LAND SURFACE TEMPERATURE AND SENSITIVE LAND USES IN CENTRAL PROVINCE, SRI LANKA

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1. INTRODUCTION

Land Surface Temperature (LST) is one of the parameter which is related to the heat transport between land surface and atmospheric boundary layer. LST can be widely used to estimate sensible heat flux, latent heat flux as well as evapotranspiration (Vlassova et al., 2014). Also it is possible to identify climate change or variability and its possible impacts on plant growth or cultivation as well as to determine management requirements of water resources. Study was carried out in a typically cold climatic area in the country in order to identify sensitive land use types with spatial variation of land surface temperature in the area.

2. METHODOLOGY

Firstly, Landsat 8 OLI and TIRS bands of year 2017 were converted to TOA radiance using the radiance rescaling factors as shown in equation (1). Then it was converted to top of atmosphere brightness temperature using the thermal constants which was supported by equation (2). Conversion from atmospheric brightness temperature to land surface temperature is according to equation (3).

$$L_\lambda = \mathrm{M_L Q_{cal}} + \mathrm{A_L} \quad (1)$$

$$TB = \frac{K_2}{In\,(\frac{K_1}{L_\lambda}+1)} - 273.15 \quad (2)$$

$$T = TB/[1 + (\,\lambda * TB/c2)\; * In\,(e)] \quad (3)$$

Vegetation fraction (Pv) was estimated using created NDVI image for the area. Sensitive land uses were identified through overlaying LST map with supervised land use classification and NDWI maps.

3. RESULT AND DISCUSSION

Typically the Western slope of the Central highlands are wet compared to Eastern slope and Eastern slopes are parts of the mid-dry zone of the country. Anyhow, LST condition was contradictory to this condition and highest LST areas indicate at Western part of the Central highlands. It is remarkable in the Kandy and Nuwaraeliya districts and Matale district shows highest LST areas at its Northern part (Figure 1). As an overall, lowest LST areas are belongs to Nuwaraeliya district. According to the NDWI overlays with LST map, surrounded areas of some major water bodies shows remarkable LST values and Victoria and Randenigala reservoir areas are best examples for that. Even though the Horton Plains National Park area is belongs Nuwaraeliya which is known as

coolest district of Sri Lanka, this vegetative area indicate higher LST values. The reason for the higher LST values for Dunumadalawa and Udawattakele forest reserve areas is visible due to the area belongs to urbanized area of the Kandy district. Rigorous impacts on land use may possible for Nuwaraeliya and Kandy district especially due to tea plantation and vegetable cultivation areas belongs to remarkable LST areas.

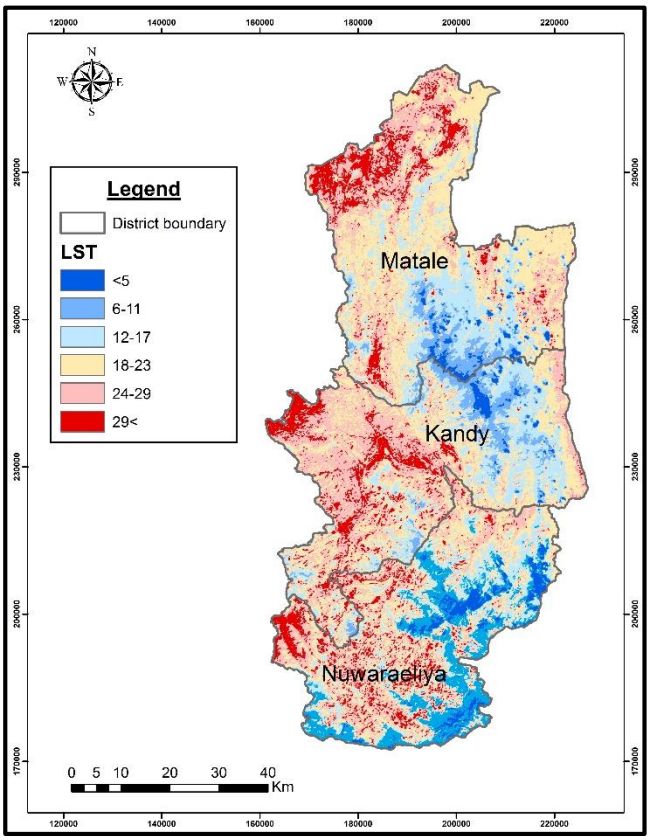

Figure 1: Land Surface Temperature Map for Central Province, Sri Lanka

4. CONCLUSION

Higher values for LST in Northern part of Matale district may natural as it is typically belongs to mid-dry zone of the country. But the LST for Western part of the Kandy and Nuwaraeliya districts are probably due to rapid urbanization and it may be impact on climatic variability in the area causing possible impacts on quantity changes of water resources and to change crop water requirements as well. Therefore the spatial pattern of LST can be used to further investigations on environmental management aspects in this heart of the country.

5. REFERENCES

Vlassova, L., Cabello, F. P., Nieto, H., Martin, P., Riano, D., & Riva, J. D. L. (2014). Assessment of Methods for Land Surface Temperature Retrieval from Landsat-5 TM Images Applicable to Multiscale Tree-Grass Ecosystem Modeling.