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Juha-Pekka Hirvi (Ed.)

Summary report of the workshop on  
Environmental Mapping and Databank  
Systems (EMDS) in the Baltic Sea area

Helsinki, Finland, November 16-17, 1998

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## FOREWORDS

The Workshop on Environmental Mapping and Databank Systems (EMDS) was arranged by the Finnish Environment Institute (FEI) on behalf of the Ministry of the Environment of Finland. The objective of the workshop was to identify the needs for developing and harmonizing the EMDS for the coastal sea areas of the Baltic Sea countries.

Invitations were sent to the Combatting Committee and the Environmental Committee's NATURE - Working Group within the Helsinki Commission, Baltic Marine Environment Protection Commission (HELCOM CC & EC NATURE) and also to the Norwegian Pollution Control Authority (SFT). A request was attached to circulate the invitation to relevant national research institutes and companies, as well as to appropriate experts.

The workshop took place on 16 and 17 November, 1998, at the head office of the FEI in Helsinki.

This report summarizes the presented papers, the main results of the working groups, and the working plans for the near future.

The Ministry of the Environment of Finland and the Finnish Environment Institute would like to thank all the participants for their excellent input to the workshop, and are looking forward to continuing cooperation in the field of EMDS.

17 November 1998  
Helsinki, Finland

Ministry of the Environment of Finland  
Finnish Environment Institute



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# 1 SUMMARY OF THE WORKSHOP

## 1.1 General

The main objective of the workshop was to clarify the state of and needs for Environmental Mapping and Databank Systems (EMDS) for coastal and sea areas in the Baltic Sea countries, and to prepare a summary of the systems already in use in the countries. It was also considered to determine whether common guidelines are needed for the development and harmonization of the EMDS.

These questions had arisen in meetings of the HELCOM Environmental Committee's NATURE Working Group (HELCOM EC NATURE 7/97 and 8/98). A bilateral expert meeting between Finland and Sweden was also held on 24 February 1998 on this issue. On all such occasions the importance of this work was stressed, and Finland and Sweden were encouraged to continue to work together on the issue. Such a workshop would be useful in gathering experts and expertise from all the countries around the Baltic Sea.

## 1.2 Presentations and discussion

The experts participating in the workshop were requested to prepare a brief summary (1-2 pages) of the EMDS available in each country. Their papers are enclosed in accordance with the presentation order of the agenda (ANNEXES 1 to 9). The results of the working groups and the working plan for 1999 are summarized in the text. The literature presented in the workshop is listed with complete reference information in ANNEX 10. All the participants who registered for the workshop are presented in ANNEX 11, including contact information. In the following there is a short summary of each presentation.

1. Dr. Juha Kämäri, the Research Director of the FEI, opened the workshop and presented the development strategy of the EMDS in Finland (ANNEX 1).
2. Ms. Anne Cristine Brusendorff, Maritime Secretary of HELCOM, gave an overview of international GIS activities within HELCOM, the International Maritime Organisation (IMO) and EU (ANNEX 2). A GIS project, the Baltic GIS, was initiated in the early 90s within HELCOM (NBWE 1994). Environmental mapping (listing sensitive areas) has been recognized internationally as a tool for regulating shipping activities - on both the preventive and operational levels.
3. The Swedish delegate demonstrated the Environmental Atlas of Öland Island using a PC (ANNEX 3). This Atlas on a PC was developed as a pilot project for studying and mapping the sensitivity of the Öland coastline. It aims to assist in decision-making in cases of oil spill contamination or other damage, and provides supporting in cleaning up the coastline.

**The Swedish delegate informed about the next environmental mapping meeting to be held in May 10-11, 1999 in the city of Kalmar, Sweden.**



4. The German delegate presented a VPS project of the North German coastline (ANNEX 4). The project started in June 1997 and will end in December 1999. The aim is to develop a tool for combatting pollution caused by shipping accidents at sea and near the coast. Data collection is the most important and extensive part of the project. The data include types of shore, protected areas, location of combatting equipment, ships, industries, pollution data from accidents, instructions for combatting pollution and a photo/image presentation of the whole shoreline. A shoreline typing is one of the issues for which clear guidelines are missing.

**Discussion:** It is impossible to establish a perfect data system, it is better to have a living system under continuous development.

Internet is a good tool for delivering coastal data. (POL).

To digitize 50 km of coastline takes 2 man-months of work. (GER).

Coastline typing is rather complicated and needs guidelines.

The German data system is similar to the Swedish one.

5. The Polish delegate informed about the GIS System Centre for Integrated Coastal Zone Management. This Centre is providing environmental and geographical data for the purposes of integrated coastal zone management (ANNEX 5). The data on shoreline, infrastructure, biological resources, water use and environmental forecasts, are shown in map format using ArcView 3.0 with a Internet Map Server extension. The data are therefore available to all those using a JAVA-enabled www-browser.

**Discussion:** Poland has 4 synonym names for a cliffy coastal zone, so some sort of guidelines are needed for a common system.

The German delegate showed a map with over 20 different shoreline types.

6. The Russian delegate could not attend the workshop but sent a paper (Dr. Litvin et. al.) presenting the environmental mapping of the Kalingrad coastal area (ANNEX 6).

7. The Lithuanian delegate presented information on a project for mapping sensitive areas (ANNEX 7). Collection and compilation of existing data on sensitive areas is currently underway. Swedish expertise is used in preparing the environmental mapping system. The Klaipeda area has been taken as an example for the development work. Cooperation in contingency planning has been established with Denmark.

**Discussion:** Germany proposed to clarify the accessibility of the different national Baltic Sea databases.

8. The Finnish delegate presented a GIS system developed at the Finnish Environmental Administration (ANNEX 8). It was followed by a PC -demonstration of the Environmental Atlas for the coastal area of Finland (ANNEX 9). The Finnish system has been primarily developed to help the combatting authorities to rapidly evaluate an oil spill situation, the environmental risks and to plan the operational work. Oil drift models can also be run in the Atlas system. In the future remote sensing data and satellite images will be linked to Atlas.

**Discussion:** The GIS software products of ArcView (ESRI Company) have begun to be very expensive in the second half of the 90s. Are there any other possible ways to obtain and present map-

format information, e.g. through the Internet Map server?

The question was raised about whether Finland has easy access to regional data, and whether there are common database between the regional and national environmental authorities? Yes, there is a common system. The local environmental administrations have copies of the GIS data in their own servers. The data of some national institutes in Finland are very expensive. The problem with the databases of many of the national institutes (administrations) is transforming the data into GIS.

Poland was interested in using operational models in connection with the Environmental Atlas, but how well do these work together. Experience with such coupling is, however, rather poor so far. Germany does not want to connect drift models to their Environmental Atlas.

The High-Resolution Operational Model for the Baltic Sea (HIROMB), which is producing flow forecasts for drift simulations, is running every day at the Swedish Meteorological and Hydrological Institute (SMHI). Finland has plans to connect the HIROMB data to the PC oil trajectory models.

## 1.3 Results of working groups I and II

The participating experts were divided into two groups in order to formulate answers to four questions. The groups consisted of a mixture of data system developers (scientists) and users (authorities). The results of the working groups are presented here in their original form as the answers were written on the overheads.

### 1.3.1 Do we have equal objectives for development and use of these systems (oil combatting, nature protection, physical planning, research, monitoring)?

#### Working Group 1

##### Objectives:

Most initiatives are aiming at a broad scope of objectives:

- nature protection
- oil combatting
- physical planning
- research
- monitoring

Some initiatives are focussed to give priority to a few items e.g. oil combatting and nature protection. However, these initiatives do not exclude the other issues and can in this sense be extended or integrated.

##### Timing:

Most initiatives are currently in the initiation phase or already in the pilot testing phase. All initiatives will be in the testing phase at least by the end of 1999.

##### Coordination:

Current coordination is mainly based on (loose) exchange between experts e.g. in meetings. No systematic approach to sharing experiences or knowledge has yet been implemented. Sharing efforts thus has important potential. Some newer initiatives are

aimed at increasing cooperation (e.g. INTERREG projects).

Harmonization:

Due to the low level of coordination, no major effort has been made towards for harmonization. Some basic work has, however, been carried out (e.g. POLSCALE-report, see ANNEX 10).

Responsibilities:

Different (autonomic) responsibilities in geographical means (e.g. nations, countries, counties, cities) and in technical means (combatting, environmental monitoring, regional development), which also differ from location to location, must be accepted when discussing coordination and harmonization.

## Working Group 2

Yes we do, but it is important to divide them into different categories in order to guarantee a step by step progress ('snowball effect').

The first category of objectives should contain the immediate needs, like sensitivity mapping for operational purposes (oil combatting), where a straightforward approach can be seen (e.g. coupling of environmental atlas/sensitivity maps to spill-drift forecasting systems).

The second category of objectives in developing the environmental atlas approach contains issues of increasing complexity, such as integrated coastal planning, nature protection, socio-economic consequences and, finally, local authorities and public participation.

### 1.3.2 What are the needs for developing the tools (programmes etc) in the system?

#### Working Group 1

Local language vs. common language:

Idea: bilingual

Integration of drift model:

Importation of the modelling results realized in some system modelling is made practicable by limiting it to rough, short-term trend calculations.

Photo/image database:

It is realized in some approaches, it might be a possible interesting addition to the system. A photo/image can transfer a lot of information, which is difficult to transfer by descriptive means.

Integration of nautical maps:

This is still missing for the major part of coastlines, rastered maps have been integrated partially, vectorized maps are not yet available in general, problems of geographical

referencing.

Geographical referencing:

Differs from country to country, land-based referencing might differ from seaside referencing (e.g. nautical maps). Referencing is considered to be technically easy to solve; however, a common reference standard will have to be agreed on.

Oil combatting rescue equipment:

Are integrated in some systems. However, it is generally considered that this does not have to be built in, as national responsibilities and organisations have their individual concepts and implementations.

Symbols used / classification:

Each system is developed individually using common references (IMO, ArcView-library). However, a peer- review and comparison of the individually used symbols are important (synopsis), and this could be used as a base for possible harmonization. The classification approach seems to use basically the same principles, but their implementation differs significantly from each other, due to local priorities, understandings, needs.

Data exchange interfaces:

This is probably not the major problem. However, it should be analysed in more depth.

Impact of responsibilities:

The current systems are basically driven by the responsible parties interested in these tools. Basically, all the current systems are open to be extended or integrated with other areas of application, providing that the design and efficiency of ones own system is not affected too much. Here again, only a synopsis can help to understand the possible fields of conflict and to develop possible "hyper structure" or defined interfaces.

Developing environments / software:

- ArcView/ArcInfo/MapInfo/MapObj. are the usual standards.
- Visual Basic for specific application
- to be analysed deeper
- local working environments might differ considerably from place to place
- Internet communication appreciated differently

General:

We do not know very much about what our colleagues have done or are doing. There is not sufficient sharing of experiences and feed-back of know-how. Possible actions to help overcome this dilemma:

- systematic inventory (synopsis)
- expert exchange, meetings, workshops, conferences
- secretariat

## Working Group 2

The development of tools (modules) should be done within the cooperation framework

of the Baltic Sea countries. The various elements to be developed are:

- shoreline sensitivity mapping
- shoreline typing
- remote sensing technique and applications
- socio-economic evaluation (impacts on fisheries, tourism, recreational value etc.)

A through-going principle should be the free exchange of tools and modules between the cooperating parties.

### **1.3.3 Do we need common guidelines (standards) for harmonizing the EMDS (pictographic symbols, shoreline typing, classification of area sensitivity, linking to remote sensing data etc.)?**

#### **Working Group 1**

##### Common framework:

as different (autonomic) responsibilities are to be respected, a common framework allowing local, specific adaptations and amendment seems to be the most natural approach.

##### Standard principles and exchange:

inside the common framework, standard principles, terminology and symbols will be required to achieve a mutual better understanding. Inside these standards, space is to be left for local implementations, scales etc.

##### Remote sensing data:

seem to be postponed or cancelled in most systems at present, there is still a chance to define a common framework

##### Common geographic referencing:

- see transparencies, "tools"

##### Synopsis of current systems in different Baltic Sea countries and in other countries (e.g. North Sea Countries, USA, Canada)

- systems and tools
- framework/standards
- organisation schemes (responsibilities)
- action schemes and plans (combatting)
- existing background reference documentation (EU-directives, regulations, IMO, national regulations + legislation, studies, reports)
- case stories

#### **Working Group 2**

Yes, where applicable.

The existing guidelines should serve as starting points for the development of the guidelines (pictographic symbols, shoreline types, principles of classification). The first step

is to study them. It might be difficult to establish uniform guidelines for sensitive areas due to the very different natural conditions around the Baltic Sea. As a minimum solution, and for initiating the discussion, guidelines for the documentation of sensitive areas could be set up.

#### **1.3.4 Are there any needs for cooperation and new project establishment (HELCOM, EU, other)?**

##### **Working Group 1**

Yes, see answers to questions 1 - 3.

##### **Working Group 2**

Yes.

A seminar has been proposed by Sweden, to be held in Sweden in Spring 1999. The issues to be dealt with would be

- state of the art of environmental atlas tools
- analysis of the existing guidelines for environmental mapping
- agreement on cooperation principles
- joint project planning

The seminar should lead to a Helcom (EU) project, to be started in 2000.

