Sensitivity Mapping of the German Baltic Sea Area

Aims and Partners

In case of accidents at sea, actions combatting pollutants have to take place in a well coordinated manner to be most effective. The computer aided Contingency Plan for Pollution Combatting (abbreviation of the German name: VPS) that is already in place for the German part of the North and Baltic Sea contains a lot of data to support a fast decision-making in case of emergency.

Depending on the extent of maritime emergencies it may become necessary to prioritise the protection or the cleaning of certain areas of shore and sea over others. The prioritisation must take place based on reliable data. The biological sensitivity as one important criterion for prioritisation is derived from those data.

For that reason a sensitivity mapping of the German Baltic Sea area was made by order of the five German coastal federal states

- the Free Hanseatic City of Bremen

- the Free and Hanseatic City of Hamburg

- Mecklenburg-Western Pomerania

- Lower Saxony

- Schleswig-Holstein

as well as the Federal Ministry of Transport, Building and Housing that were all represented by department 3 of the Central Command for Maritime Emergencies Germany.

The aims of the mapping were to evaluate the German Baltic Sea area in view of its sensitivity against oil and to distinguish between areas of various sensitivity.

The sensitivity mapping already existing for the tidelands of the North Sea will be adapted to the more topical mapping of the Baltic Sea.
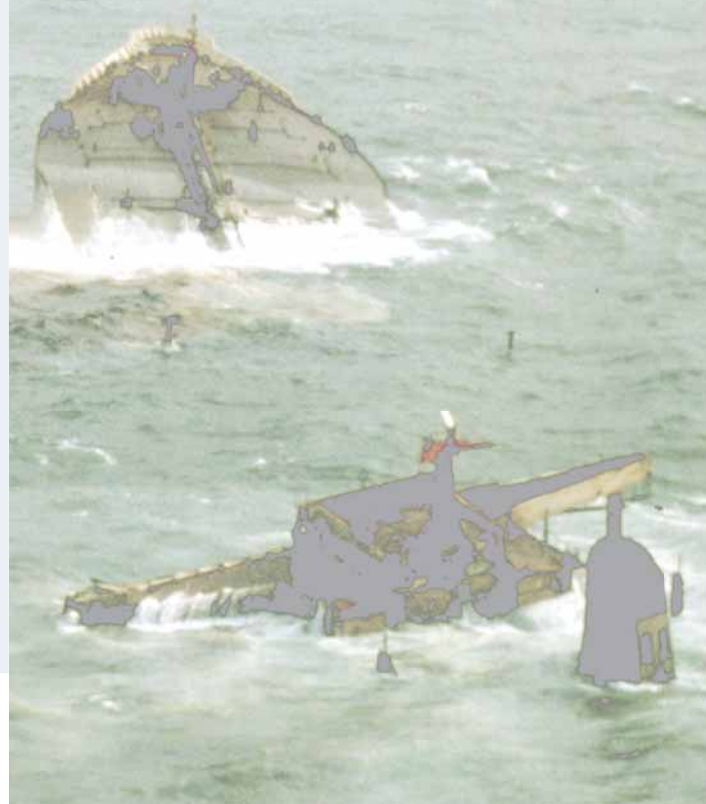
More informations you can find on:
www.vps-web.de

Project Concept

The project management at first drew up a concept of action which proposed to handle areas on shore and in the water separately in order to take into account the different conditions of these two areas.

