New tool evaluates options for cleaning up oil spills

The recent oil spill in the Gulf of Mexico has highlighted the need to effectively evaluate possible response strategies. A new decision support tool can be used to consider the environmental, socio-economic and management effects of different responses to spills, translating them into monetary terms to provide a common currency for comparison.

Oil spills are one of the worst forms of marine pollution with serious impacts on marine life and coastal activities. How to respond to an oil spill is therefore a large concern for integrated coastal zone management. The task of selecting an optimal strategy is complex as it needs to consider environmental, social, economic and management consequences. These different consequences are measured using different means and units so are rarely comparable. For example, environmental impacts may be measured by the number of wildlife killed, whereas economic impacts may be measured in terms of the money lost by fisheries.

The research proposed a decision-making tool that combined the monetary evaluation of the consequences of different response strategies with a model that predicted the impacts of oil spills. It applied the tool to the well-documented case of the 1998 oil spill in the German North Sea area which caused significant ecological harm and incurred clean-up costs of €7 million.

The tool considered six impacts on resources. Three of these were environmental: area of polluted coastal water, area of beaches covered by oil and number of Eider ducks killed. The remaining three were indicators of socio-economic impact: clean-up costs, the amount of fishery area that was polluted and the amount of tourism area that was polluted.

Using a well-known oil spill simulation model (OSCAR)¹ the research predicted the effects of the six impacts in five different response scenarios. The scenarios varied in the number and type of vessels used to clear up the spill. A major issue of discussion after the North Sea accident was the use of the appropriate number and type of response ships. The impacts were translated into monetary terms using estimated figures on the value of lost environmental services, lost wildlife and the loss of income for fisheries and tourism due to polluted areas.

The tool estimated that, in the short-term (about one year), the total environmental, economic and clean-up costs of the different response scenarios would range from €7.8 million to €8.8 million and in the long term (about ten years) they would range from €62 million to €79 million. One strategy that used six vessels was considered clearly the best option in terms of the least total costs and greatest effectiveness in terms of value for money. In general, value was strongly linked to costs, but one scenario had higher costs but lower overall effectiveness. This suggests that the tool could be used to filter out less rational strategies at an early stage.

By breaking down the complex effects of pollution into a single monetary value the tool allows response strategies to be easily compared. It also provides an easy-to-understand method of evaluation for both public and management. However, its accuracy is highly dependent on assumptions used to estimate the monetary loss of the different impacts. The loss to fisheries and tourism is relatively accurate but the monetary value for environmental goods still remains questionable.


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