FINAL REPORT OF FAUNA

ASSESSMENT OF BIRD AT CONSERVATION AREA BELAGA ESTATE, GLENEALY PLANTATIONS SDN BHD

For

GLENEALY PLANTATIONS SDN BHD
(Sustainability Division)

Prepared by
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EXECUTIVE SUMMARY

Objective

The primary goal of this assessment is to evaluate the existing bird species diversity at Belaga Estate, Glenealy Plantations Sdn. Bhd.

This survey seeks to recognize potential influences on fauna specially birds and propose pertinent compensatory and mitigative actions to safeguard and preserve biodiversity in the potentially affected area. To accomplish this, we conducted a thorough preliminary fauna assessment focusing on the birds within the conservation area. This assessment is confined to the impacted biodiversity area and also examines potential direct as well as indirect/induced impacts and risks resulting from ongoing oil palm plantation activities.

Date

This study was conducted from 12 to 16 March 2025.

Methodology

Bird data were collected using three main methods: bird sound recordings (using a Tascam recorder), mist netting, and direct field observations. A total of 12 mist nets were set up across the study area. Tascam recorders were installed at 100-meter intervals along the transect, resulting in five (5) designated recording points. The recorded audio data were then uploaded to BirdNET. Analyzer for species identification and to evaluate bird species diversity.

Result Summary

A total of 92 bird species were recorded in the study area using bird sound recordings via the Tascam Recorder. Additionally, 10 species were captured through mist netting, and 8 species were observed using binoculars during field observations. Among the species recorded by the Tascam Recorder, 39 species are classified as totally protected, including 28 Near Threatened (NT) species, 10 Vulnerable (VU) species, and 1 Critically Endangered (CR) species. The remaining 53 species are listed as Least Concern (LC) on the IUCN Red List.

The Helmeted Hornbill (*Rhinoplax vigil*), the only Critically Endangered species detected in this area, highlights the ecological significance of the site. These findings indicate that the area harbors a high level of bird species diversity and serves as an important habitat for many avian species. Therefore, any activities that could disturb this forest should be strictly avoided, and conservation efforts should be prioritized to protect this valuable ecosystem.

Recommendations

To enhance the protection of these bird species, the following recommendations are proposed:

i. Establish a protected area status for the site to legally safeguard it from logging, development, or other disruptive land-use changes.
ii. Conduct regular biodiversity monitoring to track population trends, detect threats early, and guide conservation strategies.
iii. Implement community education and awareness programs to engage local residents in the importance of bird conservation and sustainable forest use.
iv. Strengthen enforcement against illegal hunting, logging, or trade of protected bird species, particularly targeting the Helmeted Hornbill.
v. Promote eco-tourism as an alternative source of income for local communities, emphasizing bird watching and habitat conservation.
vi. Restore degraded habitats and maintain ecological corridors to support breeding, feeding, and migration of avian species.

We know very little about most of the species inhabiting the site, beyond their mere existence. To effectively conserve this unique ecosystem, it is crucial to implement several strategies. These include:

i. monitoring existing species within conservation area.

ii. initiating tree planting programs particularly with local communities to share

awareness on the area.

iii. and legally protecting important areas from disturbance.

Consequently, it is essential to monitor the biodiversity in the region, particularly by inventorying rare, threatened, endangered, and near-extinct species.

1.0 INTRODUCTION AND BACKGROUND

Birds are recognized as vital indicators of environmental health and ecosystem integrity. Their presence, abundance, and behaviour provide valuable insights into the state of various habitats and the impacts of environmental changes. This introductory overview highlights why birds are effective indicators and how they are used in ecological monitoring and conservation efforts. Birds inhabit diverse ecosystems, from forests and grasslands to wetlands and urban areas. This widespread presence makes them suitable for monitoring a variety of habitats. Birds respond quickly to changes in their environment, such as habitat degradation, pollution, and climate change. These responses can be observed and measured, providing early warnings of ecological disturbances. Birds occupy multiple trophic levels and ecological niches, including

predators, herbivores, and scavengers. This diversity allows them to reflect the health of different components of the ecosystem.

