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European Commission

Science for Environment Policy

New online oil spill risk tool provides local, specific information for coastal managers

A new oil-spill risk-management system has been developed by researchers, which shows the likely effects of a coastal spill on the environment and economic activities for specific locations. It provides maps of oil-spill risk through a web portal and could help decision makers and emergency-response authorities protect the local environment and businesses through targeted and efficient planning and responses.

The maritime industry has taken many steps to reduce the potentially devastating problem of oil spills — from developing safer ships to better training of staff. However, the shipping sector is growing, with increasing globalisation and international trade, and oil spills continue to occur.

A number of tools are already available for dealing with oil spills, such as pollution-monitoring systems. However, the researchers behind this new system suggest that these other tools tend to be too simple, in that they do not consider local environmental and socio-economic conditions and are not very accurate.

Their new system provides oil-spill information that is specific to precise locations. It takes advantage of large computational resources and recent developments in oil-spill models, which show the behaviour of different types of oil in seawater and sediment.

The system provides oil-spill risk maps based on three types of information:

- **Hazard** — the probability that an oil spill will occur in a specific location;
- **Vulnerability** — the expected damage to the local environment and economic activities;
- **Risk assessment** — areas at major risk of oil spills, in terms of oil-spill hazard and vulnerability.

By linking together different sectors of activity — both environmental and economic — the developers say that their integrated risk-assessment approach supports the goals of the EU's Water Framework Directive.

The researchers applied the system to the Aveiro lagoon in Portugal to illustrate in detail how it can be used. The Aveiro lagoon is environmentally and economically valuable, protected under the Natura 2000 network and home to a major port, as well as to thriving fishing and tourism.

To assess oil spill *hazard*, the researchers gathered data on historic oil spills in the lagoon from the national maritime authority. This revealed the sources of and most favourable weather conditions for spills. Spills and the subsequent movement of oil were then simulated using a computer model. For example, based on their knowledge and activities in the port, the port authorities established there was a 35% chance of an oil spill at the entrance to Aveiro harbour; the model helps to define to which areas the oil is most likely to be transported, where it is most likely to be retained, and for how long.

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To assess the lagoon's *vulnerability*, they looked at:

- the physical condition of its shore and water: for example, whether manmade materials, rock, sand or mud are along the shoreline;
- its biological condition: for example, the presence of threatened species and different classes of protected status, and the resilience of local habitats to recover from a spill (based on vegetation cover);
- its socio-economic vulnerability, judged according to the duration of interruption to socio-economic activities: for example, fishing and aquaculture are both expected to be interrupted for over a year.

These three forms of vulnerability were combined to generate an overall vulnerability rating.

An oil spill risk rating, ranging from 'very low' to' very high', was then generated for each point of the lagoon, based on the hazard and vulnerability information — combining the probability of the point becoming contaminated by oil, oil exposure time, and its physical, biological and socio-economic vulnerability. The highest-risk areas tended to be around the entrance to the lagoon and the port, maps suggest.

Precise information given by the system can help decisions makers prioritise which areas to protect and the best form of action to take, the researchers say — helping ensure that an oil spill is well contained and in a resourceful manner. It provides all relevant information on oil-spill risk (maps and databases) through an online portal; port and national authorities, or any private client, can contact the researchers to implement the system in a defined location.