RESEARCH ARTICLE

Status of Faunal Biodiversity and Threats to Wetlands of Barabanki District, Uttar Pradesh, India

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ABSTRACT

Areas which remain waterlogged or submerged under water, seasonally or throughout the year are termed as wetlands. Wetlands provide valuable habitat for numerous wildlife, invertebrate, and plant species. Moreover, wetlands provide numerous other ecological services such as flood mitigation, abatement, nutrient cycling, aquifer recharge, improving water quality and providing other merchantable products. However, the loss and degradation of wetlands across the Barabanki has caused population declines of various flora and fauna. The present study is aimed at providing, in a nutshell, the distribution of wetlands, the value of wetlands, the causes and consequences of the loss of wetlands. Study is done in Barabanki and its associated areas during January 2013 to March 2014. Survey was carried out seasonally, on foot or vehicle according to the area. Observations were carried using line transect method with the aid of 10x50 binoculars and data was supported with photography using Canon EOS 1000 D SLR camera. Five wetlands Salaarpur Jheel, Kodwa Jheel, Bhagharr Jheel, Puraina Jheel and Khebli Jheel in Dewa, Barabanki exposed during study and all are unprotected site. All these wetlands harbor variety of flora and fauna and can be good ecotourism habitation except Khebli Jheel. Most of area of Khebli Jheel is encroached by Highland infra-build Company for housing construction works. The various threats such Excessive fish cultivation, Soil-digging, Farmers draining and converting it to agricultural land, Development activities, Poaching of water birds, wetlands Fire, Excessive cultivation of water chestnut, Overgrazing near wetland area, Excessive use of pesticides, Cultivation along the marginal areas of wetland cause encroachment and reduction in water spread etc. to the wetland area were also studied.

Key words: Biodiversity, Ecological Status, Wetlands, Threats, Barabanki.

INTRODUCTION

India is blessed with immeasurable wetlands that provide to the society frequent and crucial ecological services. Areas which remain waterlogged or submerged under water, seasonally or throughout the year are termed as wetlands. Wetlands are amongst the world's most productive ecosystems and provide a wide variety of benefits.

The knowledge of importance of wetlands among the masses seems to be less. Wetlands provide valuable habitat for numerous wildlife, invertebrate, and plant species. Moreover, wetlands provide numerous other ecological services such as flood mitigation, abatement, nutrient cycling, aquifer recharge, improving water quality, and providing timber and other merchantable products. Wetlands are one of the most threatened habitats of the world. Wetlands in India, as elsewhere are increasingly facing several anthropogenic pressures such as rapidly expanding human population, large scale changes in land use/land cover, flourishing development projects and improper use of watersheds, threats from industrial, agricultural and various urban developments. Unsustainable levels of grazing and fishing activities have also resulted in degradation of wetlands (Kanaujia *et al.,* 2014).

Status of wetlands in India was assessed by Anonymos (1990) and Garg (1998). According to Garg (1998) nationwide wetland inventory carried out 7.6 million ha of wetland units in the country of which 4.0 million ha are coastal wetlands and 3.6 million ha are inland wetlands. The Ministry of Environment and Forests, Government of India (1990) has estimated that 4.1 million ha area (excluding paddy fields and mangroves) is occupied by different types of wetlands in India. A Directory of Indian Wetlands published by WWF and Asian Wetland Bureau in 1995 records 147 sites as important of which 68 are protected under the National Protected Area Network by the Wildlife Protection Act of 1972. Wetlands provide suitable habitat for various behavioural activities of waterbirds .According to Neave *et al.,* (1996), the physical structure of vegetation is considered an important habitat component through the provision of food, shelter and nesting resources and also in providing potential cues about the onset of conditions suitable for successful breeding. The present study was undertaken to explore wetlands in and around Barabanki, study the fauna in the identified wetlands, study the threats to wetlands and its biodiversity and aware local community and students about the wetlands, their threats, biodiversity and conservational requirements. Our initial wetland surveys carry out in nearly 05 wetlands of Barabanki.