Birds are generally conspicuous and easier to observe and identify compared to many other wildlife species. This accessibility facilitates regular monitoring and data collection. Extensive historical data and ongoing research on bird populations provide a robust foundation for assessing trends and making comparisons over time. Bird species composition and abundance can indicate the quality and health of specific habitats. For example, the presence of certain forest-dwelling bird species can signify a well-preserved woodland. Birds, especially those at higher trophic levels, can accumulate contaminants such as pesticides and heavy metals. Monitoring these birds helps assess the levels of pollution in the environment. Changes in bird migration patterns, breeding times, and distribution are valuable indicators of climate change impacts. Shifts in these patterns can provide insights into broader ecological responses to changing temperatures and weather conditions. Bird diversity and abundance serve as proxies for overall biodiversity and ecosystem health. Rich bird communities often correlate with high biodiversity and robust ecosystem functioning. Birds can reflect the impacts of human activities such as urbanization, deforestation, and agriculture. Declines or increases in specific bird populations can indicate the effects of these activities on the environment.

Birds, as sensitive and easily monitored components of ecosystems, play a crucial role in indicating the health and integrity of the environment. Their responses to various environmental factors provide valuable data for conservationists, researchers, and policymakers. By monitoring bird populations, we gain essential insights into the state of our natural world and can take informed actions to protect and preserve biodiversity and ecosystem services.

2.0 Significant Studies of Fauna in Plantation Areas

Research on fauna in plantation areas has provided insights into biodiversity, ecosystem services, and the impacts of land use changes. Here are some notable studies and their contributions to our understanding of fauna in plantation environments. This research focused on the biodiversity in oil palm plantations compared to natural forests in Southeast Asia. Findings showed significant reductions in species richness and diversity in oil palm plantations. The study highlighted the need for biodiversity-friendly management practices and the conservation of natural forest fragments within plantation landscapes.

Bird surveys in oil palm plantations are critical for understanding and mitigating the ecological impacts of these agricultural landscapes. Here are several reasons why these surveys are important. Surveys provide data on the variety of bird species present in oil palm plantations. This helps in assessing the overall biodiversity of the area. Birds often serve as indicators of

ecosystem health. Changes in bird populations can signal changes in the environment, such as habitat degradation or pollution. Surveys help in evaluating the quality of habitats within and surrounding the plantations. This information is crucial for developing management strategies to improve or maintain habitat quality. Identifying key bird species and their habitat requirements assists in creating conservation plans and measures to protect vulnerable species and enhance biodiversity.

Bird surveys can reveal the effects of different plantation management practices on wildlife. This includes the impacts of monoculture practices, pesticide use, and deforestation. Data from bird surveys can guide the adoption of more sustainable agricultural practices that support biodiversity, such as agroforestry, organic farming, and the preservation of natural habitats within plantation areas. Birds are sensitive to changes in their environment, making them useful indicators of climate change. Surveys can track changes in migration patterns, breeding times, and distribution, providing valuable data on the impacts of climate change. Regular bird surveys establish baseline data and facilitate long-term monitoring of ecological changes, helping to detect trends and inform timely conservation actions.

Surveys contribute to scientific research on bird ecology, behaviour, and conservation. This knowledge is essential for developing effective conservation strategies and understanding the broader ecological impacts of plantations. Data from bird surveys can inform policy and decision-making at local, national, and international levels, promoting sustainable agricultural practices and biodiversity conservation. Bird surveys in oil palm plantations are essential for understanding and mitigating the ecological impacts of these agricultural systems. They provide valuable data for biodiversity assessment, conservation planning, and sustainable management practices. By monitoring bird populations, we can gain insights into ecosystem health, inform policy decisions, and engage communities in conservation efforts, ultimately contributing to the preservation of biodiversity and the promotion of sustainable agriculture.

3.0 Objectives

The main objective of assessment is to assess baseline data on fauna particularly birds species within the Belaga Estate conservation area.

4.0 DESCRIPTION OF ASSESSMENT AREA

This study was conducted at Conservation are of Belaga Estate.

