

Contamination of Heavy Metal Caused By Idol Immersion Activities in Bhoj Taal: A Ramsar Site, Bhopal, Madhya Pradesh, India.

Romasilawat

Research Scholar (Ph.D.), Department of Zoology, Govt. Motilal VigyanMahavidhyalayaBhopal, Madhya Pradesh, India.

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ABSTRACT :Water resources are very essential for existence of life on the earth. Water resources are restricted close system and in any time span when population are rising, the per capita amount of water convenient is certainly decreasing. Water quality of lakes are normally get contaminated everywhere by human waste, lodgment of sediments, sits organic matter, industrial waste but in India various types of religious activities like idol immersion are taking place every year to which other country are not concern. The water source selected for the study is Bhoj Taal, Bhopal, Madhya Pradesh, India. The major source of contamination and sedimentation to the water source is the idol immersion of Goddess Durga and Lord Ganesha during Navratris and Ganesh Chaturthi. The idols are made up of Plaster of Paris, clay, paper, cloth, wood, jute, thermocol, adhesive materials and synthetic paints etc. Out of all these thermocol is Non – Biodegradable while paints contain heavy metals such as Lead, Cadmium, Chromium and Mercury. The present research study was undertaken to estimate heavy metals. The detecting of the research showed increased heavy metal concentration due to idol immersion, Lead, Mercury and Nickel may magnify in their concentration at various trophic levels including birds and fishes, inhibiting the lake which finally reach the human through food chain in ecosystem.

KEYWORDS :Water resources, heavy metal, idol immersion, bio-magnification, bioaccumulation, trophic level, food chain, ecosystem.

INTRODUCTION :

Water is the most foundational and one of the chief necessities for survival of all forms of life on the earth and no one can visualize to live life without this natural resource [1,2]. Water and life may be competently said to be two faces of the same coin. In Bhopal, Bhoj Taal is constructed by

Raja Bhoj in 11th century. Bhoj Taal has large catchment area of 361 sq kms. Bhoj Taal is the home of diverse flora and fauna including many water birds. The lake is designated as a wetland of international importance under the international Ramsar Convention since August 2002. The Bhoj Taal is one of the prime sources of potable water and site for idol immersion [3]. The idol of Goddess Durga and Lord Ganesha are immersed during Navratris and Ganesh Chaturthi every year also during the Muharram festival, Taziyas are being immersed by Muslims in the month of May every year [4]. Heavy metals like Chromium and Lead which also put on through “Sindoor” in the water source, are very toxic even in very small quantity for human beings [5]. These colors and chemicals when immersed, dissolve slowly leading to notable alteration in the water quality parameters [6]. These religious activities which are responsible for adding pollution load in the water sources. Water resources play crucial role in Bio – geochemical cycle so that they are an integral part of biosphere. They provide food, shelter and habitat for biodiversity. The anthropogenic activities may induce changes in sensitive water bodies, ecosystems and ecological conditions of many water sources in many developing countries, are destroying as a result of population explosion, intensified agricultural practices, change in land use pattern and increase industrialization are affecting natural conditions of water body [7,8].

Due to heavy anthropogenic pressure and negligence of local people who can never come forward for the betterment of the water body, so that the quality of water body is deteriorated day by day. Due to various factors which can give threat not only to the biodiversity of the water body but also to the people which are directly or indirectly depend on the source of water and the aquatic life also [9-13]. For study of heavy metal concentration

through idol immersion the Bhoj Taal can serve a model.



MATERIALS AND METHODS : Three locations are selected for sampling in the year 2017. Surface water was collected from the site of idol immersion at different intervals of time i.e. pre immersion, during immersion and post immersion. Pre idol immersion samples were collected a week before the starting of the immersion activities. At the time of second sampling water samples were collected during idol immersion activities. Post idol immersion water samples were collected 15 days after the ending of immersion activities. The samples were taken to the laboratory for the heavy metal analysis according to standard methods (prescribed in APHA 1995).

Analysis of heavy metals: The water samples were collected for the analysis are preserved by adding 5 ml of 1 N HNO₃ and dropping down the pH to near about 4 and analyzed using AAS (Perkin Elmer Analyst 100).