Study area

The study area involves Barabanki that located in the heart of Awadh region of Uttar Pradesh, India. It is situated between 27°19'- 26°30'N and 80°05'- 81°51' E. The main rivers are Ghagra and Gomti. The area of the district is 3895.4 km^2. The temperature varies 47.5 °C maximum and minimum 2.5 °C. The average rainfall is about 1056 mm. The study was carried out at Salaarpur Jheel, Kodwa Jheel, Puraina Jheel, Khebli Jheel in Dewa, Barabanki and Bhagharr Jheel, Kajiapur in Ramnagar, Barabanki (Fig.1)

(Source: www.mapsofindia.com)

Fig. 1: Map of Study Area

MATERIALS AND METHODS

The surveys were carried out from January 2013 to March 2014 to find out the ecological status of annelids, insects, mollusks, fishes, amphibians, reptiles, birds and mammals.The surveys were done twice in a month at a fixed time- interval. Faunal population was observed and monitored twice in a day in the morning 6:00-9:00 am and evening hours 4:00-7:00 pm. Observations and monitoring were done with the aid of an Olympus 10x50 binocular and photography was done with 60 D SLR Cannon camera.

The line transects and quadrate- grid methods were used for studying invertebrates. Insects were collected by net and insect trappers. They were collected and identified up to species and order lavel using Sebastian and Peter, (2009); Singh, (2010); Balmer, (2007), Kehimkar, (2008), Subramanian, (2009), Apte, (1998); Oliver, (2004); Subba Rao (1993).

Net were used for fish collection in transects of 1 to 100 meter and identified using Heda, (2009); Daniels (2002), Fishes of U.P. and Bihar by Srivastava (2007). Amphibians and Reptiles were observed by visual encounter or sighting and identification was done using Daniel (2002); Gururaja, (2010); Daniels (2005);

Whitaker and Captain (2008). Birds were monitored using "Line Transect" and "Point Count Method". A line transect of 1-100 meter was prepared and the birds were observed on both the sides of transect up to 2 Km. The birds were identified with the aid of Ali & Ripley, 1995; Grimmett *et al.,* 2011 and Ali, 2002. Mammals were studied by visual encounters and vocalization identification. The species were identified using Menon, (2003); Roberts (1997).

RESULTS AND DISCUSSION

Survey was done in Barabanki district and total 05 wetlands were listed as follows-

1. Salaarpur Jheel, Dewa, Barabanki
2. Kodwa Jheel, Vishunpur, Dewa
3. Bhagharr Jheel, Kajiapur, Ramnagar
4. Puraina Jheel, Kotwa Kala, Dewa
5. Khebli Jheel, Takaajipur, Dewa, Barabanki

1. Salaarpur Jheel

Village : Dewa, Barabanki
Location: N 27^0 04.187' and E 081^0 09. 047'.
Total area : 51 hectare
Wetland Character: annual wetland, covered with weeds like *Eichornia* and surrounded by human settlement and agricultural fields
Major Fauna: Indian Pond Heron, Purple Heron, Green Bee-eater, White-throated Kingfisher, Sarus Crane, Asian open bill, little grebe.
Main threats : Invasive species, Cattle grazing

2. Kodwa Jheel

Village : Vishunpur, Dewa
Location: N 27^0 05.350' and E 081^0 08. 499'.
Total area : 38 hectare
Wetland Character: Seasonal wetland, Most of the time of the year it remains dry.
Major Fauna: Indian Pond Heron, Purple Heron, Green Bee-eater, White-throated Kingfisher, Little cormorant, yellow wagtail, Water snake.
Main threats : Cattle grazing, Wetland fire

3. Bhagharr Jheel

Village : Kajiapur, Ramnagar
Location: N 27^0 10.691' and E 081^0 21. 693'.
Total area : 850-900 hectare
Wetland Character: It is a permanently water logged wetland and comes under Gram-Samaj land. It is joint by Ghaghra River for water.
Major Fauna: Indian Pond Heron, Purple Heron, Bronzed-winged jacana, White-throated Kingfisher, Little cormorant, Water hen, Water snake.
Main threats: Human encroachment, Weed infestation (*Eichornia),* Water irrigation.

4. Puraina Jheel

Village: Kotwa Kala, Dewa, Barabanki
Location: N 27^0 04.202' and E 081^0 11. 082'.
Total area : 311 hectare
Wetland Character: It is a seasonal wetland and comes under Gram-Samaj property, surrounded by agricultural fields.
Major Fauna: Indian Pond Heron, Purple Heron, Bronzed-winged jacana, Sarus crane, little egret, Little cormorant, Water hen, Water snake.
Main threats: pesticides poisoning.

