UNIVERSITI PUTRA MALAYSIA

WILDLIFE ROADKILL INVOLVING NATIVE MAMMALS IN PENINSULAR MALAYSIA

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WILDLIFE ROADKILL INVOLVING NATIVE MAMMALS IN PENINSULAR MALAYSIA

By

MOHD EDINOOR ANUAR BIN SUKAMI

A Project Report Submitted in Partial Fulfillment of the Requirement for the Degree of Bachelor of Forestry Science in the Faculty of Forestry Universiti Putra Malaysia

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DEDICATION

This thesis is especially dedicated to my beloved

wife and daughter

(Sharoniza Binti Shaidin and

Nur Anis Saffiyah Binti Mohd Edinoor Anuar)

My family

&

All my friends

Thank you for your encouragements supports

and the sacrifices that you have given.

Thank you very much and may ALLAH S.W.T bless you.

ABSTRACT

In Peninsular Malaysia, wildlife roadkill is a minor case and rarely happen. However, it can become a serious threat with the occurrence of wildlife habitat fragmentation. This study will help to view on the effect of wildlife roadkill involving native mammals in Peninsular Malaysia. Two main objectives of this study were to assess the effect of roadkill to the two types of roads which have been classified as plantation road and non-plantation road. The second objective was to compare the number of mammals killed according to the three categories of mammals which are big-sized mammals, medium-sized mammals and large-sized mammals. This study is based on the wildlife roadkill database collected by Department of Wildlife and National Park (DWNP) Peninsular Malaysia starting from the year of 2010 to 2014. Throughout the period, it was reported that total 605 killed of mammals resulting from roadkill. Out of that figure, 159 (26%) were recorded killed in plantation road while 449 (74%) were killed at non-plantation road. The result shows that the total number of mammals found killed on plantation road (mean ± standard error = 1.926 ± 0.03755) is significantly higher than (f-value = 67.01; p-value < 0.001) on the non-plantation road (mean ± standard error = 1.111 ± 0.01551). Result comparison between three type of mammals shows that the mean value for medium-sized mammals is 0.815 with a range of (0,8587, 0,9471), followed by big-sized mammals with a mean value of 0.047 with a range of (0,1735, 0,2619) and the least is the small-sized mammals with a mean value of 0.0002 with a range of (-,0310, 0,0574). The confidence interval used is at 95%. Based on the current situation of the surrounding habitat, wildlife population in Peninsular Malaysia and previous research conducted in other countries, it was found that the main reason that causes mammalian wildlife roadkill is because of habitat fragmentation. Habitat fragmentation involves the change of land use from the forested area to development and plantation area. Because of that, the mammals home range and their territory are disrupted and become limited. The existence of a high population of medium-sized mammals in Peninsular Malaysia is the main factor which causes the number of roadkill for this category to be the highest among the three categories. Overall, the type of roads is able to influence the rate of wildlife mammals roadkill. The aspect of road infrastructure facilities should be improved in order to reduce cases of wildlife mammals roadkill in Peninsular Malaysia.

ABSTRAK

Di dalam elemen pengurusan hidupan liar di Semenanjung Malaysia, kemalangan jalanraya diantara hidupan liar dengan kenderaan adalah perkara terpencil dan jarang berlaku. Namun, ia berpotensi menjadi ancaman serius dengan berlakunya aktiviti pemecahan habitat hidupan liar. Oleh itu, kajian ini akan memberikan gambaran terhadap kesan kemalangan hidupan liar melibatkan biodiversiti mamalia hidupan liar di Semenanjung Malaysia. Dua (2) objektif utama kajian ini ialah menilai kesan kemalangan terhadap jenis jalanraya yang diklasifikasikan sebagai jalan perladangan dan jalan bukan perladangan serta membandingkan bilangan kematian mengikut tiga (3) kategori saiz mamalia (besar, sederhana dan kecil). Kajian ini berpandukan pengakalan data kemalangan hidupan liar yang dikumpul oleh Jabatan PERHILITAN Semenanjung Malaysia dari tahun 2010 hingga 2014. Sepanjang tempoh tersebut, sebanyak 605 individu mamalia dilaporkan mati akibat daripada kemalangan jalanraya. Daripada jumlah tersebut, 159 individu (26%) dicatatkan mati di jalanraya perladangan manakala 446 individu (74%) mati di jalanraya bukan perladangan. Hasil analisis kajian ini menunjukkan bahawa jumlah mamalia yang mati di jalanraya perladangan (*mean* ± *standard error* = 1.926 ± 0.03755) adalah jauh lebih besar daripada (*f-value* = 67.01; *p-value* < 0.001) yang mati di jalanraya bukan perladangan (*mean* ± *standard error* = 1.111 ± 0.01551). Hasil analisis perbandingan kematian mengikut tiga (3) saiz kategori mamalia pula membuktikan bahawa nilai min bagi mamalia saiz sederhana adalah 0.815 dengan julat (0,8587, 0,9471), diikuti saiz mamalia besar nilai min 0.047 dengan julat (0,1735, 0,2619) dan yang paling rendah ialah kategori mamalia kecil nilai min 0.0002 dengan julat (-,0310, 0,0574). Semua selang keyakinan adalah pada skala 95%. Berdasarkan situasi semasa persekitaran habitat serta populasi hidupan liar di Semenanjung Malaysia dan merujuk kajian yang telah dijalankan di negara-negara lain, punca utama berlakunya kematian mamalia hidupan liar di jalanraya adalah disebabkan pemecahan habitat daripada kawasan hutan kepada kawasan pembangunan dan kawasan perladangan. Disebabkan itu, *home range* dan *territory* mamalia akan terganggu serta menjadi terhad. Kewujudan populasi kategori mamalia saiz sederhana yang tinggi di Semenanjung Malaysia adalah faktor utama yang menyebabkan bilangan kematian bagi kategori tersebut menjadi tinggi. Secara keseluruhannya, dapat dilihat bahawa jenis jalanraya boleh mempengaruhi kadar kemalangan melibatkan mamalia hidupan liar. Aspek penyediaan kemudahan jalanraya perlu dipertingkatkan bagi menggurangkan kejadian kemalangan hidupan liar di Semenanjung Malaysia.

