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Diversity of Avian fauna in Jodhpur Jhal Wetland, Mathura, Uttar Pradesh

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Abstract:

The avifaunal diversity of Jodhpur Jhal wetland in Mathura district, Uttar Pradesh was studied for one year (January 2022 to December 2022). To spot the birds, the Line transects and point count methods were applied and standard books and locals were taken into account for identification. This wetland is inhabited by various resident and migratory birds including Passerines and wetland dependent birds. A total of 182 avian species were recorded belonging to 57 families. The highest numbers of birds were from the family Anatidae. Maximum diversity was recorded during winters. Out of 182 species, 170 are considered as least concerned, 3 species are vulnerable, 8 species are Near Threatened and 1 is endangered according to the IUCN Red List, 2022. The presence of such species signifies the ecological importance of Jodhpur Jhal Wetland and this baseline study is crucial for the protection and preservation of this important habitat and for further studies of its sustainable management.

Keywords- *Avifauna, Vulnerable, Wetlands, Endangered, Near Threatened.*

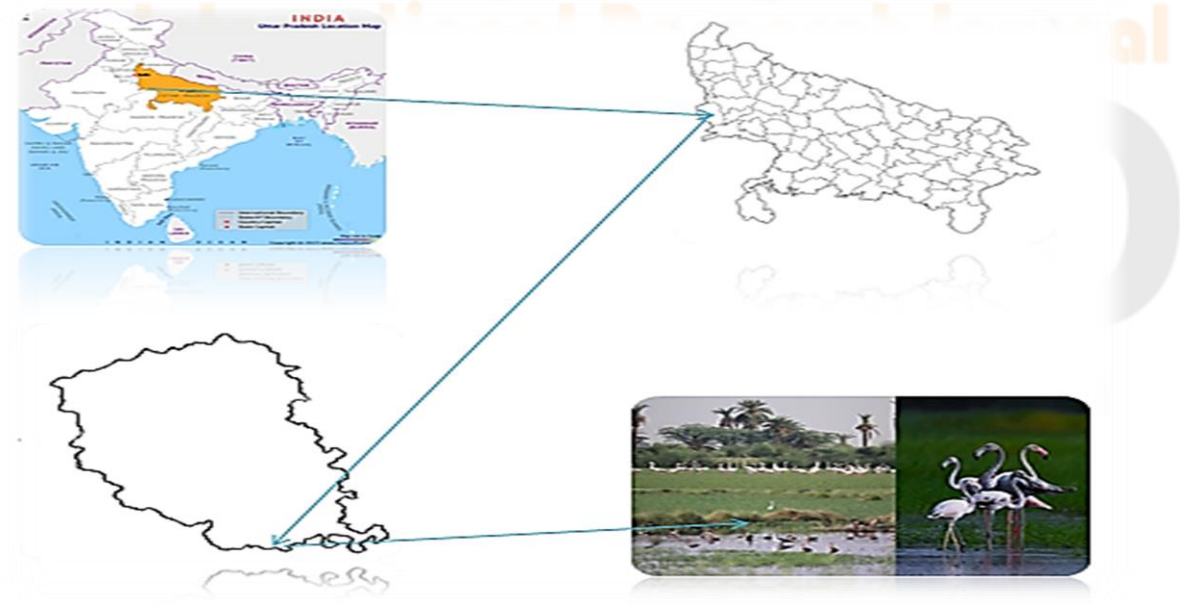
INTRODUCTION:

Wetlands are areas characterised by the presence of water that either covers the soil or is present near the surface of the soil for varying periods throughout the year. These areas are ecologically significant and support vast biodiversity. Wetlands provide crucial habitat for resident and migratory birds for feeding, breeding and as a refuel and rest during migration. Birds are highly sensitive towards any change that occurs in the ecosystem regarding lower

level of the food chain, environmental contaminants, climate change etc. (Egwumah *et al.*, 2017, Zhang and Ma, 2011). Birds are easy to detect and are excellent bio-indicators of the ecological conditions of wetlands (Mohammad and Mohammad, 2011). Monitoring the species abundance is regarded as an important tool in determining and assessing the characteristics of a wetland for further management and protection.

STUDY AREA

Jodhpur Jhal wetland is an area spread over 55.381 hectares in Koah village of Farah block in district Mathura. It is close to two famous Ramsar sites of international importance i.e. Soor Sarovar Bird Sanctuary, Agra and Keoladeo National Park, Bharatpur, Rajasthan. It is located between 27°14`35``N and 77°46`25``E and is an area of low-depth water body, grassland and marshes. The temperature of jodhpur jhal wetland reaches as high as 40°C in peak summer to 2°C - 3°C in winter. The flora that dominate this wetland are *Saccharum munja, Typha domingensis, Typha lotifolia, Saccharum spontaneum, Saccharum bengalese, Phoenix dactylifera, Abrus precatorius, Eicchornia crassipes, Ceratophyllum submersum, Lemna minor and Nymphaea alba*



MATERIAL AND METHODS:

The study was conducted between January 2023 to December 2023 with the help of celestron binoculars 50 x 10, Nikon 7000 D and 5500 D Camera. Scientific methods like point count method and direct count method were also used. Birds were identified with the help of experts, field guides and reference books. The species-level identification was done with the help of the

literature available. (Grimmett and inskipp, 2010; Grewal *et al*., 2011; Inskipp *et al*. 1996; Ali and Ripley, 1983; Mankadan, 1998).

