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Seasonal variations in aquatic Avian diversity of Gauri Sarovar, Bhind District, (M. P.), India

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ABSTRACT

Seasonal diversity of aquatic avifauna was studied in Gauri Sarovar, Bhind District, Madhya Pradesh (India) from October 2021 to September 2022 to study the impact of seasonal variations in the aquatic avifaunal diversity. A total of 70 bird species, belonging to 11 orders and 26 families were observed and identified. The maximum aquatic bird species were observed in the winter season while minimum in the rainy season. Out of 70 aquatic bird species, 67 species were found in winter season, 62 species in summer and 48 species in rainy season. Charadriiformes was the most dominant order, represented by 17 species followed by Passeriformes, represented by 16 species. This study will definitely help to prepare a seasonal checklist of aquatic bird species.

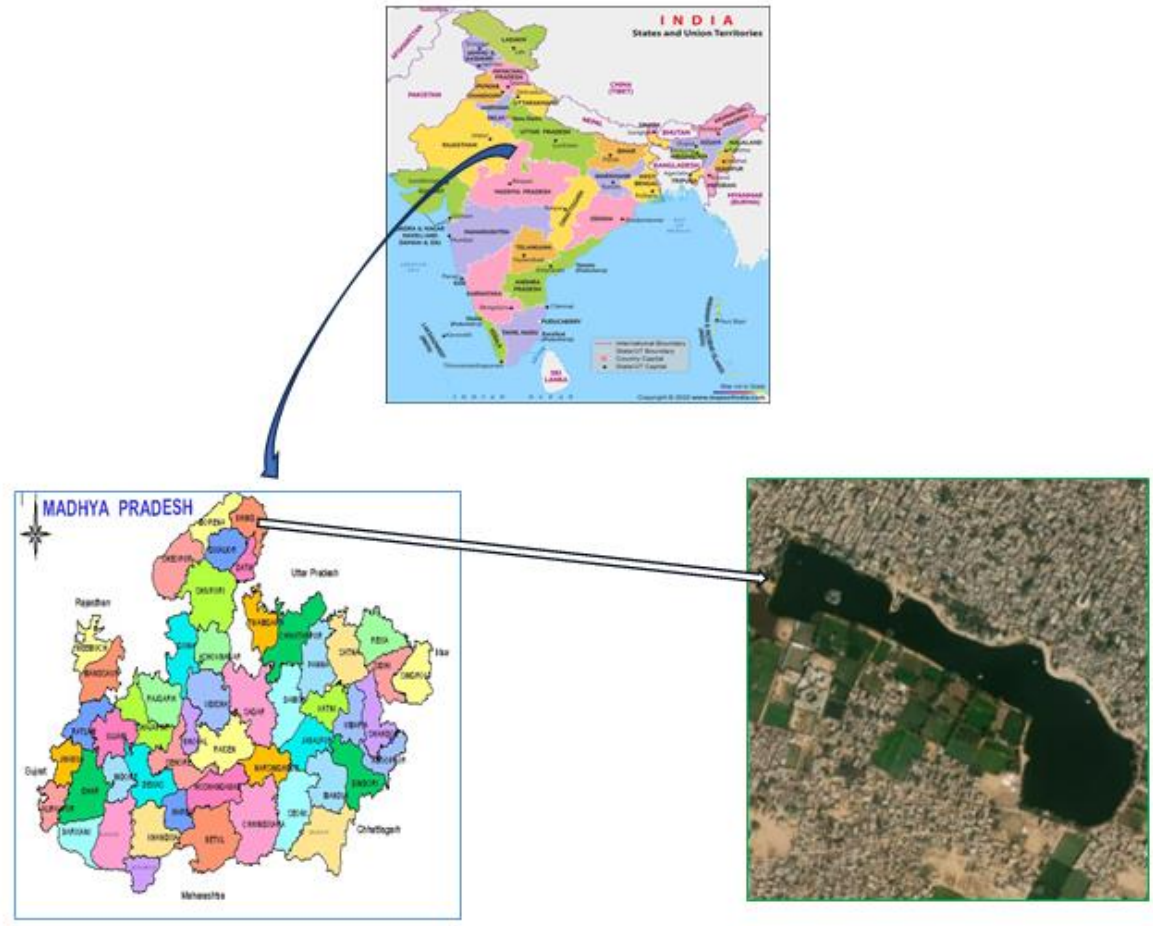
Keywords: Aquatic bird, Gauri Sarovar, Bhind district, seasonal variations.

