

Evolution of the North and the North-western Coast of Sri Lanka: Based on Satellite Images.

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Abstract

Coastal evolution is a dynamic process by which the coast can be degrade or prograde. Being an island, Sri Lankan coast shows both processes while literature shows the dominant progradation in northern area due to tectonic activities and coastal processes. The objective of the study was to identify the recent evolution of the north and northwestern coasts of the country using satellite imagery data from 1984 to 2021 presently available at Google Earth. In addition, deducing the rate of evolution (expansion) of the coastal area using ArcMap 10.1 application has been conducted. High-resolution satellite images from Google Earth Pro from 1984 to 2021 with a five year gap were digitized and compared by overlaying them. The ArcMap 10.1 software was used to analyze the spatial and temporal variations of the extracted images. The metric and the 1-inch maps covering the study area were also used to compare the evolutionary coastal changes. Subsequently, the coastal evolution rate in the considered period was calculated in each 5 years from 1984 to 2021. As per the reviewed literature, Sri Lankan landmass, once a part of the Indian subcontinent, was separated by a divergent boundary during the Jurassic time. The separated landmass was moved away further forming the Cauvery basin where continuous carbonate precipitation was taken place. It has been well documented that Jaffna landmasses were appeared due to the tectonic uplifting. The paleo longshore currents prevailed have resulted the formation of the Kalpitiya peninsula and Mannar Island. As per the analysis, in the areas of Kalpitiya Peninsula, Baththalangunduwa Island and Adam's Bridge on northwestern coast and Karaitivu Island, Paranthan coast, Karukkaitivu coast, Elephant pass coast, Pooneryn peninsula and Kayts Island in northern coast show the coastal formation in a very promising manner. Further to that, the longshore currents had been responsible for the formation of various sand spits in the west and the south of the Jaffna. The rate calculation revealed that the total land area added to the main land is 4.1939 km² from 1984 to 2021 with a rate of 0.1133km² per Annam. The main processes can be suggested as clastic and chemical sedimentation and tectonic uplifting.

Keywords: Coastal evolution, North and northwestern coast, Satellite images, Sedimentation, Uplifting

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