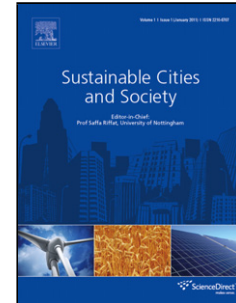


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Title: URBAN MICROCLIMATE ANALYSIS WITH CONSIDERATION OF LOCAL AMBIENT TEMPERATURE, EXTERNAL HEAT GAIN, URBAN VENTILATION, AND OUTDOOR THERMAL COMFORT IN THE TROPICS



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22 **Abstract**

23 In year 2003, United Nations estimated that by year 2030, up to 5 billion people will live in urban
24 areas which will be 61% of the world's population. Urbanization brings major modification on natural
25 landscape; buildings are erected, soil has been transformed into roads and pavement, greenery has
26 been vastly reduced, etc. The deterioration of the urban environment through urbanization can be
27 seen from a phenomenon known as urban heat island (UHI); where cities record higher temperatures
28 in comparison to their non-urbanized surroundings.

29 This study explores the effect of urban texture, characterized by its physical density and form, on
30 the receivable external heat gain, ambient temperature, urban ventilation and outdoor thermal
31 comfort. Addressing these aspects would provide a more comprehensive methodology on urban
32 microclimate analysis, rather being conducted separately. Hence, analysing building performance
33 should be looking not only at a stand-alone (isolated) setting, but also to consider the 'neighbourhood'
34 approach, where urban environment has a significant effect on the energy performance of individual
35 buildings.

36 A series of hypothetical building arrangements are being put into an empty block in a dense urban
37 area, where each of scenarios goes through a series of microclimatic analyses. At the end, this
38 parametric study would narrow down design options which have favourable microclimate condition
39 and acceptable district energy performance.

40 **Keywords**

41 Urban heat island, outdoor temperature, district heat gain, district energy performance, urban
42 ventilation, outdoor thermal comfort, thermal load units

43 **1. Introduction**

44 **1.1 Urbanization, Cities, and Buildings.**

45 The world has experienced unprecedented urban growth in the last and current centuries. Since
46 2008, for the first time in history, more than half of the world population lives in the urban areas (Laski
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