

## Spatio-Temporal Analysis of Land Use Land Cover Change Using Remote Sensing and Multispectral Satellite Imagery of Islamabad Pakistan

**Authors :** Basit Aftab, Feng Zhongke

**Abstract :** The land use/land cover change (LULCC) is a significant indicator sensitive to an area's environmental changes. As a rapidly developing capital city near the Himalayas Mountains, the city area of Islamabad, Pakistan, has expanded dramatically over the past 20 years. In order to precisely measure the impact of urbanization on the forest and agricultural lands, the Spatio-temporal analysis of LULCC was utilized, which helped us to know the impacts of urbanization, especially on ecosystem processes, biological cycles, and biodiversity. The Islamabad region's Multispectral Satellite Images (MSI) for 2000, 2010, and 2020 were employed as the remote sensing data source. Local documents of city planning, forest inventory and archives in the agriculture management departments were included to verify the image-derived result. The results showed that from 2000 to 2020, the built-up area increased to 48.3% (505.02 Km<sup>2</sup>). Meanwhile, the forest, agricultural, and barren land decreased to 28.9% (305.64 Km<sup>2</sup>), 10.04% (104.87 Km<sup>2</sup>), and 11.61% (121.30 Km<sup>2</sup>). The overall percentage change in land area between 2000 - 2020 was recorded maximum for the built-up (227.04%). Results revealed that the increase in the built-up area decreased forestland, barren, and agricultural lands (-0.36, -1.00 & -0.34). The association of built-up with respective years was positively linear ( $R^2 = 0.96$ ), whereas forestland, agricultural, and barren lands association with years were recorded as negatively linear ( $R^2 = -0.29$ ,  $R^2 = -0.02$ , and  $R^2 = -0.96$ ). Large-scale deforestation leads to multiple negative impacts on the local environment, e.g., water degradation and climate change. It would finally affect the environment of the greater Himalayan region in some way. We further analyzed the driving forces of urbanization. It was determined by economic expansion, climate change, and population growth. We hope our study could be utilized to develop efforts to mitigate the consequences of deforestation and agricultural land damage, reducing greenhouse gas emissions while preserving the area's biodiversity.

**Keywords :** urbanization, Himalaya mountains, landuse landcover change (LULCC), remote sensing., multi-spectral satellite imagery

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