Waters, Nature Conservation and Land Cover, the European Commission's DGXI and JRC as well as relevant EEA staff and Scientific Committee members. Details on the Forum actions and discussions are presented in Box 2.

Box 2. Actions and Activities during the 2nd Inter-Regional Forum

- With regard to assessment tools, further work on *statistical tools* was considered necessary as well as on *Geographical Information Systems* for which two working groups have been set up. Led by ICES and the EEA respectively.
- With regard to research needs, the following research areas were recognised as priority topics for the regional conventions/action plans: ecosystem properties; species and habitat; transport pathways and processes in marine ecosystems; biological effects of contaminants. The Forum agreed that the research priorities of the Conventions can provide a useful input to the preparatory process of the fifth Framework Programme on Research and Development for possible incorporation into specific research fields to be reflected in subsequent calls for proposals. The Forum requested EEA to forward to the EC-DGXII the final version of the paper discussed at the Forum, as the EEA contribution to the preparation of 5th Framework Programme, highlighting the important function of the regional conventions/action plans and of the EEA, as potential end-users of the research results of such priority research areas.
- Furthermore, working groups/expert meetings/workshops were considered appropriate in the following topics: Biological Effects of Contaminants, Transport Models, Combined Effects of Contaminants and the contribution of satellite observation techniques to meet data requirements by Regional Conventions/Action Plans.

The follow up mechanism to implement the actions agreed upon within the Forum will remain light and flexible and will be based on the good will and motivation of all interested participants and mostly on the direct commitment of the persons/organisations who volunteered to initiate specific actions.

The activities of the Forum were discussed at the EIONET workshop, immediately following the Forum meeting. As a result of the suggestions put forward in this workshop, EEA National Focal Points will be more involved in the future planning of Forum activities, a stronger participation by the relevant EC Directorates will be sought and working relations with EuroGOOS will be established.

A report of the second meeting of the Inter-Regional Forum will be published by the EEA in 1998.

2.5. Promotion and Compilation of High Quality Data Set of Basic Variables Relevant for Characterising the State of the Coastal and Marine Environment

The objective of this task is to ascertain the identification of water quality parameters, the comparability of data and quality control procedure at the European level to facilitate the creation and maintenance of internationally accepted, unified quality control standards used in conjunction with sophisticated data management capabilities.

In 1997 the ETC/MCE carried out:

- a study of the data management of the main organisations, including the identification of a data set to be used in the process of definition and testing of quality indicators;
- an evaluation of the data comparability of these organisations.

As a result the ETC produced two draft reports on:

- water quality problems in relation to international standards
- recommendations for improving the procedures for analysis and reporting at European level on data treatment and storage based on existing information and data

These reports will be published in 1998

2.5.1 Coastal and Marine Water Quality Problems and Objectives

The ETC/MCE produced the report on "Coastal and Marine Water Quality Problems and Objectives" which presents a preliminary and brief review of coastal and marine water quality problems in relation to national or international water quality objectives. The report highlights the main difficulties on the quality objectives to be reached according to relevant national legislation and EU Directives emphasising the complications for adopting the same quality standards all around Europe. The quality problems and quality objectives mentioned focus on the variables most commonly used in recent European monitoring programs for water quality assessment. Although numerous variables are measured in the various national and international monitoring programs, this report focuses only on those variables that are most frequent and widespread. Presently, the number of variables describing the water quality have increased partly due to development of analytical capabilities to measure more and more substances at ever lower concentrations. In that sense, marine water quality variables can be grouped into 3 categories (Table 1).

