

THE IMPACT OF DIFFERENT URBAN PARKS ON VEGETATION STRUCTURE, MICROCLIMATE AND INSECT COMMUNITIES

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THE IMPACT OF DIFFERENT URBAN PARKS ON VEGETATION STRUCTURE, MICROCLIMATE AND INSECT COMMUNITIES



By

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DEDICATION

For my beloved family: Ishak bin Agil

Siti Zahrah bte Hj Sohod

Also my siblings.

To all my friends, Faiz, Hafizul, Liyana, Fatin Asyilah, Fatin Afiqah, Meon

and Siti Wahdaniyah

Thank you for your encouragement support

And the sacrifices that you have given.

This project report is dedicated to my late grandmother who has been the strength for my struggle in completing this degree. Indeed, only god can repay all your kindness and sacrifices. I will always love you *Atok.*

Thank you for everything. May Allah Bless us all.

ABSTRACT

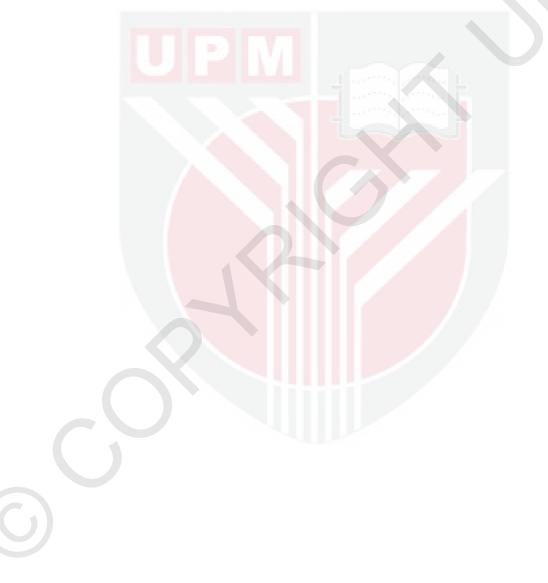
The opening of new areas for urban development has led to an increase of threatened habitat of insects due to changes of vegetation and thus introducing climate issues. The urban green spaces such as parks can provide ecosystem services such as microclimate mitigation and enhances the insect biodiversity. However, different types of urban park may have different vegetation structure and microclimatic condition thus may have different influence on the insect communities. Therefore, this study aimed to determine the influence of vegetation structure, microclimate and insect communities at different types of urban park. This study was conducted at three different park types of Taman Rimba Alam (Forest-based Park), Taman Saujana Hijau (Recreation-based Park) and Taman Warisan Pertanian (Orchard-based Park) in Putrajava. Insect sampling was done using yellow pan trap at 20 points for two weeks for each park. Vegetation structure of number of trees, number of shrubs, percentage canopy cover, percentage land cover and microclimate parameters of air temperature, relative humidty, solar radiation and wind speed were measured at each park. The findings showed that Taman Warisan Pertanian was significantly greater in insect abundance and richness implying that insect communities were more attracted due to the variety of fuiting trees (fruiting season), low in temperature and wind speed. However, Taman Rimba Alam showed significantly lower air temperature (up to 1.3°C) and solar radiation and higher relative humidity due to significantly greater canopy coverage compared to the other two parks. This study shows that types of park have influence on the vegetation structure, microclimate and insect communities. This study assists the urban forest managers and planners in the future planning in optimizing the ecosystem services of each park.

ABSTRAK

Pembukaan kawasan baru untuk pembangunan bandar telah membawa kepada habitat serangga yang semakin terancam kerana perubahan tumbuhtumbuhan dan dengan itu memperkenalkan isu-isu iklim. Kawasan hijau di bandar seperti taman boleh menyediakan perkhidmatan ekosistem seperti pengurangan iklim mikro dan meningkatkan biodiversiti serangga. Walau bagaimanapun, jenis taman bandar yang berbeza mungkin mempunyai struktur tumbuh-tumbuhan yang berbeza dan keadaan iklim mikro mungkin mempunyai pengaruh yang berbeza terhadap komuniti serangga. Oleh itu, kajian ini bertujuan untuk menentukan pengaruh struktur tumbuhan, iklim mikro dan komuniti serangga di taman bandar yang berbeza. Kajian ini dilakukan di tiga taman jenis Taman Rimba Alam, Taman Saujana Hijau dan Taman Warisan Pertanian di Putrajaya. Pensampelan serangga dilakukan menggunakan perangkap dulang kuning pada 20 mata selama dua minggu untuk setiap taman. Struktur tumbuhan iaitu bilangan pokok, bilangan pokok renek, peratusan kanopi, peratusan penutupan tanah dan parameter iklim mikro, suhu udara, kelembapan, radiasi matahari dan kelajuan angin diukur di setiap taman. Penemuan menunjukkan bahawa Taman Warisan Pertanian adalah lebih setara dalam kehadiran banyak serangga dan kekayaan yang menunjukkan masyarakat serangga lebih tertarik disebabkan oleh pelbagai pokok buah-buahan (musim buah), suhu dan kelajuan angina yang rendah. Walau bagaimanapun, Taman Rimba Alam menunjukkan suhu udara yang lebih rendah (sehingga 1.3 ° C) dan sinaran matahari dan kelembapan relatif yang lebih tinggi kerana liputan kanopi yang lebih besar berbanding dua taman yang lain. Kajian ini menunjukkan bahawa jenis taman mempunyai pengaruh terhadap struktur tumbuhan, iklim mikro dan komuniti serangga. Kajian ini membantu para pengurus dan perancang hutan bandar dalam perancangan masa depan dalam mengoptimumkan perkhidmatan ekosistem di setiap taman.

