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Bird Species in the Wetlands of Barito Kuala District, Indonesia

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ABSTRACT
There have been no publications on birds found in the wetlands of Barito Kuala District. If anything, the prevailing assumption is that many waterbirds are found in these wetlands. The research objective was to record bird species and analyze their presence in the wetlands. Diurnal birds were observed from 07.00-10.00 and 15.00-18.00 on three sites consisting of swamps, paddy fields, and rubber plantations in January 2023. Observers walked two kilometers back and forth for three times on each site. Thirty species (22 families) of birds were found and only 3 species were categorized as waterbirds. Most of these birds are of least concerned and are not protected. The degree of similarity between bird communities between sites ranged from 0.31 to 0.36. The level of similarity is likely to increase if the observations are made with a greater number of repetitions.

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1. INTRODUCTION

Birds are animals that are more often observed and easier to find than other large animals (macrofauna), such as mammals, reptiles and amphibians (Soendjoto et al., 2018). Animals which are also known as aves are easy to find at various points with various activities. They hover at a certain height, fly from one tree to another or perch with a variety of behaviors, such as jumping from one branch to another to look for food on the surface of the bark of the branches/trunks or in between the groves of leaves, making sounds (whistling, chirping, babbling) or flapping wings not only to attract the opposite sex or to show mastery over a territory, as well as pecking certain body parts, such as wings and tail to clean feathers. This behaviors are carried out in safe and comfortable conditions and cannot be separated from the elements of the surrounding environment.

One of the many groups of birds that were used as the object of observation this time were birds that were active in wetlands. In the Ramsar Convention which has been ratified by the Government of the Republic of Indonesia and ratified by Presidential Decree Number 48 of 1991 concerning Ratification of the Convention on Wetlands of International Importance especially as Waterfowl Habitat, wetlands are defined as areas of swamp, brackish, peatland and waters, natural or artificial, permanent or temporary, with stagnant or flowing water, fresh, brackish or salt, including areas of marine waters the depth of which at low tide does not exceed 6 meters. From this definition, the assumption that emerges is that the birds that are active in this wetland or most of the birds that live in these wetlands are waterbirds. This assumption is of course debatable.

This research was conducted in one of the wetland villages. The aim is to record bird species and then analyze their presence in the village. Apart from being used to answer the assumptions put forward above, research results can be used as learning material, especially those related to morphology, ecology, behavior and habits, as well as bird watching.

2. RESEARCH METHOD

The research location is Barambai Kolam Kanan Village, Barambai District, Barito Kuala Regency (Figure 1). The regency, which has an area of approximately 2,996.96 km^2 (Diskominfo Batola, 2022), is synonymous with wetlands because its territory is located between waters consisting of the Barito River which is also the boundary of natural areas in the eastern and northern parts of the district, the Kapuas River which is the boundary of the area. in the west, and the Java Sea as the boundary in the south. In detail, the Barito Kuala Regency area

actually consists of natural wetlands in the form of large rivers and small rivers, beaches (mangrove forests), galam swamps and artificial wetlands which include secondary channels (*anjir*), tertiary channels (*ray*), paddy fields, and rubber plantations or gardens (*Hevea brasliensis*).

