



CoastBase Information Definition and User Requirements

Marieke A. Eleveld, Ardy G. Siegert, Wolfram B.H. Schrimpf



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Mission

The primary mission of SAI is to develop and promote the use of space derived data and geo-spatial data from other sources in the service of EU policies, especially those relating to agriculture, fisheries, transport and anti-fraud. SAI also seeks to make the best use of information from space systems, to maximise the return from European investments in space and to help the Union reinforce its role in international action on the environment and sustainable development.

CoastBase *C-5819 460* Information Definition and User Requirements

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Preface

This report is produced in the frame of the project *CoastBase* (The European Virtual Coastal and Marine Data Warehouse) which is financed partly by the EU IST (Information Society Technologies) Program - Contract No. IST-1999-11406. The project is coordinated by RIKZ (National Institute for Coastal and Marine Management, The Netherlands) and also includes the following partners from public authorities, industry, international bodies, non-governmental organizations and Eastern Europe:

- ENEA - Italian National Authority for New Technologies, Energy and Environment, Italy
- JRC/SAI - Joint Research Centre of the European Commission, Space Application Institute, European Union
- IMR - Institute for Marine Research, Norway
- EUCC - The European Union for Coastal Conservation, The Netherlands
- FZI - Forschungszentrum Informatik an der Universität Karlsruhe, Germany
- ICES - International Council for the Exploration of the Sea, Denmark
- MATRA - Matra Systems & Information, France
- PETA - Information Training Local Development (in cooperation with the Greek Ministry of Environment), Greece
- MIG - Maritime Institute Gdansk, Poland
- MELS - Ministry of Environment of Lower Saxony, Germany

The objective of *CoastBase* is to develop a technical architecture for an easy search and access to distributed data and information in the field of marine and coastal environment. It will be an innovative tool to support management and assessment of marine and coastal areas. An additional aim is to support EEA (European Environment Agency). This report constitutes a Deliverable of Work Package 4 (Information Definition and User Requirements) of *CoastBase*, executed under the responsibility of the Marine Environment (ME) Unit of JRC/SAI. The results and findings described in this report provide the basis for the system definition and development within *CoastBase*.

The developments made in *CoastBase* are supporting the execution of the JRC institutional project *COAST* / JRC-43 (Coastal Monitoring and Management). *COAST* helps the implementation of the Community Strategy for integrated planning and management of coastal areas and various EU Directives related to water quality.

More information on *CoastBase* can be found at:

<http://www.coastbase.org>

Information on *COAST* related research and development activities are located at:

<http://www.me.sai.jrc.it>

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Acknowledgements

CoastBase is a joint effort of RIKZ, EUCC, ICES, PETA, MELS, ENEA, IMR, FZI, MATRA, MIG (and JRC) in collaboration with EEA. The CoastBase partners contributed by informing us about their data banks and on their requirements and expectations of CoastBase. We also collaborated with 'the technical project partners' on the feasibility of the technical aspects of this study. The input of all CoastBase partners at the meetings in Amsterdam (NL), Copenhagen (DK) and Bergen (NOR) was very helpful. The interest expressed by DG Information Society and EEA during the Copenhagen meeting, and extra attention of those involved in ETC/MCE in Amsterdam and Bergen was also stimulating. Therefore, we would like to thank all persons involved in CoastBase, and especially the CoastBase partners and the volunteers that they contacted for their input in the Information Definition and User Requirements study. We hope that CoastBase will live up to your expectations.

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1. Introduction

User requirements and information definition

As a first step in the development of CoastBase, an information definition and user requirements study (CoastBase Work Package 4) was performed. The aim of this Work Package is to develop a clear image of the users and the data providers of CoastBase, and of the type of data that can be made available within the framework of the CoastBase project.

Important steps taken in this information definition and user requirement study are:

- Understand the project mission, goals and history;
- Define the audience;
- Determine user goals and expectations;
- Describe the available data banks;
- Match user requirements with data availability;
- Determine target areas and topics.

Project mission

The aim of CoastBase is to improve European coastal and marine information search and exchange by the development of a distributed data warehouse (CoastBase, 1999).

This data warehouse will be accessible via the Internet and will link existing databases as well as provide place for new aggregated data (CoastBase, 1999).

It will contain:

- A truly distributed metadata catalogue with multi-lingual search facilities;
- Storage for aggregated data;
- Data conversion modules;
- Data interpretation modules;
- Quality control modules;
- Facilities for automatic feedback to the information source.

The availability of feedback to the information source provides the basis for the establishment of a communication and feedback mechanism between European coastal and marine data users and providers.

Audience definition

To evaluate the user requirements the following questions need to be answered:

- Who are the users;
- What is known about them;
- How should their preferences be incorporated into the design process.

Determining user profiles is a first step in understanding the users. User profiles give a quick impression of persons who might visit the CoastBase site and their expectations. The project partners sent in their user profiles. Initially, the information provided contained user profiles from an institutional point of view. To obtain user profiles from an individual point of view, a framework with questions aimed at individual users was sent to the partners.

Determination of user goals and expectations

From the individual and institutional user profiles, user goals and expectations were extracted. In this process thematic as well as technical considerations were taken into account.



Description of the available data banks

During the kick-off meeting (in Amsterdam on 10 and 11 January 2000) the following partners were identified as data providers: ICES, ENEA, RIKZ, IMR, JRC and EUCC. The data banks were analyzed from a technical point of view by describing each data bank.

Important aspects in this analysis were:

- Identification of a contact person at each provider;
- Information about database and data;
- Accessibility of the data from both an administrative as a technical point of view;
- Availability of descriptive information;
- Update frequency;
- Description of available data sets.

Subsequently, a detailed thematic analysis of the identified on-line data sets was performed.

Match user requirements with data availability

From the user requirements possible topics and target areas were selected. Matching user requirements with data availability allowed a first assessment of the feasibility of their exploration within the CoastBase prototype. The selection provided a starting point for further discussion about the content of the first implementations that CoastBase will provide.

Determine target areas and target topics

During the CoastBase meeting in Copenhagen (on 27 and 18 March 2000), the topics and areas to be presented in CoastBase were agreed upon.



2. Overview of user profiles and user requirements from CoastBase consortium members

Introduction

One of the final objectives of the CoastBase project is to provide authorities, research institutes, universities, private sector and public easy Internet access to CoastBase (CoastBase, 1999). For the development of a working prototype CoastBase partners representing users were defined. Users interested in data on various aggregation levels are represented within the consortium; from European, to regional (countries or states involved in the OSPAR and HELCOM Conventions), to national and local data. The following CoastBase users were identified at the kick-off meeting in Amsterdam (10 and 11 January 2000): ETC/MCE, RIKZ, ENEA, JRC, EUCC, ICES, IMR, PETA and MIG. All these CoastBase users have expressed their user requirements based on their current activities. This part of the report was based on their input (Table 1).

Table 1. Overview of responses of CoastBase users.

Organization	Institutional user requirements	Individual user requirements
ETC/MCE	X	
RIKZ	X	X
ENEA	(X)	
JRC	X	X
EUCC	X	X
ICES	X	
IMR	X	X
PETA	X	X
MIG	X	X

Remarks related to Table 1

- Both RIKZ and ENEA provided documents that replied for the ETC/MCE. RIKZ also provided information regarding its own organization. ENEA provided limited information about user needs of its own organization.
- The EUCC attached results of a questionnaire of Info-Coast '99, which gives additional information about the user requirements of a group of users that they represent (Salman, 1999).

In the user requirement analysis, three aims should be served:

- The aim of the project;
- The institutional aim of each partner in the consortium;
- The aim of the individual user.

The following example illustrates the difference between the project goal and the goal of the individual user: *The aim of an Internet bookseller is to increase its market share. The aim of a user is to find a particular book. These goals are compatible but it is not possible to derive the bookseller's goal from the users wishes.*

The difference between the requirements of an organization as a whole and the requirements of the individual user should also be well understood.

The focus of the JRC as an organization is European, while the focus of an individual researcher at the JRC might be limited to the Adriatic.

The aim of the project was extracted from the (technical) Annex of the CoastBase proposal (CoastBase, 1999). The aims of the institutional and individual users were derived from contributions of the project partners.



User requirements of partners on an institutional level

On an institutional level different users were identified. Subsequently, the feedback with their requirements was summarized. A summary was deemed necessary because of the diversity in the individual responses. Then, the summaries were compared to see if similar institutes have similar requirements. The institutes were compared according to their focus on European, regional (Conventions), national and local issues.

Table 2. Overview of institutes per level.

Category	Institute
European	ETC/MCE, JRC
Regional	ICES
National	RIKZ, (ENEA,) IMR, PETA, MIG
Local	EUCC

Remarks related to Table 2

- ENEA mainly gave input for the ETC/MCE. Therefore, ENEA was excluded from the analysis as national institute.
- EUCC is a European Union (for Coastal Conservation), but represents many local users.

Analysis per group

Based on the feedback from the CoastBase users (Table 2, the profiles for the groups 'European user' and 'National user' were elaborated. Firstly, the common characteristics within the groups were mentioned. Then, a short comparison between all groups was made.

Institutional preferences for area, topic and CoastBase objectives

The differences between the institutes concerning area and topic of interest were elaborated. This was a first step towards deducing how user requirements and data provision match within the CoastBase consortium. In addition, an assessment of the institutional user expectations was made.



ETC/MCE

Scale

The European Topic Centre on Marine and Coastal Environment (ETC/MCE) has a European focus, but uses national and regional data. The work of ETC/MCE includes spatial and temporal aspects.

Expertise of the organization

The European Environment Agency (EEA) contracted ETC/MCE (a European working group) to improve information on the marine and coastal environment at European level. The main objective of ETC/MCE is to provide reliable and comparable information linking state and pressure on the marine and coastal environment of Europe. ETC/MCE also has mandate to develop appropriate tools and procedures to assess the quality of the marine and coastal environment. Therefore, an effort towards harmonisation of reporting and assessment has been initiated by ETC/MCE and is still in progress (ETC/MCE, 1999a).

EEA and its ETCs focus on:

- Continuing to streamline the monitoring to reporting chain, according to the requirements for policy-relevant indicators;
- Further developing integrated environmental assessments to support policy framing and implementation;
- Helping to build capacity at European and national levels.

The work of the users within ETC/MCE can be described by the contacts of ENEA and RIKZ. One of the contacts of ENEA, for example, collects Italian data on eutrophication and oil spills for ETC/MCE databases. Table 3 gives a profile of RIKZ and a general description of the type of users (and suppliers) of information and data. The work of these users should be seen in the context of the DPSIR framework (Drivers-Pressures-State-Impact-Responses) and MDIAR (Monitoring-Data-Information-Assessment Reporting) chain. These users collaborate to deliver various products, for example: indicators for ETC/MCE, statistical tools development for ICES, National Evaluation Reports for OSPAR, contributions to Integrated Environmental Assessments ETC/MCE and OSPAR. (There is a close relationship between the Conventions and EEA.)

Table 3. RIKZ's users involved in national data analysis and ETC, OSPAR/ICES work.

User type	User description	Characteristics
Simple User	EIS writers team OSPAR/ICES EEA, Communication manager RIKZ / National EIS writers team	No detailed knowledge of the database /data model. Wizard driven
Specialist, data-broker	Information developer (indicator driven), scientist, EIS (Environmental Impact Assessment) analyst	Knowledge of the data model, wants to see the whole database
Specialist using GIS	As above	As above with GIS-knowledge
Data manager	Data and metadata manager	Data managers of the institutes and organizations connected to CoastBase

ETC/MCE is familiar with Internet applications in relation to EIONET

Related data / information issues

Input. Data from national providers (National Focal Points) and regional data, that is data submitted for the OSPAR (and HELCOM Commissions / Conventions).

Data processing. Conversion of data and extraction of indicators.

Products. Support to EEA, mostly in the form of data and monitoring reports, information and assessment reports, and databases (ETC/MCE, 1999a).



JRC/SAI

Scale

The work of the Joint Research Centre (JRC) has a European focus with a European or sub-European coverage. The practical work contains spatial and temporal aspects, which is demonstrated, for example, by time-series of images available on the JRC Web pages (JRC, 1996).

