UNIVERSITI PUTRA MALAYSIA

HAZARD EVALUATION OF MATURE URBAN STREET TREES IN KUALA LUMPUR

MURAD ABD. GHANI

FRSB 2000 1

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**MASTER OF SCIENCE
UNIVERSITI PUTRA MALAYSIA**

2000

HAZARD EVALUATION OF MATURE URBAN STREET TREES IN KUALA LUMPUR

By

MURAD ABD. GHANI

**Thesis Submitted in Fulfilment of the Requirements for the
Degree of Masters of Science in the Faculty of Design and Architecture
Universiti Putra Malaysia**

June 2000

Specially dedicated to…

my wife. *NUR HASLINA MUKHTAR* for her unfailing patience and encouragement.

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment
of the requirements for the degree of Master of Science.

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June 2000

Chairman: **Mr. Osman Mohd. Tahir**

Faculty: **Design and Architecture**

The hazard status of mature urban street trees in Kuala Lumpur has not being
studied. Therefore, there has been a paucity of data pertaining to the current status of
mature urban street trees in Malaysia. In order for municipalities to manage urban
street trees effectively, a thorough understanding of the resource base is needed.
Inventories and inspection are essential in order to provide a current record of
resources as well as to assist in management decision making. The data obtained can
be used to serve as source of information for developing tree maintenance and
management programme, particularly hazard prevention programme. Thus, the
purpose of this study were: (1) to determine and evaluate hazard status of mature
urban street trees in Kuala Lumpur. which is limited to the central area of Kuala
Lumpur. and (2) to propose guideline for a proper tree work in Malaysia. The study
employed a combination of cluster and systematic sampling technique. Ten percent
(232 trees) of the total street trees in the study area were sampled.

The results indicated that the status of urban street trees in Kuala Lumpur were in moderate (62.50%) to high (32.75%) hazard risk status. Only less than five percent (4.74%) had a low hazard risk status suggesting that most of the trees in the study area suffered from various structural defects requiring urgent attention by the management. Sound arboricultural practices as well as the use of systematic hazard inspection programme should be adopted in managing urban street trees in Malaysia.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Master Sains.

HAZARD EVALUATION OF MATURE URBAN STREET TREES IN KUALA LUMPUR

Oleh

MURAD ABD. GHANI

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Pengerusi: **Encik Osman Mohd. Tahir**

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Status pokok-pokok matang yang berbahaya di tepi jalan di Malaysia masih belum pernah dikaji dengan mendalam. Oleh itu tidak terdapat maklumat sediada mengenai status terkini berhubung dengan pokok-pokok tersebut. Bagi membolehkan pihak perbandaran menguruskan pokok-pokok tepi jalan dengan lebih efektif, pemahaman yang mendalam berhubung dengan sumber yang diuruskan adalah perlu. Oleh itu, inventori serta pemeriksaan pokok adalah penting, bertujuan bagi menyediakan maklumat terkini di samping dapat membantu pihak pengurusan dalam membuat keputusan berhubung dengan pengurusan. Data yang dikumpulkan juga boleh digunakan sebagai sumber maklumat bagi menyediakan program penyelenggaraan serta pengurusan pokok-pokok tepi jalan terutamanya berhubung dengan penyediaan program pencegahan bagi pokok-pokok yang berbahaya. Kajian ini adalah bertujuan untuk: (1) menentukan serta menilai status pokok-pokok matang di tepi jalan di Kuala Lumpur, dan (2) mencadangkan satu garispanduan untuk kerja-kerja pemangkasan pokok di Malaysia. Kajian ini menggunakan gabungan kaedah

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sampling 'Cluster' dan 'Systematic'. Sebanyak sepuluh peratus (232 pokok) daripada jumlah pokok yang terdapat di kawasan kajian telah di sampel.

Hasil kajian menunjukkan bahawa status pokok-pokok matang di kawasan kajian adalah dalam kategori sederhana (62.50%) ke tinggi (32.75%) tahap risiko bahayanya. Hanya kurang dari lima peratus (4.74%) mempunyai tahap bahaya yang rendah. Kajian menunjukkan bahawa pokok-pokok yang terdapat di kawasan kajian mengalami pelbagai kerosakan yang serious pada strukturnya serta memerlukan perhatian segera dari pihak pengurusan. Oleh itu, satu kaedah penyelenggaraan, pengurusan serta pemeriksaan pokok yang sistematik adalah diperlukan di dalam pengurusan pokok-pokok bandaran di Malaysia.

ACKNOWLEDGEMENTS

I wish to express my gratitude and sincere thanks to my supervisor. Mr. Osman Mohd. Tahir, for the persistent guidance. assistance. support and understanding throughout the study period.

Gratitude and thanks are also extended to all members of the graduate committee, Associate Professor, Dr. Mustafa Kamal Mohd Shariff, Tuan Haji Zakaria Abdullah, and Associate Professor Dr. Noorizan Mohamed for their constructive comments, advice and guidance.

Special thanks are also due to Encik Ismail Adnan bin Malik, for his time and sincere guidance in teaching and allowing me to use his personal GIS software for the analysis of the data.

