

## Identification of Bird Diversity in Putroe Phang Park, Banda Aceh, Indonesia

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### Abstract:

Biodiversity in Indonesia includes flora and fauna. One of the biodiversity of fauna in Indonesia is birds. The existence of uncontrolled development and hunting of rare birds can threaten the existence of birds. PutroePhang Park is a green open space that is also used by birds as their habitat. The diversity of bird species can be used as an indicator of environmental quality. The purpose of this study was to determine the diversity of bird species found in PutroePhang Park in Banda Aceh. The Point Count method was used for this research. Based on the results of research at PutroePhang Park in Banda Aceh City, there were 13 species of birds in 9 families. The Diversity Index ( $H'$ ) in PutroePhang Park is 1.78 which is included in the medium category. *Hirundorustika* bird species diversity index, has a value of 0.17 which is in the low category, with Importance Value Index value (23.57). The lowest bird species diversity index was *Lonchurapunctulata*, *Orthotomusruficeps*, *Passer montanus*, *Phylloscopus borealis* and *RhipiduraJavanica* with each value of 0.12, and IVI value of 11.51. The value of the Dominance Index in PutroePhang Park is 0.079 in the low category. For bird groups that found based on type of food, insectivores had the highest percentage (46.15%), while nectarivores had the smallest percentage with a value of (7.69%).

*Keywords* — City Park, birds, diversity, PutroePhang

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### I. INTRODUCTION

Birds are wild animals that are found in almost every vegetation area (Hadinoto et al., 2012). The habitat consists of various types of ecosystems, from native ecosystems to artificial ecosystems. Birds have a wide distribution, where birds are one of the many important sources of Indonesia's natural resources. The role of birds as an indicator of environmental

change, which makes them a regulator of ecosystem balance, to be precise in the forest ecosystem. In addition, birds also act as regulators of natural forest regeneration, such as plant pollinators and pest controllers (Oktiana and Antono, 2015). Birds are the largest group of vertebrate animals. It is estimated that there are 8,600 bird species scattered in the world. Birds are warm-blooded. When viewed from the kinship of birds, they are actually more closely related to reptiles,

which evolved around 135 million years ago (Mackinnon, 2010). The presence of bird species in a habitat is strongly influenced by the biotic or abiotic environment of the occupied area. (Juralis 2007). Birds are wild animals that are easily found in almost every vegetated environment, and can also be found in various types of ecosystems. Evenly distributed levels of birds can be used as a source of biological wealth, which plays a role in ecosystems, and is sensitive to environmental changes (Hadinoto et al. 2012). Availability of nesting sites, available food sources, perches, and shelter from enemy animals is important, which can determine the presence of bird species in a habitat (Poulin et al., 1992). Habitats that have high diversity of vegetation species also have high bird species diversity, when compared to habitats that are poor in vegetation types.

The higher and various types of vegetation in a habitat, the higher the type of feed available in the habitat, so that food choices for birds will be more available (Dewi, 2007). Indonesia is one of the countries that has a high level of biodiversity value, one of which is birds, where the bird category is recorded as many as 1598 bird species found in the territory of Indonesia (Sujatnika et al, 1995). At the beginning of 2020, there has been an increase in bird species in Indonesia, where four species have been obtained, so that from a total of 1,773 bird species to 1,777 species in 2020. (Burung.org, 2020). Studies on bird species in

Aceh have been widely reported, such as Fithri (2012a) who reported that 26 bird species were found in the Tibang Forest in Banda Aceh. According to Fithri (2012b), he reported that 26 species of birds had been obtained at the campus of the Syiah Kuala University, Darussalam, Banda Aceh, Indonesia.

The Banda Aceh City Government is currently continuing to increase the provision of Green Open Space, which can be used as a recreation area for the city community, as well as to improve air quality in cities that are full of pollution. The provision of green open space also refers to Law no. 26/2007 concerning Spatial Planning explicitly stipulates that the proportion of city green open space is at least 30% of the total area. In Banda Aceh City, there are several green open spaces that are used by the community as green recreation areas, including: Taman Sari, PutroePhang Park, Tsunami Education Park, Tibang forest, and others (DLHK3, 2020). The Banda Aceh City Government has also carried out ecosystem management by utilizing parks as ecological areas. One of the parks that performs this ecological function is the PutroePhang park.

## **2. METHODOLOGY**

The location of this research was conducted at PutroePhang Park in Banda Aceh. This location is an area of green open space that allocated as an urban forest (RTRW, 2009). The research location can be seen in Figure 1.

