

Assessment of Land Degradation in Khotang District using Remote Sensing and GIS

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SUMMARY

Land degradation is one of the burning issues in the mid-hill of Nepal contributing to the deformation of soil and turning it into infertile and unproductive land. The Analytical Hierarchy Process (AHP), the Geographic Information System (GIS), and remote sensing satellite images are effective tools for modeling and risk assessment of land degradation. The objective of the study was to identify land degradation and its key indicators in the Khotang district using satellite imagery and spatial analysis tools. The study area was

selected based on its socio-economic factors and the geographic condition of its location in the mid-hill of Nepal. Different thematic layers, including satellite imagery and secondary data, were utilized to analyze land degradation indicators such as vegetation cover, soil erosion, land cover, LST, SOC, rainfall, slope, bulk density, and soil texture. The methodology involved data preprocessing, resampling, reclassification, and applying an analytical hierarchical process (AHP) for weightage assignment. Weighted overlay analysis was performed to generate a land degradation map. The weights derived for the thematic layers using AHP were as follows: LULC (22%) > soil erosion (20%) > NDVI (19%) > slope (18%) > SOC (8%) > Precipitation (7%). The result indicates that nearly 57.495% of the total area is prone to moderate degradation risks; 40.206% is prone to low risks; and 2.251%, 0.028%, and 0.021% are prone to high, very high and very low risks, respectively. Very high degradation is mainly concentrated in the western part, and very low and low erosion is found in the northern part of the study area. The classification of land degradation in Khotang based on each municipality illustrates that Halesi Tuwachung followed by Rupakot, Saakela, Jantedhunga, Diprung, and Khotehang were observed to be more degraded. Validation of LD was carried out using high-resolution Google Earth images. The study contributes to the existing knowledge and understanding of land degradation processes in the Khotang District, providing valuable insights for future research and planning efforts.

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