

IDENTIFICATION OF MIGRATORY WATERBIRDS HOTSPOT PATTERN AS  
BIOINDICATOR OF ECOTOURISM MANAGEMENT IN PULAU KUKUP  
NATIONAL PARK.

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## DEDICATION



**In the Name of Allah, The Most Gracious, The Most Merciful**

I dedicate my dissertation to my family and friends.

A special feeling of gratitude to my loving parents,

***Kamarudin bin Hassan and Siti Ragayah binti Sh Ibrahim,***  
whose words of encouragement and push for tenacity ring in my ear.

My sisters,

***Mastura and Siti Aisa Maisara***  
have encouraged me all the way and whose encouragement has made sure  
that I give it all it takes to finish that which I have started.

I also dedicate this dissertation to my best friends,

***Muhammad Iskandar and Nabilah Huda***  
who have supported me throughout the process.

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***Dr. Ak Mohd Rafiq bin Ak. Matusin***  
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## **ABSTRACT**

The link between tourism and conservation has been strengthened and expanded through ecotourism. Mainly, ecotourism destination is often found in areas with abundant natural resources including mangroves areas. In the context of Pulau Kukup National Park, however, there is lack of exposure on using migratory waterbirds as bioindicator for ecotourism activity that might cause harm to the environment and its ecosystem. Thus, this study aims to examine migratory waterbirds hotspot pattern as bioindicator to ecotourism activity in Pulau Kukup National Park. The objectives of this study are to explore the characteristics of migratory waterbird physical environment condition, to analyze the migratory waterbird distribution pattern, and to propose potential significant action plan in protecting the distribution pattern of migratory waterbirds in Pulau Kukup National Park ecotourism management. This study applied a qualitative research method together with secondary data. Informant interviews and site observation were used to evaluate the current condition of the physical environment and the migratory waterbird species. The major findings of this study show that this area is rich in bird species and serves as a shelter for migratory waterbirds. However, lack of proper ecotourism management can cause the destruction of migratory waterbird distribution patterns and indirectly can cause harm to the ecosystem. The result implies a need to enhance the management of this park that indirectly can protect migratory waterbird distribution patterns and ecotourism resources in Pulau Kukup National Park. This study concluded that effective management and proper development, infrastructure, technologies implementation can highly benefit the management and also the environment.

## ABSTRAK

Hubungan antara pelancongan dan pemuliharaan telah diperkukuhkan melalui ekopelancongan. Kebiasaannya, destinasi ekopelancongan sering dijumpai di kawasan yang kaya dengan sumber semula jadi. Walau bagaimanapun, kekurangan pendedahan mengenai penggunaan burung air migrasi sebagai bioindikator bagi ekopelancongan di Taman Negara Pulau Kukup boleh menyebabkan kemudaratan kepada alam sekitar dan ekosistem terutamanya di kawasan bakau. Kajian ini bertujuan untuk mengkaji pola taburan burung air migrasi sebagai bioindikator kepada aktiviti ekopelancongan di Taman Negara Pulau Kukup. Objektif kajian ini adalah untuk meneroka ciri-ciri keadaan persekitaran fizikal burung air migrasi, menganalisis pola taburan burung air migrasi, dan mengesyorkan pelan tindakan yang berpotensi untuk melindungi pola taburan burung air migrasi dalam pengurusan ekopelancongan di Taman Negara Pulau Kukup. Kajian ini menggunakan kaedah penyelidikan kualitatif yang digabungkan dengan data sekunder. Temu ramah dan pemerhatian di lokasi digunakan untuk menilai keadaan semasa persekitaran fizikal dan spesies burung air migrasi. Selain itu, analisis deskriptif digunakan untuk menafsirkan hasil penyelidikan. Penemuan utama kajian ini menunjukkan kawasan ini kaya dengan spesies burung dan berfungsi sebagai tempat perlindungan burung air migrasi. Namun begitu, kurang keberkesanan pengurusan ekopelancongan boleh menyebabkan pemusnahan pola taburan burung air migrasi dan secara tidak langsung dapat menyebabkan acaman terhadap ekosistem. Hasilnya menunjukkan perlunya meningkatkan pengurusan taman ini yang secara tidak langsung dapat melindungi pola taburan burung air dan sumber semulajadi ekopelancongan di Taman Negara Pulau Kukup. Kajian ini menyimpulkan bahawa pengurusan yang efektif dan pembangunan yang sederhana, infrastruktur, pelaksanaan teknologi dapat memberi manfaat besar kepada pengurusan dan juga alam sekitar. Implikasi kajian ini untuk perancangan ekopelancongan adalah boleh membantu pengurusan taman negara untuk menambah baik pembangunan dan pengurusan ekopelancongan di Taman Negara Pulau Kukup atau destinasi ekopelancongan lain yang terletak dalam konteks yang sama.

