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A STUDY ON PHYSICO-CHEMICAL PARAMETERS OF ERRARAJAN LAKE OF BANGALORE RURAL

Zoology

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ABSTRACT

Present paper deals with the study of Physico-chemical parameters of Errarajan Lake of Bangalore rural District of Karnataka. Monthly variations in the physical and chemical parameters such as temperature, pH (6.9 to 7.9), Dissolved Oxygen (6.0-7.2 mg/L), Total Hardness (66 to 80mg/L), Chlorides (14 to 65 mg/L), Phosphate (0.00 to 0.04 mg/L) Nitrate (0.74 to 3.10mg/L) etc ,were investigated. All the parameters are within permissible limits.

KEYWORDS

Water; Physico-chemical parameters; Errarajan Lake .

Introduction

The quality of any body of surface or ground water is a function of either both natural influences and human influences. Without human influences water quality would be determined by the weathering of bedrock minerals, by the atmospheric processes of evapotranspiration and the deposition of dust and salt by wind, by the natural leaching of organic matter and nutrients from soil, by hydrological factors that lead to runoff, and by biological processes within the aquatic environment that can alter the physical and chemical composition of water. Pollution of water is measured by assessing the physiochemical parameters of water (Ramachandra mohan et al 2014). Physico-chemical analysis is the prime consideration to assess the quality of water for its best utilization like drinking, irrigation, fisheries, and industrial purpose and helpful in understanding the complex processes, interaction between the climatic and biological processes in the water (Salve and Hiware 2006).

The objective of the present study was to assess the ecosystem of Errarajan lake, by estimating the various physicochemical parameters like pH, Temperature, Total Dissolved solids, Total Alkalinity, Total Hardness, Phosphate, Nitrate, Turbidity, Fluoride, Chloride, Dissolved Oxygen, Iron and Conductivity.

Materials and Methods

Study area

The study area is of Errarajan lake which is located in Latitude: 12.9716087°N, Longitude: 77.5945527°E . Study was conducted from Dec (2016) - December (2017). Water sample from the lake was collected every month. The Water samples were immediately brought to the Laboratory for the Estimation of various Physico- chemical parameters. The physical parameters such as Temperature of Air, Water and pH were recorded by using Thermometer and Digital pH Meter (Systronics) respectively. The transparency of water to light was measured by using Secchi disc. The chemical parameters of water such as Dissolved Oxygen, Total Alkalinity, Hardness, Chlorides, Sulphates and Total Dissolved Solids etc. were determined by standard methods in the laboratory as per the standard method APHA (2005).

Results and Discussion

The data on physico-chemical analysis of Errarajan Lake water has been given in Table 1

Physical parameters

Temperature: During the study period water temperature varied from 24°C± 0.3°C to 32°±2°C. The maximum temperature (32°C) was observed during the month of April 2017, and minimum temperature (23°C) was observed during the month of December, 2017. Jayabhaye et al., 2005 and Salve and Hiware, 2006 observed that during summer, water temperature was high due to low water level and clear atmosphere.

Turbidity: The turbidity ranged from 0.3 -20.0 NTU units. The maximum value (20.0 NTU units) observed during the month of October , 2016 and minimum value (0.3 NT units) was observed during the month of December , 2017. Similar result was observed by Manjare et al., 2010 turbidity of water fluctuated from 0.41± 0.02 NTU to 3.51 ± 0.72 NTU.

Total dissolved solids [TDS]: During the present study, the TDS wavered from 120 mg/L to 329 mg/L. The higher value of total dissolved solids found in the month of April (329 mg/L) and lower value found during the month of October (120 mg/L). Alaka, 2014 reported that the amount of total dissolved solids detected from water sample at Borgaon was 347.16 mg/L to 738.0 mg/L.

Electrical Conductivity [EC] : The electrical conductivity in the water of the pond analyzed during the study period has been found to be fluctuating between 187 and 507 mho/cm. Kashyap, (2016) analysed the Ramnai (Rewa Rural) drinking water for EC and reported that 180 mho/cm.

Chemical parameters

pH: During the present investigation, the pH of the water sample ranged from 6.9 in the month of September , 2017 to 7.8 in the month of Feb , 2017. This range indicates that the water is alkaline in nature. Similar finding was observed by Joshi et al., 2009 pH of the Ganga River at Haridwar was slightly alkaline. It ranged from 7.06 to 8.35.

