Bird Species Composition, Abundance, Diversity, and Evenness at Panaad Park and Stadium and Provincial Capitol Park and Lagoon, Bacolod City, Negros Occidental

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Abstract

This study assessed bird species composition, abundance, diversity, evenness, and species dominance in Bacolod Panaad Park and Stadium and Provincial Capitol Park and Lagoon. The point transect method was employed for seven (7) stations plotted in both locales. Five hundred eleven (511) bird individuals were recorded comprising thirty (30) species. Six (6) were endemic, 19 were residents, 3 were introduced, and 2 were migrants. Only one recorded species, Lonchura oryzivora, which is an introduced species in the Philippines and native to Indonesia, was considered endangered based on the IUCN classification. Meanwhile, Passer montanus was the most abundant in both sites. The assessment also revealed that Panaad Park and Stadium had a higher diversity index and dominance of species, while Provincial Capitol Park and Lagoon had a highly even distribution of the composition of species. Based on habitat assessment, Bacolod Panaad Park and Stadium had a better index of distance to the nearest road, number of trees, and tree height compared to Provincial Capitol Park and Lagoon which was closer to water. Moreover, the results of this study will be used as baseline information in strengthening the urban management in Negros Occidental, with an emphasis on bird diversity.

Keywords: Species Composition, Diversity, Abundance, Evenness, City Biodiversity Index

Introduction

Birds have a variety of roles in ecosystems, as they can be predators, pollinators, scavengers, seed dispersers, seed predators, and ecosystem engineers, among others (Whelan et al., 2008). They are sensitive to environmental changes and can be bioindicators of environmental health (Ferenc et al., 2014; Lepczyk & Warren, 2012). Though birds are the most prominent urban wildlife species, humans have a detrimental impact on their natural habitat due to various activities, including deforestation, roads, the energy sector (renewable and coal), mining, climate change, and recently urbanization (Scanes, 2018; Evans et al., 2009; Strohbach et al., 2009; Rodricks, 2018).

In 2020, over 50% of the world's population lives in urban areas making urbanization persistent and the largest threat to bird diversity (World Bank, 2022; United Nations, 2020; Li et al., 2020; Isaksson et al., 2018; Open Forum: The Evolution of Urban Life, n.d.). Population growth makes cities more centralized and increases urban areas. Thus, inherent to urban areas are habitat fragmentation, loss, and change for numerous species (Marzluff, 2001), as species richness reduces with increasing urbanization (Jasmani et al., 2016; Sandström et al., 2006). However, urbanized cities can still support bird diversity with vegetation remnants and green spaces like parks (Callaghan et al., 2018). Urban landscapes like parks are proven biodiversity hotspots, and research on these areas provides the most recent status of bird diversity (Gatesire et al., 2014).

Previous studies have raised efforts to conserve birds, especially in highly urbanized cities. Vallejo et al. (2008) and Yuan et al. (2018) recognized that green spaces in urbanized areas host patterns of bird diversity. Other studies used park and green space characteristics to relate with and predict bird diversity (Huang et al., 2022; Thomson et al, 2022, Vasquez and Wood, 2022; Callaghan et al., 2018). Yang et al. (2020), found that park size, habitat diversity, and distance to the city center emerged as the most effective positive predators of bird species richness. Vegetation density, amount and area of green space, and available bodies of water were other determinants of bird diversity in urban green spaces (Dale, 2018; Khera et al., 2009; Chamberlain et al., 2007).

The potential of green spaces in highly urbanized cities is recognized, and efforts to conserve and manage biodiversity have led the Convention on Biological Diversity (CBD) to craft the City Biodiversity Index (CBI), an instrument for the conservation and management of biodiversity (Kohsaka & Uchiyama, 2013). Its adoption in Philippine urban biodiversity has

already been part of discussions for sustainability schemes in urbanized areas (Delima-Baron, 2022). One indicator of CBI is the documentation of native bird species in the city and how they are conserved (Uchiyama et al., 2015). In Negros Occidental, local government units now prioritize urban planning with emphasis on native biodiversity specifically birds. Though an integral requirement, bird profile still needs to be studied in its most urbanized city, Bacolod, and the dearth of comprehensive surveys in the locale is evident in the literature.

