

Faunal Composition of Ramsar Wetlands from India: An Analysis

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Abstract

Ramsar Sites are wetlands of international importance and must meet many criterions before being declared as Ramsar Wetlands, such as having over 20,000 or more water birds and a large number of local fish species. On the occasion of 75 years of independence, the Prime Minister of India announced that the total number of Ramsar Sites in India has increased to 75. Following, the 97th Episode of Mann Ki Baat (on 29.01.2023) by Prime Minister of India, Zoological Survey of India took initiative to compile and document the faunal composition of all the 75 Ramsar Wetlands (RWs) in India. For the first time, it has been found that the faunal diversity of RWs in India accounts for over 7.0% of the total fauna of India, which includes over, 4,538 species of invertebrates, 1,691 species of vertebrates and 562 species of protozoans. Over 2072 species of insects, 672 species of crustaceans, 237 species of arachnids, 187 species of earthworms, polychaetes and leaches are known from these wetlands. There are over 6,791 species of mammals, 739 species of birds, 643 species of fishes, 133 species of reptiles, and 44 species of amphibians. Among vertebrates known from RWs, 26 species are Critically Endangered, 42 Vulnerable and 72 Endangered. This baseline information would be extremely useful for further strengthening the database of each wetland and will be impactful for wetland conservation and management towards its sustainable use

Keywords: Wetlands, Ramsar Sites, Biodiversity, Mann ki Baat, Fauna component

Introduction

Wetlands are one of the most productive ecosystems on earth and provide several important services to human society, but are ecologically highly sensitive (Turner et al., 2000; Ghermandi et al., 2008; ten Brink). The ecosystem services provided by wetlands include water for irrigation, fisheries, other forest products, nutrient removal, toxin retention, and biodiversity conservation (Turner et al., 2000). These important services mainly include: carbon sequestration; erosion control; storing water during heavy rains and floods and then gradually releasing the water, significantly reducing damage downstream; aquifer recharge; water purification; recreation and financial benefits such as heritage, recreationally visited, hiking, bird watching, wildlife photography and hunting (Turner et al., 2000). Wetlands are therefore areas of crucial natural resources, which are either temporarily or permanently covered by water. So, a wetland is neither truly aquatic nor terrestrial. Depending on seasonal variations, it may be possible for wetlands to be both at the same time. It is the presence of water over a significant period of time, that is primarily responsible for the development of a wetland. Wetlands support a wide variety of plant and animal species that are adapted to fluctuating water levels, making

the wetlands of vital importance. In terms of utility services, wetlands directly and indirectly support millions of people in providing services such as food, fibre and raw materials, storm and flood control, clean water supply, scenic beauty and educational and recreational benefits. The Millennium Ecosystem Assessment had conservatively estimated that wetlands cover about seven percent of the Earth's surface and provide ~45% of the world's natural productivity and ecosystem services, the benefits of which are estimated at \$20 trillion per year.

The Ramsar Convention on Wetlands is an inter-governmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. The Convention uses a broad definition of wetlands. It includes all lakes and rivers, underground aquifers, swamps and marshes, wet grasslands, peatlands, oases, estuaries, deltas and tidal flats, mangroves and other coastal areas, coral reefs, and all human-made sites such as fish ponds, paddy fields, reservoirs and salt pans. There are over 2492 designated Ramsar Wetlands worldwide covering a total area of 256,637,774 hectares (<https://www.ramsar.org/>).

India's first Ramsar sites were Chilika Lake (Odisha) and Keoladeo Ghana National Park (Rajasthan), designated in 1981. Subsequently in 1990, Wular Lake (Jammu & Kashmir), Loktak Lake (Manipur), Harike Lake (Punjab) and Sambhar Lake (Rajasthan) were added to the list. In, 2002, 13 Ramsar sites were added namely Kolleru, Deepor Beel, Pong Dam, Ashatamudi, Tsomoriri, Sasthamkotta, Vembanand-Kol, Bhoj, Bhitarkanika, Kanjli, Ropar, Point Calimere and East Kolkata Wetlands. Later, six locations were added in 2005, namely, Chandertal, Renuka, Hokera, Surinsar-Mansar, Rudrasagar and Upper Ganga. The Nalsarovar Bird Sanctuary was added in 2012. In the course of 2019, 11 further sites were added, i.e., Sunderban, Nandur-Madhameshwar, Beas Conservation Reserve, Keshopur Miani Community Reserve, Nangal Wildlife Sanctuary, Nawabganj Bird Sanctuary, Parvati Arga Bird Sanctuary, Saman Bird Sanctuary, Samaspur Bird Sanctuary, Sandi Bird Sanctuary, and Sarsai Nawar Jheel. Asan Conservation Reserve, Kabartal Wetland, Sur Sarovar, Lonar Lake, and Tso-Kar Wetland Complex were included in the year 2020; Khijadia Wildlife Sanctuary, Thol Lake Wildlife Sanctuary, Wadhvana Wetland, Bhindawas Wildlife Sanctuary, Sultanpur National Park, Pala Wetland, Satkosia Gorge, Koonthankulam Bird Sanctuary, Bakhira Wildlife Sanctuary, Haiderpur Wetland, Ansupa Lake, Hirakud Reservoir, Tampara Lake and Chitrangudi Bird Sanctuary in 2021; and Nanda Lake, Hygam Wetland Conservation Reserve, Shallbugh Wetland Conservation Reserve, Ranganathittu Bird Sanctuary, Sakhya Sagar, Sirpur Wetland, Yashwant Sagar, Thane Creek, Gulf of Mannar Marine Biosphere Reserve, Kanjirankulam Bird Sanctuary, Karikili Bird Sanctuary, Pallikaranai Marsh Reserve Forest, Pichavaram Mangrove, Suchindram Theroor Wetland Complex, Udhayamarthandapuram Bird Sanctuary, Vaduvur Bird Sanctuary, Vedanthangal Bird Sanctuary, Vellode Bird Sanctuary, and Vembannur Wetland Complex in 2022. India has so far designated 75 Ramsar wetlands with a total area of 13,266.88 km² (Table 1). The number of designated Ramsar sites with regard to year of declaration, state wise distribution and sum of area (in sq km) with respect to year of declaration is given in Figures 1, 2 & 3.