Dissolved oxygen: The Dissolved Oxygen value ranged between 6.0-7.2 mg/L. Lowest values were recorded during Feb 2017 . Meme et al.,(2014) reported the range of Dissolved Oxygen was 6.02 to 7.01 mg/l at Oinyi River, Nigeria.

Biological Oxygen Demand : The Biological Oxygen Demand value ranged between 1.0 -3.0 mg/L. Lowest values were recorded during November 2017 .

Chemical Oxygen Demand: The Chemical oxygen Demand value ranged between 8.0-24.0 mg/L. Lowest values were recorded during Oct 2017.

Phosphate: The phosphate value ranged between 0-0.04 mg/L. Highest values were recorded during Dec 2017 .

Fluoride: The fluoride value ranged between 0.28 -1.3 mg/L. Lowest values were recorded during Dec 2017.

Iron: The iron value ranged between 0.37 - 1.49 mg/L. Lowest values were recorded during March 2017.

Total Alkalinity: The Total Alkalinity value ranged between 55-135 mg/L. Lowest values were recorded during Oct 2017.

Total Hardness: The Total Hardness value ranged between 52-190 mg/L. Lowest values were recorded during November 2017.

Chloride: The Chloride value ranged between 14-65.0 mg/L. Lowest values were recorded during Oct 2017

Nitrate: Nitrate content in the water ranged between 0.74-3.1 mg/L. Lowest values were recorded during Dec2017. Simpi et al., 2011 reported that the values of nitrate ranged from 2.1 mg/l to 12.8 mg/l in Hosahalli Tank, Karnataka.

Conclusion

A study of Physico-chemical parameters of Errarajan lake Bangalore Rural exhibited Clear water and also away from pollution , covered by forest with less anthropological influence. The work was carried out by taking important parameters like Temperature, pH, Dissolved Oxygen, Total Alkalinity, Total Hardness, Chlorides, Phosphate, etc., for the period of Dec 2016 to Dec 2017. In the present investigation pH, Total Alkalinity, Total Hardness, Chloride etc., were Within the permissible limit. Hence, Errarajan Lake water is considered as polluted water. The physico-chemical characteristics of Errarajan lake water suggests that, it is less hormfull for pisciculture, irrigation and drinking purposes.

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Table 1: Monthly variation in physico- chemical parameters of ERRARAJAN LAKE (Dec 2016 To December 2017)

MONTHS → PARAMETERS	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
TURBIDITY (NTU)	1.9	1.6	1.8	2.4	3.1	3.8	4.1	5.8	13.2	18.0	20.0	0.6	0.3
pH	7.6	7.8	7.8	7.6	7.5	7.3	7.4	7.2	7.1	6.9	7.1	7.3	7.3
CONDUCTIVITY (µs/cm)	382.0	368.0	372.0	436.0	507.0	483.0	454.0	322.0	218.0	198.0	187.0	224.0	276.0
TOTAL HARDNESS (mg/L)	72.0	68.0	70.0	72.0	80.0	77.0	77.0	75.0	71.0	68.0	56.0	56.0	56.0
CALCIUM HARDNESS(mg/L)	47.0	44.0	42.0	13.0	20.0	18.0	17.0	18.0	19.0	19.0	16.0	15.0	11.2
MAGNESIUM HARDNESS(mg/L)	25.0	24.0	28.0	10.0	6.8	6.6	6.0	6.0	5.0	4.0	3.8	5.2	6.8
CHLORIDE (mg/L)	40.0	41.0	42.0	51.0	65.0	58.0	46.0	38.0	27.0	22.0	14.0	21.0	27.0
TOTAL DISSOLVED SOLIDS (mg/L)	224.0	238.0	240.0	282.0	329.0	318.0	260.0	224.0	187.0	135.0	120.0	146.0	178.0
SULPHATE (mg/L)	11.6	11.0	12.0	14.0	9.2	9.2	8.9	8.7	7.0	7.2	7.0	3.2	1.46
NITRATE (mg/L)	2.5	2.7	2.8	3.0	3.1	3.0	2.6	2.3	2.2	2.1	1.8	1.3	0.74
FLUORIDE (mg/L)	0.93	1.0	1.0	0.5	1.3	1.2	0.9	0.82	0.74	0.68	0.52	0.36	0.28
IRON (mg/L)	0.90	0.7	0.6	0.37	1.0	1.0	1.4	1.42	1.49	1.5	1.3	0.72	0.57
DISSOLVED OXYGEN (mg/L)	6.2	6.3	6.0	6.2	6.1	6.0	6.3	6.3	6.2	6.2	6.5	6.8	7.2
PHOSPHATE (mg/L)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.04
BOD (5 DAYS AT 21^{o}C)	BDL	BDL	2.0	3.0	3.0	3.0	2.0	2.0	2.0	1.0	1.0	2.2	2.6
COD	BDL	BDL	18.0	18.0	24.0	23.0	16.0	12.0	12.0	9.0	8.0	16.8	16.0
TOTAL ALKALINITY (mg/L)	92.0	94.0	98.0	112.0	135.0	128.0	101.0	86.0	73.0	56.0	55.0	72.0	100.0
TOTAL COLIFORM/100ml	20.0	17.0	15.0	14.0	32.0	31.0	44.0	45.0	76.0	98.0	95.0	35.0	14.0

