SHODH SAMAGAM

ISSN : 2581-6918 (Online), 2582-1792 (PRINT)

Assessment of Problems faced by Wetlands in Sultanpur District

Sudhakar Chaurasia, Ph. D. Research Scholar, Department of Geography
Dinesh Kumar Tripathi, Ph.D., Principal, Department of Geography
Rana Pratap P.G. College, Sultanpur, Uttar Pradesh, INDIA

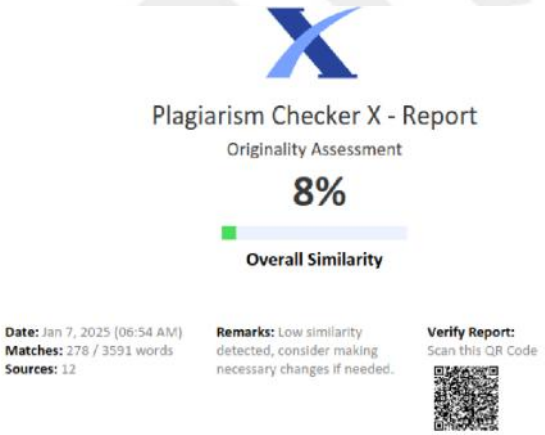
ORIGINAL ARTICLE


Authors

Sudhakar Chaurasia, Ph. D. Research Scholar
Dinesh Kumar Tripathi, Ph.D.
E-mail : sudhakarchaurasia25@gmail.com

shodhsamagam1@gmail.com

Received on : 06/11/2024
Revised on : 06/01/2025
Accepted on : 15/01/2025
Overall Similarity : 08% on 07/01/2025



ABSTRACT

Wetlands are water bodies which have great ecological importance for local environment. In last one decade, wetland received greater attention, from the viewpoint of their ecology as well as conservation practices. Wetland ecosystems in Sultanpur are both permanent and temporary geomorphic unit associated with rainfall that constantly change their status. The conflict between development and ecology and its recurrent impact on the larger society is becoming evident here every day. The reasons are availability of water, fertile land for agriculture and other allied activities. There are 28 wetland sites from 14 blocks of Sultanpur district have selected for the detail analysis of problems faced by wetlands. The developmental activities have severely damaged physical and ecological characteristics of these wetlands. The overall trend of wetland shows that they have been reduced from 2010 to 2024. The decadal comparison of wetland shows the shrinking, reduction in land area of wetlands, eutrophication siltation, waste disposal etc. The depth of wetland also reduced. The deepest wetland is less than 10 meter and shallowest is only half meter.

KEY WORDS

Wetlands, Encroachment, Developmental Activities Pollution, Conflicts.

INTRODUCTION

Wetlands have great importance for local ecology. During the last two decades, wetlands had received greater attention, from the viewpoint of their ecology as well as conservation practices (Ghosh, 2014). Wetlands produce services that are essential to human welfare, so they are viewed as a type of