OBSERVATION

Species No.	Family/ Common Name	Scientific Name	Resident Status	IUCN Status	Feeding Guild
	ACCIPITRIDAE				
1.	Black kite	*Milvus migrans*	R	LC	C
2.	Black wing kite	*Elanus caeruleus*	R	LC	O
3.	Crested hawk Eagle	*Nisaetus cirrhatus*	R	LC	C
4.	Egyptian vulture	*Neophron percnopterus*	R	EN	C
5.	Indian spotted Eagle	*Clanga hastata*	R	VU	C
6.	Long legged Buzzard	*Buteo rufinus*	R	LC	O
7.	Marsh harrier	*Circus aeruginosus*	R	LC	C
8.	Shikra	*Accipiter badius*	R	LC	C
	ACROCEPHALIDAE				
9.	Blyth's reed warbler	*Acrocephalu dumetorum*	M	LC	I
10.	Booted warbler	*Iduna caligata*	M	LC	I
11.	Clamorous reed warbler	*Acrocephalus stentoreus*	R	LC	I
12.	Sykes's warbler	*Iduna rama*	R	LC	I
	ALAUDIDAE				
13.	Ashy crown sparrow lark	*Eremopterix griseus*	R	LC	I

14.	Bush Lark	*Mirafra assamica*	R	LC	I
15.	Crested lark	*Galerida cristata*	R	LC	O
16.	Eurasian skylark	*Alauda arvensis*	R	LC	I
	ALCEDINIDAE				
17.	Common kingfisher	*Alcedo atthis*	R	LC	C
18.	Pied kingfisher	*Ceryle rudis*	R	LC	C
19.	White throated Kingfisher	*Halcyon smyrnensis*	R	LC	C
	ANATIDAE				
20.	Bar headed Goose	*Anser indicus*	M	LC	H
21.	Cotton pygmy goose	*Nettapus coromandeli anus*	R	LC	O
22.	Eurasian teal	*Anas crecca*	M	LC	O
23.	Gadwall	*Mareca strepera*	M	LC	O
24.	Garganey	*Spatula querquedula*	M	LC	O
25.	Graylag goose	*Anser anser*	M	LC	G
26.	Knob-billed duck	*Sarkidiornis melanotos*	R	LC	O
27.	Lesser whistling duck	*Dendrocygna javanica*	R	LC	O
28.	Mallard	*Anas platyrhynchos*	M	LC	O
29.	Northern pintail	*Anas acuta*	M	LC	O
30.	Northern shoveler	*Spatula clypeata*	M	LC	O
31.	Red-crested pochard	*Netta rufina*	M	LC	O

32.	Ruddy shelduck	*Tadorna ferruginea*	M	LC	O
33.	Spot billed Duck	*Anas poecilorhyncha*	R	LC	O
34.	Tufted duck	*Aythya fuligula*	M	LC	G
	ANHINGIDAE				
35.	Oriental darter	*Anhinga melanogaster*	R	NT	P
	APODIDAE				
36.	Little swift	*Apus affinis*	R	LC	I
	ARDEIDAE				
37.	Black bittern	*xobrychus flavicollis*	R	LC	C
38.	Cattle Egret	*Bubulcus ibis*	R	LC	C
39.	Great egret	*Ardea alba*	R	LC	C
40.	Grey Heron	*Ardea cinerea*	R	LC	C
41.	Indian pond heron	*Ardeola grayii*	R	LC	C
42.	Intermediate Egret	*Ardea intermedia*	R	LC	C
43.	Night heron	*Nycticorax nycticorax*	R	LC	C
44.	Purple heron	*Ardea purpurea*	R	LC	C
45.	Yellow bittern	*Ixobrychus sinensis*	R	LC	C
46.	Little egret	*Egretta garzetta*	R	LC	C
	BUCEROTIDAE				
47.	Indian grey hornbill	*Ocyceros birostris*	R	LC	C
	CHARADRIIDAE				
48.	Kentish plover	*Charadrius*	R	LC	C
49.	Red-wattled	*Vanellus indicus*	R	LC	C/I

	lapwing				
50.	River lapwing	*Vanellus duvaucelii*	R	NT	I
51.	White-tailed lapwing	*Vanellus leucurus*	R	LC	C/I
52.	Little ring plover	*Charadrius dubius*	R	LC	I
	CICONIIDAE				
53.	Black-necked stork	*Ephippiorhynchus asiaticus*	R	NT	C
54.	Open bill stork	*Anastomus oscitans*	R	LC	C
55.	Painted stork	*Mycteria leucocephala*	R	NT	P
56.	Woolly-necked stork	*Ciconia episcopus*	R	NT	C
	CISTICOLIDAE				
57.	Ashy prinia	*Prinia socialis*	R	LC	I
58.	Plain Prinia	*Prinia inornata*	R	LC	I
59.	Rufous-fronted prinia	*Prinia buchanani*	R	LC	I
60.	Tailorbird	*Orthotomus sutorius*	R	LC	I
61.	Yellow-bellied Prinia	*Prinia flaviventris*	R	LC	I
62.	Zitting cisticola streaked/ fantail warbler	*Cisticola juncidis*	R	LC	I
	COLUMBIDAE				
63.	Eurasian collared dove	*Streptopelia decaocto*	R	LC	G
64.	Laughing Dove	*Spilopelia senegalensis*	R	LC	G
65.	Red collared dove	*Streptopelia tranquebarica*	R	LC	G

