

Observations on the Physico-Chemical Status In Motia Lake of the Bhopal

**Mahima Dixit , Aparna Alia
Department of Botany, Rajeev Gandhi College, Bhopal.**

Abstract

The physio-chemical characteristics of Motia lake were monitored to determine the water quality of the lake. Samples were collected on monthly intervals from the lake. Physico-chemical parameters: temperature, pH, dissolved oxygen, alkalinity, water transparency and nutrients were measured simultaneously. Present investigation shows that status of the Motia Lake is eutrophic in nature.

Keywords : Nutrients, Eutrophic. Physico-chemical parameters, dissolved oxygen.

Introduction

Water quality, i e., the physic-chemical properties of water plays a big role to determine ecological conditions of waterbody. The study of nutrients in an aquatic body is of vital importance because it is due to the presence of nutrients on which the productivity of waterbody depends (Khan,2000). Lake, a large body of water surrounded by lands and inhabited by various aquatic life forms, is subjected to various natural processes taking place in the environment and anthropogenic activities. The study revealed that nutrient level in Motia lake was high. It is due to extra nutritional enrichment of this waterbody. Nutrient enrichment of waterbody due to increased urbanization of catchment, sewage-disposal, leeching of fertilizer and other forms of cultural eutrophication (Bousy,1975). The study clearly indicates that discharge of high amount of inorganic pollutants in Motia lake which has caused deterioration in the quality of lake water.

Material and Method

The study of lake was carried out for a period of 12 months between December 2008 and November 2009. Samples were collected on monthly intervals from Thaliwali Sadak area of Motia lake. The monitoring was usually carried out between 10 AM to 4 PM. The selected methods from APHA (1992) were followed for the analysis of water samples.

Result and Discussion

As shown in Table-1, seasonal variations are evident in all the physic-chemical parameters examined.

Temperature – The minimum and maximum water temperature in the epilimnion layer were found to be 18.00 in January and 30.80 in May. Similarly the minimum and maximum water temperature in the hypolimnion layer were found to be 17.70 in January and 29.20 in May. **Transparency** – The minimum and maximum secchi disk transparency in the epilimnion layer were found to be 30.50 in May and 57.10 in February. Similarly the minimum and maximum value in the hypolimnion layer were found to be 25.20 in May and 48.30 in February.

pH – The minimum and maximum range of pH in the epilimnion layer were found to be 7.71 in January and 8.94 in May. Similarly the minimum and maximum values in the hypolimnion layer were found to be 7.30 in January and 7.96 in May.

Dissolved Oxygen (D.O.) – The minimum and maximum D.O. level in the epilimnion layer were found to be 7.00 mg/l in January and 20.00 mg/l in May. Similarly the minimum and maximum in the hypolimnion layer were found to be 1.80 mg/l in January and 4.50 in May.

BOD – The minimum and maximum values of BOD in the epilimnion layer were found to be 3.00 mg/l in January and 25.20 mg/l in July. Similarly the minimum and maximum values in the hypolimnion layer were found to be 40.00 mg/l in January and 46.80 mg/l in July.

COD – The minimum and maximum water COD values in the epilimnion layer were found to be 20.80 mg/l in January and 8.94 mg/l in May. Similarly the minimum and maximum values in the hypolimnion layer were found to be 7.30mg/l in January and 7.96 mg/l in May.

Total Alkalinity – The minimum and maximum values in the epilimnion layer were found to be 40.00 mg/l in July and 66.00 mg/l in May. Similarly the minimum and maximum values in the hypolimnion layer were found to be 62.00 mg/l in August and 110.00 mg/l in May.

Total Hardness – The minimum and maximum values in the epilimnion layer were found to be 102.00 mg/l in July and 138.00 mg/l in November. Similarly the minimum and maximum values in the hypolimnion layer were found to be 128.00 mg/l in July and 168.00 mg/l in November.

Nitrate – The minimum and maximum values in the epilimnion layer were found to be 0.17 mg/l in January and 0.67 mg/l in May. Similarly the minimum and maximum values in the hypolimnion layer were found to be 0.23 mg/l in January and 0.75 mg/l in May.

Phosphate– The minimum and maximum values in the epilimnion layer were found to be 0.18 mg/l in January and 1.18 mg/l in May. Similarly the minimum and maximum values in the hypolimnion layer were found to be 0.40 mg/l in January and 1.42 mg/l in May.

Phosphate and nitrate is considered to be most significant among the nutrients responsible for eutrophication of lake. Phosphate enter the lake in domestic waste water accounting for the condition of eutrophication. Storm water runoff and discharge of sewage in to the lake are two common ways that various nutrient enter the aquatic ecosystems resulting in the death of those system (Sudhira & Kumar, 2000). The washing of large amount of cloths by dhobis, laundry workers and the continued entry of domestic sewage in some areas are posing pollution problem (Benjamin et al, 1996). Limno-chemical parameters of water body are affected by the external influence, eutrophication and depth of water (Dhote,2000). Of all the water quality issues regarding lakes everywhere, eutrophication is of great concern. Eutrophication of a waterbody signifies the aging of the lake. It is caused by the accumulation of nutrients, sediments, silt and organic matter in the lake from the surrounding watershed (Tamot & Sharm,2006). On the basis of the present finding, status of the Motia lake is eutrophic in nature.

