

## DIVERSITY OF BIRDS IN THE MOIST LOWLAND FOREST OF BUNGUIAO AND DULIAN (UPPER BUNGUIAO), ZAMBOANGA CITY, PHILIPPINES

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### ABSTRACT

In the Philippines, nine (9) families of birds are extremely threatened and the Philippine Eagle is one of the critically endangered birds having 400 pairs left in the wild. Anthropogenic activities, like deforestation and massive indiscriminate hunting, have contributed much to the decline of bird diversity. Mitigating measures are particularly crucial for the survival of the Philippine bird species. In this study, diversity and abundance of birds were assessed. This study sought to identify, classify and determine the density of birds in the moist lowland forest of Bunguiao and Dulian (Upper Bunguiao), Zamboanga City. The study site measures a total of 3,050 meters in which the Bolong River served as the line transect. Survey method and opportunistic bird sighting technique were employed in the study for the duration of three (3) days, with seven (7) hours of sampling a day. Morphological characteristics (head, bill, plumage and tarsus) were used to identify and classify each species. A total of seven (7) species of birds were found in the study site with a total of 114 individuals. The Palawan flowerpecker (*Prionochilus plateni*) has the highest density (0.0138/meter) while the Lowland white-eye (*Zosterops meyeri*) has the lowest density (0.0003/meter). Six (6) of the identified bird species are endemic to the Philippines. The IUCN assessment of conservation status shows that six (6) of the identified birds are Least Concern while the Southern silvery kingfisher (*Ceyx argentatus*) is a Near Threatened species.

**KEYWORDS:** Conservation biology, bird diversity and density, survey, line transect, moist lowland forest.

### INTRODUCTION

In September 1, 1914, the last passenger pigeon (*Ectopistes migratorius*) named "Martha" died in Cincinnati Zoo in Ohio, USA, making this bird species extinct. The last confirmed passenger pigeon is thought to have been shot in 1901 (Hung et al 2014). This is an example of anthropogenic extinction largely due to widespread deforestation and massive scale indiscriminate hunting. The Philippine eagle (*Pithecophaga jefferyi*) is one of the endemic birds in the Philippines threatened by these anthropogenic activities. According to the Red List Assessment of the International Union for the Conservation of Nature and Natural Resources (IUCN), the conservation status of the Philippine eagle is "critically endangered" (BirdLife International 2017). Similarly, the Haribon Foundation for the Conservation of Natural Resources Inc. describes it as one of the world's rarest eagles and most "critically endangered" species. The Philippine eagle can be considered as a model bird species in line with the conservation of other threatened birds in the Philippines.

Tanalgo et al. (2015) emphasized the crucial role of birds in providing various ecological services to maintain the

balance of many ecosystems. Before conservation efforts became very widespread and global today, many conservationists have considered the importance of birds as biological indicators relative to landscape change (McIntyre 1995). Thus, a change in landscape affects the ecological characteristics, as well as the species diversity and relative abundance of birds (Alviola 2017). The effort to identify the existence of threatened bird species is important in developing conservation measures. Through this effort, direct solutions can be implemented to restore habitats, regulate the exploitation of natural resources and eventually save the remaining bird species.

The conservation status of any bird species is not alarming unless a very few individuals exist in the wild or in captivity. Kennedy et al. (2000) assert that bird species population decline and become critically endangered mainly due to habitat loss (e.g. forest destruction) caused by logging, mining, and land conversion. Around 80% of the total known bird species are forest dependent (Cushman & McGarigal, 2004). According to the assessment of DAO 2004-15 and CITES 2014, nine (9) families of birds in the Philippines are considered "critically endangered". Sixteen (58

species) and twenty-six (53 species) families of birds are considered to be endangered and vulnerable, respectively (DAO18). Salvador and Ibanez (2006) emphasized that deforestation continues to be the primary threat to the long-term persistence of the bird species.

The Philippine Eagle Foundation (PEF) nurtures and protects the remaining Philippine eagles, which has an estimated population of 400 pairs in the wild (PEF 2014). Conservation efforts are also initiated by the Haribon Foundation which is committed to biodiversity conservation through scientific research and site conservation actions. At the communal level, the people may take several steps to save the different bird species, like reporting illegal wildlife trade, avoiding hunting the endangered species and restoration of degraded habitats. Albeit these mitigating measures, a pristine habitat remains to be more favorable for the existence of the birds. Denuded forests and polluted rivers can be restored but preserving the natural structures of the wild habitats is more practical. All and above, the protection of the Philippine eagle or “Haring Ibon” and other bird species in the Philippines are geared towards their conservation, and that these birds shall never share the same fate of the passenger pigeon.

In the study of Paguntalan *et al.* (2011) in Zamboanga Peninsula, 142 species of birds were found, 16 of which were Mindanao endemics and 68 were Philippine endemics, and a total of 20 threatened bird species were observed, 11 of which are restricted to Mindanao faunal region. Indiscriminate felling and “*kaingin*” are widespread in the rural areas of Zamboanga Peninsula which threaten the diversity of many birds. Biological diversity survey initiatives should be intensified at the rural-provincial level for these communities need more awareness. Empirical information on the status of biological diversity can help develop immediate conservation measures for the threatened fauna, like the birds, and regulate anthropogenic activities which affect these species.