In this study, bird species composition, abundance, diversity, evenness, and species dominance in Bacolod Panaad Park and Stadium and Provincial Capitol Park and Lagoon were assessed. Results can provide baseline information on native bird diversity in the city and generate insights for local sustainability actions, a step towards complying with city biodiversity indicators.

Methodology

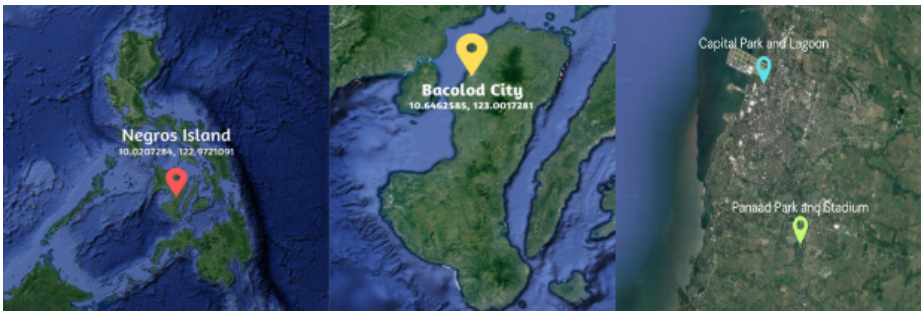
The bird diversity at Bacolod Panaad Park and Stadium and Provincial Capitol Park and Lagoon were assessed via the point transect method and the use of a bird guidebook (Jakosalem et al., 2019). As shown in Figure 1, both sites are located in Bacolod City, a highly urbanized city in Central Philippines.

Bird observations were done 3 to 4 times a week from May 2022 to June 2022 within a valid period adherent to Wildlife Gratuitous Permit No. R6-2014-001 issued by the Office of the Regional Executive Director of DENR, Iloilo City.

Equipment used were DSLR Nikon AF-S DX NIKKOR 18-55mm and Samsung WB100 4.0-104.0 mm camera, tabular list of birds found in the locale, Nikon Monarch M511 10×42 5.5° binoculars, a Nikon Prostaff P511 10×42 5.6° binocular, Celestron 22-66×100 Spotting Scope, Benro Tripod, bird transect form, measuring tape, Google Maps/Earth, photographic and bird guide of birds of Negros, Panay, and Cebu.

Figure 1

Map of the Philippines, Negros Island, and Survey Sites Taken from Google Earth: Panaad Park and Stadium and Provincial Capitol Park and Lagoon



Several practice surveys were done to discover any possible concerns and limits in the study site (Hostetler & Main, 2001). Digiscoping was also employed using a phone and a spotting scope to capture the images of species. Moreover, non-colorful clothes were used to avoid attracting or warning other birds (Hostetler & Main, 2001).

Point Transect Method and Bird Observations Using Point Counts

The Point transect method was used instead of the line transect. The former is better when surveying a larger element of bird fauna and is easier when identifying birds that are perching since observers stay at one point at a time duration (Bibby et al., 1998).

In the point transect method, six (6) stations, 250 meters apart from each other are plotted in Bacolod Panaad Park and Stadium, and one (1) station in Provincial Capitol Park and Lagoon (Hostetler & Main, 2001; Emlen, 1977).

Using a satellite imagery map from Google Earth, the area of both sites was assessed and locations of predetermined stations were established. Plot points were set in the Google map to indicate the location of every station. Coordinates (Latitude, Longitude) per station in both sites are shown in Tables 1 and 2.

Birds were observed by the researchers in each station while species' frequency of sightings, general bird movement, and behavior across the route were recorded in the transect form sheets (Vallejo et al., 2009). Birds were only recorded if they entered within the 30-meter radius of each station, and flying birds are excluded (Hostetler & Main, 2001).

The observers were divided into two groups and assigned to three (3) stations each to avoid double encounters. Each team consisted of two

(2) observers with separate 180-degree angle field of view to ensure whole area observation and one (1) writer to encode the recorded data into a data sheet. The survey in each station lasted for five (5) minutes. Tallying was not employed in listing down or recording the data on the datasheet.

