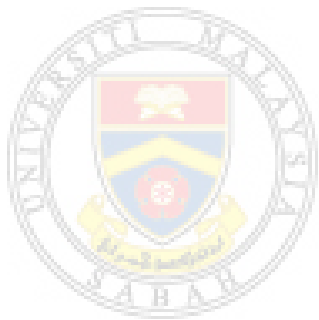


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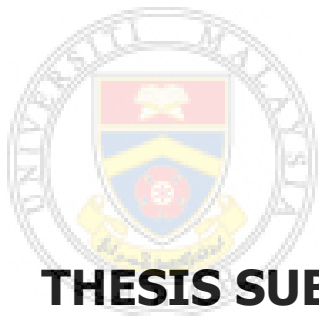


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2021**

**ENTOTOURISM EXPERIENCES FOR  
CONSERVATION AWARENESS IN TAWAU  
HILLS PARK**

**GAO LE**



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**THESIS SUBMITTED IN FULFILMENT OF  
THE REQUIREMENTS FOR THE DEGREE OF  
MASTER OF SCIENCE**

**INSTITUTE FOR TROPICAL BIOLOGY AND CONSERVATION  
UNIVERSITI MALAYSIA SABAH**

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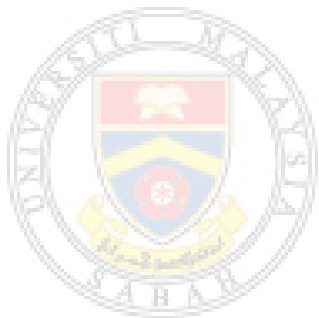
## **DECLARATION**

I hereby declare that the material in this thesis is my own except for quotations, equations, summaries and references, which have been duly acknowledged.

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# CERTIFICATION

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DEGREE : **MASTER OF SCIENCE**

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Dr. Fiffy Hanisdah Saikim

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**2. CO-SUPERVISOR**

Dr. Kalsum M. Yusah

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Gao Le

27 April 2021

## **ABSTRACT**

This research was conducted in Tawau Hills Park, Sabah aim to find out tourists' perception and awareness about insects, and conservation potential through insects tourism. Four objectives were given, 1. To investigate group of insects that have potential to be promoted as nature tourism product in Tawau Hills Park; 2. To determine the viability of insect as nature tourism product in Tawau Hills Park; 3. To assess the potential of Entotourism in Tawau Hills Park; 4. To acquire a greater understanding of individuals' perceptions on insects conservation and their awareness of insects. Two different methods were applied- survey about tourist's perception and awareness of insects and tourism package activity in the field. SPSS was used for quantitative data analysis, while Leximancer was used to analyze the qualitative data. As Result, perceptions and awareness about insects should be evaluated base on these three main factors, value, knowledge and appearance. It indicated that there is little difference between demographics among tourists. Most participants responded positively about insects due to their special characteristics and importance. Beautiful insects such as butterfly, dragonfly, firefly get more attention by people, where other insects with interesting and rare have potential to explore. In terms of insect activity, Experience, Information, Booklet were three important factors should be concerned while conducting insects tourism. Tawau Hills Park was examined to have potential and viability in doing insects tourism. Participants are more willing to join insects activity with guided walk, experience insects in the field can help them to have better understating of learning insects. This study also brought a new opportunity to broaden and advance the scope of current and future plan ecotourism activity in similar area. Thus, aided to perceive positive perception amongst tourists towards entotourism activity especially insect species. Alternately, encourage the insect conservation action to publics. It provides methods and factors of promoting and developing entotorusim for entomologists, innovators, enthusiasts, tourism manager, park manager and government decision maker in the future.