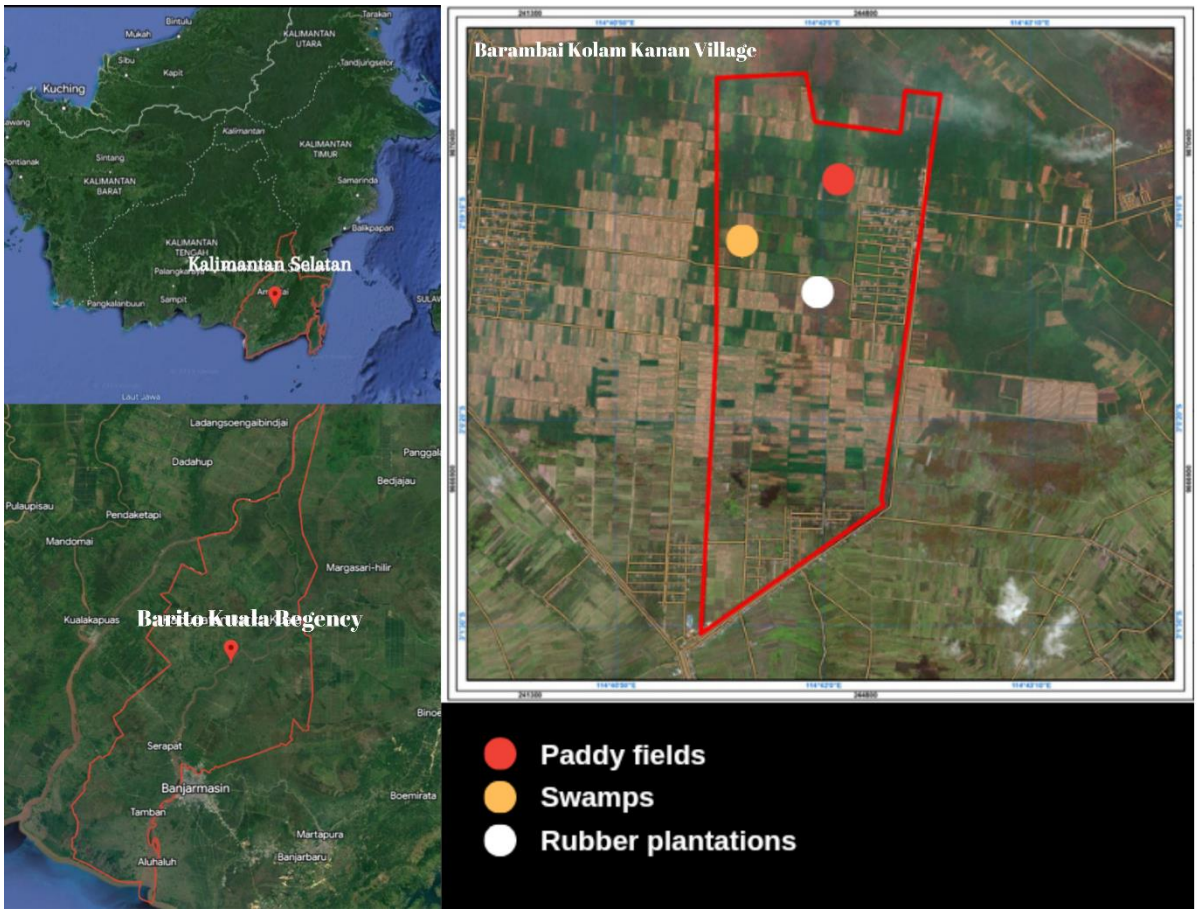

Figure 1. Three research sites in Barambai Kolam Kanan Village, Barito Kuala Regency

Diurnal birds were observed from 07.00-10.00 and 15.00-18.00 at three sites in January 2023. Observations were made on foot two kilometers back and forth for three repetitions for each site. The presence of birds was determined visually from direct encounters or based on their sounds. The morphology was observed with the help of binoculars and/or a prosumer camera. Identification was carried out directly or with the help of field books of Eaton et al. (2022), Soendjoto et al. (2015a), or Soendjoto et al. (2019). The three sites observed were swamps, paddy fields and rubber plantations.

Swamps are a land resource that dominates Barambai Kolam Kanan Village (APSSI, 2022). Here grows galam (*Melaleuca* spp.), the dominating plant and generally grows spontaneously or is not planted intentionally. Apart from plants whose leaves smell like eucalyptus, the plants that also grow in the swamp are various species of herbaceous plants, such as the eceng gondok (*Pontederia crassipes*), genjer (*Limnocharis flava*), purun tikar (*Lepironia articulata*), purun tikus (*Eleocharis dulcis*) or teki-tekian in general (Cyperaceae), grasses (Poaceae), and various species of ferns.

Paddy fields are areas for cultivating rice or padi (in Indonesian), the staple food source for almost all Indonesians. The paddy fields in this village are developed on acid soil and are affected by tides, moreover the location of the village area is at an altitude of 0.2 – 3 meters above sea level (APSSI, 2022). Paddy fields are developed by farmers who consist of various ethnicities and have an average of 23 years of experience in rice farming (Husna et al., 2020). Farmers generally plant paddy fields once a year and the rice planted is a local variety that is 8-10 months old and yields only 2.0-2.5 tonnes ha^{-1} (Koesrini et al., 2018). Apart from rice, the crops that are also cultivated by farmers are siamese oranges.

Rubber plantations are also developed in swamp areas. Different from paddy fields, where the position of the area is made lower than the surrounding area through a system of knocking or digging, the position of the surface of the rubber plantation is already high or made higher than the surrounding area through a system of piling (filling in with the surrounding soil). The high position allows the area to be planted with rubber. With this condition the roots of mature plants are not easily rotted or attacked by pests or diseases.