66.	Rock dove	*Columba livia*	R	LC	G
67.	Yellow-footed green pigeon	*Treron phoenicoptera*	R	LC	G
	CORACIIDAE				
68.	Indian roller	*Coracias benghalensis*	R	LC	C
	CORVIDAE				
69.	House crow	*Corvus splendens*	R	LC	C
70.	Indian jungle crow	*Corvus culminatus*	R	LC	C
71.	Rufous treepie	*Dendrocitta vagabunda*	R	LC	F
	CUCULIDAE				
72.	Asian koel	*Eudynamys scolopaceus*	R	LC	F
73.	Greater coccul	*Centropus Sinensis*	R	LC	I
74.	Jacobin cuckoo	*Clamator jacobinus*	M	LC	I
	DICRURIDAE				
75.	Black drongo	*Dicrurus macrocercus*	R	LC	C
	EMBERIZIDAE				
76.	Red-headed bunting	*Emberiza bruniceps*	R	LC	G
	ESTRILDIDAE				
77.	Chestnut munia	*Lonchura atricapilla*	R	LC	G
78.	Indian silverbill	*Euodice malabarica*	R	LC	G
79.	Red Avadavat	*Amandava amandava*	R	LC	G
80.	Scaly-breasted munia	*Lonchura punctulate*	R	LC	G
81.	Tricolored munia	*Lonchura Malacca*	R	LC	G

	FALCONIDAE				
82.	Common kestrel	*Falco tinnunculus*	R	LC	G
	FRINGILLIDAE				
83.	Common rosefinch scarlet rosefinch	*Carpodacus erythrinus*	R	LC	G
	GRUIDAE				
84.	Sarus crane	*Grus Antigone*	R	VU	H
	HIRUNDINIDAE				
85.	Barn swallow	*Hirundo rustica*	R	LC	I
86.	Grey-throated martin	*Riparia chinensis*	R	LC	I
87.	Pale martin or Pale sand martin	*Riparia diluta*	R	LC	I
88.	Wire Tailed Swallow	*Hirundo smithii*	R	LC	I
	JACANIDAE				
89.	Bronze-winged jacana	*Metopidius indicus*	R	LC	C
90.	Pheasant-tailed jacana	*Hydrophasianus chirurgus*	R	LC	C
	LANIIDAE				
91.	Bay-backed shrike	*Lanius vittatus*	R	LC	I
92.	Great grey shrike	*Lanius excubitor*	R	LC	I
93.	Long-tailed shrike	*Lanius schach*	R	LC	I
	LARIDAE				
94.	River tern	*Sterna aurantia*	R	VU	P

	LEIOTHRICHIDAE				
95.	Common babbler	*Argya caudata*	R	LC	O
96.	Jungle babbler	*Argya striata*	R	LC	O
97.	Large grey babbler	*Turdoides malcolmi*	R	LC	O
98.	Striated babbler	*Argya earlei*	R	LC	O
	MEGALAIMIDAE				
99.	Brown-headed barbet	*Psilopogon zeylanicus*	R	LC	F
100.	Coppersmith barbet	*Psilopogon haemacephalus*	R	LC	F
	MEROPIDAE				
101.	Blue-tailed bee-eater	*Merops philippinus*	RM	LC	I
102.	Blue-cheeked bee -eater	*Merops persicus*	RM	LC	I
	MONARCHIDAE				
103.	Indian Paradise flycatcher	*Terpsiphone paradisi*	R	LC	I
	MOTACILLIDAE				
104.	Citrine Wagtail	*Motacilla citreola*	M	LC	I
105.	Eastern yellow wagtail	*Motacilla tschutschensis*	M	LC	I
106.	Long-billed pipit	*Anthus similis*	R	LC	I
107.	Paddy Field Pipit	*Anthus rufulus*	R	LC	I
108.	Richard's pipit	*Anthus richardi*	R	LC	I
109.	Tawny pipit	*Anthus campestris*	M	LC	I
110.	Tree pipit	*Anthus trivialis*	R	LC	I

111.	Western yellow wagtail	*Motacilla flava*	M	LC	I
112.	White wagtail	*Motacilla alba*	RM	LC	I
113.	White-browed wagtail / large pied wagtail	*Motacilla maderaspatensis*	RM	LC	I
	MUSCICAPIDAE				
114.	Bluethroat	*Luscinia svecica*	M	LC	I
115.	Brown rock chat	*Oenanthe fusca*	R	LC	O
116.	European Stonechat	*Saxicola rubicola*	R	LC	I
117.	Indian robin	*Copsychus fulicatus*	R	LC	I
118.	Oriental magpie-robin	*Copsychus saularis*	R	LC	I
119.	Red-breasted flycatcher	*Ficedula parva*	M	LC	I
120.	Siberian stonechat	*Saxicola maurus*	RM	LC	I
	NECTARINIIDAE				
121.	Purple sunbird	*Cinnyris asiaticus*	R	LC	F
	ORIOLIDAE				
122.	Indian golden oriole	*Oriolus kundoo*	R	LC	I
	PASSERIDAE				
123.	Yellow-throated sparrow	*Gymnoris xanthocollis*	R	LC	O
	PELECANIDAE				
124.	Dalmatian Pelican	*Pelecanus crispus*	M	NT	C
125.	Great white pelican	*Pelecanus onocrotalus*	M	LC	C
	PHALOCROCRACIDAE				

