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Evaluating the Impact of Urban Green Spaces on Urban Microclimate of Lahore: A Rapidly Urbanizing Metropolis of the Punjab-Pakistan

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Abstract : Urban green spaces (UGS) play a key role in the urban ecology of an area since they provide significant ecological services to compensate for natural environment functions damaged by the rapid growth of urbanization. The transformation of urban green specs to impervious landscapes has been recognized as a key factor prompting the distinctive urban heat and associated microclimatic changes. There is no doubt that urban green spaces offer a range of ecosystem services that can help to mitigate the ill effects of urbanization, heat anomalies, and climate change. The present study attempts to appraise the impact of urban green spaces on the urban thermal environment for the development of the microclimatic conditions in Lahore, Pakistan. The influence of urban heat has been studied through Landsat 8 data. The land surface temperature (LST) of Lahore was computed through the Radiative transfer method (RTM). The spatial variation of land surface temperature is retrieved to describe their local heat effect on urban microclimate. The association between the LST, normalized difference vegetation index, and the normalized difference built-up index are investigated to explore the impact of the urban green spaces and impervious surfaces on urban microclimate. The results of this study show significant changes in (impervious land surface 18% increase) land use within the study area. However, conversion of natural green cover to commercial and residential uses considerably increases the LST. Furthermore, results show that green spaces were the major heat sinks while impervious landscapes were the major heat source in the study area. Urban green spaces reveal 1 to 3℃ lower LST associated with their surrounding urban built-up area. This study shows that urban green spaces will help to mitigate the effect of urban microclimate and it is significant for the sustainable urban environment as well as to improve the quality of life of the urban inhabitants.

Keywords : thermal environmental, urban green space, cooling effect, microclimate, Lahore
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