Application of environmental sensitivity index (ESI) maps of shorelines to coastal oil spills: a case study of Cat Ba Island, Vietnam

Doan Quang Tri, Nguyen Cao Don, Yi-Ching Chen, Mishra Pawan Kumar

E-mail: yiching@mail.dyu.edu.tw

ABSTRACT

The transportation of crude diesel oil in Lach Huyen port (Cat Ba Island) in Northeast Vietnam has increased due to industry development. These areas support tankers and other ships, which therefore increases the potential for oil spills from ships’s and or tankers’s collision. This paper presents the development of a two-dimensional hydrodynamic model for prediction of oil spill trajectories. An oil spill model combining with a GIS supportive software was also established to simulate hydrodynamic flow and the transportation of crude oil trajectories to the environment. Both models were calibrated and validated using field data. The GIS supportive software was applied for mapping the environmental sensitivity index that accounts for digital databases as well as for the abundant biodiversity and coastal geomorphologic features of the shoreline. The simulation results from the hydrodynamic flow model showed that the hydrodynamic flow regime in the study area is complicated due to the influence of seabed geometries with many small islands and riverine estuaries. Results from the oil spill model revealed that an oil spill even at Lach Huyen port would affect and spread out across a vast area. Environmental sensitivity maps of the shoreline for the Cat Ba ecosystem were subsequently constructed to explain how oil spills affect the marine environment. This study can be used to provide the information and preparedness for coastline managers in their effort to protect shoreline from major oil or chemical disasters.

Keywords: Cat Ba Island in Vietnam, Lach Huyen port, Environmental sensitivity index (ESI), Shoreline...

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