



Elucidation of Spatiotemporal Dynamics of Land Use Land Cover Classification in an Undulating Hilly Terrain

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ABSTRACT

In the 21st century, the world is undergoing an unprecedented, irreversible, profound transformation through urbanisation. Now, 56% of the global population resides in urban areas, projected to increase to 60% by 2030. Accelerated urban expansion and escalating human activities have endangered local landscapes and ecosystems considerably. Uncontrolled urban expansion leads to significant challenges, including deteriorating environmental quality, public health risks, natural risks, and climate change. Consequently, precise and real-time land use maps facilitate dynamic monitoring, sustainable development, planning, and management. The undulating terrain, characterised by spectral indistinction, shadows, and restricted ground validation, complicates LULC categorisation in hilly regions compared to level terrains. The study proposes to evaluate temporal variations in Land Cover and Land Use (LULC) dynamics to comprehend decadal urban expansion and quantify the attributes of change through landscape matrices in Itanagar, India. Support Vector Machine (SVM) is a supervised learning algorithm well-suited for high-dimensional datasets, making it ideal for analyzing the multispectral and temporal satellite imagery in this research. This study uses SVM in ArcGIS Pro to delineate and categorize various LULC types, enhancing the understanding of their spatiotemporal dynamics. This research will improve insights into land use and cover changes in undulating hilly terrain and elucidate urban expansion trends. Further, the landscape and its feature changes are evaluated through landscape metrics analysis. The initial results indicate a defragmented growth in the study region. This analysis will provide a framework for future research on comprehending and controlling land use changes, aiding policymakers in planning based on terrain conditions.

Keywords: Landscape metrics; LULC Mapping; Supervised learning; Urban Growth; Urbanization