Expertise of the organization

The mission of the Space Applications Institute (SAI), one of the eight Institutes of the Joint Research Centre, is to develop and promote the use of space derived data in combination with geo-spatial information from other sources, especially in disciplines relating to agriculture, environment, fisheries transport and anti-fraud. JRC/SAI provides customer-driven scientific and technical support for the conception, development, implementation and monitoring of EU policies. As a service of the European Commission, JRC as a whole functions as a reference centre of science and technology for the Union. JRC's status as a Commission Service guarantees independence from private or national interests. This aspect is crucial for pursuing its mission. JRC carries out extensive research of direct concern to European citizens and industry. Over the years, JRC has developed special skills and unique tools to provide autonomous and Europe-wide expertise to improve understanding of the links between technology, the economy and society (JRC, 2000).

On Institute level the Marine Environment (ME) is the only unit dealing with coastal and marine issues in SAI. The mission of Marine Environment Unit is to develop thematic research and operational applications of remote sensing for the coastal and marine environment. Its activities aim at an integrated approach to environmental issues, combining the use of remote sensing data, in situ measurements and modelling (JRC-ME, 2000). The ME unit has expertise in deriving this kind of information for monitoring and assessment of marine and coastal waters using space-borne data (CoastBase, 1999). The ME Sector Monitoring and Assessment of Coastal Environment (MACE) maintains close contacts with its customers, mainly the DG Environment, the European Environment Agency (EEA), DG Fisheries and DG External Relations. The work for these customers includes the development and generation of indicators for monitoring the state and changes in coastal areas as well as the design and development of decision support tools to support the assessment of the state of the coastal environment.

SAI/ME-MACE represents JRC's 'coastal' user/data provider in CoastBase. The work of the (main) users within the ME Unit is represented by the activities of the MACE Sector. These activities aim to demonstrate end-to-end utilisation of Earth Observation (EO) data (from satellites in an operational context) for the management of coastal zones (JRC-ME, 2000).

The users are working on:

- DESIMA evaluation, verification and improvement/(distributed) information systems;
- Assessment of eutrophication in coastal waters/indicators of water quality;
- Assessment of coastal change/coastal erosion and accretion, suspended sediment transport;
- Scenario specification, system design and implementation;
- Specification, development and applications of decision support tools for coastal management/multi-criteria analysis.

Related data/information issues

Input. Mainly SeaWiFS data, but also AVHRR data and data from numerical simulations and in-situ measurements

Data processing. SeaDAS (SeaDAS, 1999) and ME's own processing algorithms for European waters.

Products. Spatial information on sea/ocean parameters (classified images, thematic maps, indicators).



ICES

Scale

The International Council for the Exploration of the Sea (ICES) is working on a regional (Conventions) and on a European level. Their databases contain data and metadata from national laboratories. Their users are working on national and international issues that involve multi-temporal aspects.

Expertise of the organization

ICES is an EU inter-governmental institution that includes all EU states of the North Atlantic. ICES has expertise in marine research, and in data management for OSPAR and HELCOM (CoastBase, 1999). ICES is hosting a number of databases with data from the marine environment. ICES makes these data available to the scientific community and the management Commissions. Access to the data is in some cases restricted to ensure the intellectual rights of the originator.

ICES makes internal use of these data through its working groups. The advice presented to governments and management Commissions are based on analyses where these data are an integral part. ICES's expertise and experience covers the following fields:

- Improvement of data and information access and availability through the ICES network;
- Advice on environmental issues as requested by management Commissions and Member countries;
- Promoting research in physical, biological and chemical processes in the marine environment (CoastBase, 1999).

Two examples describe the work of possible CoastBase users within ICES:

- The Marine Chemistry Working Group (MCWG) or HELCOM assessing heavy metals in the marine environment in, for example, the HELCOM area;
- HELCOM assessing eutrophication status of the Baltic Sea.

Related data/information issues

Input. ICES makes internal use of its data through its working groups. The advice presented to governments and (regional) management Commissions are based on analyses of these data. In the examples given by ICES in answer to the request for user profiles, ICES data have to be combined with data from national data centres and from regional (HELCOM) sources. Possible non-ICES data mentioned vary from data on atmospheric deposition of heavy metals to the concentration of nutrients in freshwater.

Data processing. Statistical analysis, time series analysis, creation of maps.

Products. ICES provides highly aggregated products (mainly reports) on heavy metals, eutrophication and water quality. The examples would result in maps and trends.



RIKZ

Scale

The National Institute for Coastal and Marine Management (RIKZ), which is a part of the Dutch Ministry of Public Works, Transport and Water Management, provides advice and information on the sustainable use of estuaries, coasts and seas, and on coastal flood protection, and has primarily a national focus. The RIKZ also serves other parts of the national central government and co-operates with various agencies and organizations at international level (ETC/MCE, OSPAR, EuroGOOS, SEANET, a.o.).

Expertise of the organization

RIKZ maintains the national information infrastructure on all 'wet' data gathered by the Ministry of Transport, Public Works and Water Management, this system is called "DONAR". This is the result of monitoring the Dutch coastline and sea areas related to the distribution, transport, fluxes and sources of sea water and antropogenic compounds in the North Sea. RIKZ is currently preparing an Internet accessible database with aggregated information regarding the quality of the national waters.

RIKZ has broad experience in gathering meta-information and real information in a heterogeneous and distributed environment obtained through the extensive previous experience and recent projects such as REMSSBOT, SEANET and EuroGOOS. These projects have been focusing on the importance of international co-operation, standardisation and use of each other's information. One of the main items within these projects is the accessing and interpreting of information coming from multiple sources.

As partner in the Topic Centre of Marine and Coastal Environment (ETC/MCE), RIKZ is actively involved in the European assessing, aggregating and interpreting of information (see ETC/MCE paragraph). Therefore, harmonisation and standardisation of information from different institutes and countries for joint environmental assessment is an important item for RIKZ.

In addition, the Netherlands is a signatory to the OSPAR Convention on 'the Protection of the Marine Environment of the North-East Atlantic', and has therefore the legal obligations to co-operate on OSPAR Commision issues and to implement the actions under the Convention. OSPAR is organized on different levels in technical working groups to prepare and evaluate the activities in relation to the OSPAR strategies. Also within the OSPAR context, activities of RIKZ focus mostly on Assesement and Monitoring. The yearly submission of monitoring data on the North Sea to ICES, co-ordination of the the production of the Quality Status Report of the North Sea (to be published in 2000), and further development of Ecological Quality Objectives for the Convention Area are some examples covering the broad range of activities which are carried out by the Institute.

Below, work of possible CoastBase users within RIKZ is described.

- Accessing and aggregating information (coming from institutes in other European countries) regarding biological, chemical and physical parameters on the short term. On the longer term (3-5 years), when data on European level considering Pressure, Driving Forces and Responses become available, Integrated Coastal Zone Management (ICZM) subjects can be included.
- Checking the quality of contents and methodology of aggregation.
- Working on national, information-processing related projects, that are dealing with accessibility, aggregation, manipulation and linking of different information sources.

Most of the end-users within the RIKZ provide advice to International policy making agencies regarding the marine and coastal environment. Topics addressed range from state and impact of a variety of parameters to future threats to this environment. RIKZ delivers information to ICES and OSPAR regarding these themes.

Related data/information issues

Input. Input consists of measurements. The data are stored in DONAR and a geographical database is used, called Geokey. These information sources mostly require additional data and information.

Data processing. Processing the measurements in various ways

Product. Activities, advises, reports, trends and maps can be products.



IMR

Scale

The Institute of Marine Research (IMR) is working on a national level and manages the Norwegian Marine Datacentre (NMD). The data contain spatial and temporal aspects.

Expertise of the organization

IMR is a national institute with expertise in oceanographic research and a focus on life cycles (CoastBase, 1999).

The tasks of the institute are:

- To study and monitor life cycles and interactions of different organisms in the ocean and coastal marine environments;
- To continuously update present knowledge of marine resources of importance to the fishing and aquaculture industries;
- To develop a biological basis and technology for future-oriented fishing and aquaculture industries;
- To give the fisheries authorities and industry advice on the management of our marine environment and resources;
- To inform about research results in a manner which promotes the interests of the fishing and aquaculture industries and society in general (IMR, 1999).

The main users within IMR are working in the Department of Marine Environment. In this department the main emphasis is on monitoring and assessment of Norwegian coastal and oceanic waters and to relate the research results to fisheries management. Its main expertise is on:

- Ocean climate variability and its impact on fish resources;
- Plankton production as basis for fish populations;
- Level of pollution and its impacts on the marine food web and quality of fish;
- Demersal habitats and ecological effects of fisheries (CoastBase, 1999).

Two examples describe the work of potential CoastBase users within IMR:

- Assessing effects of climate changes on fish stocks;
- Planning a new salmon farm in a Norwegian fjord.

Related data/information issues

Input. Input consists of measurements that are mainly performed from ships (IMR, 1999). The examples require additional data, maps, spatial plots, time-series, trends and model results on a variety of topics ranging from ocean temperature (and salinity) to fish stocks, plankton and toxic algae to shipping routes, pollution and industry.

Data processing. Processing the measurements. In the examples data processing would consist of integration of disparate data (in topic and format).

Product. Reports and the NMD.



PETA

Scale

The users represented by Information Training and Local Development (PETA) are mainly working on a national scale, but they are also interested in comparing their approach of environmental monitoring with that of other countries. They are subdued to and involved in policy making on a European scale. They are dealing with spatial and temporal (monitoring) issues.

Expertise of the organization

PETA is a consulting company, supporting local, regional and national administrations. PETA has close links to government environmental institutions, and has experience in environmental EU projects (CoastBase, 1999).

The end users represented by PETA are working in The Ministry of the Environment, Physical Planning and Public Works. This Ministry is responsible for the production, maintenance and update of environmental information at national level. It is also responsible for the disposal of this information to interested parties, like other ministries, environmental agencies and institutions, as well as the general public. Moreover, the Ministry is the main national contact point in the environmental domain between Greece and the EU, and, in this respect, it is responsible for following the related directives and for providing the necessary national information. The Ministry addresses all environmental subjects. The Water Section of the Ministry is responsible for controlling and preserving all kind of related data at national level, including:

- Inland, sub-ground and surface waters;
- As well as bathing waters and measurements concerning the quality of the marine and coastal environment.

The Water Section has expertise in bathing waters quality measurements and information handling.

The Water Section is acting as the National Reference Centre for the marine and coastal environment domain, and is for this reason co-operating both with the NFP, as well as the ETC/MCE with regard to the EEA tasks and action lines. A major current activity of the Ministry is the development of the National Environmental Information Network (EDPP)

Related data/information issues

Input. Water quality samples.

Data processing. The samples are evaluated according to the criteria of the 76/160 EEC directive. Then, the results for every sample are reported to the Ministry for the final analysis. The data from the sampling report and the resulting report are registered in a personal computer by typing. The registration of the information is done using a DB3 system. (This will, however, be integrated into an Oracle database once the National Environmental Information Network is completed). The first reports concerning the condition of the bathing waters of the current year are ready when the last data of October are available. Every site is classified into a category according to the range of the results of the corresponding samples and the limitations of 76 /160 directive.

Products. After collecting and analysing all data, the Ministry of the Environment summarises them into an annual bulletin with comparisons with the previous years. Printed maps are distributed to the involved municipalities, prefectures and other local or tourist authorities. The final data are sent to EU DGXI.



MIG

Scale

The Maritime Institute Gdansk (MIG) is mainly working on a national scale but wants to compare measurements and measurement methods applied along the Polish coast to those of other countries along the Baltic Sea. MIG, therefore, also has a regional interest. MIG is frequently dealing with spatial and temporal (monitoring) issues.

Expertise of the organization

MIG is a national institute supporting maritime industry and has experience in marine EU projects (CoastBase, 1999). The main role of Maritime Institute in Gdansk, within the CoastBase Project, will be that of a user of the system. (MIG might also become a data-broker; it might become a National Data Centre.)

Recent expertise has been gained in the following projects:

- Activation of the Elblag region; sea/inland transport, recreation and fishing;
- Water and wastewater management, and environmental protection of the lower Odra;
- Coastal protection structures with fill material stabilisation using geo-textiles and geobio-textiles;
- Evaluation of corrosion hazards and elaboration of methods for extending the lifetime of maritime hydrotechnical structures;
- Securing safety in Polish Zone of the Baltic Sea (CoastBase, 1999).