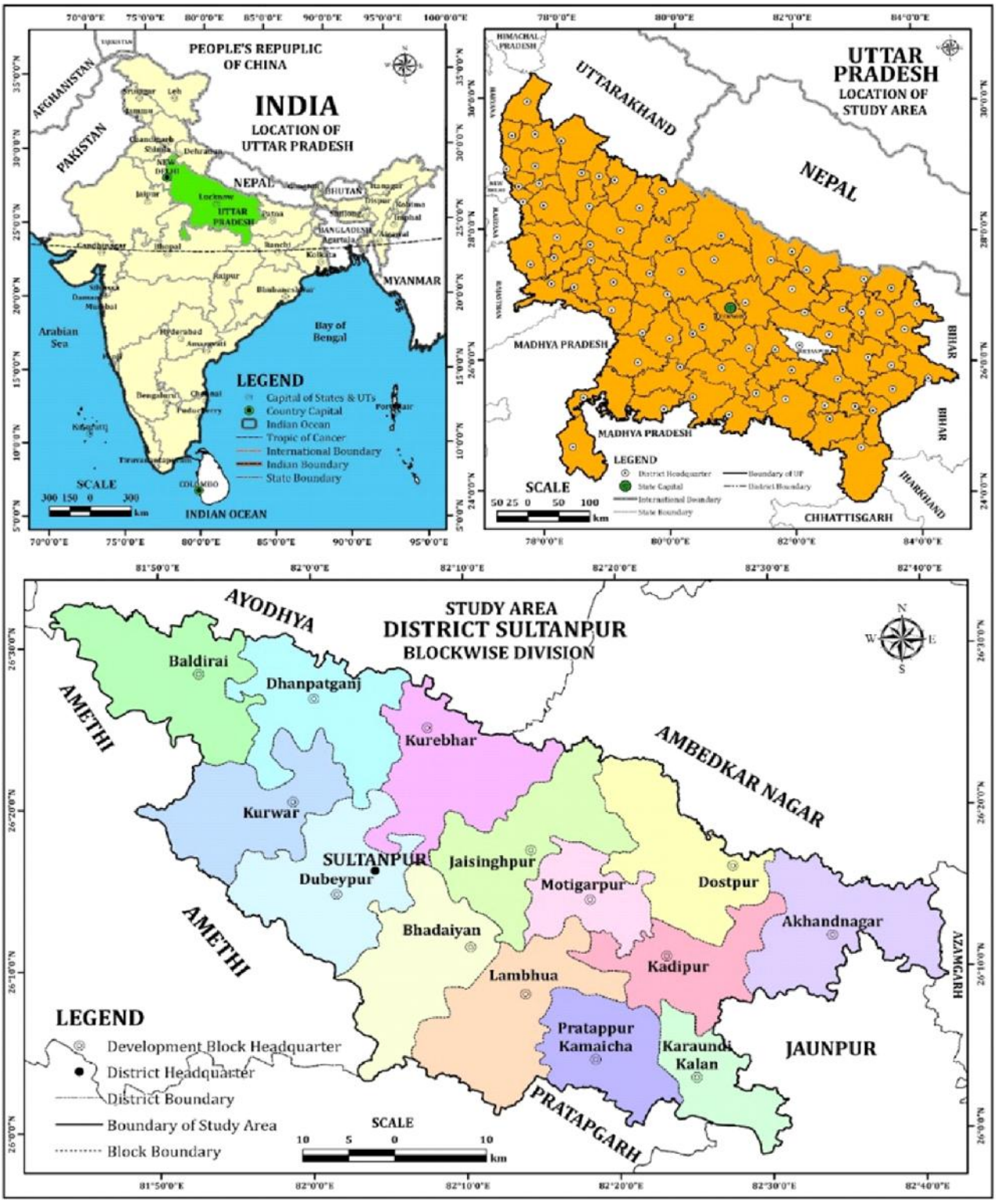
wealth ((Daily, 1997; Daily et al., 2000; Pagiola et al., 2004; Barbier, 2007).Wetlands are areas with permanently submerged land or soils that are periodically, seasonally, or became water logged. They are valuable resource for humans, animals and plants that live in wetlands. Wetlands are an essential and valuable natural resource that have been deteriorated for millennia due to negligence. Wetlands are landscapes in which water is the primary force influencing several aspects of the environment, such as the kind of soil, the kinds of plants and animals, etc. The main element governing the environment is water and the one characteristic that all wetlands have in common is the presence of water, at least occasionally. Wetlands are diverse ecosystems (Gardner & Davidson, 2011). These areas exist where dry soil meets open water. As a result, they could possess traits from both aquatic and terrestrial habitats. They can be either aquatic or terrestrial, depending on seasonal differences. Wetlands are areas where the water table is typically at or near the surface or when the land is covered with shallow water (Cowardin et al., 1995). The loss of wetlands also affects traditional jobs, cultural pursuits, food storage, increasing farming and drainage, and the gathering of weeds and grasses for roofing and building materials (Bezabih&Mosissa, 2017). Due to the rapid expansion and urbanization, the wetland's land use has been changed (Kar & Pal, 2012). The socio-ecological sustainability and management of wetlands are also being increasingly acknowledged in the world of water discourse. In spite of these priorities and action frameworks worldwide, many natural wetlands, and their biodiversity are increasingly threatened or degraded through a variety of human actions, both direct and indirect (Dugan, 1990; Finlayson and Van der Valk, 1995). The Ramsar convention is an intergovernmental pact that was signed in 1971 and got its name from Iran, where it was adopted.A wetlands may include islands or bodies of marine water inside the wetlands that are deeper than six metres at low tide, as well as riparian and coastal zones that are close to the wetlands, as stated in Article 2.1 (Ramsar Convention Secretariat, 2008).The "Convention on Wetlands of International Importance especially Waterfowl Habitat" was created by a group of nations in an effort to encourage the prudent use of wetlands in response to the growing concern about the deterioration of wetlands.

