Threats to Wetlands in and around Lucknow, Uttar Pradesh, India

Amita Kanaujia, Adesh Kumar, Sonika Kushwaha and Akhilesh Kumar
Biodiversity & Wildlife Conservation Lab.,
Department of Zoology, University of Lucknow, Lucknow-226007.
Email: adesh.science@gmail.com, wildlifeconservation.lko@gmail.com
Contact No. +91-9026987174, +91-9415030061

ABSTRACT

The wetlands are considered as the natural water storage body as well as water reservoir on the earth and they also act as a transition zone between permanently flooded and the strictly terrestrial areas is the presence of hydromorphic soils and hydrophytic vegetation. But due to anthropogenic activities, population pressure and unsustainable use of wetlands, the number wetlands are going to decline rapidly. The study is being carried out since January 2013 to January 2014 in Lucknow and its associated areas. Survey was carried out seasonally, either on foot or vehicle according to the suitability of the area. Observations were carried using open ended line transect method with the aid of 10x50 binoculars and data was supported with photography using Canon EOS 1000 D SLR camera. Total 23 wetlands were monitored during study out of which Nawabganj bird sanctuary is a protected site while others are unprotected areas. Till now studied wetlands cover an area of approx.4200 hectare and are important waterfowl habitats of Lucknow. The present study provides the information on importance of wetlands and their potential threats. The various threats such as excessive fish cultivation, excessive cultivation of water chestnut, overgrazing near wetland area, excessive use of pesticides and insecticides nearby agricultural fields, soil-digging, draining off or levelling for agricultural purposes, levelling for construction work, use of wetland water for irrigation purpose, overgrazing near wetland area, draining off for fish culture, wetlands fire, poaching of water birds have been recorded. Therefore there is urgent need to prepare consistent plan to avoid commercialization and other impacts to safeguard environment.
***Key Words:** Faunal Diversity, Wetlands, Potential Threats, Water Birds, Encroachment*

INTRODUCTION

The wetlands are considered as the natural water storage body as well as water reservoir on the earth and they also act as a transition zone between permanently flooded and the strictly terrestrial areas is the presence of hydromorphic soils and hydrophytic vegetation. The depth of a wetland is two meters which does not exceed six metres. Wetlands are areas where water is primary factor controlling the environment and the associated plants and animals life. Birds and other fauna & flora are indicator of wetland functions. According to Prasad *et al.*, (2002) Wetlands are one of the most threatened habitats of the world. Wetlands in India, as elsewhere are increasingly facing several anthropogenic pressures. Thus, large scale changes in land use/land cover, burgeoning development projects and improper use of watersheds the rapidly expanding human population, have all caused a substantial decline of wetland resources of the country. Significant losses have resulted from its conversion threats from industrial, agricultural and various urban developments. These have led to hydrological anxieties, pollution and their effects. Unsustainable levels of grazing and fishing activities have also resulted in degradation of wetlands.

Human activities cause wetland degradation and loss by changing water quality, quantity and flow rates; increasing pollutant inputs; and changing species composition as a result of disturbance and the introduction of non-native species. The current loss rates of wetlands in India can lead to

serious consequences, where 74% population is rural (Anon. 1994). At present in India, only 50 percent of wetlands remain. They are disappearing at a rate of 2% to 3% every year. Pragatheesh and Jain (2013) submit a report that the loss of wetlands leads to environmental and ecological problems, which have a direct impact on the biodiversity. Serious consequences, including increased flooding, species decline, deformity, or extinction and decline in water quality could result. Wetlands are important as a genetic reservoir for various species of plants including rice, which is a staple food for 3/4th of the world's population.

STUDY AREA

The Geographic coordinates of Lucknow is 26.8470° N and 80.9470° E. Till now studied wetlands cover an area of approx.1000 hectare and are important waterfowl habitats of Lucknow state. The study area involves Lucknow and its associated areas (up to 100 km).The capital of Uttar Pradesh is situated 123 meter above sea level. In summer temperature ranges from 25-45°C while in winter from 2-20°C, the average annual rainfall is about 896.2 mm (35.28 inch).Lucknow covers an area of 2528 sq.km. The principal river Gomti originates near the Maldo Tada town of Pilibhit. The river extends to about 900 km. Some of the tributaries of this river are Kukrail, Loni,Beta etc. Sai river flows from the south of the city and in the east enters district Raebareli. It is surrounded on the eastern side by District Barabanki, on the western side by district Unnao, on the southern side by Raebareli and on the northern side by Sitapur and Hardoi districts. Population of Lucknow as per census 2001 is 36, 81, 416 lacs.

