

Assessing the Effect of Urban Growth on Land Surface Temperature: A Case Study of Conakry Guinea

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Abstract : Conakry, the capital city of the Republic of Guinea, has experienced a rapid urban expansion and population increased in the last two decades, which has resulted in remarkable local weather and climate change, raise energy demand and pollution and treating social, economic and environmental development. In this study, the spatiotemporal variation of the land surface temperature (LST) is retrieved to characterize the effect of urban growth on the thermal environment and quantify its relationship with biophysical indices, a normalized difference vegetation index (NDVI) and a normalized difference built up Index (NDBI). Landsat data TM and OLI/TIRS acquired respectively in 1986, 2000 and 2016 were used for LST retrieval and Land use/cover change analysis. A quantitative analysis based on the integration of a remote sensing and a geography information system (GIS) has revealed an important increased in the LST pattern in the average from 25.21°C in 1986 to 27.06°C in 2000 and 29.34°C in 2016, which was quite eminent with an average gain in surface temperature of 4.13°C over 30 years study period. Additionally, an analysis using a Pearson correlation (r) between (LST) and the biophysical indices, normalized difference vegetation index (NDVI) and a normalized difference built-up Index (NDBI) has revealed a negative relationship between LST and NDVI and a strong positive relationship between LST and NDBI. Which implies that an increase in the NDVI value can reduce the LST intensity; conversely increase in NDBI value may strengthen LST intensity in the study area. Although Landsat data were found efficient in assessing the thermal environment in Conakry, however, the method needs to be refined with in situ measurements of LST in the future studies. The results of this study may assist urban planners, scientists and policies makers concerned about climate variability to make decisions that will enhance sustainable environmental practices in Conakry.

Keywords : Conakry, land surface temperature, urban heat island, geography information system, remote sensing, land use/cover change

Conference Title : ICECC 2017 : International Conference on Environment and Climate Change

Conference Location : Amsterdam, Netherlands

Conference Dates : August 07-08, 2017