INTRODUCTION

Aquatic birds are one of the planet's most populous life types, and the biodiversity contributes to a wealth of life. The presence of aquatic birds indicates rich biodiversity in the place. They are often keystone species which play an important role in the maintenance of natural ecosystem and fundamental parts of food chain and food webs. Monitoring of the water birds provides valuable information on the ecological health of ecosystem. Water birds are found everywhere throughout the world from pond, lake, reservoir, river, fresh water canal, grassland, forest wetland and jungles. Gauri Sarovar is one of the famous and attractive tourist places of Bhind district among the visitors. The wetland is an important habitat and breeding ground for water birds. Aves might live on this earth even if there were no human beings, but human beings cannot live without the birds. The present study was planned with an objective to describe the aquatic bird population in different seasons in the study areas.

MATERIALS AND METHODS

Gauri Sarovar is a protected area under Bhind District of Madhya Pradesh.



Map of Madhya Pradesh Satellite image of Gauri Sarovar, Bhind

Fig.1-: Map showing of study site (Gauri Sarovar)

It is located in the Chambal division of the Madhya Pradesh (Fig.1). It is considered to be one of the oldest ponds of Bhind town. It lies between latitude $26^{0}56'38"$ North and longitude $78^{0}78'61"$ East. The climate of the Sarovar is dry and hot in summer, humid and hot in rainy season while cold in winter. The Sarovar is a man-made and attracts number of aquatic bird species for nestling, feeding and breeding. It is a place of major tourist attraction. During winter season of every year, a huge number of migratory aquatic avian species aggregate in this lake from different parts of the world.

Aquatic avifauna were observed during winter, summer and rainy season for one complete year i.e. October 2021 to September 2022 to study the seasonal variations. The birds were studied during early morning hours from 06:00 am to 11:00 am and in the evening from 03: 00 pm to 06: 00 pm. The sampling was done using Point Count method and Line transect method. Photographs were taken using digital camera (Nikon D-5300 with 70-300 mm zoom lens) for identification. Olympus binocular s (10x50 S, 50 mm) was used for visual count. Aquatic birds were identified and classified with the help of field guide books by Grimmett *et al*., (2001) and Ali, (2006).

RESULTS AND DISCUSSIONS

70 species of aquatic birds, belonging to 11 orders and 26 families were recorded and identified from Gauri Sarovar. These observed aquatic bird species have been enlisted in table 1and table 2. Seasonal variations in aquatic bird species and their IUCN Conservation status are shown in table 3. Abundance and Relative Percentage of IUCN status of aquatic avian species are shown in fig. 2 and 3 respectively.

Table 1: Aquatic bird diversity observed during different seasons at Gauri Sarovar, Bhind District, Madhya Pradesh from October 2021 to September 2022