Wetland ecosystems in Sultanpur are both permanent and temporary geomorphic unit associated with rainfall that constantly change their status (Das & Pal 2017). As wetlands are the integral part of the present hydrologic cycle and support development of a civilization they also undergo continual pressure from various anthropogenic activities. Thus conflict between development and ecology and its recurrent impact on the larger society is becoming evident here every day (Datta and Ghosh, 2015). Historically such developmental activities have severely damaged physical and ecological characteristics of these wetlands. The reasons are availability of water, fertile land for agriculture and other allied activities. The paper is focused to identify the factor responsible for the problems of natural water resources in the sultanpur district. The paper have evaluated the status of 28 wetland sites from 14 blocks of Sultanpur district have selected for the detail analysis of problems faced by wetlands. The selected sites are: Atanagar lake, Babrahi, Baburi, Banuata, Bhairopur, Chaddowari, Chhathua Kala, Daudhpatti, Domanpur, Hathuara, Kaithapur, Kanwarpur, Karahwa Jheel, Kasartal, Koiripur, Madanpur Kalan, Maharam, Naugwaa, Parsra, Pichora, Ratanpur, Rihaikpur, Saraiyamubarakpur, Sevam (Nahariya Tal), Tarahi, Umari, Updhyapur and Vaidaha Jheel.

Study Area

The district of Sultanpur, lies on both sides of river Gomati between Lat. 25° 59' N. 25° 71' N and Long. 81° 32'E. 82° 41'E. It is border by district Faizabad on the north, districts Jaunpur and Azamgarh on the east, the district of Pratapgarh on the south, and districts of Rae Bareli and Bara Banki respectively on the west and north-west (Census of India, 2011). The district is named after its headquarters town Sultanpur, in ancient days this town was known as Kusapura or Kusbhawanpur after the name of its founder Kusha, son of Rama (Fig. 1).

Figure 1: Location of the Study Area



(Source: Census of India, 2011)

The district is located on Faizabad and Ambedkar Nagar on the northern border of Sultanpur, Barabanki in the northwest, Jaunpur and Azamgarh in the east, Amethi in the west and district Pratapgarh in the south. River Gomti river flows in the district, in a natural way, the district is divided into two parts. District is situated on the banks of river Gomti which enters this district near north-west and enters Jaunpur, near the steep ray of south-east Dwarka (Census of India, 2011).

Research Methodology

There are 28 sited selected for wetland study in the study area and primary as well as secondary data have been collected from sites.

Primary Data: Primary survey has been done for the purpose to access the cause of wetland degradation and losing its esthetic and ecological relevance. There are 550 respondent's response have been collected with related to causes behind the wetland degradation. The random sampling method used for the collection of data with the help of questionnaire based survey. On an average 20 respondent have been surveyed from every wetland in the study area.

Secondary Data: Secondary data such as area of wetlands, depth of wetland has been collected from village directories and red books. The data related to siltation, shrinkages, eutrophication have been collected from block level authorities. The primary observation related with other aspect of wetland is also done from the individual sites. The satellite imagery as well as Google earth imagery is collected from USGS and goggle earth engine.

Data Analysis: The study required descriptive statistical analysis and the problems have been assess with the help of threat assessment methods. The measures of correlation have the characteristics of being dimensionless andscaled to lie in the range -1 < r < 1. The most commonly used measure of correlation is Pearson's r. It is also called the linear correlation coefficient because 'r' measures the linear association between two variables (Hai and Oanh, 2013). If the data lie exactly along a straight line with positive slope, then r=1. If X and Y are two variables, then the correlation 'r' between the variable X and Y is given by:

Eq: $$r = \frac{n(\Sigma xy) - (\Sigma x)(\Sigma y)}{\sqrt{[n\Sigma x^2 - (\Sigma x)^2]\,[n\Sigma y^2 - (\Sigma y)^2]}}$$

