

## Distribution of Migratory, Resident Migratory and Resident Wetland Birds in Various Locations and Habitats in Sakhya Sagar Lake and Madhav Lake, Shivpuri, (M. P.) India



## Biological Science

**KEYWORDS :** Wetland birds, Sakhya Sagar Lake, Madhav Lake, Habitat utilization, Locations

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### ABSTRACT

*In the present study, an attempt is made to investigate various locations and habitat utilization by wetland birds in and around Sakhya Sagar and Madhav Lakes in the Madhav National Park, Shivpuri. Total 73 species of wetland birds belonging to 18 families and 8 orders were identified during the survey. 12 location in Sakhya Sagar Lake and 03 locations in Madhav Lake were selected for the study. 10 different habitats were also observed which are highly preferred and utilized by residents (25), resident migrant (29) and migratory (19) wetland birds. In this paper, water birds, wetland dependent and associated birds are collectively termed as wetland birds.*

### INTRODUCTION:

The Indian sub-continent supports more than 1340 species of birds, which contribute more than 15% of the world's bird species (Ali and Ripley, 1983; Ali, 2002). Wetland birds play a significant, cultural and social role in local communities as well as being an important component of wetland ecosystem. Wetlands are the world's most productive and important ecosystems that provide habitat, food, breeding and nursery ground for so many wetland birds. Birds are a familiar feature of not only arboreal environment but aquatic environment too because wetland birds are conspicuous element of consumer level in such ecosystem. Birds have been considered as useful biological indicators because they are ecologically versatile and live in varied habitats. Wetland is a special type of ecosystem which supports to the variety of local and migratory bird species by providing the specific habitat component such as abundant food to the herbivores and carnivores bird species (Nalawade *et al.*, 2008). Salim Ali visited Madhav National Park in September 1978 and was attracted with the avian fauna of the park and on the basis of the environmental conditions he suggested establishment of a birds sanctuary in the park. Perennou (1990) also considered that water bodies of the Madhav National Park as one of the most important wetlands in India for sustaining the population of migratory and other wetland birds.

### STUDY AREAS:

The Madhav National Park is situated in the central highlands of India. It is situated in the Shivpuri district of Madhya Pradesh on Agra-Bombay National Highway (NH-3), 115 km. south of Gwalior. Geographically, it lies between 25° 20' - 25° 38' N latitude and 77° 38' - 77° 57' E longitudes and the altitude of the park is 380 to 480 m (m.s.l). It is a part of upper Vindhyan hills, forming plateau, and having small and big nala. The Park represents the northern tropical dry deciduous mixed forest type, as well as dry thorn forests, typical of north-western Madhya Pradesh (Champion and Seth, 1968). The park also forms a catchment of the Sindh River, which flows along the eastern boundary of the park. In Madhav National Park, Sakhya Sagar and Madhav Lakes are important biodiversity support systems. These lakes not only add to the natural beauty of the area, but also provide a permanent source of water to the wildlife, and a fine wetland habitat to the aquatic fauna including thousands of migratory birds. The Sakhya Sagar also known as Chandpatha Lake is a large perennial water body it spreads about 309.01 hectares.

The lake has rocky and mildly sloppy banks with fringing reed-weeds and varieties of aquatic vegetation. The Madhav Lake is spread about 49 hectares and it has steep rocky bank and is surrounded by thick growth of trees and bushes.

### MATERIALS AND METHODS:

The survey of wetland birds was carried out in surrounding areas of Sakhya Sagar and Madhav Lakes and enlists the species of wetland birds seen throughout the survey period. Habitats utilization, distribution in different locations and population status of wetland birds were studied. The survey was conducted from April, 2006 to March, 2008 mostly in morning hours between 6.00 a.m. to 10.00 a.m. and late afternoon during 3.00 p.m. to 7.00 p.m. using digital camera (Nikon, 10x optical zoom) and binocular (Olympus, 7x50) for direct visual count. Standard guides such as Grimmett *et al.*, (1999), Manakadan & Pittie (2001) and Ali (2002) were referred for identification, classification and nomenclature (sequence of orders and families) of wetland birds. In Sakhya Sagar Lake 12 landing sites and in the Madhav Lake 03 landing sites were established from where avian fauna were studied. On the basis of the survey of habitats in the study area, 10 different habitats were identified in preliminary survey.