This study presents a list of bird species found in the moist lowland forest of Bunguiao and Dulian (Upper Bunguiao), Zamboanga City. Furthermore, this study provides information on the taxonomic classification, feeding and breeding activities, diversity and abundance, conservation status, global and local distribution and habitat characterization of the bird species found in the area. This study also emphasizes the significant roles of the birds and the many ecological services these organisms provide to the terrestrial ecosystems. The results obtained from this study may serve as baseline information for the local people to increase their awareness on the conservation status of birds in their locale. Moreover, the information from this study can also be used to establish various conservation initiatives with the efforts of the people and local officials of Bunguiao and Dulian (Upper Bunguiao), altogether.

## MATERIAL AND METHOD

**Description of the study site:** The study was conducted at the moist lowland forest of Bunguiao and Dulian (Upper Bunguiao), Zamboanga City, Philippines. Following the river (transect line), the study site measures a total of 3,050 meters from Point X (7.1205°N, 122.1779°E) to Point Y (7.1339°N, 122.1593°E), based on GPS calculation. The study site is located approximately 40.00 kilometers away from the city proper on the East coast of Zamboanga City. It can be reached through a detour between Sangali and Bolong. Bunguiao is located some 3.75 km from the national highway at Pamingitan on the boundary shared by Barangay Sangali and Bolong and then meets with Dulian (Upper Bunguiao) at the major bridge connecting the two barangays. The livelihood of the people in Bunguiao and Dulian depends on coconuts and other fruits, selling them at the local market. But logging, felling, *kaingin*, and hunting are other livelihood activities which threaten the bird species of the area. The study conducted photo-documentation sampling of the bird species found in the study site (Figure 1).

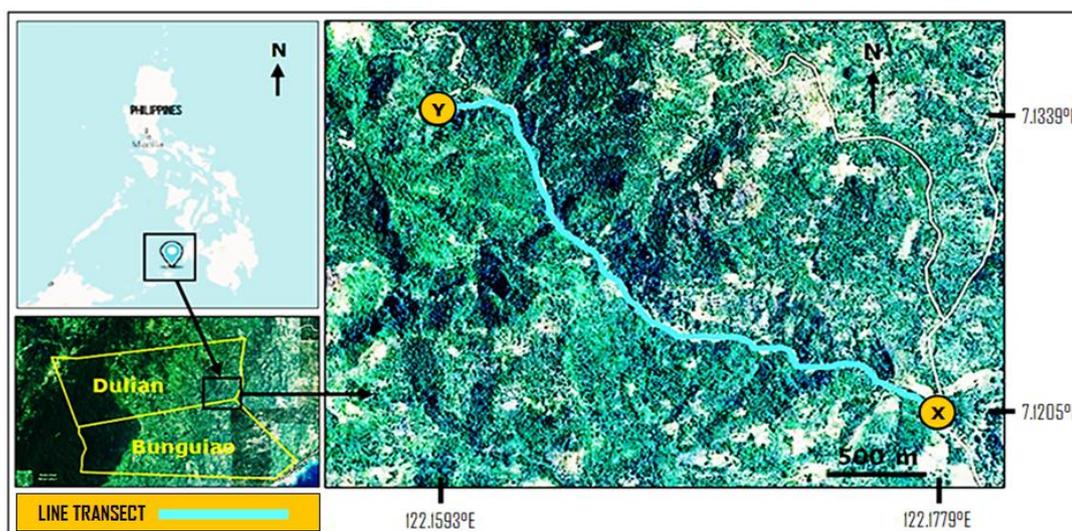


Figure 1: The location of study site in Bunguiao and Dulian, Zamboanga City, Philippines.

**Sampling Procedures:** Initial survey of the study site was conducted to establish the location and actual size of the transect line. Survey method and opportunistic bird sighting technique (adapted from Carlton 2001) were employed in this study with three (3) days of photo-documentation sampling from 09:00 to 16:00 h (7 hours) per day.

**Identification and Classification of Samples:** The samples (photos) taken during the survey were used to determine the taxonomic classification of the birds based on morphological characteristics: head (forehead, crown, lore, and ear coverts), bill, plumage (breast, scapular, and rump) and tarsus. Identification and classification were conducted using the book reference entitled "A Guide to the Birds of the Philippines" by Kennedy *et al.* (2000) and through online verification.

**Data Analysis:** Data obtained were used to determine the diversity and abundance of birds in the study site. The total number of bird species was identified based on the results of taxonomic classification. Following the

opportunistic bird sighting technique, the frequency count and species density were determined. The most and least dominant bird species were identified based on the calculated species density.

## RESULTS AND DISCUSSION

**Identification and Classification of Bird Species:** Seven (7) species of birds were found in the moist lowland forest of Bunguiao and Dulian (Upper Bunguiao), Zamboanga City. The taxonomic classification of each bird species was identified based on their morphological characteristics. Information about the feeding and breeding behaviors, habitat and distribution and the IUCN assessment of the conservation status of each bird were provided. Images from the different online references were used for comparative purposes in relation to the images photo-documented during the survey and sampling process. Table 1 shows the taxonomic characteristics of each bird species documented and identified in the study. The succeeding parts show the individual profile of each bird species.