Keywords: conservation, insects, tourism, perception, awareness

## **ABSTRAK**

### **PENGALAMAN ENTO-PELANCONGAN UNTUK KESEDARAN KONSERVASI DI TAMAN BUKIT TAWAU**

*Kajian ini dilakukan di Taman Bukit Tawau, Sabah bertujuan untuk menerokai persepsi dan kesedaran pelancong mengenai serangga, dan potensi pemuliharaan melalui pelancongan berasaskan serangga. Empat objektif kajian ini adalah: 1. Untuk mengenal pasti kumpulan serangga yang berpotensi untuk dipromosikan sebagai produk pelancongan alam di Taman Bukit Tawau; 2. Untuk menentukan daya maju serangga sebagai produk pelancongan alam di Taman Bukit Tawau; 3. Untuk menilai potensi pelancongan berasaskan serangga di Taman Bukit Tawau; 4. Untuk memperoleh pemahaman yang lebih mendalam mengenai persepsi individu terhadap pemuliharaan serangga dan kesedaran terhadap serangga. Dua kaedah yang berbeza telah diterapkan iaitu tinjauan mengenai persepsi dan kesedaran pelancong terhadap serangga dan aktiviti pakej pelancongan di lapangan. SPSS telah digunakan untuk analisis data kuantitatif, sementara Leximancer digunakan untuk menganalisis data kualitatif. Hasilnya, persepsi dan kesedaran mengenai serangga harus dinilai berdasarkan tiga factor yang utama, iaitu nilai, pengetahuan dan penampilan ini. Kajian menunjukkan terdapat sedikit perbezaan antara demografi di antara pelancong. Sebilangan besar peserta memberi tindak balas yang positif mengenai serangga kerana ciri-ciri dan kepentingan mereka. Serangga cantik seperti rama-rama, pepatung, kelip-kelip mendapat perhatian lebih tinggi, manakala kumpulan serangga lain yang menarik namun jarang adalah berpotensi untuk diterokai dengan lebih mendalam. Dari segi aktiviti serangga, pengalaman, maklumat, risalah adalah tiga faktor penting yang harus diberi perhatian semasa melakukan pelancongan serangga. Hasil kajian menunjukkan bahawa Taman Bukit Tawau memiliki potensi dan daya maju dalam melakukan pelancongan serangga. Peserta lebih cenderung untuk menyertai aktiviti serangga dengan berjalan berpandu, mengalami serangga dalam taman dapat membantu mereka untuk memahami serangga pembelajaran dengan lebih baik. Kajian ini juga membawa peluang baru untuk memperluaskan dan memajukan skop aktiviti ekopelancongan dalam perancangan semasa dan masa depan dalam bidang yang serupa. Oleh itu, terdapat keperluan untuk memahami persepsi pelancong terhadap ento-pelancongan dan mendapatkan sudut pandang positif darinya. Di samping itu, aktiviti promosi yang strategik mengenai ento-pelancongan dan pemuliharaan juga dapat membantu dalam perkembangan ento-pelancongan. Kajian ini menyediakan kaedah dan faktor untuk mempromosikan dan mengembangkan ento-pelancongan bagi ahli entomologi, penyelidik, peminat, pengurus pelancongan, pengurus taman dan kerajaan di masa depan.*

*Kata kunci: pemuliharaan, serangga, pelancongan, persepsi, kesedaran*



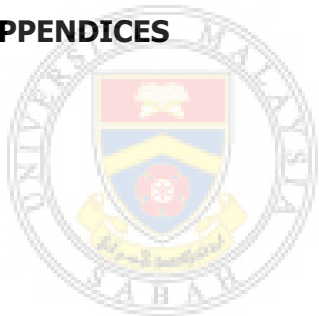
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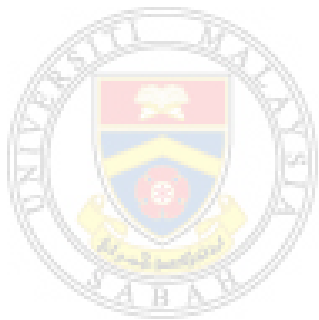


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## LIST OF ABBREVIATIONS

<b>NBSAP</b>	- Ministry of Natural Resources and Environment, Malaysia
<b>DOSM</b>	- Department of Statistics Malaysia
<b>ITBC</b>	- Institute For Tropical Biology And Conservation
<b>FA</b>	- Factor Analysis
<b>EFA</b>	- Exploratory Factor Analysis
<b>PAF</b>	- Principal Axis Factoring
<b>IUCN</b>	- International Union for Conservation Nation
<b>QR Code</b>	- Quick Response Code
<b>KMO</b>	- Keiser-Meyer-Olkin Value
<b>SWOT</b>	- Strengths, Weaknesses, Opportunities and Threats Analysis
<b>VSP</b>	- Visual Scree Plot
<b>Sig.</b>	- Significant Value
<b>Std</b>	- Standard
<b>Rel Freq</b>	- Relative Frequency
<b>TEEB</b>	- The Economics of Ecosystems and Biodiversity
<b>SPSS</b>	- Statistical Package for Social Sciences
<b>MTPB</b>	- Malaysia Tourism Promotion Board



## LIST OF SYMBOLS

**R** - Correlation Matrix

**P** - Significant Value

**km** - Kilometre

**am** - Ante Meridiem

**pm** - Post Meridiem

**%** - Percentage

**st** - First

**US\$** - United State Dollar

$\bar{X}$  - Mean

**df** - Degree of Freedom

**N** - Number

**RM** - Malaysian Ringgit

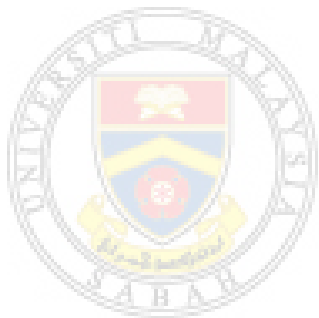
**R** - Correlation Matrix



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# CHAPTER 1

## INTRODUCTION

### 1.1 Background

Invertebrates are the most diverse and abundant creatures. Arthropods account for 85% of the world's total animals and 65% of the total known biodiversity (based on 1.7 million species); if the diversity is estimated on the basis of the total global estimate (125.196 billion species), then arthropods only account for all 91% of living animals, account for 79% of global biodiversity, and the Insecta class is the most special animal category in the animal kingdom, accounting for 90%-95% of all living organisms (Samways, 1993; Samways, 2005; Stork *et al.*, 2015).

