Int. J. Chem. Sci.: 7(2), 2009, 864-868

MONITORING OF TOXIC/TRACE METALS IN THE SURFACE WATER AROUND HYDERABAD LAKES

K. NARASIMHA REDDY[a] and S. SATHYANARAYANA[*]

Department of Chemistry, Osmania University, HYDERABAD - 7 (A. P.) INDIA
[a]AINP on Pesticide Residues, College of Agriculture, HYDERABAD - 30 (A. P.) INDIA

ABSTRACT

The surface water samples collected from 10 lakes and one stream during post monsoon 2005 and 2006 and pre monsoon 2006 and 2007.Total 44 samples at the rate of 4 samples from each loction were collected during investigation period from Hyderabad, Rangareddy and Medak districts of A. P. The samples were analysed for nine metals viz., Cr, Cu, Mn, Fe, Co, Ni, Cd, Pb and Zn and recorded concentrations (mg/L) ranges are 0.00 – 0.079, 0.00 – 0.228, 0.00 – 1.008, 0.00 – 13.112, 0.00 – 0.056, 0.00 – 0.832, 0.00 – 0.025, 0.00 – 0.543 and 0.00 – 1.040, respectively.

Key words: Toxic, Trace, Water quality

INTRODUCTION

The lakes around Hyderabad and it surrounding districts Ramgareddy and Medak is the major source of drinking water to the twin cities of Hyderabad and Secunderabad. Among the selected lakes, some of them are not for drinking purpose. The reservoirs are filled only by rains. The catchments area of the reservoirs are with intensive agriculture and some of the catchments area of reservoir is covered with industrial area. The inflow of the stream of water by rain contaminating the reservoir water by toxic/trace metals. Therefore, this investigation take-up to study the levels of concentration of toxic/trace metal viz., Cr, Cu, Mn, Fe, Co, Ni, Cd, Pb and Zn.

EXPERIMENTAL

The surface water samples collected from 11 locations of Hyderabad, Rangareddy and Medak districts viz., Osmaansagar lake, Himayathsagar lake, Singoor reservoir, Manzeera barrage, Vikarabad reservoir, Mir Alm Lake, Hussainsagar lake, Uppal lake,

[*] Author for correspondence; E-mail: knreddy_4@yahoo.com

Saroornagar lake, Sadasivapet Stream and Rajendranagar Lake. Total 44 sample were collected at the ragae of 4 samples from each location during Post monsoon 2005, pre monsoon 2006, post monsoon 2006 and pre monsoon 2007. The collected water samples were analysed for toxic/trace metals viz., Cr, Cu, Mn, Fe, Co, Ni, Cd, Pb and Zn. The representative samples of 2.5 lit collected from 20 to 30 spots and filtered and acidified[1] with concentrated nitric acid till the pH of the samples become 2 to avoid the precipitation of metals. The samples were analysed for trace metals on Varian Atomic Adsorption Spectrophotometer after pre–concentration.

RESULTS AND DISCUSSION

The surface water samples collected from 11 locations were analysed and data are presented in the Table 1. The perusal of the data indicate that the Osmansagar lake water samples contains following metals viz., Cu, Mn, Fe, Co and Ni and mean concentration (mg/L) of four seasons was 0.001, 0.072, 0.011, 0.008 and 0.023, respectively. The metal concentrations detected were below the Maximum Contamination Level (MCL) prescribed by Bureau of Indian Standards[2]. Therefore, the water in the lake is suitable for consumption. The results are similar with results of Sing et al.[3] The water samples collected from Himayathsagar lake were found to contain with Mn and Fe and mean concentrations of four seasons during 2005 to 2007 were 0.023 mg/Land 0.038 mg/L, respectively. These were below MCL. Hence, the water in the lake is suitable for drinking purpose.

The main source of drinking water to twin cities of Hyderabad and Secunderabad is from Singoor reservoir and Manzeera barrage. The water samples of Singoor reservoir do not give any detection of metal but the Manzeera barrage water sample contains Fe (0.019 mg/L), which is below MCL. The surface water of both the sources were suitable for drinking purpose.

The water samples of Vikarabad reservoir, which supplies drinking water to Vikarabad town contains Mn, Fe, Zn and mean concentration of four seasonal samples were 0.017 mg/L, 0.051 mg/L, 1.009 mg/L, respectively, which are below MCL. Therefore, the water in the reservoir is suitable for consumption. The water samples of Mir Alam lake is contaminated with higher concentrations of metals viz., Cr (0.058 mg/L), Cu (0.201 mg/L), Mn (0.882 mg/L), Fe (0.203 mg/L), Pb (0.002 mg/L) and Zn 0.480 (mg/L). Except Zn, all remaining metals detected were above the MCL. The catchments areas of the lake have metal scrap industries and this may be this reason for contamination of this lake with toxic metals. The results were very near to Yigit and Altingday[4].

