



SEASONAL VARIATIONS OF THE SULUR POND AT COIMBATORE, TAMILNADU, INDIA

B. Dhanalakshmi, M. Lekeshmanswamy and K. Varunprasad

Post Graduate and Research Department of Zoology, Kongunadu Arts and Science College,
Coimbatore-641 029, Tamilnadu, India

ABSTRACT

Studies on the physico-chemical characteristics of the Sulur pond were carried out for a period of one year from October 2001 to September 2002). The study was performed to determine the pollution status of the pond and to implement the measures for pollution control. The parameters analysed include the physical parameters such as temperature, total solids, light penetration and electrical conductivity. The chemical parameters evaluated were pH, dissolved oxygen, carbon dioxide, carbonates, bicarbonates, chloride, organic carbon, BOD, and ions such as calcium, magnesium, nitrate, phosphate, silicate, iron, sulphate, sodium, lithium and potassium.

INTRODUCTION

It is of great importance for ecologists to have knowledge of water quality as it determines the existence of life in water and its usage. Water is by far the most important and abundant substance in biosphere and vital for life (Mukerjee 1977). It is one of the natural resources and needs to be utilized economically in view of the increasing scarcity of the resource.

Freshwater habitats are one of the most common and stable habitats of biosphere. The freshwater habitats have their own physical, chemical and biological characteristics which are moulded by local conditions and physiographic features (Goel 1997).

Ponds may continually be formed in most regions of adequate rainfall. Ponds are small bodies of water in which the littoral zone is relatively large and limnetic and profundal regions are small or absent (Odum 1971). The present study gives a comparative account of some physical and chemical parameters along with other essential nutrients, plankton, zoobenthos and fish fauna of a freshwater pond of Sulur taluk, Coimbatore district. Since the quality of water affects our lives in many ways, water must be of good quality for healthy survival of organisms. Water quality can have a great influence on the ability of aquatic plants and animals to exist and to grow in a stream, pond or lake (Acheson 1983).

MATERIALS AND METHODS

Coimbatore is an important industrial city located in the state of Tamilnadu between the altitude 11°01'06" N and longitude 77°05'38" E. Water samples were collected from a fixed location for a period of one year (October 2001-September 2002) at an interval of 30 days at 12.30-1.30 p.m. in clean polythene containers. The collected samples were brought to the laboratory and kept in the refrigerator for further analysis. Samples were analysed for physico-chemical parameters by standard methods (APHA, AWWA and WPCF, Strickland & Parsons 1965). Primary production was estimated by light and dark bottle method.

The collection for plankton samples was made with 20 mesh net (bolting silk) by filtering about

Table 1: Physical characters of the Sular pond, (Mean value for one year October-2001 to September- 2002) with range of values in parentheses.

Physical characters	Values
Temperature (°C)	31.26 (28.0-37.20)
Suspended solids (mg/L)	147.50 (125.0-200.0)
Dissolved solids (mg/L)	52.08 (40.0-70.0)
Total solids (mg/L)	199.58 (165.0-250.0)
Light penetration (cms)	34.25 (15.0-49.0)

Table 2: Chemical characteristics of the Sular pond, (Mean values for one year October-2001 to September- 2002) with range of values in parentheses.

Parameters	Values
pH	7.2 (7.5-8.5)
Dissolved oxygen (mg/L)	4.36 (3.43-5.10)
Carbon dioxide (mg/L)	1.49 (0.80-2.05)
Carbonates (mg/L)	18.87 (10.00-31.50)
Bicarbonates (mg/L)	21.78 (17.00-29.30)
Total hardness (mg/L)	37.55 (30.50-60.80)
Chlorides (mg/L)	54.31 (37.45-65.45)
Organic carbon (mg/L)	0.340 (0.03-0.82)
BOD (mg/L)	16.51 (2.40-49.0)

Table 3: Nutrient content of the Sular pond (Mean value for one year October-2001 to September-2002) with range of values in parentheses.

Parameters	Values
Calcium (mg/L)	73.97 (53.90-94.04)
Magnesium (mg/L)	27.50 (23.00-32.00)
Nitrates (mg/L)	10.29 (3.32-17.22)
Phosphates (mg/L)	1.60 (1.30-1.90)
Silicates (mg/L)	0.16 (0.13-0.19)
Iron (mg/L)	3.6 (3.15-4.05)
Sulphates (mg/L)	6.8 (5.4-8.2)
Sodium (mg/L)	102.62 (100.12-105.14)
Lithium (mg/L)	114.60 (110.05-119.15)
Potassium (mg/L)	47.72 (42.31-53.13)

Table 4: Fish population of Sular pond for a period of one year (October-2001 to September-2002).

Family	Species
Cichlidae	<i>Tilapia mossambica</i> (Peters)
	<i>Catla catla</i> (Hamilton)
Cyprinidae	<i>Labeo rohita</i> (Hamilton)
	<i>Cirrhina mirigala</i> (Hamilton)

2 litres of surface water. Plankton were immediately preserved with 1% neutral formalin. Identification of plankton was made under monocular and trinocular microscopes with photo micrographic attachment. Analysis was made using transect counts used at low and high magnification in the microscope. Larger organisms such as macroplankton were collected by using hand nets. Six species of fish were identified in pond using the key.

