

A Preliminary Assessment of Avifaunal Diversity of Nawabganj Bird Sanctuary, Unnao, Uttar Pradesh

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Abstract: Avifaunal Diversity is one of the most important ecological indicators to evaluate the status of habitats. Birds are the crucial animal group of an ecosystem which maintains a trophic level. Therefore, detail study on avifauna and their ecology is important to protect them. They are one of the biological control tools to control pests in gardens, on farms, and other places. They abet in the pollinization of plants. Birds are also good seed dispersal. The study was performed in Nawabganj Bird Sanctuary (NBS) during January 2013 to March 2014. NBS covers the 224.60 hectare area and provides breeding grounds to multiple populations of flora and fauna. Surveys were carried out seasonally and observations were made along line transects with the aid of 10x50 binoculars and Canon EOS 1000 D SLR camera. The Avifaunal assessment of NBS includes 150 species of birds belonging to 17 orders and 46 families. The order Passeriformes has maximum 51 species of birds. Purple moorhen and lesser whistling duck are the most abundant residential species in the NBS. Habitat wise classification reveals that 43.33% of birds were dependent on aquatic habitat (65) i.e. Moti Jheel in NBS followed by 6.66% waders (10) and 50% terrestrial birds (75) which shows that the NBS is an important abode of many birds. Food preference of birds showed that maximum species were insectivorous (49) followed by omnivorous (28), piscivorous (25), vegetarian (13), carnivorous (9), granivorous (8), frugivorous (5) and others (13).

Keywords: Nawabganj Bird Sanctuary, Water Birds, Water Weeds, Avifaunal Diversity, Wetlands

I. Introduction

Diversity of avifauna is one of the most important ecological indicators to evaluate the status of habitats. The human-bird association is since ancient times and is an intimate one. In Indian culture there are a number of birds that are worshiped with religious sentiments and people are emotionally involved in their conservation. Birds are crucial part of an ecosystem and contribute to maintain a trophic level. Activities of birds are considered as indicator of superiority of ecosystem and they also form the incurable links in many food chains, hence they imitate changes originating in several different ecosystem components (Custer and Osborne 1977). The detail study on avifauna and their ecology is important to protect them. They are one of the biological pest management tools to control pests in gardens, on farms, and other places. They abet in the pollinization of plants. Birds are also good seed dispersal.

The Nawabganj Bird Sanctuary is spread in an area of about 3 sq km. For conservation of this wetland area and its surroundings, Government of Uttar Pradesh declared the area as a sanctuary in 1984 since then this sanctuary is being managed and protected under the Wild Life Protection Act, 1972. The avian inhabitants of Nawabganj Bird Sanctuary comprise residential as well as non-residential migratory species. The birds immigrate across Himalayas from Tibet, China, Europe and Siberia during winters. Some of the major migratory birds during the season are Greyleg goose, Pintail, Cotton teal, Red-crested Pochard, Gadwall, Shoveler, Coot and Mallard. Some major local migratory and residential birds are Spot-bill duck, Sarus crane, Painted stork, Peacock, Black ibis, Whistling teal, Open-bill stork, White-necked stork, Pheasant-tailed jacana, Bronze winged jacana, Purple moorhen, Lapwing, Tern, Vulture, Pigeon, King crow, Indian roller and Bee eater.

According to Urfi et al. avifaunal diversity specially water birds attract people towards the wetlands as well as they are the good bio-indicators and useful models for studying a variety of environmental problems [1]. The study of Avifaunal biodiversity would be useful for further initiatives in studying the status of birds and its conservation.

II. Materials And Methods

The study was performed in Nawabganj Bird Sanctuary (NBS) during January 2013 to March 2014. Nawabganj Bird Sanctuary (NBS) is situated in Tehseel Nawabganj of District Unnao at National Highway- 25. Nawabganj Bird Sanctuary is situated about 45 Km from Lucknow at Lucknow-Kanpur National Highway (Fig .1). This sanctuary got established in year 1984 under Wild Animal Protection Act 1972. NBS covers the 224.60 hectare area which provides the breeding ground to multiple populations of flora and fauna. There is a canal

near the sanctuary which is a permanent water source for wildlife. "Moti Lake" has scenic beauty of tourists concern which further inflicts the great economic value. NBS geographically located at 26° 34' N and 80°40' E co-ordinates. The average rainfall is about < 1,000 mm per annum and the temperature ranges from 1° C to 48° C, humidity is about 94%.



Fig: 1 Map of Study Area (Source: mapsofindia.com)

Survey work were carried out seasonally during suitable time (in summer- morning: 6:00 am to 10:00 am, evening: 3:30 pm to 6:30 pm, in winter morning: 7:00 am to 11:00 am, evening: 3:00 pm to 5:30 pm). Observations were made along line transects with the aid of 10x50 binoculars and Canon EOS 1000 D SLR camera. The birds were recorded according to their status, feeding habit, seasonal visits and variety of habitat. Birds were monitored using "Line Transect" and "Point Count Methods" in a pre-defined area. A line transect of 1-100 meter was prepared and the birds were monitored on both the sides of transect by close end transect up to 2 Km. without stopping. The birds were identified using standard field guide books of Ali & Ripley, 1995 [11], Grimmett et al., 1998 [10], Salim Ali, 2002 [12].

III. Results And Discussion

The Avifaunal assessment of NBS includes 150 species belonging to 17 orders and 46 families (Table. 1&2). The order Passeriformes has maximum 51 species of birds, Anseriformes with 20 species and Ciconiiformes with 17 species (Fig. 2). Purple moorhen and lesser whistling duck are the most abundant residential species in the NBS. Sur Sarovar Bird Sanctuary is also a suitable territory for water birds [16]. A study on Birds biodiversity with special reference to migratory birds' movement has been conducted by Kumar and Srivastava in 2013 at Sandi Bird Sanctuary, Hardoi [4]. A study on Avifaunal diversity of Tikamgarh District done by Kushwaha et al., in 2015 [14], An annotated checklist of aquatic avifauna of Rajura, Godada and Dhanora lakes of Buldhana district [8].