126.	Great cormorant	*Phalacrocorax carbo*	M	LC	P
127.	Indian Cormorant	*Phalacrocorax fuscicollis*	R	LC	P
128.	Little cormorant	*Microcarbo niger*	R	LC	P
	PHASIANIDAE				
129.	Black francolin	*Francolinus francolinus*	R	LC	O
130.	Grey francolin	*Francolinus pondicerianus*	R	LC	O
131.	Indian peafowl	*Pavo cristatus*	R	LC	O
132.	Rain quail / Black-breasted quail	*Coturnix coromandelica*	R	LC	O
	PHOENICOPTERIDAE				
133.	Greater Flamingos	*Phoenicopterus roseus*	M	LC	H
	PICIDAE				
134.	Black-rumped flameback	*Dinopium benghalense*	R	LC	I
135.	Eurasian wryneck or northern wryneck	*Jynx torquilla*	M	LC	I
136.	Yellow-crowned woodpecker	*Leiopicus mahrattensis*	R	LC	I
	PITTIDAE				
137.	Indian pitta	*Pitta brachyura*	R	LC	I
	PLOCEIDAE				
138.	Baya weaver	*Ploceus philippinus*	R	LC	O
139.	Black Breasted Weaver	*Ploceus benghalensis*	R	LC	O
140.	Streaked weaver	*Ploceus manyar*	R	LC	O

	PODICIPEDIDAE				
141.	Little grebe	*Tachybaptus ruficollis*	R	LC	P
	PSITTACULIDAE				
142.	Plum-headed parakeet	*Psittacula cyanocephala*	R	LC	F
143.	Rose-ringed parakeet	*Psittacula krameri*	R	LC	F
	PYCNONOTIDAE				
144.	Red-vented bulbul	*Pycnonotus cafer*	R	LC	F
145.	Red-whiskered bulbul	*Pycnonotus jocosus*	R	LC	F
	RALLIDAE				
146.	Common coot	*Fulica atra*	M	LC	O
147.	Common moorhen	*Gallinula chloropus*	R	LC	O
148.	Grey-headed swamphen / Purple swamphen	*Porphyrio poliocephalus*	R	LC	O
149.	Watercock	*Gallicrex cinerea*	RM	LC	O
150.	White-breasted waterhen	*Amaurornis phoenicurus*	R	LC	O
151.	Brown crake	*Zapornia akool*	R	LC	O
	RECURVIROSTRIDAE				
152.	Black-winged stilt	*Himantopus himantopus*	RM	LC	C
153.	Pied avocet	*Recurvirostra avosetta*	M	LC	C
154.	Pied Bushchat	*Saxicola caprata*	R	LC	I
155.	Pied myna	*Gracupica contra*	R	LC	O
	ROSTRATULIDAE				

156.	Painted-snipes	*Rostratula benghalensis*	R	LC	C
	SCOLOPACIDAE				
157.	Black-tailed godwit	*Limosa limosa*	M	NT	O
158.	Common greenshank	*Tringa nebularia*	RM	LC	C
159.	Common redshank	*Tringa totanus*	RM	LC	C
160.	Ruff	*Calidris pugnax*	M	LC	O
161.	Temminck's stint	*Calidris temminckii*	RM	LC	C
162.	Wood sandpiper	*Tringa glareola*	M	LC	C
163.	Marsh sandpiper	*Tringa stagnatilis*	M	LC	C
164.	Green sandpiper	*Tringa ochropus*	M	LC	P
165.	Common sandpiper	*Actitis hypoleucos*	RM	LC	I
	SITTIDAE				
166.	Indian nuthatch	*Sitta castanea*	R	LC	I
	STRIGIDAE				
167.	Indian scops owl	*Otus bakkamoena*	R	LC	C
168.	Short-eared owl	*Asio flammeus*	R	LC	C
169.	Spotted owl	*Strix occidentalis*	R	NT	C
170.	Spotted owlet	*Athene brama*	R	LC	C
	STURNIDAE				
171.	Bank myna	*Acridotheres ginginianus*	R	LC	O
172.	Brahminy starling	*Sturnia pagodarum*	R	LC	O
173.	Common myna	*Acridotheres tristis*	R	LC	O

