Towards Liveable Streets
Urban Canyon Microclimate: An Empirical Study of Colombo

A Dissertation
Submitted to the Department of Architecture of the University of Moratuwa in partial fulfilment of the Requirements for the degree of Master of Science In Architecture

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January 2004

DECLARATION

I declare that this dissertation represents my own work, expect where due acknowledgement is made, and that it has not been previously included in a thesis, dissertation or report submitted to this University or to any other institution for a degree, diploma or other qualification.

UOM Verified Signature

Signed:

(G.R.H Silva)

ACKNOWLEDGEMENTS

This study with many complexities and difficulties completed due to the assistance, guidance and encouragement given by all of the following persons, to whom I wish to extend my heart full gratitude.

Archt. Vidura Sri Nammuni Head, Department of Architecture University of Moratuwa, for his assistance in this study.

My Coordinator Archt. Prasanna Kulathilake, Senior lecturer, Coordinator M.Sc. Dissertations, Department of Architecture for comments and criticism which encouraged me to do this study.

I am deeply indebted to my tutor Archt. Dr. Indrika Rajapaksa Lecturer Department of Architecture for her guidance, valuable comments and unreserved help given to me for the completion of this task.

Archt. Dr. Rohinton Emmanuel, Senior lecturer, Department of Architecture, for his guidance, valuable comments and unreserved help given to me.

The staff of Department of Architecture.

Mr. Chathura , Technical officer , for the given help on arranging the instruments.

Librarian and Staff, University of Moratuwa Library and University of Peradeniya Library, for the given help.

Mr.Padmasiri and his staff for their kind guidance and help on obtaining Data from the Metrological Department, Colombo.

O.I.C. 's Administration in Dehiwala, Wellawatte, Bambalapitiya, Kollupitiya and Pettah Police Stations for their assistance for possible arrangements in having the Defense clearance to carryout the Field study survey and photograph the high security zones within Colombo.

I'm also grateful to my seniors, Miss. Sathya Sajeewa and Miss. Nirosha Loyed and Mr Narain Perera for the assistance provided.

I offer my heartfelt thanks to my dearest friends Panawala ,Bashwara, Champika, and my batch mates for their valuable support rendered in completion of this task.

Last but not least I express my deepest gratitude to my dearest parents, and my Sister for their support and for always being there to take my troubles in a most loving way.

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Urban Design;
Designing an Urban setting, it self can perceive as a single architectural process, not only an individual building, but also the way buildings are related each other and its three-dimensional composition represents the total image of the city. Performances of these solid–void compositions directly effected to thermal behaviour of the city.
The metropolization phenomenon at Colombo has provoked deep changes in the field of "Urban design". As well, as changes in thermal comfort levels and the energy balance, leading to an altered atmosphere of the urban area,
In Colombo, higher relative humidity values and moderation in wind speed, the daily (diurnal) variation in temperature and diminishing diurnal temperature variation would indicate a growing UHI problem. The phenomena of Urban Heat Island can create unpleasant microclimatic conditions at the pedestrian level. Pedestrian walkways are the key pubic domain of Equatorial towns and cities, where the greatest amount of human contact and interaction taken place.
Shading can create a comfortable level, avoids the direct solar radiation. Vegetation in particular tall trees can create a cooling effect, lower temperature and increase relative humidity.
The aim of this study is to investigate the effect of Orientation, built mass, tall trees with a wide foliage canopy and water bodies, on the climatic parameters, at the pedestrian level in street canyons, Colombo metropolitan. The research was conducted in either-side pedestrian walkways of two major public realms selected based on its Orientation. Each street canyon consisted with areas of deep, shallow and intermediate canyons, tall dense trees planted, street canyon relatively lacking in tall trees, directly effected water bodies etc.
One pair of walkways was located parallel to and, the other perpendicular to, the coastline. Data collected in two days of December 2003: Temperature and relative humidity, by a HOBO-HT data logger, in a well cross-ventilated radiation shield at seven feet height on each pavement,
Traverse walking along canyon, by which temperature and relative humidity were, measured using the mobile data logger at midday and night, in Dec 18th and 22nd.
The results show that during the day hours the temperature values in the canyons with vegetation were up to 2 THI values lower than those measured in the canyons without trees and it was up to 4 THI values lower in Gall face Green, where directly affected by the Ocean.
Wind speed in the canyons placed perpendicular to the coastline, was generally higher than in the canyons located parallel to the coastline and blocked by rows of building from the sea breeze, which is a characteristic of Sri Lankan western shoreline. But the effect of vortex phenomena caused by perpendicular winds, can clearly experienced in N-S oriented deep canyons,
Wind speed in canyons without trees was generally higher that in canyons with threes due to the windbreak and friction effects of the trees in the latter. The existence of shading devices above the pavements and tall dense trees in an urban environment could result in two opposite climatic effects. Shading devices moderate the air temperature and surface temperatures, preventing the direct solar radiation. In addition, trees act as moderators in both temperature and relative humidity levels towards comfortable levels.
This research shows imperative need of interferences, of climatized architectural imlpiceations in the case of street canyons and adjoined pedestrian walkways at the Colombo Metropolitan.