

## BIRDING HOTSPOTS AND IMPORTANT BIRD SPECIES AS TOOLS TO PROMOTE AVITOURISM IN PULAU TINGGI, JOHOR, MALAYSIA

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**Abstract:** Avitourism contributes to environmental conservation, developing education and awareness towards the environment, and promoting the involvement of local people in the ecotourism industry. However, avitourism study in Malaysia is still scarce, especially on the island. Therefore, this study aims to investigate the potential of avitourism in Pulau Tinggi, Mersing, Johor. We conducted a census on avian species using mist-netting and direct observation in Pulau Tinggi from March until August 2019. Birding hotspots and important bird species were determined according to the criteria of a good nature tourism product. Questionnaires were distributed to the resort staff, local people and tourists to see the potential of avitourism in Pulau Tinggi. A total of 39 bird species and six birding hotspots were identified. Besides that, bird species that complied with the criteria of good nature tourism products such as endemism, rarity, reliability of sighting, morphological attractiveness, linkage to the local culture, behavioural enticement and safety were also identified. Most respondents agreed that Pulau Tinggi has a high potential to be developed as an avitourism spot in Johor. Establishing a proper birding hotspot and determination of important bird species is essential to highlight the potential of avitourism on the island of Johor, especially Pulau Tinggi.

Keywords: Bird, ecotourism, avitourism, birding hotspot, Pulau Tinggi.

### Introduction

Avitourism is a branch of ecotourism. It is a niche sector of the nature-based tourism industry, in which birdwatching is the sole purpose or the main motivation for tourists to travel (Steven *et al.*, 2015). Sekercioglu (2002) defined avitourism as observing and identifying birds in their native habitat. In contrast, La Rouché (2003) suggested avitourism as an act when birders take a trip of 1.6 km or more away from home with the primary attention of observing birds in nature. Besides that, Conradie and Zyl (2016) stated that avitourism is a kind of action where birding in the backyard and around the home is a common form. In contrast, those who go on trips for birdwatching are classified as an active form of birding. Therefore, in this study, we define avitourism as a trip away from

home to respective birding sites to observe and identify birds in their native habitat.

Birdwatching is one of the key sources of income in various places. According to BirdLife International (2018), roughly a fifth of 60 million American people were identified as birdwatchers, 23% of people in the UK carry out birdwatching recreational while this activity is estimated to be growing by 40% each year in China. Conservation-wise, birdwatching tourism is a great tool to preserve the environmental well-being of local communities, outline the value of biodiversity towards locals via education, and assist the creation of local and national incentives to improve the success rate of protection and preservation of natural areas (Sekercioglu, 2002).

Despite its positive spill-over effects, avitourism study in Malaysia is still lacking, especially on islands. Therefore, this study aims to investigate the potential of avitourism in Pulau Tinggi, Mersing, Johor.

## Materials and Methods

### Study Area

Pulau Tinggi (2°18'N; 104°07'E) (Figure 1) was gazetted as a Marine Park in 1994, where this tropical island is located about 37 km from southeast of Mersing on the northeast coast of Johor. Pulau Tinggi reached 610 m in height and the summit was covered with forest (Masni *et al.*, 2011). Pulau Tinggi accommodates several Malay villages, resorts and Marine Park Centre. The study was conducted in the forest and coastal zones in Tanjung Balang Village, Pulau Tinggi, Mersing, Johor.

### Baseline Data

Birds checklist was obtained from a survey conducted in Tanjung Balang Village from March to August 2019 through mist-netting and direct observation methods. Ten mist nets were deployed along the coast and forest zones for ten days every month from 7.00 am until 7.00 pm. Birds censused throughout the survey were identified by referring to the field guide of birds in Peninsular Malaysia and Singapore by Jeyarajasingam and Pearson (2012).

### Qgis Mapping

Open-source geographic information system Qgis version 3.8.3 (Codename Zanzibar released on 21 June 2019) was used to edit and analyse geospatial data. All mist net coordinates were pinned into the Qgis map and species occupied in each area were identified. Hotspot areas for birding were chosen from the mapping.

