



UNIVERSITI PUTRA MALAYSIA

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

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**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

The image features a large, semi-transparent watermark of the Universiti Putra Malaysia (UPM) logo. The logo is a shield-shaped emblem with a red and white color scheme. At the top left, the letters 'UPM' are written in white on a red background. Below this, there is a stylized white 'U' shape. In the center, there is a white book icon. At the bottom, there are several vertical white lines of varying heights. The entire logo is set against a light grey background.

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

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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 health. 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
MENGUNAKAN SISTEM PENYOKONG KEPUTUSAN BERASASKAN
GIS: UPM-MUTIS**

Oleh

JONATHAN TENG YI CHUON

Mac 2011

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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 pendukung 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 automatik 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.

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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:

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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



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