**Table 1: Taxonomy of the seven (7) bird species found in the moist lowland forest of Bunguiao and Dulian (Upper Bunguiao), Zamboanga City.**

Order	Family	Genus	Species	Common Name
Passeriformes	Campephagidae	<i>Coracina</i>	<i>striata</i>	Bar-bellied Cuckoo-shrike
Passeriformes	Dicaeidae	<i>Dicaeum</i>	<i>australe</i>	Red-keeled Flowerpecker
Coraciiformes	Alcedinidae	<i>Ceyx</i>	<i>argentatus</i>	Southern Silvery Kingfisher
Passeriformes	Dicaeidae	<i>Prionochilus</i>	<i>plateni</i>	Palawan Flowerpecker
Passeriformes	Pycnonotidae	<i>Poliolophus</i>	<i>urostictus</i>	Yellow-wattled Bulbul
Passeriformes	Zosteropidae	<i>Zosterops</i>	<i>meyeni</i>	Lowland White-eye
Columbiformes	Columbidae	<i>Phapitreron</i>	<i>amethystinus</i>	Amethyst Brown Dove

### 1. Bar-bellied Cuckoo-shrike (*Coracina striata*)

Figure 2 shows the male (2A) and female (2C) Bar-bellied cuckoo-shrikes (*Coracina striata*) documented

during the survey. These images can be compared to Figures 2B and 2D, respectively.



**Figure 2: Bar-bellied cuckoo-shrike (*Coracina striata*) males (A, B) and females (C, D).**

**Taxonomic Classification**

KINGDOM: Animalia  
 PHYLUM: Chordata  
 CLASS: Aves  
 ORDER: Passeriformes  
 FAMILY: Campephagidae  
 GENUS: *Coracina*  
 SPECIES: *striata*  
 Scientific name: *Coracina striata* (Boddaert, 1783)  
 Common name: Bar-bellied Cuckoo-shrike

**Description**

(a) **Morphological:** Size is 24 to 32 cm and weighs 98.2 to 128 g. The male nominate race is dark plumbeous grey except for black lores, and largely black wings and tail. The head, bill, tarsus and scapular and rump plumage of the female are entirely black except the

breast is barred black and white. Both male and female have black eye-ring. The tarsus is black.

(b) **Behavioral:** Eats adult and larval insects, including mantids (Mantidae), dragonflies (Odonata), beetles (Coleoptera) and lepidopterans. Breeding period is on April to May, with dependent fledglings late in August in Malaysia, February in Sumatra, and April to May in Philippines. Voice is noisy, with loud, harsh “klee kleep” of 2–4 notes, usually given in flight.

**IUCN Assessment Information:** Least Concern (BirdLife International, 2017).

**2. Red-keeled Flowerpecker (*Dicaeum australe*)**

Figure 3A shows the Red-keeled flowerpecker (*Dicaeum australe*) documented during the survey. This image can be compared to Figure 3B.



**Figure 3: Red-keeled flowerpeckers (*Dicaeum australe*) perched on a tree branch (A, B).**

**Taxonomic Classification**

KINGDOM: Animalia  
 PHYLUM: Chordata  
 CLASS: Aves  
 ORDER: Passeriformes  
 FAMILY: Dicaeidae  
 GENUS: *Dicaeum*  
 SPECIES: *australe*  
 Scientific name: *Dicaeum australe* (Hermann, 1783)  
 Common name: Red-keeled Flowerpecker

**Description**

(a) **Morphological:** Size is 10 cm and weighs 9 to 11 g. The head is blackish but with white lore. The bill is curved, pointed and black. The breast is white with red-stain on the middle. The scapular and rump plumage are all black. The tarsus is black.

(b) **Behavioral:** The diet generally includes fruit, nectar and pollen. Mostly, the birds stay in the canopy of trees and foraging singly or in pairs. Egg-laying happens in June and August, juveniles are observed in August and birds with active gonads in August and fledged young are observed in April on Mindanao. Voice is a high-pitched insect-like trilling “suit-sui”.

**IUCN Assessment Information:** Least Concern (BirdLife International, 2016).

**3. Southern Silvery Kingfisher (*Ceyx argentatus*)**

Figure 4A shows the Southern silvery kingfisher (*Ceyx argentatus*) documented during the survey. This image can be compared to Figure 4B.

**A**Richard C. Rojas  
May 10, 2018**B**Pete Morris/Birdquest  
February 18, 2009

**Figure 4:** Southern silvery kingfisher (*Ceyx argentatus*) perched on a bamboo twig near the stream (A) and a tree branch (B).

#### Taxonomic Classification

KINGDOM: Animalia

PHYLUM: Chordata

CLASS: Aves

ORDER: Coraciiformes

FAMILY: Alcedinidae

GENUS: *Ceyx*SPECIES: *argentatus*Scientific name: *Ceyx argentatus* (Tweeddale, 1887)

Common name: Southern Silvery Kingfisher.

#### Description

(a) **Morphological:** Size is 14 cm and weighs 18.8 to 23.8 g. It is largely black-and-white. The forehead is black with silvery white spots. Both sexes have black head with white or blue-white frontal spot. Ear coverts and lore are black. The bill is black. Breast is blue and scapulars are black. The tarsus is red-orange.

(b) **Behavioral:** Primarily feeds on small fishes and crabs, and occasionally taking insects. Perches on a low branch of streamside shrub or rock, and dives in to catch prey. Juveniles are observed in April and May and nests in streamside or river banks. It builds a woven nest with a side entrance which hangs in the outer branches of trees in the canopy. Voice is soft with high-pitched “wheet”, given in flight. Movement is presumably sedentary.

