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Bird Community Structure Reflecting the Health of Wetland; Evidence from Maharana Pratap Wetland, Richha, Faridpur, Northern India

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ABSTRACT

Wetlands are important habitats for the water birds, generally used for food, breeding, nesting and foraging. Water birds are good indicators of ecosystem health. The present study was conducted from October 2024 to September 2025 in Maharana Pratap Wetland, Riccha, Faridpur Range, District Bareilly, Uttar Pradesh, India. During the study period, a total of 38 bird species were found, of which most of the species were under the IUCN category of Least Concern. The Asian woolly-necked stork (*Ciconia episcopus*) and Oriental Darter (*Anhinga melanogaster*) belong to the near-threatened category, highlighting the importance of wetlands and their conservation value. Numerous winter visitors were also seen during the study, demonstrating the availability of food and habitat quality of the wetland. Diversity was higher in winter and post-monsoon but found lower during summers, indicating habitat stability. The presence of resident species throughout the year indicates habitat integrity. The Shannon-Wiener diversity index is high in winter and post-monsoon and lower in summer, reflecting the water availability and resource condition. The study provides the measures of the ecological importance of Maharana Pratap Wetland as a year-round habitat for the different bird populations, emphasizing the continued monitoring and conservation of the habitat.

1. Introduction

One of the most varied and ecologically important groups of animals on Earth belongs to the class Aves. There are more than 11,000 bird species in the world, found on every continent and in a variety of environments, including Polar Regions, tropical rainforests, and deserts (Gill, 2007; Maheswaran and Alam, 2024). Over 1,300 bird species can be found in India alone, accounting for nearly 12% of all bird species worldwide (Grimmet *et al.*, 1999; Praveen *et al.*, 2016). Among Indian states, Uttar Pradesh has a large avifaunal population that includes both resident and migratory species, because of its diverse landscapes of wetlands, forests, and agricultural areas. Important habitats for endemic and vulnerable species are found in notable bird places, including Okhla Bird Sanctuary, Sarsai Nawar, and Dudhwa National Park (Islam & Rahmani, 2004).

From ancient times, humans and birds have a deep and emblematic relationship. They have been distinguished in folklore, religion, literature and art throughout human history. Garuda (mythical eagle) and the peacock (*Pavo cristatus*), assigned as national birds of India, show the importance of tradition and spirituality. Early evolutionary theory and environmental monitoring show the scientific importance of Birds. In history, birds acted as messengers and currently use birds for entertainment. Also, Birds create motivation for humans, like a swan inspires people to concentrate on a goal. (Barrow, 2009). Birds are showing their importance to the ecological health ecosystem. Birds help in the cycling of nutrients, pollination, pest management, and seed dispersal (Şekercioğlu *et al.*, 2004).

For the improvement of human wellbeing along with ecological roles, Birds play their important place in nature. Services that are provided by birds, sometimes called as Avian services. Some traditional communities acquire avian services, meat and feathers. Besides this, pest control, cultural activities as bird watching, aesthetic and spiritual values are the important regulating services provided by Birds (MEA, 2005). Bird watching raises awareness about environmental issues and also creates ecotourism and economic value. To maintain balance between humans and nature, it is important to have a good understanding of avian diversity, ecological role and services.

Wetland birds are showing itself the most sensitive and ecologically important sensor of wetland health, reflecting shifts in the changing climate, habitat availability, and water quality. Birds depend on wetlands for their vital functions like feeding, breeding, nesting and resting during migration. Many wetland types, such as marshes, floodplains, lakes, and mangroves, are specific for the living of species including herons, storks, ducks, cranes and shorebirds (Kumar *et al.*, 2011).

Various migratory wetland birds like black-tailed godwit (*Limosa limosa*) and the bar-headed goose (*Anser indicus*) cover thousands of miles across the continents and connect the far-flung ecosystems and symbolizing the trans-boundary conservation (Boere & Stroud, 2006). However, many bird species that depend on wetlands have declined due to habitat degradation, pollution and climate change, underscoring the need for efficient conservation strategies. Therefore, protecting wetlands is essential for the survival of bird species that rely on these dynamic and productive environments, as well as for the conservation of biodiversity.

