

THE COMPARISON OF DIURNAL BIRD'S SPECIES COMPOSITION BETWEEN SUNGAI CHONGKAK RECREATIONAL FOREST, SELANGOR AND UNIVERSITI PUTRA MALAYSIA, SERDANG, SELANGOR.

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ABSTRACT

Diurnal bird's species live in many areas. Forest conversion involves removing natural forest to other land use such as for agriculture, pasture, and urban development. Forest conversion may affect the composition of diurnal bird's species. In order to know the effect of forest conversion to the composition of diurnal bird's species, the study about the comparison of diurnal bird species composition between Sungai Chongkak Recreational Forest (SCRF), Selangor and Universiti Putra Malaysia (Serdang), Selangor was conducted to know the dissimilarity and similarity of species and family of diurnal bird between two types of areas which differ in term of environment. Sungai Chongkak Recreational Forest (SCRF), Selangor is nature forest area. Universiti Putra Malaysia (Serdang), Selangor is non-forest forest area that have many type of environment (such as plantation area, farm area, pasture area and academic area). In term of family similarity, the result of study indicates there are 12 similarities of diurnal bird's family between both study areas. In term of family dissimilarity, there are 8 families at SCRF area and 23 families at UPM area which different each other. In term of species similarity, there are only 2 similarities of diurnal bird's species between both study areas. In term of species dissimilarity, there are 39 species at SCRF area and 57 species at UPM area which different each other. The diversity indices analysis indicates that the number of families and species of diurnal birds at UPM area are richer than SCRF area. This study was found that forest conversion affect the diurnal bird's species composition where it changes the species of diurnal birds. From the comparison, almost all species of diurnal birds are different in both study area. Only 2 species of diurnal birds are same at both study area.

Keywords: Diurnal Bird's Species Comparison, Diurnal Bird's Families Comparison, Sungai Congkak Recreational Forest, Universiti Putra Malaysia

Introduction

There are approximately 10,000 bird species in the world. This number varies by a few hundred birds, depending on which classification system we use (Clements, 2014). Malaysia is among 17 mega biodiversity country in the world which contains about 70% of the world's species (Bird of Malaysia, 2014). With its rich bio-diversity, there are more than 742 species of the birds of Malaysia, belonging to 85 families. They range from the endemic and resident to migratory and vagrants. Peninsular Malaysia has a total of 644 species with 4 endemics, while Sabah has 568 species with 4 endemics, and Sarawak with 550 species, with 3 endemics (Bird of Malaysia, 2014). Diurnal bird's species are bird that normally active during sun rises which is from 7am to 7pm. Diurnal bird's species live in many areas. Forest conversion involves removing natural forest to other land use such as for agriculture, pasture, and urban development. Forest conversion may affect the composition of diurnal bird's species. In order to know the effect of forest conversion to the composition of diurnal bird's species, the study about the diversity comparison of diurnal bird between Sungai Chongkak Recreational Forest (SCRF), Selangor and Universiti Putra Malaysia (Serdang), Selangor was conducted to know the dissimilarity and similarity of species and family of diurnal bird between two types of areas which differ in term of environment. Sungai Chongkak Recreational Forest (SCRF), Selangor is nature forest area. Universiti Putra Malaysia (Serdang), Selangor is non-forest forest area that have many type of environment (such as plantation area, farm area, pasture area and academic area). Sungai Chongkak Recreational Forest, Selangor and Universiti Putra Malaysia, Selangor have their own characteristic of environment. The environment characteristic of Sungai Chongkak Recreational Forest, Selangor is more to large nature forest area. The environment characteristic of Universiti Putra Malaysia (Serdang), Selangor is more to plantation (such as plantation area, pasture area and farm area) and development (such as academic area).

METHODOLOGY

STUDY AREA

The study areas are at Sungai Chongkak Recreational Forest, Selangor and Universiti Putra Malaysia, Serdang, Selangor. The sizes, environment and function of these two area are different each other.

Sungai Chongkak Recreational Forest, Selangor is recreation area that located at Selangor about 3° 12' 42.32"N 101° 50' 36.46"E and 33.5km from Kuala Lumpur (Kuala Lumpur is located at about 3° 08' 20.45"N 101° 41' 12.68"E). This area has a large size

of forest area which is about 2800 hectare. SCRF is a popular recreational forest in Hulu Langat district of Selangor state. This area is managed by Tourism Selangor.

Universiti Putra Malaysia, Serdang is the area for study purpose. Universiti Putra Malaysia, Serdang area consists of the area such as academic area, lodging or college area, and University Agriculture Park (such as plantation area, farm area and pasture area). The size of the area is about 1214 hectare.

