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Research Article

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A Study on Avifaunal Diversity and their Conservation Status of Chandubi Tectonic Lake, Assam, India

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ABSTRACT

The present study recorded 99 bird species which indicate the high diversity of avian fauna in the study area. The study was carried out dividing the annual cycle into four seasons as pre-monsoon, monsoon, retreating monsoon and winter. Analysis of Shannon –Weinner, Margalef's and Simpson index showed significant diversity of avian fauna. Comparison of Shannon –Weinner diversity index of the study seasons showed that the winter season was more diverse than the other three seasons at 5% level (SI, H = 4.072; MD, D =11.85; SIM, D = 0.9769). The maximum avian species were recorded during the winter season and minimum during the monsoon. The study also recorded four vulnerable species. The avian diversity of the study area is under great threat due to various anthropogenic and environmental problems.

Key words: *Avian fauna, diversity, anthropogenic, vulnerable.*

INTRODUCTION

Assam is one of the "endemic bird areas" in the world. With 950 bird species the state is home to 53.5% of the bird species found in the Indian Sub-continent and 17 species of birds are endemic to Assam. This richness and diversity in bird species is due to the fact that the northeast and Assam in particular, is a meeting place of two zoogeographic sub-regions, the Indian and the Indo-Chinese, within the framework of the Oriental (or Indo-Malayan) Zoogeographic Region [1]. Wetlands are of immense use to mankind both economically and zoologically. The wetland ecosystems are very rich in avian diversity. The study area Chandubi tectonic lake is situated within the Loharghat range of Kamrup, West division bordering Meghalaya. Chandubi tectonic lake came into being on June 12, 1897 as a result of devastating earthquake. The lake is surrounded by natural forest and hilly terrain represented by Rajapara and Mayang hill range on its North-West and South-West respectively. In the West there is a river named Kulsi. The area covered by the lake is about 56 square kilometers. The study area has no basic biological information of avian species. It becomes major hindrance for conservation action plan. Therefore the present study has been conducted to evaluate the avian diversity, conservation status and anthropogenic stress of the lake.

MATERIALS AND METHODS

Line and point transacts, flush count techniques and total counts of bird species were made on the basis of habitat characteristics and bird congregations pattern in sample sites in various months of the year for qualitative and quantitative data of residential and migratory birds in Chandubi tectonic lake [2] . The observations were carried out with the aid of 8x40 binoculars and field characteristics were noted down during the study. Birds sighted during the study period were categorized according to their status as residents (R), local migrants (LM) and winter migrants (WM). Winter visitors from central Asian countries are included in Winter migrant and the visitors from other part of the Indian sub-continent is included in local migrant and those breed in the site as resident. The identification of the birds' species was made as per Ali & Ripley and Grimmett et al.[3, 4]. The sampling was carried out twice in every month.

The annual cycle was divided into four seasons as Pre-monsoon (March-May), Monsoon (June-August), Retreating monsoon (September-November) and Winter (December-February). The diversity of bird species was estimated in terms of species evenness using Margalef's D index, Shannon Wienner and Simpson's D and bootstrap method was used to calculate 95% confidence intervals. In order to test for differences in diversity among birds in different seasons of the year (Pre-monsoon, Monsoon, Retreating monsoon and Winter), pair wise randomization tests were carried out following Solow [5]. The analyses were performed as per the method of May using Species Diversity and Richness software and Microsoft Excel sheet [6].

RESULT AND DISCUSSION

The study sampled altogether 3816 individuals belonging to 99 species of bird in the study area. Amongst the species recorded at the study site, 4 species were vulnerable categories under wildlife protection act 1972, viz: *Haliaectus leucoryphus*, *Dendrocygna bicolor*, *Leptoptilos javanicus*, *Eurynorhynchus pygmeus* (Table-2). Analysis of Shannon –Weinner (SI), Margalef's D (MD), Simpson's D (SIM) index of diversity showed that the species diversity of avian fauna in different seasons significantly varies at 5% level (Table-1). The total individuals sampled in all four seasons showed that the largest number of individuals were counted during the winter season (1417) followed by retreating monsoon (876), pre-monsoon (874) and monsoon (649) (Table-1). Comparison of Shannon –Weinner diversity index among the study seasons showed that winter season was more diverse than the other three seasons at 5% level (SI, H = 4.072; MD, D =11.85; SIM, D = 0.9769; Table- 1). Of all the species recorded, the highest number (99) was during the winter season and the lowest number (45) during monsoon (Table-1).

