



**UNIVERSITI PUTRA MALAYSIA**

***VISUAL INSPECTION OF HAZARDOUS TREES ASSESSMENT  
METHODS  
IN AMENITY FORESTS OF PENINSULAR MALAYSIA***

**HELMY TARIQ BIN OTHMAN**

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**By**

**HELMY TARIQ BIN OTHMAN**

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

**March 2017**

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

## VISUAL INSPECTION OF HAZARDOUS TREES ASSESSMENT METHODS IN AMENITY FORESTS OF PENINSULAR MALAYSIA

By

HELMY TARIQ BIN OTHMAN

March 2017

**Chairman : Associate Professor Mohd Nazre bin Saleh @ Japri, PhD**  
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Visual inspection to identify potential hazardous tree is a useful tool during tree inspections. Since amenity forests in Peninsular Malaysia have become popular and attract tourists for recreation activities, inspection for hazardous tree at amenity forest becoming crucial. Forest Department Peninsular Malaysia has produced guideline for inspection of hazardous tree that is based on International Society of Arboriculture (ISA) with modifications to adapt Malaysian forest conditions as well as department's requirement of tree assessments. The aims of this study are to (i) review and compare the results of tree hazardous assessment between two methods, FDPM method and ISA method and (ii) examine the number, structure and species as well as level of hazardous trees at selected amenity forests. Based on the results, 819 trees from the study areas were potentially hazardous. The trees were from 48 families, 99 genera and 144 species. At the tree family level, 29.67% of the trees were from Dipterocarpaceae. In term of individual species, *Syzygium syzygioides* is the most potential hazardous species in the study areas with 44 individuals followed by *Dryobalanops oblongifolia* and *Koombassia malaccensis*. Negeri Sembilan among other states and Ulu Bendol Amenity Forest among other amenity forests has shown to have the highest number of trees with potentially hazardous. Results also shown that from FDPM method, the level of hazardous trees in the study areas was rated as 7 to 9 whereas ISA method was rated as 6 to 8. FDPM and ISA method have showed to have similarity of pattern in resulting the potentially hazardous tree and concluded that FDPM method can be potentially applied on hazardous tree assessment in other amenity forests in Peninsular Malaysia.

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

## **PEMERIKSAAN SECARA VISUAL SEBAGAI KAEDAH PENILAIAN POKOK BERBAHAYA DALAM HUTAN LIPUR SEMENANJUNG MALAYSIA**

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Pemeriksaan secara visual merupakan kaedah yang berguna untuk mengenalpasti pokok bahaya. Sejak kawasan hutan lipur di Semenanjung Malaysia menjadi tumpuan ramai bagi melakukan aktiviti rekreasi, pengurusan pokok bahaya di kawasan hutan lipur menjadi suatu keperluan. Jabatan Perhutanan Semenanjung Malaysia telah menghasilkan garis panduan mengenai pengurusan pokok bahaya berpandukan kepada kaedah International Society of Arboriculture dengan pengubahsuaian mengikut kesesuaian keadaan hutan semulajadi dan keperluan jabatan. Kajian ini bertujuan untuk (i) menerangkan secara keseluruhan keputusan penilaian pokok bahaya yang diperolehi serta membandingkannya antara kaedah penilaian pokok bahaya JPSM dan kaedah penilaian ISA dan (ii) mendapatkan bilangan pokok, keadaan struktur pokok dan spesis pokok serta tahap bahaya pokok di kawasan hutan lipur terpilih. Keputusan kajian mendapati sebanyak 819 pokok bahaya telah dikenalpasti yang terdiri daripada 48 famili, 99 genus dan 144 spesis. Famili Dipterocarpaceae mencatatkan potensi bahaya tertinggi dengan merekodkan sebanyak 246 pokok daripada jumlah keseluruhan. Spesis *Syzygium syzygioides* daripada famili Myrtaceae merupakan spesis pokok bahaya tertinggi iaitu sebanyak 44 pokok diikuti oleh *Dryobalanops oblongifolia* dan *Koompassia malaccensis*. Negeri Sembilan antara negeri lain dan Hutan Lipur Ulu Bendol antara hutan lipur yang lain merekodkan bilangan pokok bahaya tertinggi. Berdasarkan pengiraan kaedah JPSM, tahap pokok bahaya adalah lingkungan skala 7 hingga 9, manakala bagi kaedah ISA, adalah lingkungan skala 6 hingga 8. Secara keseluruhannya, kaedah JPSM dan ISA menunjukkan kesamaan di dalam keputusan penilaian terhadap pokok bahaya dan dapat disimpulkan bahawa kaedah JPSM berpotensi untuk digunakan untuk penilaian pokok bahaya di kawasan hutan lipur yang lain di Semenanjung Malaysia.