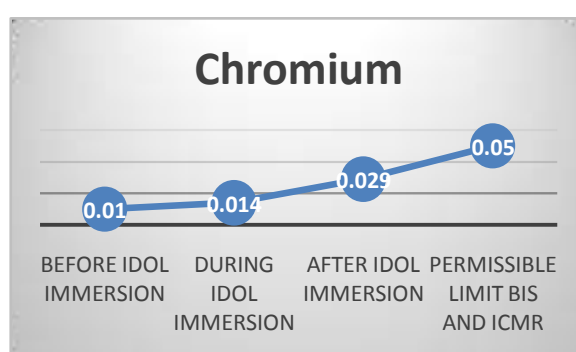
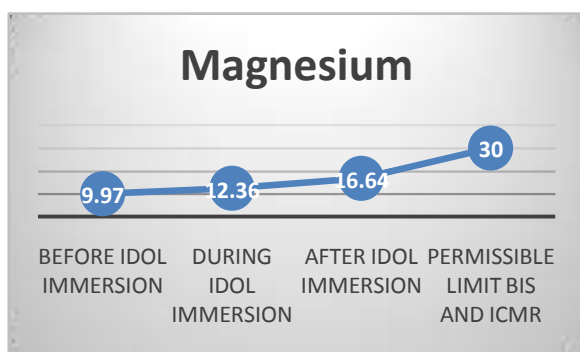
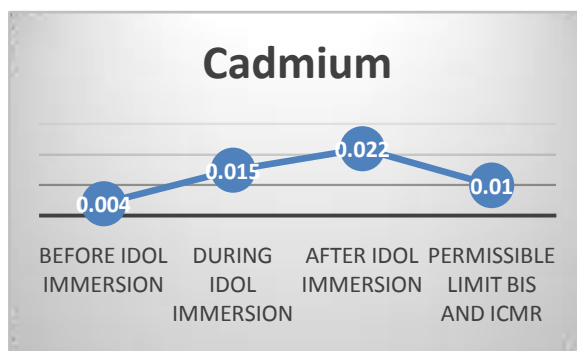
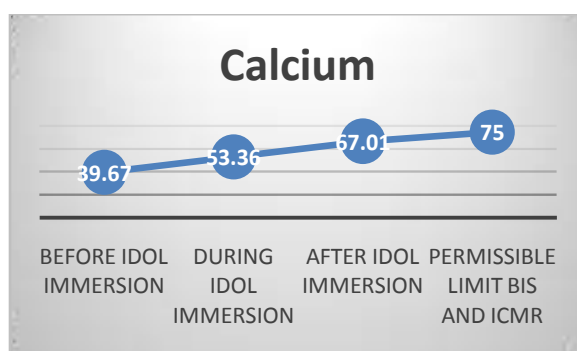
RESULTS AND DISSCUSSION : We noticed that the Calcium concentration had increased notably in the lake water after the immersion of

