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RESEARCH NOTE

Bird diversity of the wetland area in Suwi river, Muara Ancalong, Kutai Timur, Kalimantan Timur, Indonesia [version 1; referees: awaiting peer review]

Nur Linda Isa¹, Monica Kusneti¹, Rudy Agung Nugroho ²

¹Yayasan Konservasi Khatulistiwa, Jl. Untung Suropati, Kompleks Perumahan Griya Tepian Lestari blok UU no.15, Samarinda, Kalimantan Timur, 75126, Indonesia

²Animal physiology, development, and molecular laboratory, Department of Biology, Faculty of Mathematics and Natural Sciences, Mulawarman University, Samarinda, Kalimantan Timur, 75123, Indonesia

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Abstract

The aim of the study was to determine the bird diversity in an essential ecological area, Suwi river, Muara Ancalong, Kutai Timur, Kalimantan Timur, Indonesia. The observation was performed at 5 locations using direct observation at two different times, 06.00-09.00 AM and 15.00-18.00 PM (Indonesia Central Standard Time-eight hours ahead or UTC+8 of GMT) from April 2017 to March 2018. The results stated that 63 species from 28 family were found with diversity index was 3.56. Fifteen birds species have a protected status according to PP no. 7 tahun 1999 (Government regulation document number 7 year 1999) about the preservation of plants and animals, while six species are in appendix two and one species is included in appendix one of the Convention on International Trade in Endangered (CITES). Appendix one includes species threatened with extinction. Trade in specimens of these species is permitted only in exceptional circumstances. Meanwhile, appendix two includes species not necessarily threatened with extinction, but in which trade must be controlled in order to avoid utilization incompatible with their survival. In addition, four species were of vulnerable status according to the International Union for Conservation of Nature (IUCN). This study provides information regarding the biodiversity of birds in an essential ecological area and contributes useful base line data for conservation activities.

Keywords

Birds, Suwi river, Muara Ancalong, Kutai Timur, Conservation

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Referee Status: Awaiting Peer

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Corresponding author: Rudy Agung Nugroho (rudysatriana@gmail.com)

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Introduction

Kalimantan island, known as Borneo, has a high biodiversity that remains one of the most forested provinces in Indonesia¹. Kalimantan, especially east Kalimantan, also has a close relationship with Mahakam river. In the lower part of the Mahakam river, there are several large seasonal lakes and hundreds of small lakes that form wetland area². In addition, the lakes have several small rivers, both inflows and backflows, which flow from both the Kelinjau and Kedang Kepala Rivers³. One of these small rivers is called the Suwi River, located in Muara ancalong district, Kutai Timur regency, East Kalimantan Province, Indonesia.

Recently, the wetland area in Suwi river and Mesangat lake have been proposed as an essential ecosystem (13.964,13 hectare) to support in the protection of both *Crocodylus siamensis* and *Tomistoma schlegii*, to prevent them from becoming extinct (see merdeka.com article). In addition, populations of fish can be also found in the Suwi River, which is surrounded by a large area of forest with populations of birds.

Though some studies have been done in the Suwi River^{1,4}, there is no information regarding the bird diversity in this area. Therefore, the aim of the current study was to inventory the bird diversity in this essential ecosystem of the Suwi River to support the conservation actions of Mesangat and Suwi wetland essential ecosystem, Muara Ancalong, Kutai Timur, Indonesia.

Methods

This study was performed in the Suwi River, Muara Ancalong, Kutai Timur, Indonesia (Figure 1) from April 2017 to March 2018. The observation locations were

- Upper stream (latitude: 0,42469; longitude 116,61273)
- Middle stream (latitude: 0,40816; longitude: 116,61749)
- Downstream (latitude: 0,38983; longitude: 116,60514)
- Ketiaw (latitude: 0,40638; longitude: 116,60346)
- Loa Bekara (latitude: 0,41527; longitude: 116,63173)