### RESULTS AND DISCUSSION:

Out of 73 species of wetland birds 69.88 % birds are highly dependent on water bodies of the Madhav National Park. Total 18 families of wetland birds belonging to 8 orders were recorded during the study period. The Sakhya Sagar and Madhav Lakes are very favorable habitat for number of wetland birds including 25 residents, 29 resident migrant and 19 migratory species. The residential birds are found either in the lakes or around the lakes, while migratory birds stay in the lakes temporary and exploit it for various purposes. It is because the Sakhya Sagar and Madhav Lakes are perennial water bodies which have suitable water level at the time when migratory birds approach this area. Also in the winter season there is preponderant of aquatic vegetation which provide ample food and space for them to live in various locations and habitats of Sakhya Sagar and Madhav Lakes (Table-1 & 2 and Fig. 1).

**Table-1: List of wetland birds of Sakhya Sagar and Madhav Lakes in Madhav National Park, Shivpuri showing status of wetland birds.**

ORDER	FAMILIES	ENGLISH NAME	SCIENTIFIC NAME	HINDI NAME	STATUS
PODICIPEDI-FORMES	PODICIPITIDAE	Little Grebe	Tachybaptus ruficollis (Pallas)	Pandubi , Dubdubi	R
PELECANI-FORMES	PELECANIDAE	Great White Pelican	Pelecanus onocrotalus (Linnaeus)	Hawasil	RM
	PHALACROCORACIDAE	Little Cormorant	Phalacrocorax niger (Vieillot)	Chota Pan-Kowwa , Jograbi,	RM
		Great Cormorant	Phalacrocorax carbo (Linnaeus)	Bada Pan-kowwa	RM
		Indian Shag	Phalacrocorax fuscicollis (Stephens)	Pan-kowwa, Ganhill	RM
		Darter or Snake Bird	Anhinga melanogaster (Pennant)	Panwa, Pandubi	RM
CICONIIFORMES	ARDEIDAE	Indian Pond-Heron	Ardeola grayii (Sykes)	Andha bagla, Khunch Bagla	R
		Grey Heron	Ardea cinerea (Linnaeus)	Anjan, Kabud, Sain, Nari-Bagla	RM
		Purple Heron	Ardea purpurea (Linnaeus)	Lal-anjan	RM
		Little Green Heron	Butorides striatus (Linnaeus)	Kancha Bagla	R
		Night Heron	Nycticorax nycticorax (Linnaeus)	Kwaak, Tal bagla	R
		Cattle Egret	Bubulcus ibis (Linnaeus)	Surkhia Bagla, Gai Bagla	RM
		Large Egret	Casmerodius albus (Linnaeus)	Bada-Bagla	RM
		Median Egret	Mesophoyx intermedia (Wagler)	Madhayam or Manjhla Bagla	RM
		Little Egret	Egretta-garzetta (Linnaeus)	Karchia, Kilchia Bagla	R
	CICONIIDAE	Painted Stork	Mycteria leucocephala (Pennant)	Janghil, Dokh	RM
		Asian Open bill Stork	Anastomus oscitans (Boddaert)	Ghonghila, Gungla, Ghungil	R
		European White Stork	Ciconia ciconia (Linnaeus)	Laglag, Haji laglag, Retwa	M
		White- Necked Stork	Ciconia episcopus (Boddaert)	Laglag	RM
		Lesser Adjutant Stork	Leptoptilos javanicus (Horsfield)	Chinjara Chandana	RM
		Black-Necked Stork	Ephippiorhynchus asiaticus (Latham)	Banaras, Loharjang	R
	THRESKIORNITHIDAE	Oriental White Ibis	Threskiornis melanocephalus (Latham)	Safed baza, Didhar, Munda	R
		Black Ibis	Pseudibis papillosa (Temminck)	Kala baza, Karan- kul	R
		Eurasian Spoonbill	Platalea leucorodia (Linnaeus)	Chamcha, Dabil	RM