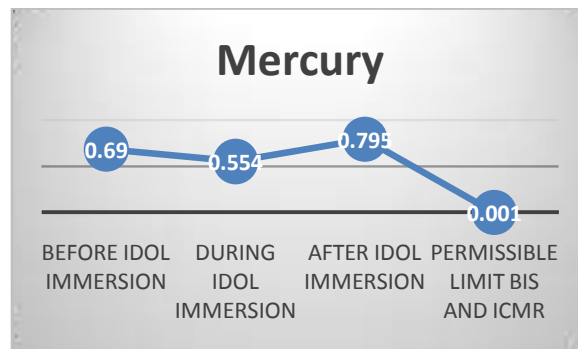
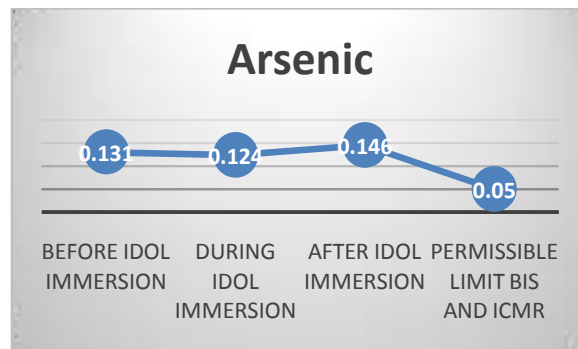
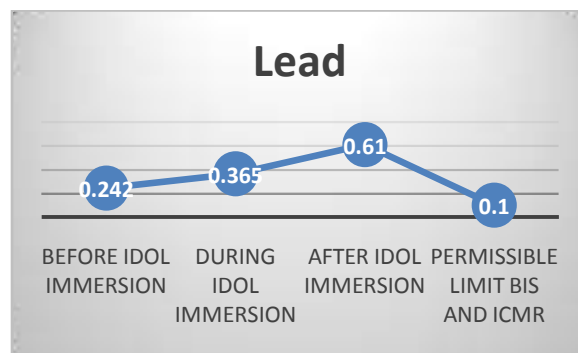
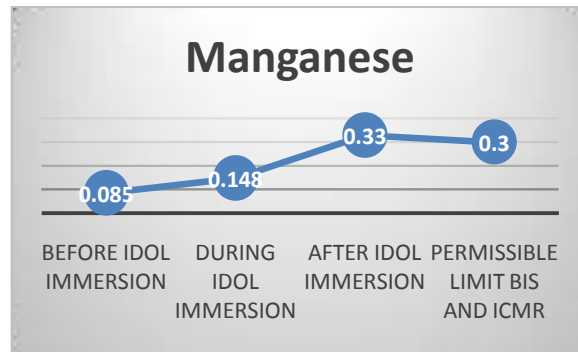
idol. Though it was below the limits of permissible standard. The mean concentration of Calcium in the lake water was much less compared to that at the immersion sites. Chromium, Cadmium, Magnesium and Arsenic concentrations had also increased remarkably in the lake water after immersion of idol [14]. However, Magnesium is non-toxic it increases the water hardness. Over the years, the standard concentration of heavy metals mainly Lead, Manganese and Mercury had also increased significantly in the lake water compared to the specification of highest desirable limits as set by BIS and ICMR (1995) standards (Table- 1). Plethora of this element causes skin diseases [15]. However, the Chromium concentration in the lake water didn't alter much and was below the limits of standards, that of mercury and Lead, possibly nasty heavy metals had increased manyfolds in the water due to the immersion of idol. In comparison to the specification of highest desirable limits of BIS and ICMR standard. The metallic concentration in sediments is much higher than in the lake water of Nainital, India [16].

Table- 1 : Alteration in concentration (mg/L) of some chemical pollutants in Bhoj Taal water before, during and after idol immersion. Chemical pollutants concentration in water before, during and after idol immersion, BIS (Bureau of Indian Standards) and ICMR (Indian Council of Medical Research) standards for highest desirable limits.

Heavy metals	Before Immersion	idol	During immersion	idol	After Immersion	idol	Permissible limit BIS and ICMR
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Calcium	39.67	53.36	67.01	75
Magnesium	9.97	12.36	16.64	30
Cadmium	0.004	0.015	0.022	0.01
Chromium	0.01	0.014	0.029	0.05
Manganese	0.085	0.148	0.33	0.3
Lead	0.242	0.365	0.61	0.1
Arsenic	0.131	0.124	0.146	0.05
Mercury	0.69	0.554	0.795	0.001





After the idol immersion, concentration of heavy metals increased further to more than seven fifty times in the water (Table- 1). The heavy

metals are well known to be persistent in the aquatic environment and little by little accumulate and magnify through the process of Bio-

accumulation and Bio-magnification, while they move up in the food chain of the ecosystem. Therefore, Mercury and Lead may magnify in their concentrations at different trophic levels including in fishes and birds, inhibiting the lake which finally reach the human through food [17]. Methyl mercury which is the organic compound of Mercury when enters into the human body concentrates in the Brain and destroy the brain cells, damaging the CNS (Central Nervous System) and also causes ulceration and corrosion of the digestive tract [18]. Hence, when people consume contaminated fish from the water source over a period of time may get affected with Mercury poisoning.

Solution :The Environment Department of Bhopal is planning several initiatives for making festivals an environmental friendly one.

- Traditional clay should be used for making idol.
- Toxic paints should not be used.
- Materials used should be water soluble.
- Use smaller idols as they would dissolve faster than bigger ones.
- Chemical dyes which are non-degradable should be banned.
- Public awareness towards environment should be mandatory.
- Idol immersion should be done into separate artificial tanks not into the water sources.

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