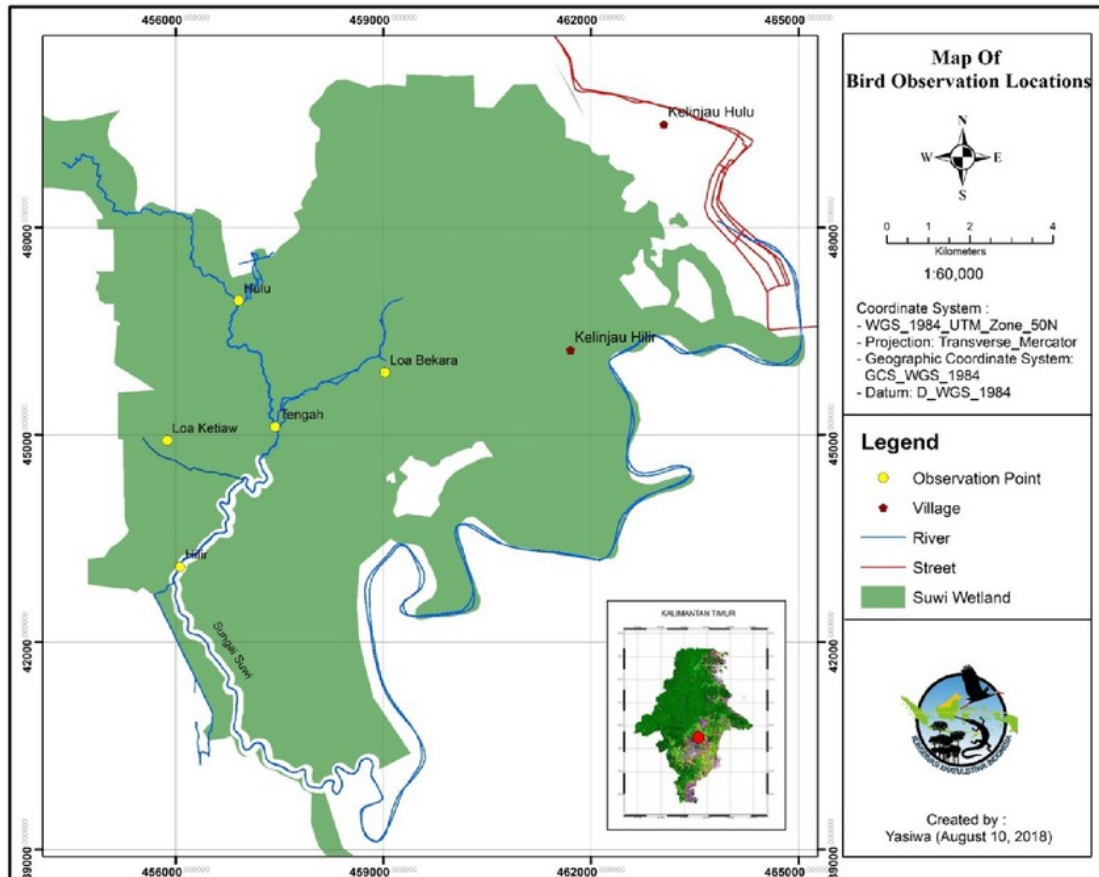


Figure 1. Bird observation location. a. Upper stream (latitude: 0,42469; longitude 116,61273), Middle stream (latitude: 0,40816; longitude: 116,61749), Downstream (latitude: 0,38983; longitude: 116,60514), Ketiauw (latitude: 0,40638; longitude: 116,60346), Loa Bekara (latitude: 0,41527; longitude: 116,63173)

Direct observation by researchers in the field at two different time points, 06.00–09.00 AM and 15.00–18.00 PM (Indonesia Central Standard Time-eight hours ahead or UTC+8 of GMT) was performed to collect the numbers of the individual birds and to identify species in each location. The equipment used included Binocular celestron, upclose G2 10-30x50 zoom porro (Torrance, California, United States) and Global Positioning System (GPSMAP) Garmin 78s. Images of found-birds were taken using a digital camera (Canon PowerShot SX520 HS PC2152 16.0MP Digital Camera, Canon, Inc., USA). To identify the species of the birds found, the guidelines book of Mackinnon *et al.*⁵ was used.