Table-1 Overall diversity indices of Avian fauna in Chandubi tectonic lake (Results Bold in parenthesis were significantly higher than other at 5% level)

Diversity indices	PRM	MON	RMON	WIN
Species	59	45	59	99
Individuals	874	649	876	1417
Shannon_H	3.739	3.464	3.791	**4.072**
Simpson_1-D	0.9681	0.959	0.9719	**0.9769**
Evenness_e^H/S	0.713	0.7097	**0.7506**	0.6747
Margalef	8.563	6.795	8.56	**11.85**

Table-2 List of vulnerable avian species of Chandubi tectonic lake

Sl. No.	Order	Family	Common Name	Scientific Name
1	Ciconiformes	Ciconiidae	Lesser Adjatant Stork	*Leptoptilos javanicus*
2	Anseriformes	Anatidae	Greater Whistling	*Dendrocygna bicolour*
3	Charadiiformes	Charadriinae	Spoon-billed Sandpiper	*Eurynorhynchus pygmeus*
4	Falconiformes	Accipitridae	Palas's Sea Eagle	*Haliaectus leucoryphus*

Table-3 systematic list with abundance and status of avifauna of Chandubi tectonic lake (Abundance is depicted by "+++" –Abundant, "++" –Normal and "+"-Rare; Status is depicted by "R"-Resident, "LM"-Local Migrant and "WM"-Winter Migrant**)**