Table 1
Bacolod Panaad Park and Stadium Station Coordinates

	Latitude	Longitude
Station 1	10.6247336	122.9628686
Station 2	10.6247064	122.963091
Station 3	10.6260395	122.9634668
Station 4	10.6265481	122.9658433
Station 5	10.6257188	122.9674207
Station 6	10.6247286	122.9658118

Table 2
Provincial Capitol Lagoon Station Coordinates

	Latitude	Longitude
Provincial Capitol Park and Lagoon	10.6761564	122.9516381

Figure 2
Provincial Capitol Park and Lagoon Plotted Stations taken from Google Earth

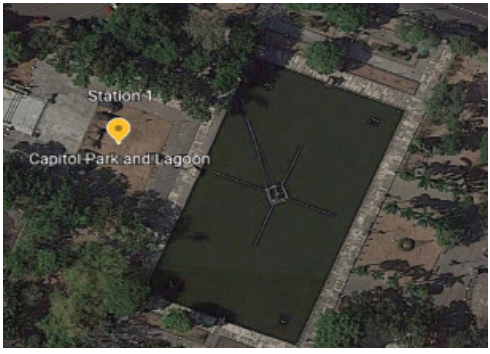


Figure 3
Panaad Park and Stadium Plotted Stations taken from Google Earth

Site Description

Bacolod Panaad Park and Stadium

The Bacolod Panaad Park and Stadium is a 25-hectare area with approximately 6,000 trees, a suitable habitat for birds. Buildings and facilities are found within the area that are used for events and recreational activities. The site is also near major roads and a river.

Provincial Capitol Park and Lagoon

The Provincial Capitol Park and Lagoon is a 3.87-hectare area surrounded by major roads. It is a rectangular-shaped park with trees together with a lagoon at the center. It is a recreational area surrounded by tall buildings and condominiums.

Habitat Description

Parameters were measured to determine habitat characteristics and features that potentially intervene with bird diversity. Parameters included the tree trunk diameter at breast height (Stagoll et al., 2012); distance of each adjacent tree; tree height; distance from the nearest busy road, and distance from the nearest body of water.

Habitat Assessment

Table 3

Bacolod Panaad Park and Stadium and Provincial Capitol Park and Lagoon Habitat Assessment

	Avg. Tree Trunk Diameter at Breast Height	Avg. Distance Measured to each Adjacent Tree	Estimated Distance from nearest Busy Road	Estimated Distance from the nearest Body of Water
Bacolod Panaad Park and Stadium				
Station 1	0.55 m	1.98 m	1,030 m	445 m
Station 2	1.17 m	4.13 m	880 m	80 m
Station 3	0.95 m	4.21 m	765 m	85 m
Station 4	1.6 m	5.2 m	650 m	410 m
Station 5	1.41 m	2.27 m	735 m	535 m
Station 6	1.26 m	4.21 m	900 m	375 m
Provincial Capitol Park and Lagoon				
Station 1	1.93 m	8.25 m	116.67 m	65 m

Bacolod Panaad Park and Stadium

As regards average tree trunk diameter at breast height, Station 5 was the thickest, while Station 1 was the least in diameter. Station 1 had trees with the closest distance to each other, while in Station 4, trees had the farthest distances. There were two (2) busy roads outside Bacolod Panaad Park and Stadium. Station 4 was the nearest to a busy road with a 650-meter distance, while Station 1 with a 1,030-meter distance from a busy road, was the farthest. The closest station to the nearest body of water was Station 2.

Provincial Capitol Park and Lagoon

The average tree trunk diameter at breast height was 1.93 m, with an average distance of 8.25 between each adjacent tree. The distance of the nearest busy road was measured only from the north, east, and west because the road in the southern area was not busy. The sum of the distances was divided by three (3) to determine the average. Lastly, the distance from the nearest body of water was estimated at 65 m from Station 1 to the center of the lagoon.