SAMPLING METHOD

During the study, transect line and point sampling was used at both area to observe the diurnal bird’s species. This is because transect line and point sampling is suitable method to conduct the research on birds and animal in tropical rainforest or in difficult terrain such as Sungai Chonkak Recreational Forest, Selangor (Buckland, 2004). Other than that, distance survey using point sampling method has been widely used to study the population of avian community and animals.

DIRECT OBSERVATION

The equipment that was used to observe diurnal bird’s species is a binocular. The model of the binocular is Bushnell 10 – 90 x 100. The Bushnell binocular is the binocular that suitable for the viewing of long distance object. To identify the species of diurnal bird, the book of “A Field Guide to the Birds of South – East Asia” by Craig Robson (2008) was used at field.

DATA ANALYSIS

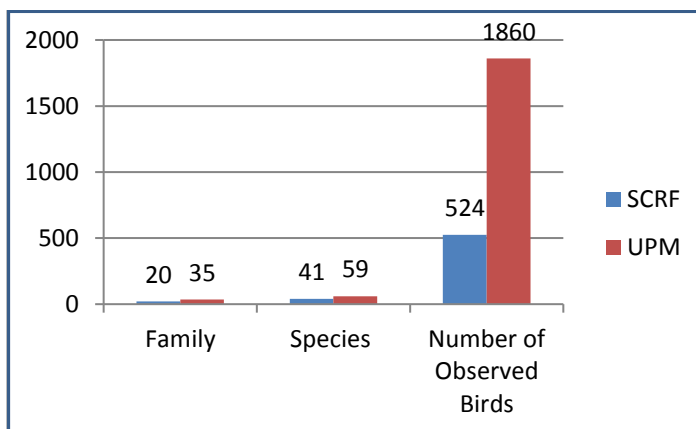
In this study, Microsoft Excel was used to record the data at both study area. Microsoft Excel also was used to ranking all the species of diurnal bird at both study area according to the number of species and number of observed bird. The data of diurnal bird’s species at both study area were analyzed to get the diversity indices. The diversity indices were analyzed using Margalef Index, Fisher’s Alpha Index and Chao1 Index. The diversity analysis is analyzing the species richness at the study area. The diversity indices were analyzed using “Past Software”. For the diversity indices, the higher the index number, the higher the species richness.

Figure 1: Diversity Indices

TITLE	FORMULA	FORMULA DESCRIPTION
Taxa (S)	-	Number of family/species
Individual (n)	-	Number of bird
Margalef’s Richness Index	$(S-1) / \ln(n)$	S: number of species n: number of bird
Fisher’s alpha Richness Index	$S=a*\ln(1+n/a)$	S: number of species n: number of bird a: Fisher’s alpha
Chao1 Richness Index	$Chao1=S + F_1(F_2 - 1)/[2(F_2 + 1)]$	F ₁ : the number of singleton species F ₂ : the number of doubleton species

RESULT AND DISCUSSION

Figure 2: Number of Family, Species and Observed Birds



From figure 2, the highest number of diurnal bird’s family, species and the number of observed bird is UPM area while SCRF area is lower than UPM. For overall, UPM area has many types of families, species and number of diurnal birds observed than SCRF area.

Figure 3: The Similarity of Diurnal Bird's Family between SCRF and UPM

The Similarity of Diurnal Bird's Family between SCRF and UPM			
No.	Family	Number of Species	
		SCRF	UPM
1	ALCEDINIDAE: HALCYONINAE	1	1
2	CISTICOLIDAE	4	1
3	COLUMBIDAE: COLUMBINAE	1	3
4	DICAEIDAE	2	1
5	DICRURIDAE	1	1
6	ESTRILDIDAE: LONCHURINAE	1	2
7	MOTACILLIDAE	1	2
8	MUSCICAPIDAE: MUSCICAPINAE	3	2
9	NECTARINIIDAE	3	3
10	ORIOLOIDAE	1	1
11	PYCNONOTIDAE	5	1
12	RALLIDAE	1	2

From figure 3, there are 12 families of diurnal bird that same at both study area. There are 4 families of diurnal bird's that has the same number of species which are ALCEDINIDAE: HALCYONINAE, DICRURIDAE, NECTARINIIDAE and ORIOLOIDAE. In SCRF area, there are 4 families of diurnal bird where the number of species is more than UPM area which are CISTICOLIDAE, DICAEIDAE, MUSCICAPIDAE: MUSCICAPINAE and PYCNONOTIDAE while in UPM area there are 4 families of diurnal bird where the number of species is more than SCRF area which are COLUMBIDAE: COLUMBINAE, ESTRILDIDAE: LONCHURINAE, MOTACILLIDAE and RALLIDAE.

