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Assessing risks of hydrocarbon spills in tropical environments

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There is a growing pressure of exposure to petroleum hydrocarbons in tropical northern Australia. This is due to increasing population and industrial activities, such as oil and gas extraction, ship traffic, and related planned (e.g. wastewater) and accidental (e.g. spills) discharges.
Through close collaboration between AIMS and AECOM, a novel, integrated approach to spill risk assessments has been developed. The approach links outcomes of a semi-quantitative risk assessment methodology to results of spill weathering and trajectory numerical modelling and to emerging tropical toxicological data.
The risk assessment is based on triple bottom line concept and uses a multi-disciplinary expert panel to assess the probabilities and consequential impacts associated with potential risk events, such as accidental hydrocarbon spills.
The probability assessments of spills are based on the type of operations being assessed and historical spill data available for the area and region.
Quantifying the impacts of hydrocarbon spills requires an understanding of the impact extents as well as of the sensitivity of relevant tropical species to both hydrocarbons and dispersants. The quantification of impacts for certain operations and areas may only rely on the known nature of hydrocarbons, while spill volumes and extents of slick propagation are highly variable. Critical ecotoxicity data for tropical environments are scarce.
Consequentially, assessments of probabilities and impacts may differ dramatically depending on the ambient conditions taken into consideration, level of understanding of properties of spilled hydrocarbon, and numerical models and techniques employed for simulating oil weathering and slick trajectories and thicknesses, as well as the available ecotoxicology thresholds of affected species.
The outcomes of the combined risk and impact assessments for the first time provide industry and regulators with advanced pre-spill information thus vastly improving the predictive efficiency of impact understanding and contingency and response measures for new and existing projects in tropical waters.