Cooperation links should be established to

- Norway (Sintef etc.)
- USA/Canada Great Lake projects (EPA, Environment Canada)
- Baltic Sea - Great Lakes Partnership process (established in Riga November 1998)

## **1.4 Working plan for 1999**

The workshop was concluded by drawing up an action plan and distributing homework in the following EMDS topics to be completed before the April meeting in Sweden.

- |   |                     |
|---|---------------------|
| 1) Synthesis of existing results<br>Hirvi (FIN), Schuldt (GER)            | <b>March -99</b>    |
| 2) Description of existing efforts<br>FIN - SWE - GER - POL - LIT et. al. | <b>February -99</b> |
| 3) Strategic positioning<br>Each member country                           | <b>March -99</b>    |

- 4) Get in touch with administrations in other countries  
Brusendorff (HELCOM) **December -98 ->  
January -99**
- 5) Get in touch with possible EU funding agencies  
National commitment **Jan/Feb -99**  
HELCOM + support **February -99**
- 6) Development of draft financial + technical form for a project  
Molitor (GER), Gajewski (POL), Follin (SWE),  
Brusendorff (HELCOM) **March -99**
- 7) Preparation of a seminar/HELCOM + SWE  
The Swedish delegate informed afterwards  
that the seminar will be held in Kalmar, Sweden **May 10-11,1999**

**ENVIRONMENTAL DATA SYSTEM IN FINLAND**

Juha Kämäri

INFORMATION SERVICE			
DIRECT ACCESS USE	SUBSCRIPTIONS		PUBLICATIONS
<ul style="list-style-type: none"> <li>• graphic information</li> <li>• interfaces</li> <li>• decisions</li> <li>• research projects</li> <li>• coordinate transformations</li> <li>• data bank searches</li> </ul>	<ul style="list-style-type: none"> <li>• data files</li> <li>• consultation</li> </ul>		<ul style="list-style-type: none"> <li>• environment status report</li> <li>• environment reviews</li> <li>• brochures</li> <li>• announcements</li> </ul>
↑			
DATA PROCESSING SYSTEMS			
ADMINISTRATION	ENVIRONMENTAL IMPACT ASSESSMENT		
<ul style="list-style-type: none"> <li>• decisions and permits</li> <li>• water treatment</li> <li>• water inspections</li> <li>• acquisition of conservation areas</li> <li>• environmental costs</li> </ul>	FIGURES	CALCULATION	KNOW-HOW
	<ul style="list-style-type: none"> <li>• cartography</li> <li>• diagrams</li> <li>• satellite images</li> </ul>	<ul style="list-style-type: none"> <li>• models</li> <li>• statistics</li> </ul>	<ul style="list-style-type: none"> <li>• indices</li> <li>• systems</li> <li>• animation</li> </ul>
↑			
ENVIRONMENTAL DATA BANK			
ENVIRONMENTAL MONITORING	POLLUTION CONTROL	NATURAL RESOURCES MONITORING	
<ul style="list-style-type: none"> <li>• air quality</li> <li>• deposition</li> <li>• water quality</li> <li>• hydrobiology</li> <li>• endangered species</li> <li>• discharge</li> <li>• ecosystems</li> </ul>	<ul style="list-style-type: none"> <li>• emissions</li> <li>• sewage</li> <li>• waste</li> <li>• dumping-grounds</li> </ul>	<ul style="list-style-type: none"> <li>• hydrology</li> <li>• water use and consumption</li> <li>• land use</li> <li>• conservation areas</li> </ul>	
↑			
INPUT SYSTEMS		SUPPORT SYSTEMS	
<ul style="list-style-type: none"> <li>• sample registration</li> <li>• automated observation</li> <li>• remote sensing</li> <li>• real time meteorological information</li> <li>• digitization</li> </ul>		<ul style="list-style-type: none"> <li>• codes characteristics of hazardous chemicals</li> <li>• industrial plants</li> <li>• monitoring stations</li> <li>• map elements</li> </ul>	





## KEY WORDS

**Ms. Anne Christine Brusendorff**  
**HELCOM / MC**

- existing HELCOM GIS (Geographic Information System) activities
- specific - existing international work as regards coastal sensitivity mapping - an area which is mostly linked with the development of Contingency Planning and thus combatting measures, but also with preventive measures regarding shipping activities

### Information and communication obligations within HELCOM context

1992 Helsinki Convention

- Article 17 (Information to the public)
- Article 20 (The duties of the Commission), specially Sub-paragraph i) of Section e) in Paragraph 1.

One way of fulfilling these duties could be by a Geographic Information System and Environmental Mapping and Data Bank System. Within HELCOM context the establishment of a Geographical Information System (GIS) was first considered in 1990. The approach was dual:

- WHO - the Regional Office for Europe
- the Nordic Council of Ministers.

The WHO proposal was to establish an integrated information system where data from different sources and sectors (health, environment, demography) was related to each other through a common standardized geographical information system. However, despite the decision of the Commission to start co-operation with WHO and the sending-out of a questionnaire (basically requesting data and names of contact persons) no progress was made.

Due to the interest of other organizations to initiate co-operation in the same field - and hence to avoid duplication of efforts and to ensure maximum comparability between data sets compiled - a consultation meeting was held between HELCOM and the different institutions (UNEP/GRID-Arendal, EDC (data consultant for HELCOM) and ECE). Based on this meeting the Helsinki Commission decided at its 13th meeting in 1992 to support the development of a GIS system within the Baltic Sea Area.

For the elaboration of such a system several meetings of Technical Experts were held. These meetings have resulted in a feasibility study report "The Basic Geographic Information of the Baltic Drainage Basin (BGIS) Project" finalized in 1994, considering, inter alia:

1. potential users and their needs;
2. already existing data;

### 3. data base management aspects.

In the feasibility study it is stated that the purpose of the GIS Project is to provide coherent spatial information of matters relevant to environmental issues in the Baltic Sea Area. Further it is stated that the intent is to include only less dynamic geographic features as well as to reduce the amount of associated statistical and other attribute information to a minimum.

Turning then to the more specific point of Coastal Sensitivity Mapping this is something which has been discussed internationally, both globally and regionally, for some time.

Firstly, Guidelines for the Designation of Special Areas and the Identification of Particularly Sensitive Sea Areas (PSSAs) have been adopted within the International Maritime Organization (IMO Assembly Resolution A.720(17)). Reasons for identifying an area as a so-called PSSA includes elements such as oceanography, ecological characteristics, social and economic value, as well as environmental pressures.

Having had an area designated as a PSSA it has been recommended that the IMO, or preferably a regional organization, see to that such areas are officially recorded on nautical charts and other relevant publications. This is important for several reasons:

- mariners should know the delineation of these areas as well as possible buffer zones;
- special operational restrictions may apply within the sea area (discharge restrictions, speed limits, navigational practices incl. requirements for pilotage); and
- in case of a conviction of a violation of anti-pollution measures within a PSSA (ship master knowing he is operating within a PSSA) this might form the basis for higher fines or even a reversal of the burden of proof.

The elaboration of a sensitivity map could also serve as a useful tool in the identification and establishment of areas where a recognized special protection scheme, such as a Particularly Sensitive Sea Area, is envisaged.

Moving away from the more preventive point of view the use of Coastal Sensitivity Mapping has also been acknowledged internationally in relation to combatting activities - often linked to the development of Contingency Planning.

Any amount of additional information could be added to the mapping, for instance

- list of available equipment;
- local current (either from a predetermined flow chart or by linking it to a trajectory model for the area, such as the HIROMB model);
- and so on.

#### **To sum up**

- A GIS Project, the Baltic GIS, was initiated in the early '90s within HELCOM. A feasibility study was elaborated - the main purpose pointed out being the creation of BASIC geo-referenced data (the Baltic GIS can be found on [www.grida.no/baltic](http://www.grida.no/baltic)).

- environmental mapping - listing sensitive sea areas - has been recognized internationally as a tool for regulating shipping activities - both on preventive and responsive levels.



# THE BALTIC SEA ENVIRONMENTAL ATLAS

Sune Follin  
Follin Consulting

## 1 BACKGROUND - ENVIRONMENTAL ATLAS OF THE ÖLAND ISLAND

It is a well-known fact that oil-spills have a serious effect on the environment, especially when the sea is polluted. It can both affect the water and the shores, both the animals and the plants. During 1994 and 1995 the Kalmar County Administrative Board performed a pilot study on these effects. They were especially interested in mapping the coast-line of the island Öland and the different state of circumstances that was to be found there. The essential part was to see how sensitive the coast-line is and what measures you actually can use to clean the shores in order not to worsen the effects of the oil-spill.

The result of the study was published under the name "Environmental Atlas of Öland". Parts of it was later digitised as a GIS (Geographic Information System) application where the original information was transformed into about 10 thematic map and the written information was connected to the maps as a relational data base.

## 2 IDEAS FOR CONTINUED WORK

The same ideas used for Öland are of course applicable to other areas around the Baltic Sea or elsewhere. The demand for this type of information should be more or less the same as long as there are oil-spills. In some cases the information already is available while in other areas nothing is done. The idea of the project is to use the same model as was used in the Öland-case in other areas around the Baltic Sea and maybe a good starting point is the Baltic Seven Islands.

## 3 OBJECTIVE

The objective for the project is the creation of a environmental atlas for the Baltic Sea consisting of all necessary information to protect the environment after an oil spill into the sea, put together and used in a computerised Geographical Information System (GIS) as a supportive tool in the cleansing operation.

## 4 SUB-PROJECTS

It is feasible to split the project up into sub projects:

- the biological database
- oil protection plans and plans for clearing the shores of oil
- to put the above parts together in a computer data base - GIS
- creating an information system in order to make the information available on the Internet
- to educate and train staff from the Rescue Services and the Coast Guard on how to use the material.

## 5 PROJECT PHASES

The project will be issued in two phases where a preliminary study is the first step. The preliminary study will have the objective to finish the Öland Environmental Atlas as a GIS model and to look further into the possibilities to finance a broader project. This includes a descriptive part concerning how the situation is in other countries around the Baltic when it comes to this type of material. Participants in the first step are Oskarshamn, Västervik, Borgholm and Mörbylånga municipalities in Sweden, a group of five municipalities around Pärnu town in Estonia, Ventspils Municipality in Latvia, Klaipeda County in Lithuania, Jastarnia Municipality in Poland, Blekinge and Kalmar Counties in Sweden.

Phase 2 will then deal with the rest of the Baltic Sea Coast.

Participation from the EU through the Swebaltcop programme

To make the project financially possible in phase 1 50 % of a budget of about 2.6 Billion SEK (about 300 000 ECU) will be covered by the EU programme Swebaltcop. The rest of the budget is covered by the Swedish Environmental Protection Agency (500.000 SEK) and the Swedish participants. The partners from Estonia, Latvia, Lithuania and Poland are seeking financial support the PHARE programme.

Phase 1 of the project will be completed September 1999 and phase 2 is supposed to start autumn 1999 and last for another two years.

A Steering Committee will be formed with representatives from the participants early November. The day to day work is run by a Technical Committee and the local project leaders.

## 6 SUMMARY OF THE PROJECT

The overall objective for the BSEA project is the creation of a co-ordinated Environmental Atlas for the Baltic Sea presenting all necessary information for protection of the environment after an oil spill into the sea, put together and used in a computerised Geographical Information System (GIS) as a supportive tool in planning a rescue and cleansing operation. This BSEA overall objective includes to develop an environmental atlas for the Baltic Sea that can function as:

- a prioritising instrument supporting the staff that has to organise the rescue and

cleansing operation

- a supportive planning instrument for activities 'in case of'
- an instrument to develop common standards for this type of activities
- a general information database for the protection of the environment when it comes to oil or other chemical spills into the sea
- an education and training ground for staff working with problems like this.

## **7 CONCISE TECHNICAL DESCRIPTION OF THE BSEA PROJECT**

### **7.1 Background**

It is a well-known fact that oil-spills have a serious effect on the environment, especially when the sea is polluted. It can both affect the water and the shores, both the animals and the plants. The problem has increased over the years - the number of oil spills in the Baltic Sea some years reaches a number of about 50 and they cause severe damages. There are many problems related to such a situation: the oil itself creating problems both for flora and fauna, the cleansing operation where people move in areas they should not move in because of very sensitive wildlife and plants, for tourism, for outdoor life as such, for the fishing and the food industry. An example is damaged breeding places for fishes affecting the reproduction of the fish. Some of the oil spills are very small but almost every year there are some that cause severe damage. In that situation it is very vital to make the correct judgements: what is important and what is maybe important not to do - e.g. prevent the cleansing operation from creating more damage than the actual spill. There are several environmental atlases produced through out the years in Sweden, Norway and in the Baltic states. The idea is to use available material as a back-ground and to try to find out what is most suitable.

### **7.2 Objectives**

The over-all objective for BSEA is to create a co-ordinated environmental atlas for the Baltic Sea that contains all necessary information needed for the protection of the environment in case of an oil- or chemical spill into the sea put together and presented in a Geographical Information System (GIS).