5. Khebli Jheel

Village : Takaajipur, Dewa, Barabanki
Location: N 27^0 01.896' and E 081^0 07. 408'.
Total area : 450 hectare
Wetland Character: It is a seasonal and natural wetland, surrounded by agricultural fields and comes under Gram-Samaj property.
Major Fauna: Indian Pond Heron, Purple Heron, Bronzed-winged jacana, Sarus crane, Little cormorant, Water hen, Water snake, fishes like rohu, channa, grass cutter.
Main threats: developmental and construction activities.

Among these most of wetlands are natural and un-conserved .Un-conserved wetlands are the property of Gram Samaj. All these wetlands harbor variety of flora and fauna and can be good ecotourism habitation except Khebli Jheel. Most of area of Khebli Jheel is encroached by Highland infra-build Company for housing construction works. Maximum 95 species of fauna were observed in Salaarpur Jheel, Dewa because this site provide feeding, roosting, breeding habitat to many migratory as well as residential species and minimum human disturbance followed by 84 species in Bhagharr jheel, 74 species in Kodwa jheel, 67 in Puraina Jheel and Minimum 52 species of fauna has been recorded in Khebli Jheel in Dewa, Barabanki because of water pollution and developmental as well as anthropogenic activity. Variations in species richness of fauna in different sites of Lucknow are given in **Table.1.**

