EFFECTS OF HABITAT TYPES, VEGETATION STRUCTURE AND PROXIMITY TO FOREST ON FARM LAND BIRD SPECIES RICHNESS AND ABUNDANCE

LIJAN JOHN ANAK AHMUI

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By

LIJAN JOHN ANAK AHMUI

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DEDICATION

This study is dedicated to my family and friends

Thank you for your encouragements and supports

ABSTRACT

Conversion of tropical forest for agricultural purposes is generally assumed to seriously threaten the survival of avian species and their habitats. Impoverished habitat quality in the matrix might influence the species composition within the agriculture areas through biotic homogenization. The aim of this study was to investigate the effects of habitat types, vegetation structure and proximity to forest on bird species richness and abundance in human-modified landscapes. Mist-nets were used to sample bird. A total of of 180 individual birds of 37 bird species representing 22 family were captured in three habitats. The highest bird species richness was found in fruit orchard followed by oil palm and rubber plantations. Avian species richness and abundance was significantly influenced by canopy cover, tree density, proximity to forest, habitat type and month. The number of tree, habitat type and month were also important predictor for total bird body weight. The findings suggested that protection of remnant forests should be prioritized to conserve bird diversity. Appropriate landscape design and habitat management could improve functional diversity in agricultural landscapes in the tropics.

ABSTRAK

Penukaran hutan tropika untuk tujuan pertanian pada umumnya dianggap serius hal ini kerana ianya mengancam kelangsungan spesies burung dan habitatnya. Kualiti habitat yang lemah dalam matriks akan mempengaruhi komposisi spesies dalam kawasan pertanian melalui homogenisasi biotik. Tujuan kajian ini adalah untuk mengkaji kesan jenis habitat, struktur tumbuh-tumbuhan dan jarak hutan ke atas kekayaan spesies burung dan banyaknya di dalam landskap yang diubahsuai oleh manusia. Jaring kabut digunakan untuk menangkap burung. Sejumlah 180 individu burung dari 37 spesies burung yang mewakili 22 famili ditangkap di tiga habitat. Bilangan spesies burung paling banyak ditangap dalam kebun buah diikuti ladang kelapa sawit dan getah. Bilangan spesies dan individual burung di pengaruhi oleh penutapan kanopi, kepadatan pokok, jarak hutan, jenis habitat dan bulan. Bilangan pokok, jenis habitat dan bulan juga merupakan ramalan penting bagi jumlah berat badan burung. Penemuan kajian ini menunjukkan bahawa perlindungan hutan perlu diberi keutamaan untuk memulihara kepelbagaian burung. Reka bentuk landskap yang sesuai dan pengurusan habitat dapat meningkatkan kepelbagaian fungsional dalam landskap pertanian di kawasan tropika.

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APPROVAL SHEET

I certify that this research project report entitled **"**Effects of Habitat Types, Vegetation Structure and Proximity to Forest on Bird Species Richness and Abundance" by Lijan John anak Ahmui 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.

Dr. Badrul Azhar Md. Sharif

Faculty of Forestry

Univeristi Putra Malaysia

(Supervisor)

Prof. Dr. Mohamed Zakaria Bin Hussin

Dean

Faculty of Forestry

Universiti Putra Malaysia

Date: June 2019

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

1.1 General background

Humankind has a long history of converting forest to other land uses. Forest conversion is a dramatic process where natural forest landscapes are replaced by other land uses, affecting their habitat and biodiversity. Global Forest Resources Assessment 2015 (FAO, 2015) reported that the global forest area has fell from 4.128 billion hectares to just under 3.999 billion hectares in the year 1990–2015. This is a change from 31.6 percent of global land area in 1990 to 30.6 percent in 2015. 50 percent of the world species can be found in tropical forest. This make the tropical forest the most bio diverse terrestrial habitat in the world (Dirzo and Raven 2003; Wright 2005). FAO and JRC (2012) reported tropical forest lost roughly 68,000 km^2 annually and each year only 3% (2000km^2) of the forest will increase (Hansen et al. 2013). In Asia, conversion of forest area to oil palm plantation are the major driver of the deforestation (Koh and Wilcove 2007; Fitzherbert et al. 2008).

Chazdon et al. (2009) stated that most protected areas in tropical countries are surrounded within a matrix of human-modified landscapes. This makes biodiversity in such regions likely to be influenced by surrounding human activities. Therefore, attention has been paid to understand he roles and effects

of human modified landscapes surrounding tropical forests in the conservation of forest biodiversity within and beyond protected areas (Chazdon et al. 2009; Gardner et al. 2009).

Conservation of forest biodiversity in human-modified landscapes is crucial in tropical forest. Malaysia is one of the world's biodiversity hotspots, here the opportunity to add forest protection areas is difficult and the current protection areas or national parks are surrounded with agricultural area and some of the national park are fragmented. In terms of birds, it is estimated that 742 species are present in Malaysia (NRE, 2009). Agroforests in human-modified landscapes play an important role to conserve biodiversity (Jose 2012; Bardhan et al. 2012).

Many studies used avian communities as indicators to examine the roles and effects of human-modified tropical landscapes in the conservation of forest biodiversity. This is because they are taxonomically well identified, easy to observe, sensitive to changes in habitat quality, and among the key players in ecosystem functioning by acting as pollinators, predators, seed dispersers, scavengers, and ecosystem engineers (Sekercioglu 2006; Tscharntke et al. 2008). Agroforests can support high levels of forest bird diversity if they are close to remnant forests (Naidoo 2004; Beukema et al. 2007), but less so if there is an absence of forests nearby (Thiollay 1995; Greenberg et al. 2000). Apart from

anthropogenic habitat type and proximity to natural forests, vegetation structure is also considered to be an important environmental factor determining bird diversity and composition (Sekercioglu 2002; Walther 2002).

1.2 Problem Statement

Conversion of tropical forest to agricultural purposes is generally assumed to seriously threaten the survival of avian species and their habitats. Skercioglu (2007) stated that less than one percent of world's bird species primarily prefer agricultural area, but nearly a third of all bird species occasionally use such habitat. Besides that, natural habitats adjacent to agricultural areas are often considered sources of species (avian) that provide beneficial regulating ecosystem services through cross-habitat spillover. To improve plantation management, we need to better understand bird communities of tropical agricultural lands and how they vary among different agricultural systems.

Conventional agriculture needs transformation – becoming biodiversity-friendly towards wildlife and protected reserves. This research being conducted to investigate the influences of all environmental factors (habitat type, vegetation structure, and proximity to forests) simultaneously on total bird species richness. Little research has being done in Malaysia to study farmland biodiversity so far. Study findings will be useful to stakeholders to improve farming practices.

1.3 Aim and Objectives

The aim of this study was to investigate the effects of habitat types, vegetation structure and proximity to forest on bird species richness in human-modified landscapes at Kampung Sungai Lalah, and Ulu Sepri, Pedas, Negeri Sembilan.

Three specific objectives were designed to meet this aim which are:

I. To determine bird species richness at three different habitats; palm oil, rubber plantation and traditional orchard plantation.

II. To examine stand- and landscape-level factors at three different agriculture habitats.

III. To examine the relationship of bird species richness with stand-/landscape-level factors.

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