Spatiotemporal analysis of vegetation cover influence on land surface temperature in Gampaha DSD, Sri Lanka (2015–2025)

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Urbanisation significantly alters land surface characteristics, leading to vegetation loss and increased surface temperatures. This study investigates the spatiotemporal dynamics of vegetation cover and land surface temperature (LST) in the Gampaha Divisional Secretariat Division (DSD) in Sri Lanka, between 2015 and 2025. The research mainly aims to assess changes in the Normalised Difference Vegetation Index (NDVI) and Land Surface Temperature (LST). Further, it explores their interrelationship and identifies urban heat-affected zones. Landsat 8 and 9 satellite images were used to calculate NDVI and LST for the years 2015 and 2025. Spatial analyses, including Pearson correlation, scatter plots, and concentric ring buffers around Gampaha town were done to evaluate the spatial patterns and relationships between vegetation cover and surface temperature. The results indicate a general increase in NDVI values and slight vegetation recovery. However, urban areas like Gampaha, Yakkala, Miriswatta, and Kalagedihena exhibited noticeable vegetation loss. LST values showed a clear upward trend intensifying the urban heat island effect. A negative correlation between NDVI and LST was observed, with Pearson coefficients of -0.4308 in 2015 and -0.4823 in 2025. It highlighted the role of vegetation in surface cooling. The concentric ring analysis confirmed higher temperatures and lower NDVI values in central urban zones compared to other areas. These findings emphasize the critical role of green cover in moderating urban heat and underline the need for integrating vegetation-based strategies into urban planning. The study offers practical insights for policymakers to implement targeted green infrastructure in rapidly urbanizing areas. It also contributes to the broader understanding of urban climate dynamics in tropical regions.

Keywords: *Landsat, Land Surface Temperature, Normalised Difference Vegetation Index, Vegetation cover*