Table 1: Faunal Species Reported in Wetlands of Barabanki

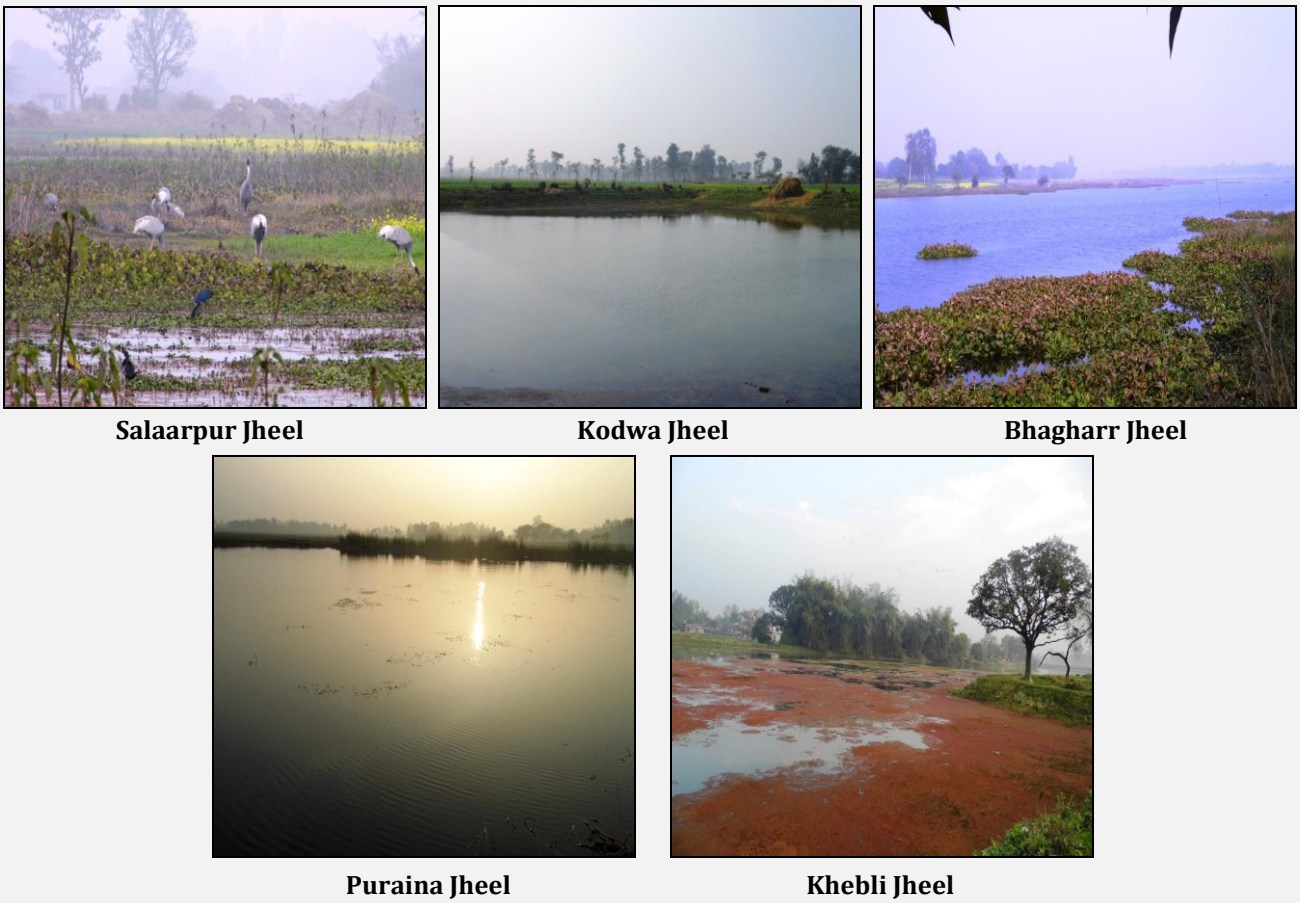
S.N.	Name of species	Common name	Site I	Site II	Site III	Site IV	Site V
	INVERTEBRATE SPECIES						
1.	*Pheretima posthuma*	Common Earthworm	√	√	√	√	√
2.	*Hirudinaria granulosa*	Cattle leach	√	×	√	×	√
3.	*Haemadipsa sylvestris*	Indian leach	√	√	√	×	×
4.	*Caenis sps.*	May-fly	×	×	√	√	√
5.	*Lathrecista asiatica*	Asiatic Blood tail	√	√	√	√	√
6.	*Anaciaeschna jaspidea*	Rusty Darner	×	√	×	√	×
7.	*Paragomphus lineatus*	Common Hooktail	√	×	√	×	√
8.	*Brachythemis cotaminate*	Ditch Jewel	√	√	√	√	√
9.	*Ictinigomphus rapax*	Common Club-Tail	×	×	√	×	×
10.	*Anaximmaculifrons*	Blue Darner	×	√	√	√	×
11.	*Neurothemis tullia*	Pied Paddy Skimmer	√	√	×	×	×
12.	*Ceriagran caromandelianum*	Coromandel Marsh Dart	√	×	√	×	×
13.	*Copera marginipes*	Yellow Bush-Dart	√	√	×	√	×
14.	*Pseudagrion microcephalum*	Blue Grass Dartless	√	×	×	√	√
15.	*Ischnura aurora*	Golden Dartless	√	√	√	×	√
16.	*Shistocerca sp.*	Short-horned grasshopper	√	√	×	√	√
17.	*Acrida exaltata*	Common Indian grasshopper	√	√	√	×	√
18.	*Sphodromantis viridis*	Praying Mantis	√	√	×	×	√
19.	*Gerris sp.*	Water Spider	√	√	×	√	√
20.	*Graphium doson*	Common Jay	√	×	√	√	×
21.	*Papylio polytes*	Common Mormon	×	√	√	×	×
22.	*Papilio castor*	Common Raven	×	√	√	×	×
23.	*Papilio demoleus*	Lime Butterfly	√	×	√	√	√
24.	*Eurema hecabe*	Common Grass Yellow	√	×	√	√	×
25.	*Delias eucharis*	Common Jezebel	√	√	×	×	×
26.	*Tirumala limniace*	Blue Tiger	√	×	√	√	√