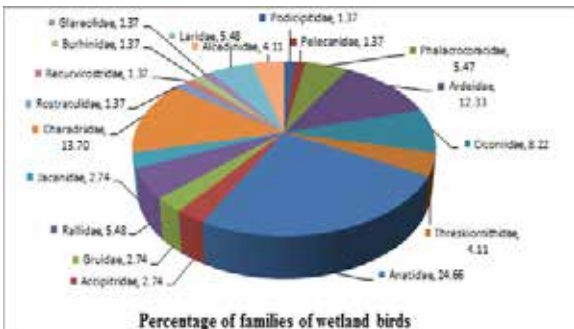
ANSERE-FORMES	ANATIDAE	Grey- leg Goose	Anser-anser	Kalhans, Badi-Satpeti Bat	M
			(Linnaeus)		
		Bar-headed Goose	Anser-indicus	Rajhans, Sawan	RM
			(Latham)		
		Brahminy or Ruddy Shelduck	Tadorna ferruginea	Surkhab, Chakwa, Chakwi	RM
			(Pallas)		
		Comb Duck	Sarkidiornis melanotos	Nakta	RM
			(Pennant)		
		Lesser Whistling Duck	Dendrocygna javanica	Choti Seelhi, Seelkahi	R
			(Horsfield)		
		Large Whistling Duck	Dendrocygna bicolor	Bada Seelhi	RM
			(Vieillot)		
		Northern-Pintail	Anas-acuta	Seenkh par, Sand	M
			(Linnaeus)		
		Gadwall	Anas-strepera	Myla, Beykhur, Bhuar	M
			(Linnaeus)		
		Shoveller	Anas-clypeata	Tidari, Punana, Ghirah	M
			(Linnaeus)		
		Common Teal	Anas crecca	Choti murghabi, Souchuruka	M
			(Linnaeus)		
		Red-Crested Pochard	Rhodonessa rufina	Lal-sir, Lal-chonch	M
			(Pallas)		
		Ferruginous or White-eyed Pochard	Aythya nyroco	Kurchiya, Burar-mada	RM
			(Guldenstadt)		
		Common Pochard	Aythya ferina	Lal seer	M
			(Linnaeus)		
		Tufted Pochard	Aythya fuligula	Dubaru, Ablak, Rahwara	M
			(Linnaeus)		
		Mallard	Anas platyrynchos	Nilsir, Nil rugi	RM
			(Linnaeus)		
		Eurasion Wigeon	Anas penelope	Peasan, Patari	M
			(Linnaeus)		
		Garganey	Anas querquedula	Chaita, Khira	M
			(Linnaeus)		
		Cotton Teal	Nettapus coromandelianus	Girri, Girija, Girja	R
			(Gmelin)		
FALCONI-FORMES	ACCIPITRIDAE	Marsh Harrier	Circus aeruginosus	Kutar, Safed sira	M
			(Linnaeus)		
		Osprey	Pandion haliaetus	Machhlimar	RM
			(Linnaeus)		
GRUIFORMES	GRUIDAE	Common Crane	Grus grus	Kurunch	M
			(Linnaeus)		
		Sarus Crane	Grus antigone	Saras	RM
			(Linnaeus)		
	RALLIDAE	White-Breasted Waterhen	Amaurornis phoenicurus	Dauk, Jal-murghi, Bansmurghi, Kharem	R
			(Pennant)		
		Common Moorhen	Gallinula chloropus	Jal-murghi	RM
			(Linnaeus)		
		Purple Moorhen	Porphyrio-porphyrus	Kharim, Kaim, Kalim	R
			(Linnaeus)		
		Common Coot	Fulica atra	Aari, Thekari, Dasari,	RM

