



Study of Few Chemical Parameters of Ashti Lake from Solapur District, Maharashtra

A.L. Shaikh

Research Center, K.B.P. Mahavidyalaya, Pandharpur, Dist. Solapur (M.S.) India
413 304

D.S. Nikam

Research Center, K.B.P. Mahavidyalaya, Pandharpur, Dist. Solapur (M.S.) India
413 304

ABSTRACT

Aquatic ecosystem forms one of the important habitat for various living things. It provides the base for survival of all the biota. On the surface of globe, water and life are intimately associated as water grows scantier life becomes more restricted until with the total failure of water life also disappears. The existence of aquatic biota depends upon the abiotic factors. Certain ecological factors are known to have very profound effect on the aquatic ecosystem. Keeping this into mind present study was undertaken to reveal the present status of few chemical parameters in the water of Ashti Lake. All the parameters studied are within the prescribed desirable limit. All the parameters have shown the seasonal variation and all the parameters are correlated with each other. The results are discussed with recent literature.

KEYWORDS : Aquatic Ecosystem, chemical parameters, Ashti Lake

INTRODUCTION

The Earth, also called "Blue Planet" due to the reason that 70 % area of its is covered with water. The total water amount on the earth is about 1.35 billion cubic kilometers. Out of this about 97.5 % has been locked into oceans as saltwater. Ice sheets and glaciers have arrested 2.1 % of water. Only 0.2 % is the freshwater present on earth. According to Dodds and Whiles (2010), freshwater lakes account for only about 0.009 % of total water and 1.45 % of total inland water. Though the freshwater is present in very little amount on earth, it has provided the habitat for variety of living things. The freshwater fishes have their own demand in the market. Further the existence of some aquatic creatures only depends upon the freshwater. Hence lakes and rivers are crucial integrants of the world aquatic ecosystems and have more than certain role in defining the existence of biota. Freshwaters of the world are collectively experiencing markedly accelerating rates of qualitative and quantitative degradations (Wetzel, 2001). There should be proper investigation and management. This can be possible by continuous water quality monitoring (Mendhegiri, 2007). Various workers have investigated the status of various freshwater bodies across the world few of them are Angadi (1985), Kambale and Sakhare (2013) and Sarode and Patil (2012). Taking this into consideration the present work has been undertaken on the few chemical parameters of Ashti Lake.

Material and Methods

The Ashti Lake is the huge lake spread over an area about 1165 hectare (2830 acres). The Ashti Lake was constructed by British government in 1881 for the purpose to avail water for drinking and irrigation. The lake is constructed along one of the feeder canal from Ujani reservoir. Hence the source of water for the lake is through precipitation and Uajani dam. The water of the Lake is supplied to the twenty two nearby situated villages. The main crops grown in this area are sugarcane and banana.

The water from the Ashti Lake was collected monthly for 1 year during July 2012 to Jun. 2013. The water was brought to laboratory and analyzed according to standard methods prescribed by Ragothaman and Trivedi (2002), Trivedi *et al.* (1998) and APHA (2012). The results are analyzed statistically by using correlation analysis.

RESULTS AND DISCUSSION

During present investigation following chemical parameters were studied. The results are shown in the table 1 and the correlation matrix is shown in table 2.

Sulfates:

Sulfates are the constituents of fertilizers and may added into the lake water along with the agricultural runoff. The sulfates were found

in the range between 40 mg/L to 78 mg/L. Maximum sulfates were found in summer while minimum sulfates were found in winter. The maximum sulfates in summer was found may be due to evaporation effect. The sulfates were found in higher amount in the water of Ashti Lake but not exceeding the normal range. This indicate the ingress of agricultural runoff. The sulfates were found to be correlated with all the parameters. They were positively correlated with Nitrates and COD. The same line of results were also obtained by Shrishail and Mathad (2008), Abdullah *et al.* (2010) and Shinde *et al.* (2011).

Phosphates:

The amount of phosphates represents the extent of eutrophication of the aquatic ecosystem. They are also present in the fertilizers and can get added into water of lake along with runoff water. The phosphates were observed to be in the range between 2.5 to 12.1 mg/L. Maximum phosphates were found in the monsoon while minimum in the winter. The monsoon maxima of the phosphates are attributed to the addition of surface runoff along with the rain water. The phosphates were found to be positively correlated with nitrates and sulfates. Our results are corroborating with the investigation of previous workers like Arvindkumar (1995), Manjare *et al.* (2010), Simpi *et al.* (2011) and Makode (2012).