The over-all objective for this application is to make a pilot study on

- what material is necessary to present in the Environmental Atlas and what is necessary to develop through further studies; e.g. quality of the material, common standard for the evaluation of sensitivity of an area
- information on GIS to key-persons and through test-planning develop a common standard for all participants GIS for mapping and the creation of a data-base linked to these maps.



### **7.3 Activities - working methods**

- Methodology Seminary concerning the environmental atlas to discuss what will be included in the atlas
- Data collection. This activity aims at collection of relevant biological, geological and geographical data and to find out what is already available
- Information to the project-leaders about GIS. It will be two seminars with practical work using the data already available in between. Parts of this information will be on-line using distance education methods
- Seminar concerning the data collected and how to use it in a GIS. This activity includes comparison of data
- Test-planning of an area using the results from activity no. 3 and 4
- Seminar for discussions concerning experiences and evaluation. Conclusions and preparations for the continuation of BSEA: BSEA II.

### **7.4 Participants**

The 'Swedish Group' (Swebaltcop application) in the project consists of 4 municipalities in Kalmar County and county administrations in Blekinge and Kalmar while the 'CEC Group' (PHARE application) consists of Pärnu and 3 other municipalities in Estonia, Ventspils in Latvia and Jastarnia plus 2 other municipalities in Poland. It is assumed that Klaipeda in Lithuania also will join the project.

### **7.5 Management and staff**

The project will be managed by a Steering Committee (one from every participant politically elected, takes all over-all decisions) and a Technical Committee (the project leader from every participant, the Project Coordinator and the Financial Controller; working group for the practical work). The project is administered by Kalmar County Administrative Board and the Project Co-ordinator is employed on consultancy bases. CV for Co-ordinator see Annex.

### **7.6 Timing and duration (see Annex)**

### **7.7 Risk assessment**

The project has a strong partnership developed through several meetings and contacts. This fact decreases the risk of project failure due lack of interest from partners in the implementation phase considerably.

## 7.8 Anticipated follow up

The BSEA project is a pilot study aiming at trying out methods to be used in a coming full-scale project covering all countries around the Baltic Sea. It is anticipated after discussions between the Swedish Environmental Protection Agency, the Finnish Environment Institute and HELCOM that this project will be co-ordinated by the Finnish Institute.

# 8 THE ÖLAND ENVIRONMENTAL ATLAS

A summary of the Swedish version containing only one of about 50 sub-parts.

## 8.1 Introduction

The Öland Environmental Atlas is a result of a cooperation between the Öland Rescue Services, the Environmental Departments of Borgholm and Mörbylånga Municipalities, the Ottenby Ornithological Station, the Environmental Department of Kalmar County Administrative Board and the Öland Ornithological Society.

The first steps on the road to today's Environmental Atlas were taken in the early 1970's when the Kalmar County Administrative Board decided to make a "Plan for Oil Protection". The Swedish Government issued some regulations concerning this topic in the late 1970's and in 1986 they issued a paper telling how an environmental atlas should be worked out. The present Öland Environmental Atlas was completed in 1995.

The objective of the Environmental Atlas is to summarize all information and knowledge concerning the coastal zone of Öland. The material is collected and chosen from the point of view that people engaged in a rescue and cleansing operation after an oil spill or chemical accident should have easy access to information on what they can do or not. Of course it is foreseen that the Atlas can be used in case of other types of investigations concerning the coastal zone.

The coastal zone has been divided into two main parts: one part is Borgholm and the other is Mörbylånga Municipalities. The main parts have been divided into a number of sub-parts. For every sub-part there is a descriptive text and a map in scale 1:50 000. The text tells the protection status, i.e. if there are any relevant reasons for protecting this very part of the coast and of course the motivation for this. If there are any other motives for protecting the coast you will also find those motives if possible.

In the atlas every sub-part has been valued or classified after its sensitivity into four classes where class 1 is the most sensitive with the most important motives for protection. It should also be noticed that the classification of a sub-part can vary because of types of motives and time of the year. If a sub-part has no sensitivity classification it means that the sub-part has a normal sensitivity after Swedish standards.

In the atlas you will also find proposals on how to protect the coast line in case of a

threat from an oil or chemical spill into the sea - protective measures. Besides proposals for protective measures there are also proposals for cleansing methods that can be used. The idea behind these proposals is to guide and advise the leader of the cleansing operation on some of the very special problems that might be related to the coast line of this sub-part of the coast.

In the atlas there is no description on each and every cleansing method as such. That type of descriptions can be found in the specialist literature.

The over all idea of the Öland Environmental Atlas is to form the basis for the leader of a cleansing operation when it comes to make good and proper decisions for the cleansing of the coast. The information in the atlas does not cover all aspects of a possible cleansing operation so therefore the leader of the operation might have to be in close contact with experts on environmental issues.

The experiences from various oil spills tells us that the oil has damaged not only the coastal zone but also the land up till some kilometres from the actual coast line (an example is the Braer accident on Shetland). There are also many examples that water areas outside the coast line has been damaged, e.g. mussel and seaweed beds. Therefore the range of the Environmental Atlas has to cover water areas of about 15 m depth, the actual coastal zone and land areas up till a few hundred metres from the coast line. In some cases the land areas can be very sensitive to even the tiniest drips of oil. Other types of damages can be caused by the vehicles carrying the cleansing staff to the coast. Vehicles driving in the terrain can easily cause a lot of damage.

## 8.2 Content

**Protected areas:** Places or areas protected through some kind decision from the authorities. Examples are historic buildings, ancient monuments, bird sanctuary or areas protected by the RAMSAR - convention. For this type of places or areas there are always rules and regulations.

Areas of national interest, e.g. areas for fishing, environment conservation, conservation of the cultural environment or outdoor life.

**Fish and mussels:** It is not possible in practice to map all areas because more or less all them over 10 metres depth are important reproduction areas. Only areas of special importance have been mapped in the atlas.

**Type of beach:** Towards the end of the 1960's all Swedish beaches were examined and mapped according to its type. This material is important due to the fact that the beach is more or less sensitive to oil because of what type it is. Besides that it is a big difference to clean the beach from oil if it is e.g. a sandy beach or a seashore meadow with rare flora and fauna. These meadows are very sensitive even during the non-vegetative season of the year because seeds, caterpillars and pupae can easily be destroyed when cleaning the shore from oil.

Protection status tells whether that part of the coast has a legal protection e.g. national

park, reserve, areas where seals are protected, historic buildings.

Protection motives has been marked on the maps with symbols e.g. Zfå for birds (få = fågel = bird). In the text the motive is then explained e.g. a rare type of tern is breeding in the area. In some cases that type of information might be classified as secret then you are referred to the authorities for more information.

Sensitivity classification gives a compressed priority to the area. The priority has three classes: I, II and III. The first class (I) means that the area has high sensitivity. To clean such an area is of great importance and has to be done quickly and it might be very expensive since big resources has to be used in the operation. If an area has no classification it does not mean that the area has no value - it only means that the value is normal. It should also be noticed that the sensitivity classification can differ depending on what time of the year it is. A very popular sandy beach used by the tourists during the summer needs quick cleansing that time of the year but during the winter there is no hurry. You also have to notice that it easier to clean a sandy beach than a seashore meadow or a moraine beach.

Protective measures and cleansing methods is to be found in the atlas as short advises.

On the maps has the areas with different sensitivity classification been marked and separated from each other with dotted lines. For each sub-part of the coast the essential information is gathered in a circle: sensitivity, motives and of course the number of the sub-part.

Other information on the maps are which roads and paths to use through sensitive areas for transport of heavy equipment etc.

Municipality: Mörbylånga  
 Area name: Öland's Southern Cape  
 Serial number: 40-09  
 Sensitivity Classification: I  
 Last revision: 1995-02-01

### 8.3 Protection status

The RAMSAR-convention applies for the whole area being an important and internationally well known area for birds living in wetlands.

**Ancient monuments:** The area is one of the biggest areas with ancient monuments on Öland.

**Birds sanctuary:** There are two sanctuaries in the area, one in the eastern part of the area and one in the western.

**Environment conservation:** The majority of the area has legal protection for environment conservation. The entire area is of national interest for environment conservation.

**Conservation of the cultural environment:** The entire area is of national interest for protection of the cultural environment.

**Outdoor life:** The entire area is of national interest for outdoor life.

## 8.4 Protection motives

**B(o)** The central part of the area is covered by a deciduous forest, Ottebylund, where many rare plants are to be found. The rest of the area is in the east covered by a meadow land used for sheep grazing all the way down to the beach, the Schäferi Meadows. These meadows are very valuable. Towards the west there are open grazing land to be found with i.a. shrubby cinquefoil and common juniper.

**F** the Ottenby area is one of the most visited environment conservation areas in the country. Especially during the season for the flight of migratory birds many ornithologists visit the area. During summertime the tourists dominate.

**G** along the beach west of the Ottenby Estate there is a valuable abrasion rock where the geological beds starting from the Lower Ordovician time can be seen.

**R** In the western part of the area many ancient monuments can be found. Along the beach and in the shallow waters there are many old ship wrecks. There are also many old foundations of ancient buildings and the remains of a medieval church.

**Ref** The activities at Ottenby Ornithological Station is a part of the monitoring programme for environmental quality (Swedish abbreviation PMK). At the station they also monitor the gamma radiation for the Swedish Radiation Institute.

**Z** Outside the Schäferi Meadows in the east there are sand banks that move from time to time and where many insects with importance for wading birds feeding can be found. Also in the western part of the area there are important sand banks for the feeding of wading birds.

**Zfi** Important area for fish breeding, i.a. flat-fish and herring from about 15 metres depth up to the shore.

**'Zfå** This area is the most important area for the flight of migratory birds on Öland. Almost all the year around there are birds passing to or from their breeding places. Some of them stay only a few hours. Others, especially some small wading birds, some birds of prey and some rare types of gees stay in the area for a longer time. During the summer the area is important for ruffling up their feathers for many, many gees and swans. The deciduous forest is a very important breeding place for threatened and rare types of song-birds.

**Z(u)F** or feeding birds important mussel and seaweed beds along the shores.

## 8.5 Sensitivity classification

I	Z	The sand banks and the entire coast line zone all the year
I	Zfå	All the year. Entry is forbidden to the birds sanctuary in south-west April 1 November 15 and to the eastern birds sanctuary April 1 - August 31 (only some paths are open)
I	Z(u)	All the year
I	R	Areas with ancient monuments all the year
I	Ref	All the year
I	B(o)	March - September
I	F	March - October
II	G	All the year
II	Zfi	May - October
III	B(o)	October - February

## 8.6 Protective measures

Hunting with lead-shot is not allowed.

In the water during spring, summer and autumn: Prevent oil and chemicals from reaching the shallow waters by using preventing materials ('länsa' in Swedish).

In the coast line zone: Protect areas with seaweed from floating chemicals by putting out protecting materials.

In the coast line zone during spring: Prevent birds from touching oil or other chemicals that have reached the coast line zone by using straw or foil or plastic sheeting.

On land all the year: The area is very sensitive to damages caused by vehicles.

## 8.7 Cleansing methods

On and in the water: It is allowed to use mechanical equipment.

In the coast line zone: Manual methods are allowed. The use of mechanical equipment is allowed with the permission from the County Administrative Board. Any damage to the Abrasion Rock is not allowed.

Gross cleansing is allowed all the year. Cleansing in detail is not allowed during April--August.



## THE GERMAN CONTINGENCY PLANNING PROJECT - VPS

**Dr.-Ing. Norbert Molitor**

**Dipl.-Ing. Burkhard Schuldt**

Since spring 1997, the German contingency planning project, called VPS, has been developing into an effective tool for combating pollution caused by shipping accidents at sea and in the German coastal zone. ARCADIS Trischler & Partner Consult is responsible for the project management and IT-management of this project which involves the five coastal federal German states.

The system is founded on two columns:

- The data, containing all relevant information, are important for contingency planning,
- The software, processing the data and providing it to the user in the case of an emergency and during training, etc..

Data collection is the most important and expensive part of the project. Data includes:

- Geographic features such as types of shores, accessibility, etc.,
- Numeric data of all skimmers, ships, vehicles and other facilities and their location,
- Numeric data of industrial operations, authorities, persons,
- Geographic and numeric data of protected areas, nature reserves,
- Data of previous pollution by shipping accidents,
- Instructions for combating pollution,
- Photos of all shores.

At present in two pilot projects on the Baltic and the North Sea coasts data are being collected. This will provide experience that can be integrated into this project.

The software is also being developed.

The system design has been completed, so programming can begin. The following gives a summary of the software design, because it will be the shell and the home of the VPS system's expensive data.



