



ANALYSIS OF PHYSICAL PROPERTIES OF WATER OF DARYABGANJ LAKE IN DISTRICT ETAH

Kuber Singh	Deptt. of Zoology, Ganjundwara P.G. College, Ganjundwara, District Etah
H.N. Sharma	Deptt. of Environmental Toxicology, S.L.S., Dr. B.R. Ambedkar University, Agra

Abstract

Industries and food supply on water has created critical problems for adequate supply and satisfactory quality of water through out the world, these problems are bound to increase as the world population increases. Because of this interrelationship of water and its resources with human beings. The hydrobiologist may play an important role in solving these problems. The study of Daryabganj lake in Etah district, is one of the most important aspects of fisheries. A proper development of fisheries in district Etah assumes greater importance as it is economically and industrially a backward district of Uttar Pradesh.

Introduction

In country like India, Fish has special importance as a supplement to ill balanced diets. Today protein deficiency in the world's most serious human malnutrition problem and perhaps over 40% of the world population is suffering from protein deficiency. It is now an established fact that food problem of our country can be solved by supplementing agriculture with aquaculture or under water agriculture.. This requires planning, which in turn demands through insight into the delicately balanced interacting relationships between various factors of the existing aquatic environment. Fortunately India is blessed with vast water resources in the form of rivers, estuaries, lakes, natural and man made ponds and mangrove wet lands, which are ideal for fishery and cover more than Ten million hectares. Inland water resources of the country if properly managed, can enrich the human diet by providing additional food for which global demand is increasing day by day. In India most of the ponds are also used for the cultivation of fishes, under such circumstances greater changes take place in hydrobiological conditions of the environment, which affect the recreational and commercial uses of these water. Hydrobiology, which deals with the biological productivity of inland waters with all the physical chemical and biological factors which effect it, is a subject of growing interest. The dependence of man on agriculture, Lake, ponds and reservoirs have many uses. Some persons take interest in these water for recreational purposes (such as swimming and boating etc.) and some for controlling floods developing power and culturing different communities of aquatic animals, mostly fishes. The comparison with many other sciences, hydrobiology is still in its developing stage in India. Although it already has become reasonably advanced in many other countries of the world, in India with the increasing demand of fish food, water supply and power development many states have already taken steps to investigate the hydrobiological conditions in lake reservoirs etc. The stock of lake fish in this district is depleting due to improper methods of fishing and tampering the natural ecological factors. The water of Daryabganj lake is used for domestic, agricultural, aquaculture and recreational purposes. Though, in this lake the fishing programmes are carried out unsystematically. A proper development of fisheries and fishing programmes in Daryabganj lake adds much not only to the welfare of the rural population engaged but

also to the general wellbeing of the district. Therefore, a complete survey and systematic planning is needed to boost the fishing programme of Daryabganj lake.

Materials and Methods

Sampling and Analysis: Monthly water samples were collected in specially designed water samples from three experimental stations of Daryabganj lake. For DO, however, water samples were collected in separate BOD bottles and fixed at spot. At the time of water sampling, temperature, depth and transparency were also noticed. The samples was lowered into the water through the cord (graduated in Centimeters) and when the desired depth was reached, the lid of the bottle was opened by pulling up the lid cord. When the bottles filled, the lid cord was released and the sampler taken out and the complete filling of the bottle was ascertained by observing the displaced air bubbles which ceased to come upon the surface of water.

For recording the water temperature, mercury bulb thermometre, having an accuracy of 0.1C, was used. Water temperature was measured by placing the bulb of the thermometer below the surface layer of water, at different spots of experimental station. The measurement of turbidity was determined by Nephelometric method. The instrument setting at 100 with 40 N.T.U. standard suspension, After setting the instrument, the sample was shaken well in the tube and placed in vertical position for some time to eliminate the air bubbles. Now, sample was transferred carefully into the Nephelometer sample tube and noticed the value on the scale in the term of N.T.P. and changed into mg/l. The measurement of light penetration (transparency) was done by means of Sacchi's disc, a disc of 20 cm. Diameter pointed in black and white quadrants and having sufficient weight to smk disc was lowered in water and when the differentiation of vick and white colour disappeared, the depth was noted and the disc was further lowered. Again it was pulled up and when the colour differentiation reappeared, the depth was noted.

Geographical Study of Daryabganj Lake: Daryabganj lake is located in Aliganj tehsil of Etah district, about 47 km from the district head quarter on Aliganj road. It is 17 km away from Ganjdundwara. The covering area is about 89.795 hactares. The lake has semilunar shape and surrounded by Kuda, Konar & Nagaria villages. The water depth varies from 5' to 16' feet. The experimental site will be near Kuda village (site A) Konar Nagla village (site B) & Nagaria village-(site C). Daryabganj lake is formed as a result of the change in the burhi Ganga river basin (formerly river course of Ganga) as its basin closely, resemble to those of the river basin. It is situated near the residential localities and is used for bathing and washing purposes besides fishing. Water supply of this lake is regulated through drainage system and rain water. The lake is now used as fish farm by the district administration and stocked with the finger lings of major carps, chinese carps & Tilapia.

