

A SPATIAL AND TEMPORAL DYNAMICS OF SHORELINE CHANGE ALONG THE WESTERN COAST OF SRI LANKA

S.Chithra^{1*}, N.P. Ratnayake², T. Hewawasam³

¹PGIHS, University of Peradeniya, Sri Lanka

²University of Moratuwa, Katubedda, Sri Lanka

³Department of Geography, University of Peradeniya, Sri Lanka

**chithras@pdn.ac.lk*

Sandy coasts are extremely dynamic geomorphic systems, experiencing continuous changes at various spatial and temporal scales. Over the decades, many locations along the western coast of Sri Lanka have suffered severe coastal erosion due to both natural and anthropogenic activities. Continuous investigation of shoreline changes is crucial for coastal protection and disaster management. The study assessed shoreline changes from 2005 to 2021 along the western coast, from Maha Oya to Kalu Ganga. The Digital Shoreline Analysis System in ArcGIS was used to calculate changes, utilizing WorldView2 satellite images for selected locations: Maha Oya, Kapungoda, Dikkovita, Kelani River mouth, Galle Face, Wellawatta, Mount Lavinia, Panadura, Pothupitiya, and Kalu Ganga mouth. Two statistical techniques, Net Shoreline Movement (NSM) and End Point Rate (EPR), were used to quantify the changes. The NSM measures shoreline distance, while EPR calculates the rate by dividing NSM by the time period. The study reveals that accretion predominates over erosion during the specified period. From Galle Face, the southward coast shows accretion, except at Kalu Ganga North, while the northward coast is mostly eroded, except at Kelani River South, Kapungoda and Dikkovita. Specifically, the northern section of Kalu River mouth recorded NSM of -72.46 m and EPR of -4.51 m per year, indicating significant erosion. In contrast, the southern section showed NSM of 107.32 m and EPR of 6.68 m per year, reflecting substantial accretion. Thus, the northern area is highly eroded, and the southern area is experiencing very high accretion. Meanwhile, Maha Oya South, Dikkovita, and Kelani River North (NSM of -0.4m, 0.85m, and -0.76m, and EPR of -0.02m/yr, 0.05m/yr, and -0.05m/yr, respectively) indicate shorelines in equilibrium. Furthermore, it was observed that northward River mouths of Maha Oya and Kelani River have a potential for erosion. The availability of sand, conservation measures such as beach nourishment, hard engineering structures along the coast, and regional morphology significantly impact erosion and accretion on the western coast. In conclusion, coastal management measures have played a significant role in shoreline shifts. However, these measures seem ineffective in mitigating coastal erosion and maintaining shoreline stability due to their significant impact on sediment supply.

Keywords: Shoreline changes, western coast, DSAS, conservation measures

This research has been funded by the university research grant (Grant No. URG/2022/20/A).