VPS.system – the computer aided contingency planning system for Marine pollution control

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Abstract
The German coastal areas of the Baltic and North Seas are part of the most highly-frequented shipping routes worldwide. The high density of shipping traffic requires effective prevention planning, especially to protect the environment from dangers implicit with high density shipping traffic. The pollution of seas and coasts is unavoidable. Therefore the Ministries for Environment of the Coastal States, in cooperation with the Federal Ministry of Transport, Building, and Housing compiled a plan for the entire German North and Baltic Seas, that assists the onshore response measures implemented in case of a pollutant release.

The main function of the VorsorgePlanSchadstoffunfallbekämpfung (VPS) - Contingency Plan for Marine Pollution Control – is derived from collection, storage, and dissemination of such information that are necessary or useful for the prevention of, as well as the response to, pollution incidents.

The following types of data are available:
- Geospatial data in the GIS
- Alphanumerical data of the database
- Texts, charts and graphics in the incident response manual
- Photo and video data of the whole German coast

1. The need for Geospatial data in Contingency planning
Contingency planning is based on the overall aim of protection of marine ecosystems: “The marine environment is a precious heritage that must be protected, preserved and, where practicable, restored with the ultimate aim of maintaining biodiversity and providing diverse and dynamic oceans and seas which are clean, healthy and productive”¹.

Oil spills in the past led induced regulations on a national, European and international level in order to respond to pollution incidents threatening the marine environment of the North Sea – the Bonn Agreement² – and the Baltic Sea – the HELCOM Convention³. These Agreements include adequate equipment, ships and manpower prepared for operations in coastal waters as well as on the high sea. Despite the fact that coastal pollution from shipping in and around EU waters in recent years has been limited, there were a number of significant spills which could have had a much greater impact if the oil types and/or locations and/ or weather/current conditions had been different⁴.

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The contingency planning is within the scope of INSPIRE mainly in the following areas via the link to HELCOM and the Bonn Agreement (via the direct link to the OSPAR convention):

- protected sites,
- utility and government services,
- production and industrial facilities and
- habitats and biotops.

The contingency planning and emergency response is within the scope of GEOSS. GEOSS based systems like SafeSeaNet on a European or international scale supplement the activities of the German coastal States.

2. **Contingency Plan for Marine Pollution Control in Germany**

The German coastal areas of the Baltic and North Seas are part of the most highly-frequented shipping routes worldwide. The high density of shipping traffic requires effective prevention planning and, especially to protect the environment from dangers implicit with high density shipping traffic.

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The main function of the **VorsorgePlan Schadstoffunfallbekämpfung (VPS)** - Contingency Plan for Marine Pollution Control – is derived from collection, storage, and dissemination of such information that are necessary or useful for the prevention of, as well as the response to, pollution incidents. At the Central Command for maritime emergencies the VPS.system is in daily use to document, to access and to control maritime pollutions.

The start of operation of VPS.system was the year 2000, since then the system is updated and upgraded on a yearly basis and adapted to the needs of the partners; the present version is VPS 11. The yearly maintenance costs are about 100 T€ and include software maintenance, data maintenance and VPS-training for up to 180 persons.

The following types of data are available:
3. **Geospatial data in the GIS**

With the included **Geographic Information System** the geospatial data contained in the system are made available and their analysis enabled. For example, the thematic layers contain geospatial data of the coast and coastal waters, protected areas and sensitivities and governmental jurisdictions. The layers that can be activated as needed. In the next version coming 2012, accessing Open Geospatial Consortium (OGC) conform web map services (WMS) will be integrated.

![GIS Interface](image)

**Figure 2:**

GIS

The GIS interface offers with ‘ClickInfo’ the answer to the question “What’s that?” With one click, the corresponding database form opens at the selected object.

