

**UNIVERSITI TEKNOLOGI MARA**

**ADAPTIVE OUTDOOR THERMAL  
COMFORT IN HOT AND HUMID  
CLIMATE OF URBAN PARK IN  
MALAYSIA**

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Thesis submitted in fulfillment  
of the requirements for the degree of  
**Doctor of Philosophy**  
**(Built Environment)**

**Faculty of Architecture, Planning and Surveying**

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## **AUTHOR'S DECLARATION**

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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## ABSTRACT

Adaptive thermal comfort in the tropical climate has become one of the priorities in the mission to reduce energy demand. The needs become crucial in the rapid urbanisation of Selangor, Malaysia as the green area has become one of the spots that have demanded to be optimised. Moreover, there is a need to mitigate some of its harmful effects through sustainable methods, such as through the application of water bodies (the study has been done at the lake garden) and high intensity of mature trees. The condition has the potential to sustainably reduce urban temperatures and outdoor thermal discomfort in Shah Alam. The broad aims of this study are to establish an adaptive outdoor thermal comfort model according to users' behavioural patterns and physical conditions of urban recreational parks in Malaysia. This study is carried out to satisfy the following objectives; (1) To assess the outdoor thermal comfort level for microclimate conditions in the Shah Alam Lake Garden; (2) To determine an improved adaptive outdoor thermal comfort model based on hot and humid climate conditions; (3) To analyse the behavioural patterns of urban recreational parks users as affected by the climate conditions; and (4) To simulate the physical conditions and materials that promote better outdoor conditions at the Shah Alam Lake Garden. The study area is located in an urban park in Shah Alam also known as Taman Tasik Shah Alam specifically, Tasik Barat. The findings provide the empirical evidence for outdoor thermal comfort in hot and humid climate. The outcomes of this study determine a distinguish findings from the existing thermal comfort indices that have been developed for a temperate climate. This study identified that the adaptive outdoor by compared with the adaptation outdoor thermal comfort model in different climate condition that has a similar setting, yet, in the various microclimate condition. The findings show that the perception of the urban park users in Malaysia is uniform. Moreover, people in Malaysia are adapted to the microclimate condition as they agreed that the microclimate condition is comfortable at the most time. As a final point of the objectives of this study, the study has investigated the physical conditions and materials that promote the better outdoor condition of Shah Alam Lake Garden by using simulations method (ENVI-Met 4.1). The daytime cooling effect by the 'extra trees' through simulations from a microscale climate model was examined. The thesis highlights how the park user in Shah Alam implements the adaptive outdoor thermal comfort.

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