During the present study, the species richness of Maharana Pratap Wetland, Richha, Tehseel Faridpur, District Bareilly, Uttar Pradesh, India (Lat 28.335266° Long 79.599853° GMT +05:30) was assessed.

2. Material and Methods

The study was conducted from October 2024 to October 2025 in Maharana Pratap Wetland, Riccha, Faridpur Range, District Bareilly, Uttar Pradesh, India. The data was collected at regular intervals after every 15 days, during the study period. Birds were observed and recorded between 6:30 am to 11:00 am, and 4:00 pm to 6:30 pm, by direct field observation. Photographs were taken by Nikon 7500 DSLR with 70-300 mm lens. Bird watching was carried out by the line transect method at the shore of the wetland. Percent occurrence of birds was calculated with the help of following formula-

Percent occurrence = 100×No of species of each family/ Total no of different species observed

Species richness and diversity of species are calculated by following the formula. (Shannon & Wiener, 1949)

$$H' = -\sum Pi\ In\ Pi$$

Where the Pi = the proportion of individuals of species i.

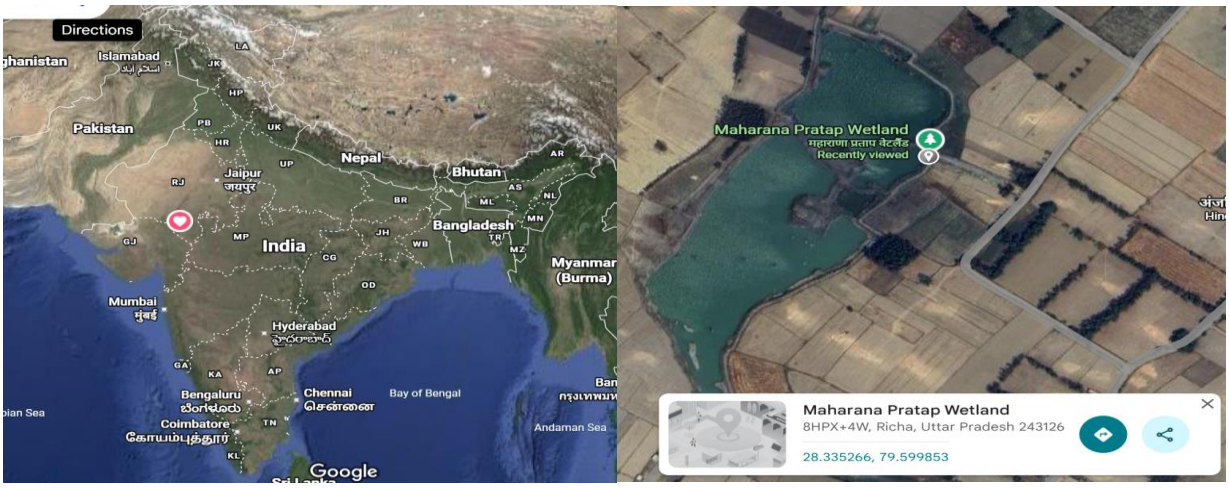

Image: Google map image of a wetland and data collection through the line transect method

2.1. Study Area

Maharana Pratap wetland is situated at Lat 28.33562° Long 79.599851°, Richha, Faridpur Range District, Bareilly, Uttar Pradesh. The elevation of this wetland above sea level is 173 meters. Wetland spreads over 7.474 hectares. The area receives water from the rain caused by way of Bengal monsoon, which arrives here by the end of June. Last June, July and August are the peak months of heavy rain. November and February are the moderate cold months, while December and January are the coldest months in this region. March is the starting month of summer, and the peak months of summer are April, May and the first half of June in when warm winds flow, which is called as "Loo" in the local language. The winter season starts from mid-November to February.