S. No.	COMMON NAME	Gauri Sarovar (2021-2022)			
		Seasons			IUCN* STATUS
		Winter	Summer	Rainy	
1.	Black-headed ibis	✓	✓	✓	NT
2.	Eurasian spoonbill	✓	✓	✓	LC
3.	Cattle egret	✓	✓	✓	LC
4.	Eastern great egret	✓	×	×	LC
5.	Intermediate egret	✓	✓	✓	LC
6.	Little egret	✓	✓	✓	LC
7.	Indian pond heron	✓	✓	✓	LC
8.	Black-crowned night heron	×	✓	✓	LC
9.	Great egret	✓	✓	✓	LC
10.	Grey heron	✓	✓	×	LC
11.	Little grebe	✓	✓	✓	LC
12.	Little cormorant	✓	✓	✓	LC
13.	Indian cormorant	✓	✓	✓	LC
14.	Great cormorant	✓	✓	✓	LC
15.	Oriental darter	✓	✓	✓	NT
16.	White-breasted waterhen	✓	✓	✓	LC
17.	Purple swamphen	✓	✓	✓	LC
18.	Common moorhen	✓	✓	✓	LC
19.	Eurasian coot	✓	✓	×	LC
20.	White-breasted kingfisher	✓	✓	✓	LC
21.	Pied kingfisher	✓	✓	✓	LC
22.	Common kingfisher	✓	✓	✓	LC
23.	Indian roller	✓	✓	✓	LC
24.	Asian green bee-eater	✓	✓	✓	LC
25.	Woolly-necked stork	✓	✓	×	NT
26.	Bronze-winged jacana	✓	✓	✓	LC
27.	Pheasant-tailed jacana	×	✓	✓	LC
28.	Marsh sandpiper	✓	✓	×	LC
29.	Common sandpiper	✓	✓	×	LC
30.	Green sandpiper	✓	✓	×	LC
31.	Wood sandpiper	✓	✓	×	LC
32.	Temminck's stint	✓	×	×	LC
33.	Ruff (bird)	✓	×	×	LC
34.	Common redshank	✓	✓	×	LC
35.	Common greenshank	✓	×	×	LC
36.	Sanderling	✓	×	×	LC
37.	Little ringed plover	✓	✓	✓	LC
38.	Long-billed plover	✓	✓	×	LC
39.	Yellow-wattled lapwing	✓	✓	✓	LC
40.	Red-wattled lapwing	✓	✓	✓	LC
41.	Black-winged stilt	✓	✓	✓	LC
42.	Greater painted-snipe	✓	✓	✓	LC

Table 1: Continued…

S. No.	COMMON NAME	Gauri Sarovar (2021-2022)			
		Seasons			IUCN* STATUS
		Winter	Summer	Rainy	
43.	White-browed wagtail	✓	✓	✓	LC
44.	White wagtail	✓	×	×	LC
45.	Western yellow wagtail	✓	×	×	LC
46.	Citrine wagtail	✓	×	×	LC
47.	Tricoloured munia	✓	✓	✓	LC
48.	Scaly-breasted munia	✓	✓	✓	LC
49.	Wire-tailed swallow	✓	✓	✓	LC
50.	Barn swallow	✓	✓	×	LC
51.	Black-breasted weaver	×	✓	✓	LC
52.	Indian pied myna	✓	✓	✓	LC
53.	Bank myna	✓	✓	✓	LC
54.	Common myna	✓	✓	✓	LC
55.	Ashy prinia	✓	✓	✓	LC
56.	Plain prinia	✓	✓	✓	LC
57.	Purple sunbird	✓	✓	✓	LC
58.	Oriental magpie-robin	✓	✓	✓	LC
59.	Greater coucal	✓	✓	✓	LC
60.	Black kite	✓	✓	✓	LC
61.	Knob-billed duck	✓	✓	✓	LC
62.	Lesser whistling duck	✓	✓	✓	LC
63.	Mallard	✓	✓	✓	LC
64.	Rouen duck	✓	✓	✓	LC
65.	Domestic goose	✓	✓	✓	LC
66.	Swan goose	✓	✓	✓	VU
67.	Ruddy shelduck	✓	✓	×	LC
68.	Northern shoveler	✓	✓	×	LC
69.	Bar-headed goose	✓	✓	×	LC
70.	Indian spot-billed duck	✓	✓	×	LC
Total		67	62	48	

IUCN Conservation status

LC = Least Concern, NT = Near Threatened, VU = Vulnerable

*https://www.iucnredlist.org/

Table 2: Abundance of aquatic bird species observed during different seasons in the Gauri Sarovar during (2021-2022)

