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THE BIODIVERSITY AT SANDI BIRD SANCTUARY, HARDOI WITH SPECIAL REFERENCE TO MIGRATORY BIRDS

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Abstract: Indian subcontinent plays host to a number of migratory birds in summers as well as winters. It is estimated that over hundred species of migratory birds fly to India, either in search of feeding grounds or to escape the severe winter of their native habitat. Sandi bird sanctuary was created in 1990 in order to protect and conserve the natural habitation and surroundings and also the marine vegetation for the migratory birds, as well as for the local people of the region. The term migration is used to describe movements of populations of birds or other animals. There are three types of migrants. One way to look at migration is to consider the distances traveled. The pattern of migration can vary within each category, but is most variable in short and medium distance migrants. The origin of migration is related to the distance traveled. The birds migrating through the area, take shelter on the river front before going to the Sandi Bird sanctuary. The birds generally migrate in the winter months of October-November-December. Bird sanctuary is a popular tourist location. Sandi particularly attracts ornithologists and bird watchers, as many rare migratory birds take refuge in the sanctuary. The bird watching camps arranged to observe the migratory birds at Sandi Bird Sanctuary in the month of October and November 2012. The migratory birds at Sandi Bird Sanctuary include great crested grebe, white storks, black Ibis, glossy Ibis, spoonbill, ruddy shelduck, pin tail, sholveller, spot bill duck, mallard, gadwall, wigeon, tufted pochard, gargancey teal, common teal, cotton teal, grey lag goose, coot, black tailed godwit, painted stock pin tail snipe, marsh sand piper, common tern, river tern, magpie robin, white wagtail, pied wagtail, common snipe, starlings, white Ibis, red crested pochard, common pochard, painted stock, black Ibis, curlew, Indian skimmer etc. The resident birds at Sandi Bird Sanctuary include little grebe, darter, purple heron, grey heron, pond heron, night heron, large, medium and little egrets, painted stork, open billed stork, cattle egret, black necked stork(endangered), combduck, lesser whistling teal, common pariah kite, brahminy kite, shikra, sparrow, hawk, tawny eagle, greater spotted eagle, crested hawk eagle, lagger falcon rain quail, jungle bush quail, painted bush quail, black partridge, grey partridge, common peafowl, water hens, purple moor hens, jacanas, black winged stilt, lap wing, blue rock pigeon, dove spp., parakeets, crow pheasants, owl, swifts, kingfishers, blue jay, hoopoe, mynas, crow, drongo, bulbul, babblers, cormorants, sarus cranes, etc. There are 38195 local birds and 11378 migratory birds (total 49572) observed during period of study. The migratory birds represent the economic importance of that particular area and faunal biodiversity along with health of ecosystem.