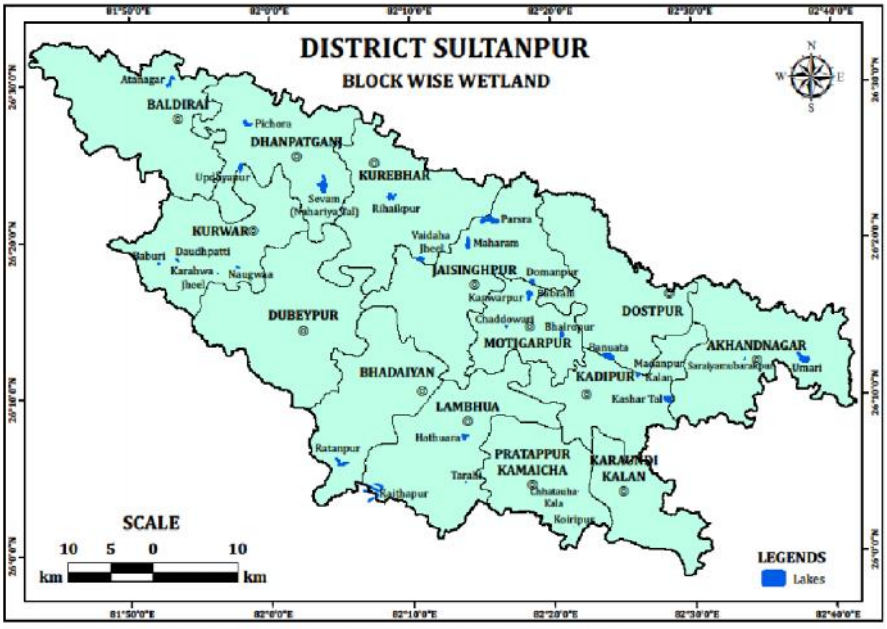
Where, *x* and *y* are the sample means. If the value of correlation coefficient 'r'between two variables *X* and *Y* is fairly large, it implies that these two variables are highly correlated.

Result and Discussion

Wetland status in Sultanpur

There are 28 wetland sites have been selected for the study and these sites are selected from 14 blocks of Sultanpur district. These sites have provided the overall scenario of wetland status in sultanpur district (Figure 2).

Figure 2: Location of selectedWetland Sites



(Source: Census of India, 2011)

The deepest wetland is less than 10 meter and shallowest is only half meter. The largest wetland in 2010 was covering the area of 89 acre which shows large ecological occupancy and smallest wetland has 2.77 acre of area. The present survey show drastic change in these wetland as the area of largest wetland with 89 acre has been reduced to 21 acre and smallest wetland has 0.68 acre area. In 2024, Vaidaha Jheel, Naharia Tal, Ratanpur, have lost their land area under wetland (Table 1).