Sr. No.	Seasons (2021-2022)	No. of species
1.	Winter season	67
2.	Summer season	62
3.	Rainy season	48

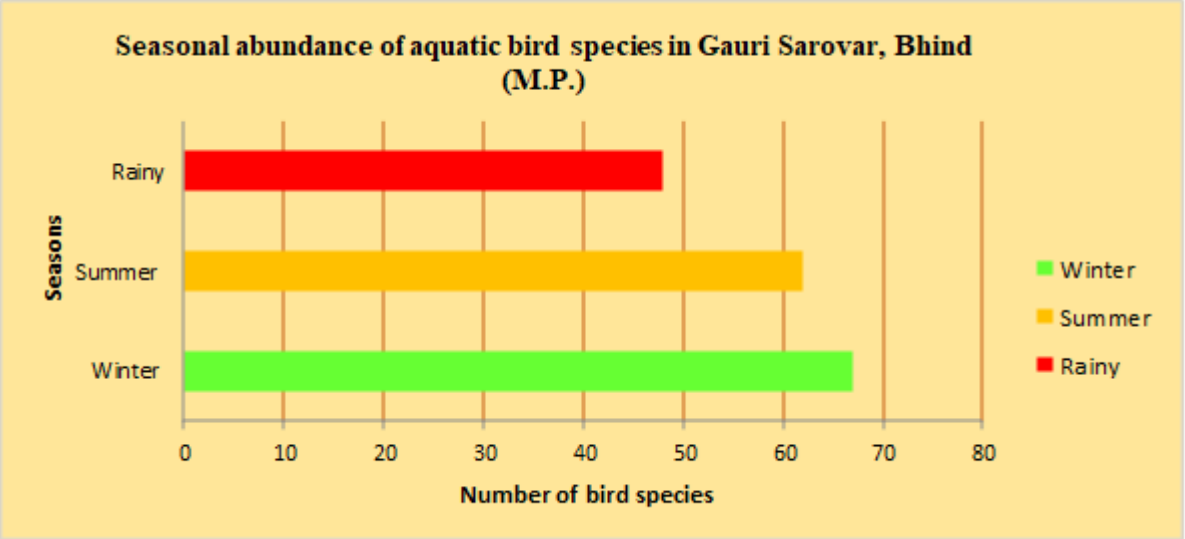


Fig.2: Abundance of aquatic bird species observed in different seasons in Gauri Sarovar

Table 3: Total number of aquatic bird species with their IUCN Conservation status in Gauri Sarovar during (2021-2022)

S. No.	IUCN Conservation status	Number of Species	Percentage
1.	Least Concern	66	94%
2.	Near-threatened	03	4%
3.	Vulnerable	01	2%
Total		70	