Data analysis

The diversity index was performed following *Shannon Index of Diversity*, with the equation of Ludwig and Reynolds⁶ using Microsoft Excel 2013:

$$H' = \sum (ni/N) \log (ni/N)$$

where :

H' = Shannon-Weiner index diversity

ni = the number of individuals found for a species

N = the number of individuals from all species

Results and discussion

63 bird species from 27 family were found during the study (Table 1). The full data of all birds found in the Suwi River wetland, Muara Ancalong, Kutai Timur, Kalimantan Timur, Indonesia can be seen in Dataset 1⁷.

Bird species that frequently were found in each observation location were *Pelargopsis capensis* ($n = 35$), followed by *Ardeola speciosa* ($n = 31$), *Treron vernans* ($n = 29$), *Anhinga melanogaster* ($n = 25$) and *Clamator coromandus* ($n = 20$).

The presence of *Pelargopsis capensis*, *Anhinga melanogaster* and *Ardeola speciosa* is likely due to the abundance of fish in the observation locations. Meanwhile, *Treron vernans* is a seed and fruit-eating bird species that can be observed in the Suwi river wetland area where local tree species such as *Ficus* sp. and *Malotus sumatranus* can be widely found. Further, *Coromandus Clamator* is a small insectivorous bird species and lives among trees, mangroves, farmland and bushes. Some of the birds that were observed during the study are categorized in the threatened-list of International Union for Conservation of Nature (IUCN), Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), or Indonesia government regulation document (PP) number 7 year 1999 about the preservation of plants and animals⁸ (Table 2).

Table 1. Bird diversity in the essential ecological area of Suwi River, Muara Ancalong, Kutai Timur, Kalimantan Timur, Indonesia.

No	Scientific name (Species)	Local name (Indonesia)	Family	Number of individuals (n)
1	<i>Acridotheres cristatellus</i>	Kerak Jambul	Sturnidae	4
2	<i>Aegithina tiphia</i>	Cipoh Kacat	Aegithinidae	1
3	<i>Alcedo meninting</i>	Raja Udang Meninting	Alcedinidae	8
4	<i>Amaurornis phoenicurus</i>	Kareo Padi	Rallidae	5
5	<i>Anhinga melanogaster</i>	Pecuk-ular asia	Anhingidae	25
6	<i>Anthraceroceros albirostris</i>	Kangkareng Perut-putih	Bucerotidae	1
7	<i>Anthraceroceros malayanus</i>	Kangkareng Hitam	Bucerotidae	2
8	<i>Aplonis panayensis</i>	Perling Kumbang	Sturnidae	2
9	<i>Ardea purpurea</i>	Cangak Merah	Ardeidae	6
10	<i>Ardeola speciosa</i>	Blekok Sawah	Ardeidae	31
11	<i>Artamus leucorhynchus</i>	Kekep Babi	Artamidae	2
12	<i>Bubulcus ibis</i>	Kuntul Kerbau	Ardeidae	1
13	<i>Butorides striatus</i>	Kokokan Laut	Ardeidae	2
14	<i>Centropus bengalensis</i>	Bubut Alang-alang	Cuculidae	5
15	<i>Centropus rectunguis</i>	Bubut Teragop	Cuculidae	4
16	<i>Centropus sinensis</i>	Bubut besar	Cuculidae	17
17	<i>Ceyx erithacus</i>	Raja Udang Api	Alcedinidae	2
18	<i>Clamator coromandus</i>	Bubut-pacar jambul	Cuculidae	20
19	<i>Columba vitiensis</i>	Merpati Hutan Metalik	Columbidae	2
20	<i>Copsychus saularis</i>	Kucica kampung	Muscicapidae	8