The main users of CoastBase are probably the researchers within MIG, although MIG also has contacts with other stakeholders dealing with the Polish coast.

Related data/information issues

Input. The users at MIG have data collected for their scientific research. They would like to validate their data sets by comparing their data on the Polish coast to that of, for example, the German coast.

Data processing. Various analyses, amongst others, spatial and trend analyses.

Products. Reports and a wide range of services, consulting, expert opinions and training within scope of the statutory activities (CoastBase, 1999).



EUCC

Scale

The European Union for Coastal Conservation (EUCC) has a European focus, but is representing users on all levels. As CoastBase partners they are important representatives of local users. These users are frequently dealing with spatial and temporal (monitoring) issues.

Expertise of the organization

EUCC is a non-Governmental European body with expertise in coastal conservation. EUCC's mission is to gather and provide information and give advice, based on the best available scientific data. Information is tailored specifically to aid policy formulation and decision making related to the coast. EUCC also promotes public awareness about coastal conservation, and develops partnerships amongst a wide variety of stakeholders. EUCC has a large variety of end users. It is the largest coastal network in Europe, with 750 members and member organizations. EUCC's membership covers all European coastal states, linking:

- 350 coastal institutes involved in coastal management, planning, ecology, engineering, pollution control etc.;
- 80 non-governmental organizations (NGO's);
- 70 government agencies at national, regional and local levels;
- 50 conservation site managers (CoastBase, 1999).

This list illustrates the diversity in individual users represented by EUCC in CoastBase.

Three examples describe current work of possible users of CoastBase that are represented by EUCC:

- Planning a wind-mill park between Wadden Sea and IJsselmeer to provide electricity to the Dutch provinces of North Holland and Friesland;
- Anticipating possible effects of climate change in the coastal zone;
- Studying the feasibility of a new international airport off the Dutch coast.

A planning team can make recommendations after taking the following steps:

- Deciding which issues need to be addressed (environmental considerations, resource issues, economic opportunities or social implications).
- Determining what is already known, and what still needs to be investigated.
- A consultant is hired and/or a working group is established to get information that is not yet available. (For example, on geology, geomorphology, climate and sea level, landscape, coastal/marine habitats and species, human use and activities, economic issues, and social and cultural issues).
- The planning team, working group and/or consultant search this information. (In future, this is to be enabled by CoastBase).

Consumers of information related to these examples vary from governmental organizations to biologists to lobbying groups for water sports.

Related data/information issues

Input. For EUCC itself input normally consists of a variety of (scientific) data. The three examples require diverse (disparate) data in topic and format. The data vary from geological maps to bird counts to international NATO agreements.

Data processing. For EUCC, data processing comprises all processing required to bridge the gap between science, planning and management, especially at an international level. In the examples, data processing would consist of integration of disparate data (in topic and format).

Products. EUCC gathers and provides information and gives advice. Information is tailored specifically to aid policy formulation and decision making related to the coast. EUCC also promotes public awareness about coastal conservation, and develops partnerships amongst a wide variety of stakeholders. (The above also covers output from users of the examples).



Common characteristics

European profile

In both European institutes the users are working in teams consisting of individuals with different backgrounds, technical knowledge and interests. Both institutes use spatial information (maps, classified imagery), and temporal information (time-series).

National profile

Two of the three national users expressed an interest in comparing data and monitoring methods with those of other nations. All national institutes are working with measurements (samples) that are subjected to statistical, spatial and temporal analyses.

Comparing all groups

Four groups were distinguished in the identification of institutional users, users working on a European, regional, national and local level. Previously, short summaries of common characteristics of the users at the European and national level have been presented. Only one CoastBase partner represents institutional users on regional and local level respectively. Therefore, reference is made to the previously presented profiles on page 14 and 20 for more information about these groups.

They all have the following in common:

- They are all dealing with spatio-temporal aspects;
- They are all somehow involved in, or supporting, policy-making.

It is important that these issues, which they all share, are kept in mind in the development of CoastBase!

Most institutes also provided examples that demonstrate how actual users in their organization could use CoastBase. These examples had in common that disparate data are used, compared and/or integrated.



Differences between the institutional users

Area

The following 'main areas' were distinguished: Arctic Ocean (including Greenland Sea), Norwegian Sea, Baltic Sea (including Skagerak, Kattegat, Gulf of Bothnia, Gulf of Finland), Atlantic Ocean (including Irish Sea, Celtic Sea, Atlantic Ocean east of Spain), North Sea (including Wadden Sea), Canal, Gulf of Biscay, Mediterranean Sea (including Tyrrhenian Sea, Adriatic Sea, Egean Sea) and Black Sea (including Sea of Azow).

Table 4 gives institutional interest in (parts of these) main areas

Table 4. Responses per area.

Area	Organization
Arctic Ocean	IMR
Norwegian Sea	ICES, IMR
Baltic Sea	ETC/MCE, JRC, ICES, MIG
Atlantic Ocean	
North Sea	ETC/MCE, RIKZ, (EUCC)
Canal	
Gulf of Biscay	
Mediterranean Sea	ETC/MCE, ENEA, JRC , PETA
Black Sea	

Remark related to Table 4

- In case more than one area of interest was indicated, areas of primary interest were included in the table in bold
- EUCC users are interested in all areas. They were mentioned for the North Sea because of their organizational interest in the Wadden Sea (and because this interest was explicitly expressed in their examples).

Topic

A variety of inter-related topics occur in coastal and marine management (Doody et al, 1998, Sorensen, 2000). Therefore only the major topics were derived from the input of the users themselves and presented below.

Table 5. Topics of main user interest.

Topic	Organization
Integrated management of coastal areas	ETC/MCE, EUCC
Management and protection of marine waters	ETC/MCE
Pollution/Water quality	ETC/MCE, ICES, MIG, PETA
Eutrophication	ETC/MCE, JRC
Climate change	IMR, EUCC
Coastal change	JRC , (MIG)
Protection of natural areas	ETC/MCE, EUCC
Biodiversity	EUCC
Fisheries	(ICES), IMR
Maritime industry	MIG
(Spatial) planning	ETC/MCE EUCC
Tourism	ETC/MCE, (PETA)

Remarks related to Table 5

- Bold topics are of special interest to a certain user.
- Integrated management of coastal areas, and Management and protection of marine waters also comprises many of the other classes.



- One could read RIKZ where it says ETC/MCE, because RIKZ answered for the Topic Centre.
- Topics of interest for EUCC that were given in the examples are presented in bold. In addition EUCC (as an organization) is related to some other topics, because of the specific interests (Protection of natural areas, Integrated Coastal Zone Management Policy and Biodiversity) mentioned in their web-pages (EUCC, 2000). For these cases EUCC is specifically mentioned in the table. However, when reading the table it should be kept in mind that the users that they represent are interested in all topics.



Individual user profiles

Considering that CoastBase aims to satisfy a variety of users, it seems necessary to see if certain groups of users are distinctly different, and if they have very specific wishes, so that a certain group is not unintentionally excluded.

Identification of groups

Requirements of the individual user probably differ according to their function. The following categories were identified in the questionnaire: decision maker, policy maker, administrator, researcher and/or other.

Table 6. Responses per professional aspect.

Category	Respondent
Decision maker	PETA1, PETA3
Policy maker	PETA1, PETA3, EUCC1, (EUCC3)
Administrator	EUCC2
Researcher	JRC, MIG, IMR
And/or other	PETA2 (database administrator), RIKZ3 (programmer, administrator), RIKZ1, 2, 4, 5 (policy advisor, project manager)

Remark related to Table 6

- Users PETA1 and PETA3 indicated to belong to both the 'Decision maker' and the 'Policy maker' category.
- The EUCC3 contribution is acknowledged, but was excluded from further analysis because, this person had no access to the Internet, and is as such currently not a real user of CoastBase.

For further analysis the following categories were considered.

Table 7. Responses per professional aspect.

Category	Respondent
Decision & policy maker	PETA1, PETA3, EUCC1, (EUCC3)
Policy advisor & project manager	EUCC2, RIKZ1, RIKZ2, RIKZ4, RIKZ5
Researcher	JRC, MIG, IMR
Database administrator & programmer	PETA2, RIKZ3

Analysis per group

Based on the feedback from the CoastBase users (Table 1), the profiles for the groups 'Decision & policy maker, Policy advisor & project manager, Researcher, and Database administrator & programmer' (Table 7) were elaborated. Firstly, the common characteristics within the groups are mentioned. Then, a short comparison between all groups was made.

Individual preferences for area, topic and CoastBase objectives

The differences between the individual users concerning their area and topic of interest were elaborated. This was required for concluding how user requirements and data provision match within the CoastBase consortium. Additionally, the individual user expectations were assessed.



Decision & policy maker profile

Scale

The three users that fitted this profile indicated that they are responsible for coastal issues on a national level. In their work they are frequently dealing with international conventions and European policies. Their work contains spatial and temporal aspects (in the form of scenarios or sampling regularly).

Daily work

Their work involves mainly project management and word-processing (reports). One of the users also performs spatial analysis. Internet is used for data exchange, information provision and knowledge upgrade.

Related data/information issues

Inventory

All users have Pentium PCs, using Windows 95 or NT, they have a permanent high-speed connection to the Internet and they use either Netscape Communicator 4.5 or higher or Internet Explorer 5.0. For two of them technical support (system administration) for CoastBase will be available.

Data/information flow

Input. Two of the users are mainly using texts and in-situ data for daily work, as well as reports generated. All their data are available in digital format and are being stored on hard disk. Through the EIONET, EEA related data are being downloaded from the Internet. The third user uses virtually all media as input.

Manipulation and processing of input data. Data manipulation consists of word processing. None of the users performs numerical simulations. They are interested in spatial analyses. Two of them might use some GIS tools for spatial analysis when the national environmental information network (EUPP) is complete. The third one already analyses data spatially, numerically and statistically.

Output. They all create output in the form of reports (in digital and printed form). The Internet is being used to present information, and will increasingly be used to do so. More information could be made available for the CoastBase project.

Goal

Two of the users in this category expect CoastBase to facilitate the provision and presentation of data and information. The third expects CoastBase to be of use for his co-workers and partners.

Remarks related to the decision & policy maker profile analysis

The profile contains more information about the decision & policy makers than just the common points. This is because there were quite some differences within the group. The results for the two policy makers that work within the same organization are very similar though.



Policy advisor & project manager profile

Scale

Four of the five users indicated that they are working on international issues on a regional or European level. One is mainly working on a national to local level. Their work contains spatial and temporal aspects.

Daily work

The topics on which they work vary. Their work involves mainly project management and word-processing (reporting). Some perform spatial or temporal analyses. There are some enthusiastic Internet users in this group.

Related data/information issues

Inventory

All users have Pentium PCs, using Windows 95, they have some permanent connection to the Internet and they all use Netscape Communicator 4.5. They did not understand (or did not know) if they could get support of a system administrator for running CoastBase.

Data/information flow

Input. They mainly use texts, but nearly all users also use maps, some use also model results. Most of the required data are available in digital format. Some data used in their daily work are available in their in-house central database. The data are stored on their hard disk and Intranet. The frequency with which they need new data varies from a few times a year to nearly every day.

Manipulation and processing of input data. Data manipulation consists mainly of word processing. Some use GIS or statistical tools, numerical modelling is hardly used.

Output. They create output in the form of reports (in digital and printed form). Two users have others storing their results for them. Some users currently use the Internet to present information. Only some users would be willing to make their results (highly aggregated data) available on the Internet for the CoastBase project.

Goal

The expectations of CoastBase vary considerably within this group. Some expect to use it a lot, some will only use CoastBase if certain criteria are met (concerning data, metadata and user-friendliness), and some users don't expect to use it at all.

Remarks related to the policy advisor & project manager profile analysis

There were differences in the data and information flow within the group. The results might be biased because all policy advisors & project managers work in the same organization.



Researcher profile

Scale

All three users indicated that their work has an important regional component. The regions studied differ between the users. The resolution used in their studies contains a scale level of 100rds of metres to kilometres. All 3 users indicated that their work contains temporal aspects, and they are all incorporating a time scale of years.