Keywords: Birds, Biodiversity, Hardoi, Nature, Sanctuary, Uttar Pradesh

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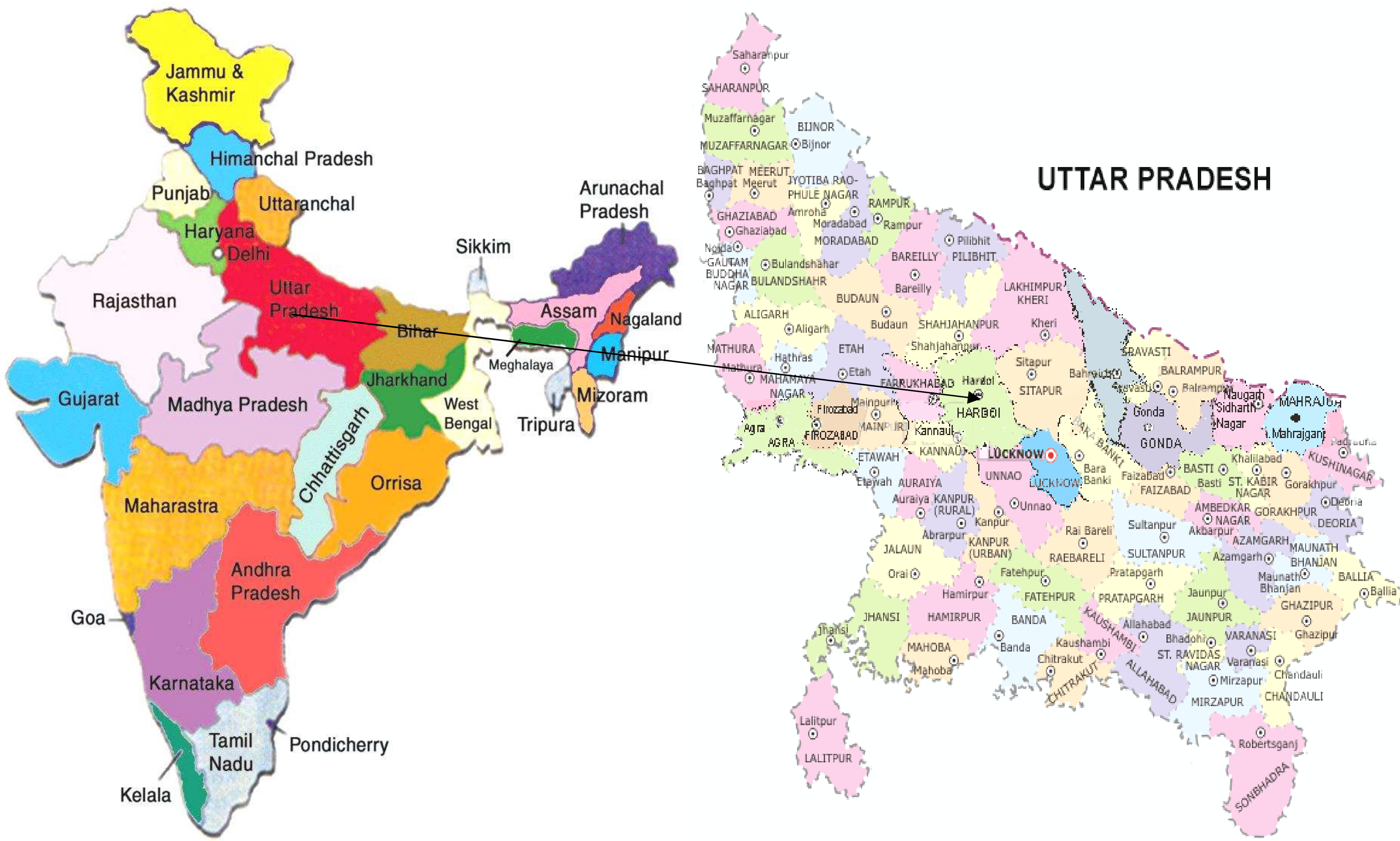
INTRODUCTION

The numerous wildlife sanctuaries set up in the country serve as their temporary habitat. Bird lovers from all over the country visit these sanctuaries to get a glimpse of some of the rarest species of birds in the world. The beauty of the birds, combined with the splendor of the natural environment provides the perfect setting for a nature lover. Usually, birds start migrating towards other areas when they perceive the tailwind to be favorable. However, once they start their migration journey, nothing can stop them, except extremely bad weather. Many birds prefer to fly at a higher altitude while migrating. This is because winds usually prevail at higher altitudes and at the same time, the cold temperature at these altitudes helps them in diffusing the body heat, which is generated by their flight muscles. The timing of the migration is usually a mixture of internal and external stimulus. Migrating birds start on a journey when they feel that they have put on enough fat to provide them energy throughout the journey. Then, the tendency to aggregate into flocks is another determinant of the time of migration. Even after the flock has gathered which has to fly together, the birds keep on feeding till the weather conditions become favorable. Thus, apart from the internal clock of the birds and their flock, it is also the availability of food and the weather conditions that play a role in the determination of the time of migration.