No	Scientific name (Species)	Local name (Indonesia)	Family	Number of individuals (n)
21	<i>Corvus enca</i>	Gagak Hutan	Corvidae	3
22	<i>Cuculus saturatus</i>	Kangkak Ranting	Cuculidae	1
23	<i>Cymbirhynchus macrorhynchos</i>	Sempur Hujan Sungai	Eurylaimidae	6
24	<i>Cyornis turcosus</i>	Sikatan Melayu	Muscicapidae	3
25	<i>Delichon dasypus</i>	Layang-layang Rumah	Hirundinidae	1
26	<i>Dendrocygna arcuata</i>	Belibis kembang	Anatidae	4
27	<i>Dicaeum celebicum</i>	Cabai Panggul Kelabu	Dicaeidae	4
28	<i>Dicaeum cruentatum</i>	Cabai Merah	Dicaeidae	1
29	<i>Dicrurus annectans</i>	Srigunting Gagak	Dicruridae	1
30	<i>Dinopium javanense</i>	Pelatuk Besi	Picidae	2
31	<i>Dryocopus javensis</i>	Pelatuk Ayam	Picidae	1
32	<i>Ducula pickeringii</i>	Pergam Kelabu	Columbidae	4
33	<i>Egretta alba</i>	Kuntul Besar	Ardeidae	2
34	<i>Egretta eulophotes</i>	Kuntul Cina	Ardeidae	1
35	<i>Egretta garzetta</i>	Kuntul Kecil	Ardeidae	6
36	<i>Elanus caeruleus</i>	Elang Tikus	Accipitridae	3
37	<i>Eudynamys scolopacea</i>	Tuwur Asia	Cuculidae	3
38	<i>Eurylaimus javanicus</i>	Sempur Hujan Rimba	Eurylaimidae	1
39	<i>Eurystomus orientalis</i>	Tiung-lampu Biasa	Coraciidae	17
40	<i>Gracula religiosa</i>	Tiung/Beo	Sturnidae	3
41	<i>Hemicircus concretus</i>	Caladi tikotok	Picidae	1
42	<i>Hirundo rustica</i>	Layang-layang Asia	Hirundinidae	6
43	<i>Hirundo tahitica</i>	Layang-layang Batu	Hirundinidae	13
44	<i>Leptoptilos javanicus</i>	Bangau tong-tong	Ciconiidae	4
45	<i>Meiglyptes tristis</i>	Caladi batu	Picidae	2
46	<i>Meiglyptes tukki</i>	Caladi badok	Picidae	6
47	<i>Merops viridis</i>	Kirik-kirik Biru	Meropidae	4
48	<i>Microhierax fringillarius</i>	Alap-Alap Capung	Falconidae	2
49	<i>Orthotomus ruficeps</i>	Cinenen Kelabu	Cisticolidae	2
50	<i>Pelargopsis capensis</i>	Pekaka emas	Alcedinidae	35
51	<i>Phaenicophaeus curvirostris</i>	Kadalan Birah	Cuculidae	1
52	<i>Phaenicophaeus diardi</i>	Kadalan Beruang	Cuculidae	4
53	<i>Phaenicophaeus sumatranus</i>	Kadalan Saweh	Cuculidae	1
54	<i>Picus miniaceus</i>	Pelatuk Merah	Picidae	2
55	<i>Porzana cinerea</i>	Tikusan Alis Putih	Rallidae	1
56	<i>Psittacula longicauda</i>	Betet Ekor-panjang	Psittaculidae	14
57	<i>Pycnonotus aurigaster</i>	Cucak Kutilang	Pycnonotidae	4
58	<i>Pycnonotus goiavier</i>	Merbah Cerukcuk	Pycnonotidae	2
59	<i>Streptopelia chinensis</i>	Tekukur Biasa	Columbidae	5
60	<i>Surniculus lugubris</i>	Kedasi Hitam	Cuculidae	1
61	<i>Treron fulvicollis</i>	Punai Bakau	Columbidae	14
62	<i>Treron vernans</i>	Punai Gading	Columbidae	29
63	<i>Trichastoma rostratum</i>	Pelanduk Dada-putih	Pellorneidae	1
Total number of individuals				369

Table 2. List of threatened, endangered or protected birds species found in Suwi river, Muara Ancalong, Kutai Timur, Kalimantan Timur, Indonesia.