Table 1. Sea Water Quality Parameters

<i>Categories</i>	<i>Types</i>	<i>Parameters</i>
<i>1. Reference parameters</i>		Temperature, Salinity, pH, OD
<i>2. Pollution</i>	<i>a. Organic pollution</i>	Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Total Organic Carbon (TOC)
	<i>b. Nutrients</i>	Nutrients (N, P)
	<i>c. Metals</i>	Cadmium, Mercury, Copper, Zinc
	<i>d. Persistent organic chemicals</i>	Pesticides (DDT, TDE,...), polychlorinated biphenyls (PCB), polyaromatic hydrocarbons (PAH)
	<i>e. Radioactive contamination</i>	Total alpha & beta activity, ¹³⁷ Cs, ⁹⁰ Sr
	<i>f. Visual characterisation</i>	Total suspended solids, Turbidity. Oils and floating matter
	<i>g. Microbiology</i>	Total colliforms, faecal colliforms, faecal streptococci, bacteria
<i>3. Ecological parameters</i>	<i>Biodiversity, community structure</i>	Phaeopigments, Phytoplankton, zooplankton, zoobenthos, fish, macrophytes

The absence of relevant legislation relating directly to sea water quality objectives is a fundamental gap in the European Community Environmental Policy in general and inadequate to address sea water quality problems. Although a Commission proposal for a Council Directive establishing a framework for European Community water policy is on the way, sea water is not addressed directly in this proposal. Furthermore, the relevant international conventions for the protection of the seas are not as closely associated with this proposed Directive as the river basin organisations. However, the European

Commission recognises the importance of the conventions for the protection of regional seas and along with the relevant Member States the importance of their role.

In the last few years, a major effort has been devoted, at the European level, to evaluate quality problems and objectives for coastal and marine environments. Although significant improvements have been achieved, such as the implementation of new European Directives, there are still many gaps and problems to be solved.

Nowadays it is well known that there is not an ideal and universal monitoring programme, that could be implemented in all the European countries and each case has to be regarded as an individual and peculiar situation which deserves special attention. The report suggests that the following is a list of topics require either further research or amendments at National or International level:

- * Better standardisation of monitoring programme (frequency of sampling, quality control of data, etc.);
- * There is a significant regional unbalance on the research and data from European coasts. There are still many European coasts vaguely characterised;
- * Foster the development of international training courses and inter-calibration programmes;
- * Develop a better system to make monitoring data easily accessible internationally;

2.5.2 Data Treatment, Storage and Reporting at European Level

A report entitled: "Recommendations for improving procedures on marine and coastal data treatment and storage at European level", was produced. The document is firstly aimed at comparing the data management systems used in four international organisations in charge of monitoring and assessment of marine environment. This specific part in the process of the exploitation of the results of monitoring had often been neglected in the past, and is increasing in importance with the new emerging information techniques.

The report describes the way data are reported, stored, maintained and disseminated in the Commission of the Helsinki Convention (HELCOM), the Commission of the Oslo and Paris Conventions (OSPARCOM) and the Mediterranean Action Plan (MAP) of the United Nations Environment Programme (UNEP). The International Council for the Exploration of the Sea (ICES) data management system is also described, as it maintains data from OSPAR. The description of the data management systems in use in the main organisations involved in marine monitoring identifies major differences between them. The Finnish system, for HELCOM, is probably the more open one, but it only applies to the Baltic sea. The ICES data management system takes into account information on the quality of the data, but the way of archiving is rather ancient. The MAP system needs to be improved, especially for the input part of the data management. Finally, the OSPAR data, except those from marine monitoring, are not under a real management system.

It is important to note that a process has started within the main organisations to improve their data management systems. In particular, the issue of data management was discussed during an inter-secretariat meeting in August 1996 with the participation of representatives from OSPAR, HELCOM, ICES and AMAP

For the MAP data, the project "Enhancement of data processing facilities for environmental data at the coordinating unit for the Mediterranean Action Plan" has been set up to give the MED POL programme an opportunity to increase effort in storage, analysis, and presentation of the data by issuing in January 1996 tables of codes and data transfer formats.

For ICES the question is to define the need for an integrated database for the different data maintained, and a report from an ad-hoc group concluded that a relational database management system (RDBMS) is not only feasible but also the best way forward. ICES is developing a wise step by step improvement of the database system, including the assessment of the justification of integrating the databases, the requirements of outputs and products, the evaluation of costs, etc.

OSPARCOM secretariat has initiated discussion regarding the development of a data management policy for OSPARCOM. The conclusions and potential decisions from this discussion were presented to Commission meeting in mid 1997.