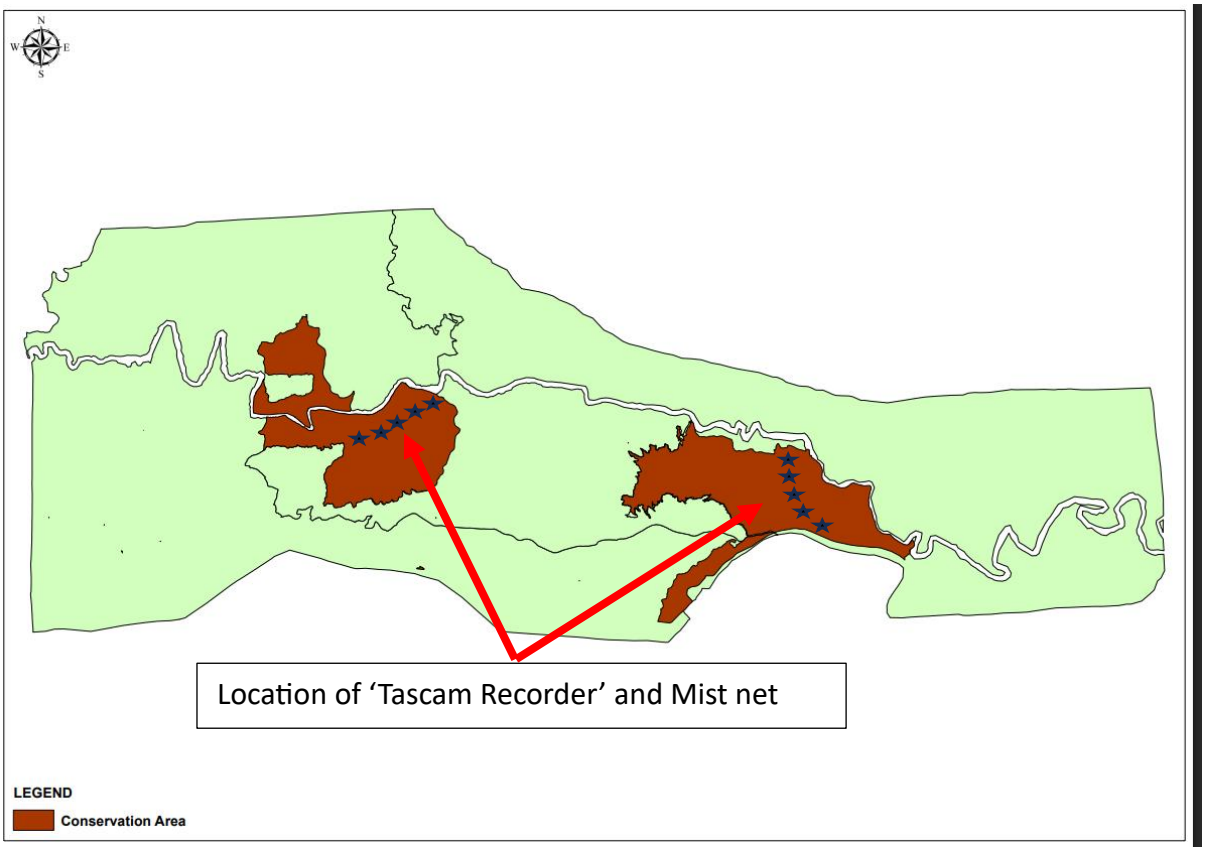

Figure 1: Location of study area in conservation area at Belaga Estate

5.0 BIODIVERSITY ASSESSMENT TEAM

There are dedicated personnel from UPMKBs (Table 1) comprises of researchers and students who work tirelessly to advance our understanding of complex scientific concepts and push the boundaries of innovation. Their collaborative efforts are driven by a shared passion for discovery and a commitment to excellence. By integrating diverse expertise and fresh perspectives, they tackle challenging problems, develop cutting-edge technologies, and contribute to significant breakthroughs in their respective fields. Their work not only enhances academic knowledge but also paves the way for practical applications that can benefit society at large. Together, they embody the spirit of curiosity, creativity, and relentless pursuit of knowledge.

Table 1: Fauna Assessment Team

No.	Name & Responsibility	Expertise & Experience
1	Dr. Zamri Bin Rosli (Project Leader)	Wildlife management and ecology • Has 22 years services with UPM as a researcher and lecturer • Published more than 30 papers in JCR, WOS and indexed journal.

		• Presented more than 20 papers at national and international levels • Receive more than 1 million research grant from university, ministry, agency and government sectors. • Published 5 books related to wildlife. • Actively involved in community engagement project such as in tree planting programme and education training.
2	Mr. Muhamad Syafiq Che Shafine	• Has over 15 years services with forest Department Peninsular Malaysia and Wildlife Department Peninsular Malaysia • Taking PhD in the field of wildlife management and currently study on birds using sound recorder (Tascam Recorder)

6.0 APPROACH AND METHODOLOGY OF THE ASSESSMENT

There are Two (2) methods were used in order to obtain bird diversity in this area. The bird song recorder via 'Tascam Recorder' were used to detect the existence of bird using their song or voice. The recorded audio data were then uploaded to Bird NET. Analyzer for species identification and to evaluate bird species diversity. The mist netting method was used to capture cryptic bird species which cannot be detected using binoculars such as those species that belong to the understorey level. All birds captured were identified by using 'Field Guide to the Birds of Borneo' by Phillip. Birds were then released immediately after identification.