Further on the concept divided the project work into the following steps:
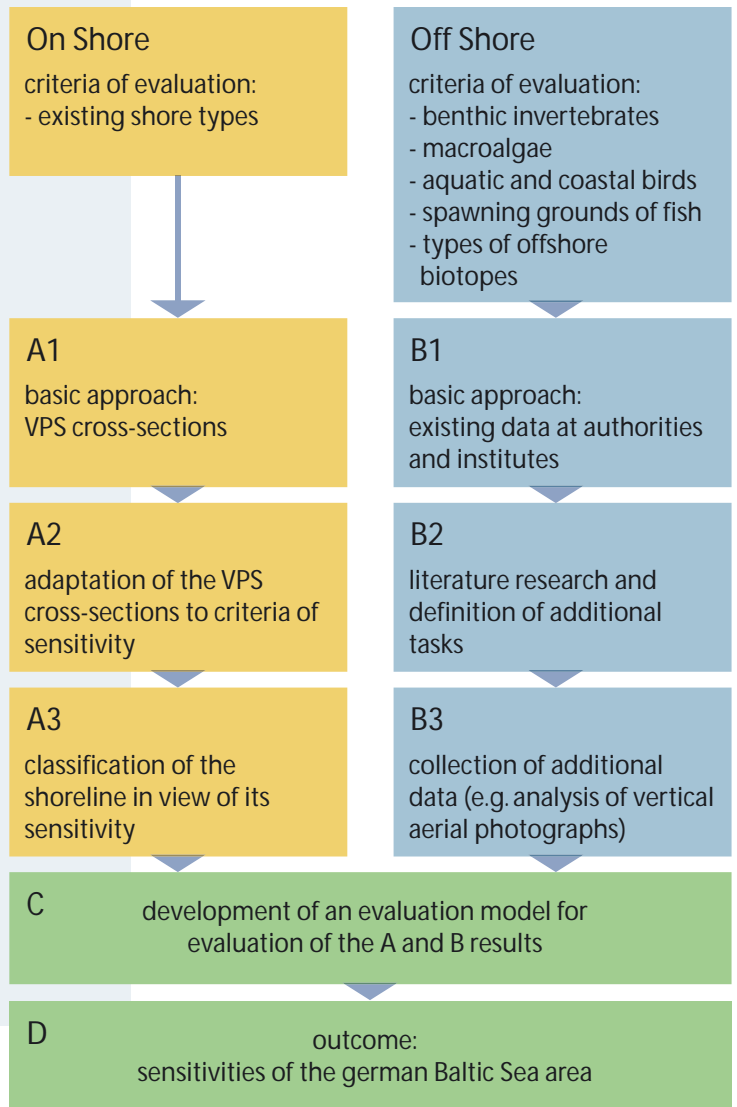
- examination of data
- data preparation / data collection
- development of an evaluation model
- evaluation of the collected data
- integration into the software VPS

The following bodies were involved in project work:

- Working Group 'Sensitivity Mapping' with members of the involved federal states and the federation

- ARCADIS Consult GmbH, Rostock and Freiberg

- ARGUMENT GmbH, Kiel

- Institute for Applied Ecology GmbH, Brodersdorf

- Baltic Sea Research Institute Warnemünde, Rostock-Warnemünde

- MariLim Aquatic research, Kiel

- Incorporated Society 'Fish and Environment' Mecklenburg - Western Pomerania, Rostock

On Shore
criteria of evaluation:
- existing shore types

Off Shore
criteria of evaluation:
- benthic invertebrates
- macroalgae
- aquatic and coastal birds
- spawning grounds of fish
- types of offshore biotopes

A1
basic approach:
VPS cross-sections

B1
basic approach:
existing data at authorities and institutes

A2
adaptation of the VPS cross-sections to criteria of sensitivity

B2
literature research and definition of additional tasks

A3
classification of the shoreline in view of its sensitivity

B3
collection of additional data (e.g. analysis of vertical aerial photographs)

C
development of an evaluation model for evaluation of the A and B results

D
outcome:
sensitivities of the german Baltic Sea area

Schedule of the Project

project step	2001 Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	2002 Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	2003 Jan	Feb	Mar	Apr
Work out of a concept	■	■	■																						
Examination of data / literature research				■	■	■	■																		
Data preparation					■	■	■	■	■																
Specification of shore types					■	■	■																		
Evaluation of vertical aerial photographs						■	■	■																	
Data collection of shore									■	■	■	■	■	■	■	■	■	■	■						
Post-mapping of the Schlei Fjord																		■	■	■	■				
Reprocessing the fish spawning grounds													■	■	■	■									
Development of an evaluation model													■	■	■	■	■								
Evaluation of the collected data																				■	■	■	■	■	■
Integration into the software VPS																				■	■	■	■	■	

Examination of Data, Data Collection and Data Preparation

To be able to build on existing data, the project started with a full lite-rature research at authorities, institutes and companies as part of the examination of data on the topics benthic invertebrates, macroalgae, aquatic and coastal birds, protected spawning grounds of fish as well as sea mammals in the German part of the Baltic Sea, all these topics being relevant for the later evaluation.
In the subsequent step data deficiencies were determined which con-cerned especially the topics benthic invertebrates and macroalgae.

