

Impact Assessment of Deteriorating Natural Wetlands on Migratory Birds in Kota, Rajasthan, India

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Abstract- Natural wetlands are the most important and indispensable sources of ecological balance in the surroundings. They are the backbone of environment and helpful in preventing pollution. They include marshes, swamps, bogs and other low lying areas. Recently the wetlands are decreasing in quantity and quality due to harmful activities by human beings. Due to population explosion, the need and demand for housing and food has led the destruction of wetlands as well as more use of pesticides, herbicides and fertilizers. Domestic, industrial and urban wastes are being disposed off into them without proper treatment. In this study, five selected natural wetlands of Kota have been studied for their impact on migratory birds by investigating the water quality parameters. It has been observed that water quality of the wetlands is not suitable for the survival of aquatic life and migratory birds. The analysis of physico-chemical parameters of these wetlands has been carried out along with counting the number of migratory birds and comparing them with previous year data. It has been found that there is reasonable decrease in the number of migratory birds. During investigation, it has been observed that there is a significant intrusion of sewage, temple waste, garbage, toxic chemicals and pesticides in the wetlands which is the main cause of deteriorating water quality and hunting, illegal fishing, cattle grazing, human interference and habitat loss are the reasons for less arrival of migratory birds. Hence, there is a need for proper management and conservation strategy for wetlands so as to ensure enough migratory birds in the wetlands.

Keywords- Aquatic life, Migratory birds, Natural wetlands, Water quality

I. INTRODUCTION

Wetlands are the land areas, saturated either seasonally or permanently, with water. They are important ecosystems for maintaining aquatic biodiversity. They work as the strong backbone of environment and help to prevent environmental pollution. Generally, they are situated near rivers, lakes and coastal areas. Traditionally, wetlands have been used for many purposes like agriculture, fishery and

recreation. They have provided shelter to many endangered plants and animals. These days the major threats to the wetlands are that they are being destroyed for commercial development, extraction of mineral resources, tourism and discharge of domestic and industrial wastes into them. People are not paying attention towards their importance and they are being encroached in want of more land for human settlements.

II. STUDY AREA

The study has been carried out at five selected natural wetlands of Kota, namely Abhera, Alania, Lakhawa, Ranpur and Umaidganj for a period of six months from July 2015 to December 2015 to assess the water quality parameters of all wetlands at regular intervals as well as observation of the residential and migratory birds in the area.

Abhera Wetland

Abhera is a historical place having beautiful palace, garden and a pond with an area of 100 hectares. It lies in the northwest of Kota city and about 7 km from Nanta village. Its open wetland, the temple of goddess Karni Mata and Abhera Palace are some of the places of great attraction for the tourists. It contains very beautiful aquatic and marshland flora. Abhera wetland is the first choice for all types of birds.



Figure 1: Google Map and Photographic View of Abhera Wetland, Kota

Alania Wetland

Alania dam is located across the Alania River near Simapura village in Kota district. Its maximum height is 14.54 metre and is a masonry dam. It is an irrigation tank rich in fish and avian diversity. The ancient paintings portraying animal figures, hunting scenes and geometrical designs are the places of attraction of Alania dam. The water of Alania dam is used for irrigation purpose. Migratory birds and residential birds also attract people.



Figure 2: Google Map and Photographic View of Alania Wetland, Kota

Lakhawa Wetland

It is a village which is located in Ladpura tehsil of the Kota district. It has a beautiful pond having a length of 1330 metre. Its catchment area is about 6.5 square kilometres. Lakhawa is known for its milk production. The water of Lakhawa wetland is used for irrigation purpose.



Figure 3: Google Map and Photographic View of Lakhawa Wetland, Kota

Ranpur Wetland

Ranpur is a village situated in Kota district, near to the urban area of Kota. It has a pond which is 3.66 km long and it comes under Ladpura tehsil. There are eight engineering colleges and seven other educational institutes in Ranpur. Besides educational institutes, it is a fast developing industrial area having several industries like agro industries, soft drink industries and mineral water industries.



Figure 4: Google Map and Photographic View of Ranpur Wetland, Kota

Umaidganj Wetland

It is the main breeding home of the Sarus crane in Kota district. Its Pakshi Vihar is known as conservation reserve. This wetland ecosystem is situated 12 km from Kota city along the right main canal of the Chambal River. It is flooded wet grassland where water remains logged throughout the year. It is an ideal and excellent habitat for resident as well as migratory birds such as ducks, coots, kormorns, warbiller and munia. The canal provides fish value to the tribal community residing there.



