

Mathematical Modeling to Reach Stability Condition within Rosetta River Mouth, Egypt

Authors : Ali Masria ,Abdelazim Negm, Moheb Iskander, Oliver C. Saavedra

Abstract : Estuaries play an important role in exchanging water and providing a navigational pathway for ships. These zones are very sensitive and vulnerable to any interventions in coastal dynamics. Almost major of these inlets experience coastal problems such as severe erosion, and accretion. Rosetta promontory, Egypt is an example of this environment. It suffers from many coastal problems as erosion problem along the coastline and siltation problem inside the inlet. It is due to lack of water and sediment resources as a side effect of constructing the Aswan High dam. The shoaling of the inlet leads to hindering the navigation process of fishing boats, negative impacts to estuarine and salt marsh habitat and decrease the efficiency of the cross section to transfer the flow during emergencies to the sea. This paper aims to reach a new condition of stability of Rosetta Promontory by using coastal measures to control the sediment entering, and causes shoaling inside the inlet. These coastal measures include modifying the inlet cross section by using centered jetties, eliminate the coastal dynamic in the entrance using boundary jetties. This target is achieved by using a hydrodynamic model Coastal Modeling System (CMS). Extensive field data collection (hydrographic surveys, wave data, tide data, and bed morphology) is used to build and calibrate the model. About 20 scenarios were tested to reach a suitable solution that mitigate the coastal problems at the inlet. The results show that 360 m jetty in the eastern bank with system of sand bypass from the leeside of the jetty can stabilize the estuary.

Keywords : Rosetta promontory, erosion, sedimentation, inlet stability

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