An overview of the national marine monitoring data management in European countries is presented in Table 2.

Table 2. Overview of Data Management in the EEA Member Countries.

Country	Name of the database	Date of operating	Type	Size
BELGIUM	IDOD	Under project	-	-
DENMARK	-	1987	Local Oracle RDBMS	1200 Mb
FINLAND	EDS	1991	Ingres, Trip and MS-Access	-
FRANCE	QUADRIGE	1996	Client/server Sybase RDBMS	800 Mb
GERMANY	MUDAB	1993	Client/server Ingres RDBMS	2.25 Mrecords
GREECE	n.i.	Planned project	Local Oracle RDBMS	-
ICELAND	n.i	n.i	Oracle	n.i
IRELAND	n.i	1997	Local Ingres RDBMS	n.i.
ITALY	n.i	n.i	n.i	n.i
NETHERLANDS	DONAR	1993	central/decentral Ingres RDBMS	15 Gb
NORWAY	BIOTASYS, SEDIMSYS	1992	Client/server Sybase RDBMS	50 Mb
PORTUGAL	n.i	n.i	data managed in different places	n.i.
SPAIN	n.i.	n.i.	data managed in different places	n.i.
SWEDEN	SHARK, BED, BIOMAD	n.i.	n.i.	n.i.
UNITED KINGDOM	n.i.	1996	Local MS Access on PC	10 Mb

n.i.: No Information

The following preliminary recommendations for actions for the ETC/MCE on short, medium and long term perspectives were presented in the report:

Short term

1. Establish contact with managers of marine monitoring databases for exchange of experience and mutual improvement.
2. Define the needs for harmonised improvements of national data management.

Medium term

3. Harmonize reference data and create a common multilingual data catalogue.
4. Create a common exchange format.
5. Define common products (aggregated data, indicators) to be elaborated in such a way that every country could contribute to their achievement with its own system.

Long term

5. Define the data management procedures for the marine aspect of the EURO-WATERNET, based on national databases for raw data and a European database for aggregated data.

2.6 Identification of Common and Major Threats to European Marine and Coastal Areas.

The objective of this task was to identify and collate information and data to be integrated into databases and maps, with particular emphasis on estuaries and coastal lagoons according to indicators developed by the ETC/MCE in 1997 (see 2.7.1 section). In 1997 the ETC/MCE has:

- identified, together with the EEA and other ETCs, Conventions and EUROSTAT, the information which could be integrated into data bases and maps of different characteristics, pressures and threats of the coastal zone. Furthermore the ETC has produced and sent to the NFPs a questionnaire to collect data relevant for the coastal zone.
- structured the basic software and built the database to produce thematic maps based on the available information and according with the data requirements of the indicators developed by the ETC/MCE in 1997 (see 2.7.1 section).

2.6.1 Data base on European Estuaries and Lagoons

The objective of this database is to provide EEA and other European Union bodies with relevant information on the state and characteristics of the European estuarine bodies for managing purposes and decision support, based on data periodically updated from estuarine management authorities of the EU member states.

Another important objective is to provide relevant and updated information on the state of the environment of European estuaries to the European public, thus contributing to a collective consciousness on environmental oriented policies.

The ETC/MCE sent a questionnaire to the member states of the EEA but the response to this questionnaire was limited and the collected data do not allow to produce an overall assessment nor an adequate picture on the coastal areas, estuaries and lagoons at a European level. However, the ETC/MCE will continue to develop this task in 1998 and provide the support that the countries may need to improve their response.

Database construction was performed using MS Access v 7.0, on a Windows NT 4.0 PC platform, resulting in a friendly-use product based in a menu-like structure.

Two main steps on database manipulation were guaranteed: Database updating and Database interrogation.

Database updating was designed to allow a straightforward procedure, through a series of menus (Forms) sequenced and arranged according to logical grouping of data and type of information. In each form, provisions have been made to clearly present the information needed to be fed in. In case of lack of information on a particular variable (Field), the system was conceived to allow a later update, as soon as the information becomes available.