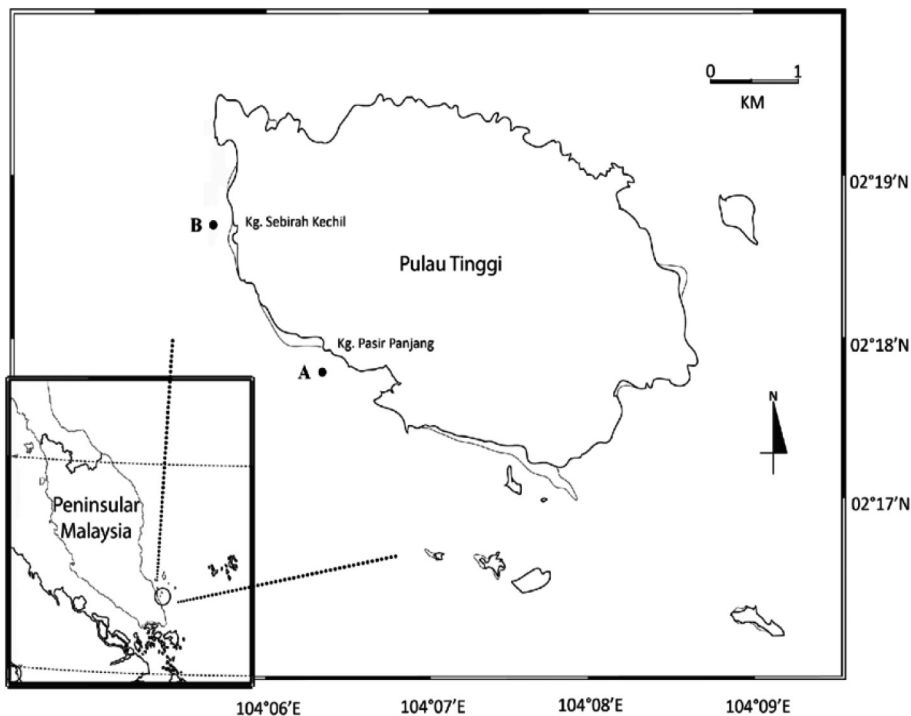


Figure 1: Location of Pulau Tinggi in Peninsular Malaysia  
Source: Harborne *et al.*, 2000

### *Avitourism Measures*

The potential of avitourism was evaluated from seven criteria of organism-based tourism proposed by Kueh *et al.* (2006). The criteria include endemism, rarity, reliability of sighting, morphological attractiveness, linkage to the local culture, behavioural enticement and safety.

### *Questionnaires and Interviews*

Knowledge and information on birds from target informants among villagers, resort staff and tourists were collected through questionnaires and interviews. A set of questionnaires was distributed to 38 respondents. Questionnaires were structured into three parts. Part A comprises demographic questions revealing basic information about informants, including age, gender, occupation and education. Part B enables respondents to evaluate the potential of implementing avitourism in the area besides looking at perceptions, species of interest and knowledge on avitourism. For part C, questions were designed exclusively for local and staff resorts to share any linkage of the avian

community with the people through folklore, local beliefs, traditional health practices and local food. Two informants were chosen for interview sessions, the manager of Shaz Resort and the Headman of Tanjung Balang Village to discuss and share their thought regarding avitourism in this area.

### **Results and Discussion**

#### *Bird Diversity in Tanjung Balang Village*

A total of 39 bird species representing 24 families were documented in Tanjung Balang Village, Pulau Tinggi, throughout the sampling duration from March to August 2019 as shown in Table 1. White-chested Babbler (*Trichastoma rostratum*) was listed as Near-threatened under the IUCN Red List of Threatened species while the rest were the least concerned. Additional birds were believed to be present based on descriptions of morphologies and behaviours from natives, including the Pied Imperial pigeon (*Ducula bicolor*), Little Green-pigeon (*Treron Olax*) and nocturnal species from owl and nightjar families.