Table 1

Location	Cr	Cu	Mn	Fe	Co	Ni	Cd	Pb	Zn
	Concentration (mg kg^{-1}) Average of four seasons								
Osmansagar	ND	0.001	0.072	0.011	0.008	0.023	ND	ND	ND
Himayathsagar	ND	ND	0.023	0.039	ND	ND	ND	ND	ND
Singoor reservoir	ND	ND	ND	ND	ND	ND	ND	ND	ND
Manzeera barrage	ND	ND	ND	0.019	ND	ND	ND	ND	ND
Vikarabad reservoir	ND	ND	0.017	0.051	ND	ND	ND	ND	1.009
Mir Alam Lake	0.058	0.201	0.882	0.203	ND	ND	ND	0.002	0.48
Hussain Sagar lake	0.079	0.108	0.241	0.206	0.02	0.029	0.012	0.027	0.2
Uppal lake	ND	0.049	0.037	0.162	ND	0.089	ND	ND	0.175
Saroornagar lake	ND	ND	ND	0.425	ND	ND	ND	ND	0.099
Sadasivapet stream	ND	ND	ND	0.04	ND	ND	ND	ND	0.02
Rajendranagar	0.072	0.228	1.008	13.112	0.056	0.832	0.025	0.543	1.04

ND - Not Detected

The Hussain sagar lake water samples contain metals viz., Cr (0.079 mg/L), Cu (0.108 mg/L), Mn (0.241 mg/L), Fe (0.206 mg/L), Co (0.020 mg/L), Ni (0.029 mg/L), Cd (0.012 mg/L), Pb (0.027 mg/L) and Zn (0.200 mg/L). The concentrations of all metals except Zn, were above the MCL prescribed by BIS specifications. Therefore, the water is not suitable for consumption. For the last few decades, the lake is polluted with effluents from the different industries. Hardware work shops around the lake are also reason for pollution of the lake. The results were similar to Ovewale and Musa[5].

The water samples of Uppal lake was found to have Cu (0.049 mg/L), Mn (0.037 mg/L), Fe (0.162 mg/L), Ni (0.089 mg/L) and Zn (0.175 mg/L). Except Zn, all detected metals concentrations were above MCL. Therefore, the water of the lake is not suitable for consumption. The reason for contamination is the industrial effluents from Nacharan Industrial area, which is merging in the lake and also drinage water coming from colonies around the lake. The results were close to results Gaur et al.[6]

The surface water samples collected from Saroornagar contain metals viz., Fe (0.425 mg/L), Zn (0.099 mg/L) and most of the metals were below detection levels. The metal Fe is more than MCL. Only domestic drinage waste is discharged into the lake and therefore, less metal pollution is observed in the source.

The water samples of Sadasivapet stream have Fe (0.040 mg/L) and Zn (0.020 mg/L). The metals detected were below the MCL and therefore, the water in the stream is suitable for comsumption. At present, the wells digged in the stream is supplying the drinking water to Nandikandi village and Sadasivapet town.

The surface water samples collected from Rajendranagar lake is highly contaminated with toxic metals viz., Cr (0.072 mg/L), Cu (0.228 mg/L), Mn (1.008 mg/L), Fe (13.112 mg/L), Co (0.056 mg/L), Ni (0.0832 mg/L), Cd (0.025 mg/L), Pb (0.543 mg/L) and Zn (1.040 mg/L). Except Zn, all the other metals were above the MCL. As the industrial effelunts from Katedan area is directly merging in the lake, the water samples were highly polluted with toxic and trace metals.

The major water supply of drinking water is from the Singoor project, Manzeera barrage, Osmansagar lake and Himayathsagar lake. Surface water from these reservoirs was not contaminated with metals. The metals detected in these reservoir water samples were below the MCL prescribed by BIS (2004). The Hussain sagar, Mir Alam, Uppal and Rajendranagar lakes were contaminated with toxic metals, and therefore the water in these reservoirs/lakes is not suitable for consumption.

REFERENCES

1. H. L. S. Tondon, Method of Analysis of Soils, Plants, Water and Fertilizers, Fertilizer Development and Consultation Organization, **3**, 36 (1999).
2. Bureau of Indian Standards, Packaged Drinking Water (Other than Packaged Natural Mineral Water) Specification, First Revision, 1 – 18 (2004).
3. V. K. Singh, K. P. Singh and K. P. Mohan, Status of Heavy Metals in Water and Sediments of River Gomathi – A Tributary to Ganga River, India, Environmental Assessment, **105(1-3)**, 43 (2005).
4. S. Yigit and A. Altingdag, Concentration of Heavy Metals in the Food Web of Lake Egirdir, Turkey, J. Env. Bio., **27(3)**, 475 (2006).
5. A. O. Ovewale and I. Musa, Pollution Assessment of the Lower Basin of Lakes Kainji/Jebba, Nigeria. Heavy Metal Status of the Waters, Sediments and Fishes, Envi. Geo. Chem. Health, **28(3)**, 273 (2006).
6. V. K. Gaur, S. K. Gupta, S. D. Pandey, K. Gopal and V. Misra, Distribution of Heavy Metals in Sediment and Water of River Gomati, Envi. Moni Assess., **102 (1-3)**, 567 (2005).

Accepted : 01.11.2008