REFERENCES

1. Simpi B, Hiremath S. M, Murthy K. 1N. S, Chandrashekarappa K. N, Patel A. N and E.T. Puttiah, 2011. Analysis of Water Quality Using Physico-Chemical Parameters Hosahalli Tank in Shimoga District, Karnataka, India. Global Journal of Science Frontier Research. 1(3): 31-34.
2. Wankhade V, Manwar N and A. Malu, 2012. Evaluation of status of ecosystem of Sawanga (Vithoba) Lake (Malkhed Talav), District Amravati, Maharashtra by assessment of Some Physicochemical Characteristics of water. International Journal of Scientific and Research Publications. 2(8):1-10.
3. Salve B. S and C. J. Hiware, 2006. Studies on water quality of Wanparkalpa reservoir, Nagapur, Near Parli Vaijinath, Dist Beed, Marathwada region, J Aqua. Bio. 21 (2): 113-117.
4. APHA, 2005. Standard methods of examination of water and waste water. American public health association. 19th ed. Inc. New York: 1170.
5. Jayabhaye, U. M.; Pentewar, M. S. And Hiware C. J, 2006: A study on physicochemical parameters of a minor reservoir, Sawana, Hingoli district, Maharashtra.
6. Joshi D. M, Kumar A and Agrawal N, 2009. Studies on physicochemical parameters to assess the water quality of river Ganga for drinking purpose in Haridwar district. Rasayan J. Chem. 2(1): 195-203.
7. Manjare S. A, Vhanalakar S. A and D. V. Muley, 2010. Water quality assessment of Vadgaon tank of Kolhapur (Maharashtra), with special reference to zooplankton. International Journal of Advanced Biotechnology and Research. 1(2): 91-95.
8. Harney N. V. Dhamani A. A and Andrew R. J, 2012. Phycio- cchemical status of three water bodies near Bhadrawati Town, Distt. Chandrapur, (M. S), India.Bionano Frontier. Eco Revolution, Colombo, Srilanka.
9. Lubal M. J, Sutar A.U and Pawar K.W. 2012. Studies on Physico-chemical aspects of Mhaswad water reservoir of Satara District (Maharashtra) India. IJPAES. 2(3): 12-15
10. Kashyap V. R, 2016. Physico-chemical analysis of various water samples of Rewa district (M.P.) India. International Journal of Applied Research. 2(1): 311-313.
11. Lende R. S and Yergi S. G, 2004. Physico-chemical parameters and zooplankton diversity of Phirange Kharbav lake, Thane, Maharahtra. J. Aqua. Biol. 19(1): 49-52.
12. Meme F.K, Arimoro F. O and F. O. Nwadukwe, 2014. Analyses of Physical and Chemical Parameters in Surface Waters nearby a Cement Factory in North Central, Nigeria. Journal of Environmental Protection. 5: 826-834.
13. Alaka P. A, 2014. An Assessment of Water Quality of Borgaon Reservoir in Sangli District of Maharashtra, India. International Research Journal of Environment Sciences. 3(5): 48-53.
14. S Gayathri, N Latha, M Ramachandra Mohan 2014,Studies on Population Dynamics and Seasonal Abundance of Zooplankton Community in Doddavoderahallilake, Bangalore,Int. J. Emerg. Trends Eng. Dev 4 (1), 50-55 Impact Factor. 0.876