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I certify that a Thesis Examination Committee has met on 30 March 2017 to conduct the final examination of Helmy Tariq bin Othman on his thesis entitled "Visual Inspection of Hazardous Trees Assessment Methods in Amenity Forests of Peninsular Malaysia" 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 the Master of Science.

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## CHAPTER 1

### INTRODUCTION

#### 1.1 General Background

In Peninsular Malaysia, forest for recreational is called amenity forests and managed by Forestry Department Peninsular Malaysia (FDPM). The forest is in Permanent Reserved Forest (PRF) and is gazetted for recreational activities, research and education as well as preserving the flora and fauna (FDPM, 2005). The forest is also a forest that designated and equipped with facilities to attract visitor (WWF Malaysia, 1995). Amenity forest was conceptualised for public use during the First Malaysia Plan (Yahya, 1999). To date, FDPM has developed and managed a total of 124 areas of amenity forest within PRF (FDPM, 2014). These amenity forests have attracted many local and foreign tourists to enjoy the beauty of nature while performing their recreation activities (Siwar *et al.*, 2011), and within the year of 2010-2014, the numbers of visitors fluctuate within 5 million (Table 1.1). In most areas, FDPM has provided some basic facilities to do recreational activities such as toilets, camp sites, resting house, chalets and car parks.

**Table 1.1: Number of tourists visited states amenity forest in Peninsular Malaysia from the year of 2010- 2014**

State	No of Amenity Forest	No. of visitors				
		2010	2011	2012	2013	2014
Pahang	28	190,560	172,122	302,963	2,025,593	254,865
Kelantan	3	1,251,119	1,175,428	242,760	180,755	199,869
Terengganu	11	100,862	69,962	100,814	244,243	169,079
Johor	8	382,026	32,141	30,618	268,739	28,947
Melaka	4	551,768	425,866	568,331	30,017	606,964
Negeri Sembilan	11	650,731	1,165,829	1,894,168	598,339	1,516,669
Selangor	10	407,335	398,803	441,038	506,715	568,508
Perak	16	251,603	283,987	357,968	555,622	290,682
Kedah	27	396,134	324,292	369,741	139,519	930,587
Penang	2	604,265	558,879	548,321	426,727	520,231
Perlis	3	879,893	419,634	465,488	332,968	290,192
Kuala Lumpur	1	31,445	24,726	10,048	2,402	2,504
<b>Total</b>	<b>124</b>	<b>5,697,732</b>	<b>5,042,669</b>	<b>5,332,258</b>	<b>5,311,639</b>	<b>5,379,097</b>

Source: FDPM, 2014

Amenity forests have been considered as an important element for nature-based tourism (Bucklye, 2009). And based on numbers of visitors, it has proved that nature based recreation area is significant among tourist either from local or foreign in Peninsular Malaysia. Because of that, amenity forest could be a significant asset for ecotourism industry in Malaysia (Nurhafizah *et al.* 2013).

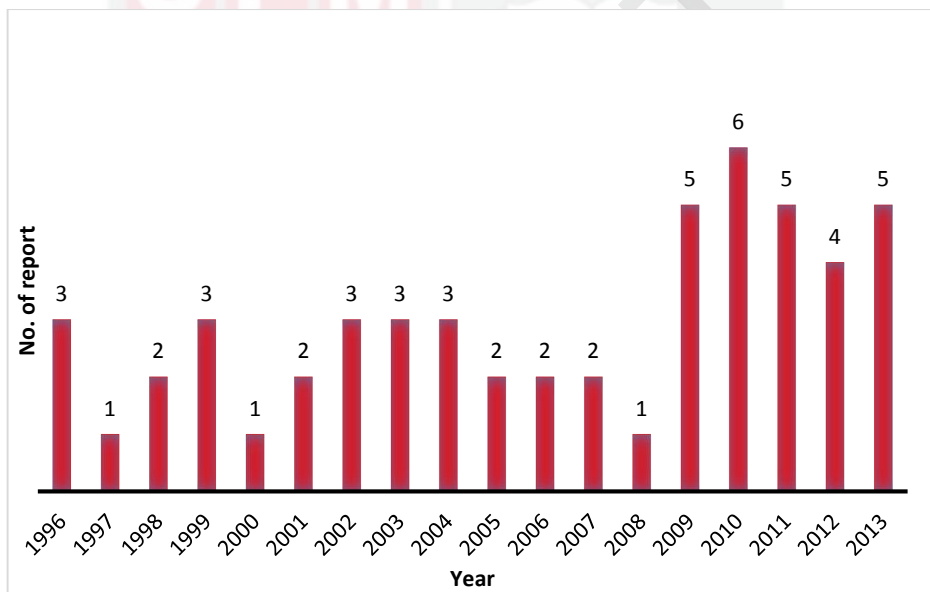
Hence, it is important for amenity forest to have safe environment and in particular, a risk management plan arise from hazardous trees. Most of the facilities in the amenity forests were built within trees that grow naturally in the area. Therefore, in this study, some popular amenity forests of Peninsular Malaysia have been selected for hazard trees assessment. Property damage, personal injury and fatality caused by the potential hazard trees are some of the effect in the event of failure from all, or partial part of trees (Angwin *et al.*, 2012). Trees in the forests may have different types of species, conditions, age and sizes and trees are vulnerable to defects by pests and diseases due to environmental factors that can cause stress and can give risks that would cause damages to property and also gives injuries (Yaman *et al.*, 2008).