Habitat wise classification reveals that 43.33% of birds were dependent on aquatic habitat (65) i.e. Moti Jheel in NBS followed by 6.66% waders (10) and 50% terrestrial birds (75) which shows the NBS is an important abode of many birds (Table. 3). Diversity of avifauna based on habitat has been showed in Fig. 3. Ismail et al., studied the Avifauna and Habitat of artificial wetlands and compared it with its two neighboring habitats [3].

Food preference of birds showed that maximum species 32.66% were insectivorous (49) followed by 18.66% omnivorous (28), 16.66% piscivorous (25), 8.66% vegetarian (13), 6% carnivorous (9), 5.33% granivorous (8), 3.33% frugivorous (5) and 8.66% (I/Fr, I/V, V/I, I/P) others (13) shown in Table 4. Diversity and percentage composition of avifauna based on food preference of birds shown in Fig. 4 and Fig. 5. A close relation between aquatic food plants and their consumer birds have been explained by Jha et al., in 2013[7]. Checklist and Feeding habit of birds recorded in and around Mayiladuthurai region by Ali et al., in 2011[2]. Community compositions and Food habit of aquatic birds have been studied by S. Rajashekara and M.G. Venkatesha, 2011 [13], P.S. Joshi, 2012 [8]. Pandotra and Sahi studied on Feeding Guilds of Avifauna of Gharana Wetland Reserve-Jammu (J&K), India [5]. Status of wetland birds of Chhilchhila Wildlife Sanctuary, Haryana has been studied by Kumar & Gupta [9].

According to IUCN Status 137 species of Least Concern, 05 Not Assessed, 01 Endangered, 06 Near Threatened and 01 Vulnerable species recorded (Table. 5). 01 Endangered species (Egyptian Vulture) and 01 vulnerable species (Sarus Crane) has been recorded during the study period. According to IUCN Status diversity and percentage composition of avifauna has been shown in Fig. 6 and Fig. 7. A study has been done on Avifaunal diversity and their IUCN status of Tikamgarh District [14]. Kanaujia et al., studied the Waterbirds of Lucknow according to their IUCN status [6].

IV. Figures And Tables

Table: 1 List of Birds Reported from Nawabganj Bird Sanctuary

S.No.	Order/Family/Scientific Name	Common Name	Feeding Habit	Habitat	IUCN Status
	Order :Podicipediformes Family: Podicipedidae				
1.	Tachybaptus ruficollis	Little Grebe	P	AH	LC
	Order: Pelecaniformes Family :Phalacrocoracidae				
2.	Phalacrocorax carbo	Great Cormorant	P	AH	LC
3.	Phalacrocorax niger	Little Cormorant	P	AH	LC
4.	Phalacrocorax fuscicollis	Indian Cormorant	P	AH	LC
	Family :Ardeidae				
5.	Nycticorax nycticorax	Black Crowned Night Heron	P	AH	LC
6.	Ixobrychus flavicollis	Black bittern	I/P	AH	LC
7.	Ixobrychus sinensis	Yellow bittern	I/P	AH	LC
	Family: Threskiornithidae				
8.	Threskiornis melanocephalus	Black- headed Ibis	P	AH	LC
	Order: Suliformes Family:Anhingidae				
9.	Anhinga melanogaster	Darter	P	AH	NT
	Order:Ciconiiformes Family: Ardeidae				
10.	Egretta garzetta	Little Egret	I	AH	LC
11.	Casmerodius albus	Large Egret	P	AH	LC
12.	Mesophoyx intermedia	Median Egret	P	AH	LC
13.	Bubulcus ibis	Cattle Egret	I	AH	LC
14.	Ardea cinerea	Grey Heron	P	AH	LC
15.	Ardea purpurea	Purple Heron	P	AH	LC
16.	Ardeola grayii	Indian Pond Heron	I/P	AH	LC
17.	Butorides striatus	Little Green Heron	I/P	AH	LC
18.	Ixobrychus cinnamomeus	Chestnut Bittern	I/P	AH	LC
19.	Nycticorax nycticorax	Black-crowned Night Heron	P	AH	LC
	Family: Ciconiidae				
20.	Mycteria leucocephala	Painted Stork	P	AH	NT
21.	Anastomus oscitans	Asian Open bill-Stork	P	AH	LC
22.	Ciconia nigra	Black Stork	P	AH	LC
23.	Ciconia episcopus	White-necked Stork	P	AH	LC
24.	Ephippiorhynchus asiaticus	Black- necked Stork	P	AH	NT
	Family:Threskiornithidae				
25.	Plegadis falcinellus	Glossy Ibis	P	AH	LC
26.	Pseudibis papillosa	Black Ibis	P	AH	NT
	Order:Anseriformes Family:Anatidae				
27.	Dendrocygna javanica	Lesser whistling duck	V	AH	LC
28.	Anser indicus	Bar headed goose	V	AH	LC
29.	Tadorna ferruginea	Brahminy shelduck	Om	AH	LC
30.	Sarkidiornis melanotos	Comb duck	V/I	AH	LC
31.	Nettapus coromandelianus	Cotton teal	V/I	AH	LC
32.	Anas platyrhynchos	Mallard	Om	AH	LC
33.	Anas poecilorhyncha	Spot-billed duck	V	AH	LC
34.	Anas clypeata	Northern shoveller	V	AH	LC
35.	Anas acuta	Northern pintail	V	AH	LC
36.	Anas querquedula	Garganey	V	AH	LC
37.	Anas crecca	Common Teal	V	AH	LC
38.	Rhodonessa rufina	Red crested Pochard	V	AH	LC
39.	Aythya fuligula	Tufted Pochard	V	AH	LC
40.	Aythya ferina	Common Pochard	V	AH	LC
41.	Anas strepera	Gadwall	V	AH	LC
42.	Nettapus coromendelianus	Cotton Pygmy Goose	V	AH	LC
43.	Anas penelope	Eurasian Wigeon	V/I	AH	LC

