

PRELIMINARY STUDY ON SPECIES COMPOSITION AND FEEDING GUILDS OF BIRDS FOUND IN JENGA RESIDENTIAL AREA AND SECONDARY FOREST OF UITM JENGA

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Abstract

Bird species are now threatened by deforestation or forest clearance. This leads to the migration of many bird species in order to search for new places or habitat. This study aims to provide data on bird composition and bird diversity of two selected habitats; UiTM Jengka secondary forest and a residential area from Jengka namely Rantau Perintis. A total of 10 families, 15 species and 59 individuals are observed in both areas. The most dominant species in the secondary forest is *Raphidura leucopygialis*, while *Apus pacificus* has dominated the residential area. The values of Shannon's Diversity index in the secondary forest is 2.207, which is higher than the residential area with the values of 1.629. However, the values of Simpson's Diversity Index in residential area is 0.7733, which is lower than the secondary forest with the values of 0.8799. There are seven types of feeding guilds recorded in the study sites and insectivore are the most recorded species during this study.

Keyword: Birds, Secondary forest, Residential area, Feeding guild

Introduction

Birds are diverse and may migrate to various places to feed, mate, and nest. They are presented in different types of habitat, and being one of the key groups that play important role in the ecosystem structure and functions. They have roles in both ecosystem structural and function such as seed dispersal, forest regeneration facilitation, pollinator of many tropical plant species (Philpott et al., 2009) and providing pest control services (Wenny et al., 2011). In Malaysia, there are approximately 460 native species and 215 migratory bird species. Many of the birds in Malaysia are endemic and have different habitat preferences (Zakaria et al., 2009). To date, Peninsular Malaysia is home to 718 species of birds from 96 families.

In general, structural characteristics of the birds and plant composition of the habitat are found to be closely linked (MacArthur, MacArthur, & Preer, 1962; Wiens & Rotenberry, 1981). The study of avian feeding guilds will help to explain the dynamics of the structure of ecosystems and provide updated data on each habitat type of the ecosystem. Furthermore, John (1991) and Zakaria & Rajpar (2010) affirmed that birds are tolerant with the changing of habitats and display a wide variety of feeding guilds. When the presence of birds decreases, it will indicate that the ecological conditions of the habitats have been disturbed or there are changes in terms of food web and nutrient cycle in that area. This research has therefore been undertaken to collect information on the composition of bird species, species diversity and feeding guilds in the secondary and residential area in Jengka, Pahang. It is also

due to the fact that many forest regions across the world have been dramatically transformed into agriculture, settlement and industrial development. The transformation of tropical forest into palm oil plantations is one of the largest per unit area leading to Southeast Asian biodiversity loss (Syafiq et al., 2020).

Materials and Methods

Study Area

There were two study sites selected; secondary forest reserve in UiTM Jengka, Pahang (X) and a residential area (Rantau Perintis) around Bandar Tun Abdul Razak, Jengka (Y) as shown in **Figure 1**.