Database interrogation was also designed in a user-friendly way, allowing easy introduction of the question to the database (Filtering), recursive operation and permanent control and visualisation of the process. Editing facilities allow also a back and forward type of action, until the desired result is obtained.

The result of the interrogation is always the "extraction" of all the information available in the database on the estuary(ies) satisfying the introduced question, and presented in an atlas-like inventory.

The database structure is, thus, ready to receive data from the European estuaries and lagoons.

2.6.2 Characterisation of the Coastal Zone of Europe

The objective of this task was to identify the major pressures on the marine and coastal environments and rank their importance on the basis of an appropriate set of indicators.

As an activity started in 1996, a map (in hard copy and electronic format) with the delimitation of the European coastal zone has been produced. The steps and criteria adopted to achieve that deliverable, namely the proposed operational definition, and the description of the rationale behind the options needed to achieve the presented results were described in the report "Data base for European Estuaries and Coastal Lagoons and Map of Coastal zone of Europe" (EEA, 1996a).

The next step is to build thematic maps based on the collection of data and information pertaining to environmental characteristics. These Thematic Maps would be connected to:

- basic geographic information such as coastline, information on geology, geomorphology, water dynamics, etc.
- information related to the environmental resources and quality, and to environmental protection policies and programmes
- Information on population, on human activities, on human uses of coastal resources and coastal zone land use

In 1997 a request for information was circulated through the National Focal Points and ETC/MCE partners. However, insufficient information was obtained to produce a set of thematic maps relevant at the European level. Hence further data collection will continue in 1998 to provide the basis for a report to be published in 1999.

2.7 Indicators at a European Level for Coastal Zone Characterisation and Management

The objective of this task is to use existing information relevant to EU coastal zone policy and development of a system of indicators to assess the pressures on the marine and coastal zones to be applied at the European level.

In 1997 the ETC carried out:

- an identification of the data requirements to be obtained by other ETCs, Agencies etc. on the coastal zone at a European level
- a preliminary set of indicators and based on this a report on the state of the European coastal zones.

2.7.1 Indicators for ICZM

The aim of this project is to establish a methodology to develop and apply a framework of indicators which can be used in environmental assessments with regard to European coastal zones. The development of such a system for all relevant issues is a major task, and this report is a first step in the process towards such a framework. In this report, a proposal for an assessment methodology has been elaborated for certain issues. A preliminary selection of pressure and state indicators has been carried out, and the possible results of the methodology are illustrated with studies (see Table 3). The findings of the case studies are evaluated, resulting in recommendations for, amongst others, optimisation of the proposed methodology and the co-ordination of a systematic data collection in close co-operation with existing data collection. The availability of relevant data on a European scale will be essential for further development of the proposed methodology. The results of the first phase of this study, focusing on the selection of the most appropriate framework and the most relevant environmental issues have already been published (EEA, 1996b).

Table 3. A Preliminary List of Indicators to be Used in the European Context

Environmental issues	Pressure indicators	State indicators
<i>Eutrophication</i> <i>Saprobiation</i>	<ul style="list-style-type: none"> • Total load of N + P • Total load of BOD 	<ul style="list-style-type: none"> • Total concentration of P, N in winter ($\mu\text{mol/l}$) • % DO saturation • Concentration of chlorophyll • Transparency
<i>Heavy metal pollution</i>	<ul style="list-style-type: none"> • Total Loads of Pb, Cd, Hg. 	<ul style="list-style-type: none"> • Concentration of (Pb, Cd, Hg) in sediments and or biota
<i>Fishing</i>	<ul style="list-style-type: none"> • Fishing mortality 	<ul style="list-style-type: none"> • Spawning stock biomass
<i>Fragmentation and degradation of habitats</i>	<ul style="list-style-type: none"> • Land use change in coastal zone • artificialization of coast line 	<ul style="list-style-type: none"> • Accelerated sea level rise • Recession of shore in M/year.

A methodology to estimate the trends in the pressure and state indicators and the criteria to define reference and objective values for the selected indicators was included in the draft report prepared by the ETC/MCE.

This report is to be published in 1998 as an EEA Technical Report.