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APPROVAL SHEET

I certify that this research project report entitled "WILDLIFE ROADKILL INVOLVING NATIVE MAMMALS IN PENINSULAR MALAYSIA" by Mohd Edinoor Anuar Bin Sukami has been examined and approved as a partial fulfilment of the requirements for the Degree of Bachelor of Forestry Science in the Faculty of Forestry, Universiti Putra Malaysia.

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Date: 26 May 2016

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CHAPTER 1

INTRODUCTION

1.1 General Background

It is undeniable that the existence of road networks has caused the death of wildlife due to collisions with vehicles on the roads. Roads create a myriad of problems to wildlife as it breaks up its population by creating a barrier in between them as well as isolating them from essential food and shelter. Animal species are vulnerable to roadkill because of a range of factors such as mobility, habitat specificity, reproductive rate, resource needs and space use (Forman et al., 2003). Impact of wildlife accidents is of concern as it may disturb the stability and sustainability of wildlife populations in an area. This is especially true considering the fact that around the world there is an increasing amount of motor vehicles utilizing the roads each year. An estimated one million vertebrates per day are killed on roads in the United State (Forman & Alexender 1998). In Florida, collision of wildlife with motor vehicles is a major cause of mortality of the endangered Florida Panther accounting for 49% of the documented deaths (Maehr et al., 2002). In Africa, endangered species such as the African elephant, African lion and wild dog are always killed by vehicles (Drews, 1995). Asian region has also recorded accidents involving wildlife. In Sariska Tiger Reserve, Rajasthan, one tiger and two leopards were killed by highway traffic in a year and several leopards in a two-month period in Corbett National Park, Uttar Pradesh (Gruisen, 1998). In Malaysia, the occurrence of

wildlife accidents has also been recorded. For example, on February 25, 2013, an adult male Malayan tapir (*Tapirus indicus)* was found dead at KM 11.1 Batu Arang Road near Cerakah Hill Forest Reserve, Selangor. The animal is believed to have been seriously injured in the body and head, and has its legs broken after being dragged by a vehicle (MStar, 2013). With the growing road network, it is therefore a challenge in terms of conservation for each country in the world as there is an increase in the death of the wildlife due to the collision with moving vehicles on the roads.

1.2 Definition

1.2.1 Wildlife roadkill

Wildlife roadkill means a collision on the road involving moving vehicles and a wildlife that causes its death.

1.2.2 Mammal

Mammal is a class of vertebrates, distinguished by the possession of mammary glands in the female and having hair on the body. It is a warm-blooded vertebrate animal of a class that is distinguished by the possession of hair or fur, the secretion of milk by females for the nourishment of the young, and (typically) the birth of live young (Burton, 1993).

1.2.3 Small-sized mammals

In this study, the average weight for small-sized mammals is classified as 3 kg and below. Examples of small-sized mammals wildlife are those of Order Insectivora (Family: Erinaceidae, Talpidae, Soricidae) and Order Rodentia (Family: Sciuridae, Rhizomyidae, Muridae) (Khan, 2012).

1.2.4 Medium-sized mammals

In this study, the average weight for medium-sized mammals is classified as above 3 kg and below 20 kg. Examples of medium-sized mammals wildlife are those of Order Carnivora (Family: Viveridae, Mustelidae), Order Primate (Family: Cercopithecidae, Hylobatidae, Lorisidae) and Order Pholidota (Family Manidae) (Khan, 2012).

