

# How can risk assessment methodologies for oil and chemical spills in the European marine environment be implemented?

Marine Theme Objective: Science for integrated management

## What's the problem?

Marine pollution associated with shipping accidents is of major concern with respect to the impacts on the health of the marine environment and its socio-economic uses. This is exacerbated by increasing maritime traffic worldwide. Economic, ecological and security considerations increase pressure upon the need for new or improved prevention mechanisms and emergency response systems to better protect marine ecosystems. Sound scientific principles are indispensable for the effective formulation of contingency plans, and RAMOCS was designed to contribute to this aspect.

In the EU, an initiative termed the Accidental Marine Pollution European Research Area (AMPERA), of which Defra is a partner has been established to find a common strategy to cope with maritime accidents. RAMOCS is one of the funded proposals to integrate transnational cooperation between Plymouth Marine Laboratory (PML), Instituto de Diagnóstico Ambiental y Estudios del Agua (IDAEA-CSIC, Spain), the Norwegian Institute for Water Research (NIVA), Universidad de Vigo (Spain), Centro Interdisciplinar de Investigação Marinha e Ambiental (CIIMAR, Portugal).

## What are the aims of the project?

The primary objective of the project is to develop scientific tools that improve risk assessment strategies in the event of oil and chemical spills from shipping incidents. Previous accidents will be evaluated, risks associated with different transported materials will be ranked, analytical tools developed and applied to afford weathering and impact assessments.

Fingerprinting tools for heavy oils, oil products, and hazardous and noxious substances (HNS) will be used assess risks in different spill scenarios in European regional seas. In addition, the identification of toxic species of HNS will be evaluated using an effects directed analysis approach to prioritise the toxicants through different bioassays. This will identify the more sensitive species in different marine ecosystems [including planktonic (bivalve, sea urchin embryogenesis bioassays, and copepods), and benthic crustaceans (shrimp and crayfish) assays].

Finally, the risks associated with oil or chemical spills will be evaluated using traditional toxicological measures for these sensitive species in different European marine environments.



Figure 1: The MSC Napoli (Photograph: P. E. Frickers)

## Which policy areas will the research inform?

Whilst this project will contribute to National approaches and policy on dealing with shipping accidents, the purpose of AMPERA is to provide a forum to enhance transnational co-operation in marine protection and research to enhance coordinated measures.

The findings will also be presented to the European Maritime Agency (EMSA), the United Nations Environment Program (UNEP) (in the framework of OSPAR, HELCOM, and MAP conventions) and the UN International Maritime Organisation (IMO).



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## What are the results from the project and how will they be used?

The project has only recently commenced. The projected results are:

- Prioritisation of chemicals and oils linked to marine incidents.
- A review and refinement of rapid broad-scale and targeted analytical and toxicological protocols to investigate spilled substances in marine environments.
- To improve fingerprinting tools for heavy oils for source recognition in the marine environment.
- Development of novel and high throughput analytical tools to fingerprint oils and to assess effects of weathering.
- To develop strategies to assess the major weathering processes (dissolution, evaporation, photooxidation, biodegradation) affecting the spillage of hazardous noxious substances.
- To develop methodologies for identifying the major toxicants occurring in spills using bioassay-directed analyses.
- Prediction of environmental concentrations of HNS in different European regional seas under different spillage scenarios.
- Application of the developed tools to several case studies to define a general strategy to be included in the response/contingency plans for use in Europe.
- Improved prevention mechanisms and response systems in case of HNS spillage.

The PML component (funded through Defra) will initially construct databases to investigate past shipping incidents and to rank transported materials including HNS and oils. Chemical products will be prioritised according to International guidelines and to shipping volumes. Moreover, sampling and analytical techniques to assess the fates and risks following a HNS and/or oil spillage will be investigated. PML will also contribute (with all other partners) to provision of guidance to enhance risk

assessment on an international level.

To disseminate results to practitioners and policy-makers, a workshop will be organized at the end of the project to define a European strategy for risk assessment of accidental marine pollution. In this workshop, autonomic and national authorities of the AMPERA partnership, NGOs, policy makers and the emergency response industry will be invited to participate. Moreover, the main conclusions of the workshop will be submitted to EMSA as one of the main end-users at the EU level. At the international level, it will be submitted to the UNEP in the framework of OSPAR, HELCOM, and MAP conventions. Indeed, the RAMOCS strategy will also be presented to IMO (Bonn Agreement Working Group, BAW) for their discussion and implementation in their training courses. The main conclusions will also be presented to the European Environment Agency for their implementation and transfer to the policymakers.



Figure 2: Sampling sea surface pollution (Photograph: P. E. Frickers)

### Where can I find further information about this and related research?

More information regarding the AMPERA initiative is available from:

[http://www.cid.csic.es/ampera/images/reports/AMPERA\\_Leaflet.pdf](http://www.cid.csic.es/ampera/images/reports/AMPERA_Leaflet.pdf)

Alternatively, please contact Defra's Marine and Fisheries Science Unit: [marinescience@defra.gsi.gov.uk](mailto:marinescience@defra.gsi.gov.uk)

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