To compensate for missing data on macroalgae and benthic inverte-brates, data were collected offshore. Vertical aerial photographs of the German Baltic coastal zone were used for mapping of types of offshore biotopes. Offshore collected data from the shallow water areas were included for additional information.

Another part of the data preparation was defining shore types. The data basis for the shore types ashore were typical cross-sections in the software VPS that were classified in view of efficient combatting measures.
For a mapping of the different sensitivities the existing shore types were grouped and, especially off-shore, supplemented in terms of ecological significance and the sensitivity deriving from it.
Subsequently a ranking of on-shore and off-shore shore types was defined in respect of their sensitivity against oil pollution.

Van-Veen grab for sampling benthic invertebrates

The picture shows sampling points of benthic invertebrates used since 1990. Areas with data deficiencies are marked with red dots.

Evaluation Model

The evaluation model, specifically developed to assess the sensitivities, processed the collected and prepared basic data and converted these data into four different categories of sensitivity that range from slightly sensitive to moderately and highly sensitive to extremely sensitive.

The evaluation model computed the respective sensitivities on the basis of the occurrence of selected species of benthic invertebrates, macroalgae, birds and protected fish spawning grounds. The single results were weighted and brought together into one overall result.

To ensure the plausibility of the results two periods of evaluation were distinguished - autumn/winter and spring/summer.

Integration into VPS.system

The results of the evaluation with the evaluation model were realised in digital maps and integrated into the existing software VPS.system.

Each category of sensitivity has its own colour: magenta - extremely sensitive, red - highly sensitive, yellow - moderately sensitive and green - slightly sensitive.

The determined sensitivities are shown both for the coastline (line signature) and for the off shore areas (area signature). The illustrations are distinguished into autumn/winter and spring/summer.
The deciding criterion for categorisation into one of the categories of sensitivity is shown as a symbol on the respective line or in the respective area.

