Integrating Urban Forestry in Land Use Planning: A Case of Pune City

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Abstract

Indian cities are rapidly evolving, which has an impact on the surrounding environment. The environment is deteriorating, areas are being destroyed by floods, and cities are becoming increasingly heated. An illustration of this phenomenon is Pune. There is significant amount of development and technology, in the Wagholi-Kharadi area, and a greater number of individuals are migrating to the city. By analyzing how forestry and blue-green infrastructure are used in city design, this study seeks to understand how Pune may become more ecologically friendly and capable of addressing climate change. Blue-green infrastructure and urban forestry are crucial to the city. The objective of this initiative is to investigate the potential of blue-green infrastructure and urban forestry to enhance the quality of life in Pune.

This study examined changes in Land Use and Land Cover (LULC) between 2010 and 2025 using remote sensing and Geographic Information System (GIS) techniques. Spatial assessments including flood vulnerability, slope, elevation, rainfall distribution, and environmental risk assessment were used to identify critical ecological stress zones. In order to investigate popular views of plant loss, flooding, heat stress, and environmental quality, this study also incorporates primary data collected through household surveys and expert talks.

The results show there is a decline in open spaces, vegetation cover, and natural drainage systems, while impermeable surfaces and urbanized areas have significantly increased. Localized flooding, increased surface runoff, reduced groundwater recharge, and declining urban biological conditions are all consequences of these changes. Survey responses confirm residents' growing concerns about the environment, including rising temperatures, a lack of green spaces, and increased waterlogging during periods of severe rainfall.

The integrated Urban Forestry and Blue-Green Infrastructure framework, which includes urban forests, Miyawaki plantations, bioswales, permeable pavements, wetland restoration, and river corridor protection strategies, is based on this research. This study emphasizes how crucial it is to incorporate natural solutions into urban planning and development rules. In the increasingly urbanized setting of Indian cities, the suggested framework offers a scalable and sustainable method for boosting climate resilience and environmental quality.

Keywords

Urban Forestry, Land Use and Land Cover (LULC), Blue-Green Infrastructure, Sponge City, Climate Resilience, GIS, Pune City, Sustainable Urban Planning.