Ecology of Semara Taal In Relation To Macrophytes

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Abstract- ***The present study was aimed to analyze the physic-chemical condition and macrophytes of Semara taal. The study was conducted over a period of one year from July, 2018 to June, 2019 at 3 different sampling sites. The physico-chemical condition of water was suitable for growth and distribution of macrophytes. A sum of 31 species of macrophytes was identified. Presence of macrophytes reflects the nutrients enrichment and organic load in taal. Abundance of Ceratophyllum demersum, Nitella hyalina, Chara vulgaris, Potamogeton pectinata is the sign of water pollution.***

Indexed Terms- ***Wetland, water quality, macrophytes, Semara taal.***

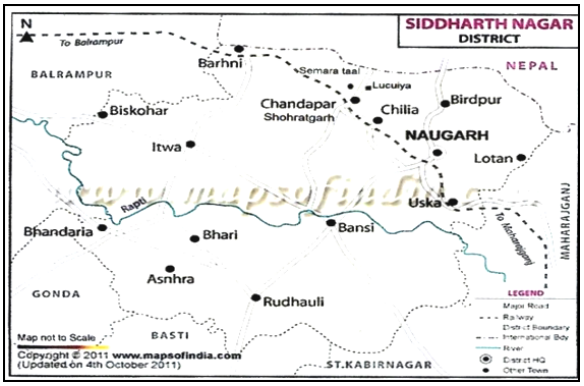
I. INTRODUCTION

Wetlands are areas where water is the primary factor controlling the environment and the associated plants and animal life. Wetlands are very productive ecosystems for primary producer that help in the regulation of biological cycles, maintenance of water quality, nutrient movement and support for food chains Wetlands are important components of watersheds and provide many valuable functions to the environment and society. The water resource is being used for various purposes such as domestic use, agriculture and fish culture etc. by local community. Now wetlands are shrinking rapidly because of urbanization and industrialization. Due to urbanization and anthropogenic pressure most of the wetlands are succumbed to greater degree of biologically active nutrient accumulation (Verma and Prakash, 2018; Prakash, 2020).

Aquatic macrophytes are group of large photosynthetic organisms usually grow with their roots in soil or water. Macrophytes often grow more vigorously where nutrient loading is high. They may be submerged, rooted with floating leaves, free floating and emergent. Macrophytes are important components of aquatic ecosystem in terms of biomass production, habitat structuring and regulation of nutrient cycle. Macrophytes are not only used as food source for aquatic invertebrates but also act as an efficient accumulator of heavy metals (Chung and Jeng, 1974). They also respond to the changes in water quality and are used as bioindicator of pollution (Trishla *et al*., 2016). The aquatic communities reflect anthropogenic influence and are very useful to detect and assess the human impacts (Solak *et al*., 2012).Thus macrophytes play a pivotal role to make an ecosystem healthy and can be used as agent in bioremediation

II. STUDY AREA

The wetland Semar taal is situated in Shohratgarh tahsil of district Siddharthnagar of Uttar Pradesh.The taal is more than 3 km away from Shohratgarh, 28 km from Naugarh (headquarter of district Siddharthnagar). The total area of this taal is 466.66 acre. The maximum depth of water in the taal is 12feet during mansoon and minimum 5 feet in summer. The sources of water supply to the taal are drainage water from Banganga river. The Taal is enriched with several type of vegetation. The water of Taal is used for Agriculture and fish culture.



Map of Siddhrathnagar district

Semara Taal, Wetland

Satellite view of Semara Taal, a wetland

III. MATERIAL AND METHODS

Water samples were collected fortnightly from three fixed sites in a plastic stoppered bottels, both from the surface and bottom layers between 8 to 10 A.M. The transparency, temperature, dissolved oxygen, free carbondioxide and pH were recorded on spot by using Secchi disc and water quality analyser kit. The total alkalinity, total hardness, nitrates, and phosphates analysis were made at field as well as in laboratory as per standard methods (APHA,1998). The primary productivity was measured with well known light and dark bottle method of Gaarder & Gran (1927). Macrophytes were collected by following the methods of Biswas and Calder (2000), Edmondson, (1992) and Adoni (1985).The identification of macrophytes was done with the help book (Singh and Karthikeyan,2001).