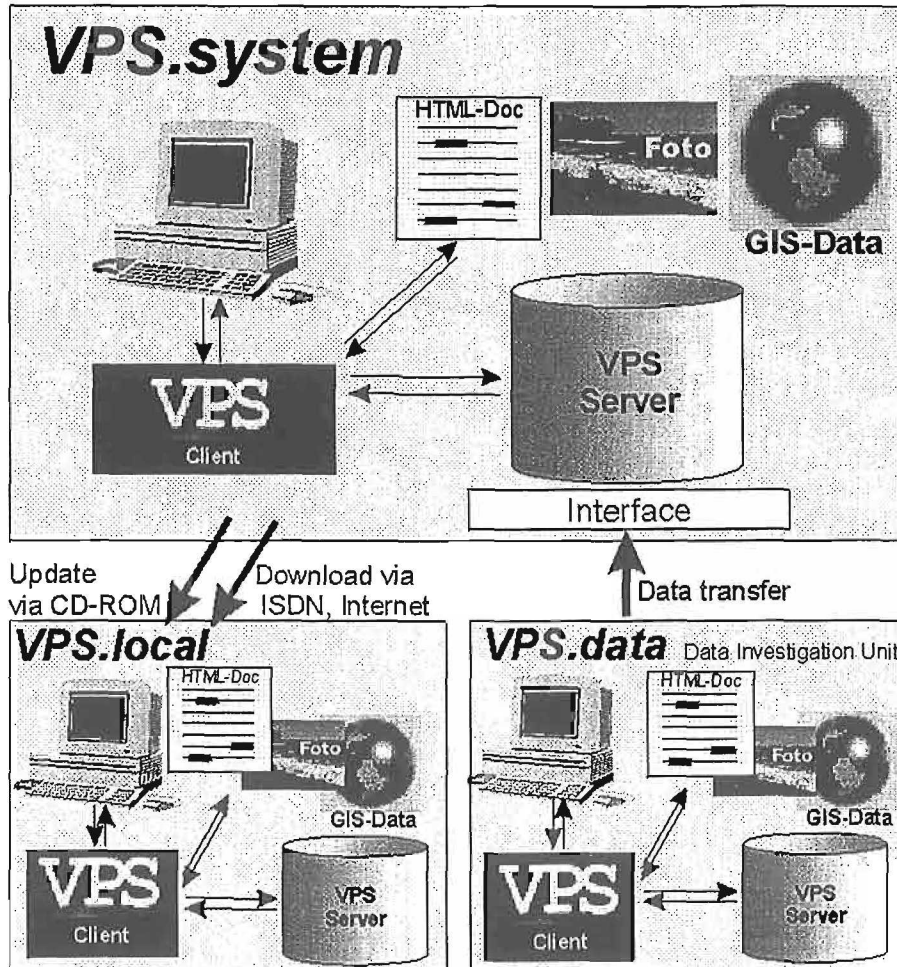


Fig.1: VPS Modules

As there is no need for a SQL client/server architecture, we decided to use a fileserver architecture for the main module, the VPS.system.

Data maintenance is carried out using the VPS.system on the SLM authority's low area network in Cuxhaven.

This system has distributed copies called VPS.local, with read-only functionality. These copies, distributed and updated by CD ROM or ISDN connections, are used by the authorities, firms and persons involved in contingency planning or pollution combating in the coastal zones.

The also distributed data collection unit VPS.data is used for data collection through companies and authorities.

For VPS.local users, this module also permits data update and collection, although their VPS.local module only has read-only possibilities.

Basic data collection will be carried out using this utility too, because it is more comfortable and delivers more reliable data than initial paper-based data collection.

The programming environment and software components of VPS are as follows:

- Programming Environment: Microsoft Visual Basic® for Applications 5.0
- Database: Microsoft Access® 7.0
- GIS: ESRI MapObjects® 1.2

The VPS-system deals with several data types such as:

- Alphanumeric data in the database
- Geographic data in the GIS
- Text data as HTML-documents
- Bitmap data as JPEG-bitmaps.

For these data types, presenting, using and editing must be programmed in suitable environments as part of the VPS-system. The following figure shows the interdependence of these environments:

### Software Components and Dataflow in VPS-System

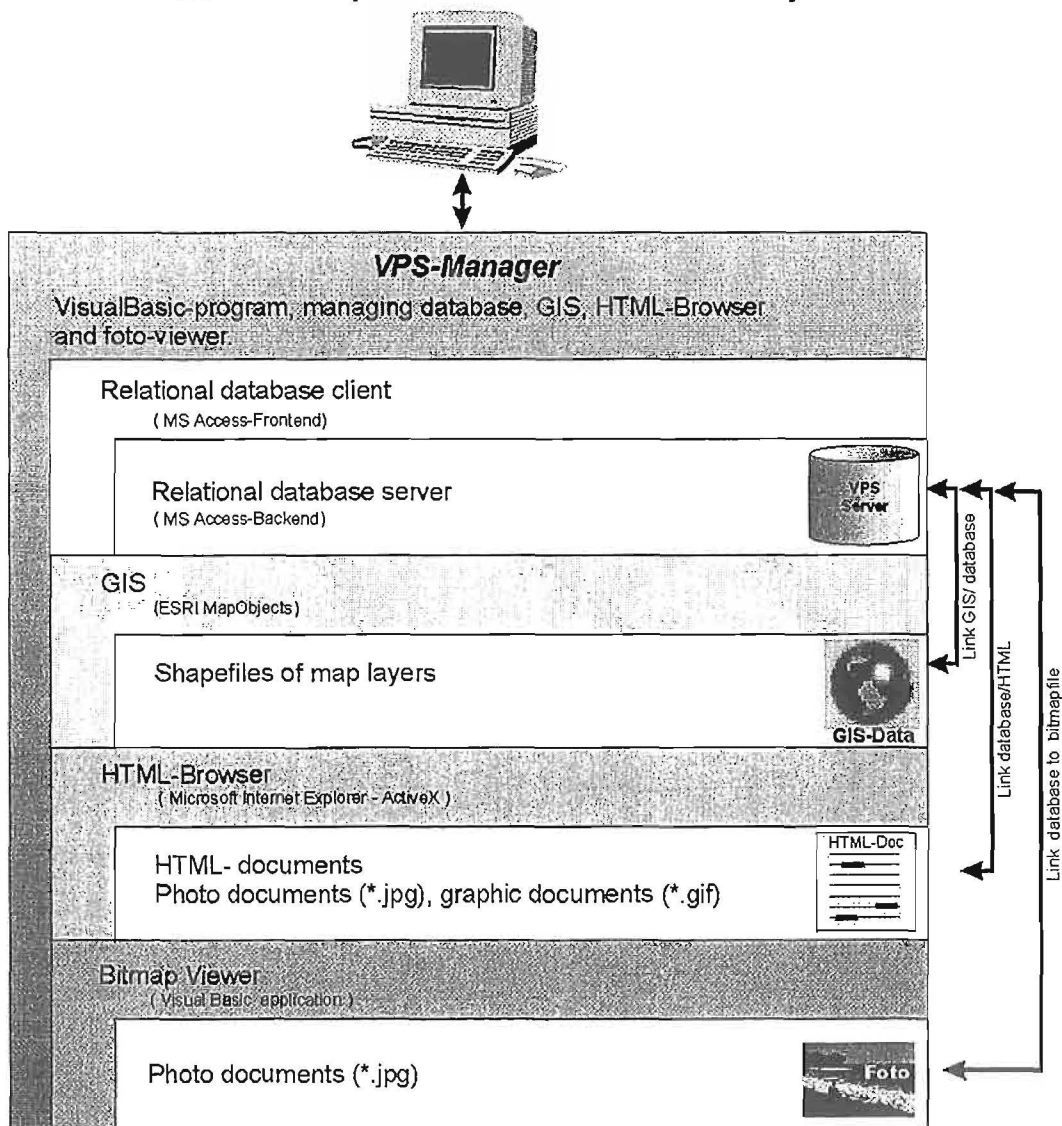


Fig. 2: Software components and dataflow in the VPS-system

The following screen shots of the first version of the VPS.system give an impression of the multi-media user interface.

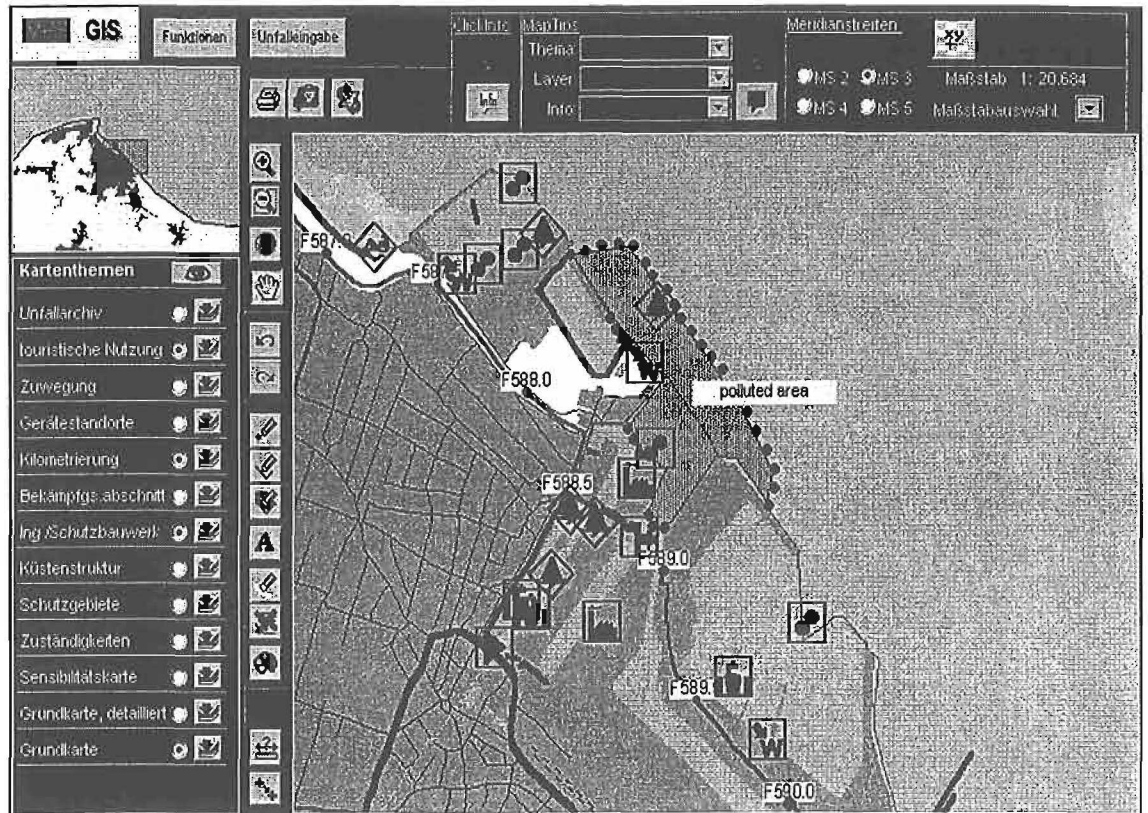


Fig.3: VPS GIS-mode

## GIS-MODE

The GIS will be the most frequented interface, as it contains the electronic map of the coastal zone and includes links to the database, HTML-documents and images.

# DATABASE-MODE

The database contains all kinds of alphanumeric data in a relational model. This demands the input of well structured and consistent data leading to a well structured and consistent data output. The figure below shows the data set of an all-terrain vehicle with its technical data, locality, field of action, etc.

**Bekämpfungsgeräte - vollständiger Datensatz**

Geräteart: **HAGGLUNDS-FAHRZEUG**

Typ: **BV 206 D** Rufzeichen: **AGT 5187**

Taufname:  Serien-Nr.: **AGT 5187**

Nationalität:  Kfz-Kennz.: **WHV 310**

SLM-Kennung: **WHV 310**  verfügbar?

Kaufdatum: **11.06.89** Eigner:

Kaufpreis: **330.000,00 DM** Wiederbeschaffungswert:

Hersteller: **HAGGLUNDS VEHICLE AB**

---

Kapazität:  Antriebsart: **DIESELMOTOR**

Leistung: **100,00** kW Kranlast max.:  t min.:  t

Ges.gewicht: **6.540,0** t -auslage max.:  m min.:  m

Länge ü.a.: **6,81** m

Breite ü.a.: **2,00** m

Höhe ü.a.: **2,45** m

Durchm.ü.a.:  m Reichweite:  km

max. Geschw.:  km/h

Ex-geschützt?

Ersatzteile: **BORDWERKZEUG**

Personal: **1 MANN**

Transportmittel: **SELBSTFAHREND/TIEFLADER**

Bemerkungen: **PERSONENKABINE 1,2t/ ZULADUNG 2,0t/ ANHANGELAST 2,5t  
KASSTAND 12/92: 7044; 12/93: 8847km  
(1803Km,187h); 12/94: 9280km(1487h); 12/95: 10412 (1851h) \*\*\* Anzahl: 1**

---

zu Körperschaft:

Ort:

Kategorie:

Standort: **CUXHAVEN**

Ort: **CUXHAVEN**

Trägereinheit:

Einsatzbereich: **UNWEGSAMES GELÄNDE, SCHWIMMFÄHIG**

Zubehör: **1 Kranmulde, 3 Stapelmulden, 2 Schwimmulden, 1 Personenkabine**

zugelassene Substanzen:

Anschlüsse: **MAUL- UND KUGELKOPFKUPPLUNG**

erstellt:  geändert: **no** 29.05.98 14:28:15 Gültigkeit

Fig.4: VPS database-mode

The relational database model also allows the use of hierarchic data structures. Database explorers provide clearly structured data as shown in Figure 5.