Insects exist for more than 400 million years on earth, they have become the most successful creatures of all living things. They represent the vast majority of terrestrial biodiversity, accounting for about four-fifths of all metazoans, and are essential for maintaining the ecological integrity of most ecosystems (Kim, 1993; Rasnitsyn & Quicke, 2007; Arribas *et al.*, 2017). It is estimated that for all insects, the average population indicates that there are about 1.5 million, 5.5 million and 7 million species of beetles, insects and terrestrial arthropods respectively worldwide (Stork, 2018). Insects affect almost all ecosystem services in complex and often complementary ways, which help provisioning services, cultural services, supporting services and regulating services, and these ways represent important feedback mechanisms (Schowalter, 2013). For thousands of years, no human has maintained the structure and function of the ecosystem intervention (Lorenz, 1972). In

approximately 18 orders of the Insecta class, 2,140 kinds of insect species are recorded to be used as food (Mitsuhashi, 2016). China has been using silkworms for the silk industry since 2000–3000 B.C., whereas bee farms and honey collection were recorded to exist since the Egyptian First Dynasty (Schowalter, 2013).

However, the decline of insect biodiversity has become a pressing issue globally. Insects are more sensitive and have greater loss of diversity and extinction than vertebrates and plant species (Thomas *et al.*, 2004; Conrad *et al.*, 2006). Many of the insect species are threatened to extinction due to habitat loss and conversion to intensive agriculture and urbanization; pollution; biological factors; and climate change. The decline of insects negatively affects health of ecosystem and human activity, for example, insects as pollinators decreasing would cause issues for human food security and health, as well as ecosystem function. Hence, conservation of insects is urgent priority and imperative to society (Chapman & Bourke, 2001; Collins, 2012; Vanbergen *et al.*, 2013; Sánchez-Bayo & Wyckhuys, 2019; Cardoso *et al.*, 2020).

Insect conservation will do well to better align with overall conservation of biodiversity and mitigation of climate change, as insects are a major component of the tapestry of life (Gill *et al.*, 2016; Samways, *et al.*, 2020). However, insects lack security measures, management methods as well as the interest of citizens, evaluation and support for conservation (Samways, 2015; Leandro & *et al.*, 2017; Leandro & Jay-Robert, 2019). Education is an important key to safeguarding biodiversity for public (Kellert, 1993; Chung *et al.*, 2016; Leandro *et al.*, 2017). Individuals perceived insects differently on the basis of their knowledge and made judgments on the basis of expectations that differed on the basis of their cultural background and experience where education can change their perception and awareness (Durst *et al.*, 2010; Tan *et al.*, 2015).

The neglect of insects would have a negative effect on its overall survival work and at the same time and put more pressure on animals already on the verge of extinction. However, since many people are not adequately aware of the ecological value of insects, it is difficult to assess the safety of insects and establish its conservation strategy.

## **1.2 Insects Tourism**

Public interest and support are key factors that help maintain sustainable development to protecting insects (New & New, 2009). Therefore, commercial activities such as insect-based tourism may lead to research and thus protect and provide better management of insecta (Wilson *et al.*, 2004). Insect tourism have been applied successfully in many places around the world and gaining more popular among today's tourists (Lemelin, 2015).

Glow worm tourism is described as "a multi-million dollar" industry in Australia, thus makes glow worm a commercially valuable creature (Baker, 2003). In New Zealand, it can attract an average of 400,000 visitors each year (Hall, 2012). Glow worm tourism can be used not only to educate the public about the threats affecting their colonies, but also to protect them. The Monarch Butterfly Biosphere Reserve in Mexico attracts millions of tourists all over the world annually, witnessing the overwintering phenomenon of monarch butterflies gathering and migration, which also brings benefits and protection (Lemelin & Jaramillo-López, 2019b). The Penang Butterfly Farm in Malaysia has produced an informative guide model, explaining and providing biological information about the displayed species. Such insect tourism activities hence been used to promote conservation of insect and local sustainability (New, 1994). Fireflies as insect tourism in Malaysia began in the 20th century. It brings social and economic benefits to locals as well as raising awareness towards

insect protection in local communities and tourists alike (Mahadimenakbar *et al.*, 2009).