Table 1: Wetland Categorization of 2024

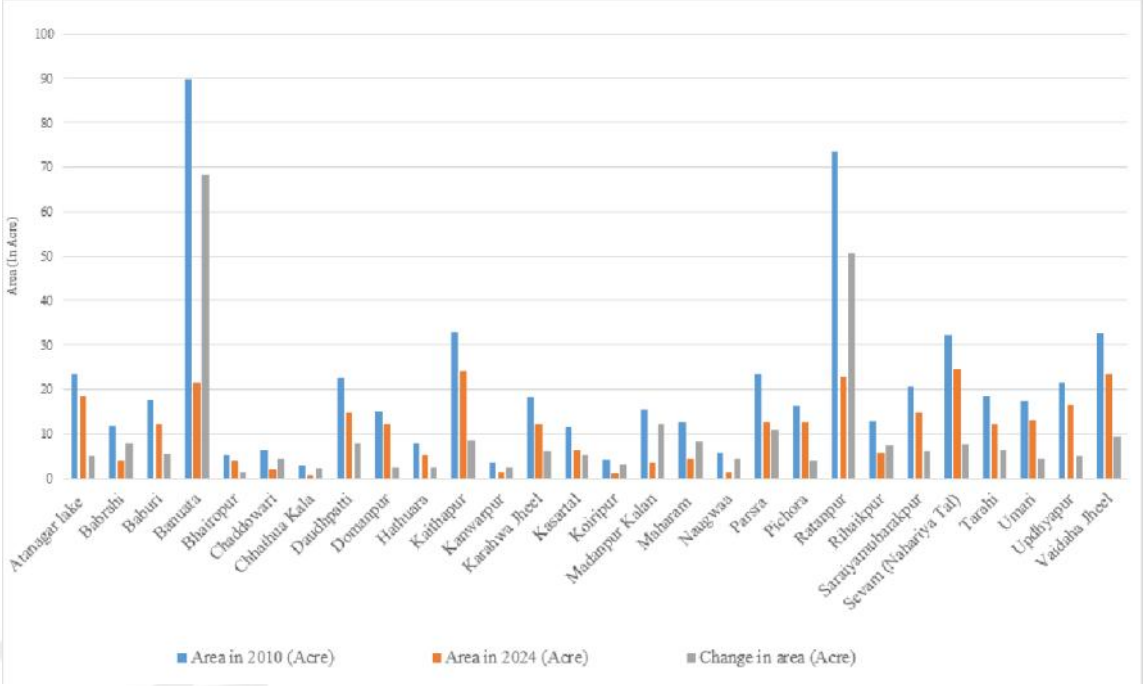
Area (In Acre)	Wetlands in 2024
0-5	Babrahi, Bhairopur, Chaddowari, Chhatauha Kala, Koiripur, Naugwaa, Kanwarpur
5 to 10	Hathuara, Kasartal, Rihaikpur
10 to 20	Atanagar lake, Baburi, Daudhpatti, Domanpur, Karahwa Jheel, Parsra, Pichora, Saraiyamubarakpur, Tarahi, Umari, Updhyapur
Above 20	Vaidaha Jheel, Sevam (Nahariya Tal), Ratanpur, Banuata, Kaithapur, Ratanpur,

(Source: Jal Kal Vibhag, Sultanpur, 2024)

Change in the Wetlands

Natural water bodies, known as wetlands, vary in area based on the hydrological parameters and terrain of the surrounding area. While all wetlands have some characteristics, they also differ in terms of their physical characteristics, size, and biotic and abiotic component sources. It seems sense that the geographical location and setup elements affect the wetlands' unique qualities and specializations. The following figure 1.3 shows that, Banuata wetland and Ratanpur wetland have lost largest area in the Sultanpur district under wetlands.

Figure 3: Change in the size of Wetlands



(Source: Primary Data)

The Madanpur wetland has lost highest area under wetland from 2010 to 2024. The trend of wetlands sows that, each and every wetland has lost their area for other land utility. The overall reduction in these 28 wetland sites very significant as these are largest wetlands in Sultanpur. These water bodies are losing their land size which is harming the ecological setups, local environment and migration pattern of birds. The region is vulnerable to flooding. The wetland surrounding affect the wetland land area.In case of agriculture, it always put pressure on wetland for water demands and land demands because both the demands are fulfilled by reducing the wetlands. The built-up demand is also completed by reducing the water body area. Most of the time land reclamation is took place from wetland areas.

Problems faces by Wetland in Sultanpur

Atanagar Lake has low level of water extraction and high level of sedimentation, levelling of wetland area, and excessive fish cultivation. Babrahi wetland high intensity of problems such as sedimentation, levelling of wetland for agriculture and low level of developmental activities, and water extraction from wetland. Baburi wetland has high intensity for levelling for wetland for agriculture and housing and developmental activities (Table 2). Banuata wetland has medium intensity of problem related with excessive water extraction, sedimentation, soil digging and wetland levelling for agriculture but high intensity observed with related to the Pollution and development activities. Bhairopur wetland has high intensity of problems such as excessive water extraction, sedimentation and garbage dumping but it has low intensity problem such as soil digging, poaching of water birds.