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## LIST OF ABBREVIATIONS

|        |   |  |
|--------|---|--|
| EIA    | - | Environmental Impact Assessment  |
| RAMSAR | - | Convention on Wetlands of International Importance<br>Especially as Waterfowl Habitat. |
| TDC    | - | Tourism Development Clusters   |
| ESA    | - | Environmental Sensitive Area   |
| QGIS   | - | Quantum Geographic Information System  |
| SPSS   | - | Statistical Package for the Social Sciences  |
| RIS    | - | Information Sheet on Ramsar Wetlands   |
| NGO    | - | Non-Governmental Organizations   |
| MCO    | - | Movement Control Order   |
| IRDA   | - | Iskandar Regional Development Authority  |
| ECERDC | - | East Coast Economic Region Development Council   |
| IoT    | - | Internet of Things   |
| WMWD   | - | World Migrating Waterbird Day  |
| EAAFP  | - | East Asian-Australasian Flyway Partnership   |

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# CHAPTER 1

## INTRODUCTION

### 1.1 Research Background

Ecotourism is a sort of niche travel that includes a wide range of activities such as bird watching, game viewing, scientific research, photography, diving, hiking, and ecosystem restoration. It provides visitors with the opportunity to witness and learn about the powerful manifestations of nature and culture, as well as the importance of biodiversity conservation and the cultures of the local people. According to Goodwin (1996), ecotourism is low-impact nature tourism that contributes to the conservation of species and habitats either directly through conservation or indirectly by providing revenue to the local community sufficient for local people to protect their wildlife heritage area as a source of income. It was also confirmed by other recent studies, which claimed that ecotourism also defined as a tourism development strategy that applies ecotourism principles of environmental protection from negative impact and environmental awareness application, as well as providing experiences for visitors and hosts, empowerment, and economic incentive potentials for local community (Noriega et al., 2020).

Aside from that, ecotourism is both an expansion and a refinement of the connection between tourism and conservation. It builds on the idea of using tourism to reinforce conservation and vice versa while deepening the criteria for sustainability. Conservation of biodiversity is now a global issue for governments from different countries to make and implement several conservation policies, treaties with neighbouring countries to preserve the world's rapidly degrading environment, which is essential for human survival particularly. The ecotourism sector relies heavily on biodiversity. This paper outlines that the capability of tourism planners and managers to start realizing the potential value of biodiversity as a tourist attraction determines the success of tourism attractions (Adetola *et al.*, 2021). People from all over the world travel to these biodiverse regions for educational and recreational purposes to learn

and observe these exotic plants and animals. The natural beauty of the resources, on the other hand, maybe threatened if they are not adequately managed or protected (Junus *et al.*, 2020).

Swangjang and Kornpiphat (2021) described that ecotourism is often found in areas with abundant natural resources. When it comes to natural resources, mangrove forests are a great example. Mangrove forests are both a breath-taking tourist destination and a vulnerable environment. Mangrove forests are very resourceful and home to a wide variety of plants and animals (Keddy *et al.*, 2009). They provide a wide range of ecosystem services, including water purification, runoff, and river discharge buffering, food and fiber production, and ecotourism (Junk *et al.*, 2013). Sensitive spots like mangroves are typically popular tourist destinations, and this area is particularly vulnerable and needs further protection to survive and thrive. Whenever it concerns towards ensuring the long-term development of ecotourism resources, stakeholders or tourism players should pay close attention to the proper development and protection of sensitive areas that include mangroves and more. They must also comply with the principle of sustainable development. Recently, the protection and development of mangrove ecotourism resources have emerged as a significant research topic (Xu, 2020).