The Prime Minister of India, in the 97th episode of Mann Ki Baat (MKB) on 29.01.2023, emphasized the function of wetlands for biodiversity conservation, livelihood, flood control, groundwater recharge, ecosystem services and India's ancient culture and practice of living in harmony with the nature. He has emphasized on the increase in the number of Ramsar wetlands in India, showing India's commitment to wetland conservation on a global scale and all credit for maintaining the bird population here goes to the local farmers. He further pointed to the fact that the wetlands in India are an example of our natural potential. Odisha's Chilika Lake is known to provide shelter to more than 40 species of water birds. Kaibul-Lamja and Loktak Lake are considered to be the only natural habitat of swamp deer. The Panjath Nag community in Kashmir spends a day specially cleaning the village spring during the annual fruit blossom festival. Most Ramsar sites also have a unique cultural heritage. Manipur's cultures have a deep connection with Loktak. The expansion of wetlands in India is largely possible due to the people living near the Ramsar sites. The theme of Ramsar sites and their conservation as raised in MKB has attracted a great deal of attention, especially after the MKB episode.

In view of the importance of the Ramsar Wetlands, which was also emphasized by the Indian Prime Minister in MKB, Zoological Survey of India (ZSI) took the initiative to document the faunal diversity in the Indian Ramsar Wetlands. In this context, ZSI published a document on the fauna of 42 Ramsar wetlands that were declared by 2021. The relevant information on the diversity of the available groups reported to occur in Ramsar Wetlands of India was gathered from the scientific literature as well as from the exploration and faunal sample data at the Zoological Survey of India to assess the diversity and distribution of the fauna in the 75 Ramsar Wetlands. This article provides an update to the species counts from the recently designated 33 Ramsar wetlands and an update to the earlier species counts in Chandra et al. (2021) based on the scientific literature, exploration and faunal sample data available at the Zoological Survey of India (Table 2).

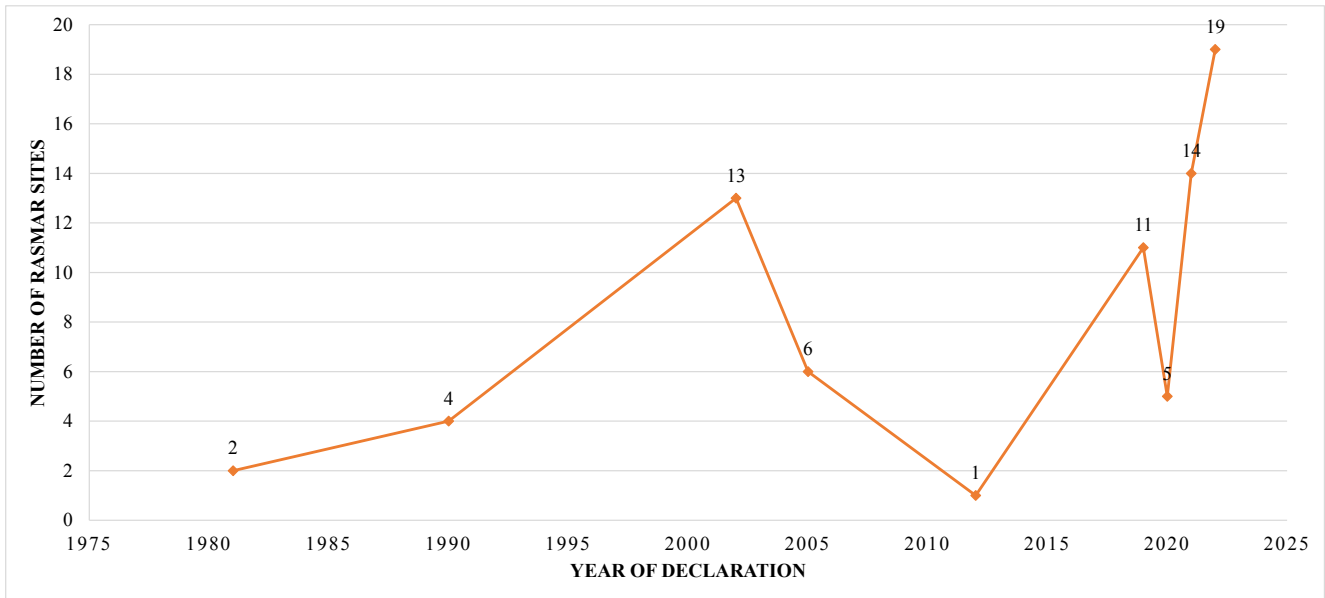


Figure 1. Number of designated Ramsar sites with respect to year of declaration.

