UNIVERSITI PUTRA MALAYSIA

TREE HAZARD ASSESSMENTS AT UNIVERSITI PUTRA MALAYSIA USING GIS-BASED UPM-MUTIS DECISION SUPPORT SYSTEM

JONATHAN TENG YI CHUON

FH 2011 4

TREE HAZARD ASSESSMENTS AT UNIVERSITI PUTRA MALAYSIA USING GIS-BASED UPM-MUTIS DECISION SUPPORT SYSTEM

By

JONATHAN TENG YI CHUON

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfillment of the Requirements for the Degree of Master of Science

March 2011

DEDICATED

TO MY PARENTS
TENG HOCK KHUN & LAU NGUOK LANG

BROTHER
CYRIL TENG YI LERN

AND ALL MY FRIENDS

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfillment of the requirement for the degree of Master of Science

TREE HAZARD ASSESSMENTS AT UNIVERSITI PUTRA MALAYSIA USING GIS-BASED UPM-MUTIS DECISION SUPPORT SYSTEM

By

JONATHAN TENG YI CHUON

March 2011

Chairman: Alias Mohd. Sood, PhD

Faculty: Faculty of Forestry

Urban forest can be defined as art, science and technology of managing trees and forest resources that grow within a city, town or a suburb. It provides benefits in the form of green landscape, storm water management, carbon storage which lead to human heath. Regardless, they are also potentially cause hazardous to their surroundings. Hence, there is a need to evaluate urban trees whether they are hazardous or not. These can be prevented by developing a tree information system which can determine hazardous trees as well as function as trees' coordinates' locator information storage. It also will act as decision support tool for the management. Hazard rating assessment in the context of urban trees is the evaluation of the defect severity of trees and how likely they are to fail as well as how severe in terms of damage that they could cause to their surroundings. In this study, roadside trees hazard rating was assessed automatically by a Visual Basic for Applications (VBA) in customized ArcMap™ application using, known as Universiti Putra Malaysia-Malaysian Urban Trees Information System (UPM-

MUTIS), developed by the Faculty of Forestry, UPM. The capabilities of UPM-MUTIS ver. 1.0 in determining hazard rating are also assessed. The study area covered part of UPM's academic zone. Result revealed that out of 909 trees assessed, A total of 840 trees (92.4%) were categorized as 'Low' hazard rating, 67 trees (7.4%) as 'Medium' hazard rating and no trees with 'High' and 'Severe' hazard rating. The accuracy on the tree counting in the study area is 95.15%.

UPM-MUTIS should be further developed into a web-based system which can be accessed by all potential users. UPM-MUTIS should be further tested by local municipal council and arborists for practicality. Further studies should be done on UPM-MUTIS to enable life long monitoring of tree health and tree risk status that could change over time.

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

PENILAIAN RISIKO POKOK DI UNIVERSITI PUTRA MALAYSIA MENGGUNAKAN SISTEM PENYOKONG KEPUTUSAN BERASASKAN GIS: UPM-MUTIS

Oleh

JONATHAN TENG YI CHUON

Mac 2011

Pengerusi: Alias Mohd. Sood, PhD

Fakulti: Fakulti Perhutanan

Hutan bandar boleh didefinisikan sebagai hutan atau sekumpulan pokok yang tumbuh di bandar raya, bandar dan pinggir bandar. Hutan bandar menyumbangkan kebaikan dari segi kehijauan landskap, kesihatan manusia, pengurusan air limpahan, penyimpanan karbon dan sebagainya. Walau bagaimana pun, hutan bandar juga berpotensi untuk menjadi risiko kepada persekitaran manusia. Oleh itu, adalah menjadi satu keperluan untuk menilai pokok-pokok tersebut sama ada ianya berisiko atau tidak. Masalah ini dapat diatasi dengan membangunkan satu sistem maklumat pokok yang boleh menentukan pokok-pokok yang berisiko serta berfungsi sebagai penyimpanan data untuk lokasi pokok dan maklumat ciri-ciri kecacatan. Sistem ini juga akan bertindak sebagai sistem pengdukung keputusan kepada pengurusan pokok. Penilaian risiko dalam konteks hutan bandar ialah penilaian tahap kecacatan pokok dan sejauh mana ia akan rosak serta tahap kerosakan yang dibuat kepada persekitaran. Di dalam kajian ini, penilaian risiko pokok di pinggir jalan dijalankan secara otomatik dengan