Daily work

The thematic topics studied differ. The work of every researcher involves word-processing, data manipulation or spatial analysis. The intensity of the use the Internet to update the knowledge and contacts in the thematic field differs.

Related data/information issues

Inventory

They all use a Pentium 400-500 MHz PC, with a 8 GB HD, and have different versions of a Windows operating system. In addition, they all have access a Unix machine. They all have a computer with a permanent high-speed connection to the Internet. They all have access to both Netscape (version 4.5 and higher), and Internet Explorer (version 4.0 and higher). They all don't expect to get or need much systems support.

Data/information flow

Input. They all use data from various data sources including in-situ data and data from simulations. They all receive data in various formats, amongst others as maps. They all also use also data that are not available in digital format. They all receive part of their data by email and ftp. The data are stored differently for each institute/user. Two researchers answered that frequency with which new data or information is needed differs per parameter from daily or monthly to (more) yearly; the other one did not react.

Manipulation and processing of input data. They all read, interpret and file texts, make statistical analyses and use the results from numerical simulations. They do not use the Internet for processing, but they have downloaded programs and routines from the Internet, which have been used without assistance. Their experience in system management differs, but seems in all case limited.

Output. They all create output in the form of reports and articles (on paper), and store also digital copies. They all intend to use the Internet to present information and are willing to put some results back into CoastBase.

Goal

They all want to use CoastBase as a search engine. They all want to use CoastBase for obtaining raw data for their daily work.

Remarks related to the researcher profile analysis

The results might be biased because all researchers are involved in, or are closely working with people involved in European projects.



Database administrator & programmer

Scale

The two users indicated that they are responsible for environmental issues on a national level. Their work is linked to a European level. They are both interested in the Greek seashores. Their work contains spatial and temporal aspects. They both work with measurement/sampling data.

Daily work

Their daily work involves receiving data, processing data and making reports. The Internet use of both users differs. One uses the Internet for data exchange, information provision and knowledge upgrade; the other hardly uses it.

Related data/information issues

Inventory

They both use Pentium PCs, using Windows. One also works on a UNIX server. One has a permanent high-speed connection to the Internet, the other one doesn't know. They both use Netscape. One could get technical support (system administration) for CoastBase, the other couldn't.

Data/information flow

Input. Mainly maps, in-situ data and numerical data are used for daily work. Almost all data are available in digital format, and large quantities of data are available from databases or archives in-house.

Manipulation and processing of input data. Data manipulation consists of mainly statistical analysis. Neither numerical simulations nor spatial analyses are being performed, but one of them might use some GIS tools for spatial analysis in future.

Output. They create output in the form of reports (in digital and printed form). They store the data on their PC (and one on the Intranet). The statistical data are mainly available for internal use. One uses the Internet for presentation of information. They are both willing to put results back into CoastBase

Goal

They both expect CoastBase to facilitate the provision of data from other countries.

Remarks related to the database administrator & programmer profile analysis

Though their daily work is similar, one uses the Internet, but the other uses data that are archived in-house.



Common characteristics: Comparing all groups

Four groups were distinguished in the identification of individual users, decision & policy maker, policy advisor & project manager, researcher, and database administrator & programmer.

Summaries of common characteristics of users within these groups were presented on the previous pages. Before the groups are compared it should be recognised that there are differences within the groups. In this respect, it should be noted that there is a greater spread within decision & policy makers and policy advisors & project managers, than within researchers and database administrators & programmers. Therefore, it might be more difficult to satisfy all members of the first two groups.

When comparing the four groups, it appears that they all have the following in common:

- They are all dealing with spatio-temporal issues;
- They all use a similar PC;
- They all don't perform extensive numerical modelling;
- They all produce output in the form of reports.

It is important that these characteristics, which they all share, are kept in mind in the development of CoastBase!



Differences between the individual users

Area

The following main areas were distinguished: Arctic Ocean (including Greenland Sea), Norwegian Sea, Baltic Sea (including Skagerak, Kattegat, Gulf of Bothnia, Gulf of Finland), Atlantic Ocean (including Irish Sea, Celtic Sea, Atlantic Ocean East of Spain), North Sea (including Wadden Sea), Canal, Gulf of Biscay, Mediterranean Sea (including Tyrrhenian Sea, Adriatic Sea, Egean Sea) and Black Sea (including Sea of Azow).

Table 8 elaborates the user interest per main area. They are identified by organization and professional aspect. For professional aspect the following codes were used decision & policy maker (Dpm), policy advisor & project manager (Ppm), researcher (Res), and database administrator & programmer (Dap)

Table 8. Responses per area.

Area	Respondent
Arctic Ocean	<i>Res-IMR</i>
Norwegian Sea	<i>Res-IMR</i>
Baltic Sea	<i>Res-MIG, Res-JRC,</i>
Atlantic Ocean	<i>Ppm-RIKZ5</i>
North Sea	<i>Dpm-EUCC1, Ppm-EUCC2, Res-JRC, Ppm-RIKZ2, Dap-RIKZ3, Ppm-RIKZ4, Ppm-RIKZ5</i>
Canal	
Gulf of Biscay	
Mediterranean Sea	<i>Res-JRC, Dpm-PETA1, Dap-PETA2, Dpm-PETA3</i>
Black Sea	

Remarks related to Table 8

- The users were stimulated to indicate more than one area of interest. The areas of secondary interest were included in the table in italic. Often their area of secondary interest is not specified, but the interest in comparing prime area to others was expressed. One user, Ppm-RIKZ4, is interested in comparison with Non-European areas.
- One user, Ppm-RIKZ1, is interested in all (European) areas.
- One user, Ppm-RIKZ3, mentioned some physiographic units as areas e.g. (input from) rivers.

Topic

A variety of inter-related topics occur in coastal and marine management (Doody et al., 1998, Sorensen, 2000). Therefore only the major topics were derived from the input of the users themselves and presented below.

Table 9. Topics of main user interest.

Topic	Respondent
Integrated coastal zone management	<i>Ppm- RIKZ1</i>
Environmental issues	<i>Dpm-PETA3, Ppm-RIKZ2, Ppm-RIKZ5</i>
Pollution/Water quality	<i>Res-MIG; Dpm-PETA1, Dap-PETA2, Ppm-RIKZ2, Dap-RIKZ3</i>
Eutrophication	<i>Ppm-RIKZ2, Dap-RIKZ3</i>
Climate change	<i>Res-IMR</i>
Coastal change (Sediment budgets)	<i>Res-JRC, Dap-RIKZ3</i>
Human impact	<i>Ppm-RIKZ2, Ppm-RIKZ5</i>
Historical, social and cultural aspects	<i>(EUCC)</i>
Economic development	<i>Ppm-RIKZ2</i>
Biodiversity (Biota)	<i>Res-IMR, Dap-RIKZ3</i>
Fisheries	<i>Res-IMR, Ppm-RIKZ4</i>
Planning	<i>Dpm-EUCC1; Ppm-EUCC2</i>
Tourism (Bathing waters)	<i>Dpm-PETA1, Dap-PETA2</i>



Remarks related to Table 9

- User Dpm-PETA3 is interested in Environmental Issues, and therefore all topics mentioned in Table 9.
- Users Dpm-EUCC1 and Ppm-EUCC2 indicated that heterogeneous information is required in real coastal problems. It could be discussed if information on financial and technical aspects of their problem should also be included in CoastBase.
- EUCC could only perform very limited sampling of their vast user group with highly disparate requirements. In addition, individual EUCC users could therefore be added as respondent for all topics.



Objectives of the user

The extracted objectives in using CoastBase from the responses by the organizations and by individual users are mentioned below. This is followed by the Conclusions that will give an overall assessment of the user expectations in relation to the original aim of CoastBase as extracted from the proposal.

From the organizations

Organizations involved in marine and coastal management want to increase their collaboration to strengthen both their individual position within their (respective) countries as well as European-wide (CoastBase, 1999). In addition these organizations, and especially EUCC, aim to use CoastBase to improve decision making (that promotes coastal conservation), undertake more effective integrated coastal zone management, and enforce policies of (ecologically) sustainable coastal development along coasts

Below an overview is given of the institutional user expectations from CoastBase.

Organizations acting on a European level

- **ETC/MCE** is represented by **ENEA** and **RIKZ**. CoastBase can be used for keeping track of the databases and reports produced for ETC/MCE. Through CoastBase these meta-information can be made available to a wide public, while an authorised group can access the databases that are archived in a distributed way (namely by different ETC/MCE partners). In addition, CoastBase can connect ETC/MCE with the main data providers such as ICES, UNEP MAP, to facilitate the data search and download and to enlarge the group of users that can access ETC/MCE databases. CoastBase will reduce the time needed to search and acquire information regarding the state and trends of the European marine and coastal areas. Furthermore, the CoastBase project should allow extension towards other European information sources in the field of ICZM, for example the OSPAR Convention and the EuroGOOS and SeaNet initiatives. The development of an innovative tool connecting several automatically updated metadata databases is of interest for their purposes. (CoastBase, 1999).
- **JRC/SAI** expects the concepts and methodologies developed in CoastBase to be useable for integration and interfacing with the prototype of an information system JRC/SAI is designing and developing for the European Environment Agency (EEA). This system will enable EEA to access and process relevant data (sets) which are required by EEA to provide information to policy making agents and the public (CoastBase, 1999).

Organizations acting on a regional level

- **ICES** expects to use CoastBase for presenting the ICES Data bases to its users. ICES further considers whether CoastBase could be used for presenting other data (fisheries catch statistics, abundance survey results and the oceanographic data) held by the ICES secretariat (CoastBase, 1999).

Organizations acting on a national level

- **RIKZ** expects to use the developed generic system architecture in other related fields. The generic system (to be developed) is interesting for management of national information sources; several current projects focus on the possibility to access multiple national data sources, the maintenance of these metadata links is very time consuming. So it complies with future developments for RIKZ, specially, as RIKZ is the national data manager for the "wet-information" of the whole ministry (CoastBase, 1999).
- **IMR** expects CoastBase to give access to coastal and ocean observations from neighbouring countries, which is useful for their annual environmental report. Access to an integrated database would help in the periodic regional environmental assessment for Arctic Monitoring and Assessment Programme (AMAP), European Environmental Agency (EEA) and the regulatory commissions (OSPAR and HELCOM). CoastBase tools that allow a nearly continuous environmental assessment are needed to integrate fisheries and environmental management, which is required for the North Sea Conferences (CoastBase, 1999).



- **PETA** expects CoastBase to set the basis for a constructive data flow and management in the domain of the marine and coastal environment, taking into account the national needs and the EEA guidelines. Especially the Greek Ministry of the Environment is interested in ensuring interoperability between the CoastBase and EIONET, as well as the National Environmental Information Network, which is now under development (CoastBase, 1999).
- **MIG** expects that Coastbase will allow them to take advantage of technological achievements that can be used in their technical environment and in their application domain (CoastBase, 1999). MIG would favour the data in CoastBase to be searchable in Polish.

Organizations acting on a local level

- **EUCC's** users expect CoastBase to be a metadata system that can provide information on a variety of data required for planning.
EUCC itself expects to learn from CoastBase, as EUCC is also developing an information service for its members (750, mostly organizations), the European Coastal Guide, with various communication facilities (e.g., mailing lists, Helpdesks). Hence, EUCC will exploit CoastBase in connection with this Coastal Guide and as an interface to its members (CoastBase, 1999).

From the individual users

Below an overview is given of the individual user expectations from CoastBase.

Decision & policy makers

- The **PETA1** user expects CoastBase to facilitate the provision and presentation of data, to benefit from the interfaces that would be developed in CoastBase, and to get more information concerning the way other European countries are processing and presenting their water data.
- The **PETA3** user expects Coast Base to enhance the delivery and presentation of information to the ETC/MCE, to set an example for similar developments in other ETCs of EEA, and to be incorporated in the national environmental information network (EDDP), demonstrating in this way the connection between the national network and EIONET.
- The **EUCC1** user expects CoastBase to support his co-workers and partners.