Figure 5: Google Map and Photographic View of Umaidganj Wetland, Kota

III. METHODOLOGY

Sample collection

The water samples were collected from all the five wetlands during July to December 2015. To analyze the water quality, 5 litres of water samples were collected in plastic containers. Samples were collected at an interval of ten days. Before sampling, the containers were cleaned and washed properly. After sampling, the containers were marked carefully with their respective identification marks.

Sample Analysis

The water quality parameters were measured according to the “Standard Methods for Examination of Waters and Waste Waters, American Publication Health Association”, 21st Edition, 2005. The number of migratory birds and their species in all the five wetlands were also observed during the study period.

IV. RESULTS

The physical parameters like pH, total dissolved solids (TDS), temperature, turbidity and conductivity and chemical parameters like dissolved oxygen (DO), biochemical oxygen demand (BOD), chemical oxygen demand (COD), alkalinity and nitrate were analyzed during the study period to determine the effect of water quality on the fish culture and migratory birds of the wetlands.

The summary of results of various physicochemical parameters of water samples of the wetlands is presented in the following tables.

Table 1: Assessment of Physical Parameters of Water in different Wetlands

Name of Wetland	Range of Physical Parameters of Water during study period July – Dec 2015				
	pH	TDS (mg/l)	Temperature (°C)	Turbidity (NTU)	Conductivity (µS/cm)
Abhera	7.25 – 8.17	91 - 152	19 - 30	1 – 6.7	100 – 210
Alania	8.09 – 8.50	94 - 354	18 - 30	2.3 – 8.5	140 - 580
Lakhawa	7.89 – 9.82	126 – 210	17 – 30	1.6 – 30	150 – 250
Ranpur	8.03 – 9.56	118 – 180	20 – 29	4.2 – 18.2	130 – 240
Umaidganj	7.96 – 9.13	190 – 388	18 – 31	1 – 6.9	230 - 590

Table 2: Assessment of Chemical Parameters of Water in different Wetlands

Name of Wetland	Range of Chemical Parameters of Water during study period July – Dec 2015				
	DO (mg/l)	BOD (mg/l)	COD (mg/l)	Alkalinity (mg/l)	Nitrate (mg/l)
Abhera	2.08 – 6.43	0.58 – 2.59	6 – 17.2	56 – 96	0.14 – 1.54
Alania	4.06 – 7.10	0.30 – 3.07	3 – 20	80 – 200	0.30 – 2.36
Lakhawa	4.8 – 6.6	0.64 – 2.35	4 – 20	44 – 92	0.32 – 1.34
Ranpur	4.51 – 6.50	0.31 – 5.25	8 – 24	60 – 120	0.32 – 2.06
Umaidganj	4.3 – 6.7	0.56 – 2.16	8 – 30	80 – 136	0.02 – 1.00

Table 3: Tolerance Limits for Inland Surface Waters: Class D*

S. No.	Characteristics	Tolerance Limit
1	pH value	6.5 to 8.5
2	Dissolved Oxygen, mg/l, Min.	4.0
3	Free Ammonia (as N), mg/l, Max.	1.2
4	Electrical Conductance at 25 °C, μ S/cm, Max	1000
5	Free Carbon Dioxide (as CO ₂), mg/l, Max.	6.0
6	Oil and Grease, mg/l, Max.	0.1
7	Alpha emitters, μ c/ml, Max.	10 ⁻⁹
8	Beta emitters, μ c/ml, Max.	10 ⁻⁸

*(For fish culture and wild life propagation as per IS 2296:1982)

V. DISCUSSION

Based on the comparison of results with the tolerance limits prescribed by the Bureau of Indian Standards (BIS) in IS: 2296:1982, we can observe that water quality of Abhera wetland is not suitable for fish culture, wildlife propagation and migratory birds due to low concentration of dissolved oxygen. However, water quality of Alania wetland is found suitable in this regard. Lakhawa and Ranpur wetlands have water of high pH and high turbidity, whereas Umaidganj wetland has water of high pH value and hence not fit for fish culture, wildlife propagation and migratory birds.

Some other observations responsible for deteriorating water quality of these wetlands, as observed during the study period are the presence of pesticides and toxic chemicals in Ranpur wetland and lower concentration of dissolved oxygen and disposal of religious waste from Karni Mata temple in Abhera wetland which are harmful for the survival of fish species and consequently, the number of wildlife species and fishes was observed less at Ranpur as compared to Abhera wetland.

Overall, we can say that out of the selected five natural wetlands, only Alania wetland has been found suitable for fish culture, wildlife propagation and migratory birds and rest four wetlands require proper conservation, monitoring and management.

