DOI: 10.46991/JISEES.2025.SI1.179

Ecosystem Services and Livelihood Security in the Beas Basin, Himachal Pradesh: A Spatiotemporal Analysis (2000 - 2021)

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ABSTRACT

The Beas River Basin has undergone significant land use and land cover (LULC) transformation over the past two decades. It is primarily due to urbanization and agricultural intensification. This study explores the spatiotemporal LULC changes between 2000 and 2021 and estimates their impacts on ecosystem service values (ESVs) using Geographic Information System (GIS) techniques and the Benefit Transfer Method. Satellite imagery for the years 2000 and 2021 were used and classified using supervised classification in ArcGIS 10.8 to generate LULC maps. The LULC data were then used to estimate changes in ESVs, using ecosystem valuation coefficients based on the frameworks proposed by Costanza et al. (2014). Which account for provisioning, regulating, supporting, and cultural services. Result shows 9.27% decline in total ES value (from $8,948.88 million to $8,119.61 million), primarily due to losses in provisioning, regulating, and supporting services in the study area. Key factors for declining the total ES include land use changes, climate change and overexploitation of natural resources. Livelihoods dependent on agro-ecosystems and forests, faced reduced productivity while cultural services grew by 13.39%, offering alternative income sources. This study emphasizes the importance of integration of ecosystem service valuation into regional land use planning and policymaking to promote sustainable development and ecological resilience in the Himalayan Mountain ecosystems.

Keywords: sustainable development, livelihood security, benefit transfer method, land use planning, supervised classification

Acknowledgement: This research is supported by the Strategic Academic Leadership Program of the Southern Federal University ("Priority 2030").

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