Table 4

Bacolod Panaad Park and Stadium and Provincial Capitol Park and Lagoon Habitat Assessment Summary

	Bacolod Panaad Park and Stadium (n=6)	Provincial Capitol Park and Lagoon (n=1)
Diameter at Breast Height (DBH)	0.24 m-1.65 m	0.67 m-2.37 m
Distance to Body of Water	Approx. 321.67 m	Approx. 65 m
Distance to Nearest Busy Road	Avg. 826.67 m	Avg. 165.60 m
Number of Trees	Estimated 400 trees	Estimated 30 - 40 trees
Tree Height	Estimated 10-20 m	Estimated 7-15 m

Table 4 presents a habitat assessment data summary in both sites to provide insights on developing an index to evaluate the security of the city's biodiversity. In Provincial Capitol Park and Lagoon, trees were thicker in diameter at breast height compared to those in Panaad Park and Stadium; however, Panaad had greater estimated tree height and number of trees compared to Lagoon. Both locales had a slightly similar distance to the nearest body of water, but Panaad Park and Stadium were significantly closer. Meanwhile, Provincial Capitol Park and Lagoon were closer to busy roads compared to Panaad Park and Stadium.

Despite having more infrastructures, vegetation was abundant in Panaad Park and Stadium since it had a wider area and more space for propagation, making it a better habitation for the birds than Provincial Capitol Park and Lagoon.

Data Analysis

To compare and measure the diversity index (H'), the researchers used the Shannon - Weiner equation (Gatesire et al., 2014). This index is a way to measure the diversity of species in a community and it is defined by the number of individuals observed for each species in the environment. The Shannon - Weiner Diversity Index is calculated using this formula:

$$H = -\Sigma pi * ln(pi)$$

where H' is the Shannon-Wiener diversity index, Pi is the proportion of each species in a sample, and LN (Pi) is the natural

logarithm of the proportion (Paguntalan et al., 2020). The Shannon Equitability Index is a method of determining the species' equality in a community. This refers to the degree to which the abundances of various species in a community are similar. It is denoted as EH which is calculated using this formula:

$$EH = H/\ln(S)$$

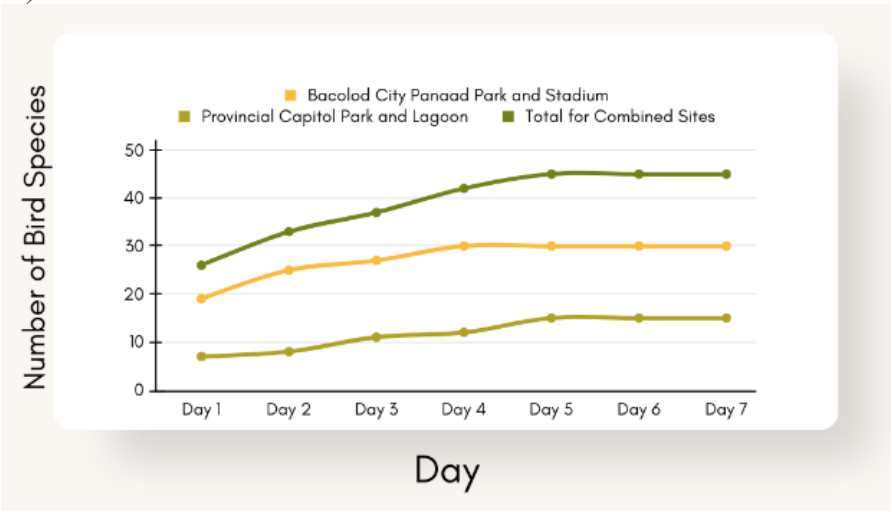
where (H) is the Shannon Diversity Index and the natural logarithm of the total number of species (k).

Results and Discussion

Adequacy of Sampling

Figure 4

Urban Bird Species Composition of Two Parks in Bacolod City (May - June 2022)



The record of bird observations was included in the bird species checklist used for data analysis. The sample data from observations resembled the baseline for the researchers to decide whether to cease the data collection once the data saturates.