Figure 4: The Different of Diurnal Bird's Family between SCRF and UPM

The Different of Diurnal Bird's Family between SCRF and UPM		
No.	Family: SCRF (Total Different of Family: 8)	Family: UPM (Total Different of Family: 23)
1	ALCEDINIDAE: ALCEDININAE	ACROCEPHALIDAE
2	CAMPEPHAGIDAE	AEGITHINIDAE
3	CHLOROPSEIDAE	ANATIDAE: DENDROCYGNINAE
4	CUCULIDAE: PHAENICOPHAEINAE	ARDEIDAE: ARDEINAE
5	LANIIDAE	CHARADRIIDAE
6	MUSCICAPIDAE: SAXICOLINAE	CICONIIDAE
7	PICIDAE	COLUMBIDAE: TRERONINAE
8	TIMALIIDAE	CORACIIDAE
9		CORVIDAE
10		CUCULIDAE: CENTROPODINAE
11		CUCULIDAE: CUCULINAE
12		FALCONIDAE: ACCIPITRINAE
13		GENERA INCERTAE SEDIS
14		HIRUNDINIDAE: HIRUNDININAE
15		MEROPIIDAE
16		PASSERIDAE
17		PHASIANIDAE: PHASIANINAE
18		PICIDAE: PICINAE

19	PLOCEIDAE
20	PSITTACIDAE: PSITTACINAE
21	RHIPIDURIDAE
22	STURNIDAE: STURNINAE
23	VANELLIDAE

From figure 4, there are 31 families of diurnal bird which different each other where 8 families at SCRF area and 23 families at UPM area. The number of diurnal bird's families at UPM area is more than SCRF area.

Figure 5: The Similarity of Diurnal Bird's Species between SCRF and UPM

The Similarity of Diurnal Bird's Species between SCRF and UPM				
No.	Scientific Name	Local Name	Number of Observed Bird	
			SCRF	UPM
1	<i>Copsychus saularis</i>	ORIENTAL MAGPIE-ROBIN	22	45
2	<i>Chalcophaps indica</i>	EMERALD DOVE	15	4

From figure 5, there are 2 species of diurnal birds that exist at both study area which are Oriental Magpie-Robin (*Copsychus saularis*) and Emerald Dove (*Chalcophaps indica*). The number of observed bird of Oriental Magpie-Robin (*Copsychus saularis*) is high at UPM area while the number of observed bird of Emerald Dove (*Chalcophaps indica*) is high at SCRF area.

Figure 6: The Different of Diurnal Bird's Species between SCRF and UPM

The Different of Diurnal Bird's Species between SCRF and UPM				
No.	UPM (Total Different of Species: 57)		SCRF (Total Different of Species: 39)	
	Scientific Name	Local Name	Scientific Name	Local Name
1	<i>Aplonis panayensis</i>	ASIAN GLOSSY STARLING	<i>Orthotomus ruficeps</i>	ASHY TAILORBIRD
2	<i>Eudynamys scolopaceus</i>	ASIAN KOEL	<i>Muscicapa dauurica</i>	ASIAN BROWN FLYCATCHER
3	<i>Gracupica contra</i>	ASIAN PIED STARLING	<i>Tersiphone paradisi</i>	ASIAN PARADISE FLYCATCHER
4	<i>Hirundo rustica</i>	BARN SWALLOW	<i>Ceyx erithaca</i>	BLACK BACKED KINGFISHER
5	<i>Ploceus philippinus</i>	BAYA WEAVER	<i>Chloropsis cochinchinensis chlorocephala</i>	BLUE-WINGED LEAFBIRD
6	<i>Platysmurus leucopterus</i>	BLACK MAGPIE	<i>Meiglyptes tukki</i>	BUFF-NECKED WOODPECKER
7	<i>Oriolus chinensis</i>	BLACK-NAPED ORIOLE	<i>Zanclostomus curvirostris</i>	CHESTNUT BREASTED MALKOHA
8	<i>Merops viridis</i>	BLUE-THROATED BEE-EATER	<i>Enicurus ruficapillus</i>	CHESTNUT-NAPED FORKTAIL
9	<i>Haliastur indus</i>	BRAHMINY KITE	<i>Orthotomus sutorius</i>	COMMON TAILORBIRD
10	<i>Dicrurus aeneus</i>	BRONZED DRONGO	<i>Orthotomus atrogularis</i>	DARK NECKED TAILORBIRD
11	<i>Anthreptes malacensis</i>	BROWN-THROATED SUNBIRD	<i>Oriolus xanthonotus</i>	DARK THROATEED ORIOLE
12	<i>Nisaetus limnaeetus</i>	CHANGEABLE HAWK-EAGLE	<i>Pericrocopus cinnamomeus</i>	FIERY MINIVET
13	<i>Merops leschenaulti</i>	CHESTNUT-HEADED BEE-EATER	<i>Dicrurus paradiseus</i>	GREATER RACQUET-TAILED DRONGO
14	<i>Dinopium javanense</i>	COMMON FLAMEBACK	<i>Hemicircus concretus</i>	GREY AND BUFF WOODPECKER
15	<i>Aegithina tiphia</i>	COMMON IORA	<i>Culicicapa ceylonensis</i>	GREY HEADED CANARY FLYCATCHER
16	<i>Gallinula chloropus</i>	COMMON MOORHEN	<i>Motacilla cinerea</i>	GREY WAGTAIL
17	<i>Acridotheres tristis</i>	COMMON MYNA	<i>Pycnonotus cyaniventris</i>	GREY-BELLIED BULBUL
18	<i>Eurystomus orientalis</i>	DOLLARBIRD	<i>Arachnothera modesta</i>	GREY-BREASTED SPIDERHUNTER
19	<i>Bubulcus coromandus</i>	EASTERN CATLE EGRET	<i>Stachyris poliocephala</i>	GREY-HEADED BABBLER
20	<i>Passer montanus</i>	EURASIAN TREE-SPARROW	<i>Tricholestes criniger</i>	HAIRY-BACKED BULBUL
21	<i>Ardea alba</i>	GREAT EGRET	<i>Malacocincla sepiaria</i>	HORSFIELD'S BABBLER