Table 1: Bird species censused in Tanjung Balang, Pulau Tinggi, Mersing, Johor

<b>Family</b>	<b>Scientific Name</b>	<b>Common Name</b>	<b>Local Name</b>
Accipitridae	<i>Haliastur indus</i>	Brahminy Kite	Helang Merah
	<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	Helang Laut/Siput
	<i>Nisaetus cirrhatus</i>	Changeable Hawk-eagle	Helang-Rajawali Hindik/ Helang Hindik
Alcedinidae	<i>Halcyon smyrnensis</i>	White-throated Kingfisher	Pekaka Dada Putih
	<i>Alcedo meninting</i>	Blue-eared kingfisher	Raja Udang Telinga Biru/Binti-Binti
	<i>Alcedo athhis</i>	Common Kingfisher	Raja Udang Rimba
	<i>Todiramphus chloris</i>	Collared Kingfisher	Pekaka Bakau
Apodidae	<i>Apus nipalensis</i>	House Swift	Lelayang Rumah
Ardeidae	<i>Egretta sacra</i>	Pacific Reef-Heron	Bangau Batu
	<i>Butorides striata</i>	Striated heron	Pucung Keladi
Columbidae	<i>Chalcopaps indica</i>	Asian Emerald Dove	Punai Zamrud/Punai Tanah
	<i>Ducula aenea</i>	Green Imperial-pigeon	Pergam Hijau
	<i>Streptopelia chinensis</i>	Spotted Dove	Tekukur Leher Berbintik/ Tekukur
Coraciidae	<i>Eurystomus orientalis</i>	Dollarbird	Tiong Batu
Corvidae	<i>Corvus enca</i>	Slender-billed Crow	Gagak rimba
Cuculidae	<i>Hierococcyx fugax</i>	Malaysian Hawk-Cuckoo	Sewah-Rajawali Rimba
Dicaeidae	<i>Dicaeum cruentatum</i>	Scarlet-backed Flowerpecker	Sepah Bunga Belakang Merah

Dicruridae	<i>Dicrurus remifer</i>	Lesser Racquet-tailed Drongo	Cecawi Anting-Anting Kecil/ Cecawi Gunung
Estrildidae	<i>Lonchura punctulata</i>	Scaly-breasted Munia	Pipit Pinang
Hirundinidae	<i>Hirundo Tahitica</i>	Pacific Swallow	Layang-layang Pasifik
Laniidae	<i>Lanius cristatus</i>	Brown Shrike	Tirjup Belukar
Laridae	<i>Sterna hirundo</i>	Common Tern	Camar Siput
Monarchidae	<i>Hypothymis azurea</i>	Black-naped Monarch	Sambar tengkuk hitam
Muscicapidae	<i>Copsychus saularis</i>	Oriental Magpie Robin	Murai Kampung
	<i>Luscinia cyane</i>	Siberian Blue Robin	Murai Biru Siberia
	<i>Copsychus malabaricus</i>	White-rumped Shama	Murai Rimba/Murai Batu
Nectariniidae	<i>Anthreptes malacensis</i>	Brown-throated Sunbird	Kelicap Mayang Kelapa
	<i>Cinnyris jugularis</i>	Olive-backed Sunbird	Kelicap Tekak Biru
Oriolidae	<i>Oriolus chinensis</i>	Black-naped Oriole	Dendang Tengkuk Hitam
Passeridae	<i>Passer montanus</i>	Eurasian Tree Sparrow	Ciak Pokok
Pellorneidae	<i>Trichastoma rostratum</i>	White-chested Babbler	Kekicau Dada Putih
Phylloscopidae	<i>Phylloscopus borealis</i>	Arctic Warbler	Cekup Daun Artik
Pycnonotidae	<i>Pycnonotus plumosus</i>	Olive-winged Bulbul	Merbah Belukar
	<i>Pycnonotus goiavier</i>	Yellow-vented Bulbul	Merbah Kapur
Scolopacidae	<i>Tringa glareola</i>	Wood Sandpiper	Kedidi Bendang
	<i>Actitis hypoleucos</i>	Common Sandpiper	Kedidi pasir
Sturnidae	<i>Acridotheres tristis</i>	Common Myna	Tiong Gembala Kerbau
	<i>Gracula religiosa</i>	Common Hill Myna	Tiong emas
	<i>Aplonis panayensis</i>	Asian Glossy Starling	Perling Mata Merah