Wetlands in and around of Lucknow are still very rich in biodiversity but due to pressure from local Inhabitants the wetland needs rehabilitation strategy. The study was carried out at Nawabganj Bird Sanctuary Unnao, Gosaiganj and Amethi, Itaunza, Bichia Block Unnao and Lucknow area (Fig.1). All the areas are very important for biological diversity and have great economic value.

Fig. 1: Map of Study Area (from Google)
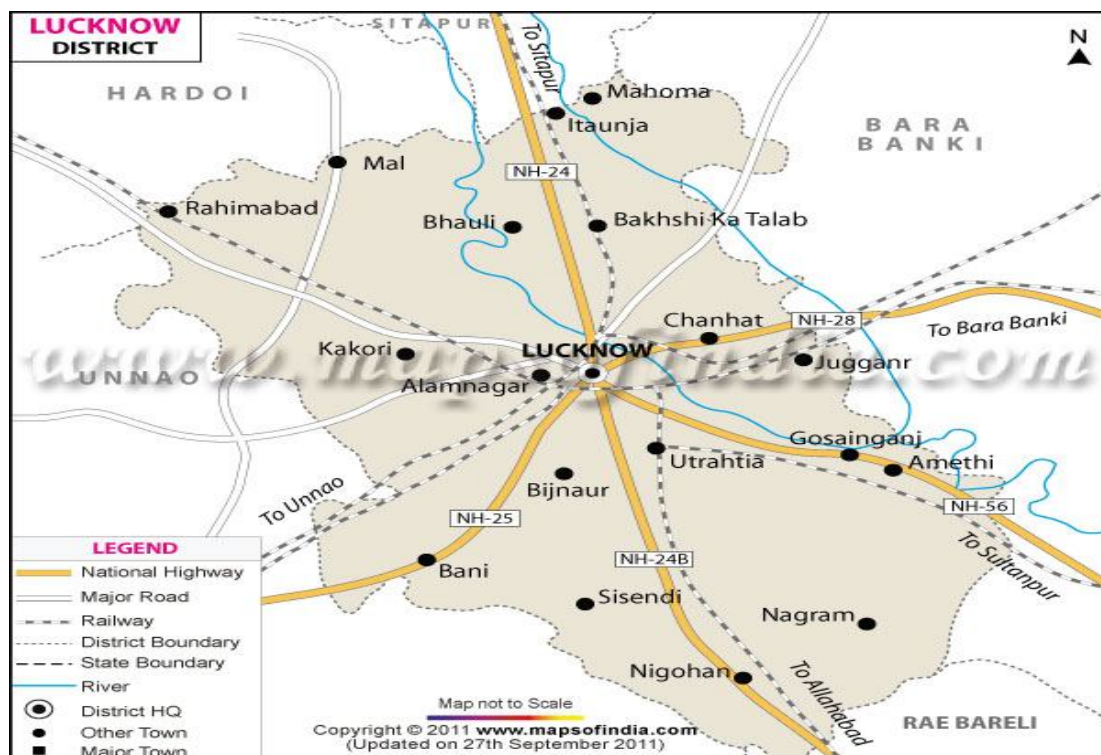
MATERIALS AND METHODS

The study is being carried out seasonally since January 2013 to January 2014 in Lucknow and its associated areas, either on foot or vehicle according to the suitability of the area. Observation are carried by using open ended line transect method with the aid of 10x50 binoculars and data is supported with photography using Canon EOS 1000 D SLR camera. The information is obtained by spot observation and interviewing with local people, forest guards and forest officials.

RESULT AND DISCUSSION

The study is carried out in different wetlands of Lucknow and its associated areas. Total 23 wetlands are found during the survey they are as follows-

- **Unnao and its associated areas** : 6 Wetlands
- **P.G. I. and Mohanlalganj areas** : 6 Wetlands
- **Gomtinagar areas** : 2 Wetlands
- **Bakshi Ka Taalab and Itaunja** : 4 Wetlands
- **Gosaiganj and Amethi** : 5 Wetlands

During the study a total of twenty three wetlands are observed, out of which Nawabganj Bird Sanctuary is a protected site while other wetlands are non-conserved and are under the pressure of threats (Table 1).