Data on the species and number of individual birds found are stored in tables. The placement of the data corresponds to the location where the species was found. This data is then processed to obtain a diversity index, similarity index, conservation status or rarity of birds according to IUCN (2023), as well as their protection status according to Permen-LHK P.106 (2018). The diversity index used is the Shannon-Wiener which is calculated according to Formula 1, while the similarity index used is the Jaccard index (Formula 2) which is calculated according to Formula 2.

$$H' = -\Sigma \frac{ni}{N} \left(\ln \frac{ni}{N}\right) \quad \text{..... (Formula 1)}$$

In this case, H' = Shannon-Wiener diversity index; ni = number of individual species-i; N = number of individuals of all species.

$$IS = \frac{2C}{A+B+C} \quad \text{..... (Formula 2)}$$

In this case, IS = Jaccard index of similarity; A = number of species in community A; B = number of species in community B; C = the number of species in community A and also community B.

3. RESULT AND DISCUSSION

Species Diversity

Thirty species belonging to 22 bird families were found in three sites in Barambai Kolam Kanan Village. These birds are spread across the research location which consists of swamps, paddy fields and rubber plantations with varying numbers of species and individuals. (Table 1). In the case of this study, several bird species were found in only one site, such as Alcedinidae and Ardeidae. However, other species are found on two or even three different sites at once, such as the zebra dove (*Geopelia striata*), the lesser coucal (*Centropus bengalensis*), and the sparrow (*Passer montanus*).

Most of them are terrestrial/land birds or not waterbirds, Of the 22 bird families found in the research sites, only 3 were categorized as water birds, namely Ardeidae, Ciconiidae and Rallidae. Waterbird, water bird, or aquatic bird is a bird that swims and lives in or near water (Britannica Dictionary, 2023), a bird that lives near water, especially rivers or lakes, and often walks or swims in the water (Oxford Advanced Learner's Dictionary, 2023), a swimming or wading bird (Merriam-Webster.com Dictionary, 2023). They are an important and non-negligible component of the wetland environment (Wetlands International, 2012). This group of birds usually migrates in large numbers from one region to another (Mulyana et al., 2021) basically because of different seasons.

When compared with the number of waterbirds throughout the world, which according to BirdLife International (2017) dan Wetlands International (2012) reaches 32 families or 871 species, the ratio of water birds in the research sites is very small, namely 9.38% of the total number of families or even only 0.34% of the number of species. Each of these waterbird families happens to be represented by only one species each. Cinnamon bittern (*Ixobrychus cinnamomeus*) is known to exist when this bird flies and then perches at a point which is located at the bottom of the stem or the ground surface where aquatic plants (such as Cyperaceae) plant their roots. Perched or active in this position makes it hidden. The presence of this bird can also be known when it flies away from a hidden point when the observer approaches that point or a moving object surprises it. The presence of white-breasted waterhen (*Amaurornis phoenicurus*) or called burak-burak in the Banjar language is detected by its sound. In addition, the presence of this bird is also known when crossing footpaths or paved public roads when moving from one place to another. The presence of the lesser adjutant (*Leptoptilos javanicus*) is known when it flies a few meters in the harvested paddy fields.

That ratio is of course balanced with the relatively low frequency of data collection, only three repetitions. The ratio is calculated to increase if the frequency of data collection is greater. This is provided that the habitat conditions are at least the same as the conditions at the time of data collection. Habitats with variations in biological resources (such as plants, animals, the impact of their presence, and food), variations in physical resources (such as moisture, coolness, shade, landscape and land strata), and minimal disturbance from humans invite birds to attend more frequently or more species and individuals.

More than 96% of the birds found have low risk status (least concern) and most have unprotected status.