Results and Discussion

Water Temperature : Temperature is one of the most important and determining factors of a water body. Its fluctuations are keenly felt in the fresh water environment. Temperature is also an important determining factor in the seasonal concentration of planktonic organism (Allen 1920, Jackson & Meir 1965, Singhal *et al.* 1985 and Rao & Duve 1992) Odum and Vilson (1962) have emphasized that solar radiation and its penetration in the water essential requirements column are the covering the total photosynthetic yield of whole plant community. Similar findings have been reported by Singh (1964 & 1966) Moitra and Bhattacharya (1965), Vasisht (1968), Rup Singh and Singh (1973). Found the temperature to belong of the most important factors influencing the distribution and production of plankton (Wetzel 1975). Temperature, directly or indirectly, controls some of the major physical processed of water such as mixing, turbulence and water currents (Bridge 1961, Bhatt and Pathak 1992). The growth, reproduction and the development of biota is also influenced by the temperature. Temperature, together with other physical factors exercises a significant control on the distribution of

gases, nutrients and similar other biogenic processes. Any change in water temperature directly or indirectly effect the metabolic rate, Growth and reproductive processes of the aquatic fauna, particularly the fish and if it is beyond the limits of thermal tolerance the quantitative make up of the fish population gets altered, Bais *et al.* (1993) have emphasized that productivity increases during winter when the water temperature is low but in 2000 they observed different results. Due to shallowness of the Daryabganj lake the water temperature has shown a tendency to follow closely the atmospheric temperature. A steady rise or fall in the water temperature is attributable to the corresponding rise or fall in the atmospheric temperature due to increased and decreased solar radiation. There was found a very close similarity between the atmospheric and water temperature due to shallow depth. This type of observation for shallow water bodies was in conformity with the earlier reports of Saad (1973), Mishra *et al.* (1975), Reid and Wood (1976), Singhal *et al.* (1985). Water temperature has shown a gradual increase (17.0 c A station 16.80 C B station & 17.4° c from January to May (31.60 C A station, 31.2° c B Station and 32.8° c C station), followed by a decline, thereafter due to rains, reaching its minimum in January.

Transparency: It amounts the transparency of a water body. The light penetrates deeper into clear water and influences the migration of food organism to whole of the water column. Further, it induces the growth of Low photosynthesis due to the presence of a carpet of floating macrophytes (Lemna, Azolla and Wolfia), increase in suspended matter and cloudy days (Rainy season) and rich population of fisher, may also explain the free carbon dioxide enrichment in the experimental areas. Higher concentration of CO₂ is lethal to fish and other organisms Basheer *et al.* (1996). In the present study the transparency of Daryabganj lake at A, B & C station ranged between 30.2 cm., 36.6 cm. In December respectively. During rains the water of Daryabganj lake becomes muddy and turbid. The fall in light penetration was mainly due to monsoon rains, erosion and inflow of eroded material from the surroundings. Monsoon fall in light penetration has also been earlier studied. In the present investigation, higher transparency was recorded during winter in fish ponds. Thus could be attributed to less decomposition of organic matter due to low temperature and less input of solids by the surface run off due to low temperature and less input of solids by the surface run off due to cessation of monsoon rain. This confirms the findings of George (1976) and Sharma (1976) low transparency was recorded during summer and monsoon which may be due to suspended colloidal matter in addition to plankton. Kaul (1983) observed that the storm entering the water body is also responsible for low transparency. The transparency may also be affected by biota causing turbidity i.e. High quantity of phytoplankton etc. The light penetration may also be affected by the suspended materials coming along with the domestic effluents, city drainages and from so many other sources.

Turbidity: Turbidity in water is caused by the substances which are not present in the form of true solution. Turbidity of water is actually the expression of optical property in which the light is scattered by the particles, present in water. Turbidity makes the water unfit for domestic purposes, food and beverage, industries and many other uses. Monthly Study of turbidity from Daryabganj lake indicates its annual variation from 60 mg/l (May) to 1.25 mg/l (September) at 'A' Station, 55 mg/l (May) to 120 Mg/l (September) at station B and 65 mg/l (may) to 130 mg/l (September) at station C and remained higher during the month of Aug. & July with the annual highest peak in the month of September (Monsoon). It was influenced by rain which caused surface run-off and thus brought with it decayed organic matter, minerals, silts which increased turbidity as also observed by Nautiyal and Lal (1981). Such an increase in a monsoon month has been reported by Dutta (1978), Jhingran (1982), Sharma (1985), Patil and Sahu (1993) and Bais *et al.* (1993) However Comparatively low values of turbidity were observed from November to May. Higher turbidity affects the life indirectly by cutting the light in the utilized by the plants for photosynthesis, there by depleting the rate of primary production and check the phytoplankton growth, The high level of turbidity may minimize the phytoplanktonic population as observed and suggested. Turbidity is closely associated with intensity of light. Turbidity in Daryabganj