Figure 2: Record bird song using ‘Tascam recorder’

Figure 3: Setting up mist net

7.0 ASSESSMENT AND FINDINGS

Assessment of birds was conducted from 12th to 16th March 2025. Data collection was done from 8:30am in the morning up to 3.30pm. The results of the fauna assessment are as follows:

7.1 Result of bird's survey using 'Tascam Recorder'

A total of 92 bird species were recorded in the Belaga Conservation Area using a Tascam recorder, as shown in Table 1. Among these, only one species (1.1%) is classified as Critically Endangered (CE): the Helmeted Hornbill (*Buceros vigil*) (Table 2). Additionally, 10 species (11%) are categorized as Vulnerable (V), including the Grey-cheeked Bulbul (*Alophoixus tephrogenys*), Black Hornbill (Anthracoceros malayanus) , Great Argus (*Argusianus argus*), Rhinoceros Hornbill (*Buceros rhinoceros*), Cinnamon-rumped Trogon (*Harpactes orrhophaeus*), Blue-headed Pitta (*Hydrornis baudii*), Great Slaty Woodpecker (*Mulleripicus pulverulentus*), Sunda Blue Flycatcher (*Cyornis caerulatus*), Bornean Bristlehead (*Pityriasis gymnocephala*), and Bornean Wren-Babbler (*Ptilocichla leucogrammica*) (Table 3). 28 species fall under Nearly Threatened (NT) by IUCN Red List as shown in Table 4, while 53 species fall under Least Concern (LC) as shown in Table 5.

Table 1: List of bird species recorder using Tascam recorder at Belaga Estate Conservation Area

NO	SCIENTIFIC NAME	COMMON NAME	STATUS
1	*Aegithina viridissima*	Green Iora	NT
2	*Aethopyga siparaja*	Crimson Sunbird	LC
3	*Alophoixus finschii*	Finsch's Bulbul	NT
4	*Alophoixus tephrogenys*	Gray-cheeked Bulbul	V
5	*Anorrhinus galeritus*	Bushy-crested Hornbill	NT
6	*Anthracoceros malayanus*	Black Hornbill	V
7	*Anthreptes malacensis*	Brown-throated Sunbird	LC
8	*Arachnothera crassirostris*	Thick-billed Spiderhunter	LC
9	*Arachnothera longirostra*	Little Spiderhunter	LC
10	*Ardea cinerea*	Gray Heron	LC
11	*Argusianus argus*	Great Argus	V
12	*Brachypodius eutilotus*	Puff-backed Bulbul	NT
13	*Brachypodius melanocephalos*	Black-headed Bulbul	LC
14	*Brachypodius melanoleucos*	Black-and-white Bulbul	NT
15	*Buceros rhinoceros*	Rhinoceros Hornbill	V
16	*Buceros vigil*	Helmeted Hornbill	CE
17	*Calyptomena viridis*	Green Broadbill	NT
18	*Centropus sinensis*	Greater Coucal	LC
19	*Ceyx rufidorsa*	Black-backed Dwarf-Kingfisher	NT
20	*Chalcoparia singalensis*	Ruby-cheeked Sunbird	LC
21	*Chalcophaps indica*	Asian Emerald Dove	**LC**
22	*Chloropsis cochinchinensis*	Blue-winged Leafbird	LC
23	*Copsychus malabaricus*	White-rumped Shama	LC
24	*Copsychus pyrropygus*	Rufous-tailed Shama	NT
25	*Corvus enca*	Slender-billed Crow	LC
26	*Corvus macrorhynchos*	Large-billed Crow	LC
27	*Cuculus micropterus*	Indian Cuckoo	LC
28	*Cyanoderma erythropterum*	Chestnut-winged Babbler	LC

