

# Ecological Investigation of Bakhira Bird Sanctuary, Sant Kabir Nagar, Uttar Pradesh

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## ABSTRACT

An attempt has been made for the very first time for ecological investigation of birds at Bakhira bird sanctuary, district Sant Kabir Nagar, Uttar Pradesh, India. Thirty-two species of birds were observed during the field investigation. The line transect method was employed for population estimates. During the field survey, we recorded a significantly higher number of migratory birds at the end of early winter (December) and at the commencement of middle winter (January). Red crested pochard (*Netta rufina*), Common coot (*Fulica atra*) and Gadwall (*Mareca strepera*) were the most populated species in the present study. The number of birds was not significantly different among winter months except between October/December and October/January wherein, we found significant variation in the number of birds at the Bakhira tal. Of the five main habitat types viz. lowland vegetation, upland vegetation, emergent vegetation, open water and agricultural fields, the most utilized were lowland vegetation and the emergent vegetation in the early and middle wintering stage. While in late winter, the emergent vegetation was the most utilized habitat. The findings of the present study provide the baseline information about the population of migratory birds and the rate of habitat utilization at the Bakhira bird sanctuary.

Grey heron, Common Red shank, Spotted Red shank, Long toed Stint, Little Stint, European White Stork and common Sand Piper were recognized as Wintering waders in Bakhira Tal, were highly susceptible to continuous anthropogenic pressures in the form of washing of cloths, cattle bathing, cattle grazing, and entry of domestic sewage, hunting, fishing, and expansion of crop lands. Since crop lands are being destroyed by waders to some extent, Man & Wild conflict was also observed among the local people of study area and waders. Consequently, villagers started scaring campaigns by exploding crackers near the waders to make them fly from the wetland.

**KEYWORDS:** ecological, migratory, birds, sanctuary, Bakhira, Sant Kabir, population, habitat, method

## INTRODUCTION

India has around 564 existing wildlife sanctuaries, covering about 3.73% of the country's geographical area. These wildlife sanctuaries play an essential role by providing stability and protecting the natural habitat and animals. Besides wildlife sanctuaries, India has numerous Ramsar sites or wetland sites that have become the largest among the countries of South Asia.[1,2]

The number of Ramsar sites has currently increased to 49 by adding Bakhira Wildlife Sanctuary to the list. On 2nd February 2022, World Wetland Day, Bhupendra Yadav, the Union Environment Minister, declared it a Ramsar site.[3,4]

The Bakhira Wildlife Sanctuary, also known as Bakhira Tal, was deemed into existence in 1990 by the Forest and Wildlife Department of the Uttar

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Pradesh Government. It is a shallow-water, river-connecting wetland. It is situated west of the Rapti riverbank, 44 km west of the Gorakhpur, 55 km away from Basti, and 18 km away from Khalilabad. This wildlife sanctuary is India's largest natural floodplain wetland in Sant Kabir Nagar, Eastern Uttar Pradesh.[5,6]

The Bakhira Wildlife Sanctuary is an open habitat for the vast species of residents as well as migratory birds. During winter, about 4000 migratory birds from 30 different species from Europe, Tibet, Siberia and China come to this wetland, covering around 5000 km. Along with the distinctive species of birds, the sanctuary has a wide variety of shrubs, hydrophytes, and trees.[7,8]

### **The Bakhira Wildlife Sanctuary has major significance, as detailed below:**

- The livelihood of villagers residing nearby wetland villages depends on the wetland in the form of fuelwood collection, fishing, and agricultural activities.
- The total area of land sanctuary cover is 2894 hectares, comprising 1819 hectares of Gram Samaj, 1059 hectares of agricultural, and 15 hectares of Reserve Forest land.
- The wetland is home to more than 45 species of fish and 119 plant species. The dominant species of fish are *Channa* sp and *Labeo rohita*.
- Various bird species from Serbia have migrated in winter every year to this wetland, covering about 5000km.
- The Grey-headed swamphen, commonly known as Purple Swamp-hen, is one of the lovely water birds usually found here.
- It supports certain species of mammals, reptiles, fishes, and amphibians.
- The terrain and landscape of the wetland are almost flat.
- There are no longer large wild mammals found as human habitation surrounds the sanctuary.
- It is home to small mammals, including Jungle Cat *Felis Chaus*, Golden Jackal *Canis aureus*, and Small Indian Mongoose *Herpestes javanicus*. [9,10]

### **Bakhira Wildlife Sanctuary Ecosystem**

- After the monsoon season, the humidity level moves above 70%.
- The average annual rainfall surrounding the wetland is about 1166 mm.
- The Bakhira Wildlife Sanctuary helps offer nesting ground to a prolonged number of birds.

