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Coastal vulnerability assessment of Vedaranyam swamp coast based on land use and shoreline dynamics

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Abstract

In the recent decades, the 60-km coastal stretch of Vedaranyam swamp located in the southern coast of Tamil Nadu is identified as a major ‘Vulnerable Hotspot’, due to increased land-based infrastructures and associated episodic hazards including floods attributable to heavy rain, cyclones, storm surges, earthquakes and tsunamis. In order to assess the impact of the land use/land cover changes (LULC) on the historical shoreline of this geographical area, vulnerability study between the periods 1978, 1998 and 2017 was attempted. The LULC change analysis from 1978 to 2017 indicated significant increase in aquaculture farms, salt pans and settlement areas upon conversion of crop lands, mudflats, coastal dunes and scrub lands especially along the coast. The end-point rate resulting from the shoreline analysis over the study period showed evidences of accretion and erosion ranging from 9.93 to -2.28 m year⁻¹ while the net shoreline movement transects about -107.79 to 382.71 m, respectively. Changes in the land uses and shoreline dynamics of the study area were considered as key parameters for the vulnerability assessment of this coast. This analysis will help to create awareness among the people about impacts of land use changes and effects of natural hazards such as coastal erosion, inundation and their consequences which includes loss of life and properties. The stress driving vulnerability parameters, namely sea-level rise, relief, wave exposure, surge potential, were considered for calculating the vulnerability index of the 60-km coastline considered for the study. The outcome of the study indicates that about 6 km of the coast is very highly vulnerable, 45 km is highly vulnerable, and 9 km is moderate vulnerable to episodic natural hazards.

Keywords Land use/cover · Erosion · Accretion · Sea-level rise · Coastal vulnerability

1 Introduction

Coastal zone is a dynamic connection of land and sea. Globally, most of the coastal zones exhibit erosion of different magnitude due to growing human populations, which is linked to land use changes (Williams et al. 2009), besides rapid growth of commercial activities

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