27.	*Danaus genutia*	Striped Tiger	√	×	√	√	√
28.	*Danaus chrysippus*	Plain Tiger	√	√	√	√	√
29.	*Junonia orithiya*	Blue Pansy	√	√	×	×	×
30.	*Junonia atlites*	Grey Pansy	√	×	×	×	×
31.	*Junonia lemonias*	Lemon Pansy	√	√	√	√	×
32.	*Junonia almana*	Peacock Pansy	√	√	√	√	√
33.	*Ampullariidae*	Apple snail	√	√	√	√	√
	VERTEBRATE SPECIES						
34.	*Catla- catla*	Catla	√	√	√	√	√
35.	*Cirrhinus cirrhosus*	Naini (Cauvery white carp)	√	√	√	√	√
36.	*Cirrhinus mrigala*	Mrigal	√	√	√	×	×
37.	*Labeo rohita*	Rohu	√	√	√	√	√
38.	*Labeo calbasu*	karonch	√	×	√	×	×
39.	*Hypophthalmichthys molitrix*	Silver Karp	×	×	√	×	×
40.	*Sperata seenghala*	Tengra	×	×	√	×	√
41.	*Clarias batrachus*	Magur	√	√	√	√	×
42.	*Duttaphrynus melanostictus*	Common Indian Toad	×	×	√	×	×
43.	*Euphlyctis cyanophlyctis*	Skipper Frog	√	×	√	√	×
44.	*Haplobatrachus tigerinus*	Indian Bullfrog	√	√	√	√	√
45.	*Calotos versicolor*	Common Garden Lizard	√	√	√	×	√
46.	*Eutropis carinata*	Common Brahminy Skink	×	×	√	×	×
47.	*Lygosoma punctatus*	Snake Skink	√	√	×	√	×
48.	*Enhydris enhydris*	Common Smooth-Scaled Water Snake	√	×	√	√	×
49.	*Tachybaptus ruficollis*	Little Grebe	√	√	√	√	√
50.	*Phalacrocorax niger*	Little Cormorant	√	√	√	√	×
51.	*Phalacrocorax fuscicollis*	Indian Cormorant	√	√	√	√	√
52.	*Anhinga melanogaster*	Darter	√	×	√	×	×
53.	*Egretta garzetta*	Little Egret	√	√	√	√	√
54.	*Casmerodius albus*	Large Egret	√	×	√	×	×
55.	*Mesophoyx intermedia*	Median Egret	√	×	×	×	×
56.	*Bubulcus ibis*	Cattle Egret	√	√	√	√	√
57.	*Ardea purpurea*	Purple Heron	×	×	√	×	×