Policy advisors & project managers

- The **EUCC2** user expects CoastBase to complement information from the library.
- The **RIKZ1** user expects CoastBase to exchange effectively on all steps in the MDIAR chain, and to allow an overview of available information and easy access for processing.
- The **RIKZ2** user expects CoastBase to provide (monthly) data on (mainly) water quality parameters, their temporal trends and spatial distribution. This information will be used to assess progress as a result of Dutch policy in a European context.
- The **RIKZ4** user expects CoastBase to allow easy file and data handling by selecting areas, selecting species of a group of species and choosing the available parameters. Output should consist of easy to read figures (maps). The data underlying data should be available for further processing. (The user is not sure of actually using CoastBase)
- The **RIKZ5** user expects CoastBase to open new ways for exploring available information that can be used in environmental monitoring and assessment.

Researchers

- The **JRC** user expects that CoastBase can find some basic data. The user would favour CoastBase to provide visualisation tools, and especially to facilitate quicklooks of spatial data.
- The **MIG** user expects CoastBase to facilitate the search process, to provide data to in easy importable/transformable formats. The user would favour CoastBase to incorporate tools for visualisation especially of satellite images or digital maps.
- The **IMR** user expects to save time, because all information is provided 'at one place' i.e. by CoastBase. After specifying a geographic area or field, CoastBase would search for all required data and information needed to study a problem.



Database administrator & Programmer

- The **PETA2** user expects CoastBase to facilitate the provision and presentation of data, to benefit from the interfaces that would be developed in CoastBase, and to get more information concerning the way other European countries are processing and presenting their water data. (Similar to PETA1).
- The **RIKZ3** user expects CoastBase to provide easy access to data of other countries and to get information on the chemical monitoring of other countries.

Overall assessment

The institutional and individual user's expectations from CoastBase can be summarised as:

- Access to data;
- Presenting results;
- Getting informed about the CoastBase structure & method.

More detailed user expectations are, however, quite diverse. A certain diversity in objectives could also be deduced from the many objectives mentioned on various pages of the CoastBase proposal (CoastBase, 1999).

The current inventory shows that each user-group has its own expectations. Decision & policy makers expect CoastBase to help them with data provision and presentation. Policy advisors and project managers are more focused on data exploration. Researchers are interested in all aspects of data handling, while the database administrator and programmer were interested in international comparisons. On an individual level the expectations between groups was not always so clear; sometimes individuals within a certain group express expectations that are indicative for other groups.

The presentation needs of the decision & policy makers are different from the data manipulation needs of the researchers. While the researchers can be expected to have a detailed focus and capacity to interpret and assess the quality of raw data, the decision & policy makers need data that are pre-processed by policy advisors or researchers.



3. Overview of data banks and data sets available within the CoastBase consortium

Introduction

The aim of this chapter is to give an overview of the information regarding the data banks of each of the possible CoastBase data providers. Where possible the reader is referred to URL's for more information on the data. The following data providers were identified at the kick-off meeting in Amsterdam (10 and 11 January 2000): ICES, JRC, RIKZ, ENEA, IMR and EUCC (providing links).



ICES

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Description of the data bank

Files are received in reporting format (ASCII), containing lab, data type and year. For a detailed description of the file format, please refer to <http://www.ices.dk/env/repfor/index.htm>. These files are handled by SAS-programmes; each file in reporting format also exists as SAS-data set. Other programs are used to screen the data files before they are entered in the file system. New databases on biological communities are under development in MS ACCESS. There are plans to move the existing archive into MS ACCESS (or other database).

Data access

ICES has no well established data policy with its clients (OSPAR, AMAP and HELCOM). AMAP is in the process of developing a data policy. Before data are released, permission has to be asked to the commissions/data providers. This process usually takes three to four weeks. Most laboratories give permission especially if the data products are aggregated data. No restrictions are expected regarding the metadata. The index is search able at <http://www.ices.dk/env/>. The laboratories of some countries will allow access to the data. Access available via ftp, other ways are negotiable.

Descriptive information/metadata

The metadata format differs per data product and exists as additional comments to the submission file of each country.

The first record of every file must be a 00-record, specifying the version numbers of the reporting format, the screening program and the valid code list of the file (Jensen, 1999). Please look at <http://www.ices.dk/env/repfor/index.htm>.

Update frequency

Currently around two files per month. Future expectation of about 150-200 files per year.

Description of the available data sets

The Environmental Data Centre, although relatively new, contains probably the largest international data bank on contaminants in marine media. Computerised in 1983, the data bank contains data back to 1978 for contaminants for which the data are considered to be valid, mainly on trace metals in finfish and shellfish.

At present, the data bank contains the following components:

- Contaminants in marine invertebrates, fish, birds, and mammals (ca. 275,000 records);
- Contaminants in sea water (ca. 280,000 records);
- Contaminants in sediments (ca. 80,000 records);
- Data from measurements of the biological effects of contaminants: enzyme assay and oyster embryo bioassay (ca. 4000 records);
- Fish disease prevalence data (ca. 80,000 records);
- Quality assurance information.

A search of inventories is available on <http://www.ices.dk/env>.



JRC

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Description of the data bank

JRC has an ordered file system of remote sensing data. An overview of the directory structure is given in Figure 1.

```
satellite name
|
area
|
year
|
month
|
day_time
```

Figure 1. Example of directory structure in JRC file system.

Data access

The data can be freely accessed via <http://me-www.jrc.it>. Provided that JRC is acknowledged when data is used or published.

Descriptive information/metadata

Descriptive data is currently not readily available, it is foreseen to include this type of information in the new archiving project.

Update frequency

Depending on processing chain, very irregular on a monthly to yearly basis.

Description of the available data sets

The Ocean Colour European Archive Network (OCEAN) Project - a co-ordinated initiative between the Space Applications Institute and the European Space Agency (ESA), has performed a reappraisal of ocean colour data from the CZCS instrument. All historical data over marine regions of European concern have been considered and a comprehensive data set of ocean colour products has been derived, archived, and distributed to a known user community. The activities of the OCEAN project are currently being expanded through the Ocean Colour Techniques for Observation, Processing and Utilisation Systems (OCTOPUS) project to exploit the new generation ocean colour sensors. SeaWiFS Level 1A LAC and HRPT LAC data distributed by the GSFC DAAC, has been processed using the SeaDAS package. The resulting L2 LAC images can be visualised.



The Marine Environment Unit has reprocessed the SeaWiFS images as announced on August 14, 1998, using the so-called version-2 data and SeaDas 3.2. All data listed below is version-2 data reprocessed with SeaDAS3.2.

- SeaWiFS Level 1A LAC data for the Northern Adriatic Sea.
- SeaWiFS HRPT data for the Baltic Sea, Mediterranean Sea, and the Northern European Seas, from the Dundee Satellite Receiving Station.
- SeaWiFS HRPT data for the Canary Islands and North West African coast, from University De Las Palmas De Gran Canaria Satellite Receiving Station.
- SeaWiFS HRPT data for the Mediterranean Sea, from CNR Rome.

The Cloud and Ocean Remote Sensing around Africa (CORSIA) project has focused on the application of Advanced Very High Resolution Radiometer (AVHRR) data, to provide a quality controlled data set of surface, atmospheric and cloud parameters over a time period, and at a resolution, not available from any other source.



RIKZ

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Description of the data bank

The main system consists of an Ingres database on a HP9000/D350/2 running HP-UX 10.20, assisted by various decentral machines with different configurations but all running on HP with UX 10.20. An upgrade in the central system to a D390 system is foreseen summer 2000. DONAR contains information on the water-related environment. DONAR provides facilities for a wide range of data manipulation operations such as: tabular presentation of data, data selection, conversion to other units/co-ordinate systems, graphic presentation in images and histograms, specific applications for selected data sets. Facilities for format conversion help users to prepare the data for ingestion in the commercial packages they might use on their PC.

Accessibility

DONAR is accessible for everyone working for the Netherlands Ministry of Transport, Public Works and Water Management via the Ministry's internal network. Separate arrangements can be made for interested parties outside the Ministry.

Remssbot uses DONAR. There is a firewall, it is possible to get it opened for protocols such as IIOP (EDS, 1998). Via the Web actual data is accessible by means of clickable maps at <http://waterland.net/>.

Descriptive information/metadata

The database contains large amounts of background information on each value. This information is stored in the WHAT, WHO, WHERE, WHEN and HOW part of DONAR (RIKZ, 1999).

WHAT: The data or biological species concerned.

WHO: The institute that ordered the data, the body performing the measurement and the agency that analysed the results.

WHERE: Where the measurement was performed.

HOW: How the measurement was performed and the method of analyses used.

WHEN: When the measurement was performed.

All this information and the authority data are centrally managed by the metadata manager.

Update frequency

Around 75 million data entries are added each year. The information on the Waterland website is updated every hour.

Description of the available data sets

DONAR contains all the measurements on the condition of Dutch waters collected, calculated and modelled by Rijkswaterstaat. DONAR contains incidental data going back to the 16th century and more regular data can be found from the end of the last century up to now. The database contains a total of approximately one thousand million items.

The DONAR system comprises of a central database and several peripheral data bases linked via the internal network of the Netherlands Ministry of Transport, Public Works and Water Management. This means that data can be retrieved from both the central and the peripheral databases.



DONAR contains data on the following fields:

- Water and soil data;
- Water quality data ;
- Water temperature;
- Current speeds;
- Wave data;
- Wind data;
- Biochemical data;
- Biological data;
- Chemical data;
- Physical data;
- Meteorological data;
- Morphological data such as coast and bank measurements.

Via the Waterland website the following data can be accessed:

- Water level and Astronomical tide;
- Discharge & current velocity;
- Wave information;
- Wind information;
- Water temperature;
- Water quality.



CoastBase IST-1999-11406

ENEA

Contact Person: Paola Picco picco@estof.santateresa.enea.it.

Description of the data bank

The ENEA database consists of Oracle 8i under Unix combined with an NT application server (ENEA 1999). Environmental and oceanographic data can be accessed via Java applets at http://192.107.66.21/www/On_line.html.

Accessibility

Environmental and oceanographic data can be searched and accessed via Java applets at http://192.107.66.21/www/On_line.html.

Descriptive information/metadata

Available for most data sets.

Description of available data sets

MEDB: oceanographic data for the Mediterranean Sea: Temperature Salinity profiles:

- Current meters and sea level time series in the Ligurian, Tyrrhenian and Sicily channel;
- Local environmental near coastal measurements in some areas of the Ligurian Sea: Temperature, Salinity, Oxygen, Nutrients, profiles; current, sea level;
- Meteorological time series.

SIAM "Provincia di La Spezia" contains information about coastal structures (villages, ports, campings, ...), as well as about environmental parameters ...

Underwater images catalogue: contains underwater slides of Mediterranean species with different classification criteria (tassonomic, environment, ...).

Atlas of seagrass bed in Liguria contains maps of distribution of seagrass in the Ligurian Sea.



CoastBase IST-1999-11406

IMR

Contact person: Helge Sagen, helge.sagen@imr.no

Description of the data bank

The database at IMR exists of several systems. The main system consists of an Open Ingres 2.0 database running on a Hewlet Packard-UX system. Small Visual FoxPro databases are running on different machines under Windows NT 4.0. These databases will be moved to a more common database management tool soon.

Some of the data from this database can be accessed via the web, it is stored in an ordered file system of ASCII files on a UNIX machine. GIF images are generated from these data files by means of a CGI-script.

Data access

The databases are running behind a firewall. Current activities foresee parts of the databases outside this firewall.

Data are accessible via the web at:

<http://www.imr.no/mil/nmd/showroom/coast/top.html>

<http://www.imr.no/mil/nmd/showroom/tgraf/top.html>

Descriptive information/metadata

IMR has no separate metadata available.

Update frequency

Two or three times per month.

Description of the data sets

Two or three measurements per month. Between 1996 and 2000. Temperature versus depth, and salinity versus depth. On eight places along the Norwegian coast.

The coastal liner M/S Vesteraalen cruises the Norwegian coast from Bergen to Kirkenes and back on a 11-day schedule. A temperature sensor mounted in the ship's cooling water intake samples the water temperature every 5 minutes, and the data are coordinated with latitude/longitude data from the ship's GPS. The data from each round trip is available as soon as possible after each trip on:

<http://www.imr.no/mil/nmd/showroom/tgraf/top.html>.



ETC/MCE

Contact person: Paola Picco, Jannette van Buuren.

Description of the data bank

The following information was extracted from the discussion paper: "ETC on Marine and Coastal Environment" (Picco et al., 1999).