Thanks are also extended to Landscape Unit, Dewan Bandaraya Kuala Lumpur, especially to Encik Norazam bin Mohamed Nor, for giving a permission to use the study area and providing data and other useful information. Thanks are also due to the staffs of the Faculty of Architecture and Design for their contribution in this research.

Finally, I also wish to express special thanks to my family and others for their support and encouragement. especially to my beloved wife for her encouragement, prayer, support and understanding for making this study possible.
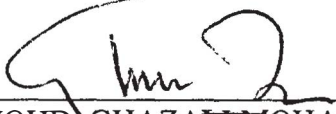
I certify that an Examination Committee met on June 9, 2000 to conduct the final examination of Murad Abd Ghani Master of Science thesis entitled "Hazard Evaluation of Mature Urban Street Trees in Kuala Lumpur" in accordance with the Universiti Pertanian Malaysia (Higher Degree) Act 1980 and Universiti Pertanian Malaysia (Higher Degree) Regulation 1981. The committee recommends that the candidate be awarded the relevant degree. Members of the Examination Commitee are as follows:

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This thesis submitted to the Senate of Universiti Putra Malaysia and was accepted as fulfilment of the requirements for the degree of Master of Science.

KAMIS AWANG, Ph.D,
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Date: 1 1 NOV 2000

I hereby declare that the thesis is based on my original work except for quotations and citations, which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UPM or other institutions.

MURAD ABD. GHANI

Date: August 9, 2000

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CHAPTER ONE

INTRODUCTION

1.1 Background

Trees have always form a vital part of human's surrounding. The presence of trees in the urban landscape has often been claimed to help satisfying a deep psychological, sociological, physical and economic well being of urban communities.

The history of urban tree planting in Malaysia has reportedly started during the British colonization period. The introduction of many exotic species such as *Pterocarpus indicus*, *Samanea saman*, *Eugenia grandis* and *Peltophorum pterocarpum* dominated our urban landscape. However, the first serious effort of tree planting only started in late 1978 when Malaysia embarked on implementing greenery and beautification programme. Kuala Lumpur was chosen as the first city to implement it. This was followed by a call from the Prime Minister, Datuk Seri Dr. Mahathir Mohamad to transform Malaysia as "Garden Nation". The programme aspires to plant 20 million trees by the year 2020, with 75,000 trees to be planted annually (Brochure Kempen Menanam Pokok Seluruh Negara, Jabatan Landskap Negara).

In general. it can be said that the government of Malaysia and particularly the Kuala Lumpur City Hall (DBKL) had achieved their objectives in tree planting programme. This can be seen from the statistic in the year 1999 (Source: Landscape Division. pers. comm.) where the total number of trees planted had reached 1.69 million trees nation wide as compared to the target of 1.5 million trees. Data from the Landscape Unit, DBKL (Pers. comm.) showed that the total number of trees planted in Kuala Lumpur had reached 341.327 trees in the year 1996. However, a close examination from the aspects of horticultural and arboricultural point of view, indicated a wide range of problems in terms of growth and maintenance of the newly planted, as well as mature trees. This can be seen in the increasing number of complaints received by the Shade Tree Unit of DBKL pertaining to trees under their jurisdiction with a total of 1686 complaints in1996 to 2605 complaints in the year 1998. This is followed by the lack of relevant information on urban trees in term of its history, location, composition, status, condition and management needs. These data are crucial to effective tree management.

1.2 Justifications and Statement of Problems

For the tree maintenance personnel of municipalities to work effectively, a thorough understanding of the resource base is needed. Thus, after more than two decades of growing trees. it is timely to examine the status and the management needs of the planted trees. especially the mature ones. This will enable the municipalities or the tree manager to systematically manage and prioritizes tree work activities such as pruning and removal of hazard trees. As good quality street

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trees prove to be beneficial and appreciated by many people, the poor ones can be a persistent eyesore and a potential hazard to urban communities due to structural defects. The increasing incidences of trees being damaged by heavy storm (e.g. in 1993, total uprooted trees were 1,364, NST March 6, 1995), has initiated the Park and Recreation Department, DBKL to implement the first street tree survey involving selected roads in Kuala Lumpur in 1993 (Adnan, 1995). Unfortunately, this practice has since ceased. Due to their close proximity to the urban communities, these mature, old and declining trees can pose potential hazards to the public. These include property damage or serious personal injury caused by structural faults or defects. Accidents like these have increased the number of litigation cases involving the public against the local authorities.

The lack of data on tree hazards has prompted this study to be carried out. The study focused on urban street trees along selected streets in Kuala Lumpur. Data from this study will be useful to planners and managers dealing with street trees. By adopting a regular and systematic inspection of the trees with relevant information recorded, municipalities can avoid legal suit against them for negligence.

1.3 Objectives:

The objectives of the study are: -

(i)   to determine and evaluate hazard status of the mature urban street trees in the central of Kuala Lumpur.

(ii)   to propose guidelines for proper tree work in Malaysia.