Table 1: List of birds observed at Maharana Pratap Wetland, Riccha, Bareilly, U.P., India

S. N.	Common name	Scientific name	Family	Habitat	IUCN status
1	Bronze Winged Jacana	*Metopidius indicus*	Jacanidae	R	LC

2	Common Greenshank	*Tringa nebularia*	Scolopacidae	M	LC
3	White Wagtail	*Motocilla alba*	Motocillidae	M	LC
4	White-browed Wagtail	*Motacilla maderaspatensis*		R	LC
5	Paddy field pipit	*Anthus rufulus*		R	LC
6	Black Winged Stilt	*Himantopus himantopus*	Recurvirostridae	R	LC
7	Eurasian Coot or Australian Coot	*Fulica atra*	Rallidae	R	LC
8	Grey-headed Swamphen	*Porphyrio poliocephalus*		R	LC
9	White Breasted Waterhen	*Amaurornis phoenicurus*		R	LC
10	Little Camorant	*Microcarbo niger*	Phalacrocoracidae	R	LC
11	Asian Open Bill	*Anastomus oscitans*	Ciconiidae	R	LC
12	Asian wolly necked stork	*Ciconia episcopus*		R	VL or NT
13	Black Headed ibis	*Threskiornis melanocephalus*	Threskiornithidae	R	LC
14	Indian Pied Myna	*Gracupica contra*	Sturnidae	R	LC
15	Indian Myna	*Acridotheres tristis*		R	LC
16	Red-whiskered Bulbul	*Pycnonotus jocosus*	Pycnonotidae	R	LC
17	Indian Pond Heron	*Ardeola grayii*	Ardeidae	R	LC
18	Great Egret	*Ardeola alba*		R	LC
19	Purple Heron	*Ardea purpurea*		R	LC

20	Little Egret	*Egretta garzetta*		R	LC
21	Eastern Cattle Egret	*Bulbulcus coromandus*		R	LC
22	Large grey Babler	*Argya malcolmi*	Leiothrichidae	R	LC
23	Purple sunbird	*Cinnyris asiaticus*	Nectariniidae	R	LC
24	Red-Wattled Lapwing	*Vanellus indicus*	Charadriidae	R	LC
25	Large billed crow	*Corvus macrorhynchos*	Corvidae	R	LC
26	Grey Breasted Prinia(Franklin)	*Prinia hodgsonii*	Cisticolidae	R	LC
27	White-throated Kingfisher	*Halcyon smyrnensis*	Alcedinidae	R	LC
28	Ruddy shelducks	*Tadorna ferruginea*	Anatidae	M	LC
29	Indian Spot Duck	*Anas poecilorhyncha*		R	LC
30	Lesser Whistling Duck	*Dendrocygna javanica*		R	LC
31	Knobe Billed Duck	*Sarkidiornis melanotos*		R	LC
32	Asian Green Bee-eater	*Merops Orirntalis*	Meropidae	R	LC
33	Eurasian Hoopoe	*Upupa epops*	Upupidae	V	LC
34	Silver Bills or White Throated Munias	*Euodice malabarica*	Estrildida	R	LC
35	Siberian stonechat	*Saxicol maurus*	Muscicapidae	M	LC
36	Bluethroat	*Luscinia svecica*		M	LC
37	Oriental Darter	*Anhinga melanogaster*	Anhingidae	R	NT
38	Eurasian collared dove	*Streptopelia decaocto*	Columbidae	R	LC