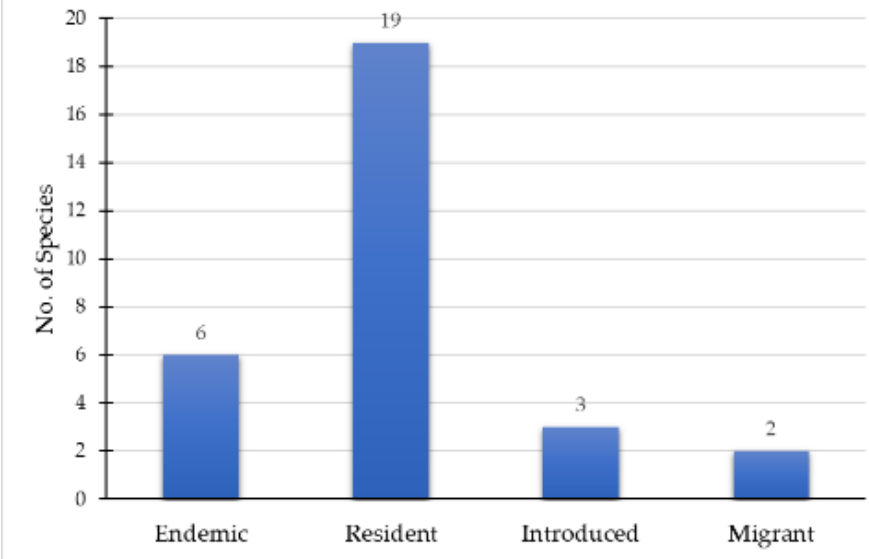
Based on the figure above, the data saturates earlier for Provincial Capitol Park and Lagoon than for Bacolod City Panaad Park and Stadium. Day 1 of conducting the bird survey in Provincial Capitol Park and Lagoon started with seven (7) recorded species and continued to increase until Day 5. However, the number of species did not increase from Day 6 and reached its plateau of 15 recorded species on Day 7. In Bacolod City Panaad Park

and Stadium, the bird checklist started with 19 bird species, and it added more species in the following days. Day 4 had 30 recorded bird species and reached its plateau on Day 7.

Species composition and abundance

Figure 5

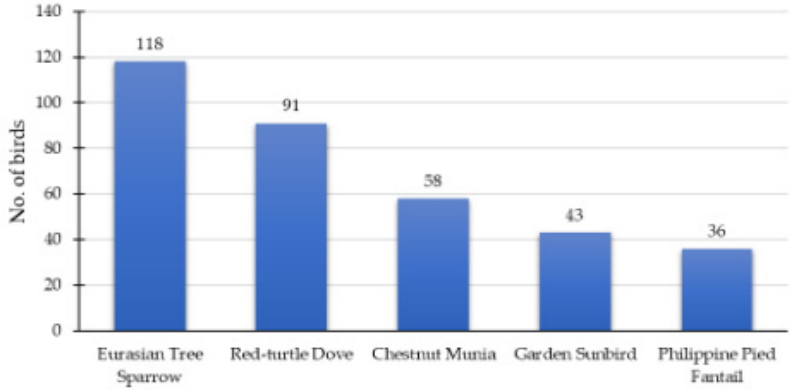
Urban bird species composition of two parks in Bacolod City (April - June 2022)



The composition of bird species of both locales (Figure 5) were 19 residents, 6 endemic, 3 introduced, and 2 migrant species, consistent with the trend from accounts of Banzon et al. (2022), Medina and Cabras (2018), and Vallejo et al., (2008). Endemic bird species consisted of the Philippine Glossy Swiftlet, Philippine Coucal, Philippine Pied Fantail, Chestnut-crowned Tailorbird, Low-land White-eye, and Philippine Magpie-robin. Introduced bird species were composed of Crested Myna, Java Sparrow, and Eurasian Tree Sparrow. The (2) two migrant species were the Philippine Brown Shrike and Barn Swallow, also documented in the green spaces of Davao City (Banzon et al., 2022).

Figure 6

Top 5 Most Abundant Birds within the 2 Parks in Bacolod City (April - June 2022)



The abundance of birds was totaled for both locales. Eurasian Tree Sparrow is the most abundant bird species (118) followed by the Red-turtle Dove (91), the Chestnut Munia (58), the Garden Sunbird (43), and the Philippine Pied Fantail (36). The Eurasian Tree Sparrow was a very common bird species in both locales; they would fly or perch in groups on trees, buildings, and the ground. In the study of Banzon et al. (2022) and Ong et al. (2007), it was also the most encountered species. Its abundance is attributed to its adaptation in highly disturbed areas that eventually allow it to dominate.

