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Avian Diversity and Abundance in Baturiya Wetland Hadejia, North Western Nigeria

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ABSTRACT

Wetlands are important water filters provide habitats for large number of fauna and flora. The study was aimed to investigate the abundance and diversity of wetland birds at Baturiya wetlands Hadejia, North western Nigeria (Long 10^0 10' and 10^0 35' N and Lat 12^0 35' and 12^0 57' E). The study involved recording birds at predefined wetlands within the study area. The result showed that a total of 89 bird species belonging to 48 families were recorded in the study. As a wetland habitat, the Ardeidae family is the largest with 6 species, followed by Accipitridae with 5 species then Ploceidae, Columbidae and Rallidae with 4 species each. The available data showed that insectivorous species has the highest frequency in the study area with 28 species which accounted for 31.6% prevalence, followed by and carnivorous 24 species, omnivores 15 species, granivores 16 species while the least in number were nectarivores and frugivores with 3 and 5 species respectively. It is concluded that Baturiya wetlandis of significant ecological value as a home to many water-birds and terrestrial bird species, and also serves as a staging and wintering ground for a number of Palaerctic migrants.

Keywords: *Avian diversity, baturiya, birds, ecosystem, wetland*

INTRODUCTION

Wetlands are one of the most productive ecosystems in the world [1]. They provide important functions in erosion control, flood control, aquifer recharge and nutrient absorption [1]. Wetlands are important water filters (www.ducks.ca). They also provide habitats for large number of fauna and flora [2]. The vast numbers of invertebrates such as worms and small shellfish contained in the mud provide food for internationally important populations of migratory water birds [3]. Widespread use of wetlands and their resources is common among diverse bird taxa of the world [4]. Water birds have some unique features that enable them survive better in their environment. These adaptations make birds better equipped as a group to exploit wetland resources. They are also conspicuous and so are often used as indicator of conditions within a wetland ecosystem [4]. Wetlands birds perform important functions in the ecosystem as main vectors maintaining biotic connection between catchments for aquatic plant and invertebrates [5], but also reflect the ecosystem functionality of the habitat: birds are therefore environmental indicators [6]. One of these very important wetland areas in West Africa is the Baturiya Wetlands Hadejia in Jigawa State, Northern Nigeria, an extensive area of floodplain located in the North-Eastern Sudano-Sahelian zone of Nigeria.

Baturiya wetland is a part of Hadejia–Nguru wetlands which are located in the North eastern zone of Nigeria with an estimated area of 3500 square kilometers [7]. The wetland currently support a population of about 1.5 million people engaged in various forms of livelihood such as fishing, farming and grazing. The area supports rich fisheries (about40 million Naira worth of fish produced annually)[8]. However, despite all the tremendous benefit of Baturiya wetland, its avian species composition is threatened by environmental hazards such as drought and desertification and the species diversity poorly documented as with the case in other parts of the country [9]. The Wetlands harbour large numbers of diverse species of wildlife, particularly Palaearctic and Afro-tropical migrant water birds. The wetlands support over 60 water bird species from 15 families [10] and are considered to be of international importance as habitats for waterfowl populations. A total of 377 wetland bird species have been recorded in the wetland

and a total of 259,767, 201,133 and 324,510 water birds were recorded during January water bird censuses in 1995, 1996 and 1997, respectively [11].

Wetlands such as Baturiya support large populations of water birds because of a suite of a biotic and biotic characteristics. There have been many studies that have identified key landscape scale habitat variables in relation to wetland bird abundance [12]. Wetland size, water depth, perimeter-to-area ratio [13], interspersion [14] and various vegetation metrics [15], [16] and other wetland-scale variables can affect the abundance and reproductive success of wetland breeding birds. Among these variables wetland size is seen as the most important [17], [18]. This study investigates the abundance and community of wetland birds at Baturiyawetlands Hadejia, North western Nigeria.