1.4 Scope and Limitations of the study:

The limitations of this study are: -

(i)   Street trees are defined as trees under the control and maintained by the City Hall of Kuala Lumpur (DBKL), with a distance of approximately three (3) meters from the road edge. comprising the public right-of-way.

(ii)   Hazard trees refer to trees with structural defects. faults or weaknesses where their presence could lead to danger and physical loss and it has an identifiable target.

(iii)   The study will only be limited on mature trees. Trees are defined as mature (aesthetic maturity), if they have attained a diameter at breast height (dbh) larger than 15 cm, and size and form in bole and crown to provide beauty and shade.

(iv)   The lack of proper maintenance record on trees in the study area made it difficult for the researcher to obtain back ground information such as age of the trees. tree size. species composition, date of planting and maintenance records.

(v)   This study focused on street trees that exclude coniferous and topiaried trees.

(vi)   The study will only be limited to major roads, which are defined as road ranges from medium to high traffic volume, with an average daily traffic of 3,000 car passenger unit (CPU). The major road includes expressway, arterial and collector roads.

(vii)   The survey and evaluation in this study will only be based on visual assessment on a particular street trees, which only applies to the structure above the ground level and do not include the root system inside the soil. This study will not include detailed study or inspection procedures such as lab work in order to confirm the names and types of pests or the use of measurement devices such as fractometer or shigometer in detecting the extent of wood decay in trees.

(viii)   The study was conducted to a specific geographical location, located in the central region of Kuala Lumpur with an area of approximately 28.82 square kilometers.

CHAPTER TWO

LITERATURE REVIEW

2.1 Urban Street Tree Management

The management of urban street tree involves three main operations, establishing, maintaining and removing of trees (Miller, 1988). This approach should be applied to urban street trees in order to achieve the long-term objective of growing trees. Of the three, removal of hazardous tree or tree parts must be the top priority, followed by pruning and planting activities. Tree pruning and removal were also reported as the most important element of urban tree maintenance activities and are two of the most costly. According to Nowak, (1990) on average, 30% of a city's total tree care budget was allocated to trimming activities and 28% to tree removal and disposal. A survey in the United States by Tate (1984) also reported that removal activities comprise of 69% of maintenance activities contracted by municipalities. These were due to the status of urban street trees that have reached mature and over-matured size and their close proximity to urban communities.

In order for the tree crew in the municipalities concerned to discharge their duties effectively and systematically, a thorough understanding of the resource base is needed. This can be carried out through inventory of its resource base. Inventories are essential in order to provide a current record of resources being managed and to assist in management decision making. Some of the common information gathered

during the inventory process include species characteristics. site condition. total number of trees. species and size composition. tree location. health. vigor and safety. The data obtained can be used to serve as a useful source of information for tree maintenance and management programme.

However. many municipalities do not carry out their street tree inventory. A survey in the United State (Bassett and Lawrence. 1975) found that only one third of 172 cities had an inventory of their street trees. Kielbaso and Giedraitis (1982) reported that tree managers in the United States spent on the average 64% of their budget on the management of street trees but only 22% of them knew with any degree of accuracy the number of street trees under their care. The remaining of the tree managers surveyed had not done so for reasons of lack of funds, interest, skill and workforce. Very often limited personal experience is usually relied upon more heavily than published technical information (Gerhold et. al, 1976). Ottman and Kielbaso (1976) reported that only 47% of urban tree managers in the United State had insufficient experience or training to perform their duties. They also reported that only 19% of urban tree managers in the United State are professional arborists. As a result. only about a quarter of municipalities use master street tree plans and more than half of cities manage their trees by the crisis system (Rubens. 1978).

By having their street trees inventorised. inspected and recorded. the authority can avoid legal suits against them for negligence in the event of injury or damage (Grainger and Thompson. 1981).

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2.2 Urban Street Tree Management in Malaysia

In Malaysia. prior to independence. there is lack of information and record on street trees planting and management. The history of urban street tree planting can be assumed to begin in the period soon after many exotic species were introduced in Malaya by the British Colonial administration (Adnan, 1995). According to Adnan (1995), it can be clearly seen from the old historical pictures that the urban street tree planting was confined to only limited species such as *Pterocarpus indicus, Samanea saman. Eugenia grandis* and *Peltophorum pterocarpum.* According to Burkill (1966), of all the species, *Pterocarpus indicus* was recorded as the pioneer species planted as street trees. Burkill, (1966) quoted that Koenig in1894 mentioned the big trees which he saw in Malacca in 1778-1779. Later Hunter reported that Ibid in 1909 mentioned the abundance of planted trees in Penang in 1802. Burkill, (1966), also reported that of the Settlements, Malacca was the first to take up it systematic cultivation and most of the roads there ultimately became lined by it. Penang, Province Wellesley and finally Singapore followed suit later in acquiring beautiful tree lined avenues. Burkill, (1966) further reported that the planting of *Samanea saman.* a tree originated from northern parts of South America and has been naturalised throughout the tropic, was recorded in Singapore in 1876. It was also reported that *Eugenia grandis.* a native tree was used as street trees back in 1882.

However, the first serious effort of greening and beautification programme in Malaysia only began in November, 1978, when the government issued a directive