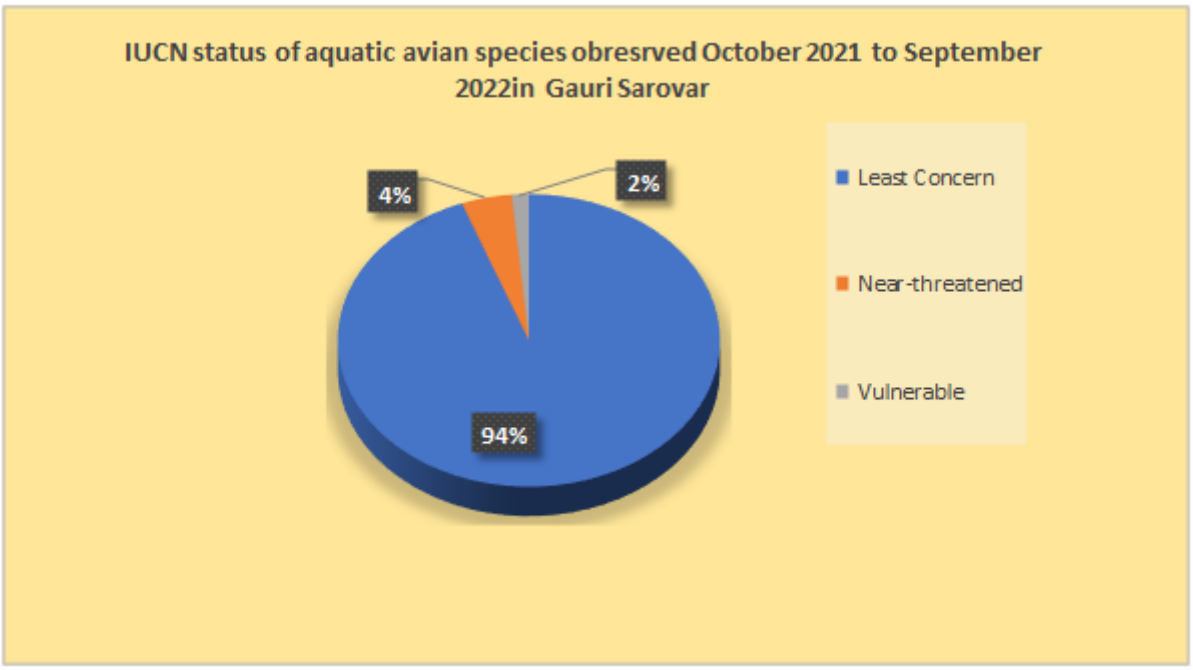


Fig. 3: Relative Percentage of IUCN status of aquatic avian species in Gauri Sarovar

Photographs of some important aquatic birds of the Gauri Sarovar


Woolly-necked stork


Ruff bird


Ruddy shelduck


Black-crowned night heron


Pheasant-tailed jacana


Knob-billed duck


Little grebe


Black-winged stilt


Red-wattled lapwing


Common moorhen


White-breasted kingfisher


Oriental darter & Little cormorant

The maximum aquatic bird species were observed in the winter season while minimum in the rainy season. Out of the total of 70 aquatic avifaunal species, 67 species were identified in winter season followed by 62 in summer season and 48 species during rainy season respectively. Earlier, more or less similar findings were found by Keshre (2019). He recorded seasonal diversity of water birds of Tapti River in Burhanpur District (M.P.). Shakya and Lodhi (2021) observed seasonal avifaunal diversity in Ramakrishna Ashram Gwalior M.P. They also identified minimum number of aquatic avian species during rainy season.

Charadriiformes was the most dominant order, represented by 17 species, followed by Passeriformes (16 species), Anseriformes and Pelecaniformes (10 species each), Coraciiformes (5species), Gruiformes, Suliformes (4 species each). There were four such orders described by single species viz. Podicipediformes, Ciconiiformes, Cuculiformes and Accipitriformes. The IUCN status of the aquatic birds was also studied. The birds were categorized as Least Concern (LC), Near Threatened (NT) and Vulnerable (VU). Out of 70 species, 66 (94%) species were Least

Concern, 03 (4%) species were Near Threatened and 01 (2%) species were Vulnerable.

Caula et al., (2008) studied seasonal variations in species composition of an Urban Bird Community in Mediterranean France and reported 61 species. Among bird species, distribution was narrower in spring and broader in winter. In winter, the amount of avifauna life increased in the suburbs and decreased in agriculture lands and woodlands, which suggests that residential sites provide winter habitats for more species of avian.

Seasonal variation of avian diversity was investigated in Deepor Beel Watland, Kamrup, Assam by Das and Saikia (2012). The survey was carried out from March 2007 – January 2010 covering the 4 seasons pre monsoon, monsoon, retreating monsoon and winter season. The survey revealed that the Anatidae family was the most dominant family in all the four seasons of the three successive years, Caula et al., (2013) studied seasonal dynamics of bird communities in Urban Forests of a Mediterranean city (Montpellier, Southern France). The estimated species richness across all three urban forest parks was 45 species of bird. 26 species were found in both winter and spring, whereas 10 species were reported only in spring, and 06 species were observed only in winter.