RESULTS AND DISCUSSION

The rapid increase in the growth rate of human population and industrialization in India have created problems of disposal of wastes which are indiscriminately discharged into the nearby ponds, reservoirs, lakes and tanks, and even in the adjoining fields with almost no pre-treatment (Jhingran 1971). Due to lack of treatment and improper mode of disposal of the industrial wastes, municipal sewage and domestic wastes the ponds get polluted. This impairs the water quality and the suitability of water for domestic purpose and aquaculture etc.

Data on the seasonal variations in the physico-chemical parameters, nutrients, plankton, aquatic insects and fishes of Sular pond for a period of one year are presented in the Tables 1 to 4 along with the mean values of physico-chemical parameters and nutrients.

The water temperature was ranging from 28°C to 37.20°C during the study period. The maximum variation in temperature may be due to rainfall pattern and due to change in seasons.

The colour of the pond water was recorded as dark green to brownish during the month of August and September 2002, and greenish during the month of October 2001 to July 2002 with algal blooms. The amount of total solids was recorded as maximum (250mg/L) during the month of September 2002, and minimum (165mg/L) during March 2002.

By using secchi disc, the transparency of the pond was recorded as maximum (49 cm) during

the month of March 2002, and minimum (15 cm) during October 2001. The maximum transparency was due to less rainfall, less turbidity and minimum due to silt deposition. The pH value of water is an important indication of water quality. The pH of the pond water was found to be alkaline during the months of June to September. The result finds support from the observation of Das et al. (1997) due to heavy rainfall which influenced more discharge of domestic sewage and industrial wastes from nearby areas.

Dissolved oxygen was maximum of 5.10 mg/L during the month of July 2002 due to be presence of aquatic vegetation, which resulted in rapid photosynthetic activity producing more oxygen (Jhingran 1982). The minimum oxygen was 3.43 mg/L during the month of October 2001 which may be due to presence of more domestic sewage and industrial wastes (Sharma & Diwan 1991).

Carbonates and bicarbonates were maximum (31.50 mg/L, 29.30mg/L) during the month of September 2002 due to more usage of the pond water by washermen and public discharge. Hardness of water is due to presence of calcium and magnesium. The total hardness value was found to be maximum (60.80 mg/L) during September 2002, and minimum (30.50 mg/L) during January 2002.

The value of chloride was found to be maximum (64.45mg/L) during September 2002, and minimum (37.45mg/L) during October 2001. The value of organic carbon was maximum (0.82 mg/L) during March 2002 due to increase in deposition of organic matter. The value of BOD was found to be maximum of 49.0 mg/L during May 2002.

The calcium and magnesium were maximum of 59.25 mg/L and 89.45 mg/L during September 2002 due to discharge of small scale industrial effluents. The values of calcium and magnesium were minimum at 37.5 mg/L and 39.0 mg/L respectively. The value of phosphate was maximum at 4.85 mg/L during the month of September 2002.

The maximum value of nitrates is 62.85 mg/L during the month of December 2001, and minimum 49.41 mg/L during the month of January. The maximum silicate value of 65 mg/L was recorded in the month of September 2002 due to the sandy nature of soil (Paka & Rao 1977), while the minimum value of 0.665 mg/L was recorded during December 2001 due to biological uptake by diatoms (Edward 1973). Iron concentration was maximum 4.45 mg/L during September 2002 due to washing of vehicles. The lithium and potassium were recorded during September month.

Eight species of molluscs were identified, both of univalves and bivalves. The number of molluscs was recorded very less during the study period due to disturbances caused by washing, bathing, fishing etc. Totally six species of fishes were identified and all were available throughout the study period. The fish population was very less due to mixing of effluents from small scale industries, disturbance by man, bathing, washing, etc.

The results indicate that in the years to come there might be possibilities of greater eutrophication of reservoirs because of the enrichment of nutrients.

REFERENCES

- Acheson, M.A. 1983. Water pollution control in India: In: Water Pollution and Management. Wiley Eastern limited, pp. 215-218.
- APHA, AWWA and WPCF 1989. Standard Methods of Examination of Water and Wastewater. Washington D.C., 17th edition.
- Das, J., Das, S.N. and Sahoo, R.K. 1997. Semidiurnal variation of some physico-chemical parameters in the Mahanadi estuary. East coast of India. Indian J. Mar. Sci., 26: 323-326.

- Edwards, A.M.C. 1973. The variation of dissolved constituents with discharge in some Norfolk rivers J. Hydrology, 18: 219-242.
- Goel, P.K. 1997. Water Pollution: Cause Effects and Control. New Age International (P) Ltd. Publishers.
- Jhingran, V.G. 1971. The problems of aquatic pollution in India. In: Proceedings of the Seminar on Pollution and Human Environment, Bhabha Atomic Research Centre, Trombay, pp. 304-311.
- Jhingran, V.G. 1982. Fish and fisheries of India. Hindustan Publishing Corporation India, Delhi, pp. 262.
- Mukerjee, B. 1997. Environmental Biology. Tata McGraw-Hill Publishing Company Ltd., New Delhi.
- Odum, E.P. 1971. Fundamentals of Ecology, 3rd Edition. W.B. Saunders Company, Philadelphia, London, Toronto.
- Paka, S. and Rao, A.N. 1997. Interrelationship of physico-chemical factors of a pond. J. Environ. Biol., 18(1): 67-72.
- Sharma, and Diwan, A. 1991. Population dynamics of rotifers species in Yeshwantsagar reservoir. Indian. J. Zool. Spectrum, 2(1-2): 25-30.
- Strickland, J.D.K. and Parsons, T.R. 1965. Manual of Sea Water Analysis. Fish, Res. Board Can., Bull. No. 125.