New Island Record

Lowland White-eye perching on a branch at Panaad Park and Stadium Photos by: Godfrey Philip C.Jakosalem

Lowland white-eyes or Zosterops meyeni were spotted in both locales. This bird species was observed to be gathering in small groups perching around the branches of trees and also seen alone or in pairs and frequently transferred to other spaces. Four (4) Lowland white eyes were spotted at the Provincial Capitol Park and Lagoon, and one (1) was spotted in Bacolod Panaad Park and Stadium. In total, the number of Lowland white-eyes spotted was a new island record in Negros Occidental.

Bird Checklist

A total of 30 different bird species were spotted both in Bacolod Panaad Park and Stadium and Provincial Capitol Park and Lagoon, lower than the 31 species recorded by Banzon et al. (2022), 33 species by Vallejo et al. (2008), and 47 species documented by Ong et al. (2007), from green spaces in the Philippines. Twenty-nine (29) bird species were classified as LC or Least Concerned, and only one species (Lonchura oryzivora) was classified as Endangered (iucnredlist.org), found in Station 1 of Bacolod Panaad Park and Stadium. Furthermore, in Brinkman et al.'s (2023) bird checklist, the Java Sparrow (Lonchura oryzivora) is also classified as an Introduced species in the Philippines. They are mostly seen in groups and they perch around tall grass and bushes. BirdLife International (2020), considers it a species of global conservation concern with a very low rate of occurrence. Records of its occurrences along green spaces were also found in Thaweepworadej and Evans (2022) and Rosyadi et al. (2019). Additionally, birds in the checklist were classified as Least Concerned or LC in the DENR classification (Brinkman et al., 2023)

The most abundant species in Bacolod Panaad Park and Stadium were the Eurasian Tree Sparrow, Red Turtle Dove, Chestnut Munia, and Pied Fantail, while the Eurasian Tree Sparrow, Crested Myna, and Starling were the most abundant in the Provincial Capitol Park and Lagoon.

Table 5

Bacolod Panaad Park and Stadium and Provincial Capitol Park and Lagoon Bird Checklist

Common Name	Conservation Status	IUCN 2020 Classification	DENR Classification	Lagoon	Panaad
Red Turtle-dove Streptopelia tranquebarica	Resident	LC	LC	3 (0.08)	88 (0.15)

Zebra Dove Geopelia striata	Resident	LC	LC	3 (0.08)	22 (0.04)
Philippine Glossy Swiftlet Collocalia marginata	Endemic	LC	LC		10 (0.02)
Philippine coucal Centropus viridis	Endemic	LC	LC		1 (0.00)
Rusty-breasted Cuckoo Cacomantis sepulcralis	Resident	LC	LC		2 (0.00)
Barred Rail Hypotaenidia torquata	Resident	LC	LC		
Black-crowned Night-heron Nycticorax nycticorax	Resident	LC	LC		1 (0.00)
Little Egret Egretta garzetta	Resident	LC	LC		3 (0.01)
Brahminy Kite Haliastur indus	Resident	LC	LC		1 (0.00)
White-throated Kingfisher Halcyon gularis	Resident	LC	LC		1 (0.00)
Collared Kingfisher Todiramphus chloris	Resident	LC	LC	3 (0.08)	17 (0.03)
Black-naped Oriole Oriolus chinensis	Resident	LC	LC		
Pied Triller Lalage nigra	Resident	LC	LC		3 (0.01)