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44.	Anser anser	Greyleg Goose	V	AH	LC
45.	Tadorna ferruginea	Ruddy Shelduck	Om	AH	LC
46.	Aythya nyroca	Ferruginous Pochard	Om	AH	LC
	Order:Falconiformes Family:Accipitridae				
47.	Elanus caeruleus	Black -shouldered Kite	C	T	LC
48.	Milvus migrans	Black Kite	C	T	LC
49.	Neophron percnopterus	Egyptian Vulture	C	T	E
50.	Accipiter badius	Shikra	C	T	LC
	Order:Galliformes Family:Phasianidae				
51.	Gallus gallus	Red jungle fowl	Om	T	LC
52.	Pavo cristatus	Indian peafowl	Om	T	LC
	Order:Gruiformes Family:Rallidae				
53.	Amaurornis phoenicurus	White-breasted Waterhen	I	AH	LC
54.	Porphyrio porphyrio	Purple Moorhen	I/V	AH	LC
55.	Gallinule chloropus	Common Moorhen	I	AH	LC
56.	Fulica atra	Common Coot	P	AH	LC
	Family: Gruidae				
57.	Grus antigone	Sarus Crane	P	AH	V
	Order:Charadriiformes Family:Jacanidae				
58.	Hydrophasianus chirurgus	Pheasant-tailed Jacana	Om	AH	LC
59.	Metopidius indicus	Bronzed-winged Jacana	Om	AH	LC
	Family:Charadriidae				
60.	Charadrius dubius	Little Ringed Plover	I	W	LC
61.	Charadrius hiaticula	Ringed Plover	I	W	LC
62.	Vanellus malabaricus	Yellow- wattled Lapwing	I	W	NA
63.	Vanellus indicus	Red -wattled Lapwing	I	W	LC
	Family:Scolopacidae				
64.	Tringa glareola	Wood Sandpiper	I	W	LC
65.	Tringa ochropus	Green Sandpiper	I	W	LC
66.	Actitis hypoleucos	Common Sandpiper	I	W	LC
67.	Tringa totanus	Common Redshank	I	W	LC
68.	Tringa nebularia	Common Greenshank	I	W	LC
	Family:Recurvirostridae				
69.	Himantopus himantopus	Black –winged Stilt	I	W	LC
	Family:Laridae				
70.	Sterna aurantia	River Tern	P	AH	NT
	Order: Columbiformes Family:Columbidae				
71.	Columba livia	Blue Rock Pigeon	Gr	T	LC
72.	Streptopelia chinensis	Spotted Dove	Gr	T	LC
73.	Streptopelia tranquebarica	Red Collared Dove	Gr	T	LC
74.	Streptopelia decaocta	Eurasian Collared- Dove	Gr	T	LC
75.	Treron phoenicoptera	Yellow- legged Green- Pigeon	Fr	T	LC
	Order:Psittaciformes Family: Psittacidae				
76.	Psittacula eupatria	Alexandrine Parakeet	Fr	T	NT
77.	Psittacula krameri	Rose-ringed Parakeet	Fr	T	LC
	Order:Cuculiformes Family: Cuculidae				
78.	Eudynamys scolopacea	Asian Koel	Om	T	LC
79.	Phaenicophaeus leschenaultii	Sirkeer Malkoha	Om	T	LC
80.	Centropus sinensis	Greater Coucal	I	T	LC
81.	Cuculus micropterus	Indian Cuckoo	I	T	LC
82.	Cuculus canorus	Common Cuckoo	Om	T	LC
	Order:Strigiformes Family: Tytonidae				
83.	Tyto alba	Barn Owl	C	T	LC
	Family:Strigidae				
84.	Bubo bubo	Eurasian Eagle-Owl	C	T	LC
85.	Athenebrama	Spotted Owlet	I	T	LC
86.	Glaucidium radiatum	Jungle Owlet	C	T	LC
87.	Glaucidium cuculoides	Asian- barred Owlet	C	T	LC
	Order:Caprimulgiformes Family: Caprimulgidae				