Table 1: Continued…

S.N.	Name of species	Common name	Site I	Site II	Site III	Site IV	Site V
58.	*Ardeola grayii*	Indian Pond Heron	√	√	√	√	√
59.	*Ixobrychus cinnamomeus*	Chestnut Bittern	√	×	×	×	×
60.	*Nycticorax nycticorax*	Black-crowned Night Heron	√	×	√	×	×
61.	*Mycteria leucocephala*	Painted Stork	√	×	×	×	×
62.	*Anastomus oscitans*	Asian Open bill-Stork	√	√	√	√	√
63.	*Ephippiorhynchus asiaticus*	Black- necked Stork	√	×	×	×	×
64.	*Dendrocygna javanica*	Lesser whistling duck	√	√	√	√	√
65.	*Anser indicus*	Bar headed goose	×	×	√	×	×
66.	*Anas platyrhynchos*	Mallard	√	√	√	√	×
67.	*Aythya ferina*	Common Pochard	√	×	×	×	×
68.	*Anas strepera*	Gadwall	√	×	√	×	×
69.	*Nettapus coromendelianus*	Cotton Pygmy Goose	√	√	√	×	×
70.	*Milvus migrans*	Black Kite	√	√	√	√	√
71.	*Accipiter badius*	Shikra	√	√	√	√	×
72.	*Pavo cristatus*	Indian peafowl	√	×	×	√	×
73.	*Amaurornis phoenicurus*	White-breasted Waterhen	√	√	√	√	√
74.	*Porphyrio porphyrio*	Purple Moorhen	√	×	√	×	×
75.	*Gallinule chloropus*	Common Moorhen	√	×	×	√	×
76.	*Fulica atra*	Common Coot	√	√	√	√	√
77.	*Grus antigone*	Sarus Crane	√	√	√	√	√
78.	*Hydrophasianus chirurgus*	Pheasant-tailed Jacana	√	×	√	×	×
79.	*Metopidius indicus*	Bronzed-winged Jacana	√	√	√	√	√
80.	*Charadrius dubius*	Little Ringed Plover	√	×	√	√	×
81.	*Vanellus indicus*	Red -wattled Lapwing	√	√	√	√	√
82.	*Actitis hypoleucos*	Common Sandpiper	√	√	×	√	×
83.	*Tringa nebularia*	Common Greenshank	×	×	√	×	×
84.	*Himantopus himantopus*	Black –winged Stilt	√	√	×	√	√
85.	*Streptopelia chinensis*	Spotted Dove	√	√	√	√	√
86.	*Streptopelia tranquebarica*	Red Collared Dove	√	×	×	√	√
87.	*Phaenicophaeus leschenaultii*	Sirkeer Malkoha	√	√	√	×	×
88.	*Centropus sinensis*	Greater Coucal	√	√	√	×	×
89.	*Cuculus micropterus*	Indian Cuckoo	×	×	√	√	×
90.	*Glaucidium radiatum*	Jungle Owlet	×	√	√	×	×
91.	*Alcedo atthis*	Small Blue Kingfisher	√	√	×	×	×
92.	*Halcyon smyrnensis*	White breasted Kingfisher	√	√	√	√	√
93.	*Merops orientalis*	Small Bee-eater	√	√	×	√	√
94.	*Ocyceros birostris*	Indian Grey Hornbill	×	√	×	×	×
95.	*Coracias benghalensis*	Indian Roller	√	√	√	√	×
96.	*Hirundo rustica*	Common Swallow	√	×	√	×	×
97.	*Hirundo smithii*	Wire-tailed Swallow	×	√	×	√	×
98.	*Pycnonotus cafer*	Red-vented Bulbul	√	√	√	×	×
99.	*Pycnonotus jocosus*	Red-whiskered Bulbul	√	√	×	√	√
100.	*Turdoides caudatus*	Common Babbler	√	√	√	√	√
101.	*Turdoides striatus*	Jungle Babbler	√	×	√	×	×
102.	*Prinia socialis*	Ashy Prinia	√	√	×	√	√
103.	*Prinia inornata*	Plain Prinia	√	√	√	√	√
104.	*Acridotheres tristis*	Common Myna	√	√	×	×	×
105.	*Acridotheres fuscus*	Jungle Myna	√	×	√	√	√
106.	*Sturnus pagodarum*	Brahminy Starling	×	√	×	√	×
107.	*Dicrurus macrocercus*	Black Drongo	√	√	√	√	√
108.	*Dicrurus paradiseus*	Greater Racket- tailed Drongo	√	×	√	×	×
109.	*Dendrocitta vagabunda*	Indian Treepie	×	√	√	×	×
110.	*Corvus splendens*	House Crow	√	√	√	√	√
111.	*Herpestes edwardsii*	Indian Grey Mongoose	√	√	√	√	√
112.	*Lepus nigricollis*	Indian Hare	√	√	×	×	√

Table 1: Continued...

S.N.	Name of species	Common name	Site I	Site II	Site III	Site IV	Site V
113.	*Mus booduga*	Little Indian Field Mouse	×	√	×	√	×
114.	*Bandicota indica*	Greater Bandicot Rat	√	×	×	×	×
115.	*Macaca mulatta*	Rhesus Macaque	×	√	√	×	×
116.	*Boselaphus tragocamelus*	Nilgai	×	√	×	√	×
117.	*Funambulus palmarum*	India Palm Squirrel	√	√	√	√	√
	Total		**95**	**74**	**84**	**67**	**52**



Salaarpur Jheel **Kodwa Jheel** **Bhagharr Jheel**

Puraina Jheel **Khebli Jheel**

Fig. 1: wetlands observed during the Study

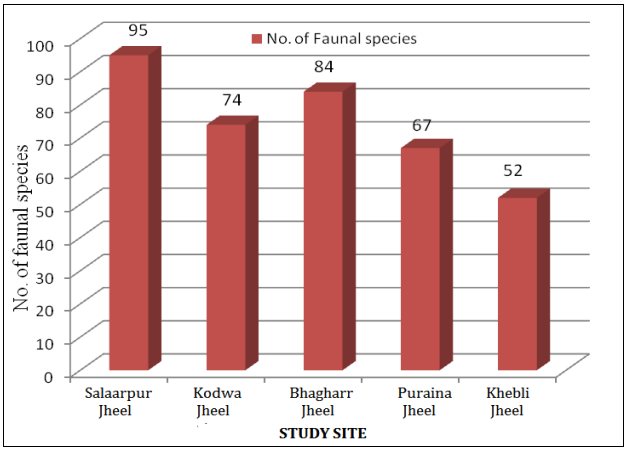


Fig. 2: Area wise species composition of faunal species in Barabanki.