22	<i>Ardea cinerea</i>	GREY HERON	<i>Chloropsis cyanopogon</i>	LESSER GREEN LEAFBIRD
23	<i>Dendrocopos canicapillus</i>	GREY-CAPPED PYGMY WOODPECKER	<i>Arachnothera longirostra</i>	LITTLE SPIDERHUNTER
24	<i>Corvus splendens</i>	HOUSE CROW	<i>Blythipicus rubiginosus</i>	MAROON WOODPECKER
25	<i>Mesophoyx intermedia</i>	INTERMEDIATE EGRET	<i>Dicaeum trigonostigma</i>	ORANGE-BELLIED FLOWERPECKER
26	<i>Acridotheres javanicus</i>	JAVAN MYNA	<i>Macronous gularis</i>	PIN-STRIPED TIT-BABBLER
27	<i>Picus vittatus</i>	LACED WOODPECKER	<i>Hypogramma hypogrammicum</i>	PURPLE-NAPED SUNBIRD
28	<i>Tephrodornis gularis</i>	LARGE WOODSHRIKE	<i>Micropternus brachyurus</i>	RUFOUS WOODPECKER
29	<i>Centropus bengalensis</i>	LESSER COUCAL	<i>Actenoides concretus</i>	RUFOUS-COLLARED KINGFISHER
30	<i>Dendrocygna javanica</i>	LESSER WHISTLING-DUCK	<i>Orthotomus sericeus</i>	RUFOUS-TAILED TAILORBIRD
31	<i>Egretta garzetta</i>	LITTLE EGRET	<i>Luscinia cyane</i>	SIBERIAN BLUE ROBIN
32	<i>Butorides striata</i>	LITTLE HERON	<i>Pynonotus erythrophthalmos</i>	SPECTACLED BULBUL
33	<i>Psittacula longicauda</i>	LONG-TAILED PARAKET	<i>Pycnonotus finlaysoni</i>	STRIPE THROATED BULBUL
34	<i>Ficedula zanthopygia</i>	NARCISSUS FLYCATCHER	<i>Lanius triginus</i>	TIGER SHRIKE
35	<i>Cinnyris jugularis</i>	OLIVE-BACKED SUNBIRD	<i>Lonchura striata</i>	WHITE RUMPED MUNIA
36	<i>Charadrius veredus</i>	ORIENTAL PLOVER	<i>Amaurornis phoenicurus</i>	WHITE-BREASTED WATERHEN
37	<i>Acrocephalus orientalis</i>	ORIENTAL REED-WARBLER	<i>Enicurus leschenaulti</i>	WHITE-CROWNED FORKTAIL
38	<i>Anthus rufulus</i>	PADDYFIELD PIPIT	<i>Alophoixus phaeocephalus</i>	YELLOW BELLIED BULBUL
39	<i>Mycteria leucocephala</i>	PAINTED STORK	<i>Prionochilus maculatus</i>	YELLOW-BREASTED FLOWERPECKER
40	<i>Rhipidura javanica</i>	PIED FANTAIL		
41	<i>Treron vernans</i>	PINK-NECKED GREEN-PIGEON		
42	<i>Dicaeum minullum</i>	PLAIN FLOWERPECKER		
43	<i>Anthreptes simplex</i>	PLAIN SUNBIRD		
44	<i>Gallus gallus</i>	RED JUNGLEFOWL		
45	<i>Vanellus indicus</i>	RED-WATTLED LAPWING		
46	<i>Orthotomus sericeus</i>	RUFOUS-TAILED TAILORBIRD		