Malaysia is now promoting seven RAMSAR sites, one of which being Pulau Kukup, as part of its ongoing commitment to the environment and conservation. Studies by Aldrie Amir (2018) have shown that Pulau Kukup has been designated as a National Park as well as a RAMSAR Site. According to Johor National Park (2019), three main factors supported the inclusion of Pulau Kukup on the RAMSAR list. The RAMSAR site, this area is home to a representative, uncommon, or unique example of a natural or near-natural wetland type found in the suitable biogeographical area, as well as vulnerable, endangered, or severely endangered species or ecological communities. As an example, migratory waterbirds, flying fox, smooth otter, bearded pig, and long-tailed macaques.

In term of tourism development, based on Rancangan Struktur Negeri Johor (2030), Pulau Kukup is one of the areas with a high potential for continuing to develop an ecotourism product, and it is one of the areas with the highest potential. In addition, this area was included as one of the flagship products in the formation of eleven (11) Tourism Development Clusters (TDC) in Pelan Induk Pelancongan Negeri Johor



(PIPNI 2023). As stated in Rancangan Struktur Negeri Johor (2030), the designation of Pulau Kukup and Tanjung Piai as Permanent Forest Reserves is one of the efforts being made to ensure the long-term sustainability of this area.

## **1.2 Problem Statement**

The problem statement for this study is the lack of identification of migratory waterbirds as bioindicator for ecotourism management in Pulau Kukup National Park. This problem statement supported by recent review of the literature on ecotourism development found that ecotourism development in Pulau Kukup can also improve local area's appearance, natural conservation and enhance the quality of the natural environment Mohamed *et al.*, (2020). However, this study reaches the conclusion that ecotourism activities in Pulau Kukup turnout has been shown to harm the environment, such as traffic congestion and crowding, littering, accumulation of waste, and pollutions.

Another researcher brings up the current scenario of mangroves ecotourism resource development and the issues involved. The researcher highlights that excessive and irrational growth and consumption will harm the ecosystem such as major soil erosion has been caused by the development of vulnerable areas such as mangroves and wetlands in an attempt to attract more tourists and improve economic benefits (Xu, 2020).

A recent study reveals that there are no longer Environmental Impact Assessment (EIA) on all RAMSAR sites in Malaysia (Hoe and Lian, 2021). Under Section 34 of the Environment Quality Act 1974, the project developer must take pollution prevention and control measures as a condition of environmental impact assessment approval to eliminate any threat to the ecosystem during the implementation of a project. Under the same study by Hoe and Lian (2021), the researcher claims that after the controversial Pulau Kukup degazettement as National Park, the government of Malaysia has announced a total ban on environmental impact assessment on RAMSAR sites in the country. The government already decided no longer approve environmental impact assessments on RAMSAR sites to ensure the

sustainability of these wetlands. Therefore, no development in RAMSAR sites is allowed after 28 March 2019, which including Pulau Kukup.

Mangrove forest loss is another issue that has arisen due to the lack of assessment. It has emerged as a significant environmental issue in recent decades, due to the effect of the disruption of their ecosystem functions and services that has been conducted in a sensitive area (Agelebe *et al.*, 2019). This same researcher also concludes that mangrove losses and fragmentation are still occurring worldwide, although numerous conservation and preservation initiatives have been launched around the world to meet the insatiable needs of humans. This includes disturbance from ecotourism activities, which contributes to mangrove loss and fragmentation. Based on the issues outlined, it is clear that conducting continuous assessments in ecotourism destinations is crucial for ensuring that resources are protected and managed correctly.

### **1.3 Research Question**

This research provides an answer to the following question:

- a) What are the criteria of migratory waterbird physical environment?
- b) What is the migratory waterbird hotspot distribution pattern?
- c) What is the potential significant action plan to protect the distribution pattern of migratory waterbirds for ecotourism management in Pulau Kukup National Park?

### **1.4 Research Aim**

To examine migratory waterbirds hotspot pattern as bioindicator to ecotourism management in Pulau Kukup National Park.