2.8 Inventory of Models for Integrated Coastal Zone Management (ICZM)

To be able to understand the complex reality of coastal zone management problems, policy makers and public need to be informed about the pressure and the state of a coastal system in a concise and reliable way. This can be achieved by a consistent application of well defined indicators. The Topic Centres and the EEA are an important chain in the process of supplying information on the state of the environment of European coastal zones to policy makers.

The use of information technology (computer models) is necessary to help describe and understand the complexity and dynamics of the coastal zone. Computer models can organise data and simulate future situations to assess the impact of developments.

Besides knowledge on causal relations which can be computerised, experts possess knowledge on the state of the environment that cannot be derived from available data. It must be examined how this knowledge can feed models that link pressure and state indicators and used directly in assessments.

2.8.1 Structure of ICZM Models

Three types of integration are essential in ICZM:

- Institutional integration: between public institutions on different levels as well as between different public agencies within one level.
- Sectoral integration: between actors from different sectors or scientific disciplines.
- Integration between science and policy development.

The models that need to be developed must facilitate all three types of integration mentioned, using the DPSIR framework which seems to be an appropriate structure for ICZM assessment.

Existing models for use in ICZM are mainly scientific expert models but there is a trend towards policy orientated models, driven by strong demand for policy orienting tools.

The European context for integrated models shows considerable differences between the countries in models that are developed and available.

To start model development, it is better to have only the main DPSIR-indicators taken up in the model than to strive for completeness. Since indicator values relate to spatial units, a model linked to

indicators should be GIS-based. Furthermore, in view of the purpose of the indicators and the range of subjects they should cover, the required model should be able to handle and link ecological as well as socio-economic variables.

The main function of the set of models that needs to be developed is integrated analysis. Hence, for the short term it should have the characteristics of an integral effect analysis that incorporates or is linked to appropriate presentation tools. Focus should be on integration and scenarios rather than on specific details, and the set of models should have an open and flexible structure taking into account the continuing process of indicator formulation and changing information needs.

The development of such a set of models seems technically feasible, starting from process based models (models directed towards policy development), through an iterative process to be developed in close relation to the development of indicators.

It is possible to start now with the development of European ICZM-models that link pressure and state. More information is needed on the subjects of data-availability, model availability and future issues and indicators used. This additional information does not need to be available at the start, but it can and should be collected as part of the development process.

This report is to be published in 1999 as an EEA Technical Report.

2.9 Contribution to EEA Reporting Activities

In 1997 the Topic Centre was involved in three main reporting activities of the EEA:

DOBRIS+3 Report

Eutrophication monograph

Mediterranean report

2.9.1 The Dobris+3 Report

The ETC contributed to "Europe's Environment: the Second Assessment". The ETC had responsibility for collecting data and for writing the chapter on Marine and Coastal Environment. Box 3 highlights some of the findings in the marine and coastal zone area of Europe.

Box 3. *Europe's Environment: The Second Assessment. Chapter 10: Marine and Coastal Environment*

The following conclusions were drawn following assessment of available information:

The most threatened seas are the North Sea (over-fishing, high nutrient and pollutant concentrations), the Iberian seas (i.e. the part of the Atlantic along the eastern Atlantic shelf, including the Bay of Biscay: over-fishing, heavy metals), the Mediterranean sea (locally high nutrient concentrations, high pressure on the coasts, over-fishing), the Black Sea (over-fishing, rapid increase of nutrient concentrations) and the Baltic Sea (high nutrient concentrations, pollutants, over-fishing).

Eutrophication, mainly resulting from nutrient surpluses in agriculture, is of major concern in some parts of many European seas. Nutrient concentrations are generally at the same level as in the beginning of the 1990s. Increases in nitrogen discharges and resulting concentrations in sea water on some of the west coasts of Europe seem to be correlated with high precipitation and flooding between 1994 and 1996. In most other seas, no clear trend in nutrient concentrations could be identified. However, concentrations of nutrients in the Black Sea, mainly originating from the Danube watershed, increased about tenfold between 1960 and 1992.