It is believed that 75% to 90% of all insects occur in tropical rainforest area (Collins, 2012). An assessment made by the Ministry of Natural Resources and Environment, Malaysia (NBSAP) in 2014, about 150,000 invertebrates have been found, most of which are insects. Thus confirming that insects are not only rich in species, but also generally diverse in range, and may be important as tourism products. Meanwhile, tourism has become popular in Malaysia, Malaysia Tourism Promotion Board reported that in 2018, Malaysia registered 25.8 million tourist arrivals and RM84.1 billion in tourist receipts. And tourism is one of Sabah's important economic income and is standing third after agriculture and manufacturing. Sabah Tourism Statistics (2020) reported that number of tourist arrivals to Sabah in year 2019 is 4,195,903, among them have 2,726,428 domestic tourists and 1,469,475, 202 international tourists. Department of Statistics Malaysia (DOSM) published a Sabah State Socioeconomic Report 2019 indicated that Sabah received a total of 22.04 million domestic visitors, and the number of tourist arrivals to Sabah is 4.95 million tourists. "Thirty-five percent of visitors in Sabah" (2019) reports that Sabah tourism set a new record in 2018 with the highest tourism revenue of RM8.324 billion involving 3.879 million tourists. A study found that 35 per cent of tourists who visit the country are into ecotourism activities such as hiking or climbing, diving, snorkeling, cave exploration, bird watching and fishing. Therefore, in order to ensure long-term, sustainable environmental benefits, there is a need to preserve and encourage nature-based offerings.

Changing public's perception, increasing their awareness of the diversity of insects and its functions, and insect conservation needs is an issue to protect the insecta (Samways & Samways, 2005). Perceptions can affect people's understanding, interactions, conservation and management practices (Samways, 1993; Kim, 1993; Hunter & Hunter, 2008; Lemelin *et al.*, 2016). It is a key facet of insect conservation

(Lewis *et al.*, 2007). Tourism may have a special impact on changes in attitudes because tourists are willing to interact with the host population and therefore hope to get new information (Amir & Ben-Ari, 1985). Therefore, as Wilson *et al.* (2004) and Huntly *et al.* (2005) stated based on their research, ecotourism and for this case, insect-based tourism can be a medium to effectively increase public awareness and to change common negative perceptions towards insects.

Field education such as entotourism helping the public to gain a better understanding of insects, human-insect relations and ways of contributing to conservation (Lemelin *et al.*, 2019a). Experiential education can affect understanding and expertise and is one of the vital strategies to the recruitment of naturalists and conservationists from the next generation (Ernst *et al.*, 2013, Lemelin, 2013b). For example, Api-tourism and meli-tourism are essentially educational provided that the beekeepers involved are keen to pass on their expertise to tourists (Lemelin, 2013b). Hence, insects-based watching tourism activities can create attraction for the tourists and provide platform for publics to learn knowledge, change perception and increase awareness via wildlife experiences.

### **1.3 Problem Statement**

The key problem in this study was that there was little information about insects in ecotourism activity, particularly in Tawau Hills Park, because most tourist visiting the place primarily focus on mammals, birds and geographical features, which have become the main attractions in most ecotourism settings across the world (Ponder and Lumney, 1999: 224).

The lack of insects in ecotourism activity will have an overall negative impact on education and conservation efforts, while also putting additional stress on already

endangered animals. Nonetheless, conservation of insects is difficult to justify when many people regard each insect as a potential pest or health hazard.

People tend to disregard all insects as important for ecosystem functioning or in need of protection without the promotion of appropriate information and potential insects that can help to change public perception (Martn-López *et al.*, 2007: 67).

As a result, this research was accomplished to evaluate insects as a new ecotourism product for Tawau Hills Park, and to help promote important insect information to tourists and the general public, ranging from their charismatic appearance to their roles in ecosystem functioning. As a result, the grounds for insect conservation methods will be justified (Matthews & Boltz, 2012: 107).

In addition, various entomological domains have documented insect participation in ecotourism (Hutchins, 2003: 133). For example, in Mexico, there is ecotourism activity that includes a tour of the annual migration of millions of Monarch Butterflies (Collen *et al.*, 2012: 16).

As a result, this style of holistic thinking advises that insects can be included in ecotourism activities at other regions especially in Malaysia, which will improve support for insects conservation there (Huntly *et al.*, 2005: 54).

Last but not least, this study was carried out empirically by using ecotourism as a platform and means of raising knowledge, perception and awareness of public in order to support insect conservation initiatives.

In reality, many ecotourism activities have made the goal of raising tourist awareness on conservation a central focus in order to encourage tourists to follow pro-conservation habits while engaging in the experience (Ballantyne *et al.*, 2009: 659).