Table 2: Major Problems faced by Wetlands in Sultanpur

Threats Factor	Excessive water extraction	Sedimentation	Soil-digging	Levelling of wetland for agriculture	Land reclaim for housing	Poaching of water birds	Excessive fish cultivation	Pollution of all form	Developmental Activities	Dumping of Garbage	Introduction of Alien Invasive Species	Impact of agriculture
Atanagar lake	+	+++	-	+	+++	++	+++	+++	++	+++	+	+++
Babrahi	+	+++	-	+++	+++	+	+++	++	+	++	+	+++
Baburi	++	++	++	+++	+++	++	+	+++	+++	+	++	+
Banuata	++	++	++	++	++	++	+++	++	+	+++	++	+++
Bhairopur	+++	+++	+	+++	+	+	++	-	++	+++	++	-
Chaddowari	+++	++	++	-	-	++	+	++	-	+++	+	+
Chhatauha Kala	+++	+++	+++	+++	-	-	-	+	++	+++	-	+++

Daudhpatti	+++	+++	+++	+++	+	+	+	+++	+++	+++	-	-
Domanpur	+++	+++	-	+++	-	-	-	+	++	+	-	-
Hathuara	++	++	-	++	-	+	+++	+	++	-	+	++
Kaithapur	+++	+++	+++	+++	+++	++	++	+	+++	+	+	+++
Kanwarpur	+++	+++	+++	+	+++	-	-	-	++	-	+	+
Karahwa Jheel	++	++	-	+++	-	-	+	+++	++	++	++	-
Kasartal	+++	+++	+++	+++	-	-	++	++	++	-	+	+++
Koiripur	++	+++	+++	+	+++	+	+++	++	-	++	-	+++
Madanpur Kalan	+++	++	+++	+	+++	+	++	+	-	+	+	++
Meharam	++	+++	++	+++	++	++	+	++	-	+	+	++
Naugwaa	-	-	+	+++	+	+++	+	+++		++	+++	+++

Parsra	++	++	++	+++	++	+++	++	++	-	++	++	++
Pichora	-	+	+	+	++	-	++	++	-	-	++	++
Ratanpur	+	+	-	+	+++	+	++	+++	-	+	+	+
Rihaikpur	++	+++	+	++	+++	-	+++	+	-	-	+++	+++
Saraiyamu barakpur	+++	++	++	+++	+	++	-	+++	-	+++	+++	+++
Sevam (Nahariya Tal)	++	+++	+++	+++	+++	++	+++	++	-	++	+++	+++
Tarahi	+++	+++	+++	+	-	+	++	+	-	+	+	++
Umari	+++	+++	+++	+++	++	-	+	++	+++	+	+	+++
Updhyapur	-	-	+	+++	+	+++	+	+	+++	-	++	+++
Vaidaha Jheel	++	+++	++	+++	-	+	-	-	+	++	-	+

Note: Intensity: + Low, ++ Medium, +++ High, - No affect.

(Source: Primary Data)

Chaddowari wetland has high intensity of problems such as excessive water extraction, dumping of garbage but it has low intensity of excessive fishing and impact of agriculture and poaching of bird and development activities are absent. Chhathua Kalawetland has high intensity problem such as excessive water extraction, sedimentation, soil-digging and levelling of wetland for agriculture butit has low level of pollution problems (Table 2).Daudhpatti wetland has high intensity of problems such as excessive water extraction, sedimentation, soil digging, levelling of wetland for agriculture, Pollution, development activities and dumping

of garbage. Domanpur wetland has high intensity of problems such as excessive water extraction, sedimentation, levelling of wetland for agriculture, Pollution and medium intensity problem of development activities and low intensity of problems such as dumping of garbage(Figure 4).

Figure 4: Different Problems Faced By Wetland Sites in Sultanpur District

Hathuara wetland has high intensity of problems such as excessive fish cultivation and low intensity of problems such as introduction of invasive species.Kaithapur wetland has wetland has high intensity problem such as excessive water extraction, sedimentation, soil-digging and levelling of wetland for agriculture, land reclaim for housing and developmental activities but it has low intensity of problem like dumping of garbage in wetland and invasive species problem. Kanwarpur wetland has midium intensity problem such as excessive water extraction, sedimentationand but high intensity problem is land reclaim for housing. Karahwa Jheel wetland has high intensity problem such as excessive water extraction, sedimentation, soil-digging and land