Table 1. Bird species found at three research sites in Barambai Kolam Kanan Village

No.	Species and family name	Local/Indonesia name	Common name	Σ individuals found at			IUCN (2023)	P.106 (2018)
				Swamps	Rubber plantations	Paddy fields		
Acanthizidae								
1	*Gerygone sulphurea*	Remetuk laut	Golden-bellied Gerygone	1	2	-	LC	UP
Accipitridae								
2	*Elanus caeruleus*	Elang tikus	Black-winged Kite	-	-	2	LC	P
3	*Haliastur indus*	Elang bondol	Brahminy Kite	-	-	1	LC	P
Alcedinidae								
4	*Todiramphus chloris*	Cekakak sungai	Collared Kingfisher	2	-	-	LC	UP
5	*Halcyon smyrnensis*	Cekakak belukar	White-breasted Kingfisher	1	-	-	LC	UP
Apodidae								
6	*Collocalia linchi*	Walet linchi	Cave Swiftlet	-	10	6	LC	UP
Ardeidae								
7	*Ixobrychus cinnamomeus*	Bambangan merah	Cinnamon Bittern	2	-	-	LC	UP
Artamidae								
8	*Artamus leucoryn*	Kekep babi	White-breasted Woodswallow	1	-	-	LC	UP
Ciconiidae								
9	*Leptoptilos javanicus*	Bangau tongtong	Lesser Adjutant	-	1	-	Vu	P
Cisticolidae								
10	*Orthotomus ruficeps*	Cinenen kelabu	Ashy Tailorbird	1	-	-	LC	UP
11	*Prinia flaviventris*	Perenjak rawa	Yellow-bellied Prinia	2	-	-	LC	UP
Columbidae								
12	*Geopelia striata*	Perkutut	Zebra Dove	3	-	1	LC	UP
13	*Spilopelia chinensis*	Tekukur	Eastern Spotted Dove	3	-	-	LC	UP
Cuculidae								
14	*Centropus bengalensis*	Bubut alang-alang	Lesser Coucal	3	-	3	LC	UP
Dicaeidae								
15	*Dicaeum trochileum*	Cabai jawa	Scarlet-headed Flowerpecker	1	-	-	LC	UP
Estrildidae								
16	*Lonchura malacca*	Bondol rawa	Tricoloured Munia	6	-	4	LC	UP
17	*Lonchura fuscans*	Bondol kalimantan	Dusky Munia	5	4	1	LC	UP
18	*Lonchura punctulata*	Bondol peking	Scaly-breasted Munia	7	-	5	LC	UP
Hirundinidae								
19	*Hirundo tahitica*	Layang-layang batu	Tahiti Swallow	-	-	8	LC	UP
Laniidae								
20	*Lanius schach*	Bentet kelabu	Long-tailed Shrike	-	1	4	LC	UP
Nectariniidae								
21	*Anthreptes malacensis*	Madu kelapa	Brown-throated Sunbird	7	-	-	LC	UP
22	*Cinnyris jugularis*	Madu sriganti	Olive-backed Sunbird	7	-	-	LC	UP
Passeridae								
23	*Passer montanus*	Burung gereja	Eurasian Tree Sparrow	4	3	4	LC	UP
Picidae								
24	*Picoides moluccensis*	Caladi tilik	Sunda Pygmy Woodpecker	1	-	-	LC	UP
Pycnonotidae								
25	*Pycnonotus aurigaster*	Cucak kutilang	Sooty-headed Bulbul	4	3	3	LC	UP
26	*Pycnonotus goiavier*	Merbah cerucuk	Yellow-vented Bulbul	3	1	-	LC	UP
Rhipiduridae								
27	*Rhipidura javanica*	Kipasan belang	Sunda Pied Fantail	2	1	-	LC	UP
Rallidae								
28	*Amaurornis phoenicurus*	Kareo padi	White-breasted Waterhen	3	-	1	LC	UP
Sturnidae								
29	*Acridotheres javanicus*	Kerak kerbau	Javan Myna	3	-	2	LC	UP
Vangidae								
30	*Hemipus hirundinaceus*	Jingjing batu	Black-winged Flycatcher-shrike	-	1	-	LC	UP
Number of individuals				72	27	45		
Number of species				23	10	14		
Number of families				15	9	11		
Diversity Index (H')				2,94	1,94	2,44		

Notes:
1. UP = unprotected; P = protected; LC = least concerned; Vu = vulnerable
2. P.106: Permen-LHK P.106.

Only a bird species (3.33%) has vulnerable status and coincidentally this bird, namely the tongtong stork or Lesser Adjutant, is a protected bird. These low-risk birds appear to be able to adapt to changing or modified wetland conditions. This type of bird is mostly active and can be found carrying out activities (nesting, jumping over plant branches and twigs to find food) in rubber agroforestry areas (Marsuki et al., 2022), former mining reclamation areas (Atmoko et al., 2015; Soendjoto et al., 2022), and coastal areas, including in this case around ports (Riefani & Arsyad 2019; Riefani & Soendjoto, 2021; Soendjoto et al., 2015b).