Apart from commonly-used map and layer organisation, more **functions** are available:

- distances or area dimensions can be measured
- multi-coloured drawings and texts can be entered via the map interface
- maps can be printed
- maps can be transferred into different graphics or text programmes

The **drift model** makes use of the mathematical core of the 'small drift model' from the German Federal Maritime Hydrographic Agency (BSH) and displays the calculation results in the easy-to-use front-end of the VPS-System. For the German Bight areas, a quick forecast of the drift of oil and chemical spills, lost
containers and other floating objects is thus possible. In the next version the calculations from the “drift model” of BSH can be viewed by import of data.

**Progress tracking** in the VPS-System is based on the continuous recordings in the progress protocol and action logbook. In the logbook, all activities and communication during routine operations or during a pollution incident are stored. The objects recorded in the progress protocol (ships, aircrafts, strike teams, etc.) are given the current coordinates via the GIS.

Real time information on vessels based on the Automated Information System (AIS is implemented in VPS). The International Maritime Organization (IMO) requires all vessels over 299GT to carry an AIS transponder on board, which transmits their position, speed and course, among some other static information, such as vessel’s name, dimensions and voyage details.
Progress tracking in the VPS-System can do more than replace the traditional progress protocol and magnetic board with ship positions. Through a number of additional applications, the system provides transparency and understanding of the local situation. The compiled situation report will be unalterably saved and therefore is legally admissible.

The VPS.sensi module displays data of the sensitivity mapping in the GIS. The German part of the Wadden Sea as part of the North Sea is an area of tidal flats and salt marshes located along the North Sea coasts of Denmark, Germany, and the Netherlands. It has enormous value as a cleansing site for North Sea water, as a nursery for juvenile fish, and as a feeding ground for many bird species. Due to the proximity of important shipping routes and harbours, this region would be especially threatened by and vulnerable to oil spills.

Figure 5:
GIS – ship positions as part of the action log and progress tracking

Figure 6:
GIS - Sensitivity map of a North Sea area
Thus, for oil spill response and prevention measures, a sensitivity study of the entire intertidal area was sorely needed in order to assess and minimize the potential ecological and economical impacts. The result data of these sensitivity studies are stored in the VPS.system and are accessible by its interfaces.

In the Baltic Sea area the sensitivity mapping bases on data already existing and yearly generated monitoring data. To be able to build on existing data, the Baltic Sea sensitivity study started with a full literature research at authorities, institutes and companies as part of the examination of data on 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 of these topics were relevant to the later evaluation.

In the subsequent step, data deficiencies were determined which concerned especially the topics of benthic invertebrates and macroalgae.

To compensate for missing data on macroalgae and benthic invertebrates, data were collected offshore. Collected data from the shallow water areas were included in the mapping of types of offshore biotopes which mainly involved evaluations of vertical aerial photographs of the German Baltic coastal zone.

The sensitivity data of both North Sea and Baltic Sea are updated in every year by a special data maintenance project for sensitivity mapping.

4. Other VPS functionalities

The database offers the alphanumeric information in an easy-to-handle user interface and connects this information with all further VPS-components.
The photo documentation of the entire coast (e.g. Figure 9) allows quick decisions for the averting of danger, because it makes an immediate evaluation of the local conditions possible.

The previously-existing only-in-paper response manual is now available as an easy-to-use, multime-

Figure 8:
Database example vessel "Scharhörn"

Figure 9:
The photo documentation contains about 16.000 near areal images
dia, electronic book. The manual is an integral part of VPS.system, but it also can be used individually, and it is fully intranet or internet suitable.

The website www.vps-web.de also offers direct access to selected data of VPS.system, such as coastal sections, response areas, the entire photo documentation library, and the response manual.

5. Summary

The VPS.system has become part of the daily life of the German coastal authorities involved in contingency planning and emergency response action. Even though it has been developed before European and international standards in geospatial data were established, the maintenance of the system ensures that it up to date to these standards.

Bibliography


ii Agreement for cooperation in dealing with pollution of the North Sea by oil and other harmful substances, 1983, as amended by the Decision of 21 September 2002 by the Contracting Parties to enable the Accession of Ireland to the Agreement, www.bonnagreement.org