### Birding Hotspot

Six birding hotspots were identified along the transect covering a diverse range of microhabitats in Pulau Tinggi. Each microhabitat is colonised by different species composition. Hotspots 1, 2 and 3 represent coastal zones while hotspots 4, 5 and 6 are forest zones. Figure 2 shows the birding hotspot areas in Tanjung Balang Village Pulau Tinggi.

### Coastal Zone

Microhabitats were distinguished based on distinctive features and vegetation types. Hotspot 1 (104.117018, 2.284345) was a coastal line that co-exists with human settlement (Shaz resort and Malay village). The coast was built with sandy beaches, mudflat areas arose when low and ebb tides approached. The coconut tree (*Cocos nucifera*) and Pine tree (*Casuarina equisetifolia*) were the most abundant plants along the shoreline.

Common Tern (*Sterna hirundo*), Pacific Reef-Heron (*Egretta sacra*), Collared Kingfisher (*Todiramphus chloris*), Common Sandpiper (*Actitis hypoleucos*) and Wood Sandpiper (*Tringa glareola*) were among coastal birds found. Sandpipers and Pacific Reef-Heron were bottom feeders. Low tide was the preferred time for them to forage as the food sources among crustaceans and fish were obtained easier when the water level was shallower, exposing their prey. Norazlimi and Ramli (2014) mention that shorebirds' population distribution is undeniably higher during low tide rather than high tide. Birds from the family of raptors, namely the White-bellied Sea-Eagle (*Haliaeetus leucogaster*) frequent flyers besides Brahminy Kite (*Haliastur indus*) and Changeable Hawk-eagle (*Niseatus cirrhatus*) were observed along the shoreline too. An individual Brown Shrike (*Lanius cristatus*), a wintering visitor was successfully captured in March.



Figure 2: Map shows the location of hotspot areas marked along the transect line (Map generated by Qgis version 3.8.3)

A group of flowering plants was introduced widely across the resort/village comprising Hibiscus (*Malvaciae* spp.), (*Bougainvillea* spp.), Telang flower (*Fabaceae* spp.), (*Lilium* spp.), Cherry tree (*Muntingia calabura*) and Lemon tree (*Citrus aurantifolis*). The abundance of flowering plants attracts nectar-feeding birds from the family Nectariniidae (sunbirds) to visit frequently. Nectar is a good source of energy. However, it has a low concentration of essential amino acids. Thus, to meet their protein needs, this bird group needs to consume animal matter (Subramanya & Radhamani, 1993). As can be seen, sunbirds also feed on small invertebrates. On the other hand, *Muntingia* trees attracted more Scarlet-backed Flowerpecker (*Dicaeum cruentatum*) which was the most treasured food for them (Jeyarajasingam & Pearson, 2012). Urban birds including Eurasian Tree Sparrow (*Passer montanus*), Common Myna (*Acridotheres tristis*), Asian Glossy Starling (*Aplonis panayensis*), Spotted Dove (*Streptopelia chinensis*), Black-naped Oriole (*Oriolus chinensis*), Pacific Swallow (*Hirunda Tahitica*) and Slander-billed Crow (*Corvus enca*) were found commensal with humans and buildings within the area.