LC=Least Concern, R=Resident, V=vagrant, M=Migratory and NT= Near threatened

Table 2: Bird population in different months

S. N.	Common name	OCTOBER 2024	NOVEMBER 2024	DECEMBER 2024	JANUARY 2025	FEBRUARY 2025	MARCH 2025	APRIL 2025	MAY 2025	JUNE 2025	JULY 2025	AUGUST 2025	SEPTEMBER 2025
1	Bronze Winged Jacana	**5**	**2**	**4**	**5**	**10**	**2**	**8**	**6**	**4**	**6**	**7**	**6**
2	Common Greenshank	**0**	**2**	**3**	**6**	**4**	**5**	**0**	**0**	**0**	**0**	**0**	**0**
3	White Wagtail	**6**	**16**	**24**	**21**	**32**	**20**	**10**	**0**	**0**	**0**	**0**	**0**
4	White-browed Wagtail	**10**	**26**	**15**	**28**	**23**	**26**	**21**	**16**	**10**	**13**	**18**	**12**
5	Paddy field pipit	**18**	**10**	**16**	**21**	**19**	**2**	**15**	**20**	**28**	**26**	**32**	**26**
6	Black Winged Stilt	**9**	**5**	**8**	**12**	**10**	**9**	**3**	**2**	**3**	**4**	**8**	**6**
7	Eurasian Coot or Australian Coot	**2**	**6**	**8**	**6**	**4**	**2**	**3**	**0**	**0**	**0**	**3**	**2**
8	Purple swamphen or grey-headed swamphen	**28**	**30**	**34**	**28**	**31**	**17**	**24**	**6**	**10**	**8**	**8**	**21**
9	White Breasted Waterhen	**13**	**6**	**2**	**2**	**3**	**2**	**0**	**1**	**6**	**9**	**10**	**9**
10	Little Camorant	**2**	**1**	**3**	**2**	**4**	**5**	**2**	**2**	**3**	**2**	**3**	**6**
11	Asian Open Bill	**9**	**12**	**9**	**2**	**0**	**0**	**0**	**0**	**2**	**6**	**8**	**11**
12	Asian wooly necked stork	**4**	**17**	**8**	**4**	**9**	**5**	**0**	**2**	**0**	**4**	**0**	**0**
13	Black Headed ibis	**10**	**13**	**10**	**8**	**4**	**6**	**0**	**0**	**2**	**7**	**5**	**12**
14	Indian Pied Myna	**9**	**8**	**11**	**16**	**12**	**21**	**26**	**16**	**28**	**16**	**23**	**27**

15	Indian Myna	**21**	**11**	**18**	**23**	**28**	**20**	**26**	**32**	**8**	**16**	**28**	**29**
16	Red-whiskered Bulbul	**2**	**0**	**0**	**0**	**0**	**2**	**6**	**2**	**3**	**7**	**2**	**3**
17	Indian Pond Heron	**8**	**7**	**6**	**11**	**2**	**4**	**8**	**11**	**8**	**17**	**20**	**8**
18	Great Egret	**10**	**7**	**8**	**4**	**6**	**8**	**7**	**8**	**15**	**28**	**20**	**16**
19	Purple Heron	**2**	**0**	**0**	**0**	**0**	**2**	**1**	**0**	**0**	**2**	**1**	**3**
20	Little Egret	**5**	**2**	**1**	**3**	**4**	**0**	**0**	**0**	**2**	**8**	**6**	**9**
21	Eastern Cattle Egret	**8**	**6**	**4**	**5**	**8**	**9**	**7**	**6**	**5**	**8**	**8**	**7**
22	Large grey Babler	**26**	**20**	**26**	**21**	**10**	**5**	**10**	**26**	**16**	**18**	**20**	**18**
23	Purple sunbird	**6**	**8**	**6**	**12**	**16**	**12**	**8**	**6**	**8**	**9**	**2**	**6**
24	Red-Wattled Lapwing	**16**	**10**	**13**	**16**	**10**	**12**	**18**	**10**	**6**	**10**	**8**	**13**
25	Large billed crow	**2**	**8**	**6**	**6**	**13**	**6**	**14**	**8**	**7**	**11**	**15**	**9**
26	Grey Breasted Prinia(Franklin)	**2**	**0**	**1**	**2**	**0**	**0**	**6**	**10**	**16**	**11**	**18**	**21**
27	White-throated Kingfisher	**2**	**3**	**2**	**1**	**3**	**3**	**2**	**1**	**3**	**2**	**2**	**1**
28	Ruddy shelduck	**6**	**20**	**27**	**30**	**27**	**29**	**10**	**0**	**0**	**0**	**0**	**0**
29	Indian Spot Duck	**3**	**4**	**4**	**2**	**4**	**0**	**0**	**0**	**0**	**2**	**4**	**6**
30	Lesser Whistling Duck	**8**	**0**	**0**	**0**	**0**	**0**	**0**	**4**	**6**	**8**	**10**	**12**
31	Knobe Billed Duck	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**5**	**3**	**4**
32	Asian Green Bee-eater	**0**	**0**	**8**	**8**	**0**	**12**	**10**	**24**	**14**	**8**	**0**	**0**
33	Eurasian Hoopoe	**6**	**4**	**2**	**4**	**7**	**2**	**3**	**5**	**2**	**6**	**2**	**12**

