Climate change hazards along the Indian coastal districts: spatial analysis on a climatic impact-driver framework

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Concepts, approaches and frameworks for assessing the impacts of climate change are evolving quickly. Due to their particular geographic location, proximity to oceans, concentration of populated regions, and infrastructure, coastal communities are particularly sensitive to the effects of climate change. The present study aims to develop a thematic map based on the CID (climatic impact-drivers) framework proposed in the assessment report-6 of the Intergovernmental Panel on Climate Change (IPCC) to evaluate the climate change's physical hazards in the coastal districts of India. The study points out that West Bengal and Odisha are the two states with the highest cyclone hazard index values making them most vulnerable to cyclones. At the same time, Kerala, Andhra Pradesh and West Bengal respectively fall in the extremely severe category of flood, heatwave and shoreline change hazards. The maritime state of Gujarat along with Diu and Daman experiences maximum severity for the sea level rise hazard. The multi-hazards index developed in the study by considering 14 threshold-based CID indices showed that the coastal state of Andhra Pradesh has the highest proneness to the physical hazards due to climate change.

Keywords: Cyclone, flood, heatwave, multi-hazard, sea level rise, shoreline change.

CLIMATE change is one [illegible] global assessments are important, there is a growing recognition of the need for region-specific and even local-scale assessments. Being one of the most populous nations, India confronts numerous threats from climate change in severe forms[14,15]. According to the World Bank assessment[16], by 2030, India would see a very high, unpredictable summer monsoon with extremely rainy conditions and associated hazards occurring every ten years, compared to the country's previous return rate of every 100 years. However, the current climate change situation in India is more adverse, as a recent study found that 314 days out of 365 days in 2022 were reported with at least one extreme event, resulting in the loss of close to 3000 lives, destruction of approximately 420,000 homes, and loss of nearly 2 million hectares of cultivated land and crops[17].

Since climate, biodiversity, ecosystem and human societies are interwoven[18], climate change vulnerability and its impact on the ecosystems substantially varies with regional positioning, patterns of societal developments, marginalization, inequalities, governance mechanism, etc.[19]. The topography and geography of India are diverse enough that different climate change responses are happening for different regions. Coastal areas are the hardest hit by uneven climate change and climate-related extremes[20]. The coastal regions of India, approximately within 50 km of the 7516.6 km coastline[21] in the 9 maritime states, which are