Offshore sand resources and mining in Malaysia

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Abstract: Offshore sand mining activity, if improperly managed, can result in economic loss and environment degradation. This is because the range of activities involved in offshore sand mining, such as dredging, extraction and transportation of the sand, all have a potentially deleterious effect on the hydrodynamics and biological environmental of the mining site and adjacent areas.

The National Offshore Sand Resource Study is a major effort by the Government to ensure that the mining of the offshore sand resources is carried out in a systematic and sustainable manner with least environmental impacts to the marine living resources and coastline. This comprehensive study that is undertaken by the Department of Mineral and Geoscience Malaysia (JMG) comprises geophysical survey, seabed sediment sampling, hydraulic and environmental assessment of the offshore sand resources. Towards this end, a comprehensive ranking methodology was developed to enable the offshore sand resources are ranked according to the potential impacts of their exploitation. The development of an appropriate ranking framework is of fundamental importance in guiding the overall mining of the sand reserve. Thirteen (13) environmental criteria (ranging from water quality, living resources, habitats, and non-living and man-made resources) are used to rank the sand reserve. The ranking involved two primary tiers in which sand resources were categorized as Non-Exploitable and Exploitable. Based on the study, the vast amount of sand reserve in Straits of Malacca and Sarawak offshore that amounted to about 9.67 billion m^3 and 17.1 billion m^3 respectively were categorized as exploitable. Based on the current royalty rates of RM0.70/tonne, the total potential Federal Government revenue that can be generated by the sustainable mining of these offshore sand reserves would amount to RM18.8 billion.

The study also indicated that the distribution of exploitable sand in offshore was greatly controlled by the environmental impact criteria that mainly comprised of coral reefs, marine protected areas, cables and oil pipelines, oil platforms, and to a smaller extend artificial reefs, living aquatic resources and turtle landing sites.

Impacts of the sand mining activities in Malaysia were first studied by JMG at Ramunia Shoal since it was actively dredged from 1996 to 2010. A multi-disciplinary scope was undertaken in this study such as bathymetry, sediment sampling, coastal mapping and hydraulic modelling. The multibeam data analysis indicated the shoal was cut through at two parts due to the sand mining activity. The sediment sampling data has further confirmed that the sediment at the two parts of the shoal has changed from sandy to muddy sediments. Coastal mapping data showed severe coastal erosion at south of Tg. Punggai and several significant erosion signs observed in other study sites. However, the hydraulic modelling results showed that there is an insignificant current speed change at the coastal locations which is less than 0.02m/s. Thus, sand resources can still be mined at Ramunia Shoal but needed to be mined at a sustainable manner.

Keywords: Offshore sand resources, sand mining, sand ranking, hydraulic modelling, environmental impact assessment

Warta Geologi (Newsletter of the Geological Society of Malaysia), Vol. 44, No. 3, July-September 2018