34	Silver Bills or White Throated Munias	**20**	**32**	**31**	**20**	**24**	**20**	**18**	**20**	**24**	**26**	**20**	**28**
35	Siberian stonechat	**30**	**35**	**39**	**42**	**31**	**34**	**20**	**0**	**0**	**0**	**0**	**10**
36	Bluethroat	**8**	**7**	**10**	**6**	**11**	**9**	**0**	**0**	**0**	**0**	**3**	**7**
37	Oriental Darter	**2**	**3**	**2**	**3**	**3**	**2**	**1**	**1**	**1**	**0**	**0**	**2**
38	Eurasian collared dove	**6**	**8**	**4**	**3**	**8**	**5**	**9**	**6**	**12**	**3**	**4**	**2**

TABLE 3. Percent Occurrence of Bird Families

S.No.	Family	Percentage Occurrence
1	Jacanidae	2.63%
2	Scolopacidae	2.63%
3	Motocillidae	5.26%
4	Recurvirostridae	2.63%
5	Rallidae	7.89%
6	Phalacrocoracidae	2.63%
7	Ciconiidae	5.26%
8	Threskiornithidae	2.63%
9	Sturnidae	5.26%
10	Pycnonotidae	2.63%
11	Ardeidae	13.16%
12	Leiothrichidae	2.63%
13	Nectariniidae	2.63%

14	Charadriidae	2.63%
15	Corvidae	2.63%
16	Cisticolidae	2.63%
17	Alcedinidae	2.63%
18	Anatidae	10.52%
19	Meropidae	2.63%
20	Upupidae	2.63%
21	Estrildida	2.63%
22	Muscicapidae	5.26%
23	Anhingidae	2.63%
24	Columbidae	2.63%

Table 4. Species diversity and species richness Shannon-Weiner Index

Month	**Species diversity(H`)**	**Species richness**
January	3.154	34
Fabruary	3.155	31
March	3.117	32
April	3.074	28
May	2.899	27
June	3.017	28
July	3.204	31
August	3.117	31

September	3.248	32
October	3.277	37
November	3.163	36
December	3.156	34

3.Results

A total of 38 bird species were recorded from the surveyed wetland habitat, representing a diverse assemblage of resident and migratory avifauna. These species belonged to multiple families, including Jacanidae, Scolopacidae, Motacillidae, Recurvirostridae, Rallidae, Phalacrocoracidae, Ciconiidae, Threskiornithidae, Ardeidae, Leiothrichidae, Nectariniidae, Charadriidae, Corvidae, Cisticolidae, Alcedinidae, Anatidae, Meropidae, Upupidae, Estrildidae, Muscicapidae, Anhingidae and Columbidae. The majority of species recorded were categorized as Least Concern (LC) under the IUCN Red List, indicating relatively stable populations, while a few species, such as the Asian Woolly-necked Stork (*Ciconia episcopus*) and the Oriental Darter (*Anhinga melanogaster*), were classified as Vulnerable/ Near Threatened (NT)**.**

The wetland supported a rich community of resident species**,** including the Bronze-winged Jacana (*Metopidius indicus*), Black-winged Stilt (*Himantopus himantopus*), Eurasian Coot (*Fulica atra*), Grey-headed Swamphen (*Porphyrio poliocephalus*), White-breasted Waterhen (*Amaurornis phoenicurus*), Asian Openbill (*Anastomus oscitans*), Black-headed Ibis (*Threskiornis melanocephalus*), Indian Pied Myna (*Gracupica contra*), Indian Myna (*Acridotheres tristis*), Red-whiskered Bulbul (*Pycnonotus jocosus*), various egrets and herons, Red-wattled Lapwing (*Vanellus indicus*), Large-billed Crow (*Corvus macrorhynchos*), White-throated Kingfisher (*Halcyon smyrnensis*), Indian Spot-billed Duck (*Anas poecilorhyncha*), Lesser Whistling Duck (*Dendrocygna javanica*), Asian Green Bee-eater (*Merops orientalis*), Silver-bill Munia (*Euodice malabarica*), and Eurasian Collared Dove (*Streptopelia decaocto*).