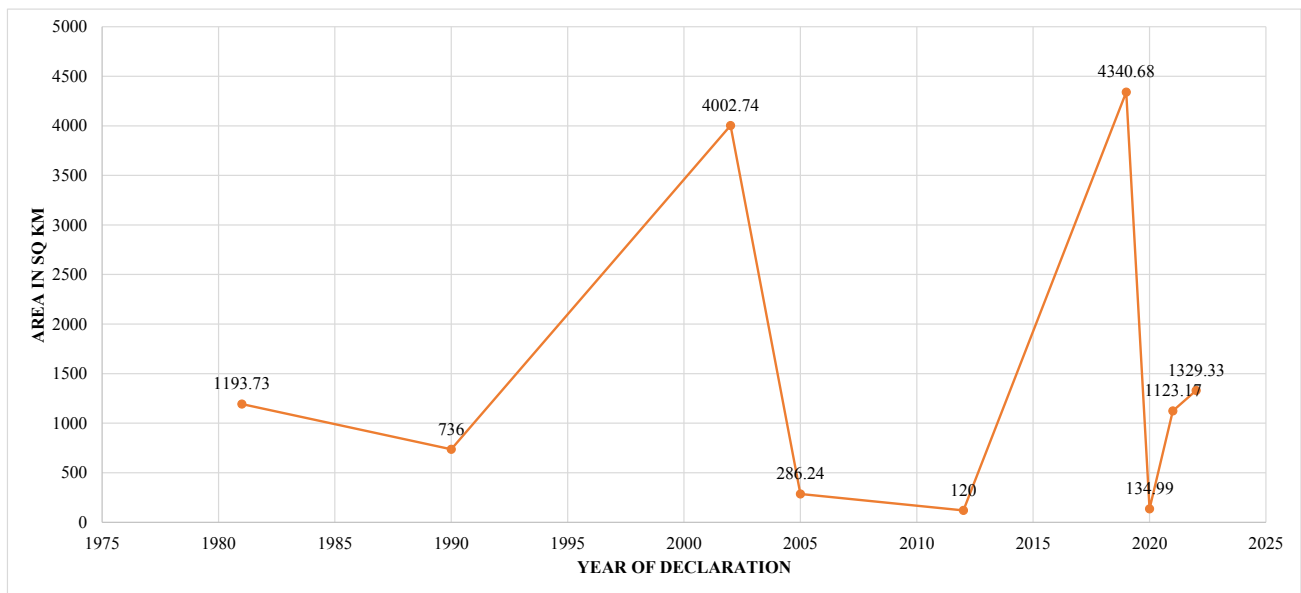


Figure 2. Sum of Area (in sq km) of designated Ramsar sites with respect to year of declaration.

