



Characterizing Urbanization Effects on Land Surface Temperature in the Capital City of El Salvador

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Rapid urbanization by converting open lands to built-up areas and aggregating people to urban settlements has greatly accelerated the socioeconomic development of cities in developing countries. However, it also triggers adverse effects on the structure of society and environmental problems, including the loss of agricultural land, habitat fragmentation, biodiversity degradation, heat island effects, and spread of infectious diseases. The elevated temperature of heat islands in urban areas during the summer time coupled with intensive human-induced landscape changes has particularly posed significant risks and challenges to the urban community's environment and quality of life. The influences of urban expansion on temperature have globally gained interests of scientists due to its potential effects on microclimate and environment. This is also phenomenal in El Salvador, which is the most densely populated country in Central America. The main objective of this study is to assess effects of urban expansion on temperature of the capital city (San Salvador), El Salvador during the period 1986–2016 using multi-temporal Landsat data. The mapping results of built-up areas achieved from the classification of Landsat data using the random forests algorithm were compared with the ground reference data indicated the overall accuracies and Kappa coefficients generally higher than 89% and 0.8, respectively. The city had been drastically expanded at a rate of 1.4% into multiple directions, especially the eastern and northern parts of the city. The urban expansion by transforming opened lands to artificial surfaces had triggered influences on the city's temperature. The land surface temperature retrieved from Landsat data indicated that the average temperature of urban areas observed for 1986 was 37.1°C, while the value for 2016 was 40.2°C, respectively. This study demonstrated the application of multi-temporal Landsat data to quantify urbanization effects on the local temperature in the capital of El Salvador. The results could be critically valuable to the government officials to shape their urban planning strategies in tackling potential risks and adverse effects of urban growth on the communities.