The presence of various migratory species was also observed, indicating the seasonal importance of the wetland. Key migrants included the Common Greenshank (*Tringa nebularia*), White Wagtail (*Motacilla alba*), Ruddy Shelduck (*Tadorna ferruginea*), Siberian Stonechat (*Saxicola maurus*), and Bluethroat (*Luscinia svecica*). Eastern Cattle Egret (*Bubulcus coromandus*) demonstrate partial migration (Geering *et al.*, 1998). Some species, such as the Eurasian Hoopoe (*Upupa epops*), reflect flexible movement patterns, showing resident and migratory status.

During the study period, monthly variation was seen in population size and species presence (Table 2). A total of 38 bird species were spotted, and there was significant seasonal variation. Different migratory species, including the White Wagtail, Common Greenshank, Ruddy

Shelduck, Siberian Stonechat, and Bluethroat, show peak abundance during the winter (November–February). The presence of these migratory species in summer and monsoon seasons completely or near zero. For instance, White Wagtail populations dramatically increase in winter from six in October to a peak of thirty-two in February, start to decline from March and completely vanish at the end of April or May. Ruddy Shelduck also showed winter winter-dominant trend, which peaked in January 2025 with 30 individuals.

On the other hand, there was a presence of local species in very constant numbers round the year. Despite seasonal variations, the White-browed Wagtail, Paddyfield Pipit, Red-wattled Lapwing, Large Grey Babbler, and Indian Pied Myna were often observed throughout the year. The Purple Swamphen maintained a constant presence, peaking at 34 members in December. The Bronze-winged Jacana, Little Comorant, Indian Pond Heron, and Egrets are examples of water-associated resident species that showed modest seasonal variations but persisted throughout the sample period. Certain species showed clear tendencies during the mating season. From April to July, the Asian Green Bee-eater's population increased, reaching a peak of 24 individuals in May, suggesting favourable circumstances for summer breeding and foraging. In a similar vein, the number of Grey-breasted Prinia increased significantly between June and September. A few species, such as the Oriental Darter, Knob-billed Duck, and Asian Woolly-necked Stork, only seldom showed up, suggesting that they used the marsh environment more irregularly or opportunistically.

3.1. Family Occurrence

The predominance of egrets, herons, and allied wading birds in the wetland system is reflected in the percentage of bird families reported throughout the study (Table-3), where Ardeidae represented the highest occurrence (13.16%). Due to the abundance of resident and migratory ducks, Anatidae (10.52%) came next. Families with lower percentages (2.63%) included the Jacanidae, Scolopacidae, Recurvirostridae, and other passerine families, suggesting moderate representation. Families that made up 5.26% of the total family composition included the Muscicapidae, Ciconiidae, and Sturnidae. A structurally diverse wetland that may support birds with a variety of ecological niches is suggested by the comparatively even distribution of families.

3.2. Species Diversity and Richness

Shannon-Wiener diversity values varied seasonally but remained quite high round the year (Table-4). The arrival of winter migrants in October coincided with the highest variety ($H' = 3.277$). With 37 species identified, this month also had the highest species richness. Summertime showed a minor fall in diversity values, which peaked in May ($H' = 2.899$) with just 27 species. This decline was probably caused by rising temperatures and decreased water availability. A secondary peak in variety was seen during July ($H' = 3.204$) and September ($H' = 3.248$), which coincided with resource availability and habitat improvement brought on by the monsoon. Overall, the patterns of diversity and richness show that the wetland serves as a significant seasonal habitat, especially in the winter and after the monsoon.

Overall, the species composition shows that a variety of bird groups, including waders, ducks, passerines, and piscivorous birds, may find acceptable foraging, roosting, and nesting sites in the marsh.