Table 1 : Showing physic-chemical parameters of water samples of Thaliwali Sadak area (Motia lake, Bhopal)

MONTHS	Water Temp (°C)	Trans P	pH	D.O.	BOD	COD	Alkalinity	Hardness	Nitrate	Phosphate
Dec.08	E-18.20 H-18.10	52.00	E-7.76 H-7.21	E-7.40 H-1.90	E- 3.50 H-14.40	E-22.80 H-42.20	E-60.00 H-76.00	E-122 H-148	E-0.31 H-0.41	E-0.22 H-0.42
Jan.08	E-18.00 H-17.70	57.10	E-7.71 H-7.30	E-7.00 H-1.80	E- 3.00 H-13.80	E-20.80 H-40.00	E-48.00 H-80.00	E-128 H-156	E-0.17 H-0.23	E- 0.18 H-0.40
Feb.09	E-19.00 H-18.90	49.50	E-8.51 H-7.48	E-8.20 H-2.20	E- 3.20 H-14.00	E-22.00 H-41.80	E-50.00 H-84.00	E-120 H-148	E-0.21 H-0.30	E-0.38 H-0.60
Mar. 09	E-21.00 H-20.80	38.40	E-8.65 H-7.60	E-9.90 H-2.50	E- 4.50 H-14.80	E-23.60 H-42.20	E-54.00 H-94.00	E-120 H-142	E-0.44 H-0.52	E-0.82 H-1.00
Apr. 09	E-28.00 H-26.10	30.50	E-8.71 H-7.88	E-10.10 H-2.70	E- 5.00 H-15.00	E-24.00 H-43.60	E- 58.00 H-98.00	E-114 H-140	E-0.51 H-0.68	E-0.94 H-1.22
May. 09	E-30.80 H-29.20	35.10	E-8.94 H-7.96	E-14.80 H-2.90	E-5.10 H-15.20	E-24.60 H-44.00	E-66.00 H-110.00	E-118 H-146	E-0.67 H-0.75	E-1.18 H-1.40
June. 09	E-28.00 H-27.10	37.50	E-8.86 H-7.82	E-18.70 H-3.90	E- 5.60 H-15.40	E-25.00 H-46.00	E-52.00 H-72.00	E-114 H-144	E-0.60 H-0.70	E-0.98 H-1.36
July.09	E-25.00 H-23.10	38.90	E-8.64 H-7.65	E-19.50 H-4.10	E-6.10 H-15.90	E-25.20 H-46.80	E-40.00 H-66.00	E-102 H-128	E- 0.58 H-0.67	E-1.00 H-1.24
Aug.09	E-23.00 H-22.40	39.70	E-8.01 H-7.14	E-20.00 H-4.50	E-6.30 H-15.50	E-24.80 H-45.00	E-46.00 H-62.00	E-112 H-138	E- 0.51 H-0.60	E-1.16 H-1.38
Sep.09	E-23.70 H-22.40	41.10	E-7.76 H-7.00	E-17.00 H-4.10	E- 6.20 H-15.30	E-24.40 H-44.60	E-48.00 H-76.00	E-122 H-148	E-0.36 H-0.55	E-0.88 H-1.00
Oct.09	E-23.10 H-22.50	52.40	E-7.80 H-7.10	E-16.60 H-3.70	E- 5.90 H-15.00	E-24.00 H-42.00	E-50.00 H-82.00	E-130 H-158	E-0.30 H-0.49	E-0.52 H-0.76
Nov.09	E-21.70 H-20.70	53.70	E-8.20 H-7.30	E-11.80 H-3.40	E- 3.10 H-14.90	E-23.60 H-41.60	E-52.00 H-80.00	E-138 H-168	E-0.27 H-0.41	E- 0.36 H-0.60

(All values in mg/l)

E – Epilimnion

H - Hypolimnion

References

APHA (1992) : Standard methods for the examination of water and waste water . APHA, AWWA, WPCF, 18th Edn. New York.

Benjamin R., Chakrapani B.K., Devashish K., Nagarathna A.V. and Ramachandra T.V. (1996) : Fish mortality in Bangalore lakes, India. Electronic Green Journal, 6. Retrieved from <http://egj.lib.uidaho.edu/egj06/ramachandra.html>.

Dhote, S. and Varughese, B. (2000) : Impact of antropogenic activities on limnological characteristics of Bhoj wetland. National workshop on “Biodiversity & Conservation of Aquatic Resources W/R to threatened Fish Mahseer”. 26th and 27th Feb.2000, p. 58.

Khan S. T. (2000) : Assessment of impact of sewage on the abiotic and biotic components n Lower lake, Bhopal. Ph.D. Thesis, Barkatullah Univ., Bhopal.

Sudhira H.S. and Kumar V.S. (2000) : Monitoring of lake water quality in Mysore city. In T.V. Ramachandra, M.C. Rajesekara, & N. Ahalya (Eds), International symposium on Restoration of Lakes and Watershed: Proceedings of Lake 2000 (pp. 1-10). Bangalore, India: Centre for Ecological Science, Indian Institute of Science.

Tamot S. and Sharma, P. (2006) : Physico-chemical status of Upper lake (Bhopal, India) water quality with special reference to phosphate and nitrate concentration and their impact on lake ecosystem. Asian J. Exp. Sci., Vol. 20, No. 1, 2006, 151-158.