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Hydro Chemical Changes in two Eutrophic Tapti Pond of Madhya Pradesh (Multai) after Immersion of Durga and Ganesh idol

Thakre Gajanand, Jain Vikrant, and Gawande Sandeep
Department of Chemistry, Patel College of Science and Technology, Bhopal (MP), INDIA

Abstract:
India is the country of rich cultural heritage and festivals. People here religiously follow the rituals and enjoy festivity. In Indian mythology, water is one out of the five elements, which form the universe. Water bodies play a significant vital role in performing rituals. These rituals include taking holy dip in sacred rivers and idol immersion. Thousands of these idols are immersed in different water bodies such as lakes, reservoirs, ponds, rivers and canals in and around different parts of India. These idols are made up of plaster of Paris, clay and cloth supported by small iron rods, and is painted with different metal-based paints. On immersion of these idols in the water bodies, the water is contaminated with these metal paints and a change in chemical load in the water body is expected. When idols immersed, these colored chemicals dissolve slowly leading to significant alteration in the water quality. Thousands of Ganesh & Durga idols of various sizes reaching heights up to 05 to 12 feet are immersed in different parts of the country.
Key Words: Immersion, Idol, Ritual, Ganesha, Durga

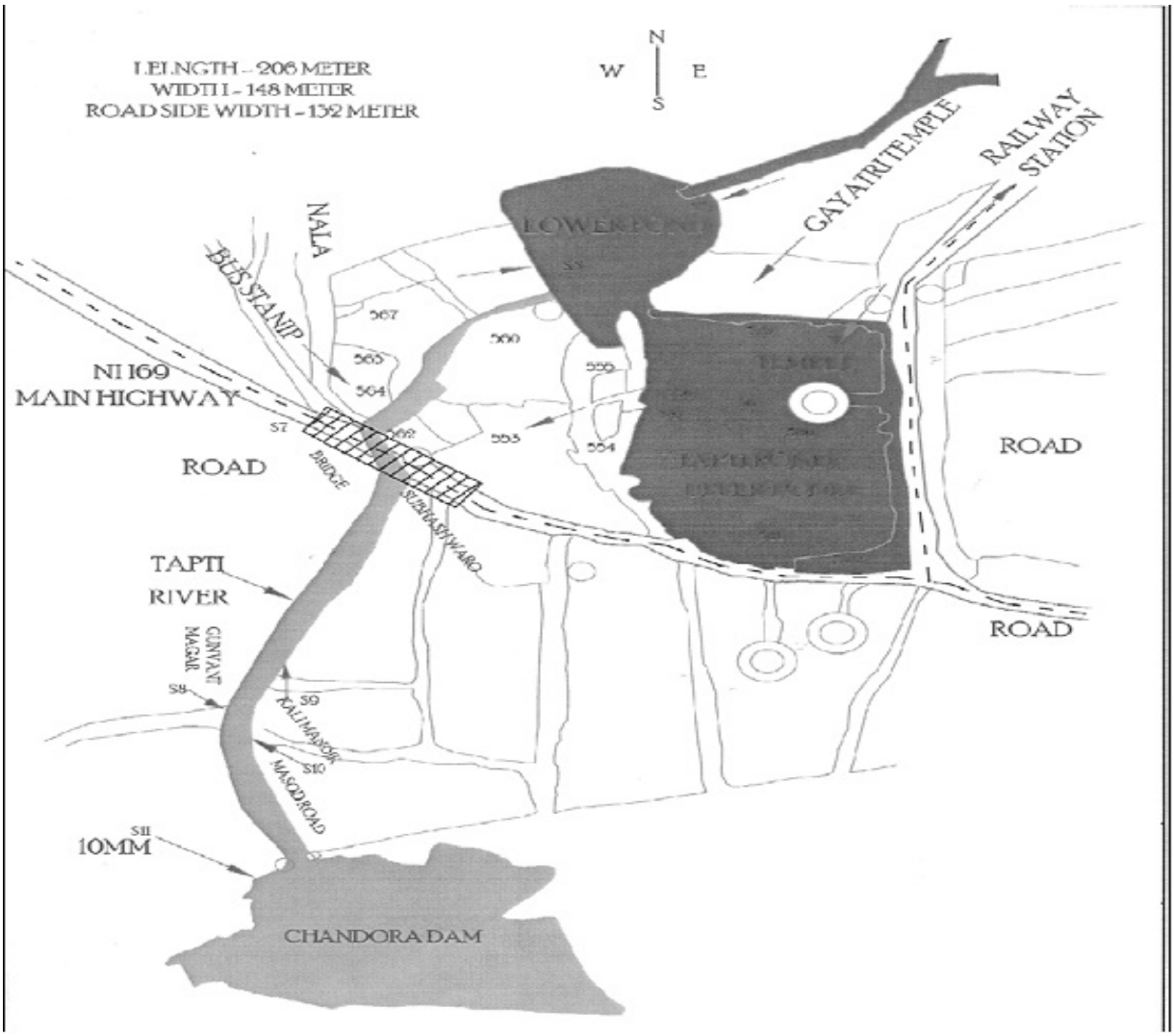
Introduction

India is the country of rituals. People have deep faith in these rituals and they follow it. Most of the rituals are performed near the bank of water bodies. Among the various rituals, two major festivals are i.e. Immersion of idols of Lord Ganesha in the month of August or September, after ten days of worship. Immersion of Deity Durga idols are also immersed after performing nine days Durgapooja. Durga idol immersion started from asthami to dusshera. Thousands of these idols are immersed in different water bodies such as lakes, reservoirs, ponds, rivers and canals in and around different towns and cities in Maharashtra, Madhya Pradesh, Karnataka, Calcutta and Andhra Pradesh. These idols are made up of plaster of paris, clay, cloths supported by small iron rods, bamboo and are decorated with different types of paints such as varnish, water colors etc. When idols are immersed in the water, these metallic paints, clay, etc. dissolve slowly leading to significant alteration in the water quality. According to (Dhote,et.al.,2001) the biodegradable matter after decomposition recycles to the system while non biodegradable substances form sediments. The nonbio-accumulation of heavy metal in biological system transfers the toxic element from producer to consumer level, which can be a future health hazard. Thousands of Ganesh and Durga idols of various sizes reaching heights up to 10 to 15 feet are immersed every year in different water bodies of the city. Lots of study had been performed on upper pond and lower pond of Multai (M.P.). The people living near water bodies use to immerse idols to nearest water bodies. Due to tremendous population growth of the city (from just over 22,000 thousand in 2011 to about 25,000 in 2012) and rapid urban development of the city ponds are facing various environmental problems resulting in deterioration of its water quality. The major cause of environmental problem is idol immersion activity especially in Tapti Ponds (Multai).