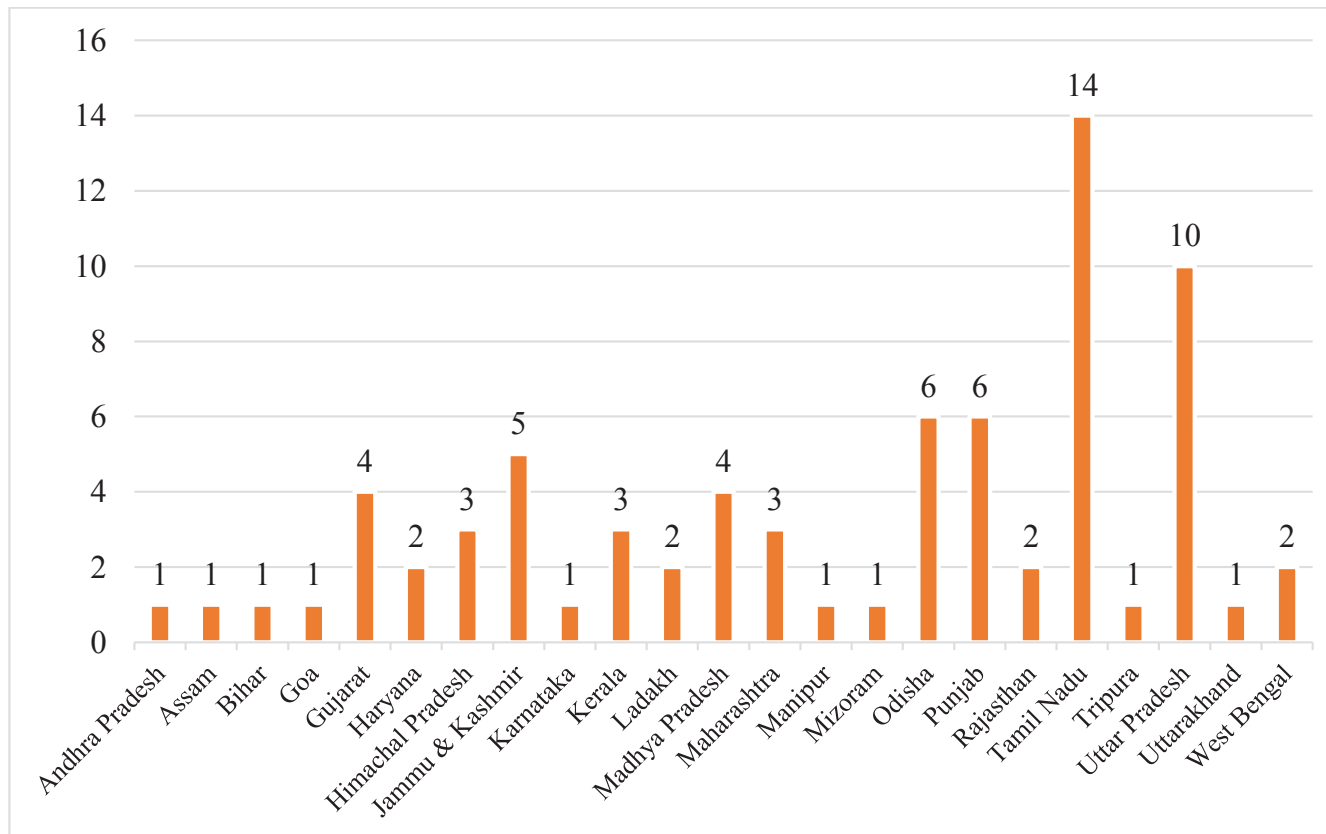


Figure 3. Distribution of Ramsar Wetlands in states of India.

Material and Methods

The updated information on the diversity of faunal groups known from the Ramsar Wetlands in India has been compiled from literature and faunal sample data available with the Zoological Survey of India. The faunal information is provided for all 75 Ramsar wetlands of India including protozoa, invertebrates, fish, birds, amphibians, reptiles and mammals (Table 2, Figure 4).

Results and Discussion

Protozoa include 562 species, invertebrates 4,538 species, and vertebrates 1,691 species. The majority of the vertebrate fauna includes birds (739 species), fish (643 species), reptiles (133 species), mammals (132 species) and amphibians (44 species). Arthropods include 2,272 species of insects, 672 species of crustaceans and 237 species of arachnids. A total

of 187 species of earthworms, polychaetes and leaches are known. Of the total animal species, the Ramsar Wetlands host 26 Critically Endangered, 42 Vulnerable and 72 Endangered species.

The Ramsar Wetlands, which have been maximally explored are Sundarbans (2644), Gulf of Mannar Marine Biosphere Reserve (1742), Chilika Lake (1416 species), East Calcutta Wetlands (1328), Satkosia Gorge (1254), Vembanad-Kol Wetland (1071), Deepor Beel (685), Keoladeo Ghana National Park (649), Pong Dam Lake (646), Beas Conservation Reserve (605), Sultanpur National Park (604), Nalsarovar Bird Sanctuary (566), Renuka Wetland (563), Sultanpur National Park (604), Pichavaram Mangrove (588) and Point Calimere Wildlife and Bird Sanctuary (532) (Table 2, Figure 5). The remaining RWs are the least explored in terms of fauna, and more research needs to be done in these areas to better understand the faunal components.