Sandi Bird Sanctuary was created in 1990 in order to protect and conserve the natural habitation and surroundings and also the marine vegetation for the migratory birds, as well as for the local people of the region. The sanctuary is located at a distance of 19 km on Hardoi-Sandi road in Hardoi district of Uttar Pradesh. Sandi bird sanctuary is 1 km from Sandi town on main road, Nawabganj, near Sandi police station Hardoi. The Sandi bird sanctuary is also known by its ancient name as Dahar jheel. The lakes area is 309 ha (3.09 km²) river Garra, formerly known as Garun Ganga, passes near the sanctuary. The coordinates of Sandi Bird Sanctuary are Latitudes- N 26°53'' to 27°46'' Longitudes- E 79°41'' to 80°46''. The small sanctuary, spread in an area of 308.5432 Ha or 3.085 sq km, attracts thousands of migratory birds species during winters. The sanctuary is mainly the area around a shallow lake located in the District of Hardoi. The lake forms a perfect place for the migratory and water birds for a long stay. As a part of conservation of lake and its surroundings, Government of Uttar Pradesh declared the area as a sanctuary in the year 1990, since then this sanctuary is being managed and protected under the Wild Life Protection Act, 1972. The sanctuary is a representative area of the indo gangetic eco-system. Almost the entire area is a wetland. Wetland vegetation is found in the sanctuary.

Figure 1. Sandi Bird Sanctuary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ETAWAH
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HAMIRPUR
BANDA
MAHOBA
VARANASI
CHITRAKUT
ALLAHABAD
MIRZAPUR
CHANDAULI
LALITPUR
SONBHADRA

Figure 2. Location map

The birds migrating through the area, take shelter on the river front before going to the Sandi Bird sanctuary. The birds generally migrate in the winter months of November-December. Sandi Bird sanctuary is a popular tourist location. Sandi particularly attracts ornithologists and bird watchers, as many rare migratory birds take refuge in the sanctuary. It also acts as a safe haven for the nature lovers and explorers. December-February is considered as the ideal time to visit Sandi Bird sanctuary. The sanctuary contains a number of wild animals also like jackal, Nilgai or blue bull and mongoose, other than different types of local and rare birds. The rare Siberian White Crane also used to migrate to this sanctuary in the past.

Hardoi City

Hardoi, district city of Uttar Pradesh state, located at 27°25'N 80°07'E to 27.42°N 80.12°E, has an average elevation of 134 meters. It is contiguous of Shahjahanpur and Lakhimpur Kheri districts on the north, Lucknow and Unnao districts on the south, Kanpur, Kannauj and Farrukhabad districts on the west and Sitapur district on the east. Hardoi is located at 110 km from Lucknow (capital of Uttar Pradesh) and 394 from New Delhi (capital of India). The Ganges and several of its tributaries are crossing the south of Hardoi district. Its area is 5947 km^2. The record height is 500 ft. In 1995, Hardoi district had 5 km^2 of dense forest and 13 km^2 of open forest. Generally people of the district depend upon the Agriculture based economy. At present, five important industries are operational in Hardoi district and they are M/s Saf Yeast Co. Ltd.; M/s Metal Wire Pvt. Limited at Sandila, M/s Baba Gauri Shankar Floor Mill; M/s Engineers Group (P.K. Enterprises), at Hardoi and M/s Kit Ply India (Sugar Unit) Rupapur at Shahabad.

Bird Migration

The term migration is used to describe movements of populations of birds or other animals. There are three types of migrants. One way to look at migration is to consider the distances traveled.

- *Short distance migrants*: May move only a short distance, as from higher to lower elevations on a mountainside.
- *Medium distance migrants:* Some species may cover distances that span from one to several states.
- *Long distance migrants*: Birds that typically have ranges that extend from one country to another or from one island to another.

The pattern of migration can vary within each category, but is most variable in short and medium distance migrants. The origin of migration is related to the distance traveled. For short distance migrants it is as simple as a search for food. The origins of long distant migration patterns are more complex and include the development of the genetic makeup of the bird.

Migration Trigger: The mechanisms initiating migratory behavior vary and are not always completely understood. Migration can be triggered by a combination of changes in day length, lower

temperatures, changes in food supplies and genetic predisposition. Different species of birds and even segments of the population within the same species may follow different migratory patterns.

Navigation: Migrating birds can cover thousands of miles in their annual travels, traveling the same course year after year with little deviation in the path followed. First year birds may migrate unescorted to a winter home they have never before seen and return the following spring to the area in which they were born. The secrets of their amazing navigational skills remain largely hidden. Birds appear to navigate using a variety of techniques, including navigation by the stars, sensing changes in the earth's magnetic field and even smell. Some species follow preferred pathways on their annual migrations. These pathways are related to important stopover locations that provide food supplies critical to the birds' survival.