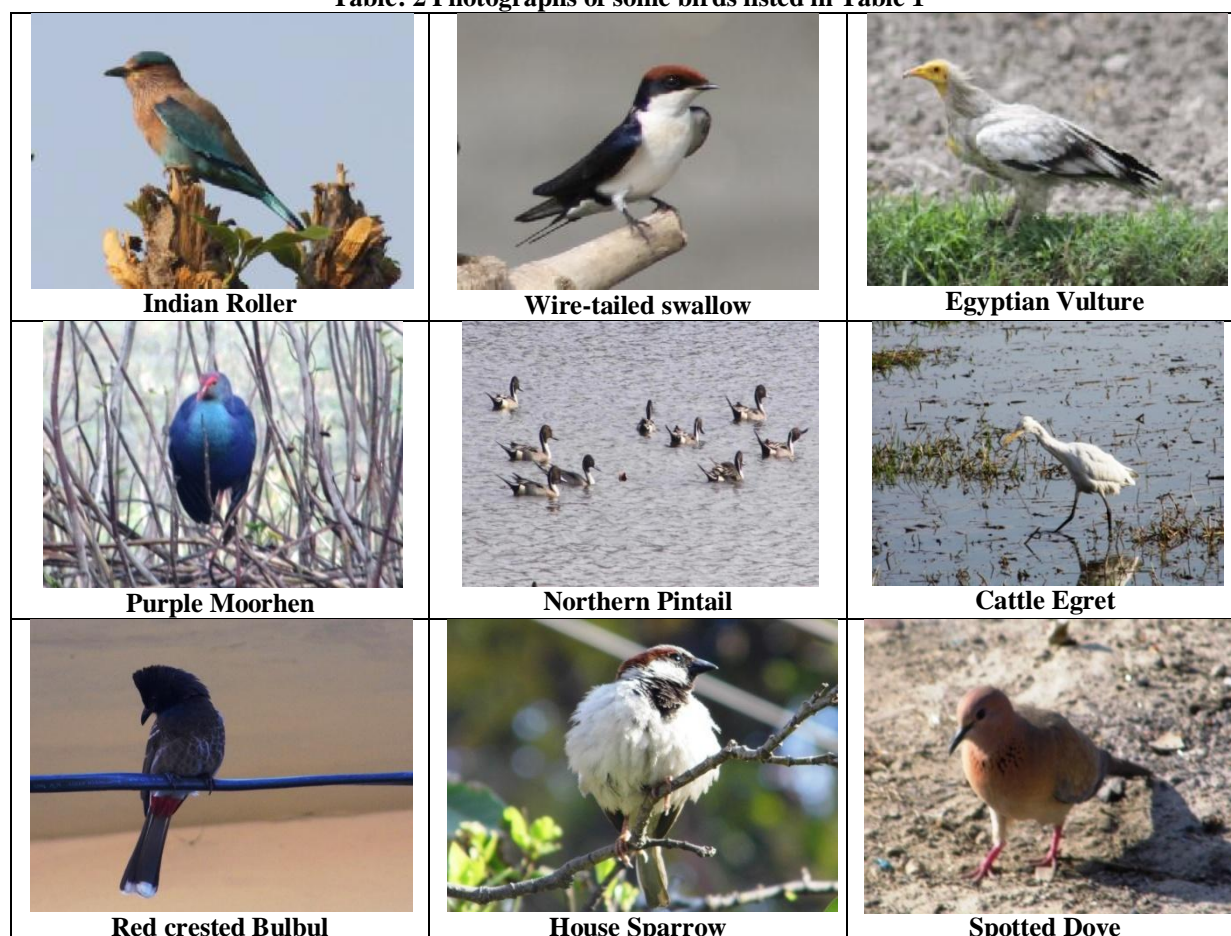
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88.	Caprimulgus asiaticus Order: Coraciiformes Family: Alcedinidae	Common Indian Nightjar	I	T	LC
89.	Alcedo atthis	Small Blue Kingfisher	P	AH	LC
90.	Halcyon smyrnensis	White breasted Kingfisher	P	AH	LC
91.	Ceryle rudis Family: Meropidae	Lesser Pied Kingfisher	P	AH	LC
92.	Merops orientalis Family: Coraciidae	Small Bee-eater	I	T	LC
93.	Coracias benghalensis Family: Upupidae	Indian Roller	I	T	LC
94.	Upupa epops Family: Bucerotidae	Common Hoopoe	I	T	LC
95.	Ocyrceros birostris Order: Piciformes Family: Capitonidae	Indian Grey Hornbill	Om	T	LC
96.	Megalaima zeylanica	Brown-headed Barbet	Fr	T	NA
97.	Megalaima haemacephala Family: Picidae	Coppersmith Barbet	Fr	T	LC
98.	Dendrocopos nanus	Brown-capped pygmy Woodpecker	I	T	LC
99.	Dinopium benghalense Order: Passeriformes Family: Hirundinidae	Lesser Golden-backed Woodpecker	I	T	NA
100.	Riparia paludicola	Plain Martin	I	AH	LC
101.	Hirundo rustica	Common Swallow	I	AH	LC
102.	Hirundo smithii Family: Motacillidae	Wire-tailed Swallow	I	AH	LC
103.	Dendronanthus indicus	Forest Wagtail	I	T	LC
104.	Motacilla alba	White Wagtail	I	AH	NA
105.	Motacilla maderaspatensis	Large Pied Wagtail	I	T	NA
106.	Motacilla flava	Yellow Wagtail	I	AH	LC
107.	Motacilla cinerea	Grey Wagtail	I	AH	LC
108.	Anthus rufulus	Paddy-field Pipit	I	T	LC
109.	Anthus trivialis Family: Campephagidae	Eurasian Tree Pipit	I	T	NA
110.	Coracina macei	Large Cuckoo-Shrike	I	T	LC
111.	Tephrodornis pondicerianus Family: Pycnonotidae	Common Woodshrike	I	T	LC
112.	Pycnonotus cafer	Red-vented Bulbul	Om	T	LC
113.	Pycnonotus jocosus Family: Irenidae	Red-whiskered Bulbul	Om	T	LC
114.	Aegithina tiphia Family: Laniidae	Common Iora	Om	T	LC
115.	Lanius schach Subfamily: Turdinae	Rufous-backed Shrike	C	T	LC
116.	Copsychus saularis	Oriental Magpie-Robin	I	T	LC
117.	Saxicoloides fulicata	Indian Robin	I	T	LC
118.	Phoenicurus ochruros	Black Redstart	I	T	LC
119.	Saxicola torquata	Common Stonechat	I	T	LC
120.	Saxicola caprata	Pied Bushchat	I	T	LC
121.	Cercomela fusca Subfamily: Timaliinae	Indian Chat	I	T	LC
122.	Chrysomma sinense	Yellow-eyed Babbler	I	T	LC
123.	Turdoides caudatus	Common Babbler	Om	T	LC
124.	Turdoides striatus Subfamily: Sylviinae	Jungle Babbler	I/Fr	T	LC
125.	Prinia socialis	Ashy Prinia	I	T	LC
126.	Prinia inornata	Plain Prinia	I	T	LC
127.	Acrocephalus agricola	Paddyfield Warbler	I	T	LC
128.	Orthotomus sutorius Subfamily: Muscicapinae	Common Tailorbird	I	T	LC
129.	Cyornis tickelliae Subfamily: Monarchinae	Tickell's Blue Flycatcher	I	T	LC
130.	Terpsiphone paradisi Family: Paridae	Asian Paradise-Flycatcher	I	T	LC
131.	Parus major Family: Nectariniidae	Great Tit	I/Fr	T	LC

