

Coastal Vulnerability under Significant Sea Level Rise: Risk and Adaptation Measures for Mumbai

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Abstract : Climate change induced sea level rise increases storm surge, erosion, and inundation, which are stirred by an intricate interplay of physical environmental components at the coastal region. The Mumbai coast is much vulnerable to accelerated regional sea level change due to its highly dense population, highly developed economy, and low topography. To determine the significant causes behind coastal vulnerability, this study analyzes four different iterations of CVI by incorporating the pixel-based differentially weighted rank values of the selected five geological (CVI5), three physical (CVI8 with including geological variables), and four socio-economic variables (CVI4). However, CVI5 and CVI8 results yielded broadly similar natures, but after including socio-economic variables (CVI4), the results CVI (CVI12) has been changed at Mumbai and Kurla coastal portion that indicates the study coastal areas are mostly sensible with socio-economic variables. Therefore, the results of CVI12 show that out of 274.1 km of coastline analyzed, 55.83 % of the coast is very low vulnerable, 60.91 % of the coast is moderately vulnerable while 50.75 % is very high vulnerable. Finding also admits that in the context of growing urban population and the increasing rate of economic activities, socio-economic variables are most important variable to use for validating and testing the CVI. Finally, some recommendations are presented for concerned decision makers and stakeholders to develop appropriate coastal management plans, nourishment projects and mitigation measures considering socio-economic variables.

Keywords : coastal vulnerability index, sea level change, Mumbai coast, geospatial approach, coastal management, climate change

Conference Title : ICRSGES 2018 : International Conference on Remote Sensing in Geological and Environmental Sciences

Conference Location : Bangkok, Thailand

Conference Dates : December 13-14, 2018