Contamination of sediments and biota by anthropogenic chemicals seems to be common in almost all European seas. Only limited data was available, mainly covering western and north-western Europe. Elevated concentrations (above natural background) of heavy metals and PCBs have been found in fish and sediment, with high levels near point sources of emission. Bio-accumulation of these substances may pose a threat to ecosystems and human health.

The overall picture of oil pollution is highly fragmentary, and no reliable assessment of general trends can be made. The main source is from land, reaching the seas through rivers. Although the annual number of oil spills is falling, small and occasional large spills in zones of heavy boat traffic are causing significant local damage, primarily smothering of beaches and seabirds and impairment of harvest of fish and shellfish. There is, however, no evidence of irrevocable damage to marine ecosystems, either from major spills or from chronic sources of oil.

Many seas continue to be heavily over-fished, with particularly serious problems in the North Sea, the Iberian seas, the Mediterranean and the Black Sea. There is a critical over-capacity in the fishing fleet, and a reduction of 40% in capacity would be needed to match available fish resources.

2.9.2 Eutrophication Monograph

The monograph on eutrophication, called "Excessive anthropogenic nutrients in European ecosystems" was a joint report produced by the Inland Waters Topic Centre in collaboration with the Nature Conservation and the Marine and Coastal Environment Topic Centres. The ETC/MCE prepared the Chapter on Marine eutrophication and gave contributions to other chapters.

In this monograph the Marine Topic Centre attempted to make an European level assessment of the eutrophication phenomena in marine and coastal waters. The investigation was based on the inapplicability of the "classic" state indicators, such as nutrient and chlorophyll concentrations, for the Mediterranean sea and even for the Black sea. Member States were asked to provide information on the "classic" parameters described above as well as on ecological events (for the last 20 years) related with the instability processes forced by eutrophication. Due to the poor response received an assessment on regional sea basis was adopted (Box 4) based also on the available scientific literature.

Box 4. Eutrophication Episodes:

English Channel & Atlantic coasts

1975-88, Bay of Seine (France): 46 algal blooms and some 'red tides';

1978-91, Bay of St. Brieuc (France): seaweed blooms;

1978-88, and 1991, Bay of Lannion (France); seaweed blooms;

1983-95, Atlantic coast of France: toxic seaweed growths;

Annually in spring and early summer, many bays in Brittany: large cover of green seaweed

North Sea

Major impacts regularly in coastal waters, including the coast between Belgium and Skagen (Denmark), in Danish inlets, along the west coast of Sweden and in the outer Oslofjord;

Effects on the growth of macroalgae in some UK estuaries.

Baltic Sea

Anoxia in most of the deep basin in the Baltic Sea;

Changes in plant communities in important fish nurseries;

No exceptional algal blooms in the Baltic Sea in 1995 and more sporadic occurrences of a toxic species in 1995 compared to previous years.

Black Sea

Eutrophication episodes:

Since early 1970s: large increase in algal bloom frequency and drastic reduction of shallow water species;

1980-90: 42 blooms recorded, with a strong increase in blooms of non-diatom species;
Reductions in some shallow water plant populations and distribution areas of long-life eelgrass species, perennial brown and red algae and all their associated fauna, but increases in some opportunistic species;
Mass mortality of numerous sea-bed species;
Mass development of jelly-fish; mass development of predatory gelatinous species;
Every summer: hypoxia and anoxia phenomena reported, most severe effects in the north-western area

Mediterranean Sea

Since early 1970s: eutrophication in semi-enclosed bays: 34 cases along coast line, 21 in lagoons, but the record is incomplete;

1975-97, Adriatic Sea: flagellate bloom, followed by anoxia and fish kill; Since 1975 every year with increases in frequency; 15 mollusc species and 3 crustacean species have disappeared.

2.9.3 Report of the State and Pressure of the Mediterranean Sea

This report will be available in 1998. The Table of Contents are presented in Box 5. The report is being written in collaboration with UNEP/MAP in Athens, adopting the EEA DPSIR assessment framework (Driving Forces, Pressures, State, Impact, Response) further developed for the Marine Environment by the Topic Centre.

