Heat Vulnerability Index In Indian Districts

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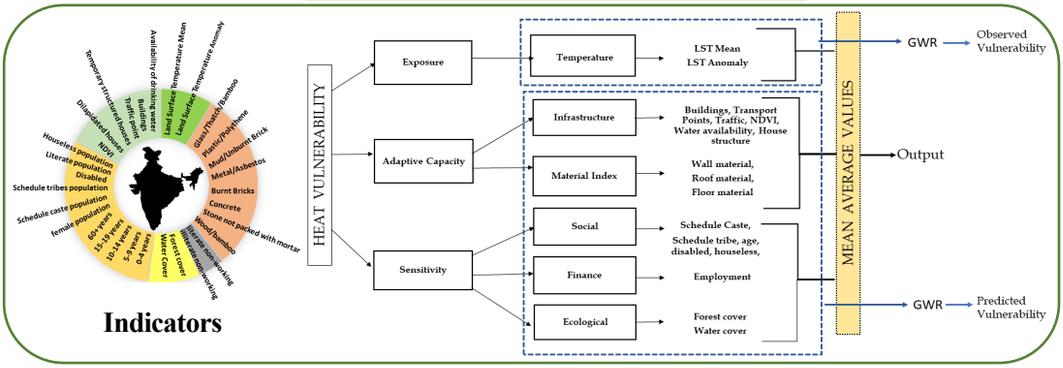
Abstract

India is one of the most vulnerable countries in the world to extreme heat. In the Indian subcontinent, heat stress has increased dramatically. It has experienced the highest temperature spike in the months of March, April, and May of 2022, and is anticipated to have a significant rise in annual mean temperature in the next years as well. The focus of this research is to find the Heat Vulnerability Index (HVI) in all 640 districts of India's 28 states using spatial and census data analysis, in order to assess heat vulnerability. The fundamental premise it that differences in social, ecological, economic, vocational, and demographic factors in different parts of the country results varied heat vulnerability. Using a graduated weighted regression model, heat sensitivity scores were assigned to each district to predict heat susceptibility based on several indicators, which were then compared to the actual temperature anomaly. The results so obtained were further compared with exposure, sensitivity and adaptive capacity of the districts to find districts with extreme heat vulnerability, which clearly indicated the need for development of good adaptive capacity in households and proper policies and mitigation measures by the government to combat heat as a hazard. As Delhi is the capital of India, this study extends to examine heat vulnerability of the capital at the district level, in little more detail in order to obtain the cause of such increasing numbers of heat clusters in the region. This research demonstrates unequal distribution of heat vulnerability and adaptive capacity in terms of regional distribution which can be used to engage inclusive and participatory conversions about how to modify urban planning and land policy regulations in order to effectively cope with heat stress.

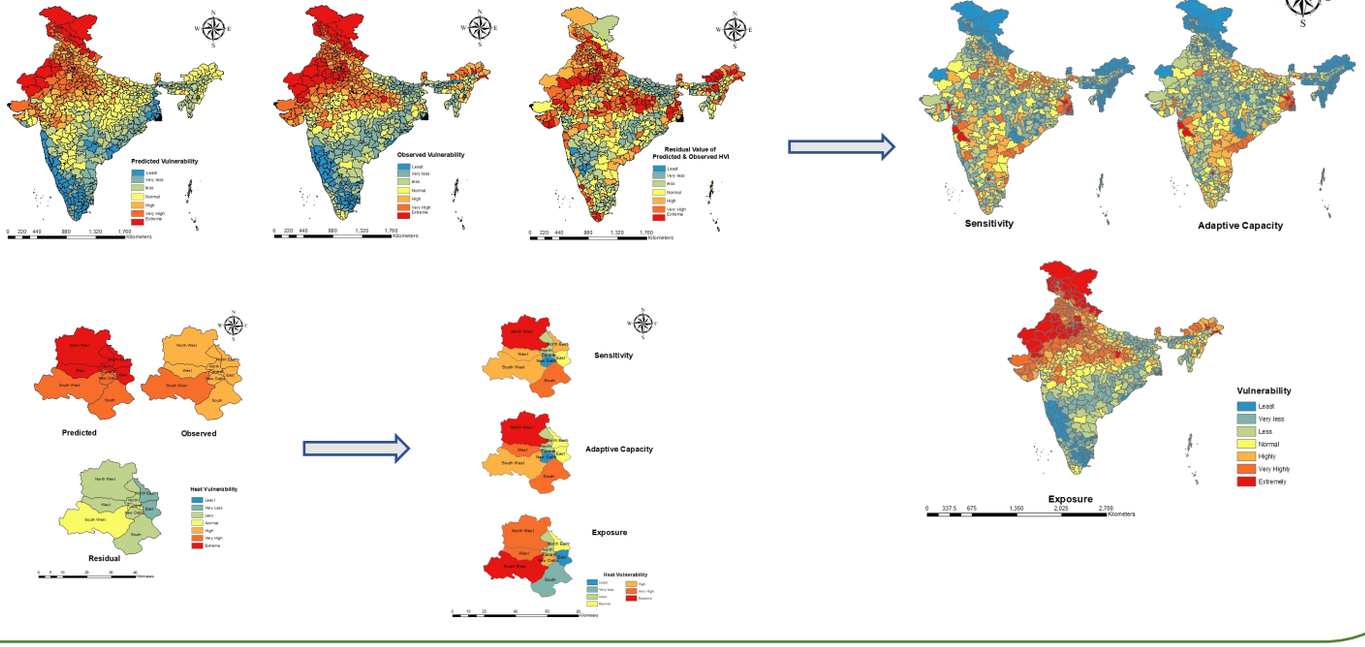
Study Area

This research focuses on the Indian Subcontinent, which is divided into districts by administrative boundaries in each of the 28 states and eight union territories. This study covers all 640 districts mentioned in the 2011 Census of India (CoI) (Register General of India, 2011). From the snow-capped Himalayan Mountains in the north to tropical rain forests in the south, it spans the globe.

Material and Methods



Results



Discussion

This study shows that in India, adaptive capacity is distributed unequally and there is a lot of asymmetries in terms of regional distribution. Furthermore, this unequal distribution is compounding the impacts of heat vulnerability: whereas northern areas experience greater temperatures, southern parts have lower temperatures. The index's key components can aid in identifying the underlying characteristics of heat vulnerability. It means that even in the wake of increasing exposure and sensitivity, heat vulnerability can be managed if an adequate adaptive capacity is developed. It can also be used to track the progress of reform initiatives targeted at reducing household vulnerability in the districts studied over time. However, there was significant heterogeneity in adaptive capacity across all the districts of the country. The geographical configuration of the exposure, sensitivity, adaptive capacity, and heat vulnerability indices can be utilized to guide urban design and management as well as serve as a forum for national discourse.