reclaim for housing but medium intensity problems of developmental activities. Kasartal wetland has high intensity of problems such as excessive water extraction, sedimentation, soil digging, levelling of wetland for agriculture and impact of agriculture on wetland but medium intensity of problems such as excessive fish cultivation, Pollution and development activities.Sevam (Nahariya Tal) wetland has high intensity of problems such as sedimentation, soil digging, levelling of wetland for agriculture, pollution, excessive fish cultivation but it has medium intensity problem such as excessive water extraction, poaching and dumping of garbage. Tarahi wetland has high intensity of problems such as excessive water extraction, sedimentation, soil digging but it has low intensity of problems such as levelling of wetland for agriculture, poaching, pollution and dumping of garbage. Umari wetland has high intensity of problems such as excessive water extraction, sedimentation, soil digging, levelling of wetland for agriculture, development activities and it has low intensity of problems such as dumping of garbage, invasive species, and excessive fish cultivation. Vaidaha Jheel wetland has high intensity of problems such as sedimentation, levelling of wetland for agriculture and it has low intensity of problems such as poaching, development and impact of agriculture on wetland.

Water Quality Problems

Pollution and water quality are major phenomena in wetlands. Extremely high and low euphotic limit is lethal for wetlands flora and fauna. Seasonally in this area euphotic limit is high in the rainy season (July to sep.) and low in the summer season (March to May). Vedaha Jheel and Nahariya Tal are the lowest transparent wetlands in this study area because of systematic managements of wetlands and Karahwa is the highest transparent wetland. Most wetland s euphotic limit is around the mean values and few are below the mean values.

Correlation Matrix Wetland Water Quality Components

The WQI method is more methodological and facilitates the comparative evaluation of wetland water quality of several sampling sites. It is found that the wetland water on more than 80 percent sampling stations are not good for drinking and 20 percent has been founded less amount of pollutant. In the present study for this area TDS has highly positive correlation with EC (r =.995). This shows that with increase or decrease in the value of TDS: EC also exhibit increase or decrease in their values. TDS also show highly positive correlation with TH, Cl and F. TH show highly positive correlation with Cl, NO3 and K (Table 3). This indicates that TH in water sample may be due to presence of Ca (NO3)2 and Mg(NO3)2, CaCl2, MgCl2, CaF2, and MgF2. Positive correlation observed between Cl & F, Cl &NO3, Cl & K, K & F, Na & K. Total positive correlation is obtained between 32 union and 41 union and rest of the union (23 union, 15 combination) show negative correlation. Turbidity show negative correlation with most of parameters (Table 3). Temperature show negative correlation with Na.

Table 3: Water Quality Correlation Matrix of Sultanpur District

		pH	TDS	EC	TH	Cl	No3	F	Na	K
pH	Correlation	1	.079	.088	.427	.318	.434	.235	.116	.602
	Sig. (2-tailed)		.827	.808	.218	.371	.210	.513	.750	.065
TDS	Correlation	.079	1	.995**	.749*	.915**	.629	.780**	.530	.353
	Sig. (2-tailed)	.827		.000	.013	.000	.051	.008	.115	.317
EC	Correlation	.088	.995**	1	.737*	.901**	.614	.746*	.515	.325
	Sig. (2-tailed)	.808	.000		.015	.000	.059	.013	.128	.359
TH	Correlation	.427	.749*	.737*	1	.906**	.957**	.640*	.217	.796**
	Sig. (2-tailed)	.218	.013	.015		.000	.000	.046	.547	.006
Cl	Correlation	.318	.915**	.901**	.906**	1	.818**	.753*	.515	.592
	Sig. (2-tailed)	.371	.000	.000	.000		.004	.012	.128	.072

No3	Correlation	.434	.629	.614	.957**	.818**	1	.501	.169	.833**
	Sig. (2-tailed)	.210	.051	.059	.000	.004		.140	.640	.003
F	Correlation	.235	.780**	.746*	.640*	.753*	.501	1	.419	.573
	Sig. (2-tailed)	.513	.008	.013	.046	.012	.140		.228	.083
Na	Correlation	.116	.530	.515	.217	.515	.169	.419	1	.009
	Sig. (2-tailed)	.750	.115	.128	.547	.128	.640	.228		.980
K	Correlation	.602	.353	.325	.796**	.592	.833**	.573	.009	1
	Sig. (2-tailed)	.065	.317	.359	.006	.072	.003	.083	.980	

**Correlation is significantatthe 0.01level(2-tailed).

* Correlation issignificantat the0.05level(2-tailed).