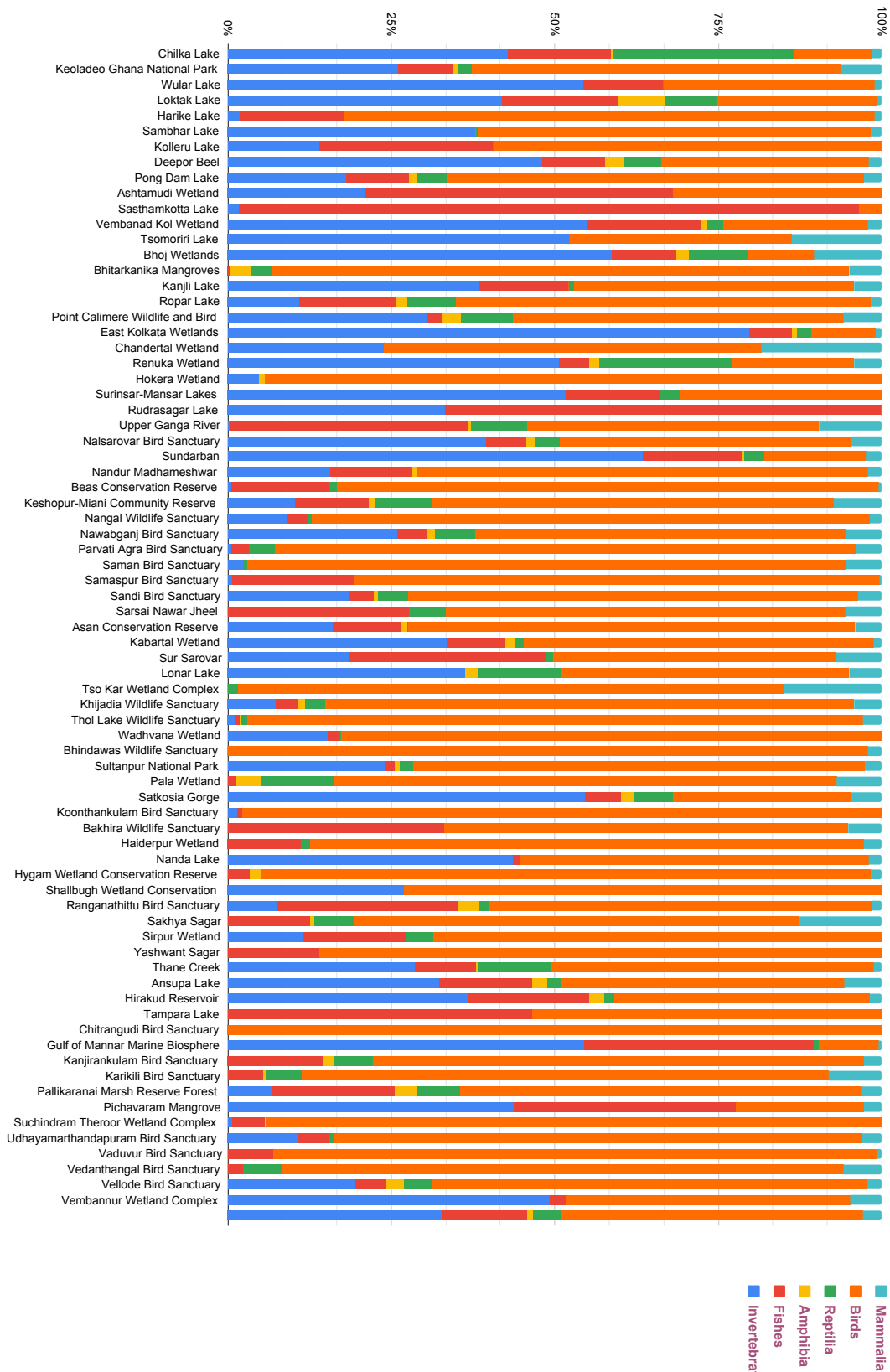


Figure 4. Faunal composition of Ramsar Wetlands in India.



Irrawady Dolphin at Chilika Lake (Photo: Chandra *et al.*, 2021).



Greylag Geese (Photo: Chandra *et al.*, 2021)

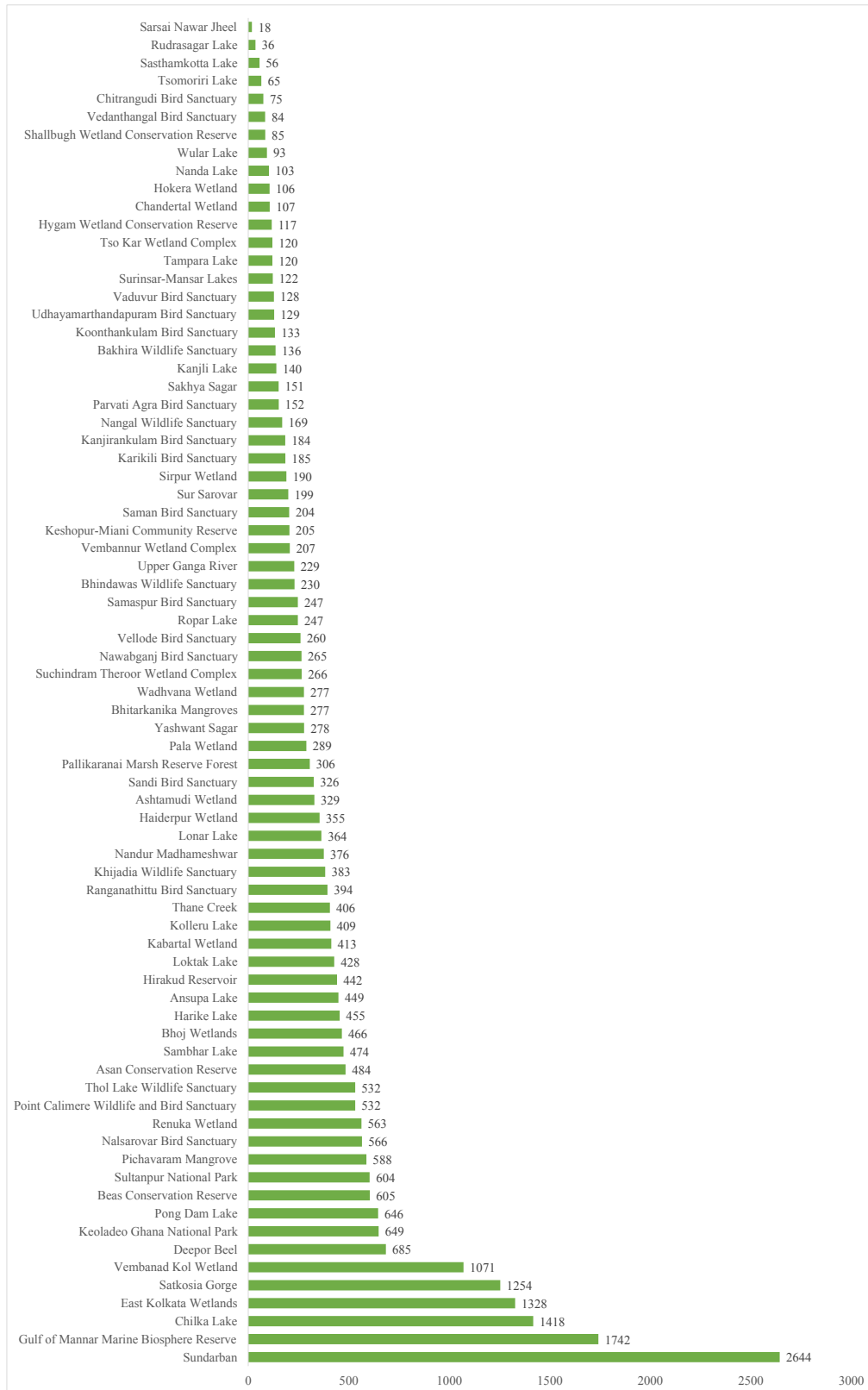


Figure 5. Faunal species composition in Ramsar Wetlands of India.