To date, different methods of tree risk assessment have been developed to guide the tree assessor during inspection processes. In North America, three types of risk assessment methods have been used by professionals in conducting tree risk assessment (Andrew *et al.*, 2013); i) International Society of Arboriculture (ISA) Tree Hazard Evaluation Method; ii) United States Department of Agriculture (USDA) Forest Service Community Tree Risk Evaluation Method; and iii) ISA Tree Risk Assessment Best Management Practice (BMP) method. These methods were served to provide as written records of the assessment and any prescribed risk abatement measures to be taken, besides to ensure a standardized of data collection. Andrew *et al.* (2013) also mentioned that differences existed between those three methods, and these informations act as additional information that may make a particular method stand out to users and cater their needs.

In Peninsular Malaysia, FDPM has produced their own guideline for tree hazard management in amenity forests entitled "*Guideline on Management of Hazard Trees in Forest Park and State Park of Peninsular Malaysia*" with the aim of guiding amenity's forest managers on evaluating and managing hazard trees (FDPM, 2012). The hazard assessment used by FDPM is largely based on ISA of Matheny and Clark (1994) with some modifications to adapt Malaysian forest conditions and department requirements of tree assessments.

## 1.2 Problem Statement

Incident of falling tree or any part of trees such as branches in urban area in Malaysia is reported after thunderstorm or during rainy season. The event usually ends up with loss or damaged of properties or vehicles, in some cases with injuries and loss of life. Based on a collection of local newspapers cutting from the years of 1996 until 2013, five (5) cases of falling trees were reported every year in Peninsular Malaysia. Figure 1.1 below shows the trend of accidents and fatality in the urban area due to fallen trees or branches. From 2009 until 2013, the figures of cases of falling trees show significantly increased in incidents but no detailed explanation or analysis could be obtained but most trees were found not evaluated by the relevant authorities for their potential risk or hazard.



Source: Bernama Online

**Figure 1.1: Numbers of reported incident of falling tree and branches in Peninsular Malaysia from 1996-2013.**

At the moment, published data on hazardous trees in amenity forest of Peninsular Malaysia is non-existent, although cases that involved incident due to fallen trees or branches is sometimes reported by the forest rangers (verbal communication). Because of that, study on hazardous tree in amenity forest is vitally important to provide information on potential hazardous tree and output from this study can be used by the amenity forest management to find a suitable plan to ensure public can have a safe natural environment to do recreation.

Hazard assessment published by FDPM (*Guideline on Management of Hazard Trees in Forest Park and State Park of Peninsular Malaysia*) is so far never been tested, compared with other standard assessment method such as by ISA. Because of that, this study will then conduct the assessments based on two methods by ISA and FDPM.

### **1.3 Objectives**

Hazardous trees assessments that were conducted at selected amenity forests in Peninsular Malaysia were based on the objectives as stated below: -

- a. to examine the number of trees and species that were potentially hazardous and tree parts that were caused the tree to become hazardous,
- b. to know the level of hazardous trees in the Peninsular Malaysia namely; northern area (Penang and Kedah), east coast area (Terengganu), central area (Melaka and Negeri Sembilan) and southern area (Johor), and
- c. to review and find differences of tree hazardous assessment between two methods, FDPM Hazardous Tree Assessment Method and International Society of Arboriculture (ISA) Tree Hazard Evaluation Method.

### **1.4 Organization of the Thesis**

This study is divided into five chapters with the first chapter as written above. The second chapter will give general background of hazardous assessment, the characteristic of the potential hazardous trees, species that generally easily become hazardous and also the tools and technologies that can be applied during hazardous tree assessments. The third chapter explained the methods used in this study and chapter four discussed the results of the study. Lastly, chapter five gave conclusion remarks from this study and recommendations for future improvement.

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