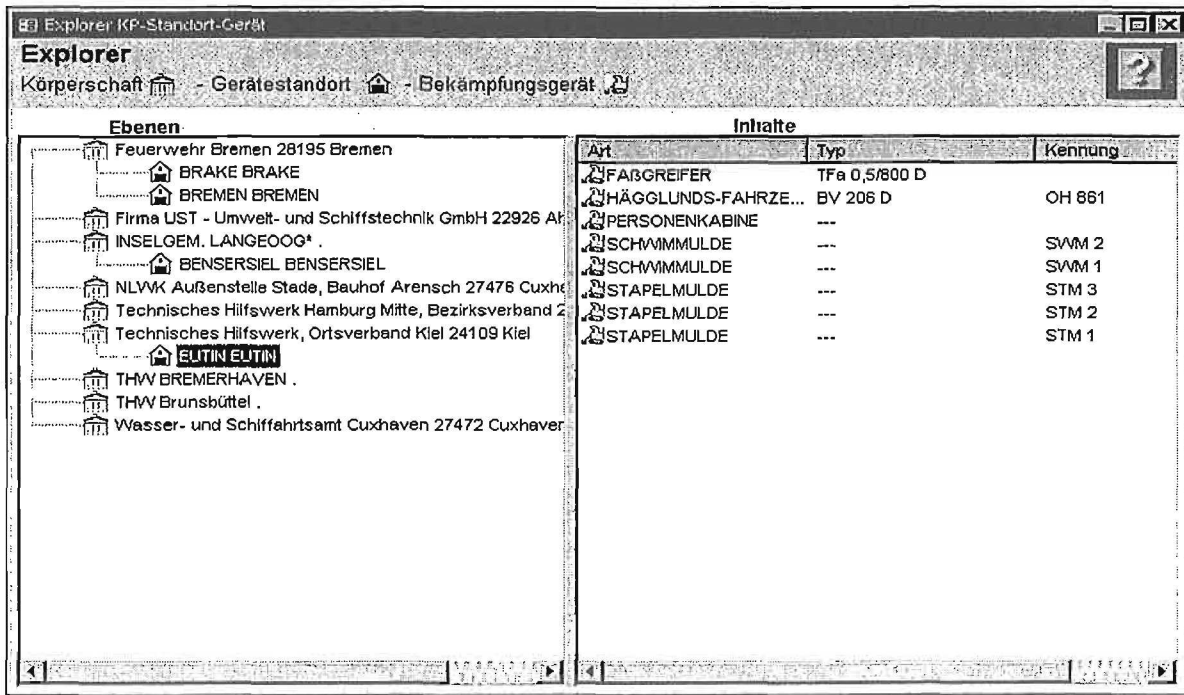
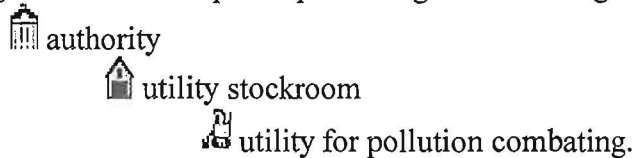


Fig.5: VPS database explorer

The figure shows an explorer presenting the following hierarchy:



The explorer contains further functions such as the opening of connected forms in the database, etc..

## HTML-MODE

The former paper handbook is now available as a comfortable multimedia HTML-file. The browser for using this handbook is part of the VPS user interface and can be handled like a normal website.

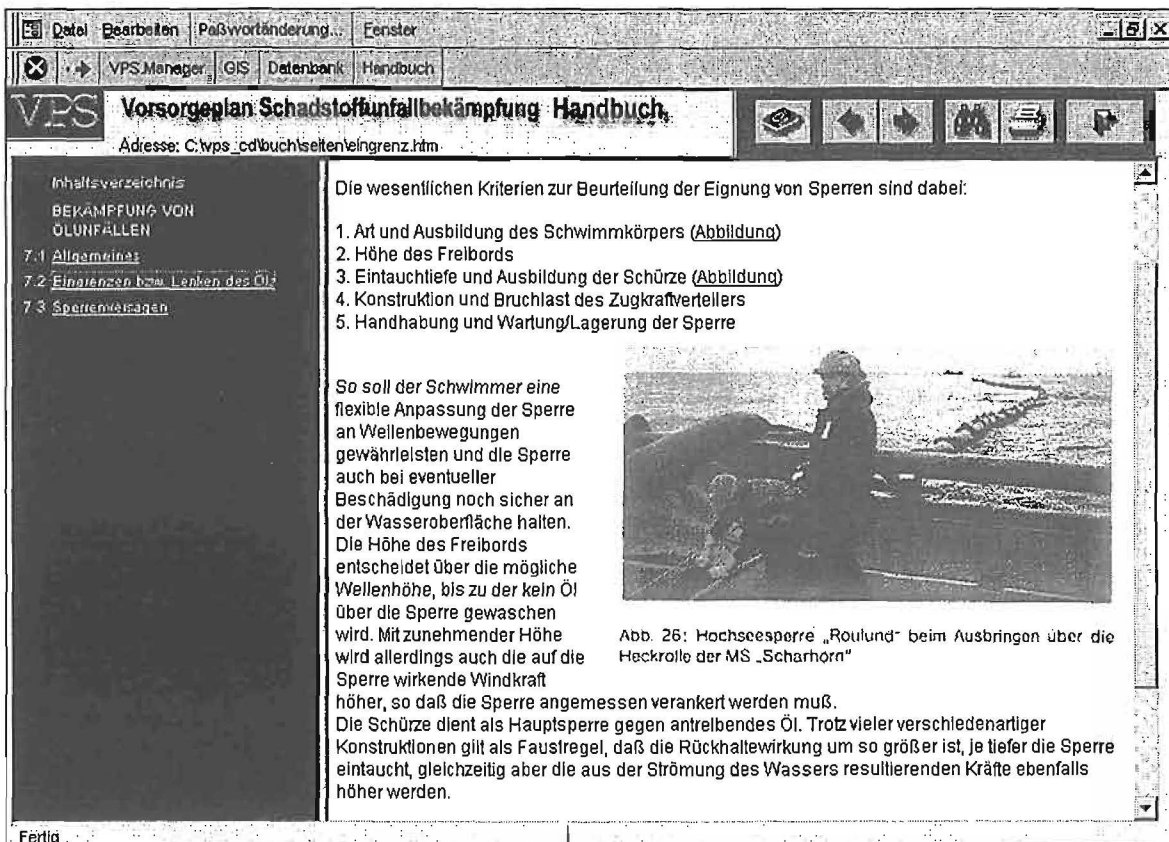


Fig.6: VPS browser window

## BITMAP VIEWER-MODE

This mode enables browsing through all bitmaps showing the German coast in 500 m sections. Thumbnails of these bitmaps are stored in the database with information regarding each photo such as author, date, coastal section, co-ordinates, etc.. The pictures are stored as JPEG-bitmaps on CD ROM or on the network fileserver. The following kind of view is possible:



Fig.7: VPS bitmap viewer

# NATIONAL GIS CENTRE FOR INTEGRATED COASTAL ZONE MANAGEMENT

Juliusz Gajewski & Leonard Gajewski

## ABSTRACT

The National GIS Centre for Integrated Coastal Zone Management purposes has been established in Maritime Institute in Gdansk. The national GIS Centre is an unit responsible for operational delivery of the environmental and technical geographical data for purposes of Integrated Coastal Zone Management. The Centre utilises the map-based information and remote sensing techniques (including aerial photography and satellite imagery) information supplemented by relevant tabular information on coastal zone features.

The data are stored in the form of atlas with information covering among others information on shoreline, infrastructure, biological resources, water use (human use in general), environment data forecasts. The data are shown in the map format using ArcView 3.0 with Internet Map Server extension. The data will be available through the Internet to anybody using the JAVA-enabled WWW-browser.

The National GIS Centre for Integrated Coastal Zone Management is created with the help of the European Union PHARE fund project aimed at creation of the common (or similar) GIS tools for Integrated Coastal Zone Management in Estonia, Latvia, Lithuania and Poland.

## 1 Introduction

There is a need for the operational cheap solution for delivery of all the information necessary to manage the coastal regions efficiently. The National GIS Centre for Integrated Coastal Zone Management (ICZM) aims at developing the tools and filling up the database with necessary data. The Centre will also operationally serve the data to the responsible agencies and local communities in the form of the atlas available through the Internet WWW site. The GIS information is further used in the developed in Maritime Institute in Gdansk Computer Aided Rescue and Oil Combating System (CAROCS).



## 2 THE MAIN POTENTIAL CUSTOMERS AND TASKS OF THE ATLAS

The main customers may be distinguished as follows (each group of the customers is followed by its tasks):

- Maritime Offices
  - planning and design of coastal protection systems,
  - decision making on all forms of use of the sea and sea bottom,
  - safe exploitation of approach channels and ports,
  - construction permits within the area of the Technical Belt and approval of decisions on conditions of construction and development of in the Protection Belt,
  - issuance of permits for dredging and dumping of spoil and waste in sea waters,
  - optimisation of life saving and oil and chemical spill removal actions on the sea (operational optimisation and contingency planning).
  
- Local (municipal) authorities
  - development of land use plans for the municipalities, including
    - issuance of construction permits,
    - planning of touristic infrastructure,
    - optimisation of operation of ports and harbours,
  - flood risk prevention,
  - preparation of contingency plans.
  
- Voivodship authorities
  - environmental policy,
  - optimisation of contingency plans for the coastal zone (e.g. harmful substance spill).

## 3 THE DATA SETS INCLUDED IN THE ATLAS

The atlas will include following data:

- Topographic reference markers - border signs, survey marks, etc.
- Administrative borders and boundaries - legal borders, administrative borders, territorial planning borders, protected areas, natural feature areas.
- Geological data - profiles, boreholes information and geological maps.
- Digital Terrain Model - grid data with resolution approx. 15 m., bathymetric contour lines (every 0.25 m.) and topographical contour lines up to cliff/dune crest (every 0.25 m.).
- Geomorphological structures and objects - near shore bars, near shore troughs, shoals, beach sectors, shoreline classification, terrain feature description, etc.
- Hydrological features - near shore currents, wind and wave climate, water level fluctuations natural terrestrial surface and ground waters, areas of salt water intrusions, etc.
- Nature objects and habitats - individual objects and vegetation forms.

- Coastal defence, shore protection and hydrotechnical structures - dikes, dams, sluice gates, groynes, gabions, breakwaters, seawalls, tetrapods, artificial beaches, nourishment areas, dunes, rip-raps, moles, jetties and others.
- Land and water use forms - agriculture, mariculture, structures and built-up areas, industrial structures, restricted areas, water use zones, etc.
- Traffic infrastructure - roads, road networks, railroads, airways, shipping.
- Supply networks - e.g. electricity, oil and gas, fresh water and waste water, heating system communication facilities.
- Infrastructure - others - health service, waste treatment, fire protection, educational facilities, rescue and combating facilities.
- Tourism and recreation infrastructure - recreation sites, hotel areas, recreation facilities.

## **4 THE TECHNICAL DESCRIPTION OF THE ATLAS**

The atlas is build up with the ArcView 3.0 programme. Most of the features listed above have a geographical extents and as geographical objects can be placed on the maps. The tables with tabular information about specific features are stored in ArcView also. The user interface is being developed with the Internet Map Server extension. The atlas will be available on-line through the WWW server located in National GIS Centre for ICZM purposes. The information will be classified for the use of different users. The data object model, specifically the description of the attributes for each feature is at the moment being evaluated within the above mentioned PHARE project and is expected to be agreed to certain extent between beneficiary countries (Estonia, Latvia, Lithuania and Poland). The content of the database if filled by already existing data from several agencies and supplemented by recent satellite imagery for whole project and aerial photography for pilot studies area.

## **5 CONCLUSIONS**

The GIS tools for ICZM purposes is being developed at the Maritime Institute in Gdansk with support from EU side. The tools developed in Maritime Institute in Gdansk will constitute the system of most of the information necessary for oil spill combating activities at sea. The data from the system are already linked to the CAROCS system being developed and operationally run in Maritime Institute in Gdansk in case of any oil spill occurrence. The system is expected to become operational before end of 1999.