Sl.No	Family	Scientific Name	English Name	Abundance	Status
1.	Phasianidae	*Coturnix coturnix*	Common Quil	+++	R
2.	Phasianidae	*Gallus gallus*	Red Jungle Fowl	+	R
3.	Anatidae	*Dendrocygna javanica*	Lesser Whistling Duck	+++	LM
4.	Anatidae	*Dendrocygna bicolor*	Large Whistling Duck	+++	LM
5.	Anatidae	*Todoma ferruginea*	Brahmini Duck	+	WM
6.	Anatidae	*Anas acuta*	Northern Pintail	++	WM
7.	Anatidae	*Netapus cormondelianus*	Cotton teal	++	R
8.	Picidae	*Dinopium javanense*	Golden backed Wood pecker	++	R
9.	Picidae	*Dinopium bengalense*	Les. Gold backed Wood pecker	++	R
10.	Picidae	*Chrysocolaptes festivus*	Black shouldered Wood pecker	++	R
11.	Megalaimidae	*Megalaima asiatica*	Blue throated Barbet	+++	R
12.	Megalaimidae	*Megalaima lineata*	Lineated Barbet	+++	R
13.	Upupidae	*Upupa epops*	Common Hoope	++	LM
14.	Coraciidae	*Coracias bengalensis*	Indian Roller	+++	R
15.	Alcedinidae	*Alcido athis*	Small blue Kinfisher	+++	R
16.	Dacelonidae	*Halcyon capensis*	Stork-billed Kingfisher	++	R
17.	Dacelonidae	*Halcyon smymensis*	White breasted Kingfisher	+++	R
18.	Cerylidae	*Ceryle rudis*	Lesser pied kingfisher	+++	R
19.	Meropidae	*Nyctyomis athertoni*	Blue beared bee eater	++	R
20.	Meropidae	*Merops phillippinus*	Blue tailed bee eater	++	R
21.	Cuculidae	*Hierococcyx varius*	Brainfever bird	++	R
22.	Cuculidae	*Cuculus micropterus*	Indian Cuckoo	++	R
23.	Cuculidae	*Eudynamys scolopacea*	Asian Koel	+++	LM
24.	Psittacidae	*Psittacula eupatria*	Alexandrine Parakeet	++	LM
25.	Psittacidae	*Psittacula krameri*	Rose-ring Parakeet	++	L M
26.	Apodidae	*Cypsiurus balasiensis*	Asian palm swift	++	R
27.	Tytonidae	*Tyto alba*	Barn Owl	++	R
28.	Strigidae	*Athene bruma*	Spotted Owlet	+	R
29.	Caprimulgidae	*Caprimulgus asiaticus*	Common Indian Nightjar	+	R
30.	Columbidae	*Treron phoenicoptera*	Yellow- legged green Pigeon	++	R
31.	Columbidae	*Treron bicincta*	Orange–breasted Green Pigeon	+++	R
32.	Columbidae	*Streptopelia chinensis*	Spotted dove	+++	R
33.	Columbidae	*Streptopelia tranquebarica*	Red –collared Dove	++	LM
34.	Columbidae	*Chalcophuaps indica*	Emarald Dove	++	R
35.	Rallidae	*Amaurornis phoenicoptera*	White breasted Waterhen	+++	R
36.	Rallidae	*Gallinula chloropus*	Common Moorhen	+++	R
37.	Rallidae	*Porphyrio porphyrio*	Purple Moorhen	+++	R
38.	Rallidae	*Gallicrex cinera*	Water Cock	++	R
39.	Scolopacidae	*Tringa stagnatilis*	Marsh Sand-piper	+++	WM
40.	Scolopacidae	*Tringa glariola*	Wood Sand-piper	++	WM
41.	Jacanidae	*Metopidius indicus*	Brownze Winged Jacana	+++	R
42.	Jacanidae	*Hydrophasianus chirurgus*	Pheasant tailed Jacana	++	R
43.	Charadiidae	*Vanellus indicus*	Red-wattled Lapwing	+++	R
44.	Laridae	*Sterna aurantia*	Indian River tern	+	R
45.	Accipitridae	*Heliaster indus*	Black shouldered kite	+	R
46.	Accipitridae	*Accipiter badis*	Brahmin kite	++	R
47.	Accipitridae	*Haliaetus leucoryphus*	Shikara	++	R
48.	Podicipedidae	*Tachybaptus ruficollis*	Little Grebe	+++	R
49.	Podicipedidae	*Podiceps cristatus*	Great-crested Grebe	+++	WM
50.	Phalacrocoracidae	*Phalacrocorax niger*	little cormorant	+++	R
51.	Phalacrocoracidae	*Phalacrocorax carbo*	Great cormorant	++	LM
52.	Phalacrocoracidae	*Phalacrocorax fuscicollis*	Indian cormorant	+++	LM
53.	Anhingidae	*Anhinga melanogaster*	Darter	+++	LM
54.	Ardeidae	*Ardea alba*	large egret	+++	LM
55.	Ardeidae	*Ardea purpurea*	Purple heron	+++	R