Migration Hazard: Taking a journey that can stretch to a round trip distance of several thousand miles is a dangerous and difficult task. It is an effort that tests both the birds' physical and mental capabilities. The physical stress of the trip, lack of adequate food supplies along the way, bad weather and increased exposure to predators all add to the hazards of the journey. In recent years long distant migrants have been facing a growing threat from communication towers and tall buildings. Many species are attracted to the lights of tall buildings and millions are killed each year in collisions with the structures.

MATERIALS AND METHODS

To observe the migratory and resident birds, the camps were organized with bird watcher with 3 groups of 5 students. The sample were collected for invertebrates; identified in laboratory and confirmation from the literature (Ali, 1941: Prater, 1948; Manakadan et al., 1994; Gayatri, 1998; Jayapal et al., 2011; David et al., 2011 Manjula et al., 2012; Kumar, 2012; Rajan and Pramod, 2012).

RESULTS AND DISCUSSION

Birds

Migratory Birds: During the study period in October and November month, the migratory birds observed were Great crested grebe, white storks, black Ibis, glossy Ibis, spoonbill, ruddy shelduck, pin tail, sholveller, spot bill duck, mallard, gadwall, wigeon, tufted pochard, gargancey teal, common teal, cotton teal, grey lag goose, coot, black tailed godwit, painted stock pin tail snipe, marsh sand piper, common tern, river tern, magpie robin, white wagtail, pied wagtail, common snipe, starlings, white Ibis, red crested pochard, common pochard, painted stork, black Ibis, curlew, Indian skimmer (table 1).

Glossy Ibis Spoonbill Painted stork

Figure 3. Migratory birds at Sandi Bird Sanctuary

Resident birds: Little grebe, darter, purple heron, grey heron, pond heron, night heron, large, medium and little egrets, painted stork, open billed stork, cattle egret, black necked stork(endangered), combduck, lesser whistling teal, common pariah kite, brahminy kite, shikra, sparrow, hawk, tawny eagle, greater spotted eagle, crested hawk eagle, lagger falcon rain quail, jungle bush quail, painted bush quail, black partridge, grey partridge, common peafowl, water hens, purple moor hens, jacanas,

black winged stilt, lap wing, blue rock pigeon, dove spp., parakeets, crow pheasants, owl, swifts, kingfishers, blue jay, hoopoe, mynas, crow, drongo, bulbul, babblers, cormorants, sarus cranes were observed during study (table 2).

Bronze winged Jacana **Comb Duck** **Common Hawk Cuckoo**

Figure 3. Resident Birds at Sandi Bird Sanctuary

Mammals

Some mammals are also observed at Sandi Bird Sanctuary such as macaque, Indian ratel, fishing cat, Common mongoose, Jackal, Fox, Ground Shrew, Common yellow bats, Squirrels, Mouse spp. Indian Porcupine, Indian hare, Blue bull.

Table 1. List of Migratory Birds (October to November 2012)

S.No.	Name of Bird	Common name	Estimated Numbers	
			Last	Present
1	*Tadorna ferruginea*	Ruddy Shelduck	-	4
2	*Anas acuta*	Pintail	-	680
3	*Anas clypeata*	Shovellor	-	290
4	*Anas poecilorhyncha*	Spot Billed Duck	1294	-
5	*Anas strepera*	Gadwall	-	780
6	*Anas americana*	Wigeon	-	360
7	*Aythya fuligula*	Tufted Porchard	-	12
8	*Anas querquedula*	Garganey Teal	-	390
9	*Nettapus coromandelianus*	Cotton Teal	490	460
10	Anas crecca	Common Teal	1460	5500
11	*Anser anser*	Greylag Goose	-	14
13	*Fulica americana*	Coot	172	780
14	*Sterna hirundo*	Common Tern	-	2
15	*Copsychus saularis*	Magpie Robin	194	290
17	*Motacilla alba*	White Wagtail	-	310
19	*Motacilla maderaspatensis*	Large Pied Wagtail	-	112
20	*Aythya nyroca*	White Eyed Porchard	-	870
21	*Aythya ferina*	Common Porchard	-	26
22	*Circus aeruginosus*	Marsh Harrier	4	4
23	*Ixobrychus cinnamomeus*	Chestnut Bittern	14	12
24	*Ixobrychus sinensis*	Yellow Bittern	12	12
25	*Motacilla flava*	Yellow Wagtail	-	470
Total			**3640**	**11378**