## ENVIRONMENTAL MAPPING OF KALININGRAD AREA

**Litvin V.M., Barinova G.M., Volkova I.I & Tcheshina E.A.**

During 1993-1998 the ecology-geographical maps of Kaliningrad area and marine shore of the Baltic Sea were made on the geographical faculty of Kaliningrad state university according to the plan of scientific researches on the departments of geocology and geography of ocean. The maps are made on materials of field and sea researches of departments using share materials of State committee on conservancy and land use, Board of forestry management, Atlantic research institute of fishery and oceanographic, Atlantic branch of institute of oceanology, SSIO "Baltic coast protection" and other organizations of area. The following maps are made:

- Ecological maps of Kaliningrad in scales 1:200 000 and 1:500 000, on which condition of an environment for 1993 is reflected. A degree of influence of anthropogenic load on components of natural and technogenic systems is shown on them over landscapes, sources and areas of pollution and disturbance of an environment are allocated as well.
- Map "Maintenance of ecological safety in Kaliningrad area" in scales 1:20 000 and 1:500 000 /1995/. The basic contents of maps is shown on chart figures reflecting priority measures for maintenance of ecological safety of area on the basic economic activities, including an industry, energy, transport, municipal facilities, agriculture, forestry, shore protection, recreation and other activities. It is recommended 50 protective measures to protect biodiversity and ecological balance. Directions for territories use are shown by colour scheme, built and planned nature protective objects - by conditional marks, areas under an unsuccessful ecological situation are set out as well.
- Maps "Protected natural territories and objects of Kaliningrad area" in scale 1:500 000 /1997/. Scheme of the special protected natural territories is shown, the functioning of which is regulated by the legislation of Russian Federation. Especial conditional marks represent flora and fauna species which are rare or in danger, including those in the Red book.
- Map "Recreational potential of landscapes in Kaliningrad area" in scale 1:500 000 /1997/. On a map five categories of landscapes are shown: the most favourable, favourable, moderately favourable, poorly favourable for the recreational objectives. The natural preconditions of recreational activity are displayed and cognitive objects are shown by means of chart figures, giving data on 20 parameters.
- Medical-geographical maps "Deceases rate of the population in Kaliningrad area in 1993 and 1995" and "Zoning of the Kaliningrad region about a risk of deceases spread" /1997/ in scale 1:400 000. Deceases rate of the population estimated there are submitted from the analysis of statistical data over administrative regions of area.
- Ecological map of the city Kaliningrad in scale 1:200 000 /1997/. Susceptibility of

urban landscapes to chemical pollution of an environment is shown there over landscapes, rate of pollution of environment components for some territories of city is estimated.

- Map "Anthropogenic load over waters of the Kaliningrad area" in scale 1:500 000 /1997/. River basins of area are marked out there and degree of anthropogenic impact from data on reception capacity of a river network to take phosphorus and nitrogen is shown, module of a river drain is stressed?.
- Maps "Kaliningrad region under some hydroecological situations" in scales 1:200 000 and 1:500 000 /1998/. Imitation model of hydroecological situations over river basins are used to reveal their actual condition: satisfactory, stressed, disputed, depressed.
- Landscape map of Kaliningrad marine shore in scale 1:100 000 /1995/. Mapping covers a shore line of width up to 5 km, including Sambia peninsula, Vistula and Curonian spits over the Kaliningrad area and underwater coastal slope up to depths of 25-30 m. A legend of a map is made on structural-genetic classification of landscapes which were allocated under the geological, geomorphological and biological characteristics. Types of substance are marked out with the imposition of data on biocenose with dominant steady species. On land dominant species are represented by floristic groups, on sea bed - mainly by zoobenthos with some dissemination from the phytobenthos representatives.
- Map "Landscape-ecological zoning of a Russian part of Vistula lagoon" in scale 1:50 000 / 1998/. Three zones with various conditions of development of biocenose are allocated on a map. Strips of underwater extraction of building raw, reception places for waste waters, items with the high contents in bottom sediments especially dangerous pollutants are shown as well.

## MAPS OF SENSITIVE AREAS

Juozas Karalavičius

### ABSTRACT

The main actions for improvement of the abilities and organizations for combating pollutions at sea are made by the Ministry of Environment of the Republic of Lithuania that has the overall administrative and strategic responsibility for combating oil pollution accidents in the marine environment.

On behalf of Klaipeda State Seaport Authority the operational response activities in relation to oil pollution in the marine environment are executed by the Marine Rescue Coordination Center (MRCC) of Klaipeda. It is also the leading institution within the National Oil Spill Contingency Plan for Combating Oil Pollution of the Sea in Lithuania as prepared by Carl Bro International.

Basically a successful combating operation of a marine oil spill is dependent on a fast response from the time the oil spill is reported until combating operations have been initiated. In order to reduce the response time and facilitate decisions about where and how to apply combat efforts, environmental sensitivity maps are essential. Information on the exact position and size of the oil spill and available combating measures can be plotted on the maps, and priorities for combat efforts and means can then be established according to the identified coastal sensitive areas.

## 1 INTRODUCTION

Some coastal areas are more sensitive to oil pollution incidents than others. Factors that determine the sensitivity are e.g. presence of important natural resources, amenity values or production activities. In planning the response to oil spills, in-depth knowledge of the coastal sensitivities in the threatened area will make it possible to make optimum use of response resources. Sensitivity mapping is a segment by segment analysis of the coastline which provides an overall picture. Furthermore, priorities for protection strategies can be identified through application of maps showing ecologically sensitive Lithuanian coastal areas.

## 2 CONTENTS AND IMPLEMENTATION

Lithuanian international collaboration is important to accomplish not only international environmental protection obligations but also state strategy of nature protection. Implementation of Convention of the Baltic Sea Protection obligations is one of the main trends of present Lithuanian environmental protection policy.

Because of that international collaboration is vital to Lithuania. Following common projects with Swedish and Danish environmentalists, preparing common action programs against the oil spilling, will provide important benefits for maintaining stability of the Baltic and preserving Lithuanian seashore.

First and general project in collaboration with Swedish specialists, on their initiative, working group was consolidated in Lithuania that is able to prepare common program for protection from oil spills at the Baltic Sea coast. Also state of the Baltic coastal zone environment and natural resources, ecosystem functioning regularities. Study was fulfilled in the course of three stages.

In the first stage of study the analysis of existing data performed (inventory) and selected the most important (priority) environmental components that define stability of Lithuanian coastal and nearshore ecosystems and make up the background for environmental atlas, preparing action plan against oil spillage.

In the second stage of study the collected material was cartographed. Coastal zone divided into 7 regions and GIS based maps of priority environmental protection complexes prepared for every region, namely:

- 1<sup>st</sup> region - Nida - Juodkrante
- 2<sup>nd</sup> region - Juodkrante - Alksnyne
- 3<sup>rd</sup> region - Alksnyne - Klaipeda - Giruliai
- 4<sup>th</sup> region - Giruliai- Karkle - Nemirseta
- 5<sup>th</sup> region -Nemirseta - Palanga
- 6<sup>th</sup> region - Palanaga - Osupis
- 7<sup>th</sup> region - Osupis - Butinge

In the third stage of study evaluated the sensitivity of natural components to the oil pollution and terms of rescue operations. Means and methods of oil pollution rescue operations suggested, also.

“Carl Bro International” has finalized the Terms of Reference for the mapping component and concluded on agreement with the Institute of Ecology (Lithuania). This component, when ready (expected to be finalized at the end of 1998) will be included in the National Oil Spill Contingency Plan for Lithuania.

Collection/compilation of existing data relevant for sensitivity mapping of the Lithuanian coastline is presently under elaboration. The information given on the different features described below will be mapped by distinguishable symbols. The following features will be identified:

- type of shoreline (geology/ecology);
- fisheries including spawning sites (including seasonal variations);
- aquaculture sites (including seasonal variations);
- deposits of medical mud;
- algae, region of harvesting (including seasonal variations);
- areas of high ecological value (national parks);
- seabirds and marine mammals seal sanctuaries (including influence/importance of seasonal variations);
- amenity beaches;

- urban areas (with more than 500 inhabitants);
- harbours including marinas;
- river mouths including approximately current velocity (including seasonal variations);
- water intakes;
- off-shore installations;
- areas of historical value.

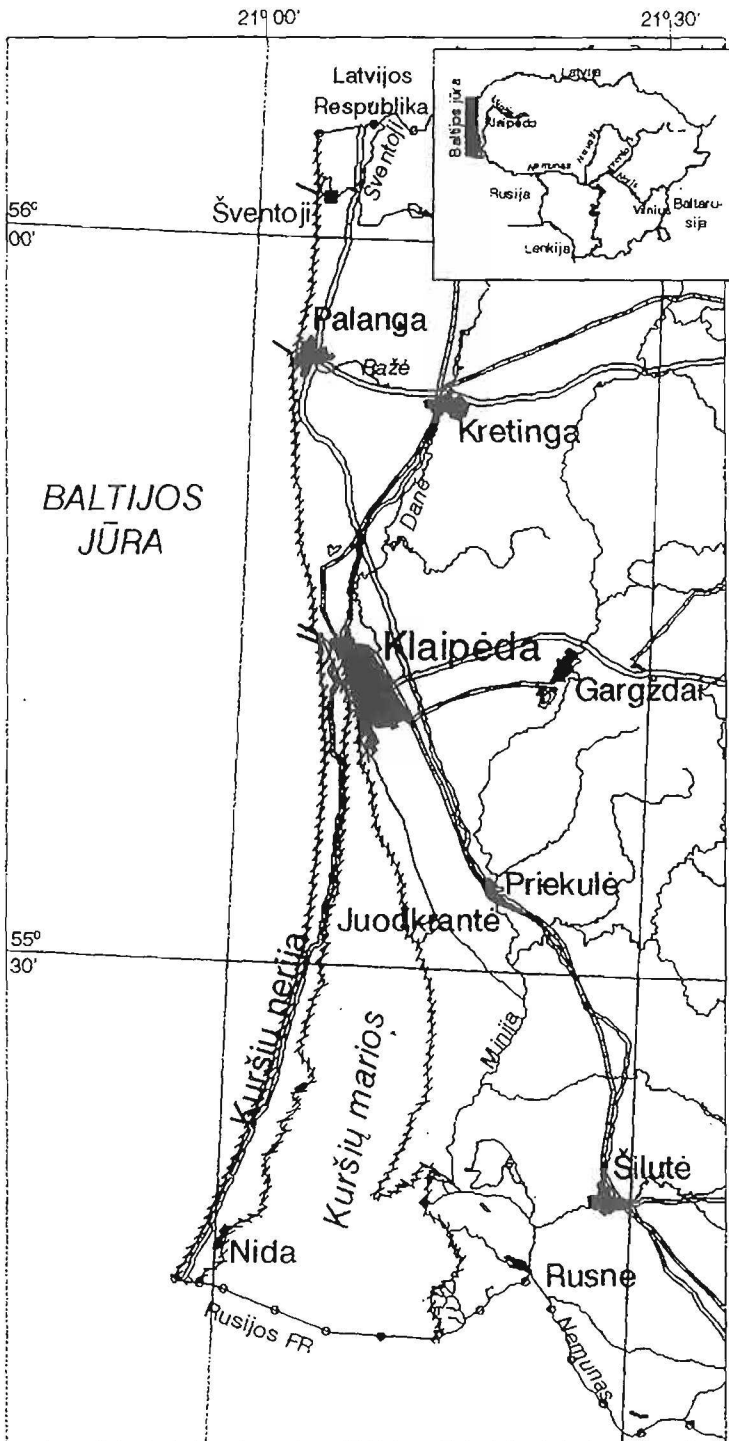
**Reference is made to** IMO Resolution A.720 (17): “Guidelines for the Designation of Special Areas and the Identifications of Particular Sensitive Sea Areas”.

Apart from mentioned above projects, Klaipėda State Seaport Authority concluded an agreement with the Institute of Ecology under equal objectives for development and use of these systems in the aquatory of the Klaipėda Port environmental management atlas.



# Lietuvos pajūrio apžvalginis žemėlapis

M - 1:500 000  
 0 15 Km



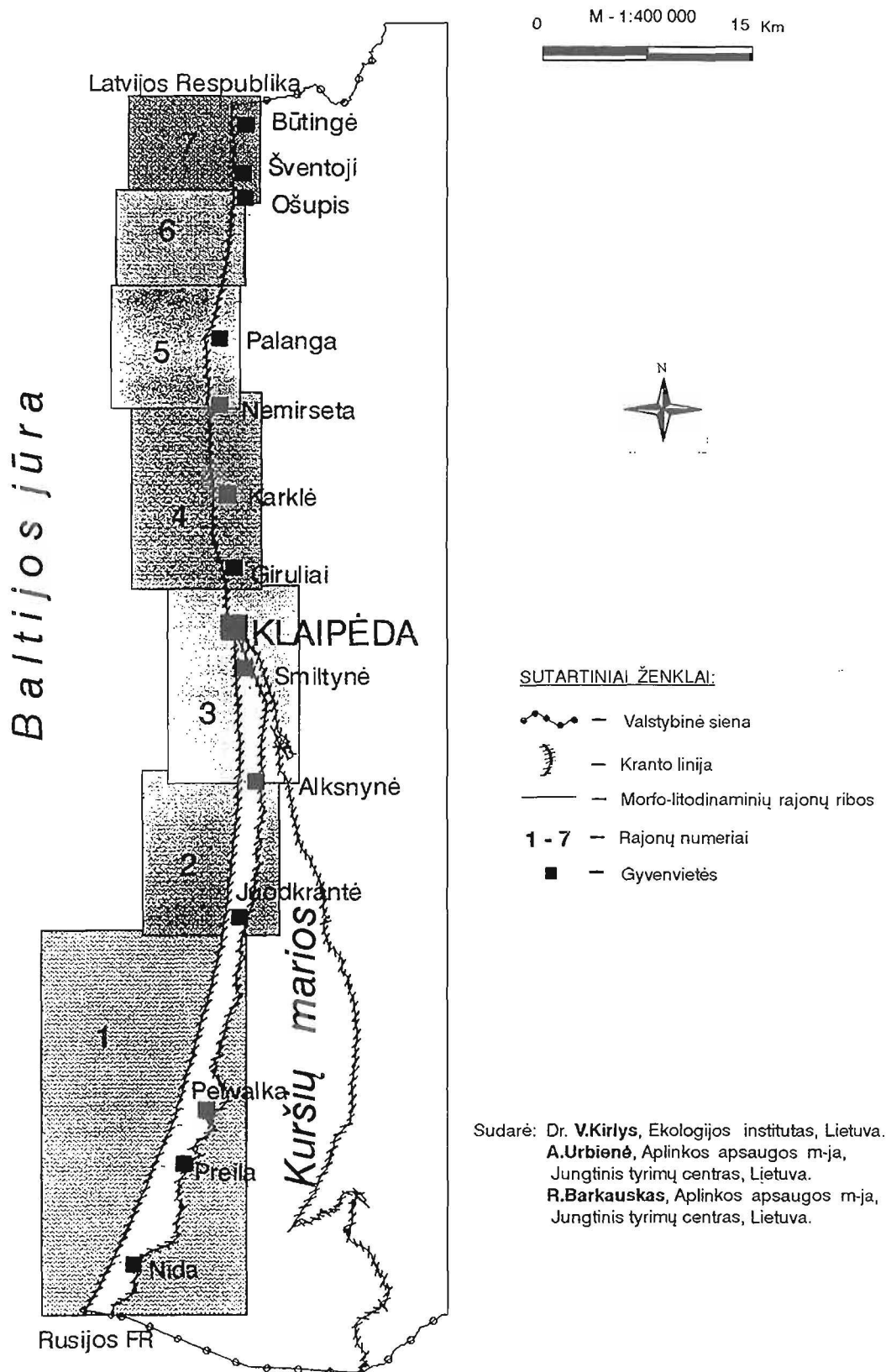
SUTARTINIAI ŽENKLAI:

-  — Baltijos jūros Lietuvos kranto zona Nida-Šventoji kranto ruože
-  — Valstybinė siena
-  — Kranto linija
-  — Keliai
-  — Geležinkeliai
-  — Upės
-  — Uosto molai
-  — Promenada
-  — Miestai
-  — Gyvenvietės

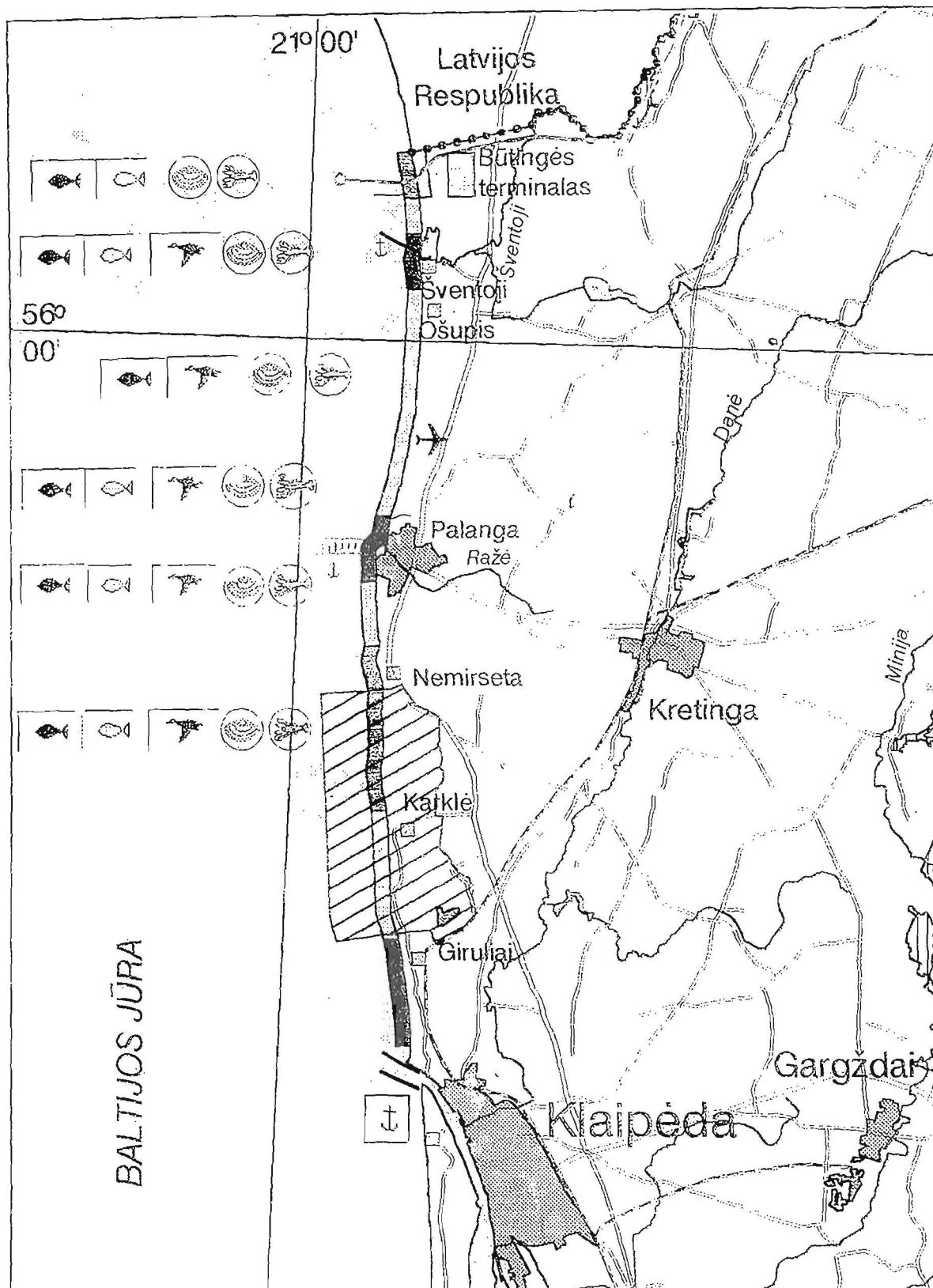
Sudarė: Dr. V.Kirlys, Ekologijos institutas, Lietuva.  
 A.Urblienė, Aplinkos apsaugos m-ja, Jungtinis tyrimų centras, Lietuva.  
 R.Barcauskas, Aplinkos apsaugos m-ja, Jungtinis tyrimų centras, Lietuva.

92 km. kranto zona  
 52 km — Neringa  
 45 " — žemųjų dalių

Baltijos jūros Lietuvos kranto zonos  
morfo-litodinaminių rajonų  
išdėstymo kartografinė schema



# Būtingės naftos terminalo galimo poveikio zonos apžvalginis žemėlapis



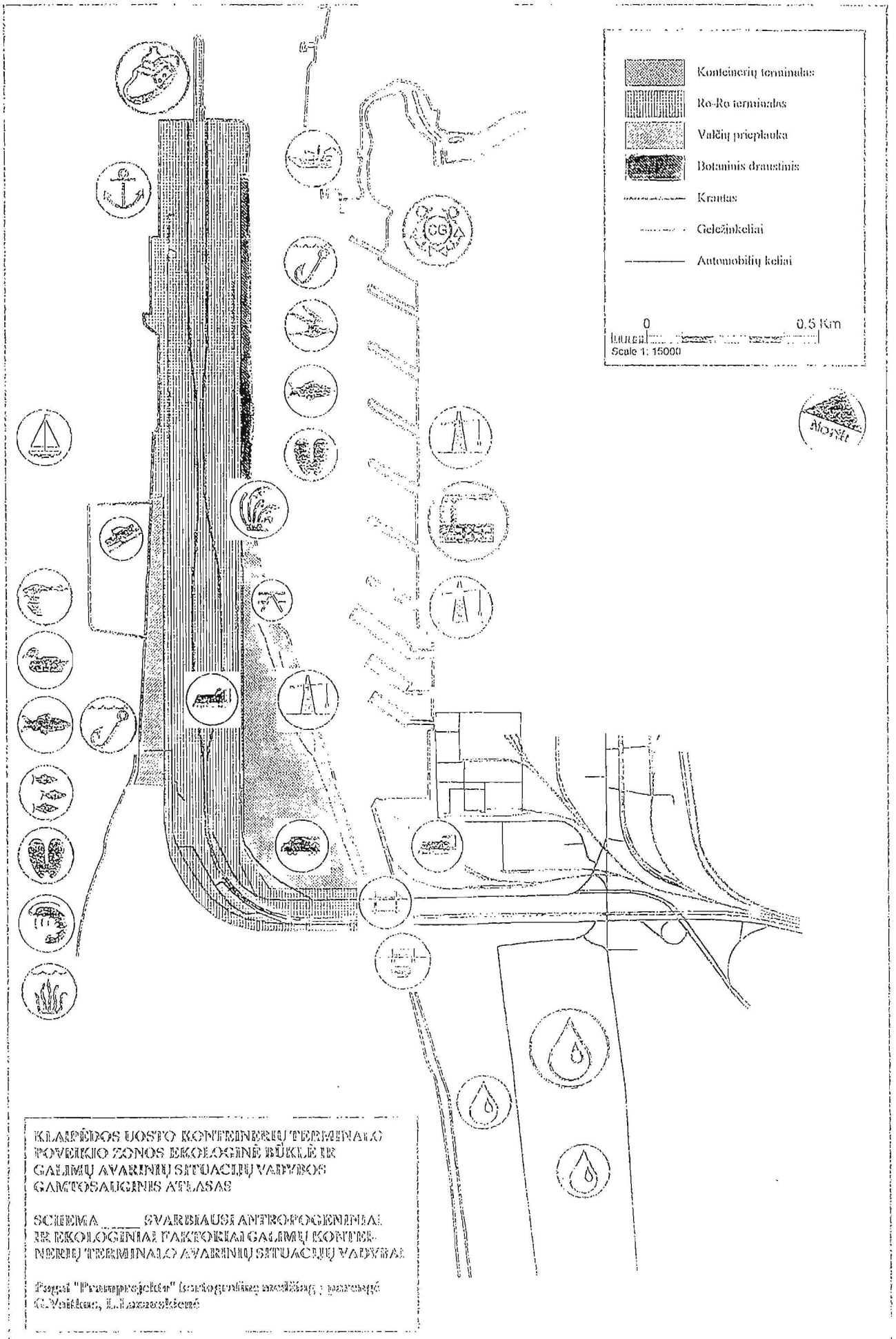
- |                  |                               |
|------------------|-------------------------------|
| Valstybinė siena | Ardomi krantai                |
| Geležinkeliai    | Rekreacinė zona               |
| Miestai          | Silpnai ardomi krantai        |
| Keliai           | Kopų draustinis               |
| Ežerai           | Draustiniai                   |
| Upės             | Regioniniai parkai            |
| Molai            | Promenada                     |
| Klaipėdos uostas | Terminalo rezervuarų aikštelė |
| Prieklaukos      | Vamzdynai                     |
| Oro uostas       | Nutekamųjų vandenų neleidėjas |

- |                   |
|-------------------|
| Neršvietės        |
| Žuvis             |
| Vandens paukščiai |
| Bentosas          |
| Nektobentosas     |

M 1:250000

5km 0





KLARĖDOS UOSTO KONTAINERIŲ TERMINALO  
 PAVEIKIO ZONOS EKOLOGINĖ BŪKLĖ IR  
 GALIMI AVARIŲ SITUACIJŲ VARPŲOS  
 GARGTOSANGINIS ATLASAS

SCHEMA \_\_\_\_\_ SVARBIAUSI ANTROPOGENINIAI  
 IR EKOLOGINIAI FAKTORIAI GALIMI KONTEI-  
 NERŲ TERMINALO AVARIŲ SITUACIJŲ VADYMAI

Projektas "Paviršiusinio" (santogrumėnų) avarijų ir paviršiusinio  
 G. Vaitiekaitis, L. Kazemskaitė



## ENVIRONMENTAL GIS AT FINLAND'S ENVIRONMENTAL ADMINISTRATION

YRJÖ SUCKSDORFF  
RIITTA TEINIRANTA  
*Finnish Environment Institute*

## CONTENTS

- data and data management
- software
- GIS organization
- GIS networks
- education
- examples of GIS use
- conclusions

### Environmental Administration in Finland



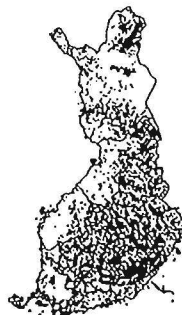
— general and result-oriented management  
..... expert services

### Environmental GIS is built to serve the whole environmental administration in Finland



### GIS DATA

- over 35 Arc/Info databases
  - cover the whole of Finland
  - scale 1: 20 000 ... 1: 1 million
  - pixel size from 2 to 200m

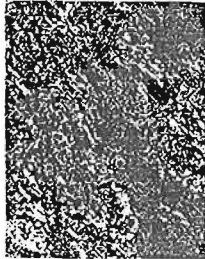


### ARC/INFO DATABASES

Data	Scale	Format	Source
Administrative bound.	1:100 000	Vector	NLS
Watersheds	1:50 000	Vector	FEI
Sea area division	1:50 000	Vector	FEI
Shorelines	1:20 000	Vector	NLS, FEI
Lake names (56 000 names)	1:50 000	Point	FEI
Groundwater areas	1:20 000	Vector	FEI
Protected areas	1:20 000	Vector	FEI
Protection plans	1:20 000	Vector	FEI
NATURA 2000-plan	1:20 000	Vector	FEI
Soil	85m*85m	Raster	FGS
Land use and forests	25m*25m	Raster	NLS
Elevation	25m*25m	Raster	NLS
Elevation	1:20 000	Vector	NLS, FEI
Base maps	2m*2m	Raster	NLS
NOAA AVHRR images	1km*1km	Raster	FEI

## NEW DATA

- Is made in co-operation
- Is bought from other data providers
- Is derived from existing data
- Is made in the Environmental administration



## DATA TREATMENT

- Reclassification
- corrections
- generalisation
- topology building
- lay-out building etc



## OWN DATA PRODUCTION 1/2

- drainage basins
- groundwater areas



## OWN DATA PRODUCTION 2/2

- protected areas
- protection plans
- general plans
- skidoo tracks etc.