The objective of the report is to describe the environmental status of the Mediterranean Sea for policy development and management and identification of missing elements to improve monitoring capacities.

The collaboration with UNEP/MAP proved profitable and the main existing data sources were accessed. At the same time the missing information was mostly identified. As an example, little or only poor quality information is available from southern and eastern countries (apart from Greece) and a lack of monitoring co-ordination is evident even among the northern Mediterranean countries. At the same time poor availability and lack of an organised data base of the results of the EU research programmes is evident.

Box 5. The Mediterranean Sea Report

The Mediterranean Sea Report will focus on:

- Natural characteristics (climate, morphology of the Mediterranean basin, volcanic and seismic activities, hydrography and oceanography, chemistry, biology);
- Human activities and estimated loads {human population (state and trends), seasonal changes (tourism), maritime transport, industry and mining, sewage outfalls, oil industry, river loads, fisheries and aquaculture, agriculture};
- Environmental status and threats {eutrophication, coastal erosion, land use, chemical contamination (hydrocarbons, heavy metals, org. Pollutants), oil pollution, microbial contamination, radioactive contamination, non-indigenous species};
- Ecosystem sensitivity and impacts (climate changes, ecosystem changes and biodiversity, human health);
- Regional activities and state of action (International environment programmes, MAP, EU, other international programmes);
- Conclusions and recommendations for future actions

3. ETC REPORTS

Reports published by EEA in 1997

- Annual Summary Report 1996, EEA Topic Report 3/1997

Final draft reports circulated to member states in 1997 (to be published as Topic and Technical Reports in 1998)

- Report of the First Meeting of the Inter-Regional Forum
- Data collected within the framework of the Regional European Sea Conventions
- Availability and access to data on Europe's Marine Environment
- Integration of information on the Marine Environment of Europe
- Recommendations for data management and quality assurance
- Preliminary set of indicators
- Data base for European Estuaries and Coastal Lagoons (Geographically referenced data-base) and Map of Coastal zone of Europe

Final draft reports prepared in 1997

- EIONET Workshop Report, November 10-11 1997
- Report of the Second Meeting of the Inter-Regional Forum
- Coastal and Marine Water Quality Problems and Objectives
- Indicators at an European Level for Coastal Zone Characterisation and Management
- Recommendations for improving procedures on marine and coastal data treatment and storage at European level
- Numerical Model packages for coastal zone management and review. Framework on integrated models and indicators for European coastal zone management
- Dobris + 3 - *Chapter 10: Marine and Coastal Environment*
- Eutrophication monograph - *Chapter 7: Marine eutrophication*

Position papers presented at the Forum and EIONET Workshop meetings in 1997

- "Assessment Tools", Forum background document
- "Research Needs to Improve Assessment", Forum background document
- Proposal for future relations between ETC/MCE and NFPs/NRCs
- ETC/MCE continuation. Steps forward

4. FUTURE PLANS

4.1 Maintain and Develop the Marine and Coastal Environment Aspects of EIONET

The ETC will keep NFPs and NRCs informed of its Workplan and its progress. It will contact and visit NFPs/NRC's as appropriate, especially as regard the help that could provide to the Member States on the coastal zone information and management, where applicable, and request relevant data and information from NFPs/NRCs. The ETC/MCE will also maintain and update the ETC Web Page with the relevant information (<http://estaxp.santateresa.enea.it/www/etc/etc.html>). Due to the limited time available and budget constraints, the annual Workshop to discuss the state of the work done and the way forward, is foreseen for early 1999.

4.2 Inter-Regional Forum

The ETC/MCE will develop specifications for data organisation, functions and management for a Geographical Information System (GIS) for European Seas as agreed by the second Inter-Regional Forum. The ETC will build on existing EEA products and experience compatible with current EEA work programmes and report on progress of the GIS application and display results of statistical operations which have spatial significance in the next Inter-Regional Forum, to be held in early 1999.

4.3 Development of European Estuaries/Lagoons and Fjords Inventory and Database

The ETC/MCE will collect data from national, regional and European authorities and compile the data into the ETC's database. In addition the ETC/MCE will further improve the structure of the data base for the inventory and improve and upgrade the maps of the characterisation of the environmental state and pressures on the European coastal zone based on the collected data.

