

## Idol Immersion Activities Cause Heavy Metal Contamination in River Budhabalanga, Balasore, Odisha, India

Kausik Kumar Das<sup>1</sup>, Tanuja Panigrahi,<sup>2</sup> Dr. R.B.Panda<sup>3</sup>

<sup>1</sup>Research Scholar P.G. Dept. Of Environmental Science, F.M. University, Balasore.

<sup>2</sup>Associate Professor in P.G. Dept. Of Environmental Science, F.M. University, Balasore.

**ABSTRACT:** Balasore town in the state Odisha, India is situated in the bank of river Budhabalanga. The impact of idol immersion on water quality of Budhabalanga River is discussed, for this purpose Balighat point was selected as sampling station because huge number of idol like Ganesh idol, Durga idol, Viswakarma idol etc. are immersed on this Ghat of Budhabalanga River. Water samples were collected at morning hours during pre immersion, during immersion and post immersion in the periods of idol immersions. The immersion of idol of Lord Ganesh, Lord Viswakarma and Goddess Durga during month of August to October is a major source of contamination and sedimentation to the River Budhabalanga. The idol are been made up of clay, plaster of paris, cloth, paper wood, thermocol, jute, adhesive materials and synthetic paints etc. Out of the all material 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 increase heavy metal concentration after immersion may magnify in their concentrations at different tropic levels by food chain. On the basis of these changes it is concluded that the level of water pollution increases in Budhabalanga River due to these religious activities and cause adverse effect to the aquatic life or entire aquatic ecosystem. No one can change or stop these religious activities but awareness among the people and society can reduce the pollution.

**Keywords:** Budhabalanga River, Heavy metals, Religious activities, water quality, water pollution.

### I. INTRODUCTION

“WATER” the elixir of life referred as nature, was worshiped since Vedic days. The Rig-Veda depicts that water functions as givers and sustainers of life. So, water is also called as “GOLDEN LIQUID”. But Now-A-Days water pollution is a major global problem. It occurs when pollutants are discharged directly or indirectly into water bodies without adequate treatment to remove harmful compound. Water pollution occurs due to the discharge of municipal sewage both domestic and industrial without any treatment which brings considerable changes in the river water quality in addition to many religious activities now became a threat to the ecosystem [1, 2]. The idols of Lord Viswakarma, Lord Ganesh, Goddess Durga etc. worshipped by Hindu are immersed in the month of August to October respectively every year. Similarly during the Moorum festival, tazias are being immersed by Muslims in the month of May every year [3]. The idol are been made up of clay, plaster of paris, cloth, paper wood, thermocol, jute, adhesive materials and synthetic paints etc. Out of the all

Material used in making the idol, thermocol is Non-biodegradable while paints contain

Heavy metals such as Chromium, Lead, Cadmium and Mercury. The chemical paints used to decorate the idols increases heavy metal concentration and acidity in the water [4]. Lead and Chromium, which also adds through SINDUR in the water bodies, are very toxic even in very small quantity for human being through the process known as Bioaccumulation and Biomagnifications [5]. When immersed, these colours and chemical dissolve slowly leading to significant alternation in the water quality [6].

Balasore is situated on the bank of Budhabalanga River that plays important and major role in its economic and social growth and development. Budhabalanga River is a river of Eastern India and North east Odisha with a length around 175 km. It originates from the Similipal Hill, Mayurbhanj district, Odisha and has a total catchment area of 4840 square kilometres. Its major tributaries are the Sono River, the Gangahar River and the Catra River. The flow of Budhabalanga covers Fuladi, Remuna, Balasore in Odisha and empty into the Bay of Bengal at Balighat. The confluence point of river Budhabalanga with Bay of Bengal is very near to the sampling station Balighat, when due to back water of sea the flow of water is almost nil. Therefore after emersion of idol the pollutant accumulated in the sampling site due to still water current of the river.

In India, a lot of religious activities take place all around the year. Most of the Temples and ritual places are located near the aquatic resources like pond, lakes, river etc. The people of Balasore are always excited for celebration of festivals. Ganesh Chaturthi and Durga puja are of the important festivals of them. In this festivals number of Ganesh and Durga idols in different sizes are immersed in Budhabalanga River. About 500 or more Ganesh idols and about 150 Durga idols were immersed during 2011 in Balighat immersion point. Ganesh idol increases pollution in Hussainsagar Lake, Hyderabad was observed [7]. Malik et al, 2010 reported deterioration in water quality of rivers due to idols immersion in South Gujarat. The floating materials released through idol in the river and lake after decomposition result in eutrophication of the river, lake etc [8]. 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.



Fig-1 Photo of Goddess Durga

## II. MATERIAL AND METHODS

The water samples were collected from surface layer during morning hours from Balighat idol immersion point and the site of idol immersion at different intervals i.e. pre immersion, during immersion and post immersion in the period of period of Ganesh chaturthi, Viswakarma puja and Durga puja in month of August to October respectively. 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 ten days after the completion of immersion activities. The water samples collected for the heavy metals analysis like chromium and lead were analyzed according to standard methods prescribed in [9, 10]. The heavy metals were preserved by adding 5 ml of 1N HNO<sub>3</sub> and bringing down the pH to near about 4 and analyzed using AAS (Perkin Elmer A Analyst 100).