Table 10. Overview of data sets managed by ETC.

Name of data sets managed by ETC	Geographic coverage	Time coverage	Type of data set	Currently held by which ETC partner
Delimitation of EU Coastal Zone	Pan Europe	N/A	Site address	LNEC (PT) *
Dobris+3 Report	Pan Europe	1996	Time series	Delivered to EEA
Mediterranean Report	Mediterranean and Black Sea with catchment area		Time series	Delivered to EEA
EU98 Report	Pan Europe		Time series, EU directives	Delivered to EEA
Trends in Compliance with the Bathing Water Quality Directive 76/160/EEC - Sea	Pan Europe	1991-1997	Time series statistic per country	Delivered to EEA
Estuaries, Lagoons and Fjords	Pan Europe	1985-1997	Time series ~90 biological and chemical parameters	NIVA To be delivered to EEA in 1999
Eutrophication, Oil spill, harmful substances	Pan Europe- coastal zones	1985-1997	Time series ~90 biological and chemical parameters	NIVA, RIKZ, to be delivered to EEA in 1999
Land Uses in coastal zone. LACOAST	Pan Europe	~1975 & ~1990	Statistic per country	Delivered to EEA from JRC
EUMARIS	Baltic, North Sea		ICES stations location and GISCO EEA data	ENEA Casaccia to be delivered to EEA in 1999
Eutrophication monograph	Pan Europe			Should be delivered to EEA

* in the ETC/MCE consortium until 1998

Table 11. Data sets, location and software.

Data base Name	Hardware/Software	Status	Data sets Contained	Key Documents
European Estuaries, Lagoons and Fjords Database	MS Access v 7.0,	Pending	Inventory of European Estuaries, Lagoons and Fjords,	Database for European Estuaries and Coastal Lagoons; draft report 11/97
Eutrophication, Oil spill, Harmful substances ENSIS	Oracle Map objects Visual Basic	In progress	Chemical, biological, physical parameters	NIVA, Oracle files to be delivered to EEA in 1999 with Report
EUMARIS	Arc/Info, ArcView	In progress	ICES stations location and GISCO EEA data	ENEA Casaccia, to be delivered to EEA in 1999



Accessibility

Current accessibility is unclear. The ETC/MCE aims at user-friendly uploading and downloading facilities, that are able to accept different formats and aggregation, and easy access by authorized users. Definition of authorized users is not yet specified but the need for authorisation system is expressed.

Descriptive information/metadata

Not specified in documentation.

Description of available data sets

Data and information collected during the past activities of the ETC/MCE were mainly used for reporting, such as the preparation of the State of Environment Report (Dobris+3), EU98, Mediterranean Report, Europhication monograph. Different types of data used included geographical environmental, socio-economic, as well as information on EU Directives (Picco et al., 1999). Most of the environmental data were provided by the Regional Conventions. Collected data were organized in Excel files.

Table 12. Formats of available data sets.

Data delivery	File format
Trends in Compliance with the Bathing Water Quality Directive	Excel
76/160/EEC - Sea	
Dobris+3	Excel
EU98 Report	Excel
Mediterranean Report	Excel
LACOST data	Excel
Eutrophication, Oil spill, Harmful substances	Oracle



Identification and thematic context

The data providers in the consortium cover the entire spectrum from providing data to providing information (highly aggregated data and metadata) on the Internet. IMR, for example, accommodates more traditional data banks, whereas ETC-MCE and EUCC mainly provide information and links. Both data and information were taken into consideration in an overview of the thematic contents. Table 13 provides the links to the data banks of each organization. In addition, a restricted overview of the covered area, period and topic is given. Only data available on the Internet and relevant for the CoastBase project are mentioned in the overview.

Table 13. Overview of on-line data.

Organization and its web-pages	Area	Period	Topic
ICES Oceanographic Data Centre http://www.ices.dk/ocean/	Measurements along most of Europe's coasts (except for the Adriatic)	Present	Oceanography (T, s)
Environmental Data Centre http://www.ices.dk/env/index.htm	D, NL, RU, (B)	Since 1995	Pollution (Heavy Metals)
	NL, (D)	Since 1995	Eutrophication (N, P)
IMR Hydrography: Coastal Monitoring http://www.imr.no/mil/nmd/showroom/coast/top.html	NO	Since 1998	Oceanography (T, s)
Hydrography: Sea Surface Temperature http://www.imr.no/mil/nmd/showroom/tgra/top.html	NO	1998-1999	Oceanography (SST)
JRC OCEAN project archive http://www.me.sai.jrc.it/OCEAN/ocean.html	N Europe (IRL-F-FIN) NE Atlantic (IRL-E) Med., Black Sea, (NW Africa)	1979-1985	Primary Production/ Eutrophication (Ocean colour)
SeaWiFS archive http://www.me.sai.jrc.it/cgi-bin/SWLAC/adriatic.pl	N Adriatic	Since 1997	Primary Production/ Eutrophication (Ocean colour)
http://www.me.sai.jrc.it/cgi-bin/SWHDUN/dundee.pl	Baltic, Med., N European Seas	1997-1998	
http://www.me.sai.jrc.it/cgi-bin/SWHCAN/canary.pl	NW Africa, Med.	1997-1998	
http://www.me.sai.jrc.it/cgi-bin/SWHROM/rome.pl	Med.	1998	
Images from the OCTOPUS project http://www.me.sai.jrc.it/other/newOCsensors/index.html	Baltic Sea, Parts of the North Sea, Bay of Biscay, Gulf of Lyon Parts of the Mediterranean (NW- Africa)	1997	Primary production/ Eutrophication (Ocean colour)
CORSA project archive http://www.me.sai.jrc.it/CORSA/index.html	Med., (Red Sea, NW Africa)	1981-1993	Oceanography (SST)



ENEA Marine environmental information system http://192.107.66.21/www/clim_atlas/QUERY.html http://estaxp.santateresa.enea.it/htbin/siamseln.exe http://192.107.66.21/www/siams/prov102.html http://192.107.66.21/www/UMI/criteriodia.html http://192.107.66.21/htbin/fanemap.exe	W-Med.	?	Oceanography (T, s)
	Parts of the Med. (mainly Ligurian Sea)	1970-1998	Oceanography (T, s, and additional data on currents, sea-level, Ox, nutrients, profiles, meteorological time series)
	La Spezia	Since 1997	Coastal defence (slides of structures)
	Ligurian Sea	1990-1995	Biodiversity (slides of species)
	Ligurian Sea	1990s(?)	Biodiversity (scanned maps of seagrass distribution, plus references to reports)
ETC-MCE Http://estaxp.santateresa.enea.it/www/etc1/etc-index.html	Europe	1996-1999	CZM (Indicators, data/IT, Eutrophication, ICZM)
RIKZ/RWS Waterland Http://www.waterland.net/ Coastnet http://www.minvenw.nl/projects/netcoast/index.htm Remssbot http://www.netor.gr/remssbot/index.htm	NL	Since 1995	Information on a variety of Water-related topics
	World	Since 1993	ICZM
	Piemonte (I), Attica (EL), Scheldt (NL, B)	1996-1997	IT, Pollution, Water quality (Regional Environmental Management Support Systems)
EUCC Coastal Guide Http://www.coastalguide.org/	Europe	Since 1998	Biodiversity ('Dune Guide' on European dune management; coastal typology and landscapes)
	Europe	Since 1997	ICZM Policy (European Code of Conduct for the Coastal Zone; action plan 'European Regions for a Safe and Clean Coast')
	Multi-level (World – countries), European focus	Since 1995	News, Organizations (links, publications)



Remarks related to Table 13

- Oceanographic data (temperature and salinity, and SST) is basic data that is available in data banks of several project partners. These data can be used for studying of a variety of problems. Examples are, studying climate change and its effect on fish stocks, but also studying physical oceanography in relation to spatial variability in eutrophication. Therefore, these data differ from, for example, data on nitrate and phosphate, which can directly be linked to a topic or problem, eutrophication.
- The ICES data bank contains information on data that has been collected for many European countries since 1977. In Table 13 the focus is on contemporary data, because these data are probably most important to CoastBase users. A more extensive overview of the data bank, can be found on the ICES web pages (ICES,2000).
- The JRC OCEAN and CORSA project sites contain browsing and analyses tools that might be of interest for the CoastBase project, for example, select area, time series, animation, profile, trend analysis and the option to download binary data.
- The RIKZ/RWS DONAR database was not tested, because it was not found on the web.





4. Discussion and conclusions

Discussion on user interest in data and information

To enable an 'user focus' in setting up the system (Doody et al., 1998), the user perspectives were analysed to see if differences in user groups occurred. The institutional users were grouped based on their focus (European, regional, national, local). The individual users were grouped according to their function (differentiation in their professional aspects).

The analyses lead to the following conclusions:

- Some coherent groups appeared (for example, researchers);
- For some factors the overall difference between the users was not so large (for example, they all have similar PC's and access to the Internet);
- In some cases the spread within the groups was almost as large as the spread between the groups.

In general the researchers have detailed knowledge about a limited area of interest, while the decision & policy makers have to have broader a overview over different topics and area's. This difference in focus results in different data needs. In Figure 2 the groups are ordered according to their interest in data of different processing levels.

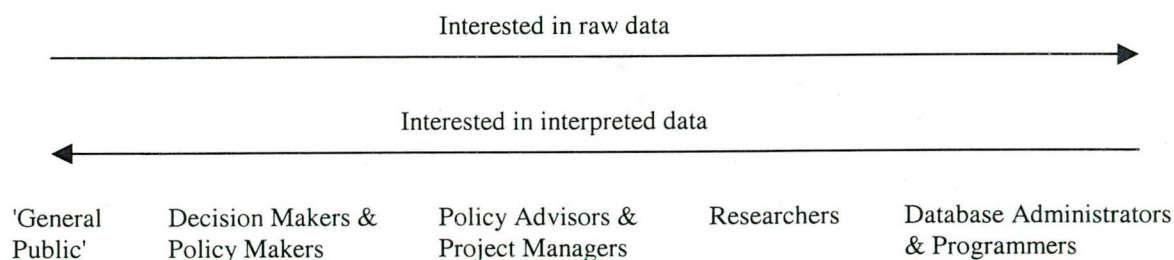


Figure 2. User interest in data.

The database administrators & programmers and researchers at the right side of the spectrum are mainly interested in raw data while the decision & policy makers at the left side of the spectrum are interested in interpreted data. The area in between is filled by policy advisors & project managers. The work of some policy advisors is closely related to the work of the researchers while others operate more closely at the side of the decision & policy makers.

The wrong combination of tools and data could lead to 'nice images' with no significant meaning, which are prone to wrong interpretations. Therefore user profiles should guide different user groups in the right use of the tools available within CoastBase. This was shortly elaborated in the next section. Meanwhile the technical partners have also started thinking about this in relation to the System Specifications



Envisioned CoastBase usage

Researchers, policy advisors & project managers, and decision & policy makers get different results when searching the metadata database on the same topic. CoastBase guides them to the data and information on the required aggregation. Authorized users can change profile and submit reports, processing chains and scenarios. Users at all access levels can contribute comments. The comments will be marked with the name and user profile of the reviewer. The characteristics of the use of CoastBase, for different user profiles are outlined below. Figure 3 illustrates how researchers, policy advisors & project managers, and decision & policy makers use CoastBase.

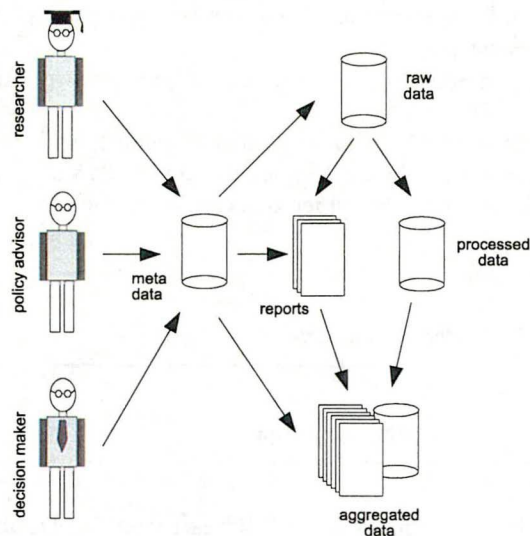


Figure 3. Illustration of the data use by users with different user profiles.