### **1.4.1 Research Objectives**

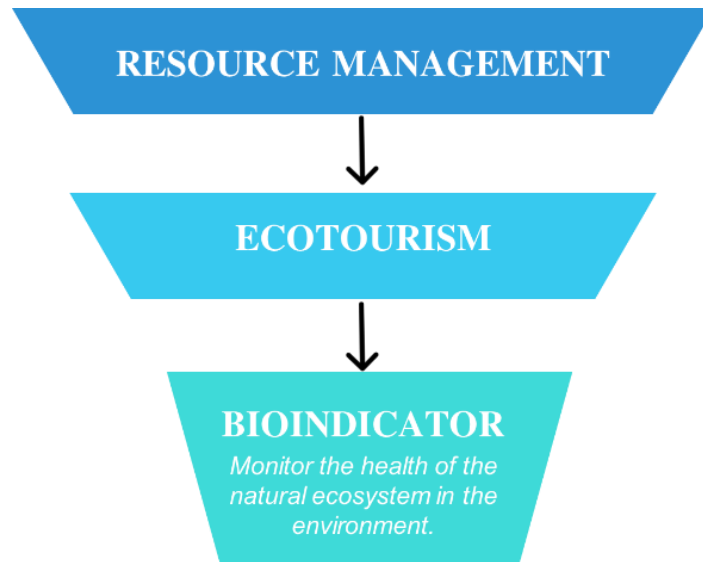
The objectives of the research are:

- (a) To explore the characteristics of migratory waterbird physical environment condition.
- (b) To analyze the migratory waterbird distribution pattern.
- (c) To propose potential significant action plan in protecting the distribution pattern of migratory waterbirds in Pulau Kukup National Park ecotourism management.

### **1.5 Scope of the study**

There are number of indicators that has been used to measure the management of ecotourism resources. For ecotourism management, a set of indicators is especially important to indicate environmental change at tourism sites. The scope of this study is to use the migratory waterbird as a bioindicator for ecotourism activity indirectly can preserve the ecotourism resource in Pulau Kukup National Park.

Migratory waterbirds are known as umbrella species. Maslo *et al.*, (2016) justified that umbrella species play a significant role in ecosystem-related conservation decisions. The purpose of this study is to examine migratory waterbirds hotspot pattern as bioindicator of ecotourism in Pulau Kukup National Park. When it comes to evaluate ecological conditions, the use of bioindicator species is a widely used approach, and several indices have been developed specifically for this purpose (Schenk *et al.*, 2020).



**Figure 1.1** Scope of the study focuses on using the migratory waterbird as bioindicator for ecotourism activity in Pulau Kukup National Park.

## 1.6 Research Framework

Six (6) primary steps have been carried out to meet the goal and objectives of this research, as shown in Figure 2:

Reading published materials such as thesis, journal articles and papers, books, and internet resources was the focus of phase one (1). The information gathered from secondary sources such as those found in the library, online journals, and secondary data from stakeholders are essential to acquire a better knowledge of past studies. Additionally, it is critical to identify the current issue in connection with the study, problem statement, and research gap.