132.	Nectarinia asiatica	Purple Sunbird	Om	T	LC
	Family: Zosteropidae				
133.	Zosterops palpebrosos	Oriental White-eye	I/Fr	T	LC
	Family: Estrildidae				
134.	Lonchura malabarica	White- throated Munia	Gr	T	LC
135.	Lonchura punctulata	Spotted Munia	Gr	T	LC
	Family: Passeridae				
	Subfamily: Passerinae				
136.	Passer domesticus	House Sparrow	Gr	T	LC
	Subfamily: Ploceinae				
137.	Ploceus philippinus	Baya Weaver	Gr	T	V
	Family: Sturnidae				
138.	Sturnus pagodarum	Brahminy Starling	Om	T	LC
139.	Sturnus roseus	Rosy Starling	Om	T	LC
140.	Sturnus contra	Asian Pied Starling	Om	T	LC
141.	Sturnus malabaricus	Chestnut-tailed Starling	Om	T	LC
142.	Acridotheres tristis	Common Myna	Om	T	NA
143.	Acridotheres fuscus	Jungle Myna	Om	T	LC
	Family: Oriolidae				
144.	Oriolus oriolus	Eurasian Golden Oriole	Om	T	LC
145.	Oriolus xanthornus	Black- headed Oriole	I/Fr	T	LC
	Family: Dicruridae				
146.	Dicrurus macrocercus	Black Drongo	I	T	LC
147.	Dicrurus paradiseus	Greater Racket- tailed Drongo	Om	T	LC
	Family: Corvidae				
148.	Dendrocitta vagabunda	Indian Treepie	Om	T	LC
149.	Corvus splendens	House Crow	Om	T	LC
150.	Corvus macrorhynchos	Jungle Crow	Om	T	LC

Legend: T= Terrestrial, AH= Aquatic Habitat, W= Waders, LC= Least Concern, NA= Not Assessed, E= Endangered, NT= Near Threatened, V= Vulnerable, P= Piscivorous, I= Insectivorous, Om= Omnivorous, Gr= Granivorous, Fr=Frugivorous, V= Vegetarian, C=Carnivorous, Others (I/Fr, I/V, V/I, I/P)

Table: 2 Photographs of some birds listed in Table 1



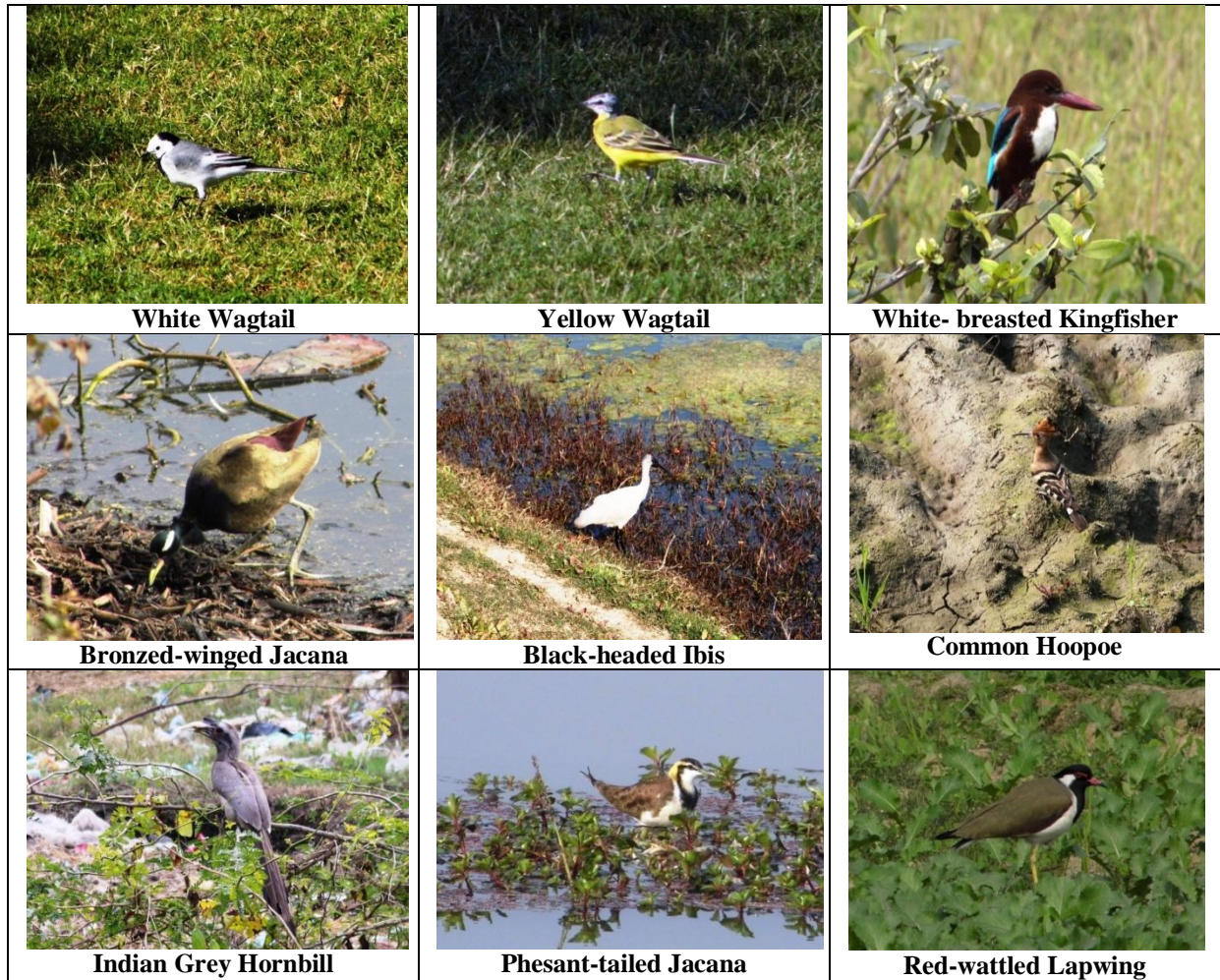


Fig.2:-Order wise species composition of birds in NBS, Unnao

Table: 3 Birds of Nawabganj Bird Sanctuary According to Habitat

S.N.	Habitat	No. of species	% composition
1	Terrestrial	75	50%
2	Aquatic Habitat	65	43.33%
3	Waders	10	6.66%