Nitrates:

In the present investigation the nitrates were found in the range between 4.1 to 28.4 mg/L. Nitrates also have shown the seasonal variation, they are found to be maximum in monsoon while minimum in winter. The nitrates are found in the fertilizers, which during monsoon season get mixed with the runoff and mixes in the water of lake resulting into the elevation of amount of nitrates. The nitrates were found to be positively correlated with sulfates and phosphates. While they were negatively correlated with the BOD. Similar results were also obtained by Manjare *et al.* (2010), Simpi *et al.* (2011), Makode (2012) and Harney *et al.* (2013).

BOD:

The Biochemical Oxygen Demand (BOD) is the measure of amount of oxygen consumed by micro-organisms during decomposition of organic matter. The BOD was found to be maximum in monsoon while minimum in winter. The summer maxima of the BOD is attributed to the increased organic decomposition. The BOD was found to be positively correlated with the sulfates and negatively correlated with the phosphates and nitrates. Our results are in good agreement with the findings of Ghorade *et al.* (2012) and Harney *et al.* (2013).

COD:

The Chemical Oxygen Demand in the Ashti Lake was found in the range 8.4 to 34.5 mg/L. The COD was found maximum in the summer while minimum COD was observed in the winter. The maximum values of COD in the summer is attributed to higher decomposition activity and lower level of water. The COD was found to be positively correlated with sulfates and BOD. Our results are in good agreement with the Ghorade *et al.* (2012) and Harney *et al.* (2013).

Table 1- Monthly variation in few chemical parameters of Ashti Lake during July 2012 to June 2013.

Months	Site	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun
Sulfates	I	56	58	55	51	48	39	41	45	55	64	69	58
	II	57	58	54	57	49	42	44	49	61	68	72	57
	III	58	59	55	54	53	45	43	48	57	63	71	54
	IV	58	58	55	52	48	39	41	46	56	62	68	56
Phosphates	I	9.4	10.3	11.3	5.3	5.4	2.3	2.6	8.4	5.4	4.2	6.8	4.9
	II	9.6	10.4	11.2	5.2	5.2	2.5	2.7	8.6	5.5	4.1	6.9	5.3
	III	9.5	11.5	11.4	5.1	5.0	2.4	2.8	8.8	5.3	4.3	6.7	5.5
	IV	9.8	10.1	11.5	5.4	5.1	2.1	2.1	8.6	5.2	4.0	6.6	5.6
Nitrates	I	18.2	26.5	25.6	14.3	9.4	6.1	5.1	4.8	10.1	15.7	14.1	16.1
	II	18.6	26.3	25.9	14.4	9.3	6.3	5.2	4.2	10.3	15.2	14.4	16.2
	III	18.1	26.4	25.4	14.2	9.2	6.6	5.0	4.5	10.2	15.4	14.3	16.6
	IV	18.0	26.2	25.2	14.3	9.0	6.5	4.9	4.2	10.0	15.0	14.1	16.1
BOD	I	4.5	2.2	1.6	3.8	4.3	6.1	5.9	8.6	9.6	14.1	14.8	4.7
	II	4.6	2.5	1.7	3.5	4.2	5.9	5.8	8.8	9.8	13.5	13.6	4.4
	III	4.7	2.6	1.5	3.7	4.6	5.8	6.0	8.5	9.2	13.8	14.4	4.6
	IV	5.0	2.8	1.9	3.6	4.9	6.2	6.3	8.8	9.9	14.9	14.2	4.5
COD	I	19.6	15.1	13.6	11.6	8.9	7.8	12.3	18.4	21.9	32.4	30.8	20.1
	II	21.3	17.4	12.5	14.3	8.8	7.4	12.9	19.6	22.3	32.5	31.2	22.3
	III	18.4	16.2	15.9	13.7	9.2	7.6	13.4	19.3	22.5	34.3	31.8	22.5
	IV	20.2	18.8	16.1	14.5	9.9	7.6	13.0	19.5	22.6	33.0	32.0	22.6

Table 2- The Correlation Matrix between Chemical Parameters of Ashti Lake during July 2012 to June 2013.

