

HEAVY METAL ANALYSIS OF WATER BODIES IN BHOPAL, M.P. (INDIA)

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ABSTRACT

Present study was focused on the assessment of water of various water bodies in and around Bhopal. In this study water quality of Kolar reservoir, Lower Lake, Shahpura Lake was assessed for summer season. Heavy metals i.e. copper and lead were studied during the study. Water quality comparison of these three water bodies in Bhopal reveals that although the situation is not too worst but it is alarming. Proper conservation and management plans and strategies have to be formulated and implemented for the restoration, conservation and management of these water bodies at government and public level.

Keywords- Copper, Lead, Pollution.

INTRODUCTION

Our environment has witnessed a continuous and rapid deterioration which cause pollution in all its abiotic and biotic components. Nowadays, water pollution is burning issue all over the world. Like other developing countries water pollution in India also reaches in alarming situation. Lakes and rivers are dead and dying in India with no plan for recovery and revival. Although the government has not sat idle, all its money seems to be lost in technical solutions that fail. Bhopal is situated in the heart of India felicitated with large numbers of water bodies in and around it. But most of the water bodies are subjected to severe pollution due to stagnant nature and numerous anthropogenic activities around them. In Bhopal, where population is approximately 28 lakhs, total waste supply is 500.94 MLD per day and total sewage is 334.5 MLD per day. Sewage from approximately 25 nallahs around the city is released into water bodies, results in deterioration of water quality of these water bodies.

Present study is focused on assessment and comparison of water quality of three water bodies (Kolar Reservoir, Lower Lake and Shahpura Lake) were selected on the basis of their different locations and different uses. Lower Lake and Shahpura Lake are located in urban area whereas Kolar Reservoir is located in rural area so there catchment area is different. Upper Lake and Kolar Reservoir are the main source of potable water in Bhopal city while the Lower Lake, Shahpura Lake is mainly used for recreational and secondary purposes. All these five water resources are used for different purposes, so water pollution in these water bodies are caused by different sources.

II. MATERIAL AND METHOD

The sampling stations were chosen at different places of the area. The present study is focused on water quality assessment for summer season period march to June 2015- 2016. Season wise sampling is done i.e. pre-monsoon (March to June), during monsoon (July to October) and post monsoon (November to February). For testing the water samples were collected in different sterile glass bottles and Jerry cans from each station. After collection of the samples the bottles were tightly capped and were immediately transported to the laboratory to avoid any unpredictable changes in the physic-chemical characteristics. Suitable preservation techniques were adopted as per the standard methods, APHA (1995). Selective heavy metals like Pb, Cu, etc. are determined by Atomic Absorption Spectrophotometer (Parkin Elmer Analyst 100).

2.1 Sampling Station Lw1 (S1 & B1): This sampling station is situated near Kali Mandir. At this station lake has maximum depth of near about 10-11 meters. Main sources of pollution here are sewage and solid waste from surrounding area. S1 is surface layer and B1 is bottom layer of this station.

2.2 Sampling Stations Lw2 (S1 & B1): This sampling station is situated near Khatlapura. These sampling stations possess ozoniser type of aeration unit. Religious activity is main source of pollution here. S2 is surface layer and B2 is bottom layer of this station

2.3 Sampling Station SL1 (S1 & B1) : This sampling station is centre of the Shahpura Lake. S1 is surface layer and B1 is bottom layer of this station.

2.4 Sampling station SL2 (S1&B1): this sampling station is point of Shahpura lake where Nalla joining from Punchsheel Nagar. From this Nalla, Lake receives domestic raw sewage from surrounding habitation. S2 is surface layer and B2 is bottom layer of this station.

2.5 Sampling Station K1 (S1&B1): This sampling station is located in the centre of Kolar dam. Kolar dam is located about 30 km away from Bhopal. The water in these part are almost unaffected by anthropogenic activities. S1 is surface layer and B1 is bottom layer of this station.

2.6 Sampling Station K2 (S1&B2): This sampling station is intake point from where water is taken for further treatment to make it suitable for drinking purposes. S2 is surface layer and B2 is bottom layer of this station.

III. RESULT AND DISCUSSION

3.1 Lead (Pb)

Lead is a soft metal that has known many applications over the years. Lead metal ranged nil on surface while nil to 0.001 mg/l at bottom water layer in the summer season year 2015 and it ranges nil on surface while nil at bottom water layer in post-monsoon the year 2016 in Kolar Reservoir. Maximum lead metal was observed as 0.001 mg/l at KB2 during monsoon whereas minimum was noted as nil at KS1, KS2, KB1, KB2 during pre-monsoon in the year 2015-16.

Lead metal ranged from 0.006 to 0.069 mg/l on surface while 0.007 to 0.07 mg/l at bottom water layer in the year 2015 and it ranges from 0.007 to 0.07 mg/l on surface while 0.008 to 0.08 mg/l at bottom water layer in the year 2016 in Shahpura Lake. Maximum lead metal was observed as 0.08 mg/l at SLB2 during monsoon whereas minimum was noted as 0.006 mg/l at SLS1 during pre-monsoon in the year 2015-16.