**IUCN Assessment Information:** Near Threatened (BirdLife International, 2017).

#### 4. Palawan Flowerpecker (*Prionochilus plateni*)

Figure 5A shows the Palawan Flowerpecker (*Prionochilus plateni*) documented during the survey. This image can be compared to Figure 5B.

**A**Richard C. Rojas  
May 10, 2018**B**Rommel M. Cruz  
March 2012

**Figure 5:** Palawan flowerpeckers (*Prionochilus plateni*) perched on a tree branch (A, B).

**Taxonomic Classification**

KINGDOM: Animalia

PHYLUM: Chordata

CLASS: Aves

ORDER: Passeriformes

FAMILY: Dicaeidae

GENUS: *Prionochilus*SPECIES: *plateni*Scientific name: *Prionochilus plateni* (Blasius, 1888)

Common name: Palawan Flowerpecker.

**Description**

(a) **Morphological:** Size is 9 cm and weighs 8 to 9 g. Male nominate race is dark greyish-blue above, except for orange-red center of crown and yellow rump and chin and malar stripe white. Throat and underparts are yellow with red patch in the middle of breast. The female is olive-green to olive-grey in

the upperparts with yellowish center of crown and rump. Whitish malar stripe separated from whitish chin and throat by grey line. The rest of the underparts are yellow. The tarsus is black.

(b) **Behavioral:** Diet includes fruit, nectar and pollen. It forages in all storeys of forest. Fledged young observed in March, and birds with active gonads in April, May and August. It makes a sound of repeated high-pitched metallic “seep-seep”.

**IUCN Assessment Information:** Least Concern (BirdLife International, 2016).

**5. Yellow-wattled Bulbul (*Poliolophus urostictus*)**

Figure 6A shows the Yellow-wattled bulbul (*Poliolophus urostictus*) documented during the survey. This image can be compared to Figure 6B.



**Figure 6: Yellow-wattled bulbul (*Poliolophus urostictus*) perched on a tree branch (A, B).**

**Taxonomic Classification**

KINGDOM: Animalia

PHYLUM: Chordata

CLASS: Aves

ORDER: Passeriformes

FAMILY: Pycnonotidae

GENUS: *Poliolophus*SPECIES: *urostictus*Scientific name: *Poliolophus urostictus* (Salvadori, 1870)

Common name: Yellow-wattled Bulbul.

**Description**

(a) **Morphological:** Size is 19 cm; male weighs 21 to 28 g while female weighs 22 to 26 g. It is medium-sized, dull brown bulbul with strongly rounded tail, elongated crest feathers often raised. The breast plumage is largely white with greyish-brown in the upperparts. The tail plumage is relatively greyish-

black with white underparts of the feathers. The tarsus is black.

(b) **Behavioral:** Singles, in pairs or small group forage mainly on fruit. Breeding observed in March, April and August, birds with enlarged gonads are observed in May in Samar. Nest is usually cup-shaped with clutched 3 eggs. Movement is residential. Highly vocal and makes variable call of loud musical trisyllabic whistle of “wee-a-wee”.

**IUCN Assessment Information:** Least Concern (BirdLife International, 2016).

**6. Lowland White-eye (*Zosterops meyeri*)**

Figure 7A shows the Lowland white-eye (*Zosterops meyeri*) documented during the survey. This image can be compared to Figure 7B.

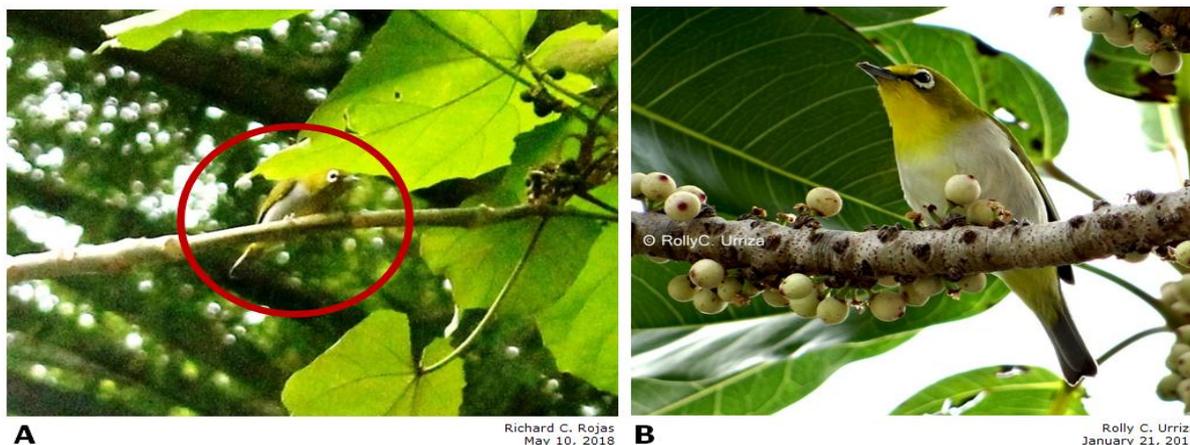


Figure 7: Lowland white-eye (*Zosterops meyeri*) perched on a tree branch (A, B).

