Shoreline Changes along the Western and North-Western Coast of Sri Lanka over the Past 15 Years

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Coastal Zone of a country is a very important interface, through which land connects the ocean. Monitoring the coastal zone of Sri Lanka is an important task in terms of sustainable development and environmental protection. As a result of natural phenomena and anthropogenic activities coastal zone is subjected to major changes. Therefore, it is necessary to identify the temporal dynamics of shoreline around the country for effective coastal zone management. Remote sensing and GIS methods can be efficiently used to determine the temporal and spatial variations of the coastal zones quantitatively and qualitatively. In this study, Google Earth satellite images have been used to analyse shoreline changes in the Western and North-Western provincial coast during the last 15 years. To estimate the accuracy of results, the ground-truthing field survey was conducted. The shorelines were delineated in Google Earth Pro 7.3 software. Tidal variation and geometric errors were considered to calculate the uncertainty to eliminate the errors in the analysis. Digital Shoreline Analysis System in ArcGIS was then used to detect the shoreline change over the period by calculating End Point Rate, Net Shoreline Movement and Shoreline Change Envelope means as the key statistics. The results show that the average erosion rates as; -1.21±0.04 m yr^{-1} in Kaluthara, -0.54±0.63 m yr^{-1} in Colombo, and -0.7±0.58 m yr^{-1} in Gampaha districts. However, Puttalam district shows a 0.26±0.07 m yr^{-1} average accretion rate while the highest accretion rate 0.95±0.58 m yr^{-1} shows in the Wilpattu region. 75.6% of coasts in Kaluthara and around 65% of coasts in Colombo & Gampaha have been subjected to erosion. Coasts of Puttalam have been eroded by 28.1% and accreted by 71.9%. This study revealed that the Western province coastal belt had subjected to coastal erosion than the North-Western province of Sri Lanka. Thus, identification of the dynamic nature of shoreline helps to enhance coastal zone management.

Keywords: Shoreline, Remote sensing, Dynamic, Erosion, Coastal changes