Study Area

Tapti ponds is situated in multai Distt., Betul , M.P. The history of Tapti Ponds starts with its origin in the Betul District**.**River Tapti is one of the most important rivers of Madhya Pradesh in India, which provides water for drinking as well as irrigation purposes. River Tapti flows 752 Km from Betul (Distt of M.P.) to join Arabian Sea. River Tapti originates from the pond in Multai (Betul), M.P., which is commonly known as Tapti pond. Tapti ponds which is life line for Multai has its religious importance for Distt. Betul, of Madhya Pradesh and is situated between M.P. and Maharastra Border. The Sanskrit name of Multai is Multapi and the term means the origin of Tapti Mata or the Tapti River. Multai, a charming town is 50 Km South East of Badnur, in Betul district, Madhya Pradesh. The Airport at Bhopal and Nagpur Multai. Multai Railway Station is on the Chennai- Delhi broad gauge line. Multai is also well connected to chindwada, Betul, Nagpur, and Amravati. National Highway 69 Passes through Multai. The town contains an old large pond surrounded by stone and some old temples. The Pond water is not suitable for

drinking it is being used by large number of people living near or around the pond for daily needs of bathing, washing clothes and vehicles.



Four sampling points have been selected in upper and lower pond. Its catchment area in the Multai is 8 sq. Km and population of the city is 25,000. The latitude and longitude are $21^0$04'00" and $78^0$21'00", respectively. The water of these ponds is supplied to the people of the city for drinking and irrigation purposes. The deterioration of water quality of this pond has posed a big problem for the living organism like human beings, animals and plants.

Materials and Method:

During present investigation, sampling was done from two sites of Upper pond namely Near Gayatri Temple as S*-1 and Near Tapti Temple as S*-2 and two sites of Lower pond namely Near Masod Road S-1 and Bhagat Singh Colony, S-2. Water samples were collected from the site of idol immersion at different intervals. Pre-idol immersion samples were collected a week before the immersion activities. During idol immersion, samples were collected at the time of idol immersion activities and Post-idol immersion samples were collected 15 days after the completion of immersion activities. The samples were analyzed for various physico-chemical parameters following the standard

methods prescribed in APHA (1995). Oil and Grease was analyzed by Solvent Extraction Method (Sharma and Kr, 1997-98)

Result and Discussion:

Turbidity: It was comparatively high during the period of immersion at the station S-3. It was found in the range of 20-28 FAU in pre, while 26-52 FAU and 32-50 FAU in during and post samples, respectively, for both the station. (Fig-1). The water colour is disturbed completely during the idol immersion activities causing high turbidity.

Total Hardness: Total Hardness as $CaCO_3$ was noticed comparatively high in post-period at both the stations. It was found in the range of 34-55 mg /L in pre, while 40-62mg/l and 41-67 mg/I. in during and post samples, respectively, for both the stations (Fig-2). The hardness of water is not a pollution parameter but indicates water quality.