menggunakan satu sistem aplikasi ArcMap™ yang diubahsuai menggunakan Visual Basic for Applications (VBA), yang dikenali sebagai UPM-Malaysian Urban Trees Information System (UPM-MUTIS), dibangunkan oleh Fakulti Perhutanan, UPM. Kawasan kajian meliputi sebahagian daripada zon akademik UPM. Keputusan menunjukkan bahawa daripada jumlah 909 pokok, 840 pokok (92.4%) dikategorikan sebagai berisiko 'rendah', 67 pokok (7.4%) dikategorikan sebagai berisiko 'sederhana' dan tiada pokok dengan markah penilaian risiko 'tinggi' dan 'amat tinggi'. Ketepatan pengiraan jumlah pokok dalam kawasan kajian ialah 95.15%. UPM-MUTIS perlu diperbaiki dan dibangunkan kepada sistem yang berasaskan web di mana ia dapat diakses oleh bakal pengguna. UPM-MUTIS perlu diuji lebih lanjut keberkesanannya oleh majlis perbandaran dan arborist. Kajian yang lebih mendalam perlu dijalankan ke atas UPM-MUTIS supaya ia dapat memantau kesihatan pokok untuk jangka masa panjang serta status risiko pokok yang mungkin berubah mengikut masa.

ACKNOWLEDGEMENTS

I want to thank my supervisor, Dr. Alias Mohd. Sood for his guidance and encouragement. He also had helped to proof reading my thesis and gave valuable comments to improve it. Thanks also to my co-supervisor, Mr Ismail Adnan Abdul Malek for his assistance in form of advice in technicality in data collection and analysis. I want to extend my appreciation to Tuan Haji Amat Ramsa Yaman for his constructive comments and input in my thesis.

Not forgetting my friends, Nik Mohd. Saiful and Noor Syafiqah for assisting me in data collection. I also want to extend my gratitude to En. Saad Nyan, lab assistant of Faculty of Forestry for his help and advice in doing my thesis.

I want to thank UPM for funding my research work through Graduate Research Fellowship (GRF). Last but not least, I want to thank my family for their permission to study Master in UPM as well as their encouragement and financial support.

I certify that a Thesis Examination committee has met on 02 March 2011 to conduct the final examination of Jonathan Teng Yi Chuon on his Master thesis entitled “Tree Hazard Assessment at Universiti Putra Malaysia Using A GIS-Based Decision Support System UPM-MUTIS” in accordance with the Universities and University colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A) 106] 15 March 1998. The Committee recommends that the student be awarded Master of Science.
Members of the Thesis Examination Committee were as follows:

Wan Razali bin Wan Mohd, PhD
Dato’ Professor
Faculty of Forestry
Universiti Putra Malaysia
(Chairman)

Mohd. Hasmadi bin Ismail, PhD
Associate Professor
Faculty of Forestry
Universiti Putra Malaysia
(Internal Examiner 1)

Abdullah Mohd., PhD
Associate Professor
Faculty of Forestry
Universiti Putra Malaysia
(Internal Examiner 2)

Sharifah Mastura Syed Abdullah, PhD
Professor
Faculty of Social Sciences and Humanities
Universiti Kebangsaan Malaysia
(External Examiner)

SHAMSUDDIN SULAIMAN, PhD
Professor and Deputy Dean
School of Graduate Studies
Universiti Putra Malaysia

Date:

This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfillment of the requirement for the degree of Master of Science. The members of the Supervisory Committee were as follows:

Alias Mohd. Sood, PhD
Senior Lecturer
Faculty of Forestry
Universiti Putra Malaysia
(Chairman)

Ismail Adnan Abdul Malek, Mr
Senior Lecturer
Faculty of Forestry
Universiti Putra Malaysia
(Member)

HASANAH MOHD. GHAZALI, PhD
Professor and Dean
School of Graduate Studies
Universiti Putra Malaysia

Date:

DECLARATION

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

JONATHAN TENG YI CHUON

Date: 2 MARCH 2011

TABLE OF CONTENTS