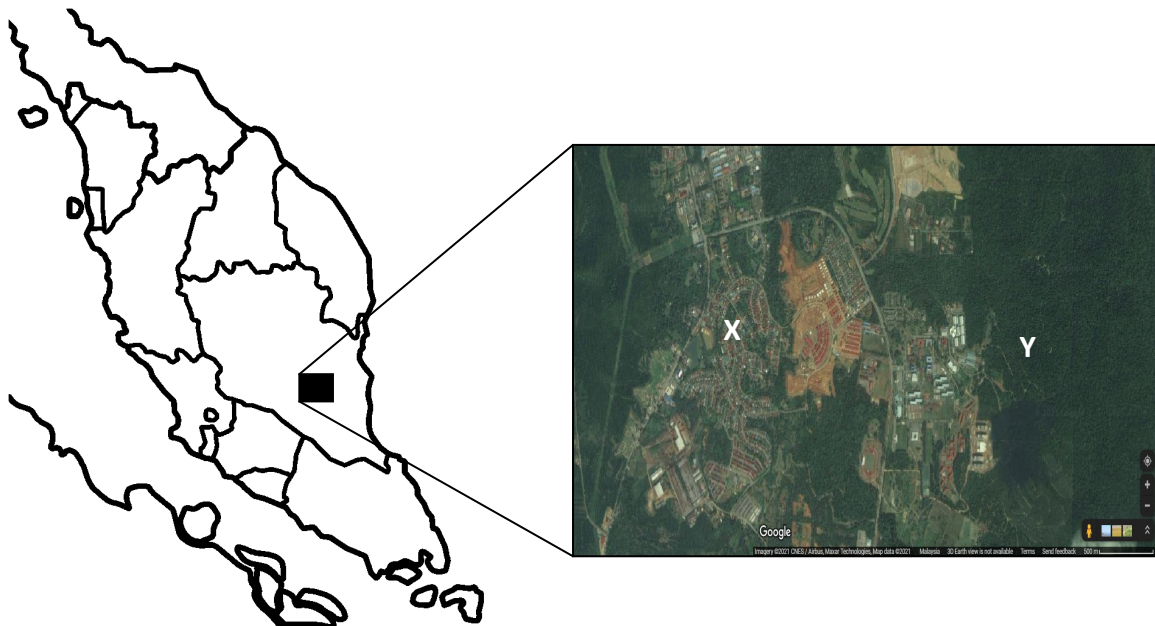


Figure 1 Two study sites selected in Jengka areas. (Note: X= residential area, Y= secondary forest)

Bird point count surveys (PC) and guild type

The bird surveys was carried out using the distance sampling PC method at both study sites. At least 10 PC points with 200 m apart were set up within the study areas. The surveys were conducted for 20 minutes at each PC points for 14 consecutive days. To document a sufficient number of individuals with minimum effort and disturbance, the 20-minute count was used. The observation was done separately for each consecutive 5 minutes periods. The species and number of individuals detected (sight or sound) were reported during each PC visit.

Flushed birds were tracked in their original locations and included in the record, while due to unknown original positions, flying birds were not recorded. Precautions were taken to prevent the same individuals from being counted twice. During the time of the greatest bird activity, surveys were performed from 0730 am to 1100 am. Meanwhile, the identification and classification of bird feeding guilds were done by referring to several comprehensive literatures such as Zakaria & Rajpar (2010), Li et al. (2013) and Tanalgo et al. (2015).

Species diversity

The birds species diversity in the study sites were determined by using two diversity indices method; Shannon-Wiener Index and the Simpson Diversity Index (Magurran, 2004) and were calculated by using PAST programme (Hammer & Harper, 2006).

Result and Discussion

Bird species and population, as well as their community structure are influenced by habitat types and diet preferences (Hashim & Ramli, 2013). The total number of species recorded was 15 species with 10 families, and the total number of birds observed was 59. Based on **Table 1**, Apodidae is the most abundance families with the percentage of the observation at 20.68% for the secondary forest, while the percentage recorded for the residential area was at 36.6%. The species found in the secondary forest was *Raphidura leucopygialis*, and *Apus pacificus* was found in the residential area. Meanwhile, the least number is Dicruridae and Bucerotidae which presented by 6.89% each. In addition, the family with the highest number of species was Sturnidae, consisting of three ground foraging species: common myna, jungle myna and javan myna with the total observation of 8 individuals. Some unique species of birds that were seen in the secondary forest were Greater Racquet-tailed Drongo (*Dicrurus paradiseus*), a member of Dicruridae and Oriental-pied Hornbill (*Anthracoceros albirostris*), a member of Bucerotidae. Both species previously recorded only showed up in the secondary forest. *Anthracoceros albirostris* is a species that is threatened in Thai-Malay Peninsula, Laos and Vietnam, due to indiscriminate deforestation (Vyas, 2002). A study done by Omar et al. (2019) documented *Dicrurus paradiseus* as the highest species observed in Gunung Tebu Forest Reserve. The least species found in the secondary forest was from Alcedinidae, represented by *Halcyon pileata* with 3.44%. Besides, in the residential area, the least species found was *Acridotheres javanicus* (Sturnidae), which were represented by two individuals (6.66%).

Table 1 Birds species found in two different study sites

Families	Species	Feeding guild	Secondary forest		Residential area	
			No. of observation	%	No. of observation	%
Columbidae	<i>Geopilia striata</i>	Gra	4	13.7	-	-
	<i>Streptopelia chinensis</i>	Gra	-	9	6	20.00
Apodidae	<i>Apus pacificus</i>	Ins	-	-	11	36.67
	<i>Raphidura leucopygialis</i>	Ins	6	20.6	-	-
Alcedinidae	<i>Alcedo atthis</i>	Car	3	10.3	-	-
	<i>Halcyon pileata</i>	Car	1	3.44	-	-
Pychonotidae	<i>Pycnonotus brunneus</i>	Ins-Fru	3	10.3	-	-
	<i>Copsychus saularis</i>	Ins-Fru	2	6.89	5	16.67
Sturnidae	<i>Achidotheres tristis</i>	Ins-fru	-	-	3	10.00