Materials and Methods

Study Area

The study was conducted at Baturiya wetland (Long10^0 10' and 10^0 35' N and Lat 12^0 35' and 12^0 57' E)[19]. The wetland is located 20 km Southeast of Hadejia Jigawa State [20] and with in the Sahel savanna zone of Nigeria. The wetland covers an area of 320 km^2. It is characterized by two distinct seasons in a year, the rainy season (May-September) and the long dry season (September-April) [19]. The wetland is in the list of Ramsar wetlands of international importance (Fig 1). The vegetation of the area is a typical Sudano-Sahelian type with total forest cover very much below national average of 14.8%. Due to both natural and human factors, forest cover is being depleted, making the area highly vulnerable to desert encroachment. The vegetation is also made up of vast grazing lands suitable for livestock production [21].

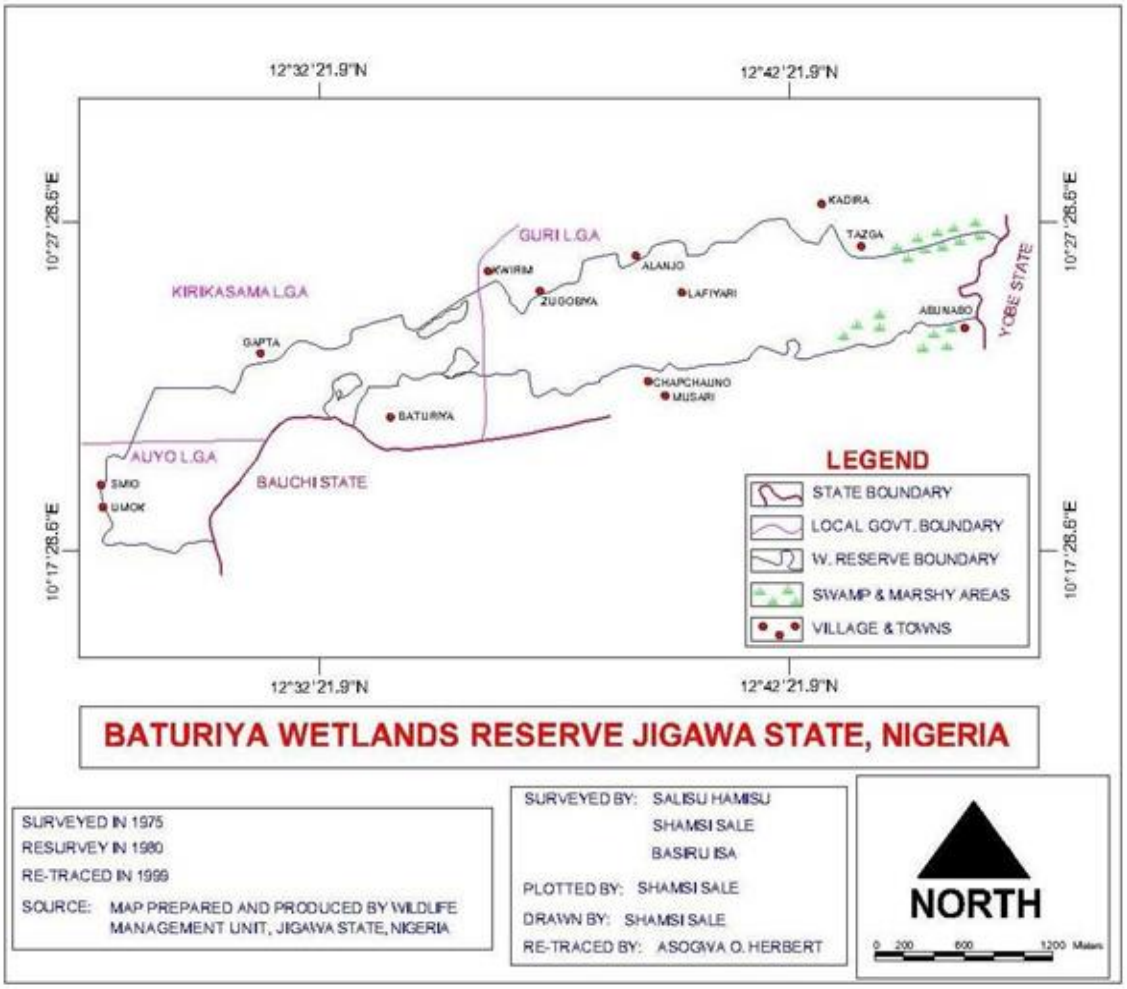

Figure1. *Map of Baturiya Wetland [22]*

Sampling Procedure

The avian species of the study site were extensively surveyed in order to determine the patterns of avian species diversity across various plots in the study area. A reconnaissance survey was conducted before the onset of rainfall with