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APPROVAL SHEET

I certify that this research project report entitled "The Impact Of Different Urban Parks on Vegetation Structure, Microclimate and Insect Communities" by Mohamad Ameerul bin Ishak 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.

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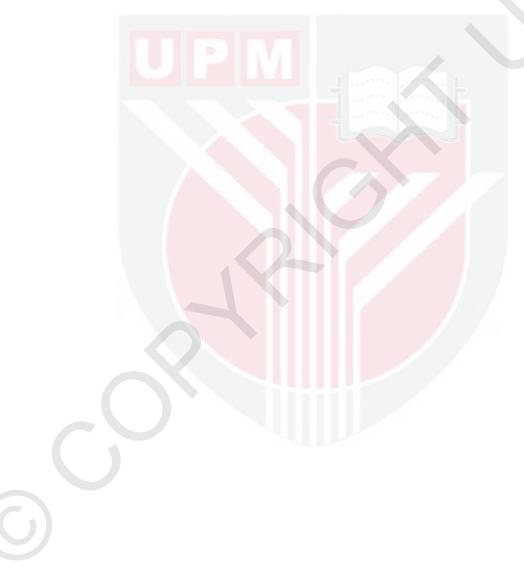
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LIST OF ABBREVIATIONS

- TRA Taman Rimba Alam
- TSH Taman Saujana Hijau
- TWP Taman Warisan Pertanian
- NOT Number of Trees
- NOS Number of Shrub
- UHI Urban Heat Island



CHAPTER 1

INTRODUCTION

1.1 General Backgroud

Tropical deforestation continues to rise at an alarming rate worldwide due to its negative impact on overall biodiversity (Wilcove & Koh, 2010). Tropical forest provide refuge for diverse insect communities and the impacts of human activity such as illegal logging, agricultural expansion and development of residences has led to population declines in many tropical insect spesies (Cunha & Juen, 2017). The net loss of forest area has reduced between 2000 to 2010 due to increase global effort in reforestation and afforestation (Achard et al., 2002). In Malaysia alone, at least 1.04 million ha of forest were converted into agriculture plantation from 1990 to 2005 (Wilcove & Koh, 2010). Insect species are considered as an important component in ecosystem functioning (Matos et al., 2016). Insect can plays as a role for pollination agent and as a predator for crop pest (Urbini et al., 2006). Insect also suitable for biological indicators for ecosystem disturbance as they are sensitive to changes in environmental conditions (Hirsh & Wolters, 2003). Most insects and other living organisms are influenced by natural changes in ecosystem environments.

Changes in environmental biotic and abiotic factor may affect the distribution and abundance of insects due to habitat loss (Tylianakis et al., 2004). Biodiversity conservation is a key mechanism in ecosystems for diversity of species or functional groups (Spehn et al., 2005). The intensification of urban area system can have negative impacts on insect composition due to lower habitat complexity compared to nature forest area. Event though, habitat heterogeneity in urban area is lower compared forest area, urban area supports few insect communities for nesting and food resource such as at urban park areas. Thus, diverse plant community in urban area may support the life cycle of insect communities. Moreover, crop production such as seeds and fruits in orchard urban area are highly dependent on insect as their agent for pollination.

1.2 Justification

Land use and occupation by human populations can cause many environmental changes in insect communities, which affect not only the number and abundance of species but also the biological characteristics or functional traits of the individuals (Barbara et al., 2017). Different functions of land use may indicate the differences of insect communities (Barbara et al., 2017). Putrajaya is an example of planned city included of federal administrative centre of Malaysia. 38 % of planned garden and intelligent city of Putrajaya are reserved for green spaces in which natural landscape is enhanced. With 90,000 human population in this city (Department of Information, Ministry of Communications and Multimedia, Malaysia, 2017), competition of living spaces between human and other organism such as insect must be high. One of the objectives of having an urban forest in Putrajaya is to provide green areas that serve as habitat for birds, insects and others wildlife (Zhang & Wang, 2006). Generally, influence on land use changes on urban insect communities depends on management and plant

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structure in the area. The diversity of insect communities with good conservation is important to ensure the survival of insect populations. The number of insect captured will reassamble the biodiversity of insect in the urban parks. Thus, this case study was conducted in order to investigate how do the differences affect the insect communities and its relation to the vegetation structure and microclimate conditions.

1.3 Objectives

The overarching aim of this study was to investigate the influence of different types urban park on habitat quality (vegetation stucture and microclimate) and insect communities. Specificilly, the objectives were to:

- 1. compare the vegetation stucture, microclimate and insect communities of different urban parks
- 2. determine the relationship between habitat quality and insect communities of different urban parks.

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