

Assessment of Morphodynamic Changes at Kaluganga River Outlet, Sri Lanka Due to Poorly Planned Flood Controlling Measures

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Abstract : Sri Lanka is affected by different natural disasters such as tsunami, landslides, lightning, and riverine flood. Out of them, riverine floods act as a major disaster in the country. Different strategies are applied to control the impacts of flood hazards, and the expansion of river mouth is considered as one of the main activities for flood mitigation and disaster reduction. However, due to this expansion process, natural sand barriers including sand spits, barrier islands, and tidal planes are destroyed or subjected to change. This, in turn, can change the hydrodynamics and sediment dynamics of the area leading to other damages to the natural coastal features. The removal of a considerable portion of naturally formed sand barrier at Kaluganga River outlet (Calido Beach), Sri Lanka to control flooding event at Kaluthara urban area on May 2017, has become a serious issue in the area causing complete collapse of river mouth barrier spit bar system leading to rapid coastal erosion Kaluganga river outlet area and saltwater intrusion into the Kaluganga River. The present investigation is focused on assessing effects due to the removal of a considerable portion of naturally formed sand barrier at Kaluganga river mouth. For this study, the beach profiles, the bathymetric surveys, and Google Earth historical satellite images, before and after the flood event were collected and analyzed. Furthermore, a beach boundary survey was also carried out in October 2018 to support the satellite image data. The results of Google Earth satellite images and beach boundary survey data analyzed show a chronological breakdown of the sand barrier at the river outlet. The comparisons of pre and post-disaster bathymetric maps and beach profiles analysis revealed a noticeable deepening of the sea bed at the nearshore zone as well. Such deepening in the nearshore zone can cause the sea waves to break very near to the coastline. This might also lead to generate new diffraction patterns resulting in differential coastal accretion and erosion scenarios. Unless immediate mitigatory measures were not taken, the impacts may cause severe problems to the sensitive Kaluganga river mouth system.

Keywords : bathymetry, beach profiles, coastal features, river outlet, sand barrier, Sri Lanka

Conference Title : ICCOE 2019 : International Conference on Coastal and Ocean Engineering

Conference Location : Paris, France

Conference Dates : September 19-20, 2019