IMPACT OF CHANGE IN LAND USE AND LAND COVER PATTERN ON LAND SURFACE TEMPERATURE AND THERMAL COMFORT USING MICRO-SCALE AREA MODEL: CASE STUDY OF AN EDUCATIONAL CAMPUS.

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The influence of change in Land Use Land Cover pattern of an area due to rapid urbanization, over the increment in the Land Surface Temperature (LST) has always been a challenging area for research. This study covers the analysis of the influence of freshly built structure and the storey increment on the thermal comfort of the outdoor environment and Land Surface Temperature with a periodic remotely sensed observation for every three years at IIT Delhi (an educational institute campus). Numerical modelling approach using a 3D microclimate model ENVIMET is implemented for simulating the surface temperature in the presence of hostel residences and in the absence of hostel residences during a summer month of May during the period from 2002 to 2018. The effect of the Sky View Factor on Mean Radiant Temperature is likely to play a key role in influencing the thermal comfort of the residents of the campus. The entire IIT Delhi was classified under open high-rise as per Local Climate Zone (LCZ) categories. It was classified into 17 classes which included eight types of building classification from 4m to 36m and the rest of the nine classes included soil layer, asphalt roads, vegetation cover like trees, dense and light bushes, concrete roads, granite concrete and swimming pool PVC liner. The building class was sub-divided into different classes based on their height to study the effect of high rise buildings on the surface temperature. The model validation is carried out with the LST values obtained from the satellite observation of LANDSAT thermal band. The model estimated the surface temperature giving a correlation of (r=0.95) with the observed values. The RMSE value was found to be 1.28 for the student residence and 2.34 for the non-building structures. Temperature difference over the years as built structure influence was assessed approximately to the tune of 10 degrees. The model performed well in estimating the surface temperature with an accuracy of 94.97 per cent.

Keywords: ENVI-met, 3D microclimate model, Land surface temperature(LST), Land Use Land Cover(LULC), Local Climate Zone(LCZ), Landsat

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ABSTRACT

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