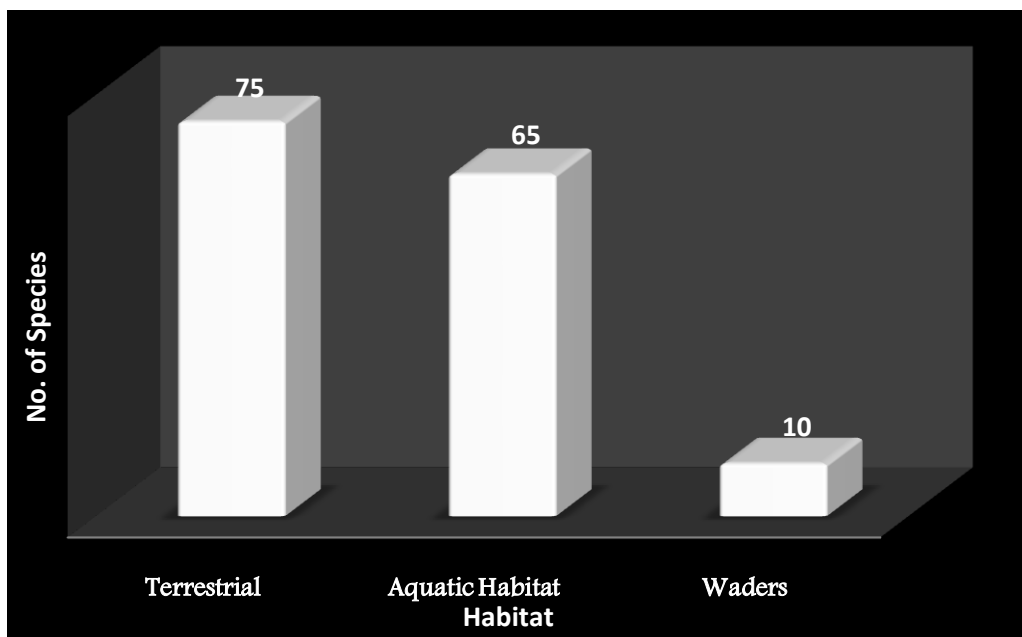


Fig.3:- species composition of birds in NBS according to Habitat

Table: 4 Birds of Nawabganj Bird Sanctuary According to Food Preferences

S.N.	Feeding Habit	No. of species	% composition
1	Insectivorous	49	32%
2	Omnivorous	28	19%
3	Piscivorous	25	17%
4	Vegetarian	13	9%
5	Carnivorous	09	6%
6	Granivorous	08	5%
7	Frugivorous	05	3%
8	Others (I/Fr, I/V, V/I, I/P)	13	9%