#### Taxonomic Classification

KINGDOM: Animalia

PHYLUM: Chordata

CLASS: Aves

ORDER: Passeriformes

FAMILY: Zosteropidae

GENUS: *Zosterops*

SPECIES: *meyeri*

Scientific name: *Zosterops meyeri* (Bonaparte, 1850)

Common name: Lowland White-eye

#### Description:

(a) **Morphological:** Size is 10.2 to 12 cm and weighs 10 g. The forehead is lemon-yellow, crown and upperparts are yellowish-green and darkish loreal line. It has a lemon-yellow throat and upper breast. The rest of underparts are pale grey with faint yellow longitudinal streak over center. Under-tail coverts are pale lemon-yellow. It has a white eye-ring, interrupted by blackish spot at front. The bill is dark grey. The tarsus is greyish-brown.

(b) **Behavioral:** Forages in groups and mixed flocks, associating with eight or nine other species. Breeding season is on April to August, occasionally from January. The nest is said to be typical of genus, placed a few meters above ground in a small tree. The male is described as “an excellent songster”, singing frequently near nest with a call of “swit” or “swit-tzee”.

**IUCN Assessment Information:** Least Concern (BirdLife International, 2016).

#### 7. Amethyst Brown Dove (*Phapitreron amethystinus*)

Figure 8A shows Amethyst brown doves (*Phapitreron amethystinus*) in a cage, documented during the survey. Two (2) individuals of this species were observed in the wild but no photos taken due to immediate flight of the birds upon sensing of human presence. This image can be compared to Figure 8B.

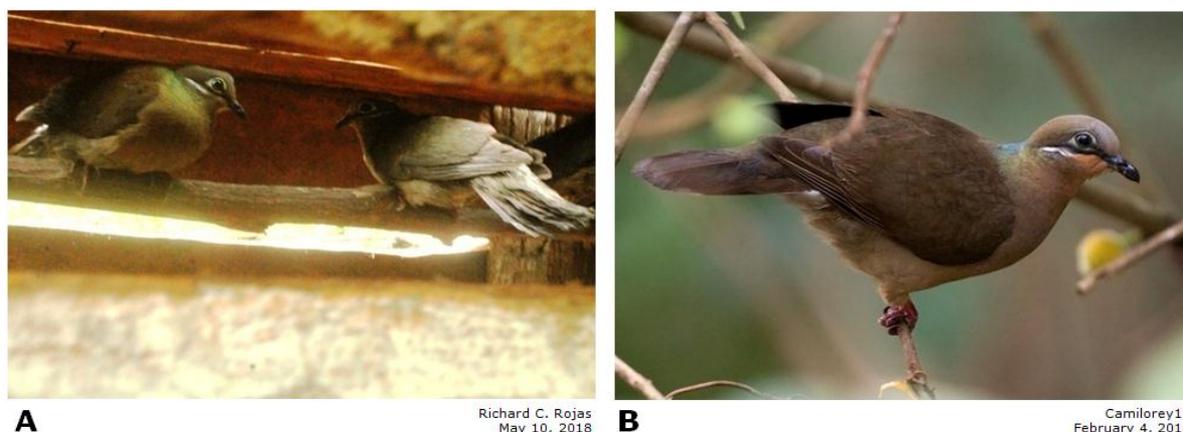


Figure 8: Amethyst brown doves (*Phapitreron amethystinus*) in a cage (A) and one perched on a tree branch (B).

#### Taxonomic Classification

KINGDOM: Animalia

PHYLUM: Chordata

CLASS: Aves

ORDER: Columbiformes

FAMILY: Columbidae

GENUS: *Phapitreron*

SPECIES: *amethystinus*

Scientific name: *Phapitreron amethystinus* (Bonaparte, 1855)

Common name: Amethyst Brown Dove

**Description**

(a) **Morphological:** Size is 26 to 27 cm and weighs 81.8 to 165 g. The plumage is largely dull brown. Its physical features include a grey tinge and purplish brown underparts, rich tan undertail-coverts, dark and white sub-ocular eye-lines, reddish-brown chin and throat with darker streaking, shading on breast to medium to darkish dull brown with narrowly edged dark back and scapulars. They also have pink flesh around the eye with amethyst or purple iridescence on the nape. The tarsus is reddish-velvet color.

(b) **Behavioral:** Diet comprises of fruit and seeds. It has recorded feeding on the inflorescence of a *Freycinetia* sp. Breeding occurs in February, May to July, with fledglings observed in April (Luzon), and June to July (Mindanao). It makes a call of well-spaced series of soft, deep, hollow, hooting notes, "hoot...hoot...hoot".

**IUCN Assessment Information:** Least Concern (BirdLife International, 2016).

**Table 2: Summary of conservation status of the seven (7) bird species (IUCN).**

Common name	Scientific name	IUCN Assessment
Bar-bellied cuckoo-shrike	<i>Coracina striata</i>	Least Concern
Red-keeled flowerpecker	<i>Dicaeum australe</i>	Least Concern
Southern silvery kingfisher	<i>Ceyx argentatus</i>	Near Threatened
Palawan flowerpecker	<i>Prionochilus plateni</i>	Least Concern
Yellow-wattled bulbul	<i>Poliolophus urostictus</i>	Least Concern
Lowland white-eye	<i>Zosterops meyeri</i>	Least Concern
Amethyst brown dove	<i>Phapitreron amethystinus</i>	Least Concern

Table 2 (above) shows the summary of the conservation status of the seven (7) bird species found in the study site. This is based on the IUCN Red List Assessment. The Southern silvery kingfisher (*Ceyx argentatus*) is described as a Near Threatened species. Table 3 (below)

shows the summary of the morphological characteristics of each bird species. The color of each part of the bird is described and the information was used in the identification and classification of each bird species.