56.	Ardeidae	*Bubulcus ibis*	Cattle egret	+++	R
57.	Ardeidae	*Egretta garzetta*	Little egret	+++	R
58.	Ardeidae	*Mesophoyx intermedia*	Median egret	+++	R
59.	Ardeidae	*Nycticorax nycticorax*	Black-crowned night heron	++	R
60.	Ardeidae	*Ardeola bacchus*	Chinese pond heron	++	R
61.	Ardeidae	*Ardeola grayii*	Indian pond heron	+++	R
62.	Ardeidae	*Ixobrychus cinnamomeus*	Chestnut Bittern	+++	R
63.	Ciconiidae	*Anastomus oscitans*	Openbill stork	+++	R
64.	Ciconiidae	*Mycteria leucocephala*	Painted stork	+++	WM
65.	Ciconiidae	*Leptoptilos javanicus*	lesser adjutant stork	+++	LM
66.	Ciconiidae	*Leptoptilos dubius*	Greater adjutant stork	++	LM
67.	Laniidae	*Lanius schach*	long tailed shrike	+++	R
68.	Laniidae	*Lanius cristatus*	Brown shrike	+++	WM
69.	Corvidae	*Oriolus xanthornus*	Black headed oriole	+++	WM
70.	Corvidae	*Dicrurus macrocercus*	Black drongo	+++	R
71.	Corvidae	*Dicrurus paradiseus*	racket tailed drongo	++	R
72.	Corvidae	*Dendrocitta vagabunda*	Indian tree pie	+++	R
73.	Corvidae	*Corvus splendens*	House crow	+++	R
74.	Corvidae	*Corvus macrorhynchos*	Jungle crow	++	R
75.	Aegithinidae	*Aegithina tiphia*	common lora	++	R
76.	Rhipiduridae	*Rhipidura aureola*	White-browed Fantail	+++	R
77.	Cisticolidae	*Orthotomus sutorius*	Common tailor bird	+++	R
78.	Muscicapidae	*Copsychus saularis*	Magpie robin	+++	LM
79.	Muscicapidae	*Copsychus malabaricus*	White-rumped shyma	++	R
80.	Sturnidae	*Sturnus contra*	Pied myna	+++	R
81.	Sturnidae	*Acridotheres ginginianus*	Bank myna	+++	R
82.	Sturnidae	*Acridotheres fuscus*	Jungle myna	+++	R
83.	Sturnidae	*Acridotheres tristis*	Common myna	+++	R
84.	Hirundinidae	*Hirundo smithii*	Wire-tailed swallow	+++	LM
85.	Pycnonotidae	*Pycnonotus cafer*	red-vented bulbul	+++	R
86.	Pycnonotidae	*Pycnonotus jocosus*	Red-whiskered bulbul	+++	R
87.	Silvidae	*Megalurus palustris*	striated marsh warbler	++	R
88.	Silvidae	*Turdoides striata*	Jungle babbler	+++	R
89.	Nectarinidae	*Nectarinia zeylonica*	Purple rumped sunbird	++	R
90.	Nectarinidae	*Aethopyga siparaja*	Crimson sunbird	++	R
91.	Nectarinidae	*Arachnothera longirostra*	Little spider hunter	+++	R
92.	Passaridae	*Dendronanthus indicus*	Forest wagtail	++	WM
93.	Passaridae	*Motacilla flava*	Yellow wagtail	++	WM
94.	Passaridae	*Motacilla alba*	White Wagtail	++	WM
95.	Passaridae	*Motacilla cinerea*	Grey wagtail	++	WM
96.	Passaridae	*Passer domesticus*	House sparrow	+++	R
97.	Passaridae	*Ploceus benghalensis*	Black-throated Weaver	+++	R
98.	Passaridae	*Lonchura punctulata*	Spotted munia	++	R
99.	Passaridae	*Amandava amandava*	Red munia	++	R

Thus the present study revealed that Chandubi lake is very rich in bird diversity, but this diversity is under great threat due to different environmental pollutions and anthropogenic problems. During the winter season the study area attracts a huge number of tourists for picnic and other recreation purposes which cause air, soil, water and noise pollution. Various anthropogenic problems such as agricultural activities, permanent closure of outlet, non-implementation of fishery acts and legislation, festival fishing, fishing of fries, fingerlings and gravid fishes etc. decrease the food resources of avifauna thereby affecting their diversity[7]. Therefore proper conservation measures such as development of eco-tourism by involving local people of the area, strong implementation of conservation laws and acts should be taken immediately to conserve the rich bird diversity of the wetland.

CONCLUSION

Birds occupy almost all habitat types and diversity of birds often serves as a good indication of overall diversity of a given area [8]. Birds are also known to be responsive to any kind of changes to their ambient

conditions hence can be used as bio-indicator [9]. The present study revealed that the rich avifaunal diversity of the lake is under tremendous pressure due to various problems. Therefore by taking immediate conservation measures we can maintain not only the rich avian diversity but also the overall diversity of the lake.

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