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Effect of Idol Immersions on some Water Quality Parameters of Saryu River

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ABSTRACT

The study aims to observe the effect of idol immersion on the water quality of Saryu river Faizabad. The immersion of idols of Lord Ganesh and Durga during Ganesh Ustav and Navratris festival is a major source of contamination and sedimentation to the river. Idols are made of clay but non-biodegradable thermocol and paints containing heavy metals are also used. The immersion practices leads to degradation of water quality and siltation. The parameters analyzed were dissolved oxygen (DO), biochemical oxygen demand (BOD), total hardness, turbidity, calcium (Ca), magnesium (Mg) and potentially toxic metals: cadmium (Cd), manganese (Mn), lead (Pb), iron (Fe) and mercury (Hg). The findings of the study revealed that the water quality degraded after the immersion of idols as some of the parameters were above the permissible limit.

Key words: Degradation, Heavy metals, Idol immersion, Water quality.

INTRODUCTION

Changing nutrient loads in lakes, rivers, estuaries and bays have become an increasingly important area of research. The contribution of enhanced nutrient loads from anthropogenic sources and their effect on natural water systems has been a focus of attention for many years and continues to be a subject of intense research worldwide. In the recent years, the practice of immersion has become a growing cause for concern on account of its adverse environmental impacts, particularly on the water bodies. Toxic exposure of the larger community through deadly chemicals and heavy metals used for making the idols is now being placed under the scanner of authorities and civil society groups with greater focus than ever. With a general deterioration of the water bodies due to growing population pressure and burgeoning pollution, the practice of immersion in its current form and volume is posing a serious hazard to life and environment. The festivals of Ganesha Chaturthi and Durga Puja witness a massive community involvement. To match the contemporary ethos, new materials are being used for modernising

the representation of these idols without much thought being given to the issue of toxicity and its impact on the environment.

Immersion of idols is carried out every year during, either in August or September. Thousands of idols are immersed in different water bodies such as lakes, reservoirs, ponds, rivers and canals in and around different towns and cities. These idols are made up of plaster of paris, clay and cloth supported by small iron rods and are coloured with different types of paint such as varnish and watercolours. When immersed, these coloured chemicals dissolve slowly leading to significant alteration in the water quality. Most of freshwater bodies all over the world are becoming polluted, thus decreasing the portability of the water. In India religious practices have deep relationship with water bodies. Today, with the rapid pace of urban development, most of these water bodies have become sinks for waste discharge, resulting in deterioration of their water quality [1]. The biodegradable matter after decomposition recycles to the system while non-biodegradable substances form sediments. The bio-accumulation of heavy metal in biological system transfers the toxic element from producer to consumer level, which can be a future health hazard. The idols of Lord Ganesh and Goddess Durga worshipped by Hindus are immersed every year. Similarly during the Mohorum festival, tazias are being immersed by Muslims every year [10]. Lead and Chromium, also finding way in the water body through "Sindur", are very toxic even in very small quantity for human being. When these idols were immersed, the colours and chemicals dissolve slowly leading to significant alteration in the water quality [5]. The idol immersion is a religious activity, which is responsible for pollution load in the water bodies.

MATERIALS AND METHODS

Situated on the banks of river Ghaghra (locally known as Saryu), Faizabad is considered to be the birthplace of Lord Ram. Thousands of idols of various sizes reaching heights up to 45 to 50 feet are immersed in this river. We carried out an investigation to find out the effects of immersion of idols on water quality of the river by collecting and analysing the water samples from the immersion site of the river. The analysis was done before the immersion (before one week), on the day of immersion and after ten days of the event, following the Standard Methods for the Examination of Water and Wastewater [2]. Water samples were sampled in jerry canes and the parameters analyzed were- dissolved oxygen (DO), biochemical oxygen demand (BOD), total hardness, turbidity, calcium (Ca), magnesium (Mg) and potentially toxic metals: cadmium (Cd), manganese (Mn), lead (Pb), iron (Fe) and mercury (Hg). Metal content was estimated using Varian Model Spectra AA-250 plus Atomic Absorption Spectrophotometer.

RESULTS AND DISCUSSION

The study reveals a clear picture of the status of water quality at different stages and is tabulated in Table 1. The higher concentration of some parameters is probably due to heavy pollution load due to the immersions, resulting in the deterioration of the natural water body.