Wetlands in India possess a rich reservoir of biodiversity and are known to play an important role in carbon sequestration. They are found in all climates - from tropical deserts to cold Ladakh and at all altitudes - from below sea level to about 6000m in the Himalayas. Wetlands in India are classified into four major types based on topographical differences: 1) Himalayan wetlands, 2) Gangetic plain wetlands, 3) desert wetlands and 4) coastal wetlands. Indian topography and climate help to support and conserve diverse and unique wetland habitats. Natural wetlands in India form the high altitude Himalayan lakes, wetlands in the flood plains of the major river systems, salt and temporary wetlands, coastal

wetlands (lagoons, backwaters and estuaries), mangrove swamps, coral reefs, marine wetlands, etc. Indian wetlands possess a number of the world-renowned Ecosystem types excluding bogs, fens and typical salt marshes.

The available information on faunal diversity in Ramsar Wetlands will be of immense benefit for the conservation and management of wetlands and their sustainable use. The basic information will further strengthen the database of each wetland. Furthermore, it is pertinent to note here that the conservation of RWs' biological resources has been widely advocated by the Prime Minister of India, which was emphasized in the 97th episode of Mann Ki Baat on 29.01.2023.



Renuka Wetlands (Photo: Chandra *et al.*, 2021)

India, with its large geographic extent, supports large and diverse wetland classes, some of which are unique. Wetlands, which by various estimates cover 1-5 percent of the country's geographic area, support about one-fifth of known biodiversity. As anywhere else in the world, there is an impending threat to the aquatic biodiversity of Indian wetlands as they are often subjected to a regime of unsustainable human pressures. Sustainable management of these assets is therefore of great relevance. Realizing this, Govt. of India has taken many appropriate steps in terms of policies, programs and plans for the conservation and preservation of these ecosystems. India is a signatory to the

Ramsar Convention on wetland management, biodiversity conservation and wise use, which extends its scope to a variety of habitats including rivers and lakes, coastal lagoons, mangroves, peatlands, coral reefs and numerous man-made wetlands such as fish - and shrimp ponds, farm ponds, irrigated agricultural land, salt pan reservoirs, gravel pits, sewage treatment plants and canals.

The Ministry of Environment, Forest and Climate Change, Govt. of India has identified a number of wetlands for conservation and management under the National Wetland Conservation Program, and state governments are granted

financial support for various conservation activities through the approval of management action plans. The need to have an updated wetland map database to support such action has long been recognized. Despite the benefits, wetlands are the first target of human encroachment and are among the most threatened of all natural resources. It is estimated that over 50% of the world's wetlands have already disappeared globally over the last hundred years through conversion to

industrial, agricultural and residential areas. Even in the current scenario, as the ecosystem services provided by wetlands are better understood, wetland degradation and conversion will continue. This is largely due to the fact that the full value of ecosystem functions is often ignored in policy making, plans and business appraisals of development projects.

Table 1. List of Ramsar Wetlands in India.

S. N.	Name of the Ramsar Site	State	Date of Declaration	Area (sq km)
1	Chilka Lake	Odisha	01.10.1981	1165
2	Keoladeo Ghana National Park	Rajasthan	01.10.1981	28.73
3	Wular Lake	Jammu and Kashmir	23.03.1990	189
4	Loktak Lake	Manipur	23.03.1990	266
5	Harike Lake	Punjab	23.03.1990	41
6	Sambhar Lake	Rajasthan	23.03.1990	240
7	Kolleru Lake	Andhra Pradesh	19.08.2002	901
8	Deepor Beel	Assam	19.08.2002	40
9	Pong Dam Lake	Himachal Pradesh	19.08.2002	156.62
10	Asthamudi Wetland	Kerala	19.08.2002	61.4
11	Sasthamkotta Lake	Kerala	19.08.2002	3.73
12	Vembanad Kol Wetland	Kerala	19.08.2002	1512.5
13	Tsomoriri Lake	Ladakh	19.08.2002	120
14	Bhoj Wetlands	Madhya Pradesh	19.08.2002	32.01
15	Bhitarkanika Mangroves	Odisha	19.08.2002	650
16	Kanjli Lake	Punjab	22.01.2002	1.83
17	Ropar Lake	Punjab	22.01.2002	13.65
18	Point Calimere Wildlife and Bird Sanctuary	Tamil Nadu	19.08.2002	385
19	East Kolkata Wetlands	West Bengal	19.08.2002	125
20	Chandertal Wetland	Himachal Pradesh	08.11.2005	0.49
21	Renuka Wetland	Himachal Pradesh	08.11.2005	0.2
22	Hokera Wetland	Jammu and Kashmir	08.11.2005	13.75
23	Surinsar-Mansar Lakes	Jammu and Kashmir	08.11.2005	3.5
24	Rudrasagar Lake	Tripura	08.11.2005	2.4
25	Upper Ganga River	Uttar Pradesh	08.11.2005	265.9
26	Nalsarovar Bird Sanctuary	Gujarat	24.09.2012	120
27	Sunderban	West Bengal	30.01.2019	4230

