

Analyzing the Changes of Shoreline Morphology: Cases in Western Coast of Sri Lanka

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The shoreline has emerged as a highly critical linear feature, due to its morphological shifts. Therefore, continues monitoring the changes of shoreline is a subject of great concern in recent years. Coastal erosion in western coast of Sri Lanka has endured as a long-standing issue. This research aimed to examine the shifts in shoreline positions and their impact on shoreline dynamics between 2012/13 and 2021. The study involved a comparative analysis of NEM and SWM in 2012/13 and 2021, focusing specifically on the Kapungoda and Mount Lavinia areas, known for their wider beaches and minimal engineering interventions. The Digital Shoreline Analysis System (DSAS) tool in ArcGIS was employed to calculate the net shoreline movement (NSM) and end point rate (EPR) using WorldView-2 satellite images with a resolution of 70 cm. Both cases reveal positive NSM and EPR accretion in both periods. Kapungoda exhibits NEM averages of NSM 11.16 m and 1.4 m/yr EPR and SWM averages of 7.4 m NSM and 0.93 m/yr EPR. The maximum positive shoreline changes (MPSC) during NEM and maximum negative shoreline changes (MNSC) during SWM, positioned southerly and northerly of the breakwater respectively, in Kapungoda. The Mount Lavinia beach indicates NEM averages of NSM 11.08 m and 1.24 m/yr EPR and SWM averages of 5.52 m NSM and 0.61 m/yr EPR. Further, a substantial increase in erosion and accretion is apparent during SWM in 2021. Particularly MPSC in 2013 and 2021 in both seasons and MNSC in NEM can be observed in north and MNSC in SWM have found in south of the headland. However, it is possible that the break water constructed in Kapungoda and beach nourishment, taken place in Mount Lavinia, might be influenced significantly on such pattern of shoreline changes. Finally, despite the positive NSM along with average EPR accretion in both locations, significant level of accretion could be identified in Kapungoda. While, Mount Lavinia has some potential for erosion in some places. Therefore continues shoreline monitoring is imperative to identify real trend of shoreline changes in these locations.

Keywords: Shoreline changes, Erosion, DSAS, Beach nourishment, Western coast

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