White-breasted Woodswallow Artamus leucorynchus	Resident	LC	LC		2 (0.00)
Philippine Pied Fantail Rhipidura nigritorquis	Endemic	LC	LC	3 (0.08)	33 (0.06)
Philippine Brown Shrike Lanius cristatus	Migrant	LC	LC		3 (0.01)
Chestnut-crowned Tailorbird Orthotomus castaneiceps	Endemic	LC	LC		2 (0.00)
Striated Grassbird Megalurus palustris	Resident	LC	LC		10 (0.02)
Barn Swallow Hirundo rustica	Migrant	LC	LC		
Pacific/Tahiti Swallow Hirundo tahitica	Resident	LC	LC		
Yellow-vented Bulbul Pycnonotus goiavier	Resident	LC	LC		
Low-land White-eye Zosterops meyeni	Endemic	LC	LC	4 (0.10)	
Crested Myna Acridotheres cristatellus	Introduced	LC	LC	7 (0.018)	
Asian Glossy Starling Aplonis panayensis	Resident	LC	LC	6 (0.15)	
Philippine Magpie-robin Copsychus mindanensis	Endemic	LC	LC		

Garden Sunbird Cinnyris jugularis	Resident	LC	LC		43 (0.07)
Scaly-breasted Munia Lonchura nisoria	Resident	LC	LC		4 (0.01)
Chestnut Munia Lonchura atricapilla	Resident	LC	LC	1 (0.03)	57 (0.10)
Java Sparrow Lonchura oryzivora	Introduced	EN	LC		21 (0.04)
Eurasian Tree Sparrow Passer montanus	Introduced	LC	LC	10 (0.25)	108 (0.19)
			Total Tally:	40	471

A bird checklist was made to take note of species in both locales. There were 30 bird species in Bacolod Panaad Park and Stadium and 15 bird species in Provincial Capitol Park and Lagoon. However, birds that were seen flying were included in the bird checklist but removed in the data analysis where their relative abundances were calculated. Therefore, there were nine (9) species recorded from Provincial Capitol Park and Lagoon and 27 species from Bacolod Panaad Park and Stadium.

In the data, Bacolod Panaad Park and Stadium recorded a higher number of species than Provincial Capitol Park and Lagoon where eight (8) species were seen or observed in both locales. These eight (8) species consisted of the Red Turtle Dove, Zebra Dove, Collared Kingfisher, Philippine Pied Fantail, Low-land White-eye, Asian Glossy Starling, Chestnut Munia, and Eurasian Tree Sparrow. However, 19 observed species in Bacolod Panaad Park and Stadium were not recorded in the Provincial Park and Lagoon (Table 5). These 19 species were composed of Philippine Glossy Swiftlet, Philippine Coucal, Rusty-breasted Cuckoo, Black-crowned Night-heron, Little Egret, Brahminy Kite, White-throated Kingfisher, Pied Triller, White-breasted Woodswallow, Philippine Brown-Shrike, Chestnut Crowned Tailorbird, Striated Grassbird, Barn Swallow, Pacific/Tahiti Swallow, Philippine Yellow-vented Bulbul, Philippine Magpie-robin, Garden sunbird, Scaly-breasted Munia, Java Sparrow. Although Black-crowned night herons and Little

Egrets were known and were always seen perching in Provincial Capitol Park and Lagoon, they were not recorded during the observation because the survey conducting time was set in late afternoons, and they would perch when there was no visible sunlight.

Diversity, Evenness, and Species Dominance

Table 6
Results for the Biodiversity Indexes for the Two (2) Locales

Locale	Total Number of Species	H	Evenness	D
Bacolod Panaad Park and Stadium	27	2.40	0.73	0.12
Provincial Capitol Park & Lagoon	9	2.04	0.93	0.13

Bacolod Panaad Park and Stadium have a higher diversity index (H'=2.40) with a total number of 27 species compared to Provincial Capitol Park and Lagoon with a diversity index of (H'=2.04), and only nine (9) species. The high avifaunal diversity index of Bacolod Panaad Park and Stadium compared to Provincial Capitol Park and Lagoon can be attributed to its size, as larger parks attract more bird species (Murgui, 2007) and provide more ecological space, habitat complexity, better food source, and conducive space for bird communities (Oliver et al., 2011; Evans et al., 2009). According to Schütz and Schulze, (2015), park size is a very important parameter in bird taxonomic and functional diversity metrics. In other studies, park size positively influenced bird diversity (Huang et al., 2022; Leveau et al., 2022; Yang et al., 2020; Murgui, 2007; Cornelis and Hermy, 2004; Fernández-Juricic and Jokimäki 2001).