29	*Cyornis caerulatus*	Sunda Blue Flycatcher	V
30	*Cyornis umbratilis*	Gray-chested Jungle-Flycatcher	NT
31	*Dicaeum cruentatum*	Scarlet-backed Flowerpecker	LC
32	*Dicaeum trigonostigma*	Orange-bellied Flowerpecker	LC
33	*Dicrurus paradiseus*	Greater Racket-tailed Drongo	LC
34	*Ducula aenea*	Green Imperial-Pigeon	NT
35	*Ducula badia*	Mountain Imperial-Pigeon	LC
36	*Erythropitta granatina*	Garnet Pitta	NT
37	*Erythropitta ussheri*	Black-crowned Pitta	NT
38	*Eupetes macrocerus*	Malaysian Rail-babbler	NT
39	*Eurylaimus javanicus*	Banded Broadbill	NT
40	*Eurylaimus ochromalus*	Black-and-yellow Broadbill	NT
41	*Gallus gallus*	Red Junglefowl	**LC**
42	*Gracula religiosa*	Common Hill Myna	LC
43	*Harpactes diardii*	Diard's Trogon	NT
44	*Harpactes kasumba*	Red-naped Trogon	NT
45	*Harpactes oreskios*	Orange-breasted Trogon	LC
46	*Harpactes orrhophaeus*	Cinnamon-rumped Trogon	V
47	*Hemicircus concretus*	Gray-and-buff Woodpecker	LC
48	*Hemiprocne comata*	Whiskered Treeswift	LC
49	*Hydrornis baudii*	Blue-headed Pitta	V
50	*Hydrornis schwaneri*	Bornean Banded-Pitta	LC
51	*Hypothymis azurea*	Black-naped Monarch	LC
52	*Kurochkinegramma hypogrammicum*	Purple-naped Spiderhunter	LC
53	*Macronus ptilosus*	Fluffy-backed Tit-Babbler	NT
54	*Malacocincla sepiaria*	Horsfield's Babbler	LC
55	*Malacopteron affine*	Sooty-capped Babbler	NT
56	*Malacopteron magnirostre*	Moustached Babbler	LC
57	*Malacopteron magnum*	Rufous-crowned Babbler	NT
58	*Mixornis bornensis*	Bold-striped Tit-Babbler	LC
59	*Mulleripicus pulverulentus*	Great Slaty Woodpecker	V
60	*Ninox scutulata*	Brown Boobook	LC
61	*Nyctyornis amictus*	Red-bearded Bee-eater	**LC**
62	*Oriolus chinensis*	Black-naped Oriole	LC
63	*Oriolus xanthornus*	Black-hooded Oriole	LC
64	*Orthotomus atrogularis*	Dark-necked Tailorbird	LC
65	*Orthotomus ruficeps*	Ashy Tailorbird	LC
66	*Orthotomus sericeus*	Rufous-tailed Tailorbird	LC
67	*Pellorneum bicolor*	Ferruginous Babbler	LC
68	*Pellorneum capistratoides*	Bornean Black-capped Babbler	LC
69	*Pellorneum malaccense*	Short-tailed Babbler	NT
70	*Phaenicophaeus sumatranus*	Chestnut-bellied Malkoha	NT
71	*Philentoma velata*	Maroon-breasted Philentoma	NT
72	*Phylloscopus borealis*	Arctic Warbler	LC

73	*Pitta moluccensis*	Blue-winged Pitta	LC
74	*Pitta sordida*	Hooded Pitta	LC
75	*Pityriasis gymnocephala*	Bornean Bristlehead	V
76	*Platysmurus aterrimus*	Bornean Black Magpie	LC
77	*Pomatorhinus montanus*	Sunda Scimitar-Babbler	LC
78	*Prionochilus maculatus*	Yellow-breasted Flowerpecker	LC
79	*Prionochilus xanthopygius*	Yellow-rumped Flowerpecker	LC
80	*Psilopogon chrysopogon*	Gold-whiskered Barbet	LC
81	*Psilopogon henricii*	Yellow-crowned Barbet	NT
82	*Psilopogon rafflesii*	Red-crowned Barbet	NT
83	*Ptilocichla leucogrammica*	Bornean Wren-Babbler	V
84	*Pycnonotus brunneus*	Red-eyed Bulbul	LC
85	*Pycnonotus goiavier*	Yellow-vented Bulbul	LC
86	*Pycnonotus plumosus*	Olive-winged Bulbul	LC
87	*Rhipidura javanica*	Malaysian Pied-Fantail	LC
88	*Rubigula erythropthalmos*	Spectacled Bulbul	LC
89	*Sasia abnormis*	Rufous Piculet	LC
90	*Stachyris maculata*	Chestnut-rumped Babbler	NT
91	*Stachyris nigricollis*	Black-throated Babbler	NT
92	*Turdinus macrodactylus*	Large Wren-Babbler	NT