47	<i>Lonchura punctulata</i>	SCALY-BREASTED MUNIA		
48	<i>Centropus rectunguis</i>	SHORT-TOED COUCAL		
49	<i>Corvus enca</i>	SLENDER-BILLED CROW		
50	<i>Streptopelia chinensis</i>	SPOTTED DOVE		
51	<i>Motacilla flava</i>	WESTERN YELLOW WAGTAIL		
52	<i>Amaurornis phoenicurus</i>	WHITE-BREASTED WATERHEN		
53	<i>Lonchura maja</i>	WHITE-HEADED MUNIA		
54	<i>Pelargopsis amauroptera</i>	WHITE-THROATED KINGFISHER		
55	<i>Acridotheres grandis</i>	WHITE-VENTED MYNA		
56	<i>Pycnonotus plumosus</i>	YELLOW-VENTED BULBUL		
57	<i>Geopelia striata</i>	ZEBRA DOVE		

From figure 6, there are 96 species of diurnal birds where 39 species at SCRF area and 57 species at UPM area. UPM has many species of diurnal bird than SCRF.

Figure 7:- The Diversity Indices of Diurnal Bird's Family between SCRF and UPM

Diversity Indices of diurnal bird's family in SCRF and UPM		
Diversity Indices	SCRF	UPM
Taxa_S	20	35
Individuals	41	59
Margalef's Richness Index	5.116	8.338
Fisher's alpha Richness Index	15.42	36.19
Chao1 Richness Index	38.33	63.88

Figure 8: The Diversity Indices of Diurnal Bird's Species between SCRF and UPM

Diversity Indices of diurnal bird's species in SCRF and UPM		
Diversity Indices	SCRF	UPM
Taxa_S	41	59
Individuals	524	1860
Margalef's Richness Index	6.388	7.704
Fisher's alpha Richness Index	10.41	11.61
Chao1 Richness Index	41	61

From the analysis of diversity indices of diurnal bird's family (Figure 7) and diurnal bird's species (Figure 8), the diversity indices at UPM area is higher than SCRF area. This can be concluded that the diversity of diurnal bird's families and species is higher at UPM area than SCRF area.

The number of observed bird for certain species at UPM area is mostly more than SCRF area. This is because the species of diurnal bird at UPM area are mostly in a large group (such as more than 10 or 30 birds in one group) while the species of diurnal birds at SCRF are mostly in a small group (such as 2 to 4 in one group) or alone (such as Black Backed Kingfisher (*Ceyx erithaca*) and Rufous-Collared Kingfisher (*Actenoides concretus*)). Species such as Asian Glossy Starling (*Aplonis panayensis*) and Barn Swallow (*Hirundo rustica*) at UPM area are mostly to be in more than 20 birds in one group. The species of diurnal birds at UPM area is easy to observe than at SCRF area. This is because UPM area mostly have wide view and easy to search the birds while the view at SCRF area is very limit because there are many thing that obstacle the view such as tree branches, tree stem, and compact with flora species (such as big tree and shrub).

CONCLUSION

As a conclusion, the diversity comparison of diurnal bird's family indicates that there are 12 similarities and 31 dissimilarities of family between both study areas. In term of the diversity comparison of diurnal bird's species indicate that there are only 2 similarities and almost 100% dissimilarities (96 birds of 98 birds) of species between both study areas. From the analysis of diversity indices indicate that the diurnal bird's family and species at UPM area is richer than SCRF area. This study was found that the forest conversion affect the composition of diurnal bird's species where it changes the species of diurnal birds. Almost all species at both study areas are different. Only 2 species of diurnal birds are same at both study area. The species of diurnal birds at UPM area are mostly in a large group while at SCRF area is mostly in a small group or alone. The species of diurnal birds at UPM area are mostly easy to be founded and at SCRF area are mostly rare species and hard to be founded.

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