Unconserved wetlands are the property of Gram Samaj. Most of the wetlands are given to villagers or local people by the Uttar Pradesh Government for fish cultivation. During the study various fauna i.e. Fishes like Rohu, Grass cutter, Girai, Channa, *Heteropneustis fossilis, Clarius*, Puntius and many others also. Some snails like apple snail, amphibians like Skipper frog, Turtle like *Lyssimus punctata*, Dragonfly, and other insects, and earthworm also were seen during the survey. Birds such as Lapwing, Jacana, whistling Duck, Little cormorant, Great cormorant, Peacock, Red Crested Pochard, Grey leg goose, Purple moorhen, Common Pochard, Indian pond heron, Purple heron, Little grebe, Cotton pygmy goose, Gadwall, Spot bill Duck, Eurasian wigeon, Northern pintail, Lesser whistling Duck, Garganey, Asian open bill, Painted storks, Sarus crane, Pied Kingfisher, White throated kingfisher, Common Kingfisher, Common Coot.

Maximum 200 species of fauna and 87 species of aquatic flora are observed in Nawabganj Bird Sanctuary Unnao because this site provides feeding, roosting, breeding habitat to many migratory as well as residential species. Minimum fauna and flora are observed in Kathota jheel and pond near Amausi Airport in Lucknow because of water pollution and anthropogenic activities.

Most of the basic pattern of wetlands declining look extremely similar, but rate differs significantly in various areas, resulting in a local loss and degradation of wetlands. Urbanization plays a major role in changing the environment, wetland ecosystem and has strong influence on wetlands biodiversity. The problems, which are related with threats, are a combination of several interacting factors. Various threats such overgrazing near wetland area, excessive use of pesticides nearby agricultural fields, soil-digging , draining off or levelling for agricultural purposes, use of wetland water for irrigation purpose, draining off for fish culture, poaching of water birds have been recorded, excessive fish and water chestnut cultivation use fertilizers and pesticides are deliberated below:-

ANTHROPOGENIC THREATS

Excessive Cattle Grazing: Defoliation i.e. overgrazing by cattle destroyed the flora and increased the turbidity of water. Maximum grazing observed at G, H, I, P and W (Table 2) sites and F, L, M, N, R, T (Table 2) areas are not affected.

Use of Pesticides: Farmers are using fertilizers and pesticides (Super killer- Cypermethsin, Monocide- Monocrotofhos) for water chestnut farming which are very harmful to wetlands birds and others fauna. Highly pesticides affected areas are A, B, C, O, Q and V (Table 2). Olhan *et al;* (2010) studied the effect of agricultural activities in wetland and observed that producers are not adequately informed about the use of fertilizers and pesticides; and water usage and they believe that efficiency would increase if input usage were increased.

Soil-Digging: In most of areas local people dig the soil for their personal as well as commercial purposes, due to which upper nutritive layer of wetlands gets ruined and loss their fertility power. Maximum soil digging areas are A, B, E, J, O, P (Table 2) and minimum K, L, R, T, V (Table 2).

Draining off or Levelling for Agricultural Purposes: Cultivation along the marginal areas of wetland cause encroachment and reduction in water spread. Due to increase in population there is a more demand of food so people convert the wetlands into agricultural areas. Maximum affected areas are A, B, C, L, N, Q, R, S, W (Table 2) and there is no effect on areas F, G, H (Table 2).

Excessive Irrigation: Most of the wetlands are seasonal and farmers use their water for irrigation purpose. Due to excessive irrigation, the water table falls down and results in drying of wetlands. The areas that are under threat of maximum excessive irrigation are A, B, J, K, L, O, P, U, and V (Table 2). 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.

Poaching of Water Birds: Hunting of water birds for their food, entertainment and superstitions are observed highest at B, C, R, S (Table 2) and lowest at E, H, J, P, U (Table 2) study sites. The Cotton Pygmy Goose is mainly affected by Social factor i.e. direct as well as indirect, hunting and cutting of nesting trees (Upadhyaya and Saikia, 2010). Cultivation along the marginal areas of wetland cause encroachment and reduction in water spread.

Excessive Fish Cultivation: Excessive fish-cultivation is disturbing the wetlands ecosystem and food chain. These causes continue harm to the floral and faunal diversity of wetlands. The areas A, B, C, D, I, N, V (Table 2) severely affected while G, H, J, N, W (Table 2) have no harm due to fish cultivation.

Excessive Water-chestnut Cultivation: Unnao and associated areas are the biggest market of water-chestnut; most of wetlands in Unnao are polluted due to water chestnut cultivation. The most affected areas are A, B, C, D, E, L, W (Table 2).

Pollution of all form: Effluent of industries and sewer-waste most pollute the wetlands and is dangerous to fishes, birds and plants species. Threats due to pollution are observed in A, G, H, M, N, R, U, W (Table 2) areas. According to Subhadip Gupta (2013) encroachment due to urban development, siltation and change of land use pattern, the waste water sewers line join to the wetlands, beside this improper use of watersheds have all caused a substantial decline of wetlands.

