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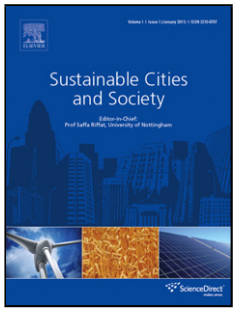

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The impact of urban compactness, comfort strategies and energy consumption on tropical urban heat island intensity: a review

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Highlights

1. Although studies on tropical UHIs remain numerically inferior to temperate UHI studies, there appears to be a considerably rich and diverse knowledge base built upon in the recent past
2. Unlike continental or higher latitude locations, correlations between mean temperature and the frequency of extreme temperatures are weaker in tropics
3. The lack of standardisation on the characterisation of parameters pose problems in deciphering the overall effect of compactness on tropical UHIs
4. Relationship between energy and UHI in tropics, especially in the residential sector is not very well captured.
5. Local Climate Zone' (LCZ) is a promising approach for the classification of measurement locations by their key micro-climate influencing features.

Abstract:

The importance of studying tropical urban climate was recognised by the World Meteorological Organisation (WMO) as early as in 1981 but substantial improvements were seen only in the last two decades. However specific knowledge of tropical urban climate still lags behind that of temperate climate. In this paper, authors review the state of the art in tropical heat island intensity, its influence on building energy consumption and the effect of urban compactness in the tropics. The review is limited to peer-reviewed journal publications found on four databases: Web of Science, Scopus, Google Scholar and Science Direct.

The review indicates that although the tropical belt has large variations in topography, forest cover, land mass and development patterns, much of the current work is confined largely to Far East Asia, South Asia and South America. Future studies should focus on protocol for parameterisation and standardisation of measurement, in depth and scientific understanding of the influence of vegetation, water and topography, survey and monitoring of the context specific relationship between UHI and energy consumption, development of database for numerical model validation and improvement, and the context specific development of LCZ based institutional framework to integrate UHI mitigation strategies with environmental design guidelines.