**Table 3: Summary of the morphological features of the seven (7) bird species of this study.**

Species	Morphological features								
	Head				Bill	Plumage			Tarsus
	Forehead	Crown	Lore	Ear Coverts		Breast	Scapular	Rump	
<i>Coracina striata</i>	black, dark gray	black, dark gray	black	black	black	black, barred black and white	black	black	black
<i>Dicaeum australe</i>	black	black	white	black	black	white with red stain	black	black	black
<i>Ceyx argentatus</i>	black with silvery spots	black	black	black	black	blue	black with white	white	red-orange
<i>Prionochilus plateni</i>	dark greyish-blue	orange-red	dark greyish-blue	dark greyish-blue	black	yellow with red	dark greyish-blue	yellow with white	black
<i>Poliolophus urostictus</i>	dull brown	dull brown	dull brown	dull brown	black	greyish-brown with white	dull brown	greyish-black	black
<i>Zosterops meyeri</i>	lemon yellow	yellow-green	dark grey	olive green	dark grey	yellow with white	olive green	pale grey	greyish-brown
<i>Phapitreron amethystinus</i>	dull brown	dull brown	reddish brown with purple	dull brown	black	dull brown	dull brown	dull brown	reddish velvet

**Species Density:** A total of one hundred fourteen (114) individuals were observed and documented during the surveying period (Table 4). The Palawan flowerpecker (*Prionochilus plateni*) shows the highest density of

0.0138 individuals per meter with forty-two (42) individuals while the Lowland white-eye (*Zosterops meyeri*) shows the lowest density of 0.0003 with one (1) individual found.

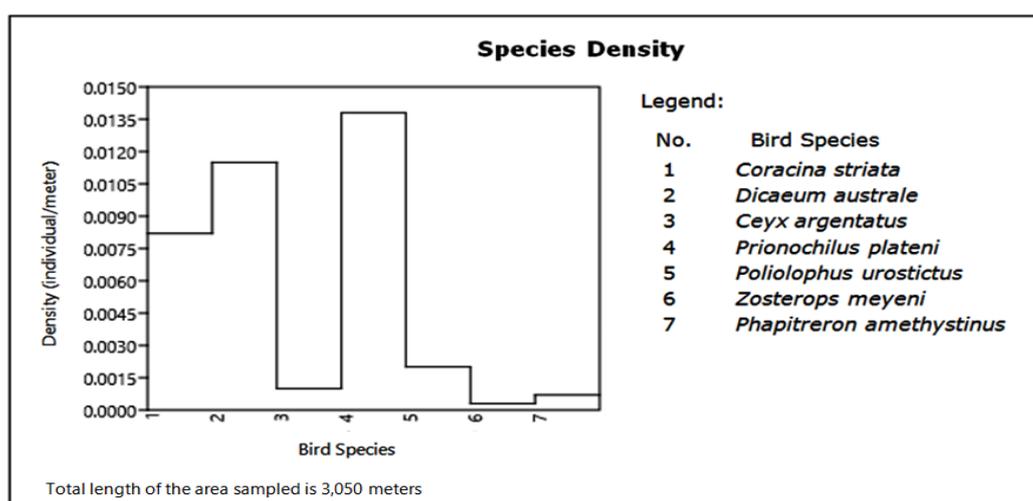
**Table 4: Density of bird species in the moist lowland forest of Bunguiao and Dulian, Zamboanga City.**

Common name	Scientific name	Total Individuals	<sup>1</sup> Species Density (N/m)
Bar-bellied cuckoo-shrike	<i>Coracina striata</i>	25	0.0082
Red-keeled flowerpecker	<i>Dicaeum australe</i>	35	0.0115
Southern silvery kingfisher	<i>Ceyx argentatus</i>	3	0.0010
Palawan flowerpecker	<i>Prionochilus plateni</i>	42	0.0138
Yellow-wattled bulbul	<i>Poliolophus urostictus</i>	6	0.0020
Lowland white-eye	<i>Zosterops meyeri</i>	1	0.0003
Amethyst brown dove	<i>Phapitreron amethystinus</i>	2	0.0007
Grand Total		114	0.0374

<sup>1</sup>Total number of individuals (N) divided by the total length of area sampled (3,050 meters).

It can be gleaned from the step graph (Figure 9) that Species 4 has the highest density while Species 6 is the least dominant species. Overall, the total density of the

birds observed and documented was 0.0374 individuals per meter.



**Figure 9: Graph showing the density of birds in the study site.**

**Habitat of the Birds:** The Bar-bellied cuckoo-shrikes (*Coracina striata*) were widely observed in Areas A, B, D, and E. The Red-keeled flowerpecker (*Dicaeum australe*) and Lowland white-eye (*Zosterops meyeri*) were only observed in Area A and D, respectively. The

highly dense Palawan flowerpecker (*Prionochilus plateni*) was particularly sighted in Areas A and C. Basically, most of the bird species were found in Area A (Figure 10).



**Figure 10: A panoramic view of the areas of the study site where birds were sighted.**

The birds prefer the moist environment of the forest (Figure 11). It is evident that the birds thrive well in the area because it is abundant with different sources of food

like fruits, insects and small fishes. But human activities like logging, felling and human littering (pollution) cause disturbances to the habitat of the birds (Figure 12).