Table 2. List of Local Birds (October to November 2012)

S.NO.	Name of Bird	Common Name	Estimated Numbers	
			Last	Present
1	*Tachybaptus ruficollis*	Little Grebe	318	470

2	*Anhinga novaehollandiae*	Darter (Local Migrant)	-	14
3	*Ardea purpurea*	Purple Heron	142	85
4	*Ardea cinerea*	Grey Heron	90	76
5	*Ardeola grayii*	Pond Heron	1448	970
6	*Nycticorax nycticorax*	Night Heron	448	280
7	*Ardea alba*	Large Egret	1690	1490
8	*Ardea intermedia*	Intermediate Egret	2080	1860
9	*Egretta garzetta*	Little Egret	2660	2420
10	*Bubulcus ibis*	Cattle Egret	1416	670
11	*Mycteria leucocephala*	Painted Stork	-	4
12	*Anastomus oscitans*	Open Billed Stork	74	74
13	*Sarkidiornis sylvicola*	Comb Duck	416	660
14	Dendrocygna javanica	Lesser Whistling Teal	1890	4430
15	*Milvus migrans*	Common Pariah Kite	-	2
16	*Haliastur indus*	Brahiminy Kite	2	2
17	*Accipiter badius*	Shikra	14	12
18	*Coturnix coromandelica*	Rain Quail	-	122
19	*Perdicula asiatica*	Jungle Bush Quail	-	270
20	*Perdicula erythrorhyncha*	Painted Bush Quail	-	130
21	*Melanoperdix niger*	Black Partidge	-	85
22	*Perdix perdix*	Grey Partidge	70	45
23	*Pavo cristatus*	Common Pea Fowl	2	2
24	*Grus antigon*	Sarus Crane	42	44
25	*Grus canadensis*	Brown Crane	-	470
26	*Amaurornis phoenicurus*	White Breasted Water Hen	494	890
27	*Gallinula chloropus*	Water Cock	-	120
28	*Gallinula chloropus chloropu*	Indian Moor Hen	560	960
29	*Porphyrio porphyrio*	Purple Moor Hen	2680	3160
30	*Metopidius indicus*	Bronzed Winged Jacana	880	490
31	*Hydrophasianus chirurgus*	Pheasant Tailed Jacana	432	310
32	*Himantopus himantopus*	Black Winged Stilt	-	120
33	*Green Imperial Pigeon*	Lapwing	1340	970
34	*Ducula aenea*	Green Imperial Pigeon	72	24
35	*Columba livia*	Blue Rock Pigeon	128	220
36	Streptopelia capicola	Ring Dove	812	540
37	*Streptopelia orientalis*	Rufous Turtle Dove	490	470
38	*Psittacula krameri*	Rose Ringed Parakeet	16	14
39	*Centropus sinensis*	Crow Pheasant	470	690
40	*Eudynamys scolopaceus*	Koel	14	12
41	*Tyto longimembris*	Grass Owl	-	4
42	*Bubo zeylonensis*	Brown Fish Owl	-	6