Table 4: Status of Migratory Birds in different Wetlands of Kota, India

Name of Wetland	Total No. of Migratory Birds		No. of species of Migratory Birds	
	Year 2014	Year 2015	Year 2014	Year 2015
Abhera	836	810	34	32
Alania	126	76	20	10
Lakhawa	462	350	12	5
Ranpur	157	10	22	15
Umaidganj	715	266	18	15
Total	2296	1512	106	77

It is observed that the maximum species of migratory birds was observed in Abhera wetland due to lotus plantation and rich flora communities which form the food base for

diverse migratory birds whereas the minimum species of migratory birds was observed in Lakhawa wetland due to presence of turbid water, sewage and cattle dung in the water, human excreta near wetland site and pesticides in the agriculture land of Lakhawa village which are harmful for migratory birds and lastly also due to early finish of irrigation water every year at the end of December in the wetland.

The study shows that the declination of migratory birds in all five selected wetlands of Kota has resulted due to the following reasons:

- 1) Changes in the natural habitat such as uprooting of vegetation.
- 2) Motor exhaust pollution, noise pollution, water pollution, litter etc.
- 3) Gradual loss of vegetation in the adjacent reserved forest area of Kota through deforestation.
- 4) Waste disposal around the wetland sites of Kota.
- 5) Inflow of sewage and dumping of garbage are responsible for decline of the migratory birds.
- 6) Due to Cattle grazing, hunting of birds, habitat loss and illegal fishing.
- 7) Due to human disturbance, spreading of pesticides in the agricultural land and spreading of toxic chemicals.
- 8) Due to agrochemical pollution and contaminated water present in wetlands.
- 9) Climate Change and global warming are important reasons for the declination of migratory birds.
- 10) Chinese kites in the sky during Makar Sakranti festival are responsible for killing and injuring migratory birds.

VI. CONCLUSION

As far as the water quality is concerned, different physicochemical parameters like turbidity, pH, dissolved oxygen, biochemical oxygen demand, chemical oxygen demand, conductivity, water temperature, total alkalinity and nitrate were analysed for wetlands of Kota during July to December 2015. All water quality parameters are within permissible limits except dissolved oxygen and pH as per the IS 2296:1982 of class D prescribed by Bureau of Indian Standard (BIS) for inland surface water for fish culture and wildlife and IS 13891:1994 for fresh water fish culture. Except Alania wetland, the water quality of other wetlands is not suitable for the survival of fish, aquatic life and migratory birds due to higher concentration of pH and lower concentration of dissolved oxygen.

Some other reasons which have been observed during study period for deteriorating water quality of Ranpur, Lakhawa, Umaidganj and Abhera wetlands are the presence of muddy water, human excreta and sewage in Lakhawa wetland,

higher pH concentration, pesticides and toxic chemicals in Ranpur wetland and contamination of water by human activities in Umaidganj and lower concentration of dissolved oxygen and disposal of religious waste from Karni Mata temple to Abhera wetland.

The reduction in the population of migratory birds in all five selected wetland of Kota is due to lack of fish, decaying of vegetation and plants and absence of aquatic species in the wetlands. The other reasons responsible for the reduction in the population of migratory birds are cattle grazing, traffic disturbance, noise pollution and automobile pollution, spreading of pesticides in agriculture land, boating, deforestation, decaying of vegetation, illegal fishing, hunting, human activities, use of Chinese kites, habitat loss, water pollution and spreading of toxic chemicals in the wetlands. So it needs proper conservation strategies for the migratory birds.

VII. RECOMMENDATIONS

Based on the study of water quality parameters and assessment of migratory birds in different wetlands of Kota, the following recommendations are made:

- 1) Steps should be taken for the conservation and sustainable utilization of all selected wetlands of Kota.
- 2) Awareness about the ecological and economical values of the wetlands of Kota should be increased among the public.
- 3) A continuous monitoring of all the wetlands of Kota should be done in order to assess the changes in quality and quantity of water.
- 4) A detailed investigation of the community metabolism is very much essential for planning the conservation strategies of these wetlands.
- 5) Complete dryness of wetlands should be avoided since it leads to human access and interference, loss of habitat as well as faunal diversity in some wetlands of Kota.
- 6) Hunting and poaching should be completely prevented in all the wetland area of Kota to prevent the further loss in the population of migratory birds.
- 7) Unrestricted use of chemicals and pesticides should be stopped to maintain the sustainability and health of the ecosystem of Ranpur and Lakhawa wetland.
- 8) Ecological impacts of highway on aquatic life and migratory birds should also be investigated.
- 9) Fishing should be strictly monitored according to the rules and regulation of Rajasthan Fisheries Act, 1953.
- 10) 10) Restriction on disposal of sewage and garbage into the wetlands may help in their conservation.

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