



***ACOUSTIC ACTIVITY PATTERN OF BIRDS IN AYER
HITAM FOREST RESERVE, SELANGOR***

KENNY LAU KIN SHOON

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KENNY LAU KIN SHOON

**FACULTY OF FORESTRY
UNIVERSITI PUTRA MALAYSIA**

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**ACOUSTIC ACTIVITY PATTERN OF BIRDS IN AYER
HITAM FOREST RESERVE, SELANGOR**



By

KENNY LAU KIN SHOON

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

2018

SPECIALLY DEDICATED

TO MY BELOVED PARENTS,

LAU KIAM CHOY & NG YEN LING

MY GRANDPARENTS,

LAU YEE & YOONG LAN MOI

MY BROTHERS,

JEFFREY LAU KIN FEI

DAVID LAU KIN HAO

JASON LAU KIN XUAN

SUPERVISOR,

DR PUAN CHONG LEONG

AND FRIENDS.

ABSTRACT

Acoustic method has increasingly being used in the tropics to survey forest birds. This study was conducted to examine bird acoustic activity pattern in relation to distance to forest edge, microclimate factors as well as different survey periods in the Ayer Hitam Forest Reserve, Selangor. Sound recording was made at six transects that were spaced 400m apart and at a distance of 100m, 200m, 300m to 400m from the forest edge. Over a total of 19 days from 10th July to 26th July 2017, 90 different bird species were recorded. A Kruskal-Wallis H test found that there were no significant differences in the number of species recorded at different distances from the forest edge. Results from the Mann-Whitney test showed a significant difference in the number of bird species called in the morning and afternoon. A Spearman correlation test found that there was a significant correlation with respect to the number of bird species recorded and temperature as well as light intensity. Acoustic activities of birds were mostly recorded during the morning session when the temperature and light intensity were low. Results from this study can aid in improving forest bird survey using vocalization in the future.

ABSTRAK

Kaedah akustik telah semakin banyak digunakan di kawasan tropika untuk meninjau burung hutan. Kajian ini dijalankan untuk menentukan hubungan antara corak aktiviti akustik burung dan jarak dari pinggir hutan, faktor iklim mikro serta masa kajian yang berlainan di Hutan Simpan Ayer Hitam, Selangor. Teknik rakaman bunyi dibuat di enam transek dengan jarak 400m antara satu sama lain serta pada titik pensampelan sejauh 100m, 200m, 300m ke 400m dari pinggir hutan. Dalam tempoh 19 hari dari 10 Julai hingga 26 Julai 2017, sebanyak 90 spesies burung yang berbeza telah direkodkan. Ujian Kruskal-Wallis H mendapati bahawa tiada perbezaan yang ketara bagi bilangan spesies burung yang direkodkan pada jarak yang berbeza dari pinggir hutan. Ujian Mann-Whitney menunjukkan perbezaan yang ketara antara bilangan spesies burung yang dikesan melalui bunyi pada waktu pagi dan petang. Ujian korelasi Spearman mendapati terdapat korelasi yang ketara antara bilangan spesies burung yang dicatatkan dan suhu serta keamatan cahaya. Aktiviti akustik burung kebanyakannya direkod pada sesi pagi apabila suhu dan keamatan cahaya adalah rendah. Hasil daripada kajian ini dapat membantu dalam memperbaiki kaedah tinjauan burung hutan menggunakan bunyi pada masa akan datang.

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Last but not least, my affectionate thanks go to my beloved family for their moral support, caring and blessing throughout this long process.

APPROVAL SHEET

I certify that this research project entitled “Acoustic Activity Pattern of Birds in Ayer Hitam Forest Reserve, Selangor” by Kenny Lau Kin Shoon has been examined and approved as a partial fulfillment of the requirements for the degree of Bachelor of Forestry Science in the Faculty of Forestry, Universiti Putra Malaysia

Dr. Puan Chong Leong
Faculty of Forestry
Universiti Putra Malaysia
(Supervisor)

Prof. Dr. Mohamed Zakaria Hussin
Dean
Faculty of Forestry
Universiti Putra Malaysia