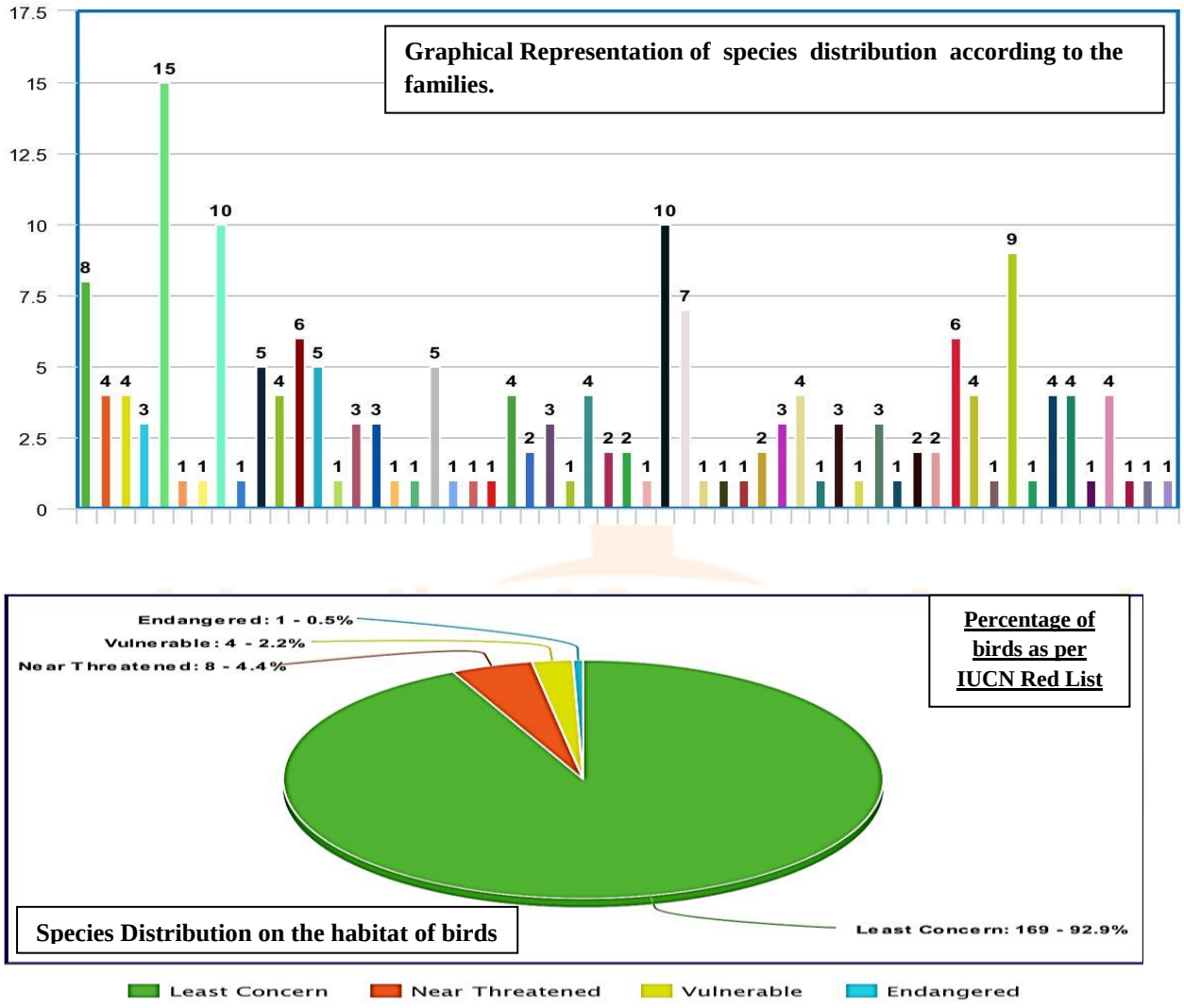
174.	Rosy starling	*Pastor roseus*	M	LC	O
	SYLVIIDAE				
175.	Lesser whitethroat	*Curruca curruca*	M	LC	I
	THRESKIORNITHIDAE				
176.	European Spoonbill	*Platalea ajaja*	RM	LC	P
177.	Glossy ibis	*Plegadis falcinellus*	R	LC	C
178.	Red naped Ibis	*Pseudibis papillosa*	R	LC	C
179.	Black-headed ibis	*Threskiornis melanocephalus*	R	NT	C
	TYTONIDA				
180.	Barn Owl	*Tyto alba*	R	LC	C
	UPUPIDAE				
181.	Common Hoopoe	*Upupa epops*	R	LC	I
	ZOSTEROPIDAE				
182.	Indian white-eye	*Zosterops palpebrosus*	R	LC	I

Resident Status : R = Resident, **RM** = Resident Migratory, **M** = Migratory
IUCN Status: **LC** = Least Concern, **NT** = Near Threatened, **V**= Vulnerable**, E**= Endangered
Feeding Guild: **I**= Insectivores**, C** = Carnivores, **P** = Piscivores, **F** = Frugivores, **G**= Granivores, **O** = Omnivores, **N** = Nectarivores, **H** = Herbvivores

RESULTS:

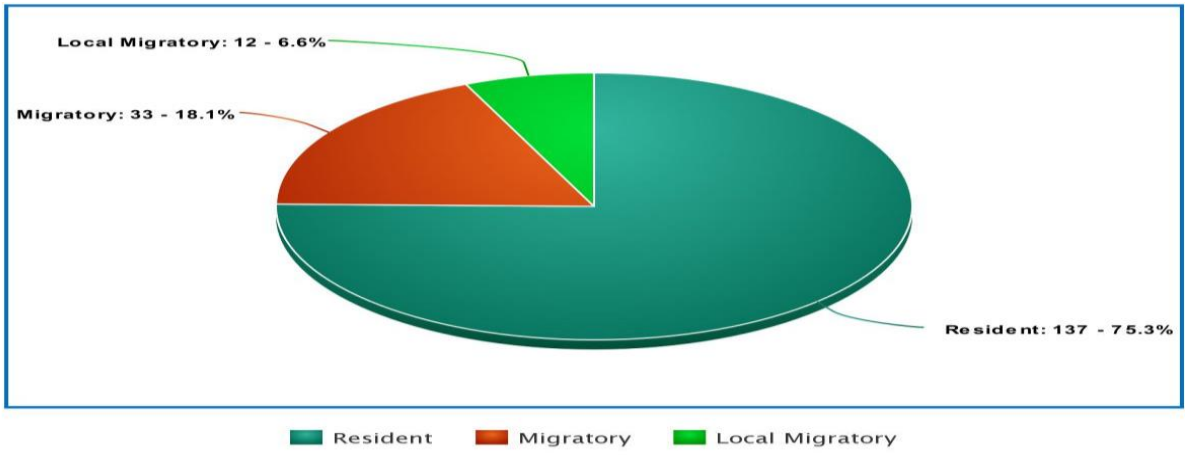
This research identified 182 species from the previous 181 species. These species belong to 57 families. Out of which Family Anatidae has the highest number of Avian fauna i.e. 15. Family Ardeidae and Motacilladae have the same number of species i.e. 10. Other families have following numbers of species i.e. Scolopacidae (9), Accipitridae (8), Muscicapidae (7), Cisticolidae (6), Charadriidae (5), Columbidae (5), Estrildidae (5), Acrocephalidae (4), Alaudidae (4), Ciconiidae (4), Hirundinidae (4), Leiothrichidae (4), Phasianidae (4), Strigidae (4), Sturnidae (4), Threskiornithidae (4), Alcedinidae (3), Corvidae (3), Cuculidae (3), Laniidae (3), Phalacrocoracidae (3), Picidae (3), Ploceidae (3), Rallidae (3), Recurvirostridae (3), Jacanidae (2), Megalaimidae (2), Meropidae (2), Pelecanidae (2), Psittaculidae (2), Pycnonotidae (2), Anhingidae (1), Apodidae (1), Bucerotidae (1). Coraciidae (1), Dicruridae

(1), Emberizidae (1), Falconidae (1), Fringillidae (1), Gruidae (1), Oriolidae (1), Passeridae (1), Phoenicopteridae (1), Pittidae (1), Nectariniidae (1), Podicipedidae (1),Rostratulida (1), Sittidae (1), Sylviidae (1), Tytonidae (1), Upupidae (1), Zosteropidae (1), Laridae (1).

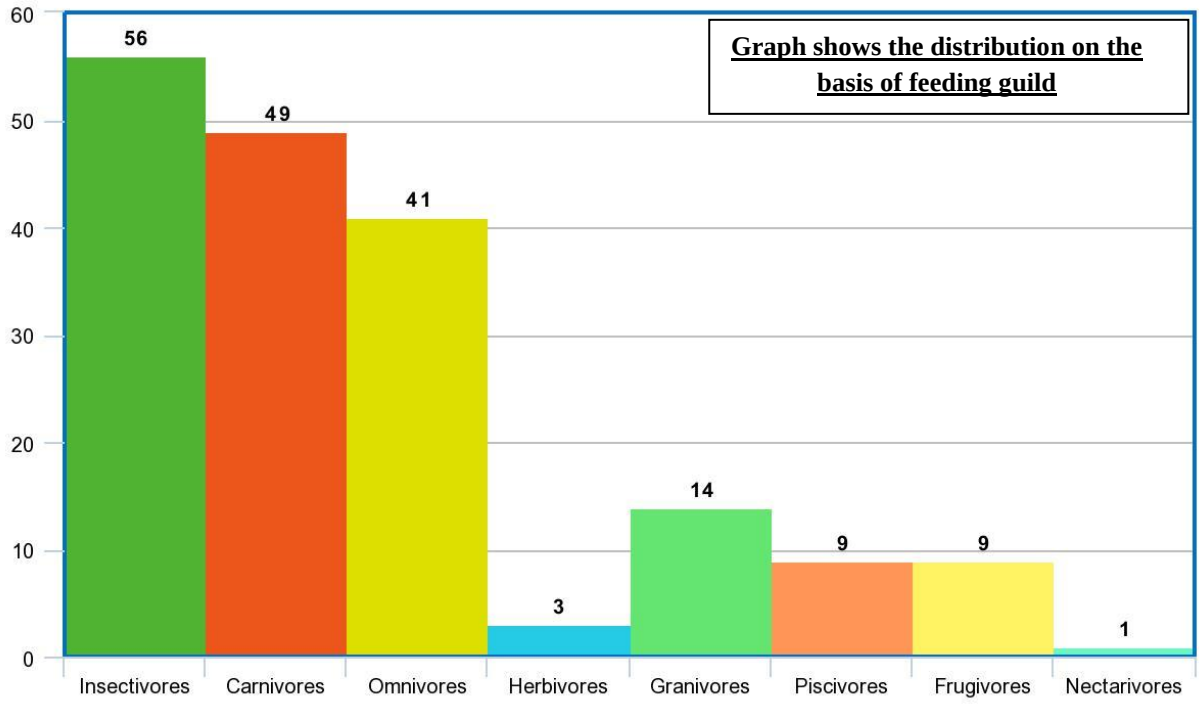


The IUCN Red List classification showed that the majority of the species recorded were classified as Least Concern (169 species). However, Eight species were in the Near Threatened category, four species were categorized as Vulnerable and one as Endangered.