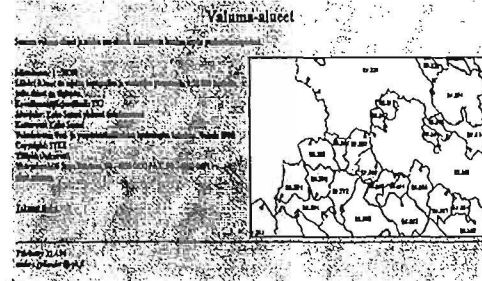


## DATABASES

- are maintained by FEI
- are located on FEI's GIS server
- copies of databases are located on RECs
- are used by whole Administration
- are described on Intranet

## CONTENTS OF INTRANET PAGES

1/2



## CONTENTS OF INTRANET PAGES

2/2

### Tekniset tiedot: Valuima-alueet

Asioiden käsittely: valtuusto, valtuusto- ja valtuustokomiteat  
 Compu-asiat: Asioiden käsittely

**Valuima-alueet**

**Maasto**

1.1 Maasto- ja valtuusto- ja valtuustokomiteat  
 1.2 Maasto- ja valtuusto- ja valtuustokomiteat  
 1.3 Maasto- ja valtuusto- ja valtuustokomiteat  
 1.4 Maasto- ja valtuusto- ja valtuustokomiteat  
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 1.8 Maasto- ja valtuusto- ja valtuustokomiteat  
 1.9 Maasto- ja valtuusto- ja valtuustokomiteat  
 1.10 Maasto- ja valtuusto- ja valtuustokomiteat

## SOFTWARE

- Arc/Info 9 unix licences
- ArcView 152 licences all connected to the network
- user interface (ArcView)

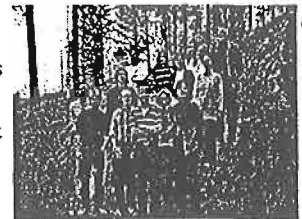
## USER INTERFACE

- facilitates GIS use, ArcView extension



## FEI'S GIS AND REMOTE SENSING UNIT

- basic GIS actions
- general GIS databases
- user interfaces
- software management
- major GIS projects etc.



## GIS STEERING GROUP

- Representatives from the Ministry, RECs and FEI (7 persons)
- Makes decisions of GIS matters concerning the whole Administration
  - supported software
  - database purchase
  - user meetings
  - yearly GIS action plans etc.

## GIS USERS NETWORK

- one person from every unit (25 persons)
- General GIS information exchange
  - e-mail
  - intranet discussion group
  - annual meetings



## ARCVIEW CONTACT PERSON

- one person in every unit (25 persons)
- is responsible of ArcView support in her own unit
- gets support from FEIs 'central' AV support
- along the support contract only FEI is allowed to contact the local ESRI dealer

## EDUCATION

- **Arcview basic education**
  - two days course when a licence is bought
- **Other gis courses**
  - GIS basics
  - GIS database building
  - etc.

## GIS IS USED <sup>1/3</sup>

- **For new data production like**
  - NATURA 2000 network
  - protection plans
  - groundwater areas
  - dump sites
  - skidoo tracks etc.



## GIS IS USED <sup>2/3</sup>

- **For different analyses like**
  - nutrient loss modeling
  - hydrological modeling
  - biodiversity calculations etc.
- **Map production**



## GIS IS USED <sup>3/3</sup>

- **For administrative tasks**
  - GIS for regional use
  - water quality maps
  - databank for recreation areas
  - realization plans for protected area plans etc.



## CONCLUSIONS <sup>1/6</sup>

- **The use of gis has enlarged very much, because**
  - Desktop GIS has proven its usefulness in several projects
  - More GIS data is available

**CONCLUSIONS** <sup>2/6</sup>

- **Gis will be utilized much more in the near future, because**
  - Awareness of GIS has increased

**CONCLUSIONS** <sup>3/6</sup>

- **Gis is not used enough, because**
  - Better data is needed
    - better quality
    - better accuracy
    - better scale,...
  - data is often made for map production, not for GIS use

**CONCLUSIONS** <sup>4/6</sup>

- **Gis is not used enough, because**
  - often the users do not have proper GIS education and thus they are not capable to utilize the software and data in the best way

**CONCLUSIONS** <sup>5/6</sup>

- **Gis is not used enough, because**
  - data is expensive
  - software is expensive
  - updates are expensive
  - support is expensive

**CONCLUSIONS** <sup>6/6</sup>

- **Gis is not used enough, because**
  - The update and support policy of ESRI and its dealers is unclear, so it is difficult to make long term plans how to develop the environmental GIS in Finland



# ENVIRONMENTAL ATLAS FOR THE COASTAL AREA OF FINLAND

Petri Porvari

## ABSTRACT

The GIS (Geographic Information System) based environmental atlas has been developed as an operative tool for oil and chemical spill combatting and for area planning on the coastal area of Finland. By the help of the atlas mapping of risks, identifying sensitive resources and simulations of accidents can be made and developing protection strategies become easier.

The environmental atlas includes information of shoreline, infrastructure, sensitive biological resources and human-use resources. Textual and tabular information like species lists of bird protection areas and fish spawning areas, contact information of fish hatcheries and local experts are linked to the maps. The atlas is used by ArcView 3.0 software. It is possible to visualise, explore, query and analyse the data.

The atlas application allows rapid evaluations of changing scenarios and circumstances. Data from oil spill trajectory models, remotely sensed data and satellite images can be imported to the application.

## 1 INTRODUCTION

There is a need for maps and qualified GIS based information of sensitive resources for oil and chemical spill combatting. The environmental atlas is developed for these purposes to set protection priorities and to prevent damages to the environment but also to help area planning.

Secondly the system helps mapping of oil damage over the coastline. The IOPC - foundation needs documentation of oil damage quite soon after an oil spill situation. The Environmental Atlas System is convenient for this objective. Also monitoring and research work after an oil spill accident needs this Atlas (Mapping) System for documentation purposes.

## 2 CONTENTS AND IMPLEMENTATION

The environmental atlas is developed at the Finnish Environment Institute. The atlas suits as an operative tool for preventing environmental damages taking place at the

coastal area. By using the atlas it is possible to see clearly all the objects and areas needing special protection. The atlas will also be used as an instrument in the area planning. Simulations of accidents and mapping of different kinds of risks will be possible. Setting protection priorities, identifying sensitive resources and developing protection strategies will become easier.

Oil spill combatting and research officers on duty, environmental protection authorities, fire and rescue departments will be some of the potential users of the environmental atlas.

The data collecting has been started from the coastal area of Finland, but the final version of the atlas will also comprise Lake Saimaa, which has a quite heavy oil transporting. The atlas could also be used in accidents occurring on the land.

The environmental atlas is used by modified ArcView 3.0 software. With the simple and user-friendly user interface it is possible to visualise, explore, query and analyse data. When the environmental atlas is completed the data will be stored on CD-ROM and distributed to users.

## **3 DATA INCLUDED IN THE ENVIRONMENTAL ATLAS**

### **3.1 Sensitive biological resources**

- Nature reserves, national parks, protected areas
- Bird areas (significant colonies, protected areas, nesting areas etc.)
- Grey seal areas
- Fish spawning and nursery areas
- Locations of endangered organisms and biotopes

### **3.2 Shoreline information**

### **3.3 Human-use resources**

- Fishing areas, fish traps, fish hatcheries
- Research islands and areas
- Historical and archaeological sites

### **3.4 Infrastructural information**

- Water intake places
- Marines
- Coast guards

- Boat ramps
- Recreational areas (beaches etc.)
- Borders, shipping lanes etc.

Textual and tabular information are linked to the maps so that maps include details of protected areas, lists of threatened species, contact information of area owners and local experts etc. Clear pictographic symbols are used, scales are flexible and printing, in whatever scale, is possible.

## **4 THE UTILISATION OF THE ENVIRONMENTAL ATLAS AND CONTINUAL STEPS**

The atlas is easily altered and updated. It is specially planned for oil and chemical spill prevention. Data from oil spill trajectory models can be imported into the application. For example in the case of oil accident the environmental atlas shows at the first phase the most important resources in all possible directions the oil slick may drift. At the later stage of the spill the oil may drift towards a particular section of the coastline, notably an area of priority protection. In that case detailed operational maps and information for clean-up teams are needed.

The GIS application allows rapid evaluations of changing scenarios and circumstances. In the future remotely sensed data and satellite images could be linked to the environmental atlas.

The system can also be developed so that it would help mapping and documentation of oil damage over coastline. The IOPC -foundation needs documentation of oil damage quite soon after an oil spill situation. The Atlas System would also be helpful tool for all kind of monitoring and research work after an oil spill accident.

## **5 CONCLUSIONS**

The environmental atlas needs further developing to meet all those needs of oil combatting. The experience from using the atlas in practise will give ideas for developing.



## LIST OF LITERATURE PRESENTED IN THE WORKSHOP

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*Abstract*

The Workshop on Environmental Mapping and Databank Systems (EMDS) was arranged by the Finnish Environment Institute (FEI) on behalf of the Ministry of the Environment of Finland during 16 and 17 November 1998 in Helsinki.

The main objective of the workshop was to clarify the state of and needs for Environmental Mapping and Databank Systems (EMDS) for coastal and sea areas in the Baltic Sea countries, and to prepare a summary of the systems already in use in the countries. It was also considered to determine whether common guidelines are needed for the development and harmonization of the EMDS.

This report summarizes the presented papers, the main results of the working groups, and the working plans for 1999.

*Keywords*

environmental mapping, data systems, models, GIS, sensitive areas, oil and chemical spills, Baltic Sea areas

*Other information*

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Julkaisun päivämäärä  
Maaliskuu 1999

Tekijä(t) (toimielimestä: nimi, puheenjohtaja, sihteeri)  
Juha-Pekka Hirvi (toim.)

Julkaisun nimi (myös ruotsinkielinen)  
Itämeren alueen ympäristöatlasta ja tietojärjestelmiä koskevan workshop:n yhteenvetoraportti,  
Helsingissä 16-17 marraskuuta 1998

Julkaisun laji

Toimeksiantaja

raportti

Toimielimen asettamispvm

Julkaisun osat  
yhteenveto esityksistä ja keskusteluista, työryhmien tulokset, työsuunnitelma vuodelle 1999

Tiivistelmä

Suomen ympäristökeskus ja Ympäristöministeriö järjestivät ympäristöatlasta ja siihen liittyviä tietojärjestelmiä koskevan workshop:n (asiantuntijakokouksen) Helsingissä 16.-17.11.1998.

Tavoitteena oli selvittää nykytila ja tarpeet ympäristöatlastyyppisille tietojärjestelmille Itämeren alueen eri maissa. Samalla selvitettiin tarvetta yhteisille ohjeistoille ympäristöatlastuksen kehittämiseksi ja yhteensovittamiseksi.

Tähän raporttiin sisältyy yhteenveto esityksistä ja keskusteluista, työryhmien I ja II tuloksista sekä kehittämissuunnitelma vuodelle 1999.

Asiasanat (avainsanat)

ympäristöatlas, tietojärjestelmät, mallit, GIS, herkäät alueet, öljy- ja kemikaalivahingot, Itämeren alueet

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Juha-Pekka Hirvi (red.)

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sammandrag av presentationer och diskussion, resultat av arbetsgruppen I och II, samt utvecklingsplan för 1999

*Referat*

Workshop (expertmötet) på Miljöatlas och Databanksystem var arrangerat av Finlands Miljöcentral och Miljöministeriet den 16 och 17 November i Helsingfors.

Syftet med mötet var att kartlägga nyläget och behovet för Miljöatlas relaterade databanksystem för havsområdena inom Östersjöländerna. Det var också viktigt att identifiera behovet för gemensamma och allmänna instruktioner för utveckling och harmonisering av Miljöatlasen.

Detta rapport innehåller summering av presentationer och diskussion, resultat av arbetsgruppen I och II, samt utvecklingsplan för 1999.

*Sakord (nyckelord)*

Miljöatlas, databanksystem, GIS, modell, känsliga områdena, olje- och kemikalieolyckor, Östersjöområdet

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