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**IMPACT OF URBANIZATION ON LAND SURFACE TEMPERATURE:
COMPARATIVE ANALYSIS OF URBANIZING ZONES IN ANURADHAPURA
DISTRICT, SRI LANKA**

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Abstract:

Rapid urbanization and shifting patterns of land use and land cover (LULC) have a major effect on vegetation cover, land surface temperatures (LST), and regional ecosystems. With a focus on their implications for ecological balance and sustainable urban development, this study examines the spatiotemporal dynamics of urban expansion, LST, and vegetation patterns in the Anuradhapura Newtown and Kekirawa regions in Anuradhapura District, Sri Lanka. This study main goal is to examine the spatiotemporal patterns of LULC changes, urban sprawl trends, and the connection between vegetation density and LST in Newtown and Kekirawa over an 11-year period (2013–2024). LULC changes were measured using supervised classification techniques on satellite data from 2013 and 2024. LST was derived to investigate heat trends, while normalized difference vegetation index (NDVI) was computed to evaluate vegetation density. To comprehend the links between NDVI and LST, statistical correlations and spatial analytic approaches were used. Temporal changes were examined for important LULC types, including water bodies, forests, homesteads, built-up regions, and paddy fields. The study main conclusions were that, in LULC, paddy fields decreased by 11.7% and 9.4%, respectively, while built-up areas expanded by 3.5% in Newtown and 4.54% in Kekirawa. In Kekirawa, homestead areas increased by 14.09%, while in Newtown, they increased by 5.8%. Water bodies expanded by 3.8% in Newtown and 3.58% in Kekirawa due to tank system development. Kekirawa showed scattered expansion across 16 kilometers, whereas Newtown showed concentrated urban growth within 8 kilometers. As a result of less vegetation and more impervious surfaces, the LST in Newtown increased from 34.06°C to 36°C, while the highest temperature in Kekirawa rose to 34.09°C. Another focus of this study was the improvement in NDVI in particular regions, which went from -0.07 to 0.26 in Newtown and from 0.23 to 0.25 in Kekirawa. While Kekirawa showed a negative correlation, Newtown showed a moderately good NDVI-LST association. The study emphasizes how LULC modifications and urban sprawl have a negative effect on environmental sustainability. To strike a balance between ecological stability and urban development, it suggests using sustainable water management techniques, improving urban planning frameworks, and giving priority to the preservation of green spaces. This study offers a thorough examination of the relationships between LULC, LST, and NDVI over an 11-year span, providing fresh perspectives on the dynamics of urban expansion and its effects on the environment in Kekirawa and Newtown. The results provide useful information for making well-informed decisions about environmental management and urban planning.

Keywords: Land Surface Temperature, Urbanization, Land Use and Land Cover, Spatiotemporal