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Pollution parameters including toxic and heavy metals contamination studies of Upper Lake of Bhopal, India

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ABSTRACT

Upper Lake of Bhopal is among the biggest lakes of India and is a major source of drinking water for citizens of Bhopal. In the present study, water quality assessment was carried out with respect to the parameters like temp, total dissolved solids (TDS), conductivity, pH, hardness (Carbonate & Bicarbonate), alkalinity, BOD, COD, DO and heavy and toxic metals. The study reveals that the water of Upper Lake is partly polluted and requires suitable majors to check it.

Key words: Upper Lake, pollution paramters, heavy and toxic metals,

INTRODUCTION

Upper lake is naturally situated in the Bhopal, the capital city of Madhya Pradesh (India). Catchment area of Upper Lake is 31 sq.km. Fresh water is one of the most important and basic natural resources.

The quality of any water body and suitability for drinking purpose can be assessed with the help of various water parameters. The concentration of these parameters are well explains the quality of water and the pollution level.

The effect of heavy metal in aquatic system depends upon the nature of individual metals and their interactions with other compounds. The toxicity of heavy metals is mediated by phsico-chemical characteristics of aquatic movement. Though certain heavy metals are essential to living beings as they take part in their metabolic activity, they have attracted much attention because they are non biodegradable, persistent, accumulative in plants and animal, they are also toxic to living beings in fairly low concentration.

EXPERIMENTAL

Collection of water samples

Collection of water samples for analysis of phsico-chemical parameters were taken from different stations of Upper Lake. The collection of water samples was carried out in acid washed plastic bottles of 5 liters capacity. For estimation D.O. separate samples were collected in 250ml D.O. bottles and fixed in the field where water temperature of each site was recorded periodically. pH of water was recorded by using pH meter.

Laboratory work

Phsico-chemical analysis of water samples from Upper Lake was carried out by standard methods of APHA (1975).

Qualitative analysis

Lead

100ml acidified H_2O sample + 20 ml HNO_3 + 50ml ammonium citrate-cyanide solution in 25ml seperatory funnel. Mix and cool it at room temperature add 10 ml dithizone working solution. Shake funnel and separate organic layer, which is

Table - 1: Physico-chemical parameters of water at different sites of Upper Lake

S. No.	Parameters	Bairagarh	Fatehgarh	Kamla park	Bhaisakhedi
1.	Temp. (°C)	26.7	26.3	27.5	27.9
2.	pH	8.06	7.56	7.86	7.22
3.	Elec. conductivity(ms/cm)	0.26	0.23	0.21	0.28
4.	Alkalinity carbonate(mg/L)	16	Abs	10	12
5.	Alakainity bicarbonate (mg/L)	108	146	112	128
6.	Dissolved oxygen(mg/L)	13.2	11.2	12.8	11.2
7.	Ca, Hardness (mg/L)	79.8	102.9	92.4	100.8
8.	Mg, Hardness (mg/L)	48.2	49.1	43.6	41.2
9.	BOD (mg/L)	16.6	20.8	12	8.6
10.	COD (mg/L)	52	64	36	28
11.	Lead (mg/L)	0.015	0.032	0.021	0.018
12.	Mercury (mg/L)	BDL	BDL	BDL	BDL
13.	Chromium (mg/L)	0.012	0.016	0.018	0.011
14.	Copper (mg/L)	0.023	0.025	0.021	0.018
15.	TDS (mg/L)	158.6	140.3	128.1	170.8

BDL- Below detection level Abs- Absent

Table -2: Parameters for water quality characterization and standards (Domestic water Supplies)

Parameters	USPH Standard	ISI Standard (IS:2296-1963)
pH	6.0-8.5	6.0-90
Specific conductance	300 mmho/cm	-
Dissolved oxygen (D.O.)	4.0-6.0 (ppm)	3.0
Total dissolved solids	500	-
Chloride	250	600
Nitrate+nitrite	<10	-
Phosphate	0.1	-
Calcium	100	-
Magnesium	30	-
Chromium(VI)	0.05	0.05
Copper	1.0	-
Lead	<0.05	0.01
Mercury	0.001	-
COD	4.0	-

USPH – United States Public Healths
ISI-Indian Standard Institution, ppm-parts per million or mg/liter

cherry-red in colour. Measure absorbance at 10 nm.

Copper

Copper reacts with Neocuproine and extracted in CH_3 OH-$CHCl_3$ mixture to produce yellow coloured solution, which will be measured at 460 nm.

Chromium(Diphenyl carbazide method)

Chromium in water sample will be estimated by Diphenyl carbazide method, the blue-violet colour produced due to complex formation. Measure the absorbance at 540 nm.

Mercury

Mercury in water can be estimated by dithizone method, produce orange coloured chelate, which is extracted into CCl_4 and measured at 490 nm.

RESULTS AND DISCUSSION

For the present study water sample were collected from four densly populated areas. Where there is a possibility of sewage and domestic pollution. A part from this due to the immersion of Tazya's and Idol's, where they use cheap dyes and colures due to which lead, iron, chromium and some other toxic metals which gets introduced into the water. The results of our study which was conducted in the month of June-2006, indicates that the values of lead, mercury, chromium and copper along with the value of Hardness, COD and BOD are indicating that although the water of Upper Lake is suitable for drinking, but still its requires physico-chemical treatments and the measures to check the entry of pollutants into the Lake.

Conclusion

Repeated application of heavy metals contaminate the lake water, which results in accumulation of toxic metals in the water and can enter into body through plants, animals etc. the lake is a treasure of nature and should by protected from human exploitation.

REFERENCES

1. DE, A.K., *Environmental Chemistry*, (2005).
2. Charterjee, A.A.K. Water quality studies on Nandankanan Lake Indian & Environment HITH **34**(4); 329-333 (1992).
3. Sharma, B.K., *Environment Chemistry* (2001).
4. International Congress of Chemistry and Environment 9-11, 16th to 18th December Indore, India (2001).
5. APHA standards, method for the examination of water and waste water 14th Ed. American Public Health association, New York (1975).
6. Chakrapani CJ and Subramanaiam, Water quality of some commodity ponder of Bairagarh town *Poll. Per*., **12**(1) (1995).
7. Iqbal S.A. Kataria, H.C. : Chaghtai, S.A.: Bacteriological Study of Upper Lake of Bhopal, India, *Environment International* (USA). **21**(6) 845-848, (1995).