	Sulfates	Phosphate	Nitrate	BOD	COD
Sulfates	1.00	0.37	0.61	0.44	0.82
Phosphates		1.00	0.72	-0.34	0.07
Nitrates			1.00	-0.36	0.16
BOD				1.00	0.81
COD					1.00

CONCLUSION

The chemical parameters chosen for analysis during the present investigation were the indicators of eutrophic status of the Lake. All the parameters were found to be within the prescribed desirable limits. While the sulfates, phosphates and nitrates were found to be in higher amount but within the limits. The higher values of the sulfates, phosphates and nitrates indicate the onset of eutrophication of the lake. This may be resulted from addition of large amount of agricultural runoff into the lake. All the parameters had shown the seasonal fluctuations. While all the parameters also have shown the correlation pattern with each other. From the present study it can be concluded that water is fit for drinking and irrigation. The results also have shown the onset of eutrophication.

REFERENCES

- Abdullah, S., M.A. Iqbal and M.I. Fazil (2010). Physico Chemical Analysis of the Freshwater at Kundalika Dam, Upli, Dist. Beed, (M.S.) India. *Global J. Environ. Res.* 4(1): 01-05. | Angadi (1985). "Hydrobiological Studies of Rajaram Tank." M.Phil. Thesis Submitted to Shivaji University, Kolhapur (M.S.) India. | APHA (2012). Standard Methods for the Examination of Water and Waste Water. 22nd Ed. American Public Health Association, American Water Works Association and Water Environment Federation, Washington D.C. pp. 1-1 to 10-175. | Arvindkumar (1995). Some Limnological Aspects of Freshwater Tropical Wetland of Santhal Pargana (Bihar) India. *J. Environ. Poll.* 2(3): 137-141. | Dodds, W. and M. Whiles (2010). "Freshwater Ecology- Concepts and environmental Applications of Limnology" Academic Press Elsevier Inc., London. | Ghorade, I.B., V.R. Jadhavar, V.R. Potdar and S.S. Patil (2012). Physico-Chemical Assessment of Kham River, Aurangabad, Maharashtra. *World J. Appl. Env. Chem.* 1(2): 67-71. | Harney, N.V., A.A. Dhamani and R.J. Andrew (2013). Seasonal Variation in the Physico-chemical Parameters of Pindavani Pond of Central India. *Sci. Weekly* 1(6): 01-08. | Kamble, N.A. and S.S. Sakhare (2013). Quantification of Zooplanktons from Freshwater Bodies of Gadhinglaj Tahsil, District Kolhapur. *Bionanofrontier* 6(1): 94-98. | Makode, P.M. (2012). Physico-chemical Parameters of Charghad Dam District Amravati, Maharashtra. *Int. J. Sci. Innov. Disc.* 2(1): 164-169. | Manjare, S.A., S.A. Vhanalakar and D.V. Muley (2010). Analysis of Water Quality Using Physico-Chemical Parameters Tamdalge Tank in Kolhapur District, Maharashtra. *Int. J. Adv. Biotech. and Res.* 1(2): 115-119. | Mendhegiri, H.T. (2007). Hydrology Project Status Report, Government of Maharashtra, Nashik. | Ragothaman, G. and R.K. Trivedi (2002). "Aquatic Ecology" Agrobios, Jodhpur. pp.1-247. | Sarode, B.P. and M.U. Patil (2012). Effect of Physicochemical Parameters on the Reproduction of the Marine Prawn, *Penaeus Canaliculatus*. *IJSR* 1(6): 161-163. | Shinde, S.E., T.S. Pathan, K.S. Raut and D.L. Sonawane (2011). Studies on the Physico-Chemical Parameters and Correlation Coefficient of Harsool- Savangi Dam, District Aurangabad, India. *Middle-East J. Sci. Res.* 8(3): 544-554. | Shrishail, V.G. and P. Mathad (2008). Distribution and Periodicity of Phytoplankton in Khaji Kotnoor Reservoir of Gulbarga Region. *Ecol. Environ. and Cons.* 14(2-3): 429-433. | Simpi, B., S.H. Hiremath, K.N.S. Murthy, K.N. Chandrashekarappa, A.N. Patel and E.T. Puttiah (2011). Analysis of Water Quality Using Physico-chemical Parameters Hosahalli Tank in Shimoga District, Karnataka, India. *Global J. of Sci. Frontier Res.* 11(3): 31-34. | Trivedi, R.K., P.K. Goyal and C.L. Trishal (1998). "Practical Methods in Ecology and Environmental Science." Enviro. Media Publications, Karad. | Wetzel, R.G. (2001). "Limnology- Lake and River Ecosystems" 3rd Ed., Academic Press, Elsevier Inc., London.