	<i>Acridotheres fuscus</i>	Ins-fru	-	3	10.00
	<i>Acridotheres javanicus</i>	Omn	-	2	6.66
Bucerotidae	<i>Anthracoceros albirostris</i>	Omn	2	6.89	-
Dicruridae	<i>Dicrurus paradiseus</i>	Fru	2	6.89	-
Nectariniidae	<i>Arachnothera longirosta</i>	Fru	3	10.3	-
Dicaeidae	<i>Dicaeum trigonostigma</i>	Nec	3	10.3	-
				4	
	Total		29	100	30
					100

Note: Gra- Granivore, Ins- Insectivore, Car-Carnivore, Ins-Fru - Insectivore-Fruitivore, Omn – Omnivore, Fru-Frutivore, Nec- Nectivore

Insectivore/frugivore and insectivore foraging were the most abundant types of feeding guild in secondary forest, with the total of 13 individuals observed that were represented by four species. Azman et al. (2011) recorded similar finding where insectivore and insectivore-frugivore dominated the secondary forest and the least common feeding types were carnivore and nectarivore. As being predicted, in the settlement area at Rantau Perintis, the types of feeding guild were less than the secondary forest in which four foraging behaviors were recorded. Insectivore species showed the domination in settlement area with 36.67%, followed by insectivore-frugivore species with 23.33% of the total individual observation. Two other species were able to adapt in the disturbed area namely granivore species and omnivore species, with the same number of individuals (20.0%). However, carnivore, frugivore, and nectarivore species were absent at the settlement area. The absence of those species was due to low tolerance to the changes of new habitat and dietary guilds (Lim & Sodhi, 2004). This study had categorized the bird species into seven feeding guilds based on the observation of the feeding behaviors and habitat utilization (**Table 2**). The insectivore group represented the higher number of individuals observed with 28.81%, followed by the species that feed two types of guild (insectivore/frugivore) with 23.73%. By using the PC method, it was hard to find small bird species that usually feed on nectar from flowers as there was only one species of nectar foraging was found from the study site.

Table 2 Feeding guilds types based on the number of species found in two different areas

Feeding guild	No of species	No of observation	%
Insectivore	2	17	28.81
Granivore	2	10	16.94
Carnivore	2	4	6.77
Omnivore	2	6	10.16
Frugivore	2	5	8.47
Insectivore/Frugivore	4	14	23.73
Insectivore/Nectarivore	1	3	5.08
	15	59	100

The values of Shannon's Diversity index in secondary forest was 2.207, higher than that at the residential area with the values of Shannon's Diversity Index was 1.629. Both recorded

values ranged between 1.5 to 3.5, which is a common range for value obtained (Magurran, 2004). Another determined diversity of bird species was species dominance where the reciprocal form of the diversity index of the Simpson (1/D) was used to calculate the diversity of birds reported from both study sites. From **Table 3**, the values of Simpson's Diversity Index in Rantau Perintis residential area was 0.7733, lower than the secondary forest with the values of 0.8799. Thus, the species in the secondary forest were more diverse and the species in the residential area were slightly high in dominance. From the result, foraging behavior of bird species contributed to the species abundance and distribution in a particular habitat. Decreasing in number of feeding types in residential area indicated that some of the species were unable to adapt with disturbed area as their food resources were very limited in that area. A study by Waltert et al. (2004) concluded that decreasing in the number of species occur when there is agricultural activities or any development takes place in the forested area. As the secondary forest generally has more types of food resources, this habitat has higher species richness than in the residential area.

Table 3 Comparison of diversity indices in secondary forest and residential area

Indices	Secondary forest	Residential area
Taxa (S)	10	6
Individuals	29	30
Dominance (D)	0.1201	0.2267
Simpson (1/D)	0.8799	0.7733
Shannon (H)	2.207	1.629

Conclusion

Based on these findings, it is concluded that the secondary forest and residential areas in Jengka provide a variety of habitats, particularly in terms of vegetation and food supplies. There are several forms of primary feed guilds presented in the study area. The secondary forest remains a significant habitat for forest-determination birds and forest protection is crucial for birds' survival.

Conflict of Interests

Author hereby declares that there is no conflict of interests with any organisation or financial body for supporting this research.

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