S. N.	Name of the Ramsar Site	State	Date of Declaration	Area (sq km)
28	Nandur Madhameshwar	Maharashtra	21.06.2019	14.37
29	Beas Conservation Reserve	Punjab	26.09.2019	64.29
30	Keshopur-Miani Community Reserve	Punjab	26.09.2019	3.44
31	Nangal Wildlife Sanctuary	Punjab	26.09.2019	1.16
32	Nawabganj Bird Sanctuary	Uttar Pradesh	19.09.2019	2.25
33	Parvati Arga Bird Sanctuary	Uttar Pradesh	02.12.2019	7.22
34	Saman Bird Sanctuary	Uttar Pradesh	02.12.2019	5.26
35	Samaspur Bird Sanctuary	Uttar Pradesh	03.10.2019	7.99
36	Sandi Bird Sanctuary	Uttar Pradesh	26.09.2019	3.09
37	Sarsai Nawar Jheel	Uttar Pradesh	19.09.2019	1.61
38	Asan Conservation Reserve	Uttarakhand	21.07.2020	4.44
39	Kabartal Wetland	Bihar	21.07.2020	26.2
40	Sur Sarovar	Uttar Pradesh	21.08.2020	4.31
41	Lonar Lake	Maharashtra	22.07.2020	4.27
42	Tso Kar Wetland Complex	Ladakh	17.11.2020	95.77
43	Khijadia Wildlife Sanctuary	Gujarat	13.04.2021	5.12
44	Thol Lake Wildlife Sanctuary	Gujarat	05.04.2021	6.99
45	Wadhvana Wetland	Gujarat	05.04.2021	6.3
46	Bhindawas Wildlife Sanctuary	Haryana	25.05.2021	4.12
47	Sultanpur National Park	Haryana	25.05.2021	1.43
48	Pala Wetland	Mizoram	31.08.2021	18.5
49	Satkosia Gorge	Odisha	12.10.2021	981.97
50	Koonthankulam Bird Sanctuary	Tamil Nadu	08.11.2021	0.72
51	Bakhira Wildlife Sanctuary	Uttar Pradesh	29.06.2021	28.94
52	Haiderpur Wetland	Uttar Pradesh	13.04.2021	69.08
53	Nanda Lake	Goa	08.06.2022	0.42
54	Hygam Wetland Conservation Reserve	Jammu and Kashmir	08.06.2022	8.02
55	Shallbugh Wetland Conservation Reserve	Jammu and Kashmir	08.06.2022	16.75
56	Ranganathittu Bird Sanctuary	Karnataka	15.02.2022	5.18
57	Sakhya Sagar	Madhya Pradesh	07.01.2022	2.48
58	Sirpur Wetland	Madhya Pradesh	07.01.2022	1.61
59	Yashwant Sagar	Madhya Pradesh	07.01.2022	8.23
60	Thane Creek	Maharashtra	13.04.2022	65.21
61	Ansupa Lake	Odisha	12.10.2021	2.31

S. N.	Name of the Ramsar Site	State	Date of Declaration	Area (sq km)
62	Hirakud Reservoir	Odisha	12.10.2021	654
63	Tampara Lake	Odisha	12.10.2021	3
64	Chitrangudi Bird Sanctuary	Tamil Nadu	08.11.2021	2.6
65	Gulf of Mannar Marine Biosphere Reserve	Tamil Nadu	08.04.2022	526.72
66	Kanjirankulam Bird Sanctuary	Tamil Nadu	08.04.2022	0.97
67	Karikili Bird Sanctuary	Tamil Nadu	08.04.2022	0.58
68	Pallikaranai Marsh Reserve Forest	Tamil Nadu	08.04.2022	12.48
69	Pichavaram Mangrove	Tamil Nadu	08.04.2022	14.79
70	Suchindram Theroor Wetland Complex	Tamil Nadu	08.04.2022	0.94
71	Udhayamarthandapuram Bird Sanctuary	Tamil Nadu	08.04.2022	0.44
72	Vaduvur Bird Sanctuary	Tamil Nadu	08.04.2022	1.13
73	Vedanthangal Bird Sanctuary	Tamil Nadu	08.04.2022	0.4
74	Vellode Bird Sanctuary	Tamil Nadu	08.04.2022	0.77
75	Vembannur Wetland Complex	Tamil Nadu	08.04.2022	0.2

Table 2. Distribution of faunal groups across Ramsar sites in India.

S.N.	Name of the Ramsar Site	Protozoa	Invertebrates	Fishes (Pisces)	Amphibia	Reptilia	Birds (Aves)	Mammalia	Total
1	Chilka Lake	104	564	205	6	364	154	21	1418
2	Keoladeo Ghana National Park	-	170	54	4	14	366	41	649
3	Wular Lake	3	49	11	-	-	29	1	93
4	Loktak Lake	51	158	67	27	30	92	3	428
5	Harike Lake	11	8	71	-	-	360	5	455
6	Sambhar Lake	21	172	-	-	1	272	8	474
7	Kolleru Lake	8	56	107	-	-	238	-	409
8	Deepor Beel	46	307	61	20	36	202	13	685
9	Pong Dam Lake	-	117	62	8	29	412	18	646
10	Ashtamudi Wetland	56	57	129	-	-	87	-	329
11	Sasthamkotta Lake	-	1	53	-	-	2	-	56
12	Vembanad Kol Wetland	67	550	177	10	23	223	21	1071
13	Tsomoriri Lake	-	34	-	-	-	22	9	65
14	Bhoj Wetlands	21	261	44	9	40	45	46	466
15	Bhitarkanika Mangroves	-	-	1	9	9	244	14	277