Developmental Activities: More population demands more houses and due to these increasing demands most of the wetlands are being dumped day by day. Most frequent developmental activity are observed in G, H, I, N (Table 2) areas. Findlay and Bourdages (1999) observed the effect of road construction nearby wetland area. Due to this construction activity there is significant loss of biodiversity, habitat fragmentation and increased human activity to wetland habitat.

Table1: List of wetlands observed during the Study

Name/Area	Name of Wetland	Status
A. Unnao and its associated areas	1. Bhadesa Lake , Bichhiya block Unnao 2. Rain Lake ,Sakran village, Bichhiya block Unnao 3. Purain Lake, Rupau village Bichhiya block Unnao 4. Badela Lake Poorva Oonchgaon, Bichhiya block Unnao 5. Dahi Pond, Bichhiya block Unnao 6. Nawabganj Bird Sanctuary, Nawabganj Unnao	1. Area about 3 ha. Non-conserved, generally this wetland become dry during the summer comes under Gram Samaj Property. 2. Area approximately 250 ha, comes under Gram Samaj and Non-conserved wetland. 3. Area approximately 10 ha, comes under gram samaj and non-conserved wetland. 4. Area approximately 500 ha comes under gram samaj, non-conserved wetland. 5. Area approximately 0.5 ha, comes under gram samaj and non-conserved wetland. 6. Area of 224.60 ha and established in year 1984 under Wild Animal Protection Law-1972.
B. P.G. I. and Mohanlalganj areas	1. A pond near Amausi airport, in front of Sainik School 2. Unnamed wetland in Telibagh 3. Man-made wetland Behind Deen Dayal Upadhyay Park (PGI) 4. Man- made wetland in MohanlalGanj 5. Parewa Wetland, MohanlalGanj 6. Nardahi MohanlalGanj	1. Approximate area of 2 ha., comes under the authority of Gram Samaj, non-conserved wetland, less diversity due anthropogenic perturbations (mainly dumping of garbage). 2. Area approximately 2.5 ha non-conserved wetland. 3. Area approximately 4.5 ha, man-made wetland as well as private property. 4. Area is approximately 3 hectares and is a non-conserved wetland as well as Gram Samaj Property. 5. Area approximately 5 ha, non-conserved wetland, Gram Samaj Property. 6. Area approximately 9 ha and non-conserved wetland and Gram Samaj Property.
C. Gomtinagar areas	1. Natural Wetland Behind Ambedkar Park, Gomtinagar 2. Katotha Jheel, Near Amity International School, Gomtinagar	1. Shallow river wetland arising from Gomti River and area approximately 26 ha. 2. Natural Wetland and area approximately 0.08 ha.
D. Bakshi Ka Taalab and Itaunza	1. Behda pond, Village Nagar chongwa Mahona, Itaunza 2. Chandnapur Pond Village Chandnapur, Mahona, Itaunza 3. Unai Jheel, Village Haldarpur, Itaunza 4. Teekarhaar jheel, Village Teekarhaar, Barabanki	1. 18 hectares in area, Gram-Samaj property, natural wetland with very rich in flora and fauna. 2. Seasonal wetland, comes under Gram-Samaj land,Area is 4 ha. 3. Area approximately 12 ha.Seasonal and natural wetland and comes under Gram-Samaj property. 4. Natural wetland area approximately 17 ha.Breeding place of many migratory birds.
E. Gosaiganj and Amethi Village	1. Maghaiya Purva Jheel in Gosaiganj 2. Sethwara Maghauwa Wetland 3. Dhan Talab 4. Aneeya Jheel in Amethi 5. Sakri Jheel in Amethi	1. Situated on the National Highway 56 having coordinate N 26°38.707' and E 081°03.237' and abode rich biodiversity. 2. Wetland covering an area of about 150 Hectares and Situated in Nawab Ali kaPurva ,Gosaiganj. 3. This spread over an area of about 70 hectares. 4. Situated on the National Highway 56 having coordinate N 26°38.870' and E 081°09.468'. This wetland covers an area of near about 40 Hectares andcomes under the authority of Gram Samaj. 5. This wetlands is situated in Amethi Block of Lucknow district near Pakouli Village having an area of near about 29 thousand hectare land having coordinates of N 26° 38.689' and E 081°10.724' .