Hotspot 2 (104.1209818, 2.2845915) covered an orchard area along the forest edge. We manage to capture a few forest birds including the Black-naped Monarch (*Hypothymis azurea*), White-rumped Shama (*Copsychus malabaricus*) and Olive-winged Bulbul (*Pycnonotus plumosus*). Other species captured and observed include the Arctic warbler (*Phylloscopus borealis*), Yellow-vented Bulbul (*Pycnonotus goiavier*), Scaly-breasted Munia (*Lonchura punctulata*), Oriental Dollarbird (*Eurystomus orientalis*), Asian Emerald Dove (*Chalcopaps indica*) and White-throated Kingfisher (*Halcyon smyrnensis*). Various domestic fruiting plants can be found in this fruit orchard such as banana (*Musa* spp.), Mango (*Anacardiaceae* spp.) and Mata Kuching (*Euphoria malaiense*).

Hotspot 3 (104.1209818, 2.2845915) shared similar species composition with Hotspot 1 but was slightly different because of the presence of a natural pond. Three additional species were censused in the pond area including Striated heron (*Butorides striata*), Common Sandpiper (*Actitis hypoleucos*) and Common Kingfisher (*Alcedo atthis*). During high tide, common sandpipers cannot find food along the coast; thus, the pond is another option for them to

forage. At the same time, the benthic and pelagic ecosystems offered here gave the most optimal ecosystem for common kingfishers to find their prey of fish (Vilches *et al.*, 2012)..

### Forest Zone

Besides the coastal zone, this study also focused on forest areas which consist of secondary forests, primary forests and waterfall ecosystems. The main vegetation in the forest zone was tropical rainforest, dominated mainly by dipterocarp trees. Hotspot 4 (104.118156, 2.288039) was located in a secondary forest. The secondary forest filled up on the lower forest and an abandoned plantation was noticed. This area is dominated by lower and middle forest residents, including White-rumped Shama (*Copsychus saularis*), Asian Emerald Dove (*Chalcopaps indica*), White-chested Babbler (*Trichastoma rostratum*), Lesser racquet-tailed Drongo (*Dicrurus remifer*), Scarlet-backed Flowerpecker (*Dicaeum cruentatum*), Brown-throated Sunbird (*Anthreptes malacensis*), Olive-backed Sunbird (*Cinnyris jugularis*) and Black-naped Monarch (*Hypothymus azurea*).

As we walked deeper into the forest, Hotspot 5 (104.1237448, 2.2912383), representing primary forest was filled with tall vegetation reaching up to 30 m or more in height and containing typical primary forest species mainly from the family *Dipterocarpaceae* and *Myristicaceae*. *Orania sylvicola* from the palm group was abundant, as well as patches of the bamboo plant. The primary forest supports canopy-level birds with tall trees, including Imperial Green-pigeon (*Ducula aenea*) and Common Hill Myna (*Gracula religiosa*). Common Hill Myna found making their nest on the high tree bark in a tree hole.

Hotspot 6 (104.1286481, 2.2922796) was a river ecosystem found at the end of our sampling trail. Blue-eared Kingfisher (*Alcedo meninting*) was observed hunting for river shrimp in this river. Woodall (2016) mentioned that Blue-eared Kingfisher strongly prefers streams, creeks and channels in evergreen, wet deciduous forests. In general, bird species' presence is influenced

supremely by different vegetation and food availability in the ecosystem. According to Rajpar and Zakaria (2013), organism habitat is determined by the structure and composition of vegetation that creates different microhabitats that are suitable to their needs..

### Questionnaires and Interviews

#### Demographic Questions

Of 38 respondents who answered the questionnaires, 31 were males and 7 were females. Of these, 23 are tourists, 13 are locals and the rest are resort staff. In terms of age, the respondents come from the age range of 21 to 60. 36 respondents were Malaysians while another 2 were China citizens. Figure 3 shows that most of the respondents were employed full time and their education background majority starting from primary school until a degree holder. Only a few were attending MSc/Ph.D. level and not attending school (Figure 4).