S.N.	Name of the Ramsar Site	Protozoa	Invertebrates	Fishes (Pisces)	Amphibia	Reptilia	Birds (Aves)	Mammalia	Total
16	Kanjli Lake	23	45	16	-	1	50	5	140
17	Ropar Lake	10	26	35	4	18	150	4	247
18	Point Calimere Wildlife and Bird Sanctuary	-	162	13	15	42	269	31	532
19	East Kolkata Wetlands	64	1008	82	11	26	124	13	1328
20	Chandertal Wetland	15	22	-	-	-	53	17	107
21	Renuka Wetland	6	282	26	8	114	103	24	563
22	Hokera Wetland	-	5	-	1	-	100	-	106
23	Surinsar-Mansar Lakes	60	32	9	-	2	19	-	122
24	Rudrasagar Lake	-	12	24	-	-	-	-	36
25	Upper Ganga River	-	1	83	1	20	102	22	229
26	Nalsarovar Bird Sanctuary	6	221	35	7	21	250	26	566
27	Sundarban	185	1561	371	11	75	380	61	2644
28	Nandur Madhameshwar	-	59	47	3	-	259	8	376
29	Beas Conservation Reserve	1	4	90	-	7	500	3	605
30	Keshopur-Miani Community Reserve	-	21	23	2	18	126	15	205
31	Nangal Wildlife Sanctuary	5	15	5	-	1	140	3	169
32	Nawabganj Bird Sanctuary	-	69	12	3	16	150	15	265
33	Parvati Arga Bird Sanctuary	-	1	4	-	6	135	6	152
34	Saman Bird Sanctuary	-	5	-	-	1	187	11	204
35	Samaspur Bird Sanctuary	-	2	46	-	-	198	1	247
36	Sandi Bird Sanctuary	-	61	12	2	15	224	12	326
37	Sarsai Nawar Jheel	-	-	5	-	1	11	1	18
38	Asan Conservation Reserve	-	78	51	4	1	330	20	484
39	Kabartal Wetland	-	138	37	7	5	221	5	413
40	Sur Sarovar	-	37	60	-	2	86	14	199
41	Lonar Lake	-	132	-	7	47	160	18	364
42	Tso Kar Wetland Complex	-	-	-	-	2	100	18	120
43	Khijadia Wildlife Sanctuary	-	28	13	4	12	310	16	383
44	Thol Lake Wildlife Sanctuary	3	6	4	1	5	498	15	532
45	Wadhvana Wetland	-	42	5	-	1	229	-	277
46	Bhindawas Wildlife Sanctuary	-	-	-	-	-	225	5	230
47	Sultanpur National Park	-	146	8	5	12	417	16	604
48	Pala Wetland	-	-	4	11	32	222	20	289
49	Satkosia Gorge	57	655	65	23	72	325	57	1254

S.N.	Name of the Ramsar Site	Protozoa	Invertebrates	Fishes (Pisces)	Amphibia	Reptilia	Birds (Aves)	Mammalia	Total
50	Koonthankulam Bird Sanctuary	-	2	1	-	-	130	-	133
51	Bakhira Wildlife Sanctuary	-	-	45	-	-	84	7	136
52	Haiderpur Wetland	-	-	40	-	5	300	10	355
53	Nanda Lake	-	45	1	-	-	55	2	103
54	Hygam Wetland Conservation Reserve	-	-	4	2	-	109	2	117
55	Shallbugh Wetland Conservation Reserve	-	23	-	-	-	62	-	85
56	Ranganathittu Bird Sanctuary	-	30	109	13	6	230	6	394
57	Sakhya Sagar	-	-	19	1	9	103	19	151
58	Sirpur Wetland	-	22	30	-	8	130	-	190
59	Yashwant Sagar	-	-	39	-	-	239	-	278
60	Thane Creek	32	107	35	1	42	184	5	406
61	Ansupa Lake	-	145	64	10	10	194	26	449
62	Hirakud Reservoir	9	159	80	10	7	169	8	442
63	Tampara Lake	-	-	56	-	-	64	-	120
64	Chitrangudi Bird Sanctuary	-	-	-	-	-	75	-	75
65	Gulf of Mannar Marine Biosphere Reserve	-	950	611	-	12	160	9	1742
66	Kanjirankulam Bird Sanctuary	-	-	27	3	11	138	5	184
67	Karikili Bird Sanctuary	-	-	10	1	10	149	15	185
68	Pallikaranai Marsh Reserve Forest	-	21	57	10	21	187	10	306
69	Pichavaram Mangrove	-	257	200	-	-	115	16	588
70	Suchindram Theroor Wetland Complex	-	2	13	1	-	250	-	266
71	Udhayamarthandapuram Bird Sanctuary	-	14	6	-	1	104	4	129
72	Vaduvur Bird Sanctuary	-	-	9	-	-	118	1	128
73	Vedanthangal Bird Sanctuary	-	-	2	-	5	72	5	84
74	Vellore Bird Sanctuary	-	51	12	7	11	173	6	260
75	Vembannur Wetland Complex	-	102	5	-	-	90	10	207

Source:

Ramakrishna (2002), Tak *et al.* (2003), Bhattacharyya *et al.* (2006), Kumar (2005, 2009, 2013), Mehta *et al.* (2009), Khan *et al.* (2009), Venkataraman and Satyanarayan (2012), Sharma *et al.* (2014) and Sharma (2013), Jaiswal *et al.* (2014), Tak and Rizvi (2017), Sidhu *et al.* (2018), Tripathy *et al.* (2019), Nanda *et al.* (2019), Chandra *et al.* (2017, 2020a, 2020b), Chandra *et al.* (2021), Banerjee *et al.* (2022). Web sources: <https://rsis Ramsar.org/>; www.MAweb.org; <https://indianwetlands.in/>; <https://moef.gov.in/>.

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