- It supports various species of aquatic plants; still, the sanctuary has a relatively lesser amount of marine species because of the rocky soil and harsh climatic conditions.
- The mean maximum temperature in winter is 23°C, and the mean minimum is 9°C.[11,12]

Besides the distinctive features of the Bakhira Wildlife Sanctuary, the authorities also use it for tourism and recreation and contribute to nutrient cycling and food supply. It has become one of the 49th Ramsar Sites of India and one of the 10th Ramsar Sites of Uttar Pradesh. This sanctuary is internationally important for its birdlife, as it provides wintering ground to the numerous species of birds.[13,14]

### **Discussion**

In 1990, it was declared a bird sanctuary by the forest and Wildlife department, under the Government of Uttar Pradesh. The wildlife sanctuary is an open habitat and a large variety of migratory birds reside there. It is also known as Bakhira Tal which means wetlands. It is the largest natural wetlands of Uttar Pradesh and it is a perennial wetland. The source of water is rainfall and the river Ami (a tributary of the Rapti river). The area covered by the Bakhira wildlife sanctuary is about 29 sq km. The name Bakhira is from the village which is situated adjacent to the river. The villagers mostly depend on the wetlands for their livelihood. Bakhira is a bird sanctuary and there are more than 40,000 birds and those are of 30 different species. During winters there are a lot of migratory birds seen in the sanctuary. It keeps the birds safe from poaching and hunting.[15,16]

The wildlife sanctuary helps to conserve different species of birds found in India as well as migratory birds. Birds are a part of wildlife and it is equally important to conserve and protect them with proper measures. Bakhira wildlife sanctuary plays an important role in protecting wildlife. It provides breeding and nesting grounds to resident and migratory birds in huge numbers. The migratory birds are from China, Tibet, Siberia, and Europe. Bakhira wildlife sanctuary also provides shelter for aquatic animals and plants. There are various fishes, amphibians, and reptiles found there. However, the climatic conditions of wetlands are harsh and Rocky soil makes it hard for the aquatic species to flourish.[17,18]

### **Importance of the Sanctuary**

- Though the wetland has been declared as a Wildlife Sanctuary, there are several anthropogenic pressures on it.

- Fishing and poaching of migratory birds are key issues.
- It is an important habitat for sarus as well as winter migratory birds; hence, it is important to conserve the area/wetland.
- The loss of wetland can reduce the number of stopover sites for migrating birds as well as nesting species. [19,20]
- The Bakhira Lake supports a variety of aquatic plants typical to the upper Gangetic system.[21,22]
- However, it is also said that the sanctuary has a relatively lesser number of aquatic species due to the harsh climatic conditions and rocky soil.
- The water bodies are shallow and boggy.
- The average annual rainfall in the district is 1166 mm.
- During the winter, the mean minimum temperature is about 9 °C and the mean maximum – 23 °C.
- In the post-monsoon seasons, the relative humidity is high and reaches above 70%. [23,24]

### Ecosystem

- Bakhira lake is one of the significant wetlands of eastern Uttar Pradesh.
- The sanctuary provides breeding and nesting ground to a large number of migratory and resident birds.
- The majority of the migratory birds come from Siberia, Tibet, China and Europe.
- Moreover, certain species of fish, amphibians, reptiles and mammals are also found dwelling in and around Bakhira Tal.
- The flora of this area is represented by semi-arid vegetation and typical aquatic vegetation of the lake in the plains of North India.
- Waders are defined as a group of medium sized wading birds, which have a wide variety of bill structures and possess long legs and toes enabling them to live and feed in shallow water habitats. Waders are belonging to following families, viz. Ardeidae, Charadriidae, Recurvirostridae, Gruidae, Rallidae, Ciconidae, Jacanidae, Threskiornithidae and Burhinidae. Waders represent the greatest species diversity