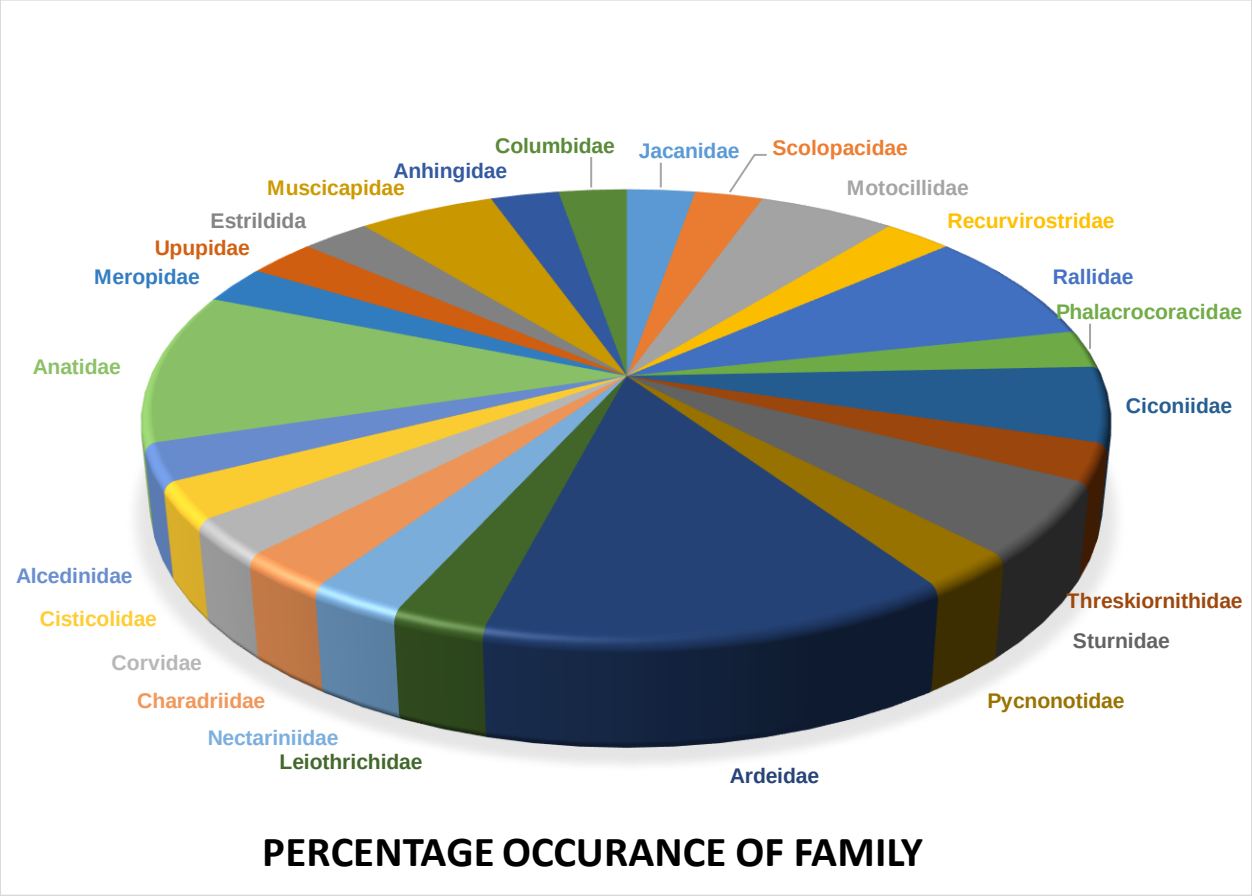

Figure-1: Percentage occurrence of family

4. Discussion

The present study suggests that the wetland has a multipurpose habitat that is compatible with high-diversity avifauna. This means the wetland shows ecological significance. A total of 38 bird species were present, which indicates that the wetland has several microhabitats, proper food supply and ecologically fit hydrological conditions, which offer a better chance for Breeding, feeding, foraging roosting around the year. These structural and functional cohort of properties nourishes diverse bird assemblages (Mitsch & Gosselink, 2015; Weller, 1999).