The most significant pollutants observed in the present study are total Alkalinity, Chloride, Fluorides, Nitrates, total Dissolved Solids and Electrical Conductivity. Though, some sampling sites also exhibits total hardness, calcium and magnesium as principal pollutants with other parameters whilst by analyzing the NPI values in both seasons it can also be concluded that in some samples all parameters except pH behaves like pollution causing parameters.

CONCLUSION

Wetland ecosystems in Sultanpur are both permanent and temporary geomorphic unit associated with rainfall that constantly change their status. The developmental activities have severely damaged physical and ecological characteristics of these wetlands. With rapid change in land use due to developmental activities during last 30 years many wetlands were irreversibly lost, while performing specific ecological functions in purifying air and water, conserving soil and controlling climate change. The overall trend of wetland shows that they have been reduced from 2010 to 2024. The decadal comparison of wetland shows the shrinking, reduction in land area of wetlands, eutrophication siltation, waste disposal etc. The depth of wetland also reduced. The deepest wetland is less than 10 meter and shallowest is only half meter. The largest wetland in 2010 was covering the area of 89 acre which shows large ecological occupancy and smallest wetland has 2.77 acre of area. Pollution and water quality are major phenomena in wetlands. Extremely high and low euphotic limit is lethal for wetlands flora and fauna. Vedaha Jheel and Nahariya Tal are the lowest transparent wetlands in this study area because of systematic managements of wetlands and Karahwa is the highest transparent wetland.

REFERENCES

1. Barbier, E. B. (2007) Valuing ecosystem services as productive inputs, *Economic policy,* 22(49), 178-229.
2. Bezabih, B.; & Mosissa, T. (2017) Review on distribution, importance, threats and consequences of wetland degradation in Ethiopia, *International Journal of Water Resources and Environmental Engineering*, 9(3), 64-71.
3. Cenbsus of India, (2011). Directorate of Census Operation, MHa, Govt. of India, Delhi, India.
4. Cowardin, L. M.; & Golet, F. C. (1995) *US Fish and Wildlife Service 1979 wetland classification: A review,* Classification and inventory of the world's wetlands, 139-152.
5. Daily, G. C. (1997) Introduction: what are ecosystem services. Nature's services: Societal dependence on natural ecosystems, 1(1), p. 129-141.
6. Daily, G. C.; Söderqvist, T.; Aniyar, S.; Arrow, K.; Dasgupta, P.; Ehrlich, P. R. & Walker, B. (2000). The value of nature and the nature of value, *Science*, 289(5478), 395-396.

7. Das, R. T.; & Pal, S. (2017) Exploring geospatial changes of wetland in different hydrological paradigms using water presence frequency approach in Barind Tract of West Bengal, *Spatial Information Research,* 25, 467-479.

8. Datta, D.; & Kumar Ghosh, P. (2015) Evaluating sustainability of community endeavours in an I ndian floodplain wetland using multi criteria decision analysis. *Singapore Journal of Tropical Geography,* 36(1), 38-56.

9. Dugan, P. J. (1990) The role of ecological science in addressing wetland conservation and management in the tropics, *InternationaleVereinigung für Theoretische und AngewandteLimnologie: Mitteilungen,* 24(1), 5-10.

10. Finlayson, C. M.; & Van der Valk, A. G. (1995) Wetland classification and inventory: a summary. *Vegetatio,* 118 (1), 185-192.

11. Gardner, R. C.; & Davidson, N. C. (2011) The ramsar convention. Wetlands: Integrating multidisciplinary concepts, (Ed. B. Le Page.), p. 189-203.

12. Ghosh, S.; & Halder, S.(2014) Wetland macrophytes in purification of water, *International Journal of Environmental Sciences,* 5(2), 432-437.

13. Kar, N.; Debbarma, M. K.; Saha, A.; & Pal, D. R. (2012) Study of implementing automated attendance system using face recognition technique, *International Journal of computer and communication engineering,* 1(2), 100-103.

14. Pagiola, S.; Von Ritter, K.; & Bishop, J. (2004) Assessing the economic value of ecosystem conservation. Washington, DC: World Bank, Environment Department.

15. Ramsar, C. (2008). The Ramsar convention on wetlands, Changwon, Republic of Korea, 3(3).

****