



## Heavy metal contamination cause of idol immersion activities in urban lake bhopal, India

<sup>1\*</sup>VYAS, ANJU; <sup>2</sup>BAJPAI, A; <sup>3</sup>VERMA, N; <sup>4\*</sup>DIXIT, S

<sup>1</sup>Research scholar, Govt. Geetanjali. G. P.G. College, Bhopal, M.P., India, Address Flat 3, 41 Lorne Road Harrow, Middlesex, London, UK HA3 7NH, Phone ++44 07958798799, email [anjuv22@rediffmail.com](mailto:anjuv22@rediffmail.com)

<sup>2</sup>LCA, Environmental Planning and co-ordination Organization (EPCO), Bhopal, M.P., India, PIN 462016, Phone 91-0755-2767973, [baipai\\_avinash@rediffmail.com](mailto:baipai_avinash@rediffmail.com)

<sup>3</sup>Lecturer, Applied Chemistry Department, Maulana Azad National Institute Of Technology, Bhopal & Research scholar, Govt. Geetanjali. G. P.G. College, Bhopal, M.P., India PIN 462016, Phone 91-0755-2762515, email [neelam\\_15@rediffmail.com](mailto:neelam_15@rediffmail.com)

<sup>4\*</sup>Applied Chemistry Department, Maulana Azad National Institute Of Technology, Bhopal, MP, India, PIN 462007, Phone 91-0755-2428155, e-mail [savitadixit1@yahoo.com](mailto:savitadixit1@yahoo.com)

**ABSTRACT:** Water resource of the earth is part of a finite close system, and in any time period when population are rising, the per capita amount of water available is inevitably decreasing. Water quality of lake are normally get contamination every where by accumulation of sediments, human waste, sits organic matter, industrial waste but in India different type of religious activities (Idol immersion) are take place every year to which other country are not concern. The water body selected for the study is Upper lake of Bhopal, M.P., India. The immersion of idol of Lard Ganesh and Goddess Durga during Ganesh Ustav and Navratris festival is a major source of contamination and sedimentation to the lake water. The idol are been made up of Clay, Plaster of paris, cloth, paper, wood, thermocol, jute, adhesive material and synthetic paints etc. Out of the all martial used in making the idol, thermocol is Non-Biodegradable while paints contain heavy metals such as Chromium, Lead, Cadmium and Mercury. The present study was under taken to evaluate heavy metals. The findings of the study Increase Heavy Metals contamination after idol immersion, nickal, lead and mercury may magnify in their concentrations at different tropic levels, including in fishes and birds inhabiting the lake, which finally reach the humans through food. @JASEM

All forms of life upon the earth depend upon water for their mere existence. Life & water may be aptly said to be two faces of the same coin. The Upper Lake (Lat 23°16'N Log 77°18' - 77°23' E) situated in Bhopal. Upper lake was created by Raja Bhoj in 11 century. The Upper Lake has large catchments area of 361 sq. km. and at present has water spread area of 31 sq.km. The Upper lake is a major source of potable water and idol immersion also (Shukla, S.S., 2003). The idols of Lord Ganesh and Goddess Durga worshipped by Hindus are immersed in the month of September and October respectively every year. Similarly during the Moorum festival, tazias are being immersed by Muslims in the month of May every year (Mukerjee A., 2003). Lead & Chromium, which also adds through "Sindur" in the water bodies, are very toxic even in very small quantity for human being (Bubicz, 1982). When immersed, these colors and chemical dissolve slowly leading to significant alteration in the water quality. (Dhote, S. et al., 2001) The idol immersion is a religious activity, which is responsible for adding pollution load in

the water bodies. The reservoir can serve as a model for studying heavy metal contamination through idol immersion.

### MATERIAL AND METHODS

**Sampling:** Samplings was done from three sites of Upper lake. The water samples was collected from surface layer and the site of idol immersion at different intervals i.e. pre immersion, during immersion and post immersion. Pre idol immersion samples were collected a week before the commencement of the immersion activities. During idol immersion samples were collected during the immersion activities. Post idol immersion samples were collected fifteen days after the completion of immersion activities. The samples were subjected to Heavy metals analysis like chromium & lead were analyzed according to standard methods (prescribed in APHA American Public Health Association, 1995).

#### I. idol immersion of Ganesh



- Heavy metal analysis: The water sample collected for the heavy metals are preserved by adding 5 ml of 1 N  $\text{HNO}_3$  and bringing down the pH to near about 4 and analyzed using AAS (Perkin Elmer AAnalyst 100).

## RESULT AND DISCUSSION

We found that the concentration of calcium had increased significantly in the lake water after the idol immersion; however, it was below the limits of permissible standards. The average concentration of calcium in the lake water was much less compared to that at the immersion sites. Magnesium, chromium, arsenic and cadmium concentrations had also increased significantly in the lake water after the idol immersion (Kulshrestha, S.K., 1988). Though magnesium is non-poisonous, it increases the hardness of water. Over the years, the average concentration of heavy metals, especially manganese, lead and mercury has also increased considerably in the lake water compared to the specifications of highest desirable limits as set by BIS and ICMR (1975) standards (see Table 1). (Reddy, Vikram M., 2001) Excess of this element causes skin diseases. Though the concentration of chromium in the lake water did not change much and was below the limits of standards, that of lead and mercury, the potentially obnoxious heavy metals, had increased many-fold in the water due to the idol immersion. Compared to, the specifications of highest desirable limit of BIS and ICMR standards. (Pande, 1980) studied the metallic content in water & sediments of lake Nainital, India & found that the concentration of metallic content in sediments is much higher than in the lake water.