the view to assessing the general features of the wetland, and to justify the sampling criteria and sampling point. Different sites for selection of sampling plots were also identified to serve as representative of the larger study area. The study area was divided into three sections, and then three plots of 100m x 100m were demarcated at the corner of each section. Within each plot two clusters (or sub-plots) of 50m x 50m were randomly demarcated for consistency in enumeration of species [23] (Boboye and Jimoh, 2016).

Data Collection

The study was carried out in three plots within the study area. Counting bands of 50m radius was used for all the stations. The minimum distance between two counting stations was 200m. The number of counting stations was determined by the site size. In all counting station were used, 10 stations per a study site. On arrival at the sites birds were allowed time to settle before recording all the birds seen or heard for a predetermined time (about 20 minutes). Bird calls were also recorded with a voice recorder and played back later for confirmation. Physical features of birds sighted but could not be identified immediately were taken and field guidebook of West African birds (Burrow and Demey, 2011)[24] was used to identify the bird species. Data was collected for six months between March, 2018 and August, 2018.

Data Analysis

Species family name, scientific name, and English names, as well as residence status were according to the field guide to the birds of Western Africa [24]. Feeding guild was determined using Birds of Western Africa field guide (Borrow and Demey, 2014)[24] and Handbook for the Birds of the World Alive (HBW, 2019)[25].

RESULTS

The diversity and abundance of birds in Baturiya wetland Hadejia is presented in Table 1. The result showed that a total of 89 bird species belonging to 48 families were recorded in the study. As a wetland habitat, the Ardeidae family is the largest with 6 species, followed by Accipitridae with 5 species then Ploceidae, Columbidae and Rallidae with 4 species each.

The classification of bird species based on their feeding guild is shown in Table 2. The available data showed that insectivorous species has the highest frequency in the study area with 28 species which accounted for 31.6% prevalence, followed by and carnivorous24 species, omnivores 15 species, granivores16 species while the least in number were nectarivores and frugivores with 3 and 5 species respectively.

Table 1. *Diversity and abundance of birds in Baturiya wetland Hadejia*

S/N	Scientific name	Family	Common name
1	*Accipiter badius*	Accipitridae	Shikra
2	*Circus aeruginosus*	Accipitridae	Western Marsh Harrier
3	*Elanus caeruleus*	Accipitridae	Black-shouldered Kite
4	*Melieraxmetabates*	Accipitridae	Dark Chanting Goshawk
5	*Milvus aegyptiusparasitus*	Accipitridae	Yellow-billed Kite
6	*Acrocephalusscirpaceus*	Acrocephalidae	European Reed Warbler
7	*Hippolaispolyglotta*	Acrocephalidae	Melodious Warbler
8	*Galerida cristata*	Alaudidae	Crested Lark
9	*Cerylerudis*	Alcedinidae	Pied Kingfisher
10	*Halcyon leucocephala*	Alcedinidae	Grey-headed Kingfisher
11	*Dendrocygnaviduata*	Anatidae	White-faced Whistling Duck
12	*Plectropterusgambensis*	Anatidae	Spur-winged Goose
13	*Sarkidiornis melanotos*	Anatidae	Knob-billed Duck
14	*Apus affinis*	Apodidae	Little Swift
15	*Cypsiurusparvus*	Apodidae	African Palm Swift
16	*Ardea cinerea*	Ardeidae	Grey Heron
17	*Ardea intermedia*	Ardeidae	Intermediate Egret
18	*Bubulcus ibis*	Ardeidae	Cattle Egret
19	*Butorides striata*	Ardeidae	Green-backed Heron
20	*Egrettaardesiaca*	Ardeidae	Black Heron
21	*Egrettagarzetta*	Ardeidae	Little Egret
22	*Tockuserythrorhynchus*	Bucerotidae	Northern Red-billed Hornbill
23	*Tockusnasutus*	Bucerotidae	African Grey Hornbill
24	*Buphagus africanus*	Buphagidae	Yellow-billed Oxpecker
25	*Charadrius dubius*	Charadriidae	Little-ringed Plover