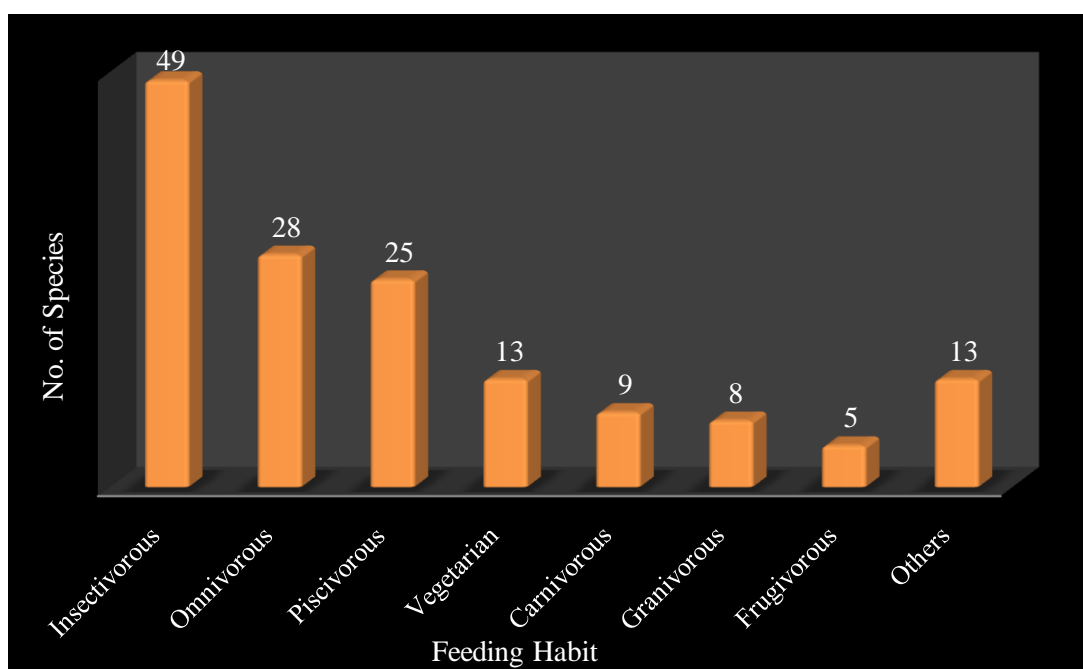


Fig.4:- species composition of birds in NBS according to Food Preferences

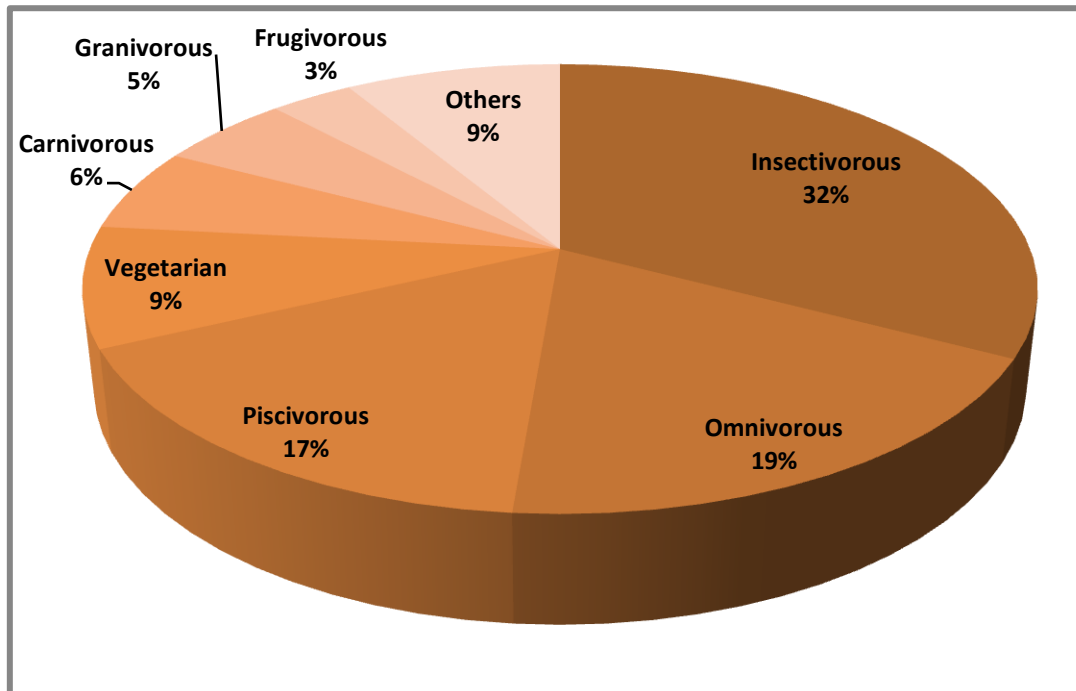


Fig.5:- % composition of birds species in NBS according to Food Preferences

Table: 5 Birds of Nawabganj Bird Sanctuary According to IUCN Status

S.N.	IUCN Status	No. of species	% composition
1	Least Concern	137	91%
2	Not Assessed	05	3%
3	Endangered	01	1%
4	Near Threatened	06	4%
4	Vulnerable	01	1%