Dissolved Oxygen: Dissolved Oxygen in water is of great importance to all aquatic organisms and is considered to be the factor that reflects the biological activity taking place in a water body as it determines the biological changes. DO was noticed comparatively high in post sample at station S*-2. It was found in the range of 6.1-8.3 mg/l in pre, while 6.4-8.4 mg/I and 6.9-8.5 mg/I in during and post samples, respectively, for both the stations. For drinking water DO limit is 6.0mg/I according (WHO, 1968) (Fig-3). On account of disturbance in the water column, DO increase at surface layer due to mixing of atmospheric oxygen.

Biochemical Oxygen Demand: BOD was noticed comparatively high in during and post samples at both the station. It was found in the range of 4.8-7.4 mg/I. in pre, while 6.8-8.3mg/I. and 8.9-9.2mg/I. in during and post samples. The higher values of BOD mean presence of more biodegradable organic material (ICMR, 1975). During the period of study, higher values of BOD that crosses the permissible limits have been observed at the both station.

Chemical Oxygen Demand: COD was noticed comparatively high in during and post samples at both the station. It was found in the range of 27-38mg/l. in pre, while 36-44mg/l. and 45-51 mg/l. in during and post samples (Fig-5) Maximum limit of COD for drinking water is 150 mg/l (ISI, 1991).

Oil and grease: It was noticed comparatively high in during and post samples at station S*-2.It was found in the range of nil mg/l. in pre, while 0.10-0.49 and 0.19-0.65 mg/l. in during and post samples. The permissible limit for oil in boiler feed water is 7 ppm as prescribed by American Boiler Manufacturer's Association (Fig-6).

The present study on assessment of idol immersion on hydro-chemical characteristics of Tapti Pond revealed that idol immersion activity has negative impact on water quality of the Pond. The total hardness was also reported higher in post-idol immersion. The values of DO, BOD, COD and oil and Grease have shown an increase during and after immersion of idols. The input of biodegradable and non biodegradable substance deteriorates the pond water quality and enhance silt load in the pond. The floating material released through idol in the pond, after decomposition result in eutrophication of the pond

Fig-1: Variation in Turbidity at different stations of Tapti pond.

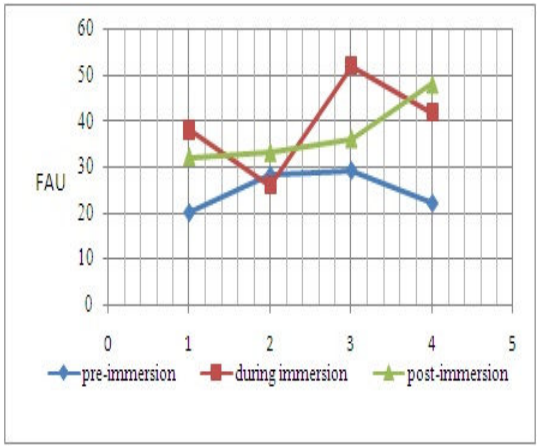


Fig-2: Variation in Total hardness at different stations of Tapti pond

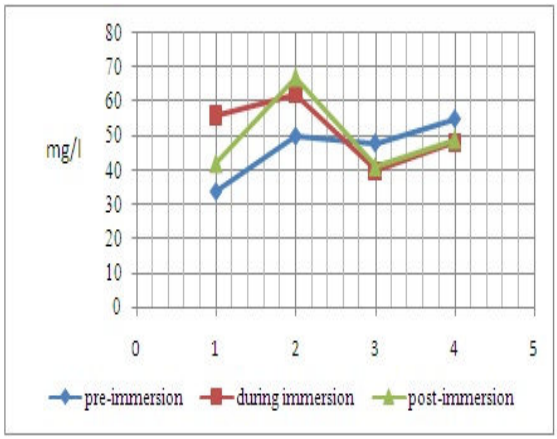


Fig-3:Variation in Dissolved oxygen at different stations of Tapti pond.

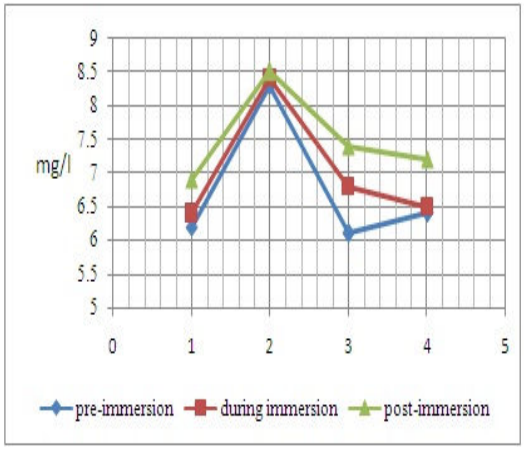


Fig-4: Variation in Biological oxygen demand at different stations of Tapti pond.