Date: January 2018

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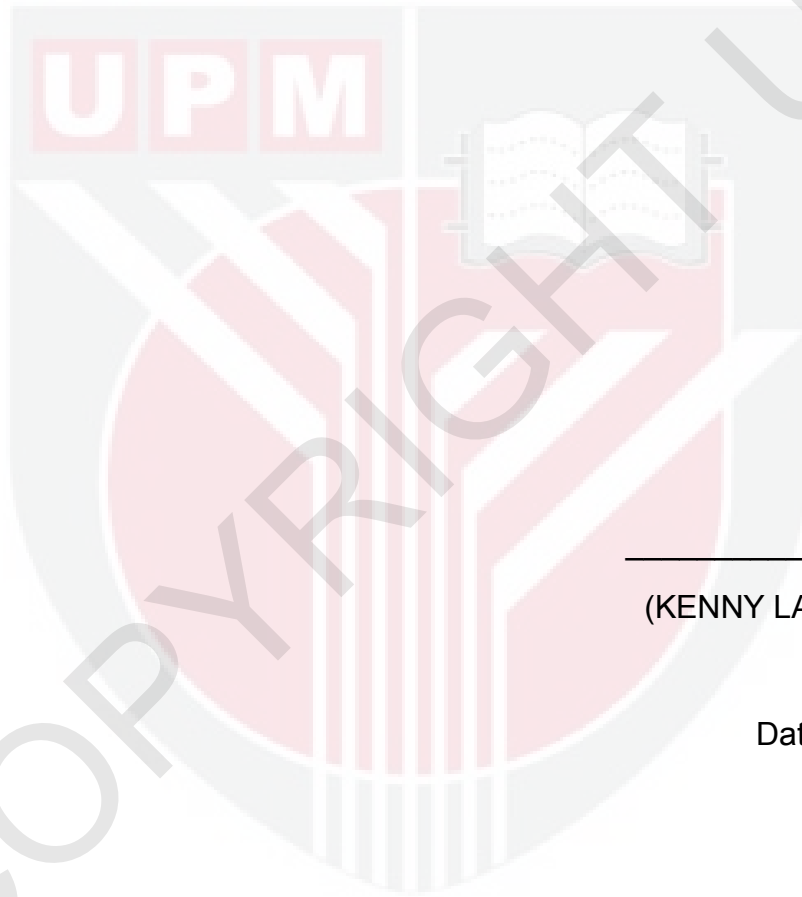
LIST OF ABBREVIATIONS

Symbol	Description
AHFR	Ayer Hitam Forest Reserve
m	metre



PUBLICATION OF THE PROJECT UNDERTAKING

This is to certify that I have no objection to publish the project entitled “Acoustic Activity Pattern of Birds in Ayer Hitam Forest Reserve, Selangor” by the supervisor in a joint authorship. However, it has to be evaluated by the Faculty of Forestry, Universiti Putra Malaysia and published in the form approved by the Faculty.



(KENNY LAU KIN SHOON)

Date: January 2018

CHAPTER ONE

INTRODUCTION

1.1 Background

The increase in human population has led to a vast urban development and the increase in land use. As of 2016, an estimated 54.5% of the world's population lived in urban settlements. By 2030, urban areas are projected to house 60% of people globally (United Nations, 2016). In order to provide urban settlements, forests are harvested to provide building materials and land spaces. The land spaces are normally converted to farm lands, pasture for livestock, plantations and other forms of land uses. Forest as one of the most important terrestrial ecosystems, offers timber services, fresh water and carbon storage. As a result of forest conversion, wildlife habitats have been disturbed without exception. Due to the disturbance from natural disasters and human activities, forest loss or forest degradation have become more and more severe over the last five decades. They have changed forest ecosystems with respect to composition, structure and functional processes. Deforestation causes by humans result a decline in biodiversity (Nilsson et al., 2001) and in another word, causes the extirpation of plant and wildlife species. Throughout these years, deforestation has led to changes in the environment and one of the results is the decrease in the number of bird species found throughout the world. The most intensive deforestation occurs in tropical rainforests (Bradford, 2015). Tropical forests face a great challenge to global biodiversity conservation as they suffer from

destruction and degradation by human activities at exceptional rates (Morris, 2010).

Environmental changes are often continuous processes of strongly fluctuating factors. This cannot be measured by one single observation using chemical and physical methods because these two methods may be too time-consuming and costly. Biotic factors are living components of an ecosystem and they have a close relation with the abiotic factors which are the environmental conditions. Thus, such interactions allow us to gain the information of environment by observing the condition of biotic factors. Specifically, biological indicators are species which are sensitive to human associated disturbance to the environment. Each species is associated with its own niche where the niche is expressed by the surrounding condition (Morrison, 1986). There are many biotic indicators to determine the environment changes. However, birds are said to be one of the effective indicators in monitoring the environment. Birds are useful biological indicators as they are sensitive to broad-scale changes and environment contaminants. Morrison (1986) highlighted the validity of birds as environmental indicators despite of the problems encountered in monitoring bird populations.