Fig. 1: Some Glimpse of threats to wetlands in and around Lucknow

Overgrazing

Use of Pesticides

Soil digging

Draining off or levelling for agricultural purposes

Excessive irrigation

Poaching of water birds

Alien Invasive Species

Excessive Water-chestnut cultivation

Wetlands fire

Developmental Activities

Excessive fish cultivation

Pollution of all form

Table 2: Threat factors affecting the wetland's ecosystem and cause of wetlands declining in and around Lucknow

Threats Factor	Wetlands Areas Under Effect																						
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
Excessive cattle grazing	+	+	+	++	++	-	+++	+++	+++	++	++	-	-	-	++	+++	++	-	++	-	+	++	+++
Use of pesticides	+++	+++	+++	++	+	-	+	-	+	++	++	+	+	-	+++	++	+++	-	++	+	+	+++	++
Soil-digging	+++	+++	++	++	+++	-	-	-	+++	+	+	-	+++	+++	++	+	++	+	++	+	-	+	++
Draining off or levelling 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	-	+++	-	+++	-	+	-	-	+	++	+++	-	-	+++	++	++	+++	++	++	+	+++	+++	+++

A= Bhadesa Lake (BHL), B=Rain Lake (RL), C=Purain Lake (PL), D=Badela Lake (BAL),E= Dahi Pond (DP), F=Nawabganj Bird Sanctuary (NBS), G=A pond near Amausi airport (PAA), H=Unnamed wetland in Telibagh (UWT), I=Man-made wetland Behind Deen Dayal Park (MWDDP), J=Man- made wetland in MohanlalGanj (MWMG),K= Parewa wetland (PW), L=Nardahi Gunhari wetland (NGW),M= Natural Wetland Behind Ambedkar Park (NWBAP),N= Katotha Jheel (KJ),O= Behda pond (BP), P=Chandrapur Pond (CP), Q=Unai Jheel (UJ), R=Teekarhaar jheel (TJ), S=Maghaiya Purva Jheel(MPJ),T= Sethwara Maghauwa Wetland(SMW), U=Dhan Talab (DT), V=Aneeya Jheel(AJ), W=Sakri Jheel(SJ). Intensity: + low, ++ medium, +++ high, - no affect.

sDumping of Garbage: Garbage is dumped in by the nearby shopkeepers as well as local people in some of the wetlands. Intensity of dumping of garbage is maximum in A, G, H, M, N, W (Table 2) and minimum in I, K, P, Q, U (Table 2) areas.

Introduction of Alien Invasive Species: Most of the wetlands are covered by *Eichornia sps.* which is drastically affecting wetland productivity and biodiversity. The most affected areas are A, B, C, D, F, O, R, V, W (Table 2) and there are no alien invasive species in G, H, I (Table 2) areas because of regularly and timely removal of these weeds.

Impact of Agriculture: The types agricultural activities near wetlands decide the biodiversity and other flora-fauna of associated wetlands. Areas of B, C, L, O, R, V, W (Table 2) are most affected by agricultural activities.

Various threats affecting the wetlands ecosystem and cause of wetlands decline in and around Lucknow (Table.2). The glimpse of threats to wetlands in and around Lucknow (Fig. 1).

CONCLUSION

Most of the wetlands are seasonal and farmers use their water for irrigation purpose. Due to excessive irrigation water table fall down and wetlands start drying. Excessive fish and water chestnut cultivation are disturbing the wetlands ecosystem and food chain which continuously harm the floral and faunal diversity of wetlands. Farmers are using fertilizers and pesticides for water chestnut farming which are very harmful for wetland birds and other fauna.

Wetlands support a rich diversity of flora and fauna. During survey, teams explored different types of birds, fishes, reptiles, amphibians, mollusks and plants. There is an urgent need to aware the local people, NGOs and government organization to conserve the wetlands otherwise the ecosystem will get disturbed.

ACKNOWLEDGEMENT

REFERENCES

1. Anonymous (1994): World Development Report. World Bank Development Report.
2. Findlay C.S. and Bourdages J. (1999): Response Time of Wetland Biodiversity to Road Construction on Adjacent Lands. Conservation Biology, 14(1):86-94.
3. Gupta S. (2013): Changing Land-use of East Kolkata Wetland, India. International Journal of Applied Research & Studies, 2(3): 352.
4. Olhan *et al.,* (2010): Effects of agricultural activities in Seyfe Wetland. Scientific Research and Essay, 5(1): 9-14.
5. Pragatheesh A. and Jain P. (2013): Environmental Degradation of the Coimbatore.
6. Prasad *et al,* (2002): Conservation of wetlands of India- a review. Tropical Ecology, 43(1): 173-186.
7. Upadhyaya S. and Saikia P.K. (2010): Conservation threats of cotton pygmy-goose in Assam, India. International Journal of Biodiversity and Conservation, 2(9): 225-232.