In Lower Lake during the present investigation lead metal ranged from 0.008 to 0.1 mg/l on surface while 0.010

to 0.11 mg/l at bottom water layer in the year 2015 and it ranges from 0.008 to 0.11 mg/l on surface while 0.009 to 0.12 mg/l at bottom water layer in the year 2016. Maximum lead metal was observed as 0.12 mg/l at LWB1 during monsoon whereas minimum was noted as 0.009 mg/l at LWS2 during pre-monsoon in the year 2015-16.

season	Kolar Reservoir				Shahpura lake				Lower lake			
	KS1	KS2	KB1	KB2	SLS1	SLS2	SLB1	SLB2	LWs S1	LWS 2	LWB 1	LWB 2
	Copper in mg/l											
Pre-monsoon	0.063	0.03	0.066	0.035	0.102	0.36	0.102	0.39	0.31	0.12	0.34	0.15
Monsoon	0.062	0.04	0.067	0.05	0.103	0.39	0.11	0.4	0.15	0.34	0.37	0.17
Post-monsoon	0.062	0.04	0.066	0.05	0.103	0.39	0.11	0.4	0.15	0.34	0.36	0.17

Table1. Showing Seasonal variation of Copper in 3 reservoirs

while comparing Lower Lake and Shahpura Lake, maximum value 0.12 mg/l was observed at LWB1 in monsoon season and minimum 0.006 mg/l at SLS1 during pre-monsoon (2010) studied the impact of idol immersion on Lakes of Bhopal and found higher value of lead after idol immersion activity which held in winter season.

3.2 Copper (Cu)

During present study in Kolar Reservoir copper metal ranged from 0.03 to 0.063 mg/l on surface while 0.035 to 0.066 mg/l at bottom water layer in the year 2015 and it ranges from 0.04 to 0.062 mg/l on surface while 0.05 to 0.067 mg/l at bottom water layer in the year 2016. Maximum copper metal was observed as 0.067 mg/l at KB1 during monsoon whereas minimum was noted as 0.03 mg/l at KS2 during pre-monsoon in the year 2015-16.

Copper metal ranged from 0.12 to 0.31 mg/l on surface while 0.14 to 0.34 mg/l at bottom water layer in the year 2015 and it ranges from 0.15 to 0.34 mg/l on surface while 0.17 to 0.37 mg/l at bottom water layer in the year 2016 in Lower Lake.

Maximum copper metal was observed as 0.37 mg/l at LWB1 during monsoon whereas minimum was noted as 0.12 mg/l at LWS2 during pre- monsoon in the year 2015-16.

Copper metal ranged from 0.101 to 0.36 mg/l on surface while 0.102 to 0.39 mg/l at bottom water layer in the year 2015 and it ranges from 0.103 to 0.39 mg/l on surface while 0.11 to 0.4 mg/l at bottom water layer in the year 2016 in Shahpura Lake. Maximum copper metal was observed as 0.4 mg/l at SLB2 during monsoon whereas minimum was noted as 0.101 mg/l at SS1 during pre-monsoon in the year 2015-16.

While comparing Lower Lake and Shahpura Lake, maximum value 0.4 mg/l was observed at station SLB2 in monsoon season and minimum 0.101 mg/l at SLS1 during pre- monsoon. Bhavana(2009) studied Narmada river and found maximum value of copper in monsoon season.

IV.CONCLUSION

Water quality comparison of these two water bodies in Bhopal reveals that although the situation is not too worst but it is alarming. The conditions of water bodies which are being used for primary purposes have to be maintained while the other which are being used for secondary purposes have to be improved. As these waterbodies are the lifeline for Bhopal city in one way or the other, proper conservation and management plans and strategies have to be formulated and implemented for the restoration, conservation and management of these water bodies at government and public level.

season	Kolar Reservoir				Shahpura lake				Lower lake			
	KS1	KS2	KB1	KB2	SLS1	SLS2	SLB1	SLB2	LWs S1	LWS 2	LWB 1	LWB 2
	LEAD in mg/l											
Pre- monsoon	0	0	0	0	0.006	0.069	0.007	0.07	0.009	0.008	0.11	0.010
Monsoon	0	0	0	0.001	0.007	0.07	0.007	0.08	0.009	0.11	0.12	0.01
Post- monsoon	0	0	0	0	0.007	0.07	0.007	0.07	0.009	0.10	0.11	0.01

Table 2.showing seasonal variation of Lead in three reservoirs

REFERENCES

- [1.] Anu, Upadhyaya, S. K. and Bajpai, A. "Comparison of physicochemical parameters of various water bodies in and around Bhopal (M.P)". Asian journal of chemical and environmental research (2010), 3(3): pp20-26.
- [2.] Bhavana, A., Shrivastava, V., Tiwari, C.R. and Jain, P. "Heavy metal contamination and its potential risk with special reference to Narmada River at Nimar region of M.P.(India)". Res. J. of Chem. & Env. (2009), 13 (4), 23-27.
- [3.] APHA, (1995). Standard methods for examination of water and wastewater,16th edition, American Public Health Association, Washington DC, USA.