			(Linnaeus)		
CHARADRII-FORMES	JACANIDAE	Pheasant-Tailed Jacana	Hydrophasianus chirurgus	Jalmor, Piho, Pihuya	R
			(Scopoli)		
		Bronze-Winged Jacana	Metopidius indicus	Jalmakhami, Dal or Jal pipi	R
			(Latham)		
	CHARADRIIDAE	Red-Wattled Lapwing	Vanellus indicus	Titeeri, Titai, Titi, Titori	R
			(Boddaert)		
		Little ringed Plover	Charadrius dubius	Zierrea, Merwa	RM
			(Scopoli)		
		Golden Plover	Pluvialis fulva	Chhota batan	M
			(Gmelin)		
		Spotted Redshank	Tringa erythropus	Batan, Gatni, Surma	M
			(Pallas)		
		Common Redshank	Tringa totanus	Chhota batan	RM
			(Linnaeus)		
		Marsh Sandpiper	Tringa stagnatilis	Chhota gotra	M
			(Bechstein)		
		Common Sandpiper	Actitis hypoleucos	Panewa	RM
			(Linnaeus)		
		Jack Snipe	Limnocyptes minimus	Chhota chaha	M
			(Brunnich)		
		Little Stint	Calidris minuta	Chhota panlowwa	M
			(Leisler)		
		Ruff	Philomachus pugnax	Gehwala, Bagbad	M
			(Linnaeus)		
	ROSTRATULIDAE	Painted Snipe	Rostratula benghalensis	Rajchaha	R
			(Linnaeus)		
	RECURVIROSTRIDAE	Black Winged Stilt	Himantopus-himantopus	Gazpaon, Tinghur	R
			(Linnaeus)		
	BURHINIDAE	Stone-Curlew	Burhinus oedicephalus	Karwanak, Barsiri	R
			(Linnaeus)		
	GLAREOLIDAE	Indian Courser	Cursorius coromandelicus	Nukri	R
			(Gmelin)		
	LARIDAE	River Turn	Sterna aurantia	Badi kurri	RM
			(J.E.Gray)		
		Little Turn	Sterna albifrons	Choti kurri	R
			(Pallas)		
		Brown headed Gull	Larus brunicephalus	Dhomra	RM
			(Jerdon)		
		Indian Skimmer	Rynchops albicollis	Panchira	R
			(Swainson)		
CORACII-FORMES	ALCEDINIDAE	Lesser Pied Kingfisher	Ceryle rudis	Koryala	R
			(Linnaeus)		
		Small Blue Kingfisher	Alcedo atthis	Chhota Kilkila	R
			(Linnaeus)		
		White-breasted- Kingfisher	Halcyon smyrnensis	Kilkila, Kourilla	R
			(Linnaeus)		
8	18	73			

(M) = Migrant, (RM) = Resident Migrant, (R) = Resident

S. No.	Families	Total Species	Percentage	Resident	Resident Migrant	Migrant
1.	Podicipitidae	1	1.37 %	1	—	—
2.	Pelecanidae	1	1.37 %	—	1	—
3.	Phalacrocoracidae	4	5.47 %	—	4	—
4.	Ardeidae	9	12.33 %	4	5	—
5.	Ciconiidae	6	8.22 %	2	3	1
6.	Threskiornithidae	3	4.11 %	2	1	—
7.	Anatidae	18	24.66 %	2	6	10
8.	Accipitridae	2	2.74 %	—	1	1
9.	Gruidae	2	2.74 %	—	1	1
10.	Rallidae	4	5.48 %	2	2	—
11.	Jacaniidae	2	2.74 %	2	—	—
12.	Charadriidae	10	13.70 %	1	3	6
13.	Rostratulidae	1	1.37 %	1	—	—
14.	Recurvirostridae	1	1.37 %	1	—	—
15.	Burhinidae	1	1.37 %	1	—	—
16.	Glareolidae	1	1.37 %	1	—	—
17.	Laridae	4	5.48 %	2	2	—
18.	Alcedinidae	3	4.11 %	3	—	—
	Total	73		25	29	19

**Table-2: Family wise total species and their percentage with total number of resident, resident migratory and migratory wetland birds**