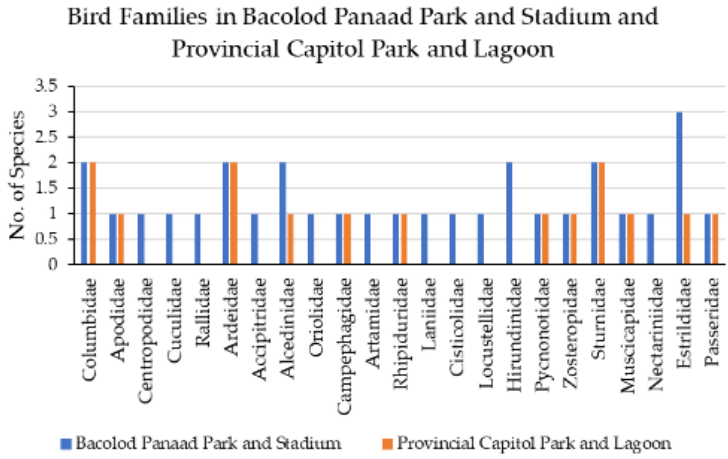
In regard to the distribution of species, where a value closer to 1 is more even, the Provincial Capitol Park and Lagoon, having a (0.73) evenness value, had a much even distribution (0.93) compared to Bacolod Panaad Park and Stadium. The result is parallel to Thompson et al. (2022), which found that evenness was significantly higher in large parks. Food availability can also explain distribution and evenness variability (Tu et al., 2020). Lastly, Bacolod Panaad Park and Stadium had a greater dominance

of species (D'=0.12) than Provincial Capitol Park & Lagoon (D'=0.13). The diversity index values imply the diversity of bird species in both locales; however, there were bird families with species that are dominant in the said locale. In Bacolod Panaad Park and Stadium, the most dominant family was the Estrildidae which has three (3) species. The three (3) species were composed of Scaly-breasted Munia, Chestnut Munia, and Java Sparrow. The Columbidae, Ardeidae, Alcedinidae, Hirundinidae, and Sturnidae families had at least two (2) species, while the remaining ones had one (1) species.

Dominant Bird Families

Figure 8

Bar Graph of the Bird Families in Bacolod Panaad Park and Stadium and Provincial Capitol Park and Lagoon



The Provincial Capitol Park and Lagoon had three (3) dominant families having two (2) species which consisted of composed of Columbidae, Ardeidae, and Sturnidae. The Columbidae family consisted of Red Turtle-dove and Zebra Dove, the Ardeidae family was composed of Black-crowned night heron and Little Egret, and the Sturnidae family included Crested Myna and Glossy Starling. The same families had common and abundant species in the records of Banzon et al. (2022), Serrano et al. (2019), and Vallejo et al. (2009).

Conclusion

The Bacolod Panaad Park and Stadium had higher species richness and diversity compared to Provincial Capitol Park and Lagoon, with 27 and 9 observed species, respectively. Despite similarities in the observed species for both sites, the larger size and better habitat characteristics of Bacolod Panaad Park and Stadium, such as Distance to the Nearest Road, Number of Trees, and Tree Height likely contributed to its higher diversity index.

Notably, the Philippine Glossy Swiftlet Collocalia marginata was the most commonly seen species at Provincial Capitol Park and Lagoon, while the Eurasian Tree Sparrow Passer montanus had the highest number of species seen at the Bacolod Panaad Park and Stadium.

The presence of the Lowland white-eyes (Zosterops meyeni), a new island record, further underscores the importance of these habitats for avian biodiversity. Management efforts should focus on maintaining and enhancing these habitats to support the diverse bird species present, especially considering the EN (Endangered) classification of one species in the area.

Recommendations

More surveys should be done in both sites to further identify other bird species. Continued monitoring of bird diversity, evenness, and distribution is also encouraged. Since the study is a baseline for the bird diversity profile in an urbanized city of Negros Occidental, it offers insights into the urban planning management of the provincial government which should look into the establishment of more green spaces and urban environmental hotspots in the city.

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