Veerwal et al., (2014) identified diversity and conservation status of water birds at Upper Lake, Bhopal -A Ramsar site in central India, and reported 68 species of water birds belonging to 14 families. Among these, 08 species were Near Threatened, 2 species were Vulnerable and 01 species were Endangered.

Pawar and Wanjari (2015) observed avian diversity and seasonal abundance of Muchi Lake Wetland near Pandhakawada, Dist. Yavatmal (M.S.) India and recorded 34 species of birds belonging to 10 different orders. It was recorded the maximum avian species were observed during summer and winter followed by monsoon period. On the basis of genus, the richest number occurred during winter season, followed by summer and monsoon season.

Puri and Virani (2016) surveyed avifaunal diversity from Khairbandha lake in Gondia district, Maharashtra state and recorded 86 species of birds belonging to 33 families. Maximum avian species were recorded during the winter season, followed by summer and monsoon season respectively.

Ambiya et al., (2016) observed water bird diversity in winter and summer seasons of Motijheel lake, Murshidabad, West Bengal, India and recorded 39 species of water birds, belonging to 12 families in winter season and 24 species in summer season. The result showed that the diversity of water avifauna are high in both seasons, although diversity of avian are somewhat high in winter season than the summer season.

Sahoo et al., (2020) made assessment of avifauna diversity and their seasonal fluctuations in an urban park, Bhubaneswar, Odisha and found 146 species of birds belonging to 18 orders and 56 families. Out of these 146 species, 57 species were found in all season, 138 species were found in winter, 87 species were found in summer and 64 species were found in rainy season.

Shakya et al., (2021) noted a total of 53 species. Maximum 49 species were identified in winter season, 43 species in summer season and 35 species in rainy season in Ramakrishna Ashram, Gwalior district, (M. P.), India.

Sharma and Sharma (2022) investigated seasonal variations in avifaunal diversity of Madhav National Park, Shivpuri, Madhya Pradesh, and found 123 species of birds, belonging to 19 orders and 49 families. Maximum avifaunal species were reported during the winter season followed by summer and monsoon seasons respectively.

Mohanraj and Pandiyan (2022) studied seasonal variation of water birds in the Periyakulam lake, Tiruchirappalli, Tamil Nadu and identified 37 species of water birds, belonging to 7 orders and 14 families. The avian diversity was also highest during the post monsoon when compared to other seasons. But the aquatic avian species richness was higher during monsoon season than the post monsoon and other seasons.

Bharos et al., (2023) surveyed diversity and conservation status of avifauna in the Surguja region, Chhattisgarh and found 361 avian species, belonging to 18 orders and 74 families.

Basaula et al., (2023) recorded abundance and diversity of water birds around the Begnas lake of Pokhara Valley, Nepal and reported 25 species of water birds belonging to 10 families. Out of total 10 families, the family Anatidae had the maximum avian species richness (08 species) followed by the family Ardeidae (04 species), families Rallidae and Passeridae (03 species each).

CONCLUSION

The present study indicates that Gauri Sarovar represents a good diversity of aquatic birds which is influenced by climatic conditions and also shows seasonal abundance. Seasonal richness was found in the aquatic bird species, the highest species diversity was reported during winter season, followed by summer season and it was lowest during the rainy season. Gauri Sarovar is also an important area for migratory as well as globally red listed bird species such as Black-headed Ibis, (*Threskiornis melanocephalus*), Oriental Darter (*Anhinga melanogaster*), Swan goose **(***Ansercygnoides domesticus)* and Woolly necked Stork, (*Ciconia episcopus*).

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Conflict of interest: The authors declare that they have no conflict of interest.

REFERENCES

Ali S (2006) The Book of Indian Birds, Bombay Natural History Society, Bombay.

