

Local measures to mitigate the urban heat island effect in hot and humid climate: Comparative case study of Sana'a, Bushehr and Dubai Marina

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ABSTRACT: Cities experience the effect of extra heat compared to their rural surroundings. This phenomenon is known as the Urban Heat Island (UHI) effect. Urban geometry, land cover, landscape and metabolism have been cited as the main contributors to the UHI effect. This paper compares the UHI mitigation strategies of the contemporary development of Dubai Marina (United Arab Emirates) with historical cities of Sana'a (Yemen) and Bushehr (Iran). Shadow patterns, wind flow, vegetation ratio, surface materials and energy consumption are being investigated to measure their effectiveness on microclimate moderation in hot and humid climate. The study benefits from aerial imagery feature extraction, climate data and spatial measurements as primary sources. An analysis chart based on Strengths, Weaknesses, Opportunities and Threats (SWOT analysis) is being used to facilitate discussion about future development in Dubai Marina. Results indicate that increasing the use of permanent shadow, natural ventilation, permeable materials and vegetation can contribute to mitigate the UHI effect, while the use of surface water, car oriented transport networks and free standing buildings can magnify the UHI effect in hot and humid climates. The outcome design guidelines can be used in cities in hot and humid climate, which intend to mitigate the UHI effect.

Keywords: Urban Heat Island effect; Hot and Humid Climate; Shadow Pattern; Urban Vegetation; Land Cover