1.2.5 Big-sized mammals

In this study, the average weight for medium-sized mammals is classified as 20 kg and above. Examples of big-sized mammals wildlife are those of Order Perissodactyla (Family Tapiridae), Order Carnivora (Family: Canidae, Felidae), Order Artiodactyla (Family: Suidae, Cervidae) and Order Proboscidea (Family Elephantidae) (Khan, 2012).

1.2.6 Plantation Road

Plantation road refers to a road network in plantation areas (mainly oil palm plantation and rubber plantation). It owned such as by Felda Global Ventures,

Federal Land and Consolidation and Rehabilitation Authority (FELCRA), IOI Corporation Berhad, Hap Seng Plantations Holdings Berhad, Kulim (Malaysia) Berhad, Sime Darby Plantation Sdn. Bhd. and also involves monoculture smallholdings. Plantation road also refers to the network of roads located between the plantations separated by the roads, or only the one side of the road to have plantation crop. The roads include paved or unpaved roads. Traffic at plantation road is less busy.

1.2.7 Non-plantation Road

Non-plantation road refers to the network of main roads in Peninsular Malaysia, apart from the plantation road. It includes the Federal Roads, State/ Domestic Roads, Municipal Roads and Rural Roads. Usually a paved road. In most instances a normal road has a heavy amount of traffic.

1.3 Problem Statement

Wildlife roadkill is one of the contributing factors in the death of wildlife in Peninsular Malaysia. According to the Department of Wildlife and National Park (DWNP), there has been a significant increase in wildlife mortality due to road accidents. Based on the records, there were 27 species of mammals killed from year 2006 until 2009, killing a total of more than 350 dead wildlife mammals to date. The statistic is expected to rise every year as the trend of increasing use of

vehicles in Malaysia, followed by the loss and fragmentation of wildlife habitat which is also increased in numbers.

As of today, no scientific information about wildlife roadkill in Peninsular Malaysia has been published in tackling or at least, identifying the factors which might have caused the accidents. There is also no scientific information regarding the types of roads involved in wildlife roadkill, and of the size of the animal that is often involved in these accidents. Conversely a number of research papers have been published regarding this issue abroad. For example in Netherland, it has been estimated that as many as 159,000 birds and 653,000 mammals have been involved in roadkill within a period of one year (Forman & Alexander, 1998). Another example of a long-term study of wildlife roadkill which took place near wetlands in Lake Erie, Ontario, located in eastern North America recorded that 625 snakes and 1700 frogs had died within a kilometre per annum (Ashley & Robinson, 1996). Therefore, it is very important to conduct a local study to determine the species of wildlife and the type of road frequently involved in the occurrence of wildlife roadkill in Peninsular Malaysia.

Due to the expansion of the oil palm industry, plantation roads have been built to accommodate the logistic necessity of the industry and also used by the public as the main route to a particular area. The construction of plantation roads is expected to be the leading factor in the rise of wildlife roadkill in Peninsular Malaysia. In the developing world, 109 hectares of natural surrounding habitats,

an area approximately equal to that of all the planet's remaining tropical rainforest might be cleared for agriculture by 2050 (Tilman et al., 2001). It is a right gesture to expect that many of the instances whereby a wildlife roadkill would take place on or within the vicinity of plantation areas. Accordingly, the agency that manages the wildlife must taking measures to reduce accidents involving wildlife. Every step taken by the management includes taking into consideration the type of roads and mammals species frequently involved in the roadkill accidents. This is important because the occurrence of wildlife roadkill can be measured in both abiotic and biotic component. In addition, a range of road construction according to the function can cause direct destruction and removal of existing ecosystems such as native mammals species (Coffin, 2007).

1.4 Aim and Objectives

The aim of this study was to determine the effect of wildlife roadkill on mammalian biodiversity in Peninsular Malaysia. The objective of this research is:

1. To determine the effect of road type (plantation road and non-plantation road) on the number of wildlife roadkill involves:
    i. Total mammals abundance.
    ii. Total number of big-sized mammals.
    iii. Total number of medium-sized mammals.
    iv. Total number of small-sized mammals.

2. To compare the number of roadkill among big-sized mammals, medium-sized mammals and small-sized mammals.

1.6 Expected Outcome

Expected outcome of this research is:

1. Wildlife roadkill (involving three types of mammals size) more frequently takes place on the plantation road compared to the normal roads because the location of plantation areas in Peninsular Malaysia mostly located in rural areas and connected with the forest; minimal number of predators in the plantation area; and high population of the medium mammalians wildlife in the plantation area.
2. Medium-sized mammals are the most frequently mammals affected in the accidents compared to big-sized mammals and small-sized mammals because the existence of high population on medium-sized mammals wildlife in Peninsular Malaysia and their limited home range.

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