Table 2: list of Critically Endangered (CR) Species

No.	***Scientific name***	**Species name**
1.	*Buceros vigil*	Helmeted Hornbill

Table 3: List of 'Vulnerable' (V) species

No.	***Scientific name***	**Species name**
1.	*Ptilocichla leucogrammica*	Bornean Wren-Babbler
2.	*Pityriasis gymnocephala*	Bornean Bristlehead
3.	*Mulleripicus pulverulentus*	Great Slaty Woodpecker
4.	*Hydrornis baudii*	Blue-headed Pitta
5.	*Harpactes orrhophaeus*	Cinnamon-rumped Trogon
6.	*Cyornis caerulatus*	Sunda Blue Flycatcher
7.	*Buceros rhinoceros*	Rhinoceros Hornbill
8.	*Argusianus argus*	Great Argus
9.	*Anthracoceros malayanus*	Black Hornbill
10.	*Alophoixus tephrogenys*	Gray-cheeked Bulbul

Table 4: List of 'Nearly Threatened' species (NT)

No.	*Scientific name*	Species name
1.	*Stachyris maculata*	Chestnut-rumped Babbler
2.	*Stachyris nigricollis*	Black-throated Babbler
3.	*Turdinus macrodactylus*	Large Wren-Babbler
4.	*Psilopogon henricii*	Yellow-crowned Barbet
5.	*Psilopogon rafflesii*	Red-crowned Barbet
6.	*Pellorneum malaccense*	Short-tailed Babbler
7.	*Phaenicophaeus sumatranus*	Chestnut-bellied Malkoha
8.	*Philentoma velata*	Maroon-breasted Philentoma
9.	*Malacopteron magnum*	Rufous-crowned Babbler
10.	*Malacopteron affine*	Sooty-capped Babbler
11.	*Macronus ptilosus*	Fluffy-backed Tit-Babbler
12.	*Harpactes diardii*	Diard's Trogon
13.	*Harpactes kasumba*	Red-naped Trogon
14.	*Erythropitta granatina*	Garnet Pitta
15.	*Erythropitta ussheri*	Black-crowned Pitta
16.	*Eupetes macrocerus*	Malaysian Rail-babbler
17.	*Eurylaimus javanicus*	Banded Broadbill
18.	*Eurylaimus ochromalus*	Black-and-yellow Broadbill
19.	*Ducula aenea*	Green Imperial-Pigeon
20.	*Cyornis umbratilis*	Gray-chested Jungle-Flycatcher
21.	*Copsychus pyrropygus*	Rufous-tailed Shama
22.	*Ceyx rufidorsa Black-backed*	Dwarf-Kingfisher
23.	*Calyptomena viridis*	Green Broadbill
24.	*Brachypodius melanoleucos*	Black-and-white Bulbul
25.	*Brachypodius eutilotus*	Puff-backed Bulbul
26.	*Anorrhinus galeritus*	Bushy-crested Hornbill
27.	*Alophoixus finschii*	Finsch's Bulbul
28.	*Aegithina viridissima*	Green Iora

Table 5: list of' Least Concern' (LC) species

No.	*Scientific Name*	Species Name
1.	*Aethopyga siparaja*	Crimson Sunbird
2.	*Anthreptes malacensis*	Brown-throated Sunbird
3.	*Arachnothera crassirostris*	Thick-billed Spiderhunter
4.	*Arachnothera longirostra*	Little Spiderhunter
5.	*Ardea cinerea*	Gray Heron
6.	*Brachypodius melanocephalos*	Black-headed Bulbul
7.	*Centropus sinensis*	Greater Coucal
8.	*Chalcoparia singalensis*	Ruby-cheeked Sunbird
9.	*Chalcophaps indica*	Asian Emerald Dove
10.	*Chloropsis cochinchinensis*	Blue-winged Leafbird
11.	*Copsychus malabaricus*	White-rumped Shama
12.	*Corvus enca*	Slender-billed Crow
13.	*Corvus macrorhynchos*	Large-billed Crow
13.	*Cuculus micropterus*	Indian Cuckoo
14.	*Cyanoderma erythropterum*	Chestnut-winged Babbler
15.	*Dicaeum cruentatum*	Scarlet-backed Flowerpecker
16.	*Dicaeum trigonostigma*	Orange-bellied Flowerpecker
17.	*Dicrurus paradiseus*	Greater Racket-tailed Drongo
18.	*Dicaeum cruentatum*	Scarlet-backed Flowerpecker
19.	*Dicaeum trigonostigma*	Orange-bellied Flowerpecker
20.	*Dicrurus paradiseus*	Greater Racket-tailed Drongo
21.	*Ducula badia*	Mountain Imperial-Pigeon
22.	*Gallus gallus*	Red Junglefowl
23.	*Harpactes oreskios*	Orange-breasted Trogon
24.	*Hemicircus concretus*	Gray-and-buff Woodpecker
25.	*Hemiprocne comata*	Whiskered Treeswift
26.	*Hydrornis schwaneri*	Bornean Banded-Pitta
27.	*Hypothymis azurea*	Black-naped Monarch
28.	*Kurochkinegramma hypogrammicum*	Purple-naped Spiderhunter
29.	*Malacocincla sepiaria*	Horsfield's Babbler
30.	*Malacopteron magnirostre*	Moustached Babbler
31.	*Mixornis bornensis*	Bold-striped Tit-Babbler
32.	*Ninox scutulata*	Brown Boobook
33.	*Nyctyornis amictus*	Red-bearded Bee-eater
34.	*Oriolus chinensis*	Black-naped Oriole
35.	*Oriolus xanthornus*	Black-hooded Oriole
36.	*Orthotomus atrogularis*	Dark-necked Tailorbird
37.	*Orthotomus ruficeps*	Ashy Tailorbird
38.	*Orthotomus sericeus*	Rufous-tailed Tailorbird
39.	*Pellorneum bicolor*	Ferruginous Babbler
40.	*Pellorneum capistratoides*	Bornean Black-capped Babbler
41.	*Phylloscopus borealis*	Arctic Warbler
42.	*Pitta moluccensis*	Blue-winged Pitta

