Oil spill scenario modelling due to offshore bunkering operations in Algoa Bay

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The ongoing offshore bunkering operations in the anchorage areas of the Port of Ngqura, South Africa, pose a threat to the ecologically sensitive receptors within Algoa Bay. The potential environmental impact due to these operations has however not been properly quantified. This study presents oil spill scenario modelling in order to provide some insight into the ecological impacts due to hypothetical spill events from the bunkering operations.

The oil spill modelling has been undertaken using the D-Waq PART model, which relies on surface current input from a validated Delft3D-FLOW model, developed as part of this study, and surface winds from a WRF model provided by the Climate Systems Analysis Group (CSAG) at the University of Cape Town (UCT).

A total of four oil spill scenarios have been considered, corresponding to two spill sizes (1 000 m^3 and 10 m^3) and two spill locations (inshore and offshore of the anchorage areas). For each spill scenario, an ensemble of 200 simulations was used to compute the probability of surface oil thickness exceeding defined thresholds for ecological impact. Also computed were the minimum times to oiling, providing input to response time requirements.

Due to the location of the operations in an enclosed embayment, the model predicts that a majority of oil from an accidental spill event (70-75% on average) is likely to impact the shoreline. The severity of the impact largely depends on the size of the spill, as related through the exceedance of surface oil thickness thresholds for ecological impact. The model results for probability of oiling and minimum time to oiling have been summarised for various ecologically sensitive receptors in the bay, including Jahleel Island, St Croix Island, Brenton Island, Bird Island, Swartkops River and Sundays River. The presentation will highlight the sensitivity of the results and inferred ecological impacts due to spill size, spill location and the season in which the spill takes place.

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