ENVIRONMENTAL FRAMEWORK FOR MITIGATING HEAT ISLAND EFFECT – HIGH TEMPERATURES IN URBAN AREAS: ASSESSMENT AND PRIORITISATION OF GREEN COVERAGE APPLICATIONS IN CAIRO GOVERNORATE, EGYPT

by

Mona Mostafa Amin Mostafa

A Thesis Submitted to the
Faculty of Engineering at Cairo University
in Partial Fulfilment of the
Requirements for the Degree of
MASTER OF SCIENCE
in
Architectural Engineering

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
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Under the Supervision of

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Title of Thesis:
Environmental Framework for Mitigating Heat Island Effect – High Temperatures in Urban Areas: Assessment and Prioritisation of Green Coverage Applications in Cairo Governorate, Egypt

Key Words: Climate Change Mitigation; Heat Island Effect; Urban Green Coverage; Green Open Space; Green Roofs and Facades; Simulations

Summary :

Climate change implications due to population growth and urbanisation sprawl are important issues that attract high concern globally. These implications resulted in colossal energy consumption rates in cities. Egypt is one of the most vulnerable countries to climate change risks. The main objective of this thesis is to develop a strategic environmental framework to prioritize areas in mega cities such as Cairo exploiting GIS software, as a simulation tool, for implementing urban green coverage (UGC) strategies, including: green open spaces, trees, green roofs, and vertical greening, as a solution to mitigate high temperatures and urban heat island effect (UHIE). In addition, the methodology adopted in this research encompasses theoretical and applied approaches. Moreover, the research follows a deductive approach to quantify the benefits of UGC using ENVI-met software to examine the effectiveness of the mitigation strategy proposed to offset the effect of climate change scenario 2080. Results indicated that UGC implemented in the case study led to a maximum decrease in temperature by 2.36 ℃ at 16:00. Finally, conclusions and guidelines for UGC implementation to mitigate heat island effect in Egypt are developed. Also, recommendations for professionals and institutions as well as future work are suggested.

Disclaimer

I hereby declare that this thesis is my own original work and that no part of it has been submitted for a degree qualification at any other university or institute.

I further declare that I have appropriately acknowledged all sources used and have cited them in the references section.

Name: Mona Mostafa Amin Mostafa Date: 13.02.2019

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Dedication

To everyone, light a candle, erase the darkness of ignorance.

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