43.	*Pitta sordida*	Hooded Pitta
44.	*Platysmurus aterrimus*	Bornean Black Magpie
45.	*Pomatorhinus montanus*	Sunda Scimitar-Babbler
46.	*Prionochilus maculatus*	Yellow-breasted Flowerpecker
47.	*Psilopogon chrysopogon*	Gold-whiskered Barbet
48.	*Pycnonotus brunneus*	Red-eyed Bulbul
49.	*Pycnonotus goiavier*	Yellow-vented Bulbul
50.	*Pycnonotus plumosus*	Olive-winged Bulbul
51.	*Rhipidura javanica*	Malaysian Pied-Fantail
52.	*Rubigula erythropthalmos*	Spectacled Bulbul
53.	*Sasia abnormis*	Rufous Piculet

Table 6 presents the 17 most frequently captured bird species groups, with the babbler group leading at 17.45%. The bulbul group follows at 9.89%, while the pitta group accounts for 6.59%. The flowerpecker, flycatcher, hornbill, trogon, and barbet groups each contribute 4.40% of recorded captures. Meanwhile, other groups such as broadbill, pigeon, spiderhunter, sunbird, tailorbird, woodpecker, crow, oriole, and shama each represent less than 2.20% of the recorded data.

Table 6: List of 17 most recorded species by Group

No.57.	Group of Bird	No of individual recorded	% of species recorded
1.	Babbler	16	17.45
2.	bulbul	9	9.89
3.	Pitta	6	6.59
4.	Flowerpecker	4	4.40
5.	Flycatcher	4	4.40
6.	Hornbill	4	4.40
7.	Trogon	4	4.40
8.	Barbet	4	4.40
9.	Broadbill	3	3.30
10.	Pigeon	3	3.30
11.	Spiderhunter	3	3.30
12.	Sunbird	3	3.30
13.	tailorbird	3	3.30
14.	Woodpecker	3	3.30
15	Crow	2	2.20
16	Oriole	2	2.20
17	Shama	2	2.20

7.2 Birds captured using mist-netting method

Assessment of bird species using mist netting method captured Nine (9) species of birds represented by Creasted Goshawk (*Lophospiza trivirgata*), Artic Warbler (*Phylloscopus borealis*), Banded Kingfisher (*Lacedo pulchella*), Purple-naped Sunbird (*Kurochkinegramma hypogrammicum*), Yellow-breasted Flowerpecker (*Prionochilus maculatus*), White-chested Babbler (*Pellorneum rostratum*), Black-backed Dwarf Kingfisher (*Ceyx erithaca*), Yellow-bellied Bulbul (*Alophoixus phaeocephalus*), Chestnut-winded Babbler (*Cyanoderma erythropterum*) and the only one bat belonging to Spotted Frut Bat (*Balionycteris maculata*) (Figure 4 – 13).