No	Species	IUCN	CITES	PP No 7 1999
1	<i>Elanus caeruleus</i>	LR/lc	All	P
2	<i>Alcedo meninting</i>	LR/lc	NL	P
3	<i>Ceyx erithacus</i>	LR/lc	NL	P
4	<i>Anhinga melanogaster</i>	LR/nt	NL	P
5	<i>Ardea purpurea</i>	LR/lc	NL	P
6	<i>Ardeola speciosa</i>	LR/lc	NL	P
7	<i>Egretta alba</i>	LR/lc	NL	P
8	<i>Egretta eulophotes</i>	VU	NL	P
9	<i>Egretta garzetta</i>	LR/lc	NL	P
10	<i>Anthracoceros albirostris</i>	LR/lc	All	P
11	<i>Anthracoceros malayanus</i>	LR/nt	All	P
12	<i>Leptoptilos javanicus</i>	VU	NL	P
13	<i>Ducula pickeringii</i>	VU	NL	NP
14	<i>Centropus rectunguis</i>	VU	NL	NP
15	<i>Microhierax fringillarius</i>	LR/lc	All	P
16	<i>Pelargopsis capensis</i>	LR/lc	NL	P
17	<i>Dryocopus javensis</i>	LR/lc	AI	NP
18	<i>Psittacula longicauda</i>	LR/nt	All	NP
19	<i>Gracula religiosa</i>	LR/lc	All	P

IUCN = International Union for Conservation of Nature (IUCN), CITES = Convention on International Trade in Endangered Species of Wild Fauna and Flora, PP No 7 1999 = Indonesia Government regulation document (PP) number 7 year 1999 about preservation of plant and animal. LR/Lc = Lower risk/ Least Concern, LR/nt = Lower risk/near threaten, VU = Vulnerable, NL = Not on the List AI = Appendix I, All = Appendix II, P = Protected, NP = not protected

In the present study 63 species were identified, of which 15 species have protected status according to the Indonesia Government regulation document (PP) number 7 year 1999 on the preservation of plants and animals. Moreover, 6 species are categorized in appendix II of CITES indicating that the species are not necessarily threatened with extinction, but the trade of these animals must be controlled and regulated in order to avoid utilization incompatible with their survival. Furthermore, only one species is classified in appendix I of CITES, meaning the species is threatened with extinction. Trade in specimens of this species is only permitted under special circumstances. 4 species were found to be vulnerable according to the IUCN.

The diversity index of birds of the Suwi River, Muara Ancalong, Kutai Timur, Kalimantan Timur, Indonesia was found to be

3.56. According to Shannon-Wiener index, the diversity of birds of the Suwi river, Muara ancalong was $H > 3$, a high diversity index. However, illegal hunting for commercial use and land-use change for palm oil plantations might threaten the habitat of the birds. Thus, conservation actions and further regulation should be considered.

Dataset 1. List of found-birds during observation between April 2017 and March 2018 in the Suwi River wetland, Muara Ancalong, Kutai Timur, Kalimantan Timur, Indonesia

<http://dx.doi.org/10.5256/f1000research.16251.d219571>

Dataset 2. Pictures of found-birds during observation between April 2017 and March 2018 in the Suwi River wetland, Muara Ancalong, Kutai Timur, Kalimantan Timur, Indonesia

<http://dx.doi.org/10.5256/f1000research.16251.d219586>

Conclusion

The first report of bird diversity an essential ecological area of the Suwi River wetland, Muara Ancalong, Kutai Timur, Kalimantan Timur, Indonesia has found it contains a number of birds that are protected according to the IUCN, CITES and Indonesia government document. Though the diversity index of bird is classified as high, conservation action should be taken into consideration in order to protect the birds as well as their natural habitat.

Data availability

Dataset 1: List of found-birds during observation between April 2017 and March 2018 in the Suwi River wetland, Muara Ancalong, Kutai Timur, Kalimantan Timur, Indonesia. [10.5256/f1000research.16251.d219571](https://doi.org/10.5256/f1000research.16251.d219571)⁷

Dataset 2: Pictures of found-birds during observation between April 2017 and March 2018 in the Suwi River wetland, Muara Ancalong, Kutai Timur, Kalimantan Timur, Indonesia. [10.5256/f1000research.16251.d219586](https://doi.org/10.5256/f1000research.16251.d219586)⁹

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