The earth is characterized by dynamic climatic patterns and weather conditions. Some of these conditions are in short-term such as hurricane and drought and some are in long-term such as greenhouse effect. Each of these conditions may affect animal populations directly or indirectly through changes in habitat quality. Such changes may alter the amount of habitat available or may alter qualitative measure of the environment. Although birds respond to quantitative and qualitative changes in their environment, birds somehow respond to the secondary changes which are the effect of primary factors over time (Morrison, 1986). Will birds face extinction in one day?

Birds call for various reasons to survive such as communicating with their members in a group, attracting mates, defending their territories and competing with rivals. Each acoustic signal from a species carries individual information. Previously, the study on birds required individual assessment by capturing or observing. However, it requires man-power and it is time-consuming. Such method may cause stress and injuries to the animals. However, variations of acoustic activities can facilitate the identification and monitoring of individual animals within a population in ecological studies (McGregor, 1998; McGregor et al., 2000). The assessment of bird vocalizations may also be employed in biodiversity conservation measures.

One of the biggest threats to biodiversity is the edge effects, especially in isolated and fragmented habitats. Habitat disturbance creates core and edge habitats, altering the microclimate as well as allowing easy accessibility of invasive species and predators. Human activities lead to loss in forest cover and create forest islands within a fragmented landscape. Forest edges are becoming more abundant in many regions around the globe because of the loss of forests arising from human activities, including settlement, agriculture, resource extraction, and timber harvesting. Negative effects of forest edge creation have since become apparent, including structural damage to the habitat (Laurance et al., 1998) and this has affected the breeding success of songbirds (Gates & Gysel, 1978) at forest edges. The influence of forest edges on bird species and communities has received considerable attention recently, as forest fragmentation and the resulting edge effects have been linked to high rates of nest predation (Small and Hunter, 1988; Yahner and Scott, 1988; Rudnicky and Hunter, 1993) and population decline in several species (Robinson et al., 1995). Species loss occurred due to habitat isolation and fragmentation as there is no connectivity between the forests. It affects gene flow and maintenance of genetic diversity as well as movement of migratory species while preventing access to multiple habitat types needed for different life stages of certain organisms. The Ayer Hitam Forest Reserved (AHFR) is surrounded by urban development and it is experiencing effects of habitat isolation and fragmentation as the forest is getting smaller and smaller creating more forest edges.

1.2 Problem Statement

Loss of interior forest was due to changes in human land use in some cases. Using global tree cover data, scientists found that the rate of loss of the interior forest was three times greater than the net loss of global forest. The researchers looked at changes in land patterns for different biomes and ecological systems. Generally, it was found that interior forest was vanishing at a faster rate due to an increase in forest fragmentation, which divided forest and prevented it from functioning ecologically as interior forest. In Malaysia, large area of forested lands have been fragmented and degraded. Forest fragmentation and isolation have caused negative effects on wildlife. Certain species are sensitive to forest disturbance and they will avoid forest edges. Conservation implications of such studies are critical since recent studies have highlighted significant population declines in forest specialist birds, including long-distance migratory insectivores (Gregory et al., 2007; Vickery et al., 2014). On the other hand, the AHFR is a secondary logged over forest during 1990's and it is an isolated lowland dipterocarp forest which is surrounded by urban buildings and development. Thus, it is important to find out the remaining bird species that can still be found in this forest. The forest was gazetted as a Forest Reserve in 1906 with an area of 4270.7 hectares comprising 22 compartments. However, since the 1980's AHFR had been reduced to 1176.1 ha with only six compartments remaining. In addition, fragmentation of the forested land is still going on. Consequently, assessing the relationship between forest fragmentation or creating of forest edges and bird species richness in AHFR is important.

On the other hand, mist-netting is often laborious and time-consuming. It is also an invasive method to the individuals captured. Moreover, many birds move in the canopy. This means that mist-netting is only targets on terrestrial and understory birds. This makes the data collected only represent certain proportion of the bird communities in the forest. In the case of direct observation, it requires knowledge on identification of bird species. However, acoustic studies on birds serve as an alternative way to mist-netting and visual survey. Through the acoustic survey of birds, the vocalizations of birds can be recorded from a distance. This solves the problems dealing with limitations of our view, identifying bird species on-sites, as well as reducing the need of catching birds. In addition, the recordings obtained can be kept for further identification and analysis purposes in the future.

1.3 Objectives

The main objective of this study was to examine the acoustic activity pattern of birds in Ayer Hitam Forest Reserve, Selangor.

The specific objectives were:

- a) To examine the vocalization activities of birds in relation to distance from forest edge.
- b) To determine the relationship between bird acoustic activities and microclimate factors, and
- c) To compare the acoustic activities of birds in the morning and afternoon.

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