

Threat of Sea Level Rise to the Coastal Community in Sri Lanka: Use of Satellite Information in Disaster Management

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Abstract

Sea level rise is a profound indicator for circumstance of human activities relatively growing population and their requirements of the development during last three decades. The coastal area around the country consisted of most dense population, economically active land areas and interconnected infrastructures such as ports, fisheries harbours, industries, express roads and port cities. One of leading impacts of global warming is a progressive rise of mean sea level by the causing of thermal expansion of oceanic water and melting of glaciers. Sea level records were collected from Sri Lankan tide gauge network and 10 sampling stations from gridded satellite sea level observations during last 25 years around the country. The satellite data was provided by the Achieving Validating, Interpretation of Satellite Oceanography (AVISO). The high frequency tide gauge time series data were averaged to obtained monthly mean and was superimposed on the same axis of satellite time series mean sea level to compare the precision of expected sea level trend. The vulnerable coastal area was calculated under three ranking based on elevation factor from the mean sea level zero to 3m elevation in 1m contour using the Shuttle Radar Topographic Mission (SRTM) 90 m Digital Elevation Map (DEM) originally produced by the NASA with horizontal datum WGS84 and Vertical datum EGM96 using Arc Map 10.1. Satellite derived annual average mean sea level trend 2.585mm around the country while tide gauge estimated trend 2.904mm were showed with a difference of 0.319mm positive deviation from satellite observations. The sea level trend in northern coast little lower than southern coast around of the country. The tide gauge observations showed root mean square differences (RMSDs) approximately 80% of the variance of the MSL signal estimated from satellite altimetry data. Annual variation was 20 to 30 cm according to the average monthly mean sea level signals during the last 25 years. The enumerated vulnerable land area were classified as highly vulnerable, moderately vulnerable and low vulnerable with the elevation gradient of 0-10 cm, 10-20 cm, 20-30 cm. The maximum vulnerable land area was recorded in the Northern part of the country within 100 Sq.km of land area below 1m elevation exposing to the ocean based hazards induced by sea level rise.

Keywords: *Sea Level, Climate Change, Satellite information, Disaster management, Coastal Communities*

Introduction

Mean Sea level is a unique quantity in earth science, because it is powerful as an indicator of both the trajectory and societal impact of Earth's climate. The historical record shows economic and social, consequences related sea level rise by the impact of the climate change.