Most of the listed bird species during the study lay under the “Least Concern” category of the IUCN Red List. It indicates the ecologically stable condition of the wetland right now (BirdLife International, 2024). Oriental Darter and Asian Woolly-necked Stork are designated as Near Threatened and vulnerable categories in the IUCN Red List. These species are very sensitive to

anthropogenic activity, hydrological change, and destruction of the habitat, which requires the promise of conservation of the wetland (Prasad *et al.*, 2002; Sundar & Subramanya, 2010; Wetlands International, 2012). According to Singh & Roy (2019), these species are present mainly in those habitats, where adequate habitat quality is present.

Resident birds are in constant numbers throughout the year, despite the fluctuation in climate, and make up the backbone of the avian community. A slight change in the number seen during seasonal fluctuation. Jacanas, Lapwings, Swamphens, and Waterhens like to stay in shallow water and emergent vegetation. Hence, these species are also present here, reflecting that the wetland has a stable water level and coverage of vegetation around the year (Gopal, 2013). Egrets, herons, and other Ardeidae family members are also here, representing a solid supply of fish and invertebrates (Stewart, 2007; Colwell, 2010). Findings of the present stdy also match the pattern of Ardeidae dominance from other tropical Indian wetlands (Kumar & Gupta, 2009; Mukherjee & Saha, 2016).

Migratory birds have a great impact on seasonal species richness and numbers. Spotting of White Wagtail, Common Greenshank, Ruddy Shelduck, Siberian Stonechat, and Bluethroat in winter at the wetland proves the significance of the wetland. The presence of migratory birds proves the significance of the wetland as it has great foraging spots, steady water, and favourable weather (Newton, 2008; Wetlands International, 2012). But in summer and monsoon, these birds vanished from the wetland, showing a strong habitat preference by these species. It is a common pattern for all tropical and subtropical wetlands (Zakaria *et al.*, 2015; Sarkar *et al.*, 2018).

On the other hand, some local species individuals increases in the breeding season. Because In Summer and monsoon, insect and lush plant growth is at peak, which brings a perfect habitat for nesting and feeding. That's why we saw a burst in the count of some local species of birds like the Asian Green Bee-eater and Grey-breasted Prinia during those months (Tews *et al.*, 2004; Leito & Truu, 2012). These seasonal variations indicate that the marsh and its near habitat are essential for feeding and reproductive success. Spotting big water birds like the Oriental Darter and Knob-billed Duck indicates the opportunistic use of the wetland, which is ideal for these birds due to good hydrological conditions and prey distribution. It matches clearly the reports of other Indian wetlands (Verma & Prakash, 2020).

Family-wise composition of aves indicates that a variety of feeding cohorts, such as granivores, insectivores, piscivores, waders and waterfowl, may be nourished by the wetland. It reflects the even distribution of resources among the ecological guilds present here. This happens due to habitat variability and permits the different species to co-exist according to their diverse need (Whittaker, 1972; Tews et al., 2004). The presence of Shrubs, grasses, and trees around the marsh improves the complexity and overall biodiversity. It is proved by the presence of different passerine families (MacArthur & MacArthur, 1961).

Seasonal variation in Shannon-Wiener diversity value indicates again to the dynamic nature of the wetland ecosystem. Higher diversity during winter and post-monsoon is due to better habitat after rainfall, clearly proved by the presence of migratory and resident species community in the wetland during the study period (Shannon & Wiener, 1949; Magurran, 2004). During

Summer, elevated temperature, low water, and poor food availability are the major factors for decline in diversity (Hails, 1997; Kumar *et al.*, 2020). Water cycles ruled these inclines and declines in diversity. With the coming of the monsoon, diversity is also bouncing back (Ramsar Convention Secretariat, 2016).

Overall, the composition of species and patterns proves that the marsh is an important year-round habitat for a diverse group of birds. The coexistence of migratory, resident, and Near Threatened species in the wetland emphasizes the importance of conservation for the ecological stability of the wetland. Long-time monitoring and management techniques, as per the need, play a crucial role in maintaining habitat quality, ensuring the guarantee for survival of the wetland and wetland-dependent birds. (Ali, 2002; Jha & McKinley, 2014; Grimmett *et al.*, 2016).

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