26	*Charadrius pecuarius*	Charadriidae	Kittlitz's Plover
27	*Vanellusspinosus*	Charadriidae	Spur-winged Lapwing
28	*Camaroptera brachyura*	Cisticolidae	Grey-backed Camaroptera
29	*Cisticola cantans*	Cisticolidae	Singing Cisticola
30	*Priniasubflava*	Cisticolidae	Tawny-flanked Prinia
31	*Columba guinea*	Columbidae	Speckled Pigeon
32	*Streptopelia senegalensis*	Columbidae	Laughing Dove
33	*Streptopeliavinacea*	Columbidae	Vinaceous Dove
34	*Turturabyssinicus*	Columbidae	Black-billed Wood Dove
35	*Coracias abyssinicus*	Coraciidae	Abyssinian Roller
44	*Corvus albus*	Corvidae	Pied Crow
36	*Ptilostomusafer*	Corvidae	Piapiac
37	*Centropus senegalensis*	Cuculidae	Senegal Coucal
38	*Cuculusgularis*	Cuculidae	African Cuckoo
39	*Dicrurusadsimilis*	Dicruridae	Fork-tailed Drongo
40	*Emberizatahapisi*	Emberizidae	Cinnamon-breasted Rock Bunting
41	*Estrilda troglodytes*	Estrildidae	Black-rumped Waxbill
42	*Lagonostictasenegala*	Estrildidae	Red-billed Firefinch
43	*Uraeginthusbengalus*	Estrildidae	Red-cheeked Cordon-bleu
44	*Falco ardosiaceus*	Falconidae	Grey Kestrel
45	*Falco biarmicus*	Falconidae	Lanner Falcon
46	*Falco chicquera*	Falconidae	Red-necked Falcon
47	*Crithagraleucopygia*	Fringillidae	White-rumped Seedeater
48	*Hirundo aethiopica*	Hirundinidae	Ethiopian Swallow
49	*Actophilornis africanus*	Jacanidae	African Jacana
50	*Microparra capensis*	Jacanidae	Lesser Jacana
51	*Corvinella corvina*	Laniidae	Yellow-billed Shrike
52	*Chlidoniasleucopterus*	Laridae	White-winged Tern
53	*Gelochelidonnilotica*	Laridae	Gull-billed Tern
54	*Acrocephalusschoenobaenus*	Locustellidae	Sedge Warbler
55	*Laniariusbarbarous*	Malaconotidae	Yellow-crowned Gonolek
56	*Motacilla alba*	Motacillidae	White Wagtail
57	*Bradornis pallidus*	Muscicapidae	Pale Flycatcher
58	*Myrmecocichla aethiops*	Muscicapidae	Northern Anteater Chat
59	*Crinifer piscator*	Musophagidae	Western Grey Plantain-eater
60	*Anthodiaetaplatura*	Nectariniidae	Pygmy Sunbird
61	*Chalcomitra senegalensis*	Nectariniidae	Scarlet-chested Sunbird
62	*Cinnyriscupreus*	Nectariniidae	Copper Sunbird
63	*Passer griseus*	Passeridae	Northern Grey-headed Sparrow
64	*Microcarbo africanus*	Phalacrocoracidae	Long-tailed Cormorant
65	*Phoeniculuspurpureus*	Phoeniculidae	Green Wood-hoopoe
66	*Bubalornisalbirostris*	Ploceidae	White-billed Buffalo Weaver
67	*Euplectesfranciscanus*	Ploceidae	Northern Red Bishop
68	*Ploceuscucullatus*	Ploceidae	Village Weaver
69	*Poicephalussenegalus*	Psittacidae	Senegal Parrot
70	*Psittaculakrameri*	Psittaculidae	Rose-ringed Parakeet
71	*Pycnonotus barbatus*	Pycnonotidae	Common Bulbul
72	*Crex egregia*	Rallidae	African Crake
73	*Gallinula chloropus*	Rallidae	Common Moorhen
74	*Porphyrioalleni*	Rallidae	Allen's Gallinule
75	*Zaporniaflavirostra*	Rallidae	Black Crake
76	*Himantopus*	Recurvirostridae	Black-winged Stilt
77	*Actitishypoleucos*	Scolopacidae	Common Sandpiper
78	*Calidris pugnax*	Scolopacidae	Ruff
79	*Scopus umbretta*	Scopidae	Hamerkop
80	*Lamprotorniscaudatus*	Sturnidae	Long-tailed Glossy Starling
81	*Lamprotornischalybaeus*	Sturnidae	Greater Blue-eared Starling
82	*Lamprotornispulcher*	Sturnidae	Chesnut-bellied Starling
83	*Sylvia Communis*	Sylviidae	Common Whitethroat
84	*Bostrychiahagedash*	Threskiornithidae	Hadada Ibis