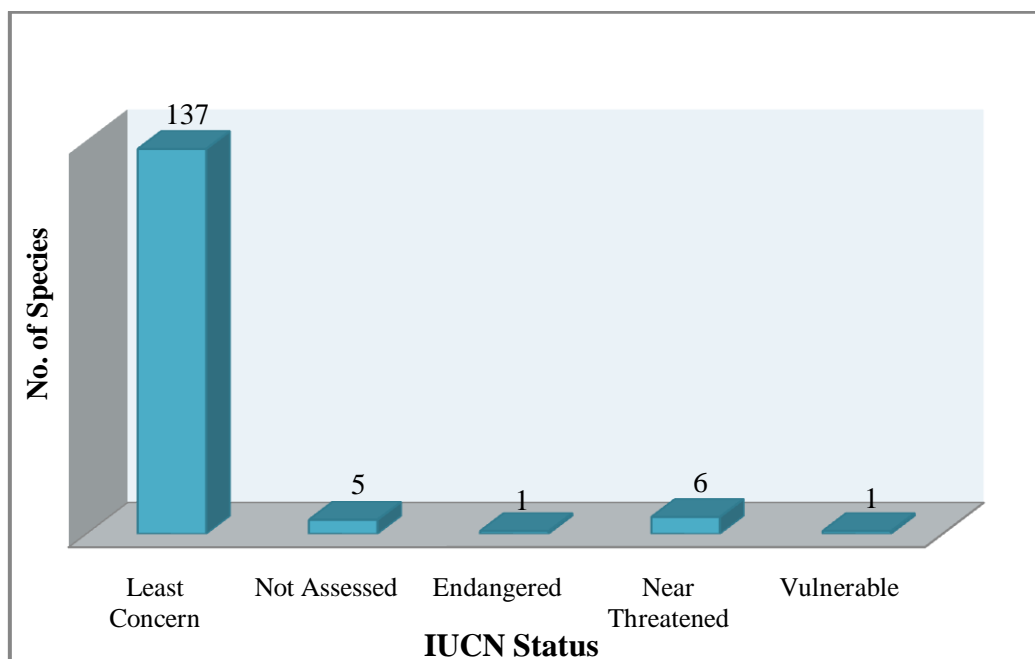


Fig.6:- species composition of birds in NBS according to IUCN Status

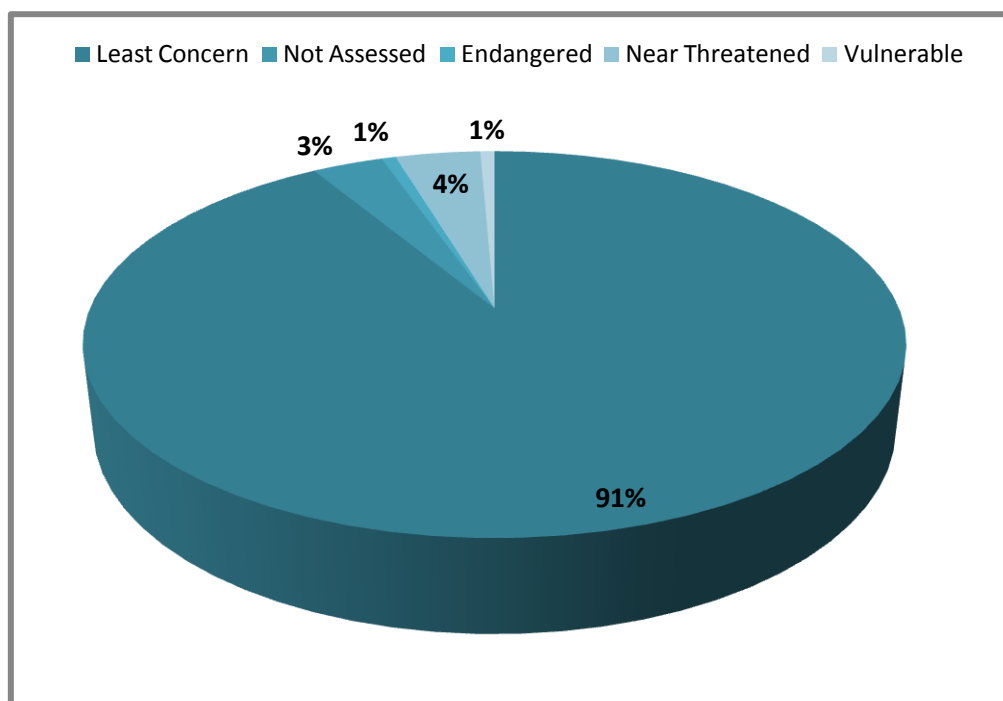


Fig.7:- % composition of birds species in NBS according to IUCN Status

V. Conclusion

It can be concluded that NBS support variety of flora and fauna. Since there is no published Avifaunal checklist prior to this, the present work can form the baseline for further research and comparative studies. NBS is a biodiversity hub. Preliminary study performed in the discussed area would reveal a baseline data which is important for further research and conservation. The study establishes that the present ecological status of NBS supports the birds population. NBS is important as a feeding ground for the Migratory and residential species of birds and other faunal diversity. Being a breeding ground of numbers of birds, it creates space for other animals. Healthy population is a bioindicator of ecological status of wetlands. Ecological value of NBS is directly related to its faunal and floral biodiversity, changes in distribution of species, species richness and abundance are source of the future which can further be quantified in NBS for calculating its ecological value, which would further contribute to its conservation.

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References

- [1]. A.J. Urfi, M. Sen and T. Megnathan, Counting birds in India: methodologies and trend, *Current Science*, 89(12), 2005, 1997–2003.
- [2]. A.M.S. Ali, S. Asokan, R. Manikannan and P. Radhakrishnan, Checklist and nesting [3] patterns of avifauna in and around Mayiladuthurai region, Tamil Nadu, India, *Journal of Threatened Taxa*, 3(6), 2011, 1842–1850.
- [3]. A. Ismail, F. Rehman and S.Z. Zulkifli, Status, Composition and Diversity of Avifauna in the Artificial Putrajaya Wetlands and Comparison with its Two Neighboring Habitats, *Tropical Natural History*, 12(2), 2012, 137-145.
- [4]. A. Kumar and M. Srivastava, The Biodiversity at Sandi Bird Sanctuary, Hardoi with special reference to Migratory Birds, *Oct. Jour. Env. Res*, 1(3), 2013, 187-196.
- [5]. A. Pandotra and D. N. Sahi, Feeding Guilds of Avifauna of Gharana Wetland Reserve-Jammu (J&K), India, *Int. Res. J. Environment Sci.*, 3(4), 2014, 27-33.
- [6]. A. Kanaujia, A. Kumar, S. Kushwaha and A. Kumar, Diversity of Waterbirds in Lucknow District, Uttar Pradesh, India, *International Journal of Science and Research (IJSR)*, 4(1), 2015, 862-866.
- [7]. K.K. Jha, Aquatic Food Plants and their Consumer Birds at Sandi Bird Sanctuary, Hardoi, Northern India, *Asian Journal of Conservation Biology*, 2 (1), 2013, 30–43.
- [8]. P. S. Joshi, An annotated checklist of aquatic avifauna of Rajura, Godada and Dhanora lakes of Buldhana district of (M. S.) India, *Science Research Reporter*, 2(1), 2012, 30-33. Putrajaya Wetlands and Comparison with its Two Neighboring Habitats, *Tropical Natural History* 12(2), 2012, 137-145.
- [9]. P. Kumar and S. K. Gupta, Status of wetland birds of Chhilchhila Wildlife Sanctuary, Haryana, *Journal of Threatened Taxa*, 5(5), 2013, 3969–3976.
- [10]. R. Grimmett, C. Inskipp, and T. Inskipp, *Birds of the Indian Subcontinent*, (London: Oxford University Press, 2011).
- [11]. S. Ali and S.D.Ripley, *A Pictorial Guide to the Birds of the Indian Subcontinent*, (Bombay Natural history society, Mumbai, 1995).

- [12]. S. Ali, *The Book of Indian Birds* (13th Eds.), (Bombay Natural History Society and Oxford University Press, Mumbai, 2002).
- [13]. S. Rajashekara and M.G. Venkatesha, Community Composition of Aquatic Birds in Lake of Bangalore, India, *Journal of Environmental Biology*, 32 (1), 2011, 77-83.
- [14]. S. Kushwaha, A. Kanaujia, A. Kumar, A. Kumar and S. Maheshwari, Avifaunal Diversity of Tikamgarh District, Madhya Pradesh, India, *Discovery Nature*, 9(20), 2015, 20-32.
- [15]. T.W. Custer and R.G. Osborne, *Wading birds as biological indicators*, (Long Survey, US Fish and Wildlife service, Washington, DC. 1977).
- [16]. U.N. Shukla and A.A. Lone, Water Birds of Sur Sarovar Bird Sanctuary Agra, Uttar Pradesh, *Research Journal of Agricultural Sciences*, 1(2), 2010, 135-139.