**Analyse the Surface Temperature Fluctuation in Matara Municipal Council, Sri Lanka by Utilizing Remote Sensing and GIS**

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***ABSTRACT***

Rapid urbanization, often characterized by unplanned urban expansion, has led to significant reductions in vegetation cover and increases in impervious surfaces such as buildings, pavements, and roads. This phenomenon is particularly evident in the city of Matara, Sri Lanka, which has experienced substantial urban growth over the past few decades. This study employs remote sensing techniques to assess the impact of urban development on urban surface temperature in Matara. This research utilizes pre-processed *LANDSAT ETM+* images from Landsat 4-5 level 1, Landsat 7 level 1, and Landsat 8 level 1, satellites, spanning the years 2001, 2008, 2014, and 2021.The study relayed on analysing thermal infrared (*TIR*) data to derive Land Surface Temperature (*LST*), as well as calculating vegetation and built-up indices. Specifically, the Normalized Difference Vegetation Index (*NDVI*) and the Normalized Difference Built-up Index (*NDBI*) were examined to quantify changes in vegetation cover and urban development, respectively. The relationships between *LST* and these Vegetation and buildup indices are explored to understand the thermal characteristics of the urban environment. Results indicate a consistent annual increase in surface temperature in the heart of Matara city area. While temporal fluctuations in *NDVI* and *NDBI* were observed, these changes significant in heart of Matara city area which were not always linear or uniform. The findings suggest that the urban heat effect in Matara could be mitigated by increasing vegetation cover and implementing more sustainable urban development practices. Further, we recommend the implementation of comprehensive urban planning initiatives that incorporate sustainable development principles within the Matara municipal council area. Such efforts should aim to balance urban growth with the preservation and enhancement of green spaces, thereby improving the city's thermal environment and overall livability.

**Keywords:** land surface, NDBI, NDVI, remote sensing, temperature, urbanization