Fig-2 Lord Ganesh Bisarjan

## III. RESULT AND DISCUSSION

The results of this research work have been shown in table 1 and figure1. These data revealed that the water of River Budhabalanga is deteriorated due to the immersion of different idols. The concentration of calcium has increased significantly in the river water after the idol immersion and became normal after one to two month of the idol immersion; however it was below the limits of permissible limits. Magnesium, Chromium, Cadmium, Lead and Arsenic concentration has also increased significantly in the river water ten days after the idol immersion [11].

Magnesium is non-poisons, though it increases the hardness of water. Over the year the concentration of heavy metals, especially manganese, lead and mercury has also increased considerably in the river water compared to the specifications of highest desirable limits as set by BIS and ICMR [12]. The concentration of cadmium, mercury and lead, the potentially obnoxious heavy metals had increased many folds in the water due to idol immersion compared to highest desirable limits of BIS and ICMR standard. The heavy metal especially manganese, lead and mercury excess in water cause skin diseases [7]. The chromium concentration in the river water did not change much and was below the limits of standards. After the immersion of the idols, its concentration increased further and after about 45 days of immersion its concentration slightly decreases still it higher than before idol immersion. The heavy metals are known to be persistent and gradually accumulate and magnify through the process known as bioaccumulation and

biomagnifications, while they move up in the food chain [1]. Thus load Cadmium and Mercury may magnify in their concentrations at different trophic levels in the river ecosystem and finally reach the humans through food chain.

Organic compounds of Mercury, for example Methyl Mercury when it enters the human body, concentrates in the brain and destroy the brain cells, damaging the central nervous system and also cause Ulceration of the digestive facts [13]. Therefore, it is suggested that the authorities looking into the environmental protection of the river need to take necessary steps.

Fig-3 Concentration of Ca & Mg before, during, after 10days and after 45days of immersion in comparison to the BIS & ICMR standards.

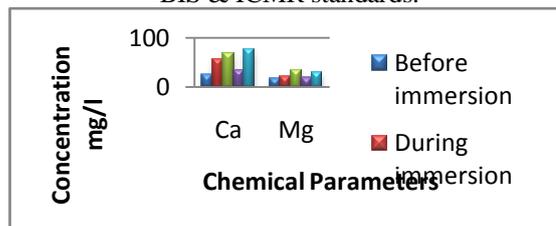


Fig-4 Concentration of Cd, Cr & Hg before, during, after 10days and after 45days of immersion in comparison to the BIS & ICMR standards

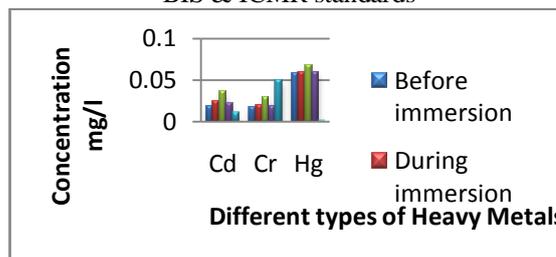
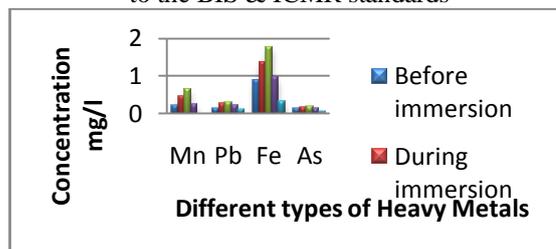


Fig-5 Concentration of Mn, Pb, Fe & As before, during, after 10days and after 45days of immersion in comparison to the BIS & ICMR standards



## IV. CONCLUSION

From the mythological point of view, the water bodies are related to religious sentiments but from the scientific point of view, these water bodies like ponds, rivers and lakes are not suitable for human uses. The main cause of change in water quality in River Budhabalanga is various religious activities. The idol immersion like Lord Ganesh idol, Goddess Durga idol and Lord Viswakarma idol plays an important role because the plaster of paris, clothes, iron rods, chemical colours, varnish and paints used for making the idols deteriorate water quality of river Budhabalanga. No one can stop these religious activities but awareness among the problem.



Fig-6 Idol Immersion activities kill aquatic fauna

- The idols should be made of traditional clay instead of baked clay.
- The paints of idols should be water soluble.
- Idols should be small as they would dissolve faster.
- Non-degradable chemical dyes are banned.
- Stress on natural colours used in food products.

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## V. SUGGESTION

To make the idol an environmental friendly we should follow the following points

**Table-1.** Change in concentration (mg/l) of some chemical pollutants in Balighat Immersion Point of Budhabalanga River before immersion, during immersion and after immersion of idols in month of August 2011 to October 2011

Heavy Metals	Before immersion	During immersion	Immersion after 10days	Immersion after 45days	Standard as per BIS & ICMR
Ca	24.05	56.11	68.16	35.27	75
Mg	17.56	21.70	35.18	19.71	30
Cd	0.019	0.024	0.036	0.022	0.01
Cr	0.018	0.020	0.029	0.019	0.05
Hg	0.058	0.0592	0.067	0.059	0.001
Mn	0.2	0.44	0.65	0.23	-
Pb	0.13	0.25	0.291	0.205	0.1
Fe	0.87	1.35	1.75	0.94	0.3
As	0.124	0.169	0.173	0.134	-

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