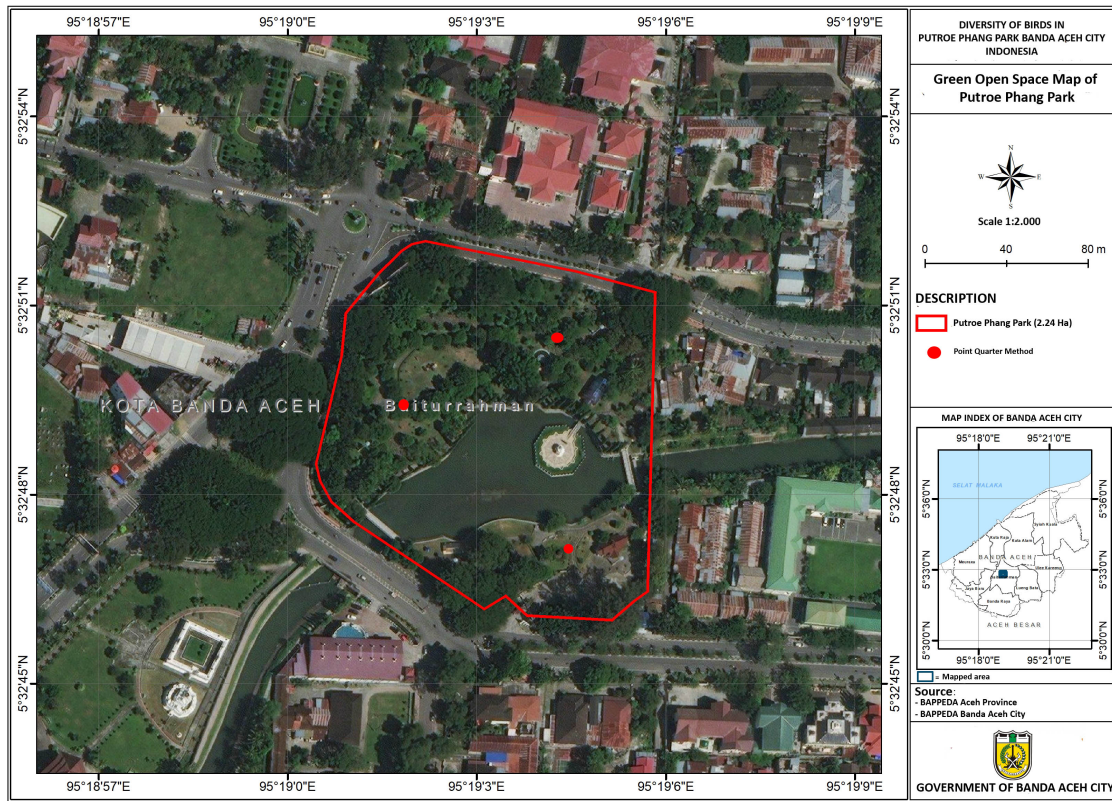


Figure 1. Research Locations at Putroe Phang Park in Banda Aceh.

The data collection method used was the Point Count method (Bibby et al., 2000). Bird data was collected using the point count method, by making a circular plot, which has a diameter of 20 meters, with a point distance of 80 meters. This data collection was carried out by observing birds at the point of observation, by observing each type of bird found, either directly or indirectly, what was observed were body shape, body size, body color arrangement, beak and leg shape, as well as other characteristics. After all these characteristics have been obtained, identification or naming is carried out

according to the field guidebook. Observations were carried out in the morning at 06.00–09.00 AM, in clear weather conditions at the predetermined observation points, with observation time intervals every 50 minutes. The number of observation points was 3 points, for 5 days in the morning and evening. Direct recording was carried out by observing birds (either in plain view or using binoculars), with the help of a Bird Recognition Field Guide Book (MacKinnon, 2010), and indirect observations were made based on the sound of birds and their nests.

Bird data was processed and presented in tables and graphs, in the form of bird frequency, dominance, important value index (IVI), Shannon-Wiener diversity index (H') (Ludwig and Reynold, 1988), ShannonWiener species diversity index is calculated using the formula:

$$H' = -\sum p_i \cdot \ln \cdot p_i$$

Where :

H' = Shannon Diversity Index

Pi = (n/N)

Ni = number of individuals to-i

ln = Natural Logarithm

The value of the diversity index calculation (H') shows that (Odum, 1998) :

H' > 3 High

1 > H' > 3 Mid

H' < 1 Low

The dominance index is used to obtain information about the types of birds that dominate a community in the research area determined by Simpson, determined using a formula. (Ludwig and Reynold, 1988), namely:

$$C = \sum_{i=1}^n \left[ \frac{n_i}{N} \right]^2$$

Where:

C = Simpson Dominance Index

ni = the number of individuals of a type

N = Number of individuals of all types

The range of dominance index values (C) according to Krebs (1978) is: 0 < C ≤ 0.5 is low species dominance; 0.5 < C ≤ 0.75 is moderate species dominance; C ≤ 1 is the species dominance of the high-frequency presence of birds. The value of the frequency of the presence of birds was obtained using the formula (Bibby et al, 2000):

$$\text{Frequency (F)} = \frac{\text{Number of plots found of a type}}{\text{Total of plots}}$$

$$\text{Relative Frequency (RF)} = \frac{\text{Frequency of a type}}{\text{Total frequency of types}} \times 100\%$$

$$\text{Density Type} = \frac{\text{Number of bird species}}{\text{sampled plot example}}$$

$$\text{Relative Density (RD)} = \frac{\text{Density of a type}}{\text{Total Density of type}} \times 100\%$$

### 3. RESULTS AND DISCUSSION

Based on field observations, 13 species from 9 bird families were found in the PutroePhang Park area. These bird families are Cisticolidae, Hirundinidae, EstrildidaeNectariniidae, Cisticolidae, Passeridae, Phylloscopidae, Pycnonotidae, and Rhipiduridae.

The results showed that there were 4 groups of birds based on the type of feed. The bird groups are insectivores, frugivores (fruit eaters), granivores (seed eaters), and nectarivores (honey eaters). For bird groups



based on their food type, insectivores were the highest with 46.15% of the other types. Insects are a type of bird food that is available all year round, insectivorous groups have adapted to the environment, and these birds have a way of catching prey while

flying, to pecking into tree trunks (Morse, 1971). Meanwhile, the least species found were nectivorous birds with a value of 7.89% in the PutroePhang Park area. The percentage of birds by type of food can be seen in Figure 2.

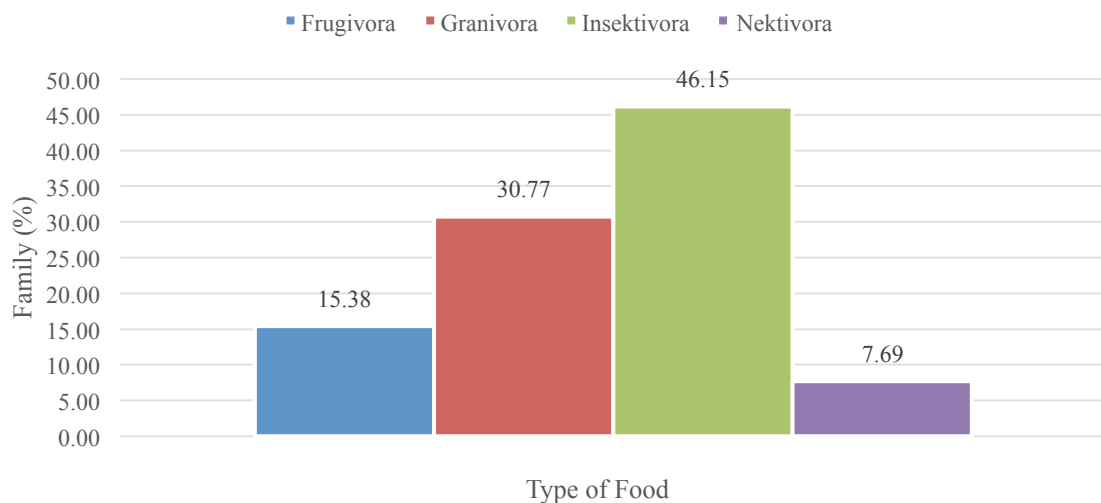


Figure. 2. Types of Food Based on BirdFamily

Each species of bird has its own type of food, such as frugivores are fruit eaters, granivores are grain eaters, insectivores are insectivores, nectarivores are nectar eaters. The low number of nectar-eating birds is probably because the area has not yet entered the flowering and

fruiting season from the vegetation in the area, which is used as food for birds. According to Setiawan et al, (2006), each type of tree in a community can result in various environmental conditions, and the availability of specific food for certain bird species (ecological niches).

