

A Multihazard Regional Level Impact Assessment for South Asia

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To prioritize climate adaptation strategies, there is a need for quantitative and systematic regional-level assessments which are comparable across multiple climatic hazard regimes. Assessing which countries in a region are most vulnerable to climate change requires analysis of multiple climatic hazards including: droughts, floods, extreme temperature as well as rainfall and sea-level rise. These five climatic hazards, along with population densities were modelled using GIS which enabled a summary of associated human exposure and agriculture losses. A combined index based on hazard, exposure and adaptive capacity is introduced to identify areas of extreme risks. The analysis results in population climate hazard exposure defined as the relative likelihood that a person in a given location was exposed to a given climate-hazard event in a given period of time.

The study presents a detailed and coherent approach to fine-scale climate hazard mapping and identification of risks areas for the regions of South Asia that, for the first time, combines the following unique features: (a) methodological consistency across different climate-related hazards, (b) assessment of total exposure on population and agricultural losses, (c) regional-level spatial coverage, and (d) development of customized tools using ArcGIS toolbox that allow assessment of changes in exposure over time and easy replacement of existing datasets with a newly released or superior datasets. The resulting maps enable comparison of the most vulnerable regions in South Asia to climate-related hazards and is among the most urgent of policy needs.

Subnational areas (regions/districts/provinces) most vulnerable to climate change impacts in South Asia are documented. The approach involves overlaying climate hazard maps, sensitivity maps, and adaptive capacity maps following the vulnerability assessment framework of the United Nations' Intergovernmental Panel on Climate Change (IPCC). The study used data on the spatial distribution of various climate-related hazards in 1,398 subnational areas of Bangladesh, Bhutan, India, Nepal, Pakistan and Sri Lanka. An analysis of country-level population exposure showed that approximately 750 million people are affected from combined climate-hazards. Of the affected population 72% are in India, followed by 12% each from Bangladesh and Pakistan. Due in part to the economic importance of agriculture, it was found to be most vulnerable and exposed to climate extremes. An analysis of individual hazards indicates that floods and droughts) are the dominant hazards impacting agricultural areas followed by extreme rainfall, extreme temperature and sea-level rise. Based on this vulnerability assessment, all the regions of Bangladesh and the Indian States in Andhra Pradesh, Bihar, Maharashtra, Karnataka and Orissa; Ampara, Puttalam, Trincomalee, Mannar and Batticaloa in Sri Lanka; Sind and Baluchistan in Pakistan; Central and East Nepal; and the transboundary river basins of Indus, Ganges and Brahmaputra are among the most vulnerable regions in South Asia.