#### Avitourism Overview

Figure 5 shows the summary of respondents' answers regarding avitourism. For the first question, more than half of the respondents were aware of avitourism (18 yes, 16 no, 2 not sure). Meanwhile, for question 2, most respondents said they never went to the birding areas (17 yes, 21 no) and never participated in any birdwatching activities (9 yes, 28 no, 1 not sure). For the next question, the respondent's knowledge of the IUCN Red List of Threatened Species was tested and the majority were unaware of this (14 yes, 20 no, 4 not sure). Besides that, they are also generally unfamiliar with bird studies (5 yes, 26 no, 7 not sure). Questions 7 to 11 seek opinions on the potential of implementing avitourism in Pulau Tinggi. Most of them are interested (31 yes, 3 no, 4 not sure) and agreed that avitourism should be implemented in Pulau Tinggi (29 yes, 2 no, 7 not sure). Furthermore, they determined that avitourism can contribute to the conservation of bird species on Pulau Tinggi (31 yes, 2 no, 5 not sure) and will also generate income for the local population (33 yes, 2 no, 5 not sure).

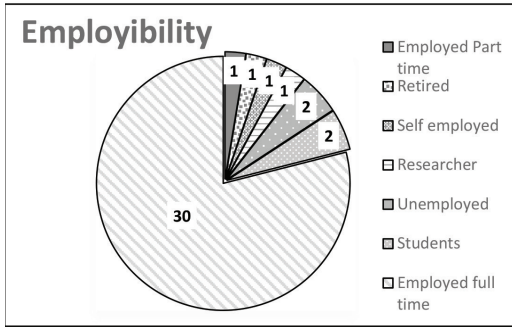


Figure 3: Pie chart shows the number of respondents' employability status

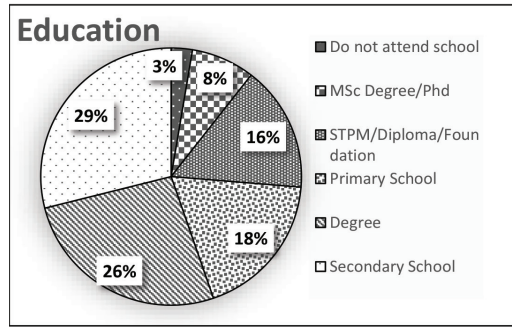


Figure 4: Pie chart shows the percentage of informants' educational level

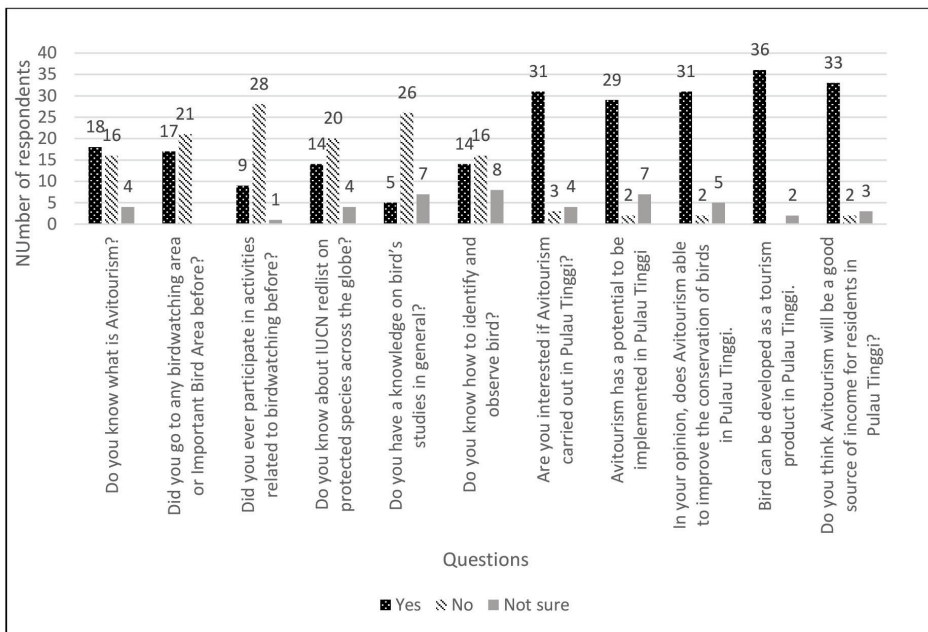


Figure 5: Graph shows responses made by respondents on avitourism and the potential

**Potential of Avitourism**

Few criteria were placed in questionnaires to see the expectations from respondents on avitourism. Figure 6 below indicates that most respondents agree with all five criteria listed. The highest criteria voted by respondents is to find a rare species (32 respondents), followed by being able to watch birds with unique bodies and morphologies (30 respondents), able to find diverse species of birds (29 respondents),

able to see birds with unique behaviour (27 respondents) and lastly, able to find endemic species (26 respondents) (Figure 6).

