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Study of some limnological properties of Harchandpur pond, District Etah (U.P.) India

VISHWAKANT[1], R.C. VERMA[2] and R.S. SAXENA[3]

[1]Department of Zoology, Agra College, Agra (India)
[2]Department of Chemisrty, Agra College, Agra (India)
[3]Department of Zoology, Ganjdundwara College, Ganjdundwara, (India)

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ABSTRACT

The present investigation deals with seasonal variations of physico – chemical parameters and Quantitative analysis of a rural pond during the year 2005 -2006 **.** Water temperature was maximum (33.7 ^{0}C) in May and minimum (15.2 ^{0}C) in January; Transparency was max. (35.5 cm) in Jan. and lowest (27.0 cm) in July; Alkalinity & Hardness were high in May – June and D.O. had highest value (8.20 mg/l) in Dec. and lowest(3.32 mg/l) in Aug.; Planktons (No./l) were abundant two times a year (Summer & Winter pulses) and lowest during monsoon season.

Key words: Harchandpur, biota, Sewage, Summer – Winter pulse.

INTRODUCTION

The present observed pond is eutrophicated and keeps changing its physico–chemical and biotic complexes by virtue of seasonal changes and by incorporation of organic and man generated polluted matter like sewage, domestic discharges, municipal wastes, agrochemicals, grazing with other animal activities, surface run off, silt, clay, suspended inorganic and organic matter.

Present study reveals that how planktonic and biotic especially fishery lives get affected on account of alterations of abiotic factors in the Harchandpur pond.

Extensive work has been done by Indian limnologists on the ecology of Indian wetlands. How ever no sufficient work has been done on the ecology of wetlands of Distt. Etah.

The pond under study is getting deteriorated for pisci– culture and fishery management programmes due to lack of public attention, dis-management and infiltration of excess biogenic pollution. However people awareness could regenerate good conditions for production of living biota for commercial purposes. In this pond fishing is practisized by local contractors on behalf of Village Panchayat.

The Harchandpur pond is 9 Km. away from Etah city on Etah – Kanpur G.T. Road and located at about 0.25 Km. on eastern side of G.T. Road. The covering areas is around 10 hectares.

The purpose of study is to prepare qualitative and quantitative assessment of the abiotic and biotic conditions prevailing in the pond.

MATERIAL AND METHODS

Water samples were collected in clean glass bottles once in a month throughout the year (July 2005 to June 2006). Water temperature was recorded with centigrade thermometer.

Table -1: Variations of some physico-chemical parameters of observed pond during the year 2005 – 2006

Month/ parameter	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
Water temperature	32.0	32.1	31.7	28.0	22.7	18.7	15.2	16.8	22.9	28.1	33.7	32.8
Transparency	27.0	27.2	27.9	30.3	32.3	33.7	35.5	33.7	34.2	31.1	29.9	27.8
Turbidity	105	118	125	105	105	95	95	92	85	85	90	100
pH	7.4	7.1	7.0	8.2	8.2	8.4	7.8	7.4	7.9	8.0	8.2	8.6
Alkalinity	200	190	190	220	230	212	220	228	242	272	310	320
Hardness	140	138	169	239	246	252	275	245	290	310	328	298
Free CO2	29.9	30.7	29.0	25.5	19.9	14.9	13.8	15.9	19.7	22.8	23.5	26.8
Dissolved Oxygen	3.99	3.32	5.21	5.96	7.92	8.20	8.01	7.90	7.88	4.88	5.01	5.00
Phosphates	2.98	3.01	2.20	2.22	2.01	1.20	0.99	1.11	1.33	1.42	2.19	2.28
Silicates	22.9	23.8	25.8	21.9	19.0	15.9	14.7	14.2	13.8	14.9	17.7	18.7

All values are expressed in mg/lit. except pH, temperature, turbidity and transparency.

Table - 2: Variations of No. of planktons during the year 2005 – 2006.

Month/parameter	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
No. of Phytoplanktons (No./lit.)	10500	7895	12380	12556	11212	18660	14200	18248	16280	19705	20875	20120
No. of Zooplanktons (No./lit.)	4990	3497	7080	5572	3795	4500	6997	8248	8870	9000	8956	7887

Transparency (penetration of light) was measured with Sacchi disc. pH was recorded with digital pH stick. Other physico-chemical parameters were estimated by standard methods of APHA (1998). Results were expressed in mg/l except pH, temperature and transparency. For plankton counting samples were collected from the water surface by filtering 5000ml. water through plankton net. Samples were preserved in 5% formalin and counting was done by haematocytometer and counter plate.

RESULTS AND DISCUSSION

Four seasons were taken into account viz. Monsoon (July to Sept.), Post monsoon (Oct. to Nov.), winter season (Dec. to Feb) and summer season (march to June). Water temperature was more in summer and less in winter due to climato-geographical factors. Season wise fluctuation was due to heat gain from solar energy and transfer by conduction. (Chauhan *et.* al., 2006)**.** Transparency was noticed high during winter and post winter times in which water becomes clear and transparent increasing penetration of light (low turbidity). Lower values were found in rainy season due to incoming surface run off with turbid rain waters.

Alkalinity and Hardness were higher in summer probably by high growth of biota, more sewage, higher decomposition, domestic discharges and depletion of water level. Carbon-dioxide and bicarbonates concentrations got depleted in post monsoon and winter due to high rate of photosynthesis. pH kept more or less changing with alkalinity.

The D.O. concentration was suitable measure for aqua culture and fish management**.** D.O. was available in the pond by the direct diffusion from air and photosynthesis. (Dhakad and Chaudhary 2003). Dissolved oxygen (D.O.) was recorded maximum in winter due to high rate of photosynthesis and holding capacity of water. Its concentration was reduced during peak summer and monsoon due to more respiratory activities and decomposition by organisms. More pollution load also reduced D.O.

Phosphates and silicates had higher values in monsoon due to infiltration of agrochemicals, bony materials and other organic matter. Lower values were due to (in winter) more consumption by limnoplanktons (Mishra *et al.,*1998).

Phytoplanktons act as bridge between abiotic and biotic complexes in wetlands (Saha *et al.,*2000). Chlorophyceae, Cyanophyceae, Bacillariophyceae were found as major groups of phytoplanktons while Rotifera, Cladocera and Copepoda were abundant Zooplanktons. Optimum presence of limnoplanktons leads to healthy production of macrofauna including fishes. No single factor could govern the production of limno-planktons. Infact variations in planktonic production attribute to many factors.

Two pulses of limnoplanktons were observed during present investigation. First one was recorded in winter and second one in summer (khan *et al.,*1974). Higher values of pH, D.O.and transparency and low temperature, moderate values of alkalinity, phosphates and other vital minerals were probably responsible for winter pulse while Summer pulse was due to higher values of temperature, pH and alkalinity and moderate value of penetration of light.

Minimum growth of planktons was recorded during monsoon due to less D.O., minimum sunlight, less photosynthesis and transparency and load of turbid waters with organic pollution. These findings about limnoplanktons are similar to some extent to Jindal and Vasisht (1985).

The limnological evaluation of pond water described above shows certain fundamental features which promote moderate pisci-culture. Higher values of D.O., alkaline pH, higher values of total alkalinity and moderate presence of limnoplanktons are responsible for productive nature of pond.

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