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Land Cover, Land Surface Temperature, and Urban Heat Island Effects in Tropical Sub Saharan City of Accra

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Abstract : The effects of rapid urbanisation of tropical sub-Saharan developing cities on local and global climate are of great concern due to the negative impacts of Urban Heat Island (UHI) effects. The importance of urban parks, vegetative cover and forest reserves in these tropical cities have been undervalued with a rapid degradation and loss of these vegetative covers to urban developments which continue to cause an increase in daily mean temperatures and changes to local climatic conditions. Using Landsat data of the same months and period intervals, the spatial variations of land cover changes, temperature, and vegetation were examined to determine how vegetation improves local temperature and the effects of urbanisation on daily mean temperatures over the past 12 years. The remote sensing techniques of maximum likelihood supervised classification, land surface temperature retrieval technique, and normalised differential vegetation index techniques were used to analyse and create the land use land cover (LULC), land surface temperature (LST), and vegetation and non-vegetation cover maps respectively. Results from the study showed an increase in daily mean temperature by 0.80 °C as a result of rapid increase in urban area by 46.13 sq. km and loss of vegetative cover by 46.24 sq. km between 2005 and 2017. The LST map also shows the existence of UHI within the urban areas of Accra, the potential mitigating effects offered by the existence of forest and vegetative cover as demonstrated by the existence of cool islands around the Achimota ecological forest and University of Ghana botanical gardens areas.

Keywords : land surface temperature, climate, remote sensing, urbanisation
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