**Fig. 1:Percentage of different families of wetland bird species in Sakhya Sagar and Madhav Lakes**

The preferable habitat for wetland birds is Sakhya Sagar Lake which shelters 73 species of wetland dependent birds in which 25 species were residents, 29 resident migrants and 19 migrants (Arya *et al.*, 2014a). Sakhya Sagar Lake has large muddy and marshy habitat and shoreline at Landing No. 2, 3, 4, 5, 9 and 10. *Hydrilla verticillata*, *Vallisneria spiralis*, *Potamogeton* (Submerged), *Cyperus*, *Typha*, *Phragmites*, (Emergent) and *Nymphaeo nuchalis*, *Nymphoides* (Floating) are well spread in the areas. The area between Landing No. 2 to 5 is fully secured for basking and resting because of least disturbances and adequate shoreline. Most of the migratory birds preferred Landing No. 5 (18) and Landing No. 3 (17), while 09 migratory species preferred Landing No. 4. They prefer these sites due to the presence of long shallow and marshy undisturbed area. Also this area shows a gradual slope in to the water where birds can find food in the form of vegetation and small fishes. Landing No. 5 was also preferred by resident migratory and resident birds. In this way total 64 species were found preferring at Landing No. 5. The next most preferred site was Landing No. 3 where a total of 41 species were found. It is interesting to note that at Landing No. 1, 6, 8, 9 and Sailing

Club no migratory birds were observed; however, resident migratory and resident birds were found. At Landing No. 1 and Sailing Club there is ample human disturbance and the migratory birds were scare to stay there, while, Landing No. 6, 8, 9 are devoid of marshy area, which is an important requisite for the migratory birds. Since resident migratory and resident birds are more accustomed to human activities and understand the human behaviour, they can afford to take risk to stay in these localities for want of food. The resident migratory birds show maximum concentration at Bhadaiya Kund (14), Landing No. 5 (25), Landing No. 10 (10), Sailing Club (11) and mound area inside water (14). This pattern shows that they have more adaptability for these types of terrains.

Resident birds also show maximum concentration at Bhadaiya Kund (13), Landing No. 5 (21), Landing No. 10 (10), Sailing Club (11), Pump House (11) and Mound area inside water (12). This shows that the resident birds are more conversant with the localities as they stay there throughout the year. Their food and nesting requirement must be fulfilled at this site. Landing No. 7 shows only one migratory and resident migratory species, while no resident wetland bird was seen. It may be because this area is devoid of muddy, marshy shoreline and there is lack of aquatic vegetation. Also there is frequent visit by cattle and forest line is also quite near. Therefore, vision of the birds is obstructed giving rise to risk. In Madhav Lake the mound area which is situated inside the water and covered with thick vegetation was dominantly utilized by wetland birds compared to other sites. (Table- 3 and Fig. 2 & 3).

**Table-3: Different locations utilized by migratory, resident migratory and resident birds in Sakhya Sagar Lake and Madhav Lake**

S. No.	Locations	Migratory	Resident Migratory	Resident	Total
1.	Bhadaiya Kund (BK)	2	14	13	29
2.	Landing No.-1 (L-1)	0	5	8	13
3.	Landing No.-2 (L-2)	1	8	3	12
4.	Landing No.-3 (L-3)	17	15	9	41
5.	Landing No.-4 (L-4)	9	11	8	28
6.	Landing No.-5 (L-5)	18	25	21	64
7.	Landing No.-6 (L-6)	0	1	2	3
8.	Landing No.-7 (L-7)	1	1	0	2
9.	Landing No.-8 (L-8)	0	1	2	3
10.	Landing No.-9 (L-9)	0	4	4	8
11.	Landing No.-10 (L-10)	4	10	10	24
12.	Sailing Club (SC)	0	11	11	22
13.	Pump House (PH)	2	6	11	19
14.	Mound area inside water (MAW)	2	14	12	28
15.	Northern Bank of Lake (NB)	1	3	5	9

