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Dramatic morphological changes caused by intensive coastal development: A case study in the Longkou Bay, China

Dong Li, Cheng Tang, Xiyong Hou and Hua Zhang
Yantai Institute of Coastal Zone Research, Chinese Academy of Sciences, China

Tracing the evolution of subaqueous topography in coastal water enables us to understand the effects of intensive coastal development on bays and estuaries. Analysis of a series of historical bathymetric acoustic surveys has revealed large changes in morphology from 1960s to 2010s in Longkou Bay, China. Water depths were extracted from digitized admiralty charts to explore the accretion-erosion characteristics in a geographical information system (GIS) environment, providing quantitative estimates of morphological changes. Multi-Beam Echo-Sounders (MBES) were used to map and analyze the geomorphologic features caused by the construction of artificial islands. Results illustrated that the shoreline and bathymetry of Longkou Bay changed dramatically in recent decades. The subaqueous area decreased by about 15%, while land area increased by more than 13 km2 in the study area during the last 50 years. From 1960s to 1990s, the evolution of Longkou Bay was mainly governed by natural processes with a patchy distribution of deposition and erosion and there were few signs of being related to large-scale human activities. During the period of 1990s to 2010s, intensive coastal developments including large port engineering projects, channel dredging and artificial islands construction became the main processes affecting morphological changes in the Longkou Bay. The high-resolution bathymetric results near the artificial island showed that the seafloor was dredged at many sites, leaving large areas of borrow pits. The sudden change of the underwater topography will lead to the destruction of local benthic habitat and effective measures need to be taken to protect and remediate heavily disturbed subaqueous environment.

Biography

Dong Li has his expertise in acoustic data processing and submarine sediment classification. He is familiar with basic knowledge and principle of acoustic seabed detection, skillful in operating multi-beam equipment and post-processing software and able to explore data mining to solve some scientific issues. He devised a technical approach to characterize, classify and map shallow coastal areas with artificial reefs using a multi-beam echo-sounder.

dli@yica.ac.cn

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