Submitted Abstract

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Abstract

The Himalaya is known as a mountainous terrain that provides a variety of ecosystem services for the survival of billions of people. The region is one of 35 global biodiversity hotspots because of its unique and diverse wildlife. Furthermore, the region is extremely vulnerable to anthropogenic disruptions and climate change. The structure and function of forest ecosystems are impacted by increased community reliance on forests and changing climate. As a result, forest vulnerability assessment is critical in order to comprehend the anticipated effects of these changes and actions. Previous studies on forest and forest-dependent people vulnerability assessment have overlooked the importance of geographical and temporal dimensions of vulnerability evaluated through field-based observations. The study focuses on assessing forest vulnerability using field data over an altitudinal gradient in India's west Himalaya. We have chosen nine forest vulnerability indicators across four domains based on literature and data availability: ecological (species richness, and the Normalized Difference Vegetation Index), climate (temperature, rainfall), topographic (slope, aspect, elevation), disturbances (forest fragmentation), and social (forest fragmentation) (population density). The forest vulnerability index (FVI) was created using a general linear model technique based on the Analytic Hierarchy Process (AHP). The FVI index was then divided into four categories: low, medium, high, and extremely high. Forest vulnerability is higher in temperate and mixed forests in the region, but subtropical pine, broadleaf, and subalpine forests have less vulnerable forest grids. These findings revealed that elevation (15.4%), population density (15.1%), slope (14.5%), rainfall (13.7%), forest fragmentation (12.9%), temperature (12.3%), and aspect (11.4%) are the key drivers of forest vulnerability, especially in the region. To verify the findings, we compared the created FVI in this study to ground-based FVI generated in earlier studies from the region and found that the assessments were more similar. The present study's spatial forest vulnerability maps provide a realistic profile of sensitive forests in India's western Himalayas, which can be used to build adaptation measures and management plans. Indigenous knowledge and sustainable development goals have been linked in previous studies. This information is important not only for dependent communities but also for ensuring livelihood security and human well-being in the modern world. Documenting such studies is thus critical for mainstreaming and developing discourses on sustainable ecosystem management practices in the region, as well as addressing the threats among indigenous groups.