

A Comparative Study on the Effects of Different Clustering Layouts and Geometry of Urban Street Canyons on Urban Heat Island in Residential Neighborhoods of Kolkata

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Abstract : Urbanization during the second half of the last century has created many serious environment related issues leading to global warming and climate change. India is not an exception as the country is also facing the problems of global warming and urban heat islands (UHI) in all the major metropolises. This paper discusses the effect of different housing cluster layouts, site geometry, and geometry of urban street canyons on the urban heat island profile. The study is carried out using the three dimensional microclimatic computational fluid dynamics model ENVI-met version 3.1. Simulation models are done for a typical summer day of 21st June, 2015 in four different residential neighborhoods in the city of Kolkata which predominantly belongs to Warm-Humid Monsoon Climate. The results show the changing pattern of urban heat island profile with respect to different clustering layouts, geometry, and morphology of urban street canyons. The comparison between the four neighborhoods shows that different microclimatic variables are strongly dependant on the neighborhood layout pattern and geometry. The inferences obtained from this study can be indicative towards the formulation of neighborhood design by-laws that will attenuate the urban heat island effect.

Keywords : urban heat island, neighborhood morphology, site microclimate, ENVI-met, numerical analysis

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