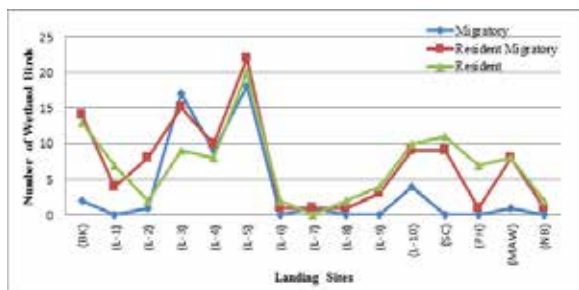


Fig. 2: Different locations utilized by migratory, resident migratory and resident wetland birds



Fig. 3: Habitat utilization by migratory, resident migratory and resident birds in different locations of Sakhya Sagar Lake and Madhav Lake

Study of different habitats utilized by migratory, resident migratory and resident birds in Sakhya Sagar and Madhav Lakes shows that most of the migratory birds prefer safe sites in open water. 15 species were found in shallow marshy area because it is not easily approachable and adequate water level is available for their survival. At least 8 migratory species preferred submerged vegetation and open water each, while 10 species were frequently seen on the muddy shoreline. Strikingly no migratory birds preferred to stay on open rocky area near water. This strengthens the view that the migratory birds very carefully avoid predators which may approach from outside the water. Resident migratory and resident birds were found almost in all types of habitats. 16 species of resident migratory and 17 species of resident birds preferred muddy shoreline. Similarly 18 resident migratory and 11 resident bird species were found in shallow marshy area probably for feeding purpose, because near the shallow marshy area, sufficient water is available where small size fishes and invertebrate fauna can be located and preyed upon. Unlike migratory birds, 07 species of resident migratory and 10 species of resident birds were also found on the rocky area near water. This may be because they are more familiar with the area and possible predators also rest in non feeding hours.

Least preferred site seems to be floating vegetation and trees and bushes near water in case of both resident migratory and resident birds. Some wetland birds like turns, gull, skimmer and pied kingfisher were found flying over shallow water, while some birds like lapwing, stilt, sandpiper, plover and courser were found in the rocky area near water. In the shallow water invertebrates, fishes and amphibians are present which are favorable foods for birds. In deep water also some birds prey upon fishes. In this way some birds like Pelican, Cormorants, Storks, Pochards expend their forage ground depending upon the water level of these lakes. The shallow open water and the marshy area support a variety of aquatic and semi aquatic vegetation that provides adequate food and good habitat for various wetland birds. Some species are mostly observed on the shore of the lakes like Herons, Egrets, Stilt, Jacanas, Moorhens, Waterhen, Snipe and Kingfishers. In addition to this some birds in mix groups are also observed from the banks of the lakes like Grebe, Coot, Spoonbill, Skimmer and Little Turn. On the basis of above observation this is evident that different habitats of the water bodies are important for sustaining the population of migratory and other wetland birds (Table- 4 and Fig. 4).

Table- 4: Different habitats utilized by migratory, resident migratory and resident birds in Sakhya Sagar Lake and Madhav Lake

S. No.	Habitat	Migratory	Resident Migratory	Resident	Total
1.	Submerged Vegetation (H-1)	8	11	10	29
2.	Emergent Vegetation (H-2)	5	8	3	16
3.	Flouting Vegetation (H-3)	0	3	8	11
4.	Open Water (H-4)	8	10	3	21
5.	Muddy Shoreline (H-5)	10	16	17	43
6.	Shallow marshy area (H-6)	15	18	11	44
7.	Rocky area near water (H-7)	0	7	10	17
8.	Tree and Bushes standing near water (H-8)	1	4	3	8
9.	Reeds and Grassland near water (H-9)	1	7	10	18
10.	Fly over and around lakes (H-10)	1	3	4	8

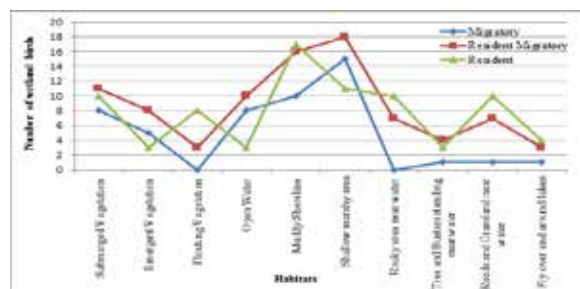


Fig. 4: Different habitats utilized by migratory, resident migratory and resident wetland birds