It was found that before the immersion of idols the dissolved oxygen level was 15 mg/l which decreased during and after the immersion activity. Dissolved oxygen is of great importance in water quality monitoring and is considered to be the factor which reflects physical and biological process going in water body. Biological oxygen demand was observed maximum during (14 mg/l) and after (11 mg/l) the immersion activity. The average values of DO and BOD indicate the presence of organic pollution sources. Since there are no major industries around the study site, the source of organic pollution may be the immersion of the idols. The higher values of BOD mean presence of more biodegradable organic material. According to ICMR [7], BOD

should be 3 mg/l. Earlier studies reported the high values between 23.0-56.4 mg/l and indicated the high organic pollution in river [6]. The values of DO and BOD have shown an increase during and after immersion of idols as same reported by many researchers [5]. The input of biodegradable and non-biodegradable substances deteriorates the lake water quality and enhances silt load in the water. The floating material released through idols after decomposition result in eutrophication of the lake.

Table 1: Changes in concentration of some water quality parameters in Suryu river before, during and after the immersion of idols

Parameter	Before Immersion	During Immersion	After Immersion
DO (mg/l)	15	10	11
BOD (mg/l)	9	14	11
Total Hardness (mg/l)	35	41	50
Turbidity (NTU)	30	60	55
Ca (mg/l)	38.14	51.57	60.93
Mg (mg/l)	8.78	11.58	15.75
Cd (mg/l)	0.003	0.012	0.031
Mn (mg/l)	0.091	0.182	0.299
Pb (mg/l)	0.192	0.219	0.411
Fe (mg/l)	0.123	0.311	0.521
Hg (mg/l)	0.575	0.617	0.811

The results of total hardness were 35 mg/l (before immersion), 41 mg/l (during immersion) and 50 mg/l (after immersion). Hardness in water is predominantly contributed by Ca and Mg along with Zn, Mn, Al and Fe. The hardness of water is not a pollution parameter but indicates water quality. The BIS recommend the limit of total hardness for drinking water purpose to be 300 mg/l and WHO has set 100 mg/l. Hardness was reported between 94.0 and 167.3 mg/l in Hanuman Taal, Jabalpur [4]. Effect of Ca and Mg hardness was studied in catfish [10]. Turbidity was recorded 30 NTU, 60 NTU and 55 NTU during the three stages of the activity respectively. The turbidity of water is concerned with the presence of suspended and colloidal substances of various origins. These substances contain particle of suspended silt including a complex mixture of solid organic and mineral substance. The water column is disturbed completely during idol immersion causing higher turbidity [5]. Limno-chemical characteristics of Tawa reservoir were studied [8] and noticed that the turbidity varies between 48.0–68.0 NTU. The physico-chemical characteristics of any aquatic ecosystem and the nature and distribution of its biota are directly related to and influenced by each other and controlled by a multiplicity of natural regulatory mechanisms. However, because of man's exploitation of the water resources, the normal dynamic balance in the aquatic ecosystem is continuously disturbed, and often results in each dramatic responses as depletion of fauna and flora, fish kill, change in physico-chemical characters *etc* [11]. The quality of water is identified in terms of its physico-chemical parameters [12,13,14,15].

We found that the concentration of calcium had increased significantly after the idol immersion; however, it was below the limits of permissible standards. The concentration of calcium in the river water was 38.14 mg/l before the immersion which increased to 51.57mg/l during the immersion and was 60.93 mg/l after the immersion of idols. The concentration of magnesium also increased after the immersion of idols into the river water which was 8.78 mg/l before the immersion, 11.58 mg/l during the immersion and 15.75 mg/l after the immersion of the idols. Though magnesium is non-poisonous, it increases the hardness of water. The concentration of metals also increased from pre immersion to post immersion stage. 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 [3]. The concentration of cadmium was recorded 0.003 mg/l before the immersion, 0.012 mg/l during the immersion and 0.031 mg/l after the immersion of the idols. Manganese also increased from pre immersion to post immersion stage. Same trend was observed for lead, iron and mercury. The increased metals in the river water are toxic to the living communities in the aquatic ecosystem and also cause health problems in human. The aquatic ecosystems are degraded by the increased nutrients and metals, water quality is impaired and water availability is decreased. Besides, heavy metals have tendency to accumulate in various organs of marine organisms especially fish, which in turn may enter into the human metabolism through consumption causing serious health hazards [16].

CONCLUSION

Therefore, it is suggested that the authorities looking into the environmental protection of the river need to take necessary steps. Along with other measures, including strict implementation of central and state level legislation. They should conduct environmental awareness programmes, particularly before the festival to educate the public of the city and make them aware of the harmful environmental effects of immersion of idols.

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