Among the 182 avian species in Jodhpur Jhal wetland, 137 are residents, 33 are migratory, and 12 are classified as local migratory. This distribution highlights the wetland's significance as a habitat, providing both a permanent home and seasonal refuge for a diverse array of bird species throughout the year.



The examination of feeding guilds in Jodhpur Jhal underscores a significant presence of avian species specializing in insect consumption, with 56 identified as Insectivores. Alongside this, 49 species adopt a Carnivores diet, primarily preying on various organisms. The wetland also hosts 41 Omnivores species with a diverse diet comprising both animal and plant matter. Three Herbivores species primarily consume plants, while 14 granivores focus on seed consumption. Additionally, nine piscivores rely on fish, nine frugivores consume fruits, and one nectarivore extracts nectar from flowers. This diverse spectrum of feeding strategies highlights the ecological richness of Jodhpur Jhal, supporting a wide variety of avian dietary preferences and contributing to the complex balance of the wetland ecosystem.



CONCLUSION

The research conducted provided valuable insights into the avian diversity of the region. The identification of the bird species with an increase from the previous counts, underscores the importance of on-going monitoring efforts. The majority of recorded species are from the least

concerned category which shows a positive sign for the overall health of the avian community. However, IUCN status emphasizes the need for conservation measures to safeguard these populations. The resident status analysis indicates the area's importance as a habitat for breeding and feeding. The presence of migratory and local migratory species further adds to the ecological significance of the wetland.

The study also draws attention towards the challenges faced by the avian communities, including habitat degradation due to rising population, industrialization, and pesticide in farm field. The research underscores the urgency of implementing conservation steps and effective management strategies to preserve the wetland ecosystems. The findings of this study advocate for a concerted effort towards the conservation of the Jodhpur Jhal wetland and similar ecosystems to ensure the survival of diverse avian species and maintain the delicate balance of our natural environment.

PHOTOGRAPHS OF SOME BIRDS CAPTURED IN JODHPUR JHAL WETLAND

EGYPTIAN CULTURE

SHIKRA

BLYTH'S REED WARBLER

CRESTED LARK

PIED KINGFISHER

COTTON PYGMY GOOS

BAR HEADED GOOSE

MALLARD

NORTHERN PINTAIL

NORTHERN SHOVELER

RUDDY SHELDUCK

ORIENTAL DARTER

GREAT EGRET & INTERMEDIATE EGRET

GREY HERON

PURPLE HERON

INDIAN GREY HORNBILL

BLACK NECKED STORK

ASHY PRINIA

PLAIN PRINIA

RUFOUS-FRONTED PRINIA

ZITTING CISTICOLA

INDIAN ROLLER

RUFUOUS TREEPIE

ASIAN KOEL

ASIAN KOEL

RED HEADED BUNTING

INDIAN SILVERBILL

SCALY-BREASTED MUNIA

TRICOLORED MUNIA

SARUS CRANE

BRONZE WINGED JACANA

PHEASENT TAILED JACANA

GREAT GREY SHRIKE

LONG TAILED SHRIKE

LARGE GREY BABBLER

BLUE-TAILED BEE-EATER

TAWNY PIPIT

TREE PIPIT

WESTERN YELLOW WAGTAIL

WHITE WAGTAIL

WHITE-BROWED WAGTAIL

BLUETHROAT

BROWN ROCK CHAT

MAGPIE ROBIN

SIBERIAN STONECHAT

INDIAN PEAFOWL

BLACK-RUMPED FLAMEBACK

EURASIAN WRYNECK

BAYA WEAVER

STREAKED WEAVER

GREY-HEADED SWAMPHEN

WATERCOCK

WHITE-BREASTED WATERHEN

PIED AVOCET

BLACK-TAILED GODWIT

COMMON GREENSHANK

COMMON REDSHANK

SHORT-EARED OWL

BRAHMINY STARLING

FLAMINGOS

EURASIAN SPOONBILL

BROWN CRAKE

REFERENCES:-

Ali S, Ripley SD. 1995. A pictorial guide to the birds of the Indian subcontinent. India: Oxford University Press.

Anderson SH, Kelly D, Robertson AW, Ladley JJ. 2016. Pollination by birds: a functional evaluation. In:Why birds matter. University of Chicago Press. pp. 73-106.

Bhargava R, Rahmani AR, De R. 2016. Birds of Suheldev wildlife Sanctuary, Balrampur and Shravasti districts, Uttar Pradesh, India. J Bombay Nat Hist Soc 113:3-14.

Chaube RP, Kumar A, Kanaujia A. 2018. A preliminary study on the birds of a typical suburban region of Luckhnow, Uttar Pradesh, India. J New Biol Rep 7(2):81-105.

DeGraaf RM. 1978. The importance of birds in ecosystems. In: DeGraaf RM, editor [technical coordinator]. Proceedings of the workshop on nongame bird habitat management in Conifer Forests of the Western USUS Dep. agric. For. ServoGen. Tech Rep PNW-64. pp. 5-1

Dwevedi R, Singh SK, Krishna V. 2014. Heronries of Mathura District, western Uttar Pradesh, India. Indian Birds 9(4):93-5.

Gopi Sundar KS, Kittur SA. 2012. Methodological, temporal and spatial factors affecting modeled occupancy of resident birds in the perennially cultivated landscape of Uttar Pradesh, India. Landsc Ecol 27(1):59-71.