**Figure 11: The moist lowland forest is the natural habitat of the birds found in the site.**



**Figure 12: Habitat disturbance observed in the study site (logging, felling and littering).**

In general, the birds were found thriving in the moist lowland forest of Bunguiao and Dulian (Upper Bunguiao) but online references have provided information on the habitat characteristics of each bird species relative to its nesting environment and feeding guild. *Phapitreron amethystinus* inhabit humid forest and dense secondary growth, within an altitudinal range. *Zosterops meyeri* stay in forest edge and bamboo thickets. *Prionochilus plateni* occupies the secondary forest growth, scrub and gardens, particularly around fruiting and flowering trees. *Coracina striata* are found in freshwater swamp-forest, second growth and scrub, including regenerating forests. *Dicaeum australe* live in forest particularly in forest edge, secondary growth, and coconut groves. *Ceyx argentatus* are usually found in primary or secondary rainforest having streams, small rivers and pools with well-timbered banks. *Poliolophus urostictus* inhabit the forest edge, open woods, second growth in lowlands and tends to avoid intact forest. Each of the birds have different niche in relation to the type of habitat they are found.

**Distribution and Endemism of the Birds:** Six (6) of the bird species are endemic to the Philippines: *Phapitreron*

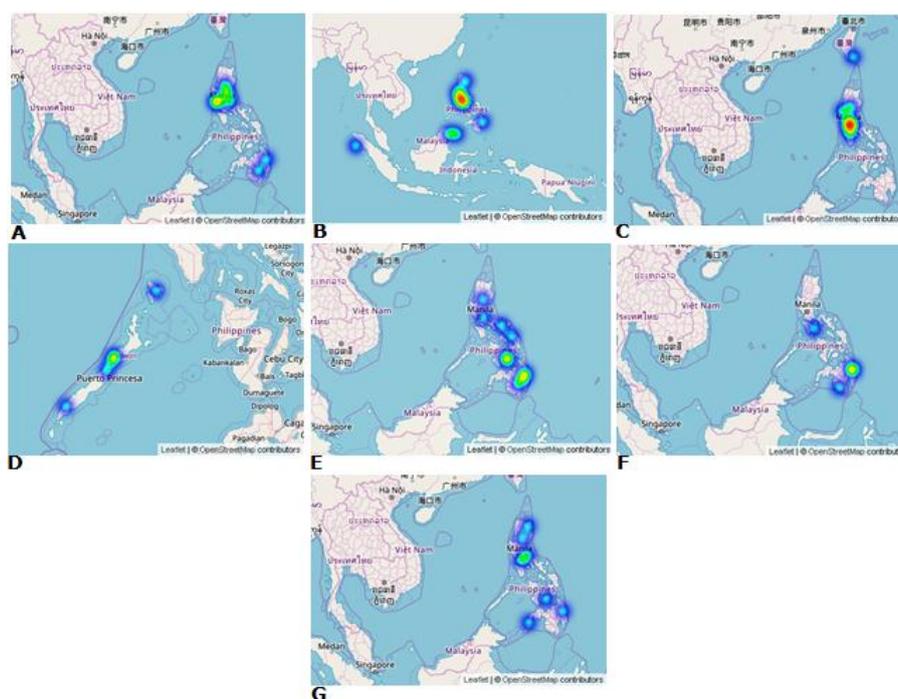
*amethystinus*, *Zosterops meyeri*, *Prionochilus plateni*, *Dicaeum australe*, *Ceyx argentatus*, and *Poliolophus urostictus*. The Bar-bellied cuckoo-shrike (*Coracina striata*) is a non-endemic species to the Philippines which also can be found in Thailand, Malaysia and Indonesia. Each bird species shows varying distribution in the Philippines (Table 5). Thermal illustration is also shown about the bird species distribution in Southeast Asia and in the Philippines (Figure 13).

**Table 5: Distribution and Endemism of the Bird Species in the Philippines.**

Bird Species	Distribution in the Philippines
<sup>1</sup> <i>Coracina striata</i>	Marinduque, Catanduanes, Mindoro, Palawan, Samar, Leyte, Bohol, Cebu, Basilan, Sulu archipelago
<sup>2</sup> <i>Dicaeum australe</i>	Found in all areas except Mindoro, Palawan, Panay and Negros
<sup>2</sup> <i>Ceyx argentatus</i>	Dinagat, Siargao, Basilan, and Mindanao (Southern Philippines)
<sup>2</sup> <i>Prionochilus plateni</i>	Palawan islands, Calamian group (Calauit, Busuanga Culion), and Balabac (Western Philippines)
<sup>2</sup> <i>Poliolophus urostictus</i>	Luzon, Catanduanes, Samar, Biliran, Leyte, Bohol, Negros, Dinagat, Siargao, Bucas, Basilan and Zamboanga Peninsula
<sup>2</sup> <i>Zosterops meyeri</i>	Batan Islands (Y'Ami, Itbayat, Batan, Sabtang, Ijuhohos), Lanyu and Lūdao (extreme North of the Philippines)
<sup>2</sup> <i>Phapitreron amethystinus</i>	Luzon, Polillo, Alabat, Catanduanes, Samar, Biliran, Leyte, Bohol, Panaon, Dinagat, Marinduque and Mindanao

<sup>[1]</sup>Non-endemic species (also found in Thailand, Malaysia and Indonesia)

<sup>[2]</sup>Endemic species to the Philippines



**Figure 13: The distribution of each bird in Southeast Asia. (A) *Phapitreron amethystinus*, (B) *Coracina striata*, (C) *Zosterops meyeri*, (D) *Prionochilus plateni*, (E) *Dicaeum australe*, (F) *Ceyx argentatus*, and (G) *Poliolophus urostictus*.**

Human activities that contribute to the reduction in bird population include habitat destruction and disturbance, pollution, introduction of foreign species, pest and predator control, and illegal commercial hunting and harvest. Habitat destruction is the most significant cause of declining of bird diversity (Raven et al 1998). Many bird species are endangered and highly susceptible to become extinct over its natural range. Legislations have

been enacted to protect the endangered species. But the real issue is not protecting individual species but protecting the ecosystems of which they, associated species, and humans are a part (Smith & Smith 2004). The Haribon Foundation presents a list of some of the threatened birds (Table 6) and the critically endangered bird families of the Philippines (Table 7).