**Red crested pochard (*Netta rufina*)**

Water birds and wetlands are inseparable elements. Wetlands are the main custodians of the water birds. Wetlands attract a large number of migratory and resident bird species. Wetlands are defined as transitional zone between terrestrial and aquatic ecosystem where land is covered by shallow water. They are also known as biological supermarkets because they provide extensive food chain and rich in biodiversity. [25,26] Waders have been seen wading through the shallow waters and occasionally probing along dry margins of the wetland. They prefer shallow muddy banks of the pond and close by small water spots. The migratory waders need adequate food supply and safety. Almost all of them leave the wetland by march-end or early April. Habitats used by waders are diverse ranging from aquatic habitat to dry upland meadows, pastures and crop fields. They usually inhabit in wet lands where they feed and breed even some species are migratory, breeding in northern latitudes and migrating to tropics and south of the equator. Most of waders migrate to India during autumn, mainly through the north and north-west. [27,28] They are primarily gregarious in nature. Waders commonly feed on fish, aquatic and terrestrial invertebrates, amphibians and crustaceans. Most waders are opportunistic feeders, capturing food items using bills adapted to probe mud and animal burrows. Asian water bird census ,collects data which is used as vital tool nationally and internationally for conservation and protection of wetlands as

water bird habitat. In India 243 species of water birds and 67 species of wetland dependent and associated birds have been reported. They form vital prey base for many living organism in the food webs of wetlands and are important component of wetland ecosystem. Waders are also important component of nutrient cycle.[29,30] Bakhira Tal is a natural wetland which has been converted into Bird Sanctuary in 1990. It is the largest natural flood plain in U.P. (Uttar Pradesh). It is vast stretch of water body expanding over an area of 29 km<sup>2</sup>. Due to high nutritional value and productivity; it provides a long stretch of feeding and breeding ground for the huge number of migratory and resident wader's species. But among the various habitats, wetlands are considered as one of the most threatened one in the world. [31,32] During the last century the world has lost over 50% of wetlands due to various anthropogenic activities. Wetland habitat is being lost owing to constant spreading of villages, expansion of crop fields, discharging of domestic sewage, discharging of industrial effluent, dumping of solid waste, and over exploitation of their natural resources and conversion of wetlands into barren lands. This results in to the loss of biodiversity and disturbance of wetland services. Moreover, shortage of wetlands during the dry season forces water birds to gather in dense concentrations, which are probably highly vulnerable to drought, hunting or other threats. In Bakhira Tal Sarus crane are forced to feed in the fields, causing major economic losses and antagonism between farmers and birds. The loss of wetland reduces the number of stop over sites for migrating birds as well as nesting species.[33,34]



**Common coot (*Fulica atra*)**

### **Methodology**

Bird survey was done by using binoculars at 5-6 day intervals. Entire study was carried out in a year. Waders were counted by 4 main observers to avoid double counting. They were identified by 'Birds of the Indian subcontinent' a field guide to the birds of India. Moreover, identification of birds with the help of key reference books was done successfully. Bird counting was carried out during early morning from 6 am to 9 am with the help of binoculars and SLR cameras. Point count method was used while total number of bird from each wader species was recorded. Block count method was adapted for estimating waders present in flocks either in flight or on ground.

### **Discussion and Results**

Grey heron, Common Red shank, Spotted Red shank, Long toed Stint, Little Stint, European White Stork and common Sand Piper were recognized as Wintering waders in Bakhira Tal, were highly susceptible to continuous anthropogenic pressures in the form of washing of cloths, cattle bathing, cattle grazing, and entry of domestic sewage, hunting, fishing, and expansion of crop lands. Since crop lands are being destroyed by waders to some extent, Man & Wild conflict was also observed among the local people of study area and waders. Consequently, villagers started scaring campaigns by exploding crackers near the waders to make them fly from the wetland. [35,36]



**Gadwall (*Mareca strepera*)**

Thirty-two species of birds were observed during the field investigation. The line transect method was employed for population estimates. During the field survey, we recorded a significantly higher number of migratory birds at the end of early winter (December) and at the commencement of middle winter (January). Red crested pochard (*Netta rufina*), Common coot (*Fulica atra*) and Gadwall (*Mareca strepera*) were the most populated species in the present study. The number of birds was not significantly different among winter months except between October/December and October/January wherein, we found significant variation in the number of birds at the Bakhira tal. [37,38]



