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Analysis of the spatial relationship between land surface temperature and vegetation cover in Gampaha District, Sri Lanka

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Land Surface Temperature (LST) provides important information about the land surface's physical properties and climate. Natural phenomena and anthropogenic activities, particularly urbanization, can alter LST. Besides, population increase, and urbanization are among the most widely reported drivers of vegetation cover change. As such, it is essential to investigate vegetation cover changes to identify vulnerable areas and implement sustainable management strategies to protect the environment. The present study evaluated the relationship between LST on vegetation change in the Gampaha district. Landsat 8 OLI /TIRS data of the study area from 2013 to 2015 were utilized to prepare vegetation maps and investigate LST. The thermal infrared bands of Landsat 8 were used to calculate the LST. Normalized Difference Vegetation Index (NDVI) was used to explore the vegetation change of the study areas. The result revealed that LST increased from 2013 to 2015. The maximum LST was reported from areas surrounding the Gampaha city (i.e., the maximum temperatures for 2013 and 2015 were 30.63°C and 35.02°C, respectively). The highest NDVI values reported for 2013 and 2015 were 0.62 and 0.52, respectively. Vegetation cover types of Gampaha district were classified into three categories based on the NDVI values (i.e., -0.1 to 0.2 non-vegetation, 0.2 to 0.3 sparse vegetation and 0.3 to 0.6 moderate vegetation). Interestingly, the current study revealed considerable changes in areas of vegetation cover classes over the study period. In 2013, the study area was found to be dominated by moderate vegetation (67.16 %) followed by sparse vegetation (27.92 %) and non-vegetation (4.92 %). However, between 2013 to 2015, the extent of moderate vegetation significantly declined from 67.16 % to 61.67 %, whereas sparse vegetation increased significantly from 27.92 % to 32.03 % ($p < 0.01$). Correlation analysis revealed a negative correlation between NDVI and LST, suggesting an increase in LST resulting in the decline of the vegetation cover change in Gampaha district. The results of this study may support urban planners, and respective authorities in making appropriate decisions to mitigate the environmental impacts of urban development activities in Gampaha district.

Keywords: Gampaha District, Landsat-8, LST, Vegetation Cover, NDVI