Figure 4: Creasted Goshawk (*Lophospiza trivirgata*)

Figure 5: Artic Warbler (*Phylloscopus borealis*)

Figure 6: Banded Kingfisher (*Lacedo pulchella*)

Figure 7: Purple-naped Sunbird (*Kurochkinegramma hypogrammicum*)

Figure 8: Yellow-breasted Flowerpecker (*Prionochilus maculatus*)

Figure 9: White-chested Babbler (*Pellorneum rostratum*)

Figure 10: Black-backed Kingfisher (*Ceyx eritacha*)

Figure 11: Yellow-bellied Bulbul (*Alophoixus phaeocephalus*)

Figure 12: Chestnut-winged Flycatcher (*Cyanoderma erythropterum*)

Figure 13: Spotted Fruit Bat (*Balionycteris maculata*)

According to the IUCN Red List assessment, out of the nine bird species captured by using mist netting method, only two— the White-chested Babbler (*Pellorneum rostratum*) and the Black-backed Kingfisher (*Ceyx erithaca*)— are classified as Nearly Threatened (NT). The remaining species recorded fall under the Least Concern (LC) category (Table 7)

Table 7: List of bird species and status captured using mist netting method

No.	***Scientific name***	**Species name**	**Status**
1.	*Lophospiza trivirgata*	Creasted Goshawk	LC
2.	*Phylloscopus borealis*	Artic Warbler	LC
3.	*Lacedo pulchella*	Banded Kingfisher	LC
4.	*Kurochkinegramma hypogrammicum*	Purple-naped Sunbird	LC
5.	*Prionochilus maculatus*	Yellow-breasted Flowerpecker	LC
6.	*Pellorneum rostratum*	White-chested Babbler	NT
7.	*Ceyx erithaca*	Black-backed Kingfisher	NT
8.	*Alophoixus phaeocephalus*	Yellow-bellied Bulbul	LC
9.	*Cyanoderma erythropterum*	Chestnut-winged Flycatcher	LC
10,	*Balionycteris maculata*	Spotted Fruit Bat	LC

8.0 CONCLUSION

The avifaunal survey conducted in the Belaga Conservation Area using a Tascam recorder and mist netting method revealed significant biodiversity, with a total of 92 bird species documented. Among these, one species—the Helmeted Hornbill (Buceros vigil)—is classified as Critically Endangered (1.1%), and 10 species (11%) are listed as Vulnerable according to the IUCN Red List. Additionally, 28 species (30.4%) fall under the Near Threatened category, while the majority (53 species, 57.6%) are categorized as Least Concern.

Species group analysis indicates that babblers were the most frequently recorded group (17.45%), followed by bulbuls (9.89%) and pittas (6.59%). Other groups such as flowerpeckers, flycatchers, hornbills, trogons, and barbets each contributed 4.40% to the total records, while remaining groups showed lower representation.

Overall, the results demonstrate the high avian diversity within the Belaga Conservation Area, with a notable proportion of species under various threat categories, underscoring the importance of continued conservation and monitoring efforts in the region. Studying birds in these areas is crucial for biodiversity conservation, ecological research, climate monitoring, public engagement, and economic sustainability. Birds are excellent indicators of biodiversity and environmental health. Monitoring bird populations can provide valuable data on the state of ecosystems. Birds play key roles in ecosystems, such as seed dispersal, pest control, and pollination. Studying their interactions within the ecosystem helps in understanding and maintaining ecological balance. This area still contains several important species such as Great Argus, Hornbills and Babbler species which can be used as the indicator of a forest ecosystem.

9.0 RECOMMENDATION

From this study, some recommendations are made as follows:

i. Strengthen Conservation Efforts for Threatened Species
   Targeted conservation programs should be implemented to protect species classified as Critically Endangered and Vulnerable, particularly the Helmeted Hornbill and other hornbill species, which play vital ecological roles as seed dispersers.

ii. Habitat Protection and Restoration
   Preserve existing forested areas within the Belaga Conservation Area and initiate reforestation or habitat restoration in degraded zones to support species with declining populations and limited ranges.

iii. Expand and Integrate Monitoring Methods
Continue using passive acoustic monitoring with devices like Tascam recorders and complement it with mist netting and visual surveys to obtain a more comprehensive understanding of avian diversity and population trends.

iv. Raise Community Awareness and Involvement
Engage local communities through awareness campaigns and ecotourism initiatives to promote the value of bird conservation and encourage participation in protection efforts.

v. Conduct Regular Biodiversity Assessments Implement
periodic surveys to monitor changes in bird species richness, abundance, and conservation status, which will inform adaptive management strategies and conservation priorities.

vi. Research on Understudied Species and Groups Promote research focusing on lesser-known species, particularly those in the Nearly Threatened category, to understand their ecology, threats, and conservation needs more thoroughly.

vii. Collaborate with Conservation Organizations
Partner with national and international conservation bodies, NGOs, and academic institutions to enhance resource mobilization, technical support, and the effectiveness of conservation programs.

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