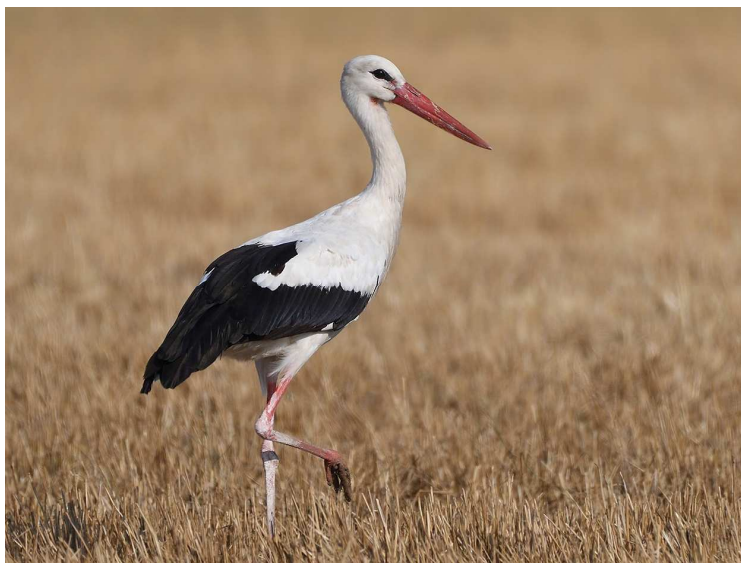
**Spotted Red Shank**

Of the five main habitat types viz. lowland vegetation, upland vegetation, emergent vegetation, open water and agricultural fields, the most utilized were lowland vegetation and the emergent vegetation in the early and middle wintering stage. [39,40]



**Common Sandpiper**

While in late winter, the emergent vegetation was the most utilized habitat. The findings of the present study provide the baseline information about the population of migratory birds and the rate of habitat utilization at the Bakhira bird sanctuary.[41,42]



**European White Stork**

**Table I. Population structure of migratory birds during winter season**

Order	Family	Species	Scientific name	Oct	Nov	Dec	Jan	Feb	Mar	Mean ±SD
				Mean±SD						
Acciptri- formes	Accipi- tridae	Oriental honey buzzard	<i>Pernis ptilorh- yncus</i>	25 (0.81)	26 (1.29)	24 (0.84)	24 (0.75)	22 (1.71)	19 (2.8)	23.3± 2.50
		Black baza	<i>Aviceda leuphotes</i>	2 (0.54)	3 (0.83)	3 (0.74)	2 (0.68)	1 (0.32)	0 (0)	1.8± 1.16
		Egyptian vulture	<i>Neophron percno-pterus</i>	0 (0)	2 (0.58)	3 (0.79)	3 (0.35)	2 (0.21)	2 (0.17)	2± 1.09
		Tawny eagle	<i>Aquila rapax</i>	5 (0.75)	7 (1.14)	7 (1.12)	9 (1.21)	8 (1.16)	4 (0.85)	6.6± 1.86
		Hen harrier	<i>Circus cyaneus</i>	8 (1.25)	12 (2.63)	14 (1.67)	14 (1.25)	12 (0.59)	9 (0.78)	11.5± 2.50
		Black winged kite	<i>Elanus caeruleus</i>	15 (1.50)	18 (2.24)	20 (2.06)	14 (1.41)	13 (1.90)	10 (1.65)	15 ± 3.57
		Greater spotted eagle	<i>Clanga clanga</i>	0 (0)	1 (0.52)	1 (0.63)	2 (0.32)	2 (0.47)	1 (0.41)	1.16 ±0.75
		Lesser spotted eagle	<i>Clanga pomarina</i>	2 (0.73)	3 (0.89)	2 (0.53)	2 (0.58)	1 (0.35)	1 (0.42)	1.8 ±0.75
Anseri- formes	Anati- dae	Common teal	<i>Anas crecca</i>	20 (3.01)	30 (2.60)	34 (2.15)	36 (2.65)	36 (2.17)	30 (1.53)	30.66667
		Spot billed duck	<i>Anas poecilo- rhyncha</i>	14 (1.33)	18 (1.28)	22 (2.14)	24 (2.11)	23 (2.34)	21 (2.16)	20.3± 3.72
		Mallard	<i>Anas platyrhynchos</i>	15 (0.85)	25 (2.16)	29 (1.95)	30 (1.39)	29 (2.24)	22 (2.11)	25± 5.76
		Gadwall	<i>Mareca strepera</i>	29 (2.36)	32 (2.17)	44 (1.78)	48 (3.26)	37 (1.23)	24 (1.86)	35.6 ±9.13
		Eurasian wigeon	<i>Mareca penelope</i>	4 (1.49)	8 (1.59)	15 (1.79)	11 (2.86)	8 (1.98)	5 (1.98)	8.5 ±4.03