**Criteria of Organism-based Tourism  
Endemism and Rarity**

Species within small geographical ranges are rare and thus vulnerable to global extinction. Threatened species are usually geographically

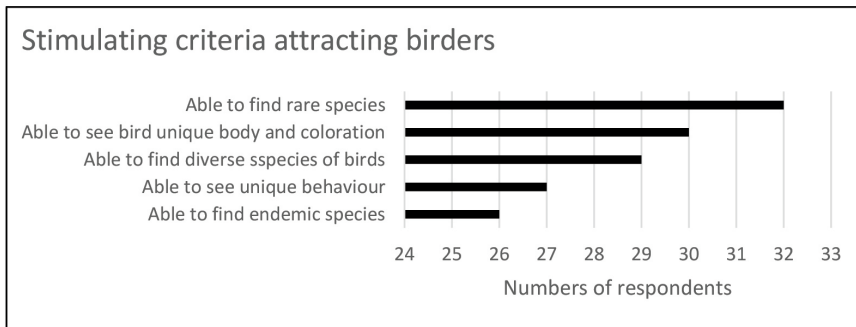


Figure 6: Chart shows the number of respondents that agreed with the criteria in birds attracting birders to visit respective birdwatching sites

restricted while species with an extensive range survive elsewhere if they are locally abolished (Pimm, 2019). Tourists seek to watch organisms that are seldom seen and occupy a specific area to boost their satisfaction (Kueh *et al.*, 2006). White-chested Babbler was the only species in Pulau Tinggi that could be listed under this criterion. The near-threatened status is given under the IUCN Red List of Threatened Species and is occupied a small geographical range from Peninsula to Sumatra Borneo (Wells, 2010).

### ***Linkage to Locals***

The foremost point an added advantage of nature tourism is the presence of any linkage to the locals via folklore, traditional medications, local foods, and local beliefs (Kueh *et al.*, 2006). Linkage of the bird community in Tanjung Balang with humans is primarily associated with belief in bird signs toward natural phenomena. For instance, when the White-bellied Sea-eagle whistles, the day will rain and strong wind coming along. As it perches on high trees, it calls for the rain to fall. The white morph Pacific Reef-Heron presence in the large group indicates that monsoon is approaching.

### ***Behavioural Enticement***

Nature tourists adore flora and fauna that can provide enticement through various behaviours. In Pulau Tinggi, three species of birds, namely Lesser Racquet-tailed Drongo, White-rumped Shama and Common Hill Myna have

exceptional vocalisation ability, according to Jeyarajasingam and Pearson (2012). They can mimic the voices of other species. At the same time, many respondents said they favour the voices of White-rumped Shama and Common Hill Myna.

### ***Morphological Attractiveness***

The quality of birds comes in vibrant colours, combinations and unique features. The score of morphological attractiveness was analysed in questionnaires given a range from 1 (least attractive) to 5 (most attractive). All scores were added to see which species scored the highest (Figure 7). Birds with vibrant colouration morph, namely Common Hill Myna, White-rumped Shama, Black-naped Monarch, Brown-throated and Scarlet-backed Sunbirds, Collared and Common Kingfisher were favoured the most morphologically by respondents. Liskova and Frynta (2013) assessed traits affecting human preference towards bird morphology, showing that preference was significantly affected by bird morphology. However, the blue and yellow colours, as well as the overall lightness were also significant.