Table 1. Composition of Bird Species in the PutroePhang Park Area in Banda Aceh

No	Species	Family	Local name	RF	RD	D	H'	IVI
1	<i>Aegithinatifhia</i>	<i>Cisticolidae</i>	Cipohkacat	7.89	8.33	0.007	0.14	16.23
2	<i>Geopeliastrata</i>	<i>Columbidae</i>	Perkutut	7.89	8.33	0.007	0.14	16.23
3	<i>Hirundorustica</i>	<i>Hirundinidae</i>	Layang-layang	13.16	10.42	0.011	0.17	23.57
4	<i>Lonchuramaja</i>	<i>Estrildidae</i>	pipit haji	7.89	6.25	0.004	0.12	14.14
5	<i>Lonchurapunctulata</i>	<i>Estrildidae</i>	pipit peking	7.89	8.33	0.007	0.14	16.23
6	<i>NectariniaJugularis</i>	<i>Nectariniidae</i>	madusriganti	7.89	8.33	0.007	0.14	16.23
7	<i>Orthotomusruficeps</i>	<i>Cisticolidae</i>	Cinenekelabu	5.26	6.25	0.004	0.12	11.51
8	<i>Orthotomussp</i>	<i>Cisticolidae</i>	-	7.89	8.33	0.007	0.14	16.23
9	<i>Passer montanus</i>	<i>Passeridae</i>	Burung-gereja	7.89	6.25	0.004	0.12	14.14
10	<i>Phylloscopus borealis</i>	<i>Phylloscopidae</i>	Cikrak	5.26	6.25	0.004	0.12	11.51
11	<i>Pycnonotusaurigaster</i>	<i>Pycnonotidae</i>	kutilang	7.89	8.33	0.007	0.14	16.23
12	<i>PycnonotusGoiavier</i>	<i>Pycnonotidae</i>	Merbahcerukcuk	7.89	8.33	0.007	0.14	16.23
13	<i>RhipiduraJavanica</i>	<i>Rhipiduridae</i>	Kipasanbelang	5.26	6.25	0.004	0.12	11.51

*Notes:*

RD = relative density; RF = relative frequency; D = Simpson dominance index value; IVI =importance value index; (H ') = Diversity index

Based on the results of the Relative Density analysis, in Table 1, it was found that *Hirundorustica* from *Hirundinidae* had the highest frequency and relative density compared to other bird species. According to Marsden et al (2001), each species of bird will survive well in a habitat that is able to provide sufficient space and food for its survival. In that area, there is also a Simpson Dominance Index Value in PutroePhang Park, which is 0.079 with the category of area was low. The dominance index value is used to describe the pattern of control of one type over another in a community (Mawazin and Subiakto, 2013). Lack of

food and habitat conditions may be a major influence on bird presence. According to Odum (1971), low bird presence is influenced by lack of food and hunting for certain bird species, thus indicating pressure on bird species in an area. Furthermore, Warsito and Bismark (2009) stated that the existence of a species in a place is very dependent on the presence of food sources and suitable habitat conditions. According to Farimansyah (1981) in Wisnubudi (2009), the high diversity of vegetation species can be a source of food, shelter can also be a nesting place for bird species.

The diversity of bird species is influenced by several factors, namely the abundance of epiphytes, the openness of the forest floor, the abundance of fruits, and the composition of tree species (Orians, 1969 in Wisnubudi, 2009). Based on Table 1, it shows that the highest Importance Value Index (IVI) is *Hirundorustica* bird from the *Hirundinidae* family with a diversity value ( $H'$ ) of 0.17, and a value (IVI) of 23.57. The IVI value is to determine the dominance of one type over other types in a community (Mawazin and Subiakto, 2013). The bird species with the highest IVI value are birds that have wide adaptability and tolerance in utilizing their habitat. The magnitude of the IVI value of a species is influenced by the large dominance of the species in its community, large dominance indicates a wide limit of adaptation and tolerance (Adil et al., 2010).

Based on the research results in Table 1, it shows that the diversity of species ( $H'$ ) of birds in the PutroePhang Park area is 1.78 which are classified in the medium category, where the results of this study are supported by the results of research conducted by Aida Fithri et al (2018), which stated that PutroePhang Park is included in the category of low bird diversity index, with a range ( $H'$ ) of 1.6 to 1.9. The diversity of bird species in an area is determined by several factors, namely the size of the area and its remoteness from other habitats (McArthur and Wilson, 1997 in Wibowo, 2004), diversity in habitat types and habitat quality in

general (Lack, 1969 in Wibowo, 2004), and the wide ecotone area (Thomas, 1979 in Wibowo, 2004).

#### 4. CONCLUSION

Based on the research results, there were 13 species from 9 families. Diversity Index ( $H'$ ) in PutroePhang Park with a value of 1.78 in the medium category. *HirundoRustika* has a value of 0.17 in the low category, with an Importance Value Index of (23.57). The lowest bird species diversity index was *Lonchurapunctulata*, *Orthotomusruficeps*, *Passer montanus*, *Phylloscopus borealis* and *RhipiduraJavanica* with a value of 0.12, and IVI value of 11.51. The value of the Dominance Index in PutroePhang Park is 0.079, with a low category. For bird groups that found based on type of food, *insectivores* had the highest percentage (46.15%), while *nectarivores* had the smallest percentage with a value of (7.69%).

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