**Table 6: Some of the Threatened Endemic Birds of the Philippines (Haribon Foundation).**

Common Name	Scientific Name	Distribution	Threats
Walden's hornbill, <i>Kalaw</i> , <i>Dulangan</i>	<i>Aceros waldeni</i>	Negros, Panay, Guimaras	Deforestation, hunting
Giant scops owl, <i>Kuwago</i>	<i>Mimizuku gurneyi</i>	Dinagat and Siargao Islands	Deforestation, hunting
Philippine hawk-eagle, <i>Banog</i>	<i>Spizaetus philippensis</i>	Luzon, Visayas islands, Basilan	Forest destruction
Whiskered pitta, <i>Kong Kong</i>	<i>Pitta kochi</i>	Luzon	Forest destruction
Philippine Cockatoo, <i>Katala</i> , <i>Abukay</i>	<i>Cacatua haematuropygia</i>	Palawan, Sulu archipelago	Intensive pet trade
Palawan peacock-pheasant, <i>Tandikan</i>	<i>Polyplectron emphanum</i>	Palawan	Habitat loss
Mindoro bleeding-heart, <i>Puñalada</i>	<i>Gallicolumba platenae</i>	Mindoro	Hunting, mining

**Table 7: Critically Endangered Bird Families and Species of the Philippines.**

<i>Bird Families</i>	<i>No. of Species</i>	<i>Species Affected</i>	<i>Common Name</i>
Accipitridae	1	<i>Pithecophaga jefferyi</i>	Great Philippine Eagle
Bucerotidae	2	<i>Aceros waldeni</i> <i>Anthracoceros montani</i>	Walden's Hornbill Sulu Hornbill
Columbidae	5	<i>Gallicolumba menagai</i> <i>Gallicolumba keayi</i> <i>Gallicolumba platenae</i> <i>Phapitreron cinereiceps</i> <i>Ptilinopus arcanus</i>	Sulu Bleeding-heart Negros Bleeding-heart Mindoro Bleeding-heart Tawi-Tawi Brown Dove Negros Fruit Dove
Cuculidae	1	<i>Centropus steerii</i>	Black-hooded Coucal
Dicaeidae	1	<i>Dicaeum quadricolor</i>	Cebu Flowerpecker
Falconidae	1	<i>Falco peregrinus</i>	Peregrine Falcon
Gruidae	1	<i>Grus antigone</i>	Sarus Crane
Psittacidae	1	<i>Cacatua haematuropygia</i>	Philippine Cockatoo
Sternidae	1	<i>Sterna bernsteini</i>	Chinese-crested Tern

In this study, the identified seven (7) bird species share a list of common and contrasting traits in terms of their morphological and behavioral traits, diversity and abundance, distribution and habitat characteristics.

## CONCLUSION

There were seven (7) species of birds found in the moist lowland forest of Bunguiao and Dulian (Upper Bunguiao), Zamboanga City, Philippines. A total of 114 individuals were observed and documented. The Palawan flowerpecker (*Prionochilus plateni*) was the densest species with 0.0138 individuals per meter (a total of 42 individuals) while the Lowland white-eye (*Zosterops meyeri*) was the least dominant species with 0.0003 individuals per meter (a total of one (1) individual). Diet and feeding guild of the birds generally include insects (insectivores) and fruits (frugivores) while some feed on small fishes. They thrive well in the moist lowland forest oftentimes found perching on the high canopies of the coconut and other fruit trees. According to the IUCN assessment, the birds are described as "Least Concern" except for the Southern silvery kingfisher (*Ceyx argentatus*) which is a "Near Threatened" species.

Human settlements were found near the habitats of the identified birds of this study. Timber felling and human littering (pollution) were visible in the area. These anthropogenic activities, together with logging (warranted or illegal), *kaingin* and hunting of birds, are considered as the major causes of habitat damage and disturbances which might lead to population decline of the identified bird species. Therefore, the use of forest resources should be regulated. Furthermore, proper disposal of wastes should be observed within the perimeter of the forest, river, streams and other ecosystems. Conservation initiatives should also be a priority of the people of Bunguiao and Dulian (Upper Bunguiao) to protect the birds and other wildlife from human activities that tolerate habitat damage and disturbances. The preservation of the remaining population of the birds would benefit the people of today and the next generations to come.

It is recommended to conduct bird surveys and assessment of other moist lowland forests and rivers of Zamboanga City, Philippines to provide baseline information on the present status of bird diversity and its abundance. Future ornithological assessment should also consider the highland forests and other ecosystems. It is also recommended to conduct trophic structure and food web assessment to determine the interrelationship activities of the birds with the other organisms found in the forest community.

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