

Abstract

Urbanization affects biodiversity, ecosystem processes, and regional climate. This study was done to monitor effect of urbanization on Land Surface Temperature in Athi River Sub-County using remote sensing techniques. Athi River has been experiencing rapid urbanization due to its proximity to Nairobi county. One of the most prominent aspects of urban climate is Land Surface Temperature. Use of remote sensing images has gained traction in the past years in monitoring temperature, hence their use in this study.

This study was achieved by converting Landsat images of the different years to their spectral radiances and then calculating the at-satellite temperature and the land surface emissivity thereafter. Land Surface Temperature (LST), Land Use Land Cover (LULC) classification, Normalized Difference Vegetation Index (NDVI), and Built-up Density Index (BDI) were then calculated. Urban Heat Islands (UHI) were also identified using the LST measurements. Rate of change of LULC changes, comparison of LULC and LST measurements and correlation of NDVI and BDI with LST was analyzed.

The study shows that the urban areas in Athi River have increased over the years from 2000 to 2020. There was also a consequent drop in vegetated and bare-ground areas over the years. This consequently led to an increase in Land Surface Temperature (LST) from the years 2000 to 2020. Built-up areas and bare-grounds experienced the highest temperature increases over the years. This study showed the formation of the Urban Heat Islands (UHI) from the increase in temperatures. The UHI intensity dropped from 2000 to 2014 but increased from 2014 to 2020. It was the highest in 2020 with 23.82° C. There was a negative correlation between LST and Normalized Difference Vegetation Index (NDVI), and a positive correlation between LST and Built-up Density Index (BDI), revealing that BDI is a better predictor of LST than NDVI. A negative correlation implying that when NDVI values decrease, LST increases, while the positive correlation implying that when BDI values increase, LST values also increase. It can be concluded that the rapid urbanization happening in Athi River has increased temperatures in the area and a resultant increase in the UHI effect.

Therefore, it is recommended that proper urban planning policies be formulated and implemented to counter the rapid urban sprawl in the area and reduce LST, consequently UHI effect.