Ambiya Md. G, Bhattacharya S and Dey SR (2016) Water bird diversity in Winter and Summer season of Motijheel lake, Murshidabad, West Bengal, India, *International J. of Experimental Research and Review (IJERR)*, 07: 01-09.

Basaula R, Singh OP and Dahal BR, (2023) Abundance and diversity of waterbirds around the Begnas Lake of Pokhara Valley, Nepal, *Glob J Ecol* 8 (1), 011-018.
DOI: https://dx.doi.org/10.17352/gje.000076

Bharos AMK, Vishwakarma A, Bharos A and Naidu R (2023) Diversity and Conservation Status of Avifauna in the Surguja region, Chhattisgarh, India, *Journal of Threatened Taxa*, www.threatenedtaxa.org, 15 (8), 23710–23728.
DOI:https://doi.org/10.11609/jott.7314.15.8.23710-23728

Caula S, de Villalobos AE & Marty P (2013) Seasonal dynamics of bird communities in Urban Forests of a Mediterranean city (Montpellier, Southern France), *Urban Ecosyst* 17, 11–26.
DOI: https://doi.org/10.1007/s11252-013-0295-2.

Caula S, Martya P and Martin JL (2008) Seasonal variation in species composition of an Urban Bird Community in Mediterranean France, Landscape and Urban Planning, *Elsevier*, 87, 1-9.

Das J and Saikia PK (2012) Seasonal variation of avian diversity in Deepor Beel Watland, Kamrup, Assam, India, *NeBIO*, 3 (1), 25-34.

Grimmett R, Inskipp C and Inskipp T (2001) Pocket guide to the birds of the Indian subcontinent, Oxford University Press, Mumbai.

Keshre V (2019) Seasonal diversity of water birds of Tapti River in Burhanpur District (M.P.), *Environment Conservation Journal*, 20 (3), 29-32.
DOI.Org/10.36953/ECJ.2019.20304
https://www.environcj.in/

Mohanraj S and Pandiyan J (2022) Seasonal Variation of Water birds in the Periyakulam Lake, Tiruchirappalli, Tamil Nadu, Southern India, *European Journal of Environment and Earth Sciences*, 3 (1), 23-27.
DOI: ttp://dx.doi.org/10.24018/ejgeo.2022.3.1.209.

Pawar S and Wanjari A (2015) Avian Diversity and Seasonal Abundance of Muchi Lake Wetland Near Pandhakawada, Dist. Yavatmal (M.S.) India, *International Journal of Science and Research*, 4 (2), 1419-1421.

Puri SD and Virani RS (2016) Avifaunal diversity from Khairbandha Lake in Gondia district, Maharashtra State, India, *Bioscience Discovery*, 7 (2), 140-146.

Sahoo AA Ray SS and Parida SP (2020) Assessment of Avifauna Diversity and their Seasonal Fluctuation in an Urban Park, Bhubaneswar, Odisha, India, *Indian Journal of Natural Sciences*, 10 (60), 19816-19833.

Shakya S and Lodhi RK (2021) Seasonal Avifaunal Diversity in Ramkrishna Ashram Gwalior, Madhya Pradesh, India, *AJOAIR*, 11(4), 231-238.

Sharma M and Sharma, DK (2022) Seasonal Variations in Avifaunal Diversity of Madhav National Park, Shivpuri, Madhya Pradesh, India, 4(1), 205-212.
DOI: https://doi.org/10.46505/IJBI.2022.4122

Veerwal H, Balapure S and Vyas V (2014) Diversity and conservation status water birds at Upper Lake, Bhopal - A Ramsar site in central India, *Journal of Research in Biology*, 4 (8), 1534-1542.

https://www.google.co.in/maps/search/satellite+map+gauri+sarovar/@26.557593,78.7858064,

https://www.google.co.in/search?q=map+of+india.

https://www.google.co.in/search?q=map+of+mp.

https://www.iucnredlist.org/