IV. RESULT AND DISCUSSION

Physico-chemical condition of water: The physico-chemical conditions of Semare taal water during July to June,2019 ^{0}C was presented in the table1. The water temperature of taal ranged from 13.8 to 34.4^{o}C with mean value 23.96. The water transparency of taal was ranged from 18.6 to 36.8cm with mean value 26.09 cm. The depth of taal was ranged between 142 to 465cm with mean depth of 254.25cm.The pH was ranged between 7.01 to 9.08 with mean pH 7.85. The dissolved oxygen was ranged 5.7 to 9.4 cm with mean value 7.29. The free carbondioxide was ranged from 12.0 to 18.0 ppm with mean value 14.25ppm. The total alkalinity was ranged 97.0 to 106.0 ppm with mean value 101.37 ppm. The total of hardness of taal d 77-126 ppm with mean value 97.18 ppm. The nitrate was ranged 1.09 to 1.38 ppm with mean value 1.19 ppm. The phosphate was ranged 1.02 to 1.08 ppm with mean value 1.o4 ppm. The grass primary product was ranged 68.75 – 96.35 mgC/m^3/3hr with mean value 87.54 mgC/m^3/3hr. The net primary productivity was ranged 49.54 – 69.43 mgC/m^3/3hr with mean value 55.46 mgC/m^3/3hr

Table 1. Physico-chemical characteristics of water of Semara Taal (July,2018-June,2019)

Parameters of water	Sites			Range	Means±SD
	S1	S2	S3		
Temp.(^{0}C)	13.8 - 34.2	13.9- 34.4.	13.9- 34.1	13.8 - 34.4	23.96 ± 2.41
Transp.(cm)	18.6 -35.7	19.7-36.8	18.9-35.8	18.6 - 36.8	26.09 ± 3.47
Depth (cm)	146 – 455	142 – 460	144 – 465	142 – 465	254.25 ± 46.87
pH	7.01-9.03	7.04- 9.08	7.06-9.02	7.01- 9.08	7.85 ± 0.33
DO(ppm)	5.7-8.9	5.9 - 9.4	5.8 – 9.2	5.7 - 9.4	7.29 ± 1.23
F CO_2(ppm)	12.5 -17.7	12.6 - 18.0	12.0 - 17.8	12.0 - 18.0	14.25 ± 1.85
TA (ppm)	99.5 – 105.5	97.9 - 106.0	97.0 – 105.5	97.0 -106.0	101.37 ± 1.20
T H (ppm)	78.5 – 126.0	78.0- 125.0	77.0 – 124.0	77 - 126	97.18 ± 2.70
Nit.(ppm)	1.09 – 1.29	1.18-1.35	1.10 - 1.37	1.09 -1.38	1.19 ± 0.09

Phos.(ppm)	1.02 - 1.07	1.03 - 1.08	1.03 – 1.08	1.02 - 1.08	1.04 ± 0.08
GPP ($mgC/m^3/3hr$)	68.75 – 80.86	75.34 – 96.35	71.45 – 95.34	68.75 – 96.35	87.54±1.65
NPP ($mgC/m^3/3hr$)	49.54 – 67.54	50.32 – 69.43	50.54 – 67.56	49.54 – 69.43	55.46±1.32

Table 2: Diversity of Macrophytes of Semara Taal

S.N.	Name of Macrophytes	Family	Site -1	Site-2	Site-3
1.	*Alternanthera sessilis*	Amaranthaceae	+	+	+
2	*Azolla pinnata*	Salviniaceae	+	+	+
3	*Aponogeton natans*	Aponogetonaceae	-	+	-
4	*Cyperus rotundus*	Cyperaceae	+	-	+
5	*Ceratophyllum demersum*	Ceratophyllaceae	+	+	+
6	*Eichhonia crassipes*	Pontederaceae	+	-	+
7	*Eupatorium album*	Asteraceae	+	-	+
8	*Hydrilla verticellata*	Hydrocharitaceae	+	-	+
9	*Hydrocharis cellulose*	Hydrocharitaceae	+	+	-
10	*Ipomea aquatica*	Convolulaceae	+	+	+
11	*Jussiaea repens*	Onagraceae	+	+	+
12	*Lemna purpusilla*	Lemnaceae	+	+	-
13	*Marsilea minuta*	Marsileaceae	+	+	+
14	*Myriophyllum spicatum*	Haloragaceae	+	+	+
15	*Monochoria hastata*	Pontederaceae	-	+	-
16	*Najas minor*	Hydrocharitaceae	-	+	-
17	*Nelumbonucifera*	Nelumbonaceae	+	-	-
18	*Nymphea stellata*	Nymphaceae	+	-	+
19	*Nitella hyalina*	Characeae	+	+	-
20	*Pistia stratiotes*	Araceae	+	-	+
21	*Passiflora foetida*	Passifloraceae	+	+	+
22	*Potamogeton pectinata*	Potamogetonaceae	+	-	+
23	*Persicaria glabra*	Polygonaceae	+	-	+
24	*Polygonum glabrum*	Polygonaceae	+	+	-
25	*Salvinia auriculata*	Saliviniacee	+	-	+
26	*Spirodela polyrhiza*	Araceae	+	+	+
27	*Trapa natans*	Trapaceae	-	+	-
28	*Typha anguistata*	Typhaceae	+	-	+
29	*Utricularia vulgaris*	Lentibulariaceae	+	+	+
30	*Vallisneria spiralis*	Hydrocharitaceae	+	+	+
31	*Wolffia arrhiza*	Araceae	+	+	+