lake was mainly due to silt coming from the catchment area in the upper reaches. The deforestation, improper cultivation and dumping of raw sewage into the lake were some of the other causes of turbidity. The particles settle of their own weight. But the sedimentation is objectionable, in that it smoother's the bottom life in lake. During monsoon the process of photosynthesis was mostly inhibited and no microscopic plant life was found even on the surface of lake water the reduction of solid penetration during monsoon causes hovering pH and D.O., free ammonia and chlorides whereas phosphates and silicates showed an inverse relationship with turbidity. Saxena *et al.* (1996) observed highest value of turbidity in Kawar lake, Begusarai, during rainy season due to the surface runoff, high velocity of current and other impurities.

Table -1: Monthly Variation in Air And Water Temperature(°C) of Daryabganj Lake

Months And Years	Station		Station		Station	
	A		B		C	
	Temperature(°C)		Temperature(°C)		Temperature(°C)	
	Air	Water	Air	Water	Air	Water
July.2000	33.2	31.1	33.0	30.8	33.4	31.6
Aug.2000	32.1	30.2	32.4	30.2	32.3	30.8
Sept.2000	33.8	29.9	33.1	29.4	33.1	29.5
Oct.2000	30.5	27.5	30.2	27.0	30.1	27.4
Nov.2000	25.0	25.5	23.3	22.8	25.3	22.5
Dec.2000	18.5	18.4	18.8	18.4	18.6	18.1
Jan.2001	17.6	17.0	17.2	16.8	17.8	17.4
Feb.2001	22.0	20.5	22.3	20.1	22.2	20.6
March.2001	26.6	27.0	26.0	27.2	26.4	27.6
Apr.2001	32.5	30.2	32.3	30.0	32.8	30.3
May.2001	38.6	31.6	38.4	31.2	38.9	32.8
June.2001	38.2	30.8	38.1	30.5	38.4	30.9

Table-2: Seasonal Variation in Air and Water Temperature(°C) of Daryabganj Lake

Seasons	Stations					
	A		B		C	
	Temperature(°C)		Temperature(°C)		Temperature(°C)	
	Air	Water	Air	Water	Air	Water
Rainy Season	33.0	30.4	32.8	30.1	32.9	30.6
Winter Season	24.6	23.2	24.1	22.7	20.6	22.6
Spring Season	22.0	21.8	21.8	21.3	22.1	21.8
Summer Season	36.4	30.8	36.2	30.5	36.7	31.0

Table-3: Months Variations in Transparency (Cm.) of Daryabganj Lake

Months And Years	Stations		
	A	B	C
July.2000	30.5	31.3	30.4
Aug.2000	30.2	30.5	30.4
Sept.2000	31.8	31.4	31.2
Oct.2000	34.9	34.5	35.0
Nov.2000	35.4	36.7	35.5

Dec.2000	36.9	37.9	36.6
Jan.2001	35.2	35.2	35.0
Feb.2001	34.5	35.2	32.3
March.2001	33.2	32.4	31.2
Apr.2001	30.2	31.2	30.7
May.2001	31.7	31.8	30.0
June.2001	30.4	30.2	31.1

Table-4 : Seasonal Variations in Transparency (cm.) of Daryabganj Lake

Seasons	Stations		
	A	B	C
Rainy Season	30.8	31.3	30.2
Winter Season	35.7	36.7	35.7
Spring Season	34.4	33.7	32.8
Summer Season	30.7	31.0	30.6

Table-5: Monthly Variations in Turbidity (Cm.) of Daryabganj Lake

Months And Years	Stations		
	A	B	C
July.2000	110	100	115
Aug.2000	115	110	120
Sept.2000	125	120	130
Oct.2000	110	105	115
Nov.2000	105	90	105
Dec.2000	95	95	100
Jan.2001	100	85	95
Feb.2001	90	80	90
March.2001	70	75	85
Apr.2001	65	70	80
May.2001	60	55	65
June.2001	80	75	90

Table-6: Seasonal Variations in Turbidity (Cm) of Daryabganj Lake

Seasons	Stations		
	A	B	C
Rainy Season	116.6	110	121.6
Winter Season	103.3	96.6	106.6
Spring Season	96.6	80.0	90.0
Summer Season	70.0	66.6	78.3

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