These information given for the German Baltic Sea area are important for prioritisation of combatting measures as well as measures of protection. For the German North Sea area these information are already available for some time.
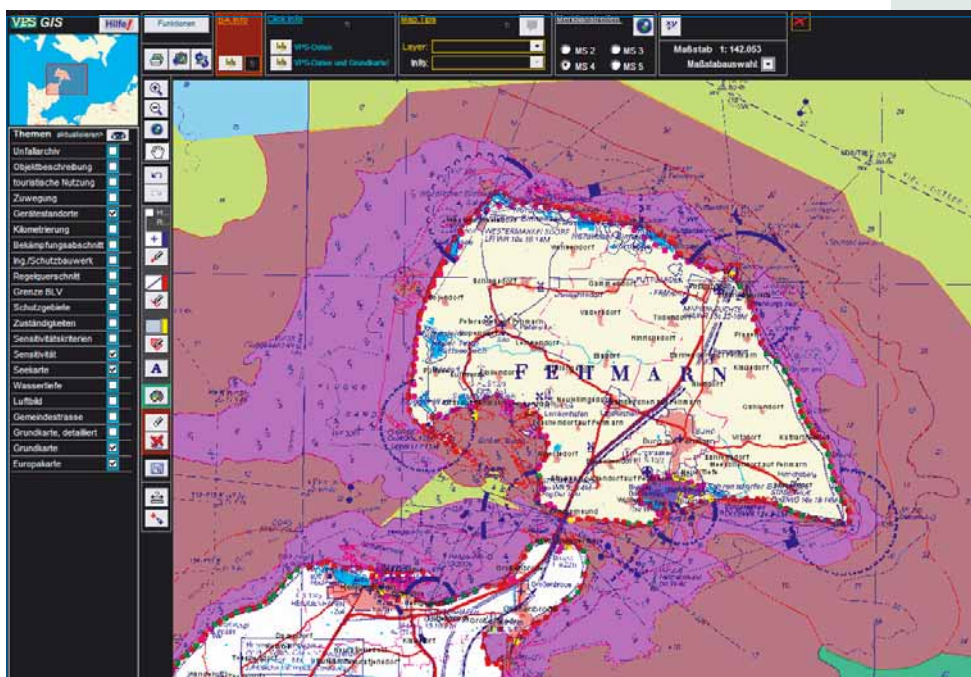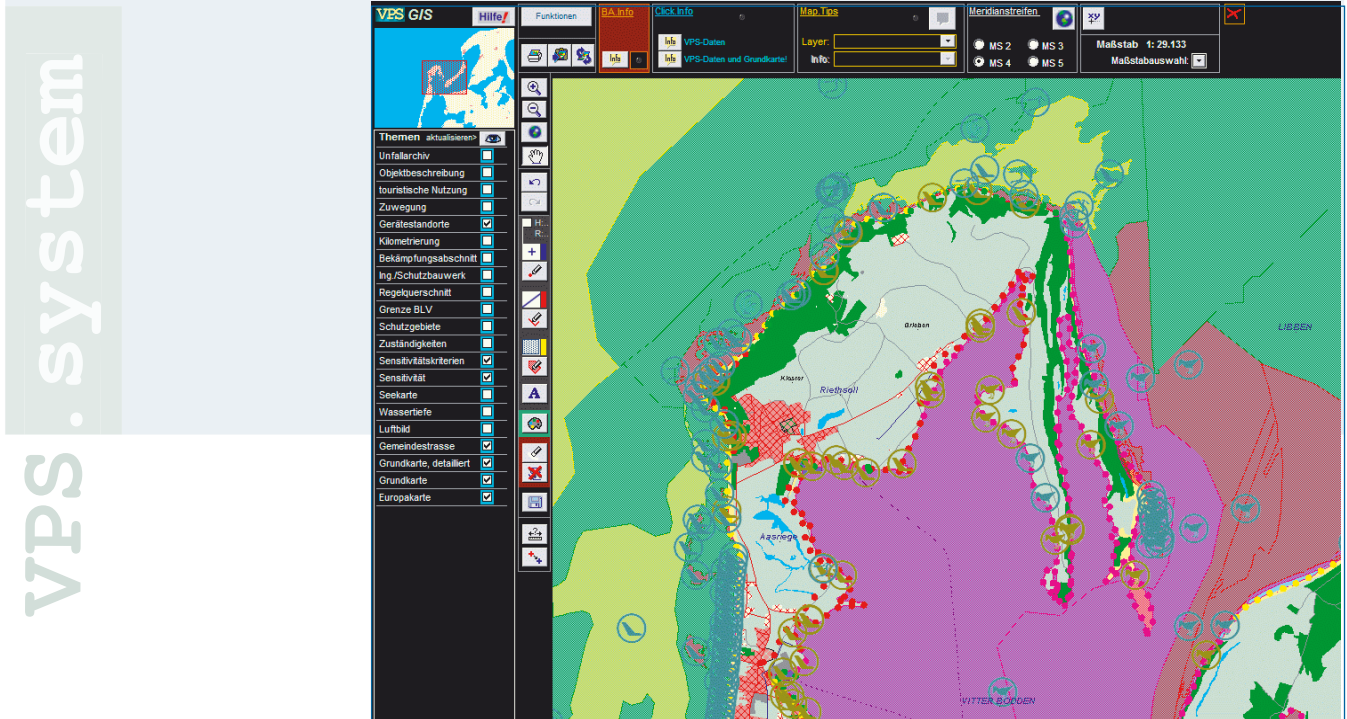
VPS.sensi as a Software for Using Sensitivity Data

In order to allow a wide range of users access to all initial raw data that formed the basis of the sensitivity computation and to avoid complicating the use of the existing VPS software by too many data an additional VPS module was developed.

It is named VPS.sensi and it may be used independently of the VPS. VPS.sensi enables the visualisation of all initial raw data and data administration.