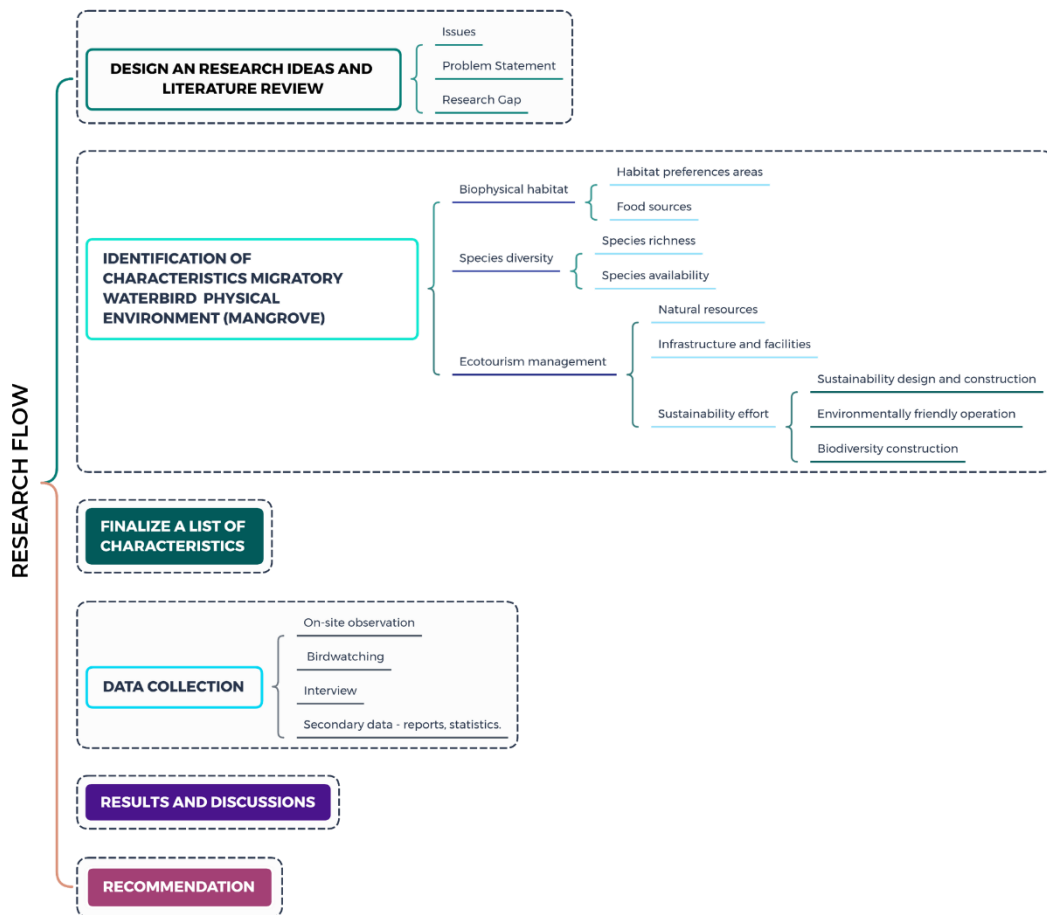
This phase was completed to achieve the research objective one (1) that were established at the beginning of this study. Aside from that, these materials are quite helpful in determining the physical environment of migratory waterbirds.

The finalization of a set of characteristics related to the research area is the highlight of phase three (3). A majority of the characteristics identified in the literature study are focused on migrating waterbirds that migrate to mangrove ecosystems. These characteristics also become a baseline to obtain the data related to the species and the physical environment. It was necessary to gather data in the study area, Pulau Kukup

National Park was done in the following phases of the study. This phase was largely focused on testing the characteristics that had been defined in phase three (3) to the test in a real-time situation. In order to fulfil the second objective, the characteristics that had been defined during phase three (3) were applied to the research area. During this stage, the results will be reported. At this time, on-site observations are important to analyze the habitats of migratory waterbirds and verify their current condition.

The data from objectives one and two were be used in phase five (5) to address the third objective, which is to propose potential significant action plan in protecting the distribution pattern of migratory waterbirds in Pulau Kukup National Park ecotourism management. The QGIS software was used to produce the map of research area. The map generated by the software will be able to pinpoint the migratory waterbird hotspot in the study area. A few points will be raised in discussion as a consequence of the results of the analysis.

In this study, two types of software, including Quantum Geographic Information System (QGIS) software, were used to carry out the study. It is free and open-source software with more comprehensive cartographic capabilities for thematic mapping than most other programs. Aside from that, QGIS software can develop a great zoning map that can be used to identify and map the migratory waterbird hotspots in the study areas. Other software applications that are required include the Statistical Package for the Social Sciences (SPSS) application. This program may assist in the analysis of data from the birding inventory.



**Figure 1.2** Research flow.

**Figure 1.2** explains the overview of the research flow of this study. This research flow serves as a guideline for conducting this research accordingly. All steps must be completed in order to obtain accurate data and information, which will allow the researcher to answer the research question and obtain quality results.

## **1.7 Research Significant**

This research has the following consequences on a broad variety of government and private sectors in order to boost tourism industry in Malaysia:

### **i. Academician**

The study contributes to the academicians as it will be sources of information and knowledge migratory waterbirds as bioindicator in ecotourism sustainability activities. It also eventually will help the academician to explore more about the topic.

### **ii. Ecotourism planning**

This study also aligns with the strategic thrusts of Johor Sustainability Policy 2017-2021 to protecting rare, threatened and endemic species and also maintaining ecosystem services.

### **iii. Biodiversity inventory**

In the future, researchers studying migratory waterbirds will be able to benefit substantially from the findings of this study, which will provide a significant amount of data on the particular topic.

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