Researcher

A researcher performs a metadata search: an area, time-frame, subject, author and institute are selected. A list of results is displayed, the user selects directly from this list or clicks on a button to obtain a click-able map which displays position of the data in this list. By clicking on a station on the map the full metadata is displayed. A link leads the user to the data.

The registration-profile of the researcher tells CoastBase which formats can be read by the applications on the users machine. If a transformation tool is available the data will be transformed within CoastBase. The user downloads the file or clicks on a CoastBase tool to view the data on-line.

The researcher combines data from different sources with the tools provided by CoastBase on a local machine or on-line. The secondary data produced, can be submitted back to CoastBase. To do this the user has to fill out a metadata form that is signed with a password.

The new data can include scenarios and processing chains accompanied by a report.



Policy advisor & project manager

A policy advisor finds the report of the researcher via a metadata search. CoastBase transforms the report in a user preferred format (pdf, doc, rtf, ascii, html) before the user downloads the report or views it on-line.

The scenario can be accessed and activated by the policy advisor. After running the scenario for different circumstances a report is written, or a limited scenario is made that can only be run for the conditions that are investigated. This information is submitted to CoastBase. Other researchers and policy advisors will check the results and comment on it. Their comments are linked to the report via the metadata. Policy advisors read reports of different researchers and colleagues and comment on it via feedback forms.

Decision & policy maker

A decision & policy maker searches the metadata database and gets links to the reports and the limited scenario. The metadata search of the decision & policy maker will initially not show the raw data sets. To find the raw data the decision & policy maker is guided via the reports of the policy advisor and the researcher.



Thematic conclusion

The user requirements (as described in this report) resulted in a proposal for geographic areas (2) and topics / thematic fields (2) to be covered by CoastBase.

Based on the (quantity of) responses the following areas were proposed:

- 1) Mediterranean;
- 2) North Sea or Baltic.

In addition, the following topics were proposed:

- 1) Water quality / Pollution & Eutrophication;
- 2) Planning (because there is a clear interest from both institutional and individual users).

Subsequently user requirements and data provision (also described in this report) were matched. The use of such a method (matching provision and needs) was proposed for development of the system. Some users also indicated that provision of complete and reliable data was required for their possible use of the system. It is recognised, however, that such an approach should not structurally be taken, because developments in Integrated Coastal Zone Management (ICZM) should not only be led by what is already (accidentally) available (Doody et al., 1998).

About data provision the following was remarked:

- 1) Water quality / pollution and eutrophication data are probably available for the Baltic with ICES. However, from the web pages, you would conclude that only limited data for few areas are available (e.g. ICES, 2000).
- 2) Data for planning projects as proposed in the examples of EUCC is very disparate. Where could the data for planning be found in a more or less structured way?

The recommendations for topic and area were discussed in plenary and accepted at the Copenhagen meeting on 27 and 28 March 2000 and the CoastBase consortium has been elaborating two case studies that will be mentioned below. (The CoastBase consortium will deliver a separate document with full description of the scenarios.) Some formal thematic recommendations that should be included in the development of CoastBase are included in the list of the technical conclusion that follows after the scenarios.



Scenarios

The first case comprises eutrophication (in relation to fisheries) in the North Sea. The second case relates to planning in the North Sea and Mediterranean. Below a state of the art overview will be given.

Scenario 1: Eutrophication

Topic. The overloading of seas, lakes, rivers and streams with nutrients (nitrogen and phosphorus) can result in a series of adverse effects known as eutrophication. Phosphorus is the key nutrient for eutrophication in freshwaters and nitrate is the key substance for salty waters. In severe cases of eutrophication, massive blooms of algae occur. The unbalanced ecosystem and changed chemical composition make the water unsuitable for recreational and other uses (EEA, 2000). The scenario is related to eutrophication in the North Sea.

In addition, this scenario illustrates the aggregation process that accompanies the data flow from national and regional organizations towards EEA and other international bodies. National databases that comprise raw data feed regional databases consisting of aggregated data, and both feed the EEA database comprising aggregated data (indicators) for reporting (Figure 4, source: ETC/MCE, 1999b).

Technical classification. This is a supply-limited scenario focussing on access, retrieval, **manipulation, aggregation** and feedback. Experts indicated, however, that it would be very hard to automatize the aggregation process itself because of the required expert judgement. Therefore, the scenario does not fully incorporate this entire aggregation process, but it consists of two parts. **Part A** comprised retrieval (and manipulation) of **raw data**. Subsequently experts aggregate these data mainly outside CoastBase, and upload the aggregated results to CoastBase. **Part B** comprises retrieval, manipulation and feedback of **aggregated data**.

Data. The data originate from different distributed sources at RIKZ, ICES, JRC, IMR and ENEA. CoastBase will provide access to some of these sources. The databanks considered are highly disparate in data models and system architectures. Possibly some data and at least the feedback will be stored on the CoastBase server. The data cover many of the variables used in eutrophication studies, and match partially in space and time.

Workflow. For this scenario a workflow (Figure 4, source: ETC/MCE, 1999b) is available, and interaction with the graphical User Interface (GUI) has been sketched. The latter comprises:

- For **Part A**, searching metadata, retrieving **raw data** by an **expert**, displaying the results for interpretation, accessing and manipulating the results (partly outside CoastBase) for aggregation into indicators (as done for the Topic Centre), uploading the products on the CoastBase server and displaying the results;
- For **Part B**, searching metadata by a **'general' user**, displaying and downloading **aggregated data**, combining aggregated data (e.g. maps from ICES, JRC RIKZ and IMR) and performing some basic GIS analyses.

Problems & Recommendations:

- A better thematic problem definition is recommended for this scenario. This will, however, become clearer at a later stage. (Some delay is inherent in the choice for a data-driven (supply based) approach instead of a problem-driven approach.)
- For this scenario, that offers the user a lot of freedom, provision of an example (i.e. in the tutorial) of sensible combination of aggregated data is recommended.

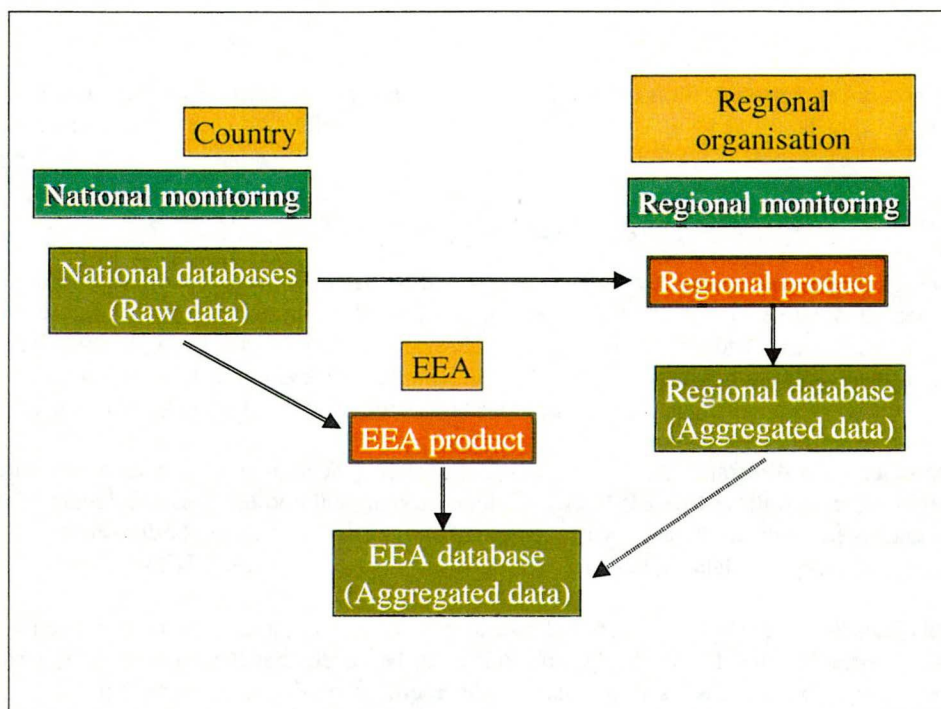


Figure 4. Dataflow (ETC/MCE, 1999).



Scenario 2: Planning

Topic. Two examples in the field of coastal planning and management were chosen for the planning scenario: a pre-feasibility study for a new international airport on an artificial island off the Dutch coast, and a project on responsible gold mining in the coastal zone of Strymonikos Bay, Greece. The latter is a project of the European ICZM demonstration programme (EC, 1997). In addition, this scenario illustrates a way to access the variety of sources and retrieve information on a variety of topics related to integrated coastal planning. It shows the metadata and/or hyperlinks towards a variety of information sources and products.

Technical classification. This is a metadata and catalogue scenario focussing on description, access and retrieval of data.

Data. Metadata are an indispensable tool to find the way to information and services provided in networks. In many cases, such metadata adheres to a certain standard. It is maintained in so-called meta-information or catalogue systems. The developers of digital catalogue systems face important issues in their attempt to support a diversifying and expanding user base. One of the most important and challenging problems they have encountered is how to create descriptions of information resources that are appropriate for a wide variety of potential users. Metadata providers prefer an automatic input of metadata directly from the databases of interest, but environmental data are very heterogeneous and in practice, nearly no environmental database has a 'metadata header', and if so, standards are mostly ignored. New concepts of meta-tags, XML, RDF, and so on, cover only few environmental data that are already represented in the Web. Furthermore, these technologies mostly do not cover dynamic Web pages. As a consequence sometimes metadata are entered manually. This is very expensive and reduces the acceptance of such a system on the data holder side (Kramer, 1999).

Workflow. An (idealized) vision on the step-wise approach has been sketched in the schematic user - CoastBase dialogue. Firstly, the user requests a link to more information on the case and issues (pressures). Helped by the information, the user can make a specified search for (metadata on) raw data. Then, the user either selects the available data and manipulates them, or identifies information gaps and contracts third parties to fill in these gaps. Finally the user reports the results and puts it back in the metadata base (Figure 5, source: Lucius et al., 2000).

Problems & Recommendations:

- The scarcity of available metadata for the scenarios in catalogue systems might pose a problem. Therefore, close collaboration of the thematic, technical and catalogue partners in the further development of the scenario is recommended.
- A metadata form has to be filled in for all feedback that is to be uploaded in CoastBase.