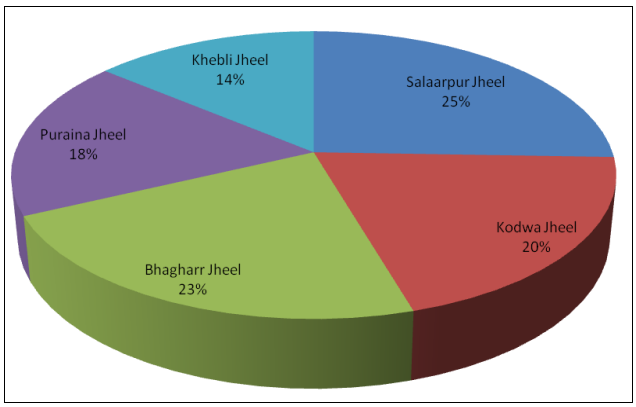


Fig 3: Area wise percent composition of faunal species in Barabanki.

Table 2: Various threats affecting the wetlands ecosystem and cause of wetlands decline in and around Barabanki.

Threats factor	Wetlands areas under effect				
	Site-I	Site-II	Site-III	Site-IV	Site-V
Excessive cattle grazing	+	+ + +	+ + +	-	+
Use of pesticides	+ +	-	+	+	+
Soil-digging	-	+ +	+	+ +	+ + +
Draining off or leveling for agricultural purposes	-	+ +	+ + +	+	+ +
Excessive irrigation	+	+ + +	+ +	+ + +	+ +
Poaching of water birds	-	+	+ +	+	-
Excessive fish cultivation	-	+	+ +	-	-
Excessive Water-chestnut cultivation	+	-	+ +	-	-
Pollution of all form	+	+	+ +	-	-
Developmental Activities	-	-	+	-	+ + +
Dumping of Garbage	+	-	+ +	-	-
Introduction of Alien Invasive Species	+ + +	+	+ + +	-	+
Impact of agriculture	+ +	+ +	+ + +	+	+ +

Wetlands anchorage a large number of threatened birds, in addition to a variety of wildlife which are vital to their conservation (Kumar *et al.,* 2005) but according to Garcia *et al.*, 2007; Caziani and Derlindati, 2000 variation in habitat condition may cause changes in relative abundance of bird species composition. Area wise species composition of faunal species in Barabanki has been mentioned in Fig.2. Area wise percentage composition of faunal species in Barabanki has been given in Fig.3.

Most of wetlands are given to villagers or local people by the Department of Fisheries for fish cultivation. But besides pisciculture lot of water chestnut cultivating is done in these wetlands. Most of the wetlands are seasonal and farmers use their water for irrigation purpose, due to excessive irrigation, water table fall down and wetland gets dried up. Prasad *et al* (2002) reviewed the wetland status in India and their declining pattern, distribution, covered area of wetland, threats, legislative rule and regulation about the conservation of wetlands in India. The various threats such as excessive fish cultivation, soil-digging , transformation in to agricultural land, developmental activities, poaching of water birds, water pollution, wetlands fire, overgrazing near wetland area, excessive use of pesticides, cultivation along the marginal areas of wetland causing encroachment and reduction in water spread to the wetland area were observed. Various threats affecting the wetlands ecosystem and cause of wetlands decline in and around Barabanki have been mentioned in **Table.2.**

Wetlands in and around of Barabanki are still very prosperous in biodiversity. They provide a wintering, staging and breeding ground for a number of migratory as well as residential birds. The species records compiled in this research paper suggest species rich areas in and around Barabanki district need to be monitored at regular intervals for obtaining species presence- absence data. There is need to attention to local people, conservation agencies, NGOS and government that conserve wetlands otherwise our whole ecosystem will extremely disturb. The result of this study hopes to form a basis for other workers to investigate in more detail about the wetland biodiversity assessments and status of wetlands in Barabanki.

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