**Table I.** Changes in concentration (mg/l) of some chemical pollutants in Upper lake water before, during immersion and after the immersion of Ganesh idols Chemical pollution conc. in the water before immersion of idols, during immersion of idols and after immersion of idols BIS and ICMR standards for highest desirable limits.

| Heavy metals | Before Idol Immersion | During Idol Immersion | After Idol Immersion | Permissible limit BIC & ICMR |
|--------------|-----------------------|-----------------------|----------------------|------------------------------|
| Calcium      | 39.64                 | 53.21                 | 66.97                | 75                           |
| Magnesium    | 9.98                  | 12.34                 | 16.52                | 30                           |
| Cadmium      | 0.003                 | 0.013                 | 0.021                | 0.01                         |
| Chromium     | 0.009                 | 0.015                 | 0.028                | 0.05                         |
| Manganese    | 0.084                 | 0.146                 | 0.328                | ****                         |
| Lead         | 0.243                 | 0.364                 | 0.609                | 0.1                          |
| Arsenic      | 0.132                 | 0.125                 | 0.145                | ****                         |
| Mercury      | 0.689                 | 0.552                 | 0.794                | 0.001                        |

After the immersion of the idols, its concentration increased further, to more than seven-hundred fifty times in the water (Table I). The heavy metals are known to be persistent in the aquatic environment, and gradually accumulate and magnify through the process known as bioaccumulation and biomagnifications, while they move up in the food chain. (Bajpai, A., 2003) Thus, lead and mercury may magnify in their concentrations at different trophic levels, including in fishes and birds inhabiting the lake, which finally reach the humans through food. Organic compounds of mercury, for example methyl mercury when it enters the human body, concentrates in the brain and destroys the brain cells, damaging the central nervous system,

\* Corresponding author: <sup>1</sup>\*VYAS, ANJU anjumjoshi@yahoo.com

and also causes corrosion and ulceration of the digestive tracts (Bowen, H.J.M., 1966). Thus, people consuming contaminated fish caught from the lake over a period of time may get afflicted with mercury poisoning. Therefore, it is suggested that the authorities looking into the environmental protection of the lake need to take necessary steps.

## SOLUTION

To make this year's festival an environment-friendly one, the environment department of the Bhopal government is planning several initiatives: It has planned to educate idol makers this time. They will be asked to, and the NGO, Development Alternative will be guiding them on how to use non-toxic colors to paint the idols. They are also asked to use traditional clay which is non-polluting instead of baked clay.

- Idols should be made of traditional clay.
- Painted idols should not be used.
- They should be water-soluble. \* Smaller idols
- Idols should be small as they would dissolve faster.
- Non-degradable chemical dyes are banned.
- Stress on natural colors used in food products.

## REFERENCES

- APHA (1995), Standard methods for examination of water and waste water, American Public Health Association, Washington, D.C., 19th Edition.
- Bajpai, A., S.Pani, R.K.Jain & S.M.Mishra, (2003) Heavy metal contamination through idol immersion in a tropical lake. *Ecological & Environmental Conservation* 8(2):157-159.
- Bowen, H.J.M., (1966) Trace Element in Biochemical (New York: Academic Press Including)
- Bubicz, M., (1982). Heavy metal in the aquatic environment of some water bodies of the Lublin basin *Actuatic Hydrobiologia.*, 24, 125-138.
- Dhote, S., Varghese, B., Mishra S.M., (2001) Impact of Idol immersion on water quality of Twin Lakes of Bhopal. *Indian Journal Environmental protection*. Vol. 21, 998-1005.
- ICMR, (1975) Manual of standards of quality for drinking water supplies, Special report series No. 44, 2<sup>nd</sup> edition.
- Kulshrestha, S.K., M.P. George, and A. A., Khan, (1988). Preliminary studies on the impact of certain religious activities on water quality of Upper lake, Bhopal. *National. Symp. Past Present and Future of Bhopal lakes.*, 253-257.
- Mukerjee A., (2003) Religious Activities and Management of Water Bodies. Case Study of Idol Immersion in Context of Urban lakes *Management International Water Histroy Association* (3) 325.
- Pandey, Jyotsana & Das S.M., (1980). Metallic contents in water & sediments of lake Nainital, *Indian Journal. Ecological.* 7(1): 114-118.
- Reddy, Vikram M., and Kumar, Vijay, A., (2001). Effect of Ganesh Idol Immersion on some water quality parameter of Hussain Sagar, *Current Science*, Vol. 81: 1412.
- Shukla, S.S., (2004) Effect of Public Awareness Campaign in Mitigating impact of religious activities on Bhopal Lakes., *Abstract of Global Biodiversity Fourm*.