V. MACROPHYTES

Total 31 species of macrophytes were identified during this entire period of study at 3 different sites of Semara taal (table 2). Common species recorded from sampling sites were *Ceratophyllum demersm, Nitella hyalina, Alternanthera sessilis, Hydrilla verticellata, Vallisneria spiralis,Utricularia vulgaris, Potamogeton pectinata, Persicaria glabra, Cyprus rotundus, Typha angustata, Amaranthus spinosus, L emna perpusilla, Passiflora foetida*.

Distribution of various types of macrophytes indicates the quality of water. Change in water quality

influences the weed formation and distribution (Jafari and Guanale, 2006). Species indicative of organic enrichment and nutrient loading were *Ceratophyllum demersum, Nitella hyalina, Chara vulgaris, Potamogeton pectinata, Eichhornia crassipes, Lemna perpusilla, Azolla pinnata and Amaranthus spinosus* at sampling stations. The study got support by findings of Uedeme-Naa(2011).

Species found at Site 1 are *Alternanthera sessilis ,Azolla pinnata, Cyperus rotundus, Ceratophyllum demersum, Eichhonia crassipes, Eupatorium album, Hydrilla verticellata, Hydrocharis cellulose, Ipomea aquatic, Jussiaea repens, Lemna purpusilla, Marsilea minuta, Myriophyllum spicatum, Nelumbonucifera, Nymphea stellata, Nitella hyalina ,Pistia stratiotes, Passiflora foetida, Potamogeton pectinata, Persicaria glabra, Polygonum glabrum, Spirodela polyrhiza ,Typha anguistata ,Utricularia vulgaris, Vallisneria spiralis* and *Wolffia arrhiza.*

Species found in S2 are *Alternanthera sessilis ,Azolla pinnata, Aponogeton natans, Ceratophyllum demersum, Ipomea aquatic, Jussiaea repens, Lemna purpusilla, Marsilea minuta, Myriophyllum spicatum, Monochoria hastate, Najas minor, Nitella hyalina , Passiflora foetida, Polygonum glabrum, Salvinia auriculata, Spirodela polyrhiza ,Utricularia vulgaris, Vallisneria spiralis* and *Wolffia arrhiza.*

Abundant species found in site 3 are *Alternanthera sessilis ,Azolla pinnata, Cyperus rotundus, Ceratophyllum demersum, Eichhonia crassipes, Eupatorium album, Hydrilla verticellata, Ipomea aquatic, Jussiaea repens, Lemna purpusilla, Marsilea minuta, Myriophyllum spicatum, Nymphea stellata, Nitella hyalina ,Pistia stratiotes, Passiflora foetida, Potamogeton pectinata, Persicaria glabra, Spirodela polyrhiza , Utricularia vulgaris, Vallisneria spiralis* and *Wolffia arrhiza.* indicates that the water of taal was polluted and not suitable for domestic purposes.

CONCLUSION

Sampling sites S1, S2 and S3 differ in physicochemical characteristics of water quality Abundance and high density of *Ceratophyllum demersum, Nitella hyalina, Chara vulgaris, Eichhonia crassipes, Potamogeton pectinata* indicate enrichment and high nutrient loading. *Nitella hyalina, Lemna purpusilla, Azollap innata , Ceratophyllumd emersum , Alternanthera sessilis, Hydrilla verticellata, Vallisaneria spiralis, Persicaria glabra* were reported as dominant species at sampling stations which are indicators of organic pollution. The presence of large number of macrophytes indicated that taal water is rich in nutrients and organic loading. The taal water is found suitable for fish culture and agricultural purposes also. Further more detail study is recommended.

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