Grewal B. 2000. Birds of the Indian subcontinent, published by. Local Colour Limited Quary Bay HK 1-213.

Grewal B, Harvey B, Pfister O. 2011. A photographic guide to the birds of India: and the Indian subcontinent, including Pakistan, Nepal, Bhutan, Bangladesh, Sri Lanka, and the Maldives (Princeton field guides). New Delhi: Timeless Books.

Grimmett R, Inskipp T. 2010. Birds of Northern India. India: OM Books International. pp. 240

Inskipp T, Lindsey N, Duckworth W. 1996. An annotated checklist of the birds of the Oriental region. U.K: Oriental Bird Club.

Jha KK. 2013. Aquatic food plants and their consumer birds at Sandi Bird Sanctuary, Hardoi, Northern India. Asian J Conserv Biol 2(1):30-43.

Kanaujia A, Kumar A, Kushwaha S, Kumar A. 2015. Diversity of waterbirds in Lucknow District, Uttar Pradesh, India. Int J Sci Eng Res (IJSR) 4(1):862-6

Kumar A, Chaube RP, Kanaujia A. 2018. New records of birds from the Shahid Chandra Shekhar Azad bird Sanctuary (SCSABS) of Unnao, Uttar Pradesh, India. Wildl Res 6(02):17-23.

Kumar A, Kanaujia A, Kushwaha S, Kumar A. 2015. A preliminary assessment of avifaunal diversity of Nawabganj bird Sanctuary, Unnao, Uttar Pradesh. IOSR J Environ Sci Toxicol Food Technol (IOSR-JESTFT) 9(4):81-91.

Kumari M, Sagar MP, Dhawal KK. 2020. Analysis of major causes and rate of mortality at different stages in layer birds of Uttar Pradesh state.

Levey DJ, Stiles FG. 1994. Birds: ecology, behavior, and taxonomic affinities. La Selva: ecology and history of a Neotropical rainforest, 217-28.

Lincoln FC, Peterson SR. 1979. Migration of birds (No. 16). Fish & Wildlife Service, United States Department of the Interior.

Manakadan R, Pittie A. 2001. Standardized English and scientific names of the birds of the Indian subcontinent. Buceros 6(1):1-38

Mazumder SU, Khan A. 2020. A checklist of birds in agricultural landscapes of Aligarh, Uttar Pradesh, India. Int J Fauna Biol Stud 7(2):16- 23

Mishra H, Kumar V, Kumar A. 2016. Diversity and population status of waders (Aves) of Bakhira Tal, a natural wetland in District Sant Kabir Nagar, Uttar Pradesh, India. Biodivers J 7:331- 6

Mishra H, Kumar V, Kumar A. 2019. Population structure and habitat utilization of migratory birds at Bakhira bird Sanctuary, Uttar Pradesh, India. Pak J Zool 52(1):247.

Patel H, Gajjar G, Bhatt D, Patel K. 2021. An annotated checklist of avifauna from Hemchandracharya North Gujarat University campus, Patan, Gujarat, India. J Biol Stud 3(4):121-31.

Plunkett RL. 1979. The importance of birds in forest communities. In: Management of North Central and Northeastern Forest for nongame birds, Workshop. Proceedings of the USDA For Serv. gen. Tech Rep NC-51 268 (pp. 4-8).

Prakash S, Verma AK. 2016. Marital fidelity and congregation of Indian sarus crane, Grus antigone antigone in and around Alwara lake of district Kaushambi (Uttar Pradesh), India. Int J Biol Res 4(1):10-3.

Praveen J, Jayapal R, Pittie A. 2020. Taxonomic updates to the checklists of birds of India, and the South Asian region-2020. Indian Birds 16(1):12-9.

Riyaz M, Sivasankaran K, Mariapackiam SM. 2021. Midnight heroes brought to Daylight: insights from the National Moth Week-2021 (India). Insect Environ 24(3):442-6.

Singh DK, Singh MK, Singh PK, Kumar A, Fahim A. 2018. Comparative performance of Cari Nirbheek, Hitcari and Cari Shyama bird under backyard system of rearing in western Uttar Pradesh, India. The J Rural Agric Res 18(2):39- 41.

Singh KP, Riyaz M, Singh G, Syed S. 2021. Avifaunal diversity of Jodhpur Jhal Wetland Mathura (Uttar Pradesh) India: A preliminary survey. J New Biol Rep 10 (2): 95 – 108.

Tomar VS, Chouksey S. 2018. Ethology and nesting behavior of sarus crane (Grus antigone) in Faridpur tehsil under Bareilly district of Uttar Pradesh. Int J Ecol Environ Sci 44(2):135-43.

Kumar Verma AK. 2020. Conservation status of amniotes found in and around Balapur Pond of District Prayagraj (Uttar Pradesh), India. Int J Biol Res 8(1):01-5.

Weller MW. 1999. Wetland birds. Cambridge, UK: Cambridge University Press.

Yadav BS, Niyogi D, Gupta RK, Singh SV, Saif M, Jaiswal SK. 2020. Incidence and clinicopathological study of gout in broiler birds of Faizabad and Sultanpur districts of Eastern Uttar Pradesh. Explor Anim Med Res 10(1):88- 9