43	Otus senegalensis	Scops Owl	14	4
44	*Apus affinis*	House Swift	570	272
45	Cypsiurus balasiensis	Palm Swift	210	470
46	*Ceryle rudis*	Pied Kingfisher	52	64
47	*Halcyon smyrnensis*	White Breasted Kingfisher	72	84
48	*Alcedo coerulescens*	Small Blue Kingfisher	6	4
49	*Cyanocitta cristata*	Blue Jay	28	26
50	*Upupa epops*	Hoopoe	12	12
51	*Ocyceros birostris*	Grey Horn Bill	10	10
52	*Dicrurus macrocercus*	Black Drongo	56	26
53	*Acridotheres tristis*	Indian Myna	1720	1860
54	*Acridotheres fuscus*	Jungle Myna	1310	1920
55	*Acridotheres ginginianus*	Bank Myna	1580	1420
56	*Sturnus contra*	Pied Myna	2020	2170
57	*Corvus splendens*	House Crow	452	470
58	*Corvus macrorhynchos*	Jungle Crow	392	320
59	*Pycnonotus jocosus*	Red Whiskered Bulbul	472	172
60	*Turdoides caudata*	Seven Sisters	-	210
61	*Passer domesticus*	House Sparrow	310	192
62	*Microcarbo niger*	Little Cormorants	1810	1260
63	*Phalacrocorax carbo*	Large Cormorants	16	74
64	*Coracina pectoralis*	White Breasted Cuckoo	14	12
65	*Oriolus larvatus*	Black Headed Oriole	14	12
66	*Oriolus oriolus*	Golden Oriole	12	10
67	*Dendrocitta vagabunda*	Tree Pie	194	274
68	*Turdoides striata*	Jungle Babber	282	390
69	*Motacilla cinerea*	Grey Wagtail	-	620
70	*Motacilla alba*	White Wagtail	-	172
71	*Leptocoma zeylonica*	Purple Rumped Sun Bird	36	14
72	*Phalacrocorax fuscicollis*	Indian Shag	12	-
73	*Lonchura malabarica*	White Throated munia	496	122
75	*Ploceus philippinus*	Baya Weaver	-	172
76	*Eudocimus albus*	White Ibis	4	14
77	*Ictinaetus malayensis*	Black Eagle	2	2
78	*Vanellus malabaricus*	Yellow Wattled Lapwing	34	172
79	*Spilopelia chinensis*	Spotted Dove	496	270
80	*Spilopelia senegalensis*	Little Brown Dove	190	122
Total Local Birds			**34088**	**37105**
Total Migratory Birds			**3640**	**11378**
Total			**37728**	**48483**

Invertebrates

Some of main invertebrate species were observed during the camps include Euglena, Paramecium, Earthworms, Leeches, Water flea, Prawn, Cyclop, Cypris, crabs, Centipedes, Millipedes, Spider, Scorpion, Cockroach, Praying mantis, Grasshopper, Crickets, Honeybee, Wood ants, Red ants, Giant water bug, Termite, Dragon fly, Water scorpion, whirling, beetle, ladybird, water beetle, firefly, wasp,

hornet, mud wasp, large carpenter, masbee, different species of butterflies like Kaiser-e-hind, great Zebra, tailed jay glory, blue bottle, common mime, common crow, glossy tiger, common tiger, yellow jezebel, plain sulphur, tree yellow, grass yellow, common grass yellow, bright sun beam, tiger brown, common leopard, commander panther and moths. Different species of mollusca like apple Snail, pond snail, slug, fresh water mussel (unio), vivipera spp. Lymnea spp were found.

Amphibians

The amphibian include toads, Indian cricket frog, Rana species of frogs, Skipper frog, Indian burrowing frog, Chunani frog, Narrow mouthed frog and Funny frogs etc were observed at Sandi Bird Sanctuary.

Pisces

Fishes Spiny eel, Suya, Patra, Rohu, Kochya, Kalvasu, Katla, Nain, Singhi, Chilva, Saur, Girai, Magur, Taingan, Taingen were found.

Reptiles

- **Turtles**: Indian soft shelled turtle, Indian flap shelled turtle, spotted pond turtle, Indian Roof Turtle.
- **Snakes**: Russel's sand Boa, Red sand Boa, Blind snakes, Checkered Keelback, Striped Keelback, Branded racer, Wolf Snake, Rat snake, Binocellate Cobra, Common Krait, Russel's Viper.
- **Lizads**: Brahminy Skink, northern house Gecko, Garden Lizard, Common Indian monitor.

CONCLUSION

The study reveals that the Sandi Bird Sanctuary is healthy ecosystem. It has a huge biodiversity especially in birds and other vertebrate and invertebrates. The industrial development can hinder the migration of these birds and reduce the migratory bird population.

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Bird migration has larger ecological implications that underscore the interconnectedness of life: Migratory cycles are closely attuned to seasonal food productivity cycles, which leads to a mutual gain for both the migrating species and the ecosystems in which they participate. Migratory birds are able to settle in areas where life is not tenable year-round, while the food resources of some regions would not be adequately utilized without the seasonal presence of migrating populations. Bird species have diverse modes of migration. Arctic Terns migrate vast distances.