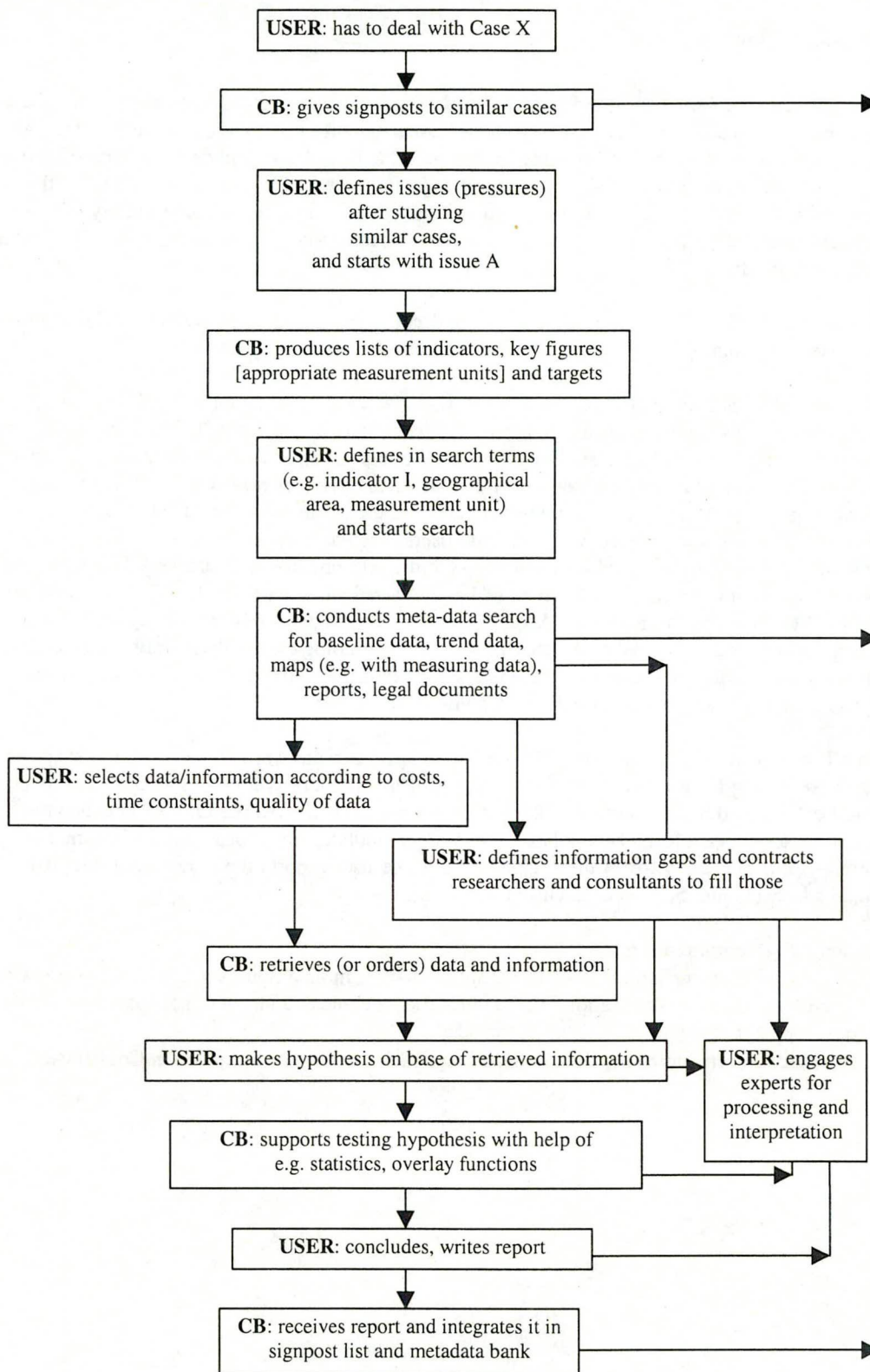


Figure 5. Schematic User-CoastBase dialogue for the planning scenario (Lucius et al., 2000).



Technical conclusion

To provide a comprehensible checklist, user requirements, requirements extracted from the CoastBase technical Annex (CoastBase, 1999) and previous experience have been translated into three categories: MUST, SHOULD and MAY. The definition and use of these words was derived from RFC 1123 (Internet Engineering Task Force, 1989).

* **"MUST"**

This word or the adjective "REQUIRED" means that the item is an absolute requirement of the specification.

* **"SHOULD"**

This word or the adjective "RECOMMENDED" means that there may exist valid reasons in particular circumstances to ignore this item, but the full implications should be understood and the case carefully weighed before choosing a different course.

* **"MAY"**

This word or the adjective "OPTIONAL" means that this item is truly optional.

An implementation is not compliant if it fails to satisfy one or more of the MUST requirements for the software it implements. An implementation that satisfies all the MUST and all the SHOULD requirements for its software is said to be "unconditionally compliant"; one that satisfies all the MUST requirements but not all the SHOULD requirements for its protocols is said to be "conditionally compliant".

The list of technical requirements was discussed and in major lines agreed upon in plenary at the Copenhagen meeting (on 27 and 28 March 2000) and subsequently refined in co-operation with the Technical Partners.

Preconditions

- Some of the functioning of the system can only be demonstrated (and some of the criteria related to the functioning can only be met) if the system contains data that allow this functioning.
- Some of the requirements can not be met for the part where there is only metadata functionality implemented.



Requirements

Basic functionality as described in the CoastBase Technical Annex (CoastBase, 1999)

1. CoastBase **MUST** be accessible via the Internet
2. The user interface and a limited set of search terms **MUST** be multi-lingual
3. Users **MUST** be able to download products from CoastBase
4. The software **MUST** provide a module for automatic feedback to the information source
5. The software **MUST** be able to contain updated aggregated information
6. The software **MUST** implement a prototype system for two or more applications in agreement with the user requirements
7. The software **MUST** provide solutions for the interfacing with different databases (distributed data banks) and the interoperability of the data banks.
8. The software **MUST** be extendable to a fully integrated system incorporating additional data sets
9. The software **MUST** contain an authorisation module
10. The user **MUST** be able to carry out a metadata search.
11. Users **MUST** be able to upload aggregated data (products) in CoastBase
12. The CoastBase system **MUST** demonstrate the features required in a fully operational system
13. CoastBase **MUST** facilitate the exchange of information

Additional requirements

14. The software **SHOULD** be universally applicable, i.e. in different geographic regions, at various geographic scales for different thematic issues
15. The Welcome pages of CoastBase **SHOULD** be readable on any browser and **MUST** comply with the HTML 4.01 standard as published by the W3 Consortium (1999)
16. CoastBase **MUST** allow concurrent operations of different users
17. The CoastBase software components **SHOULD** be capable of operating without human intervention for a period of at least 72 hours
18. The CoastBase documentation **SHOULD** include clear and complete interface description of all modules for which no source code will be made available
19. The CoastBase client (system) **SHOULD** run at least under UNIX and Windows NT with Java support. (The CoastBase server **SHOULD** run at least under Sun Solaris)
20. The CoastBase software **SHOULD** provide maintenance modes of operation which do not interfere with on-going modes of operation
21. The CoastBase software quality requirements **SHOULD** be verified by testing the software according to specification plan over a period of weeks under normal load
22. The changes necessary when a data set or data collection is moved from one place to another, or from one machine to another should be limited to configuration files.
23. The CoastBase software **SHOULD** be designed such that failure of one or more underlying sources does not affect access to the still operational sources

Initial input of data into CoastBase

24. The software **MUST** provide a module for data conversion
25. The software **MUST** provide a module for data manipulation
26. The software **MUST** provide a module for data aggregation
27. The software **MUST** provide a module for quality control, although quality control will mainly be the responsibility of the data providers



General user requirements

- 28. The use of CoastBase **MUST** be user-friendly and require no specific knowledge of informatics
- 29. The use **SHOULD** be intuitive and **MUST NOT** require any preparatory training
- 30. The software **SHOULD** provide a tutorial ('how to use description') for first time users
- 31. CoastBase **SHOULD** allow users to abort a running client process

User authorisation/customisation

- 32. The User interface **SHOULD** allow customisation
- 33. CoastBase **SHOULD** provide the possibility to store pre-selections on user and group level
- 34. CoastBase **SHOULD** at least provide the possibility to store pre-selections on three group levels (scientific user profile, a decision support profile and an administrative profile)
- 35. The user **SHOULD** be able to carry out an online registration
- 36. Users **SHOULD** be able to un-subscribe
- 37. It **SHOULD** be possible for users to view and edit their subscription information
- 38. CoastBase **SHOULD** allow users to fill out feedback forms
- 39. The http and link server sub-system **MAY** transport user profile information in an encrypted form

Metadata search

- 40. The distributed metadata search **MUST** be designed so that when it is not possible to communicate with one of the connected databases, this does not cause a failure of any of the other CoastBase software components
- 41. the software **MUST** provide limited multi-lingual search in the metadata catalogue (if a limited list with translations of search terms has been provided)
- 42. The software **MUST** provide the possibilities of simple and complex queries: a simple query involves a single parameter, a complex query is one which specifies two or more parameters connected by AND and OR operators (if the underlying data sources allow these operations)
- 43. Searches **SHOULD** be optimised (the results **SHOULD** be given as fast as possible given the condition of the Internet)
- 44. CoastBase **SHOULD** show the number of inventory items matching the search criteria
- 45. CoastBase **SHOULD** display a list of inventory items matching the search criteria
- 46. CoastBase **SHOULD** give the geographical footprints (at least as text) of the inventory items matching the search criteria
- 47. CoastBase **SHOULD** be able to dispatch a request to all databases or a single selected database
- 48. The inventory **SHOULD** be organized in such a way that it allows retrieval of geographic, temporal and alphanumerical criteria (provided that the data providers already have this information in their original databases)



Data manipulation and information analyses

- 49. The software SHOULD make use of existing technologies and tools such as basic GIS tools
- 50. CoastBase SHOULD support production of maps and trends and graphics
- 51. CoastBase MAY include basic GIS functionality
- 52. The software SHOULD support 'mapping' of georeferenced information
- 53. The overlay of various data sources MAY be possible
- 54. CoastBase SHOULD be able to compute conversions between several different co-ordinate systems
- 55. CoastBase SHOULD provide a tool to upload vector data
- 56. CoastBase SHOULD provide a tool to upload and display raster data
- 57. The software SHOULD provide the possibility for quick look preview of images (if available at the provider sites)

Requirements regarding the client system

- 58. CoastBase SHOULD NOT require user hardware faster than 150 MHz Pentium, with 64 MB memory, and a browser with Java 1.2 plug-in installed
- 59. CoastBase SHOULD NOT require internet connection speed over 56 Kb
- 60. CoastBase MUST work with Netscape 4.7 and Internet Explorer 5 under Windows NT, 98 and 2000 and SHOULD work with newer versions of these browsers and operating systems
- 61. Java applets and Browser plug-ins MAY be used but SHOULD NOT require assistance of a system administrator, or user side configuration changes

Content

- 62. CoastBase MUST provide access to European level aggregated marine and coastal data
- 63. CoastBase MUST provide access to indicators, maps and reports
- 64. CoastBase MUST provide access to data from local, regional and national organizations
- 65. Uploading of remote sensing data MUST be possible
- 66. Uploading of new data MUST only be allowed after a metadata form has been completed

Specific user requirements

- 67. Animations MAY be used to give insight in temporal changes
- 68. Panning and zooming facilities MAY improve the ease of use of CoastBase
- 69. CoastBase MAY provide tools for multi-scale analyses
- 70. CoastBase MAY provide tools for statistical analyses
- 71. CoastBase SHOULD facilitate international comparison of data and information



5. Support to EEA

CoastBase could support the European Environment Agency in the implementation of the DPSIR (Driving forces, Pressures, State, Impacts, Responses) approach (EEA, 1999a) and in the elimination of deficiencies in the current model of information exchange (EEA, 1999b). EEA's mission statement 1999-2003 is the provision of timely, targeted, relevant and reliable information to policy making agents and the public. In this context EEA has also to consider increasing demands for spatial and territorial analysis to support policy developments such as CAP (Common Agricultural Policy) and the new Water Framework Directive, to name only two. The CoastBase data warehouse could help to meet these demands. The backbone of all EEA activities is formed by the data and information flows along the monitoring-to-reporting chain (Peifer & Cryan, 1999). There was a request (PETA3) for connecting CoastBase to EIONET. SPADE (2000) and Peifer and Cryan (1999) can be consulted for more information on the technical requirements for such a link. However, the realization of such functionality needs further discussions with the informatics partners in CoastBase and, of course, agreement by and coordination with EEA.

The implementation of the CoastBase system could also help to fulfil the tasks to be covered in the integrated coastal zone management process which is an iterative procedure of description, analysis, planning and implementation (EC, 1997).

Organizational and individual users expressed an interest in comparing data and monitoring methods with those of other nations. Possibly some more international information could be provided to and by ETC/MCE and EEA.

"In the first stage of the project the CoastBase team will determine and provide the requested European level indicators determined by the participating institutes, which are both producers of information on different levels and active in the assessment of this information on European level" (CoastBase, 1999, p.8). With regards to the aim to provide indicators for the EEA within CoastBase, the following should be noted: the provider delivers data, the user wants an indicator. Who is responsible for specifying which data are needed and which method should be followed in deriving the indicator? This question cannot be answered by the CoastBase partners alone. CoastBase can only demonstrate an example, but most probably not a final solution.

To increase transparency of European policy to end-users, CoastBase could provide links to the EEA, future 'State of the Coast' reports, and it could provide information on the derivation of indicators. For example, a link to an (unofficial) description of the DIPSR framework can already be found on the web (Jesinghaus, 1999).

It has to be stressed that no direct input from EEA has been received for consideration in the compilation of the user profiles and information definition (EEA is not a partner in the CoastBase Consortium). We believe that EEA should assess the results and conclusions obtained within WP04 and provide the CoastBase Consortium with their opinion on how far the user requirements derived would match EEA's needs. This could help to underline the European 'stamp' of CoastBase.





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