Chandra and Nema (2006) studied the avian fauna of Madhav National Park and prepared a checklist of birds, which includes 239 species of birds pertaining to 160 genera under 58 families. Arya and Mishra (2014b) prepared a

checklist of 73 species of wetland birds of Madhav National Park, Shivpuri. Wetland birds prefer muddy and marshy habitat and rich vegetate areas for foraging and shallow water area and stony habitat for resting. Well-developed aquatic vegetation attracts more number of migratory and other wetland birds. Most of the wetland birds utilize aquatic vegetation for different purposes like feeding, habitat and as breeding and nesting ground. Raj *et al.*, (2010) recorded total 101 species of resident and migratory birds and give a consolidated checklist of birds in the Pallikarainai wetlands, Chennai. Sultana (2013) surveyed different habitats and localities and recorded 224 birds species including 36 new records in Sariska Tiger Reserve, Rajasthan. Conservation of the wetlands and their biodiversity is an ever-increasing need, viewed from the growing impacts and consequences of human activities. According to National Wetland Conservation Programme (NWCP, 2009) dense human population in catchments, urbanization, and various anthropogenic activities have resulted in over exploitation of wetland resources, leading to degradation in their quality and quantity. Now, there is increasing concern to conserve and restore perishing wetlands and endangered habitats to achieve ecological sustainability.

#### REFERENCES:

1. Ali, S. and Ripley, S.D. (1983). A pictorial guide to the birds of the Indian sub-continent. Bombay Natural History Society (BNHS), Mumbai. 1-354.
2. Ali, S. (2002). The book of Indian Birds. 13 Ed. Bombay Natural History Society. Oxford University Press.
3. Arya, M., Rao, R.J. and Mishra, A.K. (2014a). Avifaunal occurrence and distribution of wetland birds in Sakhya Sagar and Madhav Lakes in Madhav National Park, Shivpuri, India. *Journal of Environmental Biology*. Vol. 35(4): 703-708.
4. Arya, M. and Mishra, A.K. (2014b). Checklist of wetland birds of Sakhya Sagar and Madhav Lakes in the Madhav National Park, Shivpuri, M. P., India. *Periodic Research*. Vol. 3(1): 103-109.
5. Champion, H.G. and Seth, S.K. (1968). A revised survey of forests types of India. Govt. of India: New Delhi.
6. Chandra, K. and Nema, D.K. (2006). Birds of Madhav National Park, Shivpuri, Madhya Pradesh. *Journal of Tropical Forestry*. Vol. 22: (I&II).
7. Grimmett, R., Inskipp, C. and Inskipp, T., (1999). Pocket guide to the birds of the Indian subcontinent. Oxford University Press, Delhi.
8. Manakadan, R. and Pittie, A. (2001). Standardized common and scientific names of the birds of the Indian subcontinent. *Buceros*. Vol. 6 (1): 1-37.
9. Nalawade, P.M., Solunke, K.R., Late, A.M., Patil, C.A. and Mule, M.B. (2008). Dying Lake: A Loosing Habitat of Migratory Birds- A Case Study from Aurangabad City. *Proceedings of Taal 2007: The 12<sup>th</sup> World Lake Conference*: 1623-1627.
10. NWCP, (2009). National Wetland Conservation Programme, Guideline for conservation and management of wetlands in India. Conservation and survey division, ministry of environment and forests. Govt. of India, New Delhi.
11. Perennou, C. (1990). Asian Waterfowl Census, I.W.R.B. Slimbridge.
12. Raj Nikhil, P.P., Ranjini, J., Dhanya, R., Subramanian, J., Azeez, P.A. and Bhupathy, S. (2010). Consolidated checklist of birds in the Pallikarainai Wetlands, Chennai, India. *Journal of Threatened Taxa*. Vol. 2(8): 1114-1118.
13. Sultana, A. (2013). An updated checklist of birds of Sariska Tiger Reserve, Rajasthan. India. *Journal of Threatened Taxa*. Vol. 5(13): 4791-4804.