4.4 Further Development and Testing of System of Indicators

The ETC/MCE will further develop requirements for the data to be obtained by other ETCs, Agencies etc. on the coastal zone at a European level. The collection of data and collation of the information on the state of the European Coastal zone will be based on the available data and work funded by DGXI under the European Demonstration programme for Integrated Coastal Zone Management.

4.5 Harmonisation of Reporting and Data Exchange Between the Regional Conventions and the EEA requirements

The ETC/MC will study the reporting systems of the regional organisations/conventions, evaluate the different reporting systems of these organisations and report on recommendations for improving the procedures for reporting and the process to be followed at European level/regional seas. This will provide a further step to achieve more efficient and comparable information, taking into consideration existing initiatives.

4.6 Contribution to EEA Reporting

One of the key activities in 1998 is the preparation of the EU98 Report. The ETC/MCE will contribute to the chapter on the Marine and Coastal areas, by collecting the relevant data and writing the chapter on the spatial section of the report. At the same time guidance and review of other chapters will also be provided.

The ETC will also assist to the development of a technical paper on the strategy of the EEA in the biological diversity field. The Topic Centre will participate in workshops/meetings to help define the requirements for the development of the Community's biodiversity strategy.

5. ETC/MC WORKPLAN 1998

EVENT/ACTIVITY	EVENT DATE	RESPONSE DEADLINE	EXPECTED OUTPUT	OUTPUT DATE
<i>Workshops</i>				
IRF's Follow-up meeting	February 1998		Meeting Report	March 1998
Common work on Statistical Tools (possibly through e.mail)	February 1998		ToR, Work Plan, Deliverables	March 1998
Expert Meeting on GIS	June 1998		Programme of work between the EEA and regional conventions	Summer 1998
Expert Meeting on Biological Effects of Contaminants	May 1998		To develop a project proposal for DGXII	
Workshop on Transport Models	not identified		Workshop Report	
Workshop on Combined Effects of Contaminants	September 1998		Workshop Report	End 1998
Workshop on the Contribution of Satellite Observation techniques	not identified		Workshop Report	
Forum's Steering Group Meeting	September 1998		Finalisation of specific objectives, detailed programme, list of participants, final date for the third Forum meeting	October 1998
<i>Questionnaires</i>				
Estuaries/lagoons/fjords inventory and database: Data collection	May 1998	October 1998	access to inventory and database	December 1998
Thematic maps: Data collection for indicators on coastal zone	May 1998	October 1998	access to database and use of thematic maps for better CZM at National level	December 1998
<i>Draft reports for review</i>				
Monograph on the Mediterranean Sea	End March 1998	15 May 1998	Final version to EEA	15 June 1998
Indicators at a European level for coastal zone characterisation and management	10 March 1998	17 April 1998	Final version to EEA	May 1998
Water Quality Problems and Objectives	10 March 1998	17 April 1998	Final version to EEA	May 1998
Framework on Integrated Models and Indicators for European Coastal Zone Management	10 March 1998	17 April 1998	Final version to EEA	May 1998
Numerical Model Packages for Coastal Zone Management and Review	10 March 1998	17 April 1998	Final version to EEA	May 1998
Recommendation for improving procedures for assessing and reporting on coastal data treatment and storage	10 March 1998	17 April 1998	Final version to EEA	May 1998
Proceedings of the ETC/MCE EIONET Meeting, 1997			Final version to EEA	May 1998
Proceedings of Second Inter-Regional Forum, November 1997			Final version to EEA	May 1998

6. REFERENCES

1. EEA, 1997. Annual Summary Report 1996, European Topic Centre for Marine and Coastal Environment. EEA Topic Report 3/1997
2. EEA, 1996a. Data base for European Estuaries and Coastal Lagoons and Map of Coastal zone of Europe. (in preparation)
3. EEA, 1996b. Indicators at an European Level for Coastal Zone Characterisation and Management (in preparation)