An increase in the number of bird species whose protection status is low risk is believed to have a negative impact on bird conservation or overall environmental sustainability. People, especially those whose job is catching or hunting birds, can continue work that is actually categorized as negative (Commerçon et al., 2021; Noraini et al., 2013; Pattiselanno & Mentansan, 2010; Suroto, 2018). No one disturbs their source of livelihood. In the end, they have a greater opportunity to continue to threaten and destroy the environment which is actually the bird's habitat.

It is the government's duty to be wiser in determining the protection status of birds. The government definitely knows that each bird species has a different ecological function or role from other species. Pycnonotidae, such as *P. aurigaster* and *P. goiavier* act as frugivores. With this role they help seed dispersal (Saputra et al., 2020). They can also act as insectivores, a role that allows them to not only increase their protein intake but also help control pests and disease. Nectariniidae, such as *A. malacensis* and *C. jugularis* act as nectarivores-insectivores (Munira et al., 2012). When they are nectarivores, these two species either directly or indirectly help pollinate flowers. Columbidae, and Estrildidae are two families of granivorous birds (Tohir et al., 2021). Through this role, they may only consume bad seeds and leave superior seeds to grow and develop. Accipitridae act as carnivores (Hadi et al., 2022) which then function as top predators to maintain environmental balance.

Community Similarities

The bird community similarity index at the compared sites ranged from 0.31 to 0.36 (Table 2). This index is identical to the difference between sites, which ranges from 0.64 to 0.69. Differences in index are normal because the sites are indeed different, both biologically and physically. The main biological differences include the availability (quantity) and quality of food, both from vegetable sources (such as leaves, fruit, seeds) and from animals (such as insect larvae, imago). Other biological differences concern micro elements (such as viruses, bacteria, and other micro-organisms) that cause disease, as well as macro elements (such as predators and other large animals) that cause predation or competition. Micro elements or macro elements have the potential to reduce bird populations. Physical differences concern the atmosphere, which includes humidity, shade, and hiddenness due to the presence of air, water, or hot sun. This atmosphere makes the birds feel safe and comfortable doing activities on the research site. Soendjoto et al. (2014, 2018) and Riefani et al. (2019) argues that fluctuations in the number of bird species in an area are influenced by the time of observation (dry season or rainy season), species preferences (preferences) for habitat, quantity (availability) and quality (diversity) of plant species as food sources, convenience for activities (breeding, finding partners, mating, building nests, laying eggs, caring for and caring for children) as well as security from biological factors (predators, competition for space and food, and human disturbance or threats) or physical factors (environmental temperature and humidity, shading conditions , ease of finding and obtaining nest material).

Table 2. Similarity index

Areas	Swamps	Paddy fields	Rubber plantations
Swamps	1,00	-	-
Paddy fields	0,36	1,00	-
Rubber plantations	0,31	0,34	1,00

In the current research, the similarity index between sites is lower than 0.40 and this already indicates that there are no striking differences between sites. However, when compared with the similarity index between sites in modified areas found in other studies in the Kalimantan region, this index is relatively small. The bird community similarity index between sites in agroforestry areas in Banjar Regency, South Kalimantan is around 0.70–0.75 (Marsuki et al., 2022) and in the revegetation areas of former coal mines in Balangan Regency and Tabalong Regency, South Kalimantan is 0.29–0.65 (Pranata et al., 2022).

A similarity index lower than 0.40 is of course not permanent or does not happen forever. The similarity index can increase if the frequency of data collection repetitions is increased to more than 3 repetitions and then stops when the results are constant. In addition, an increase in the index can occur if site maintenance is not carried out, thereby allowing plant diversity to increase, diversity of food sources to increase, and human disturbance to decrease. The problem is whether the owners of modified areas want to do this in their areas and become a source of livelihood.

4. CONCLUSION

Thirty bird species were found with varying diversity between research locations (range 1.94 – 2.94) in the wetlands and less than 10% were categorized as waterbird families. Most of the birds are of least concerned status and are also not protected. The frequency of bird observations should be more or not only three times as in this study. The frequency of lots produces data that is not just a lot but more importantly, relatively constant. With more constant data, the conclusions are more consistent. Even so, data from low frequency observations can still be used, especially for activities related to biology learning for students.

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