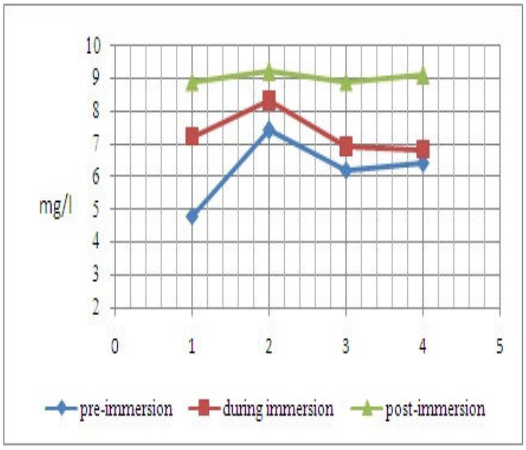


Fig-5: Variation in chemical oxygen demand at different stations of Tapti pond.

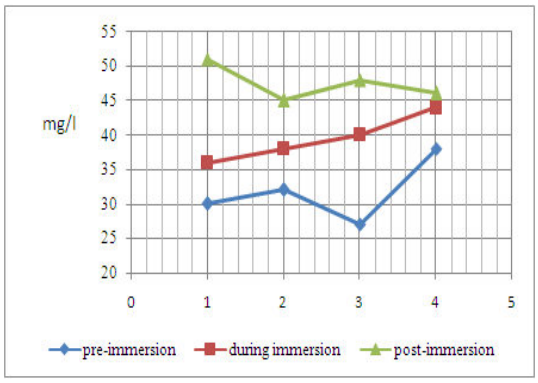
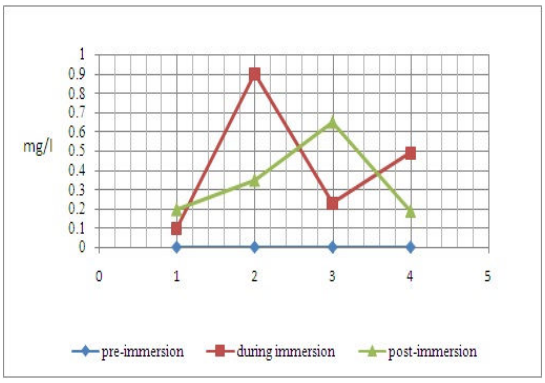


Fig-6: Variation in oil and grease at different stations of Tapti pond.



The hydro-chemical status of Lower pond (Multai, M.P. India) with special reference to nutrients (BOD,COD) has been investigated during the year 2011-2012. The Tapti ponds which is known as the lifeline for Multai, has got religious importance as the Tapti River originates from this pond in Multai (Betul), Madhya Pradesh. It has two parts. The Upper and Lower pond ($78^0$21' 00" and 21^0 04' 00'') situated towards the south east of Betul. It has a catchment area 632 sq. Km and storage capacity 15.67 M. cum. Ganpati festival is one of the prominent festivals celebrated by all communities irrespective of cast creed and religion. During the period of investigation, more than 1000 idols of various sizes reaching a height up to 4 to 12 feet were immersed in Lower and Upper ponds Multai.

The present study on assessment of idol immersion on hydro- chemical characteristics of Multai Tapti pond revealed that idol immersion activity has negative impact on water quality of the pond. The values of DO, BOD, COD and oil and Grease have shown an increase in concentration during and after immersion of idols. The total hardness was also reported higher in post-idol immersion. The input of biodegradable and non-biodegradable substances deteriorated the ponds water quality and enhanced slit load in the pond. The floating material released through idols in the ponds, after decomposition resulted in eutrophication of the ponds.

The quality of water in lower pond has far more deteriorated than that in the upper pond. The lower pond receive a large amount of raw sewage from its densely populated habitation. The water body is an urban eutrophic pond where the amount of nutrient accumulation is very high and frequent depletion of Dissolved Oxygen is very prominent. The untreated waste water contains effluent rich phosphate, caustic soda etc. There are various source of phosphate to the

pond water, such as firm rock deposit, runoff from surface catchments, and interaction between the water and sediment from dead plant and animal remains at the bottom of the pond. Phosphate is considered as the most significant among the nutrients responsible for eutrophication of pond, as it is the primary initiating factor. Phosphate enters the pond through domestic waste water, accounting for the condition of eutrophication. Organic enrichment of the pond through floral offerings, idol immersion and decomposition of aquatic weeds are also the significant causes of its eutrophication Thus the present study on Impact of idol immersion on water quality of Multai Tapti pond" revealed that idol immersion activities have negative effect on water quality of pond. The pollution of this pond is a matter of great concern as it has reached an alarming level due to inflow of large volume sewage and solid was

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