85	*Plegadisfalcinellus*	Threskiornithidae	Glossy Ibis
86	*Turdoidesplebejus*	Timaliidae	Brown Babbler
87	*Turdus pelios*	Turdidae	African Thrush
88	*Viduachalybeate*	Viduidae	Village Indigobird
89	*Vidua macroura*	Viduidae	Pin-tailed Whydah

Table 2. *Classification of bird species based on their feeding guild in Baturiya wetland*

S/N	Guild	Frequency (n)	Prevalence (%)
1	Carnivore	24	26.9
2	Insectivore	28	31.6
3	Omnivores	15	16.8
4	Frugivore	05	5.6
5	Granivore	14	15.7
6	Nectarivore	03	3.4
	Total	**89**	**100**

DISCUSSION

Wetlands are important water filters provide habitats for large number of fauna and flora [2]. The record of 89 avian species belonging to 48 families in the Baturiya wetland has indicated its importance as a good habitat for many bird species. Several studies were conducted in Northern Nigeria for the determination of avian species in several wetlands and terrestrial habitats. A study of wild birds in Dagona-Waterfowl Sanctuary Yobe State, Nigeria, a protected area, records 135 species in 40 families [26]. In a study by Adang*et al*. [27], they reported 60 species from 27 families at the Dadin Kowa Dam of Gombe State, Nigeria. Similarly, Sabo [28] recorded 164 species from 50 families at the Hadejia-Nguru Wetlands (HNWs), Nigeria; likewise, Ringim and Muhammad [29] reported 191 bird species belonging to 54 families from the same wetlands. The differences in the avian species richness among these habitats could largely be due to discrepancies in duration of the studies or sampling methods [30]. Moreover, differences in the habitats covered by each study could also influence species richness. Higher avian species in the study area is attributed to diverse habitat types, including swamps, marshes, ponds and rivers. Majority of the species recorded belong to the insectivore and carnivore feeding guilds. Insectivorous species were also found to be the most dominant species in other wetland habitats as reported by Zakaria *et al.* [31] in Peninsular (Malaysia), Odewumi*et al.* [32] in Ondo State (Nigeria), as well as Sunday and Olumide [33] in Oyo State (Nigeria). Furthermore, the prevalence of insectivore guild is probably due to the availability of aquatic insects and other suspended macro-invertebrates that serve as the diet of many bird species. Birds are valuable bio-indicators of habitat health because the occurrence of diverse avian fauna in a given habitat is an indication that such habitat is also rich in biodiversity [34]. Undoubtedly, Baturiya wetland provides a refuge for birds and other biodiversity taking into cognizance its bird species richness. Thus, protecting this habitat is of paramount importance with the view that conservation of avian species involves protecting them alongside their habitats, which favors other biodiversity as well [35].

CONCLUSION

It is evident from the findings of this study that Baturiya wetland is home to many aquatic and terrestrial bird species. Higher avian species in the study area is attributed to diverse habitat types, including swamps, marshes, ponds and rivers. In addition to that vegetation and land mass play important roles in the diversity and distribution of avian species. It is recommended that policies should been acted, enforced and implemented by the government regarding endangering ecosystems and its biotic components. Also more refugesites should be created so as to enable birds come and lives freely

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