		Garganey	<i>Spatula querquedula</i>	16 (1.85)	34 (2.68)	40 (2.73)	42 (2.15)	35 (3.96)	21 (2.33)	31.3 ±10.50
		Tufted pochard	<i>Aythya fuligula</i>	12 (1.22)	16 (2.59)	22 (1.19)	17 (3.36)	13 (1.65)	8 (0.75)	14.6 ±4.80
		Ruddy shelduck	<i>Tadorna ferruginae</i>	0 (0)	2 (0.52)	6 (0.21)	7 (0.36)	6 (0.55)	4 (0.17)	4.1± 2.71
		Northern shoveler	<i>Spatula clypeata</i>	0 (0)	14 (2.31)	15 (0.89)	16 (1.38)	15 (1.88)	12 (1.22)	12±
		Cotton pygmy goose	<i>Nettapus coromandelianus</i>	12 (1.85)	17 (2.31)	19 (2.15)	24 (2.11)	22 (2.55)	18 (2.67)	18.6± 4.18
		Graylag goose	<i>Anser anser</i>	25 (3.19)	38 (3.98)	44 (2.66)	42 (3.26)	41 (3.45)	29 (2.14)	36.5± 7.71
		Northern pintail	<i>Anas acuta</i>	0 (0)	12 (1.55)	14 (1.48)	15 (1.11)	12 (0.96)	11 (1.38)	10.6± 5.42
		Bar headed goose	<i>Anser indicus</i>	14 (1.62)	18 (1.65)	28 (2.46)	30 (2.28)	25 (2.46)	21 (1.97)	22.6± 6.12
		Red crested pochard	<i>Netta rufina</i>	40 (2.86)	45 (2.15)	56 (2.76)	58 (3.10)	48 (3.26)	32 (2.67)	46.5± 9.79
Cuculi- formes	Cucu- lidae	Jacobin cuckoo	<i>Clamator jacobinus</i>	5 (0.56)	6 (0.31)	6 (0.12)	8 (0.98)	5 (0.34)	4 (0.19)	5.7± 1.36
Columbi- formes	Colum- bidae	Oriental turtle dove	<i>Streptopelia orientalis</i>	4 (0.25)	8 (0.68)	8 (0.45)	12 (0.15)	11 (1.21)	8 (0.49)	8.5± 2.81
	Scolop- acidae	Wood snipe	<i>Gallinago namoricola</i>	0 (0)	0 (0)	5 (0.46)	4 (0.13)	4 (0.16)	2 (0.01)	2.5± 2.16
		Common redshank	<i>Tringa totanus</i>	26 (2.78)	29 (2.96)	32 (2.44)	34 (2.59)	25 (2.03)	21 (1.97)	27.8± 10.08
		Little stint	<i>Calidris minuta</i>	24 (2.02)	28 (2.36)	30 (3.14)	28 (3.26)	23 (2.19)	19 (2.05)	25.3±
	Larid-ae	Common tern	<i>Sterna hirundo</i>	16 (2.14)	19 (2.32)	28 (3.25)	27 (2.99)	24 (2.13)	22 (2.56)	22.6± 4.63
Ciconii- formes	Cicon- iidae	European white stork	<i>Ciconia ciconia</i>	18 (1.53)	19 (1.29)	25 (2.12)	24 (2.39)	22 (1.37)	21 (1.04)	21.5± 2.73
Gruifo- rmes	Rall- idae	Common coot	<i>Fulica atra</i>	39 (3.27)	41 (3.39)	54 (2.23)	58 (2.96)	50 (3.92)	35 (2.91)	45.1± 8.42
Passeri- formes	Dicru- ridae	Fork tailed drongo	<i>Dicrurus adsimilis</i>	8 (0.36)	8 (0.25)	10 (1.20)	12 (1.14)	11 (0.96)	7 (0.38)	9.3± 1.96
Pelecan- iformes	Arde- idae	Grey heron	<i>Ardea cinerea</i>	12 (0.96)	14 (1.23)	21 (1.26)	20 (1.49)	18 (1.53)	12 (1.11)	16.1± 4.02



**Long Toed Stint**

### Conclusion

Control of aquatic microphytes is necessary in order to maintain optimal habitats. The weeds especially the emergent and floating types obstruct the waterways which should be thinned or removed by mechanical or manual measures. [43,44] The wetland habitat being a famed and crowded bird sanctuary more effective steps from control of poaching should be recommended. For habitat preservation, the bird sanctuary should be fenced to afford a disturbance-free environment for birds and afford complete protection from illegal activities. Bakhira bird sanctuary may provide an efficient foraging and nesting ground for migratory birds as well as resident birds. We suggested some conservation measures for migratory waders as well as resident birds. The land use for human habitations should be discouraged to avoid agricultural drain off posing pollution threat.[45,46]

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