### ***Reliability of Sighting***

The manifestation of trust between tour operators and nature tours is of the utmost significance to guarantee the survivability of tourism products and the industry (Deng *et al.*, 2002). Birds can be seen easily with magnifying tools like binoculars



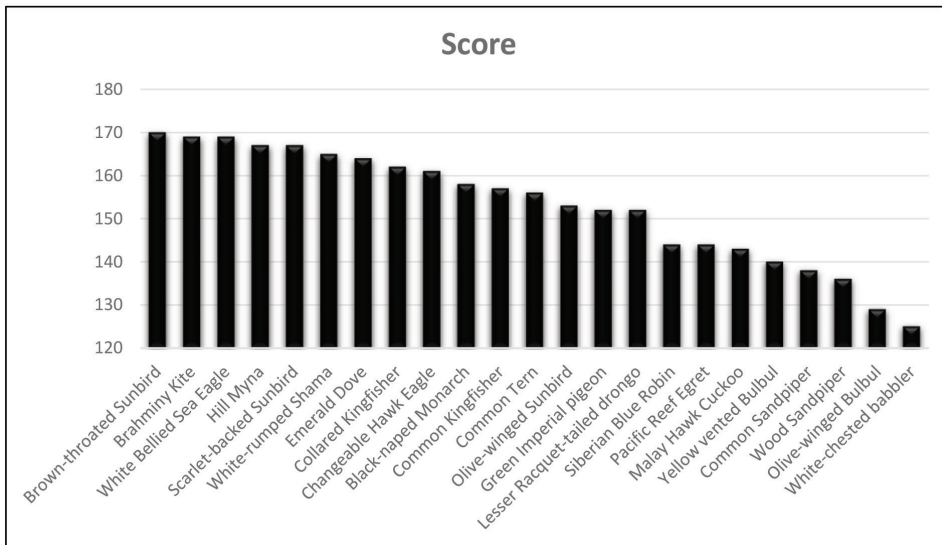


Figure 7: Score of attractiveness given by respondents for bird species in Tanjung Balang, Pulau Tinggi

and spotter scopes. A high-end camera body and lens best capture the most outstanding bird images will be an advantage. Distinct voices made by birds will be the concrete evidence of the species present. However, trained and experienced guides are needed to verify species from the voices to be presented verbally to the tourist. Birdwatching is conducted during the optimal time in the morning from 0700 to 0900 hours and in the evening from 1600 to 1800 hours to increase sightings probability.

### **Safety**

In implementing Avitourism, tourist safety is the uttermost crucial criterion. Nature tourists want to be safe from mishaps directly inflicted by the flora and fauna they admire (Kueh *et al.*, 2006). Birds are far from being dangerous to humans as avitourism activities are associated with watching birds from far thus no direct contact with birds. Hand-feeding birds usually occur in in-situ institutions where training is provided while uncommonly practised in the wild.

### **Conservation and Awareness**

Wildlife tourism's main pillar principle is to emphasise the conservation of the animal. Many authors claim that wildlife watching can

be good for conservation when it is associated with economic incentives and education (Higginbottom, 2004). Wildlife watching is a form of ecotourism industry where this tourism is affiliated with conservation-related education (Weaver, 2001). Overall, respondents were aware of the importance of conserving wildlife with several suggestions on protecting them and ways of performing sustainable avitourism. One of the ideas was avoiding intensive overdevelopment where avitourism should be kept on a small scale, sustainable and premium. This is agreed with the head villager that there should not be a massive change in infrastructure in Tanjung Balang village to reduce negative environmental impacts.

### **Conclusion**

In conclusion, Pulau Tinggi, Mersing, Johor has a high potential to be developed as an avitourism in Johor. The variety of microhabitats offered on this island supports various birds occupying their preferred niche. Thus, hotspot areas were assigned based on different microhabitats to increase the chance of watching different targeted species. On the other hand, by implementing birdwatching, conservation-related education was achieved. Vigorous promotion and proper

infrastructure should be well developed by operators to achieve business sustainability to attract more people to join this activity.

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