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## **POLLUTION LOAD ASSESSMENT OF TAPI RIVER DURING GANESH FESTIVAL, INDIA**

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**Abstract:** Present work was conducted to evaluate the physico-chemical properties of water samples Tapi River during Ganesh festival at Umara Ovara immersion site. Water samples were collected and analyzed for temperature, turbidity, total solids, total dissolved solids, total suspended solids, pH, total alkalinity, total hardness, calcium hardness, DO, BOD, COD, and Oil and Grease etc. during pre-immersion, immersion and post-immersion periods of festival. It was noted that the values of most of the parameters significantly increased during the immersion period followed by the declined in the post-immersion period.

**Keywords:** Ganesh festival, COD, Physico-chemical, Tapi river.

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### **INTRODUCTION**

Water is the natural source for various activities on the earth and is polluted by various anthropogenic activities. Idol worship has been observed in India since ancient time. Ganpati festival is very famous to celebrate the festival following the rituals and idols immersion. In the past decades, the idol of Shree Ganesh was made of clay; however, with the advent of new materials like Plaster of Paris (POP), plastic, cement, paper, etc. the idol does not dissolve completely in the water after the immersion. In addition to this, the toxic paints are used to decorate the idol. Gupta *et al.*, (2011) stated that in ancient time eco-friendly idols were made with clay and natural colors like turmeric etc. to worship God and Goddess. Only natural items like milk, curd, ghee, coconut and river water were usually used. However in present scenario, metals, oily substances, synthetic colours and different types of chemical are used to make polish and decorate these idols for worship

followed by immersion of these idols in aquatic environment (Mehta, 2013). This leads to pollution of the environment. Tapi River plays important and significant role in the economic growth and development of Surat city. Its length is around 724 km and originates from the Satpura range of hills, Betul district of Madhya Pradesh. Tapi River covers the states like Maharashtra, Madhya Pradesh and Gujarat and empty into the Arabian Sea near Dumas. Surat is known for its habits to celebrate the festival with lots of joy and encouragement. During the Ganesh festival numbers of idols are immersed at different location of Tapi river that contaminate the quality of water and soil. Pollution assessment of Tapi River at different location due to idol immersion were studied by various researchers Variya, (2010); Varsani, (2010); Azahar, (2011); Malik *et al.* (2010) and Malik *et al.* (2012) Ansari *et al.* (2014). In present paper the effect of Ganesh idols immersion on water quality has been discussed.

## EXPERIMENTAL

To test the pattern and extent of pollution caused due to idols, water samples were collected from, Umara Ovara of Tapi River, Surat during the Ganesh festival 2014 at different periods *i.e.* pre-immersion, immersion and post-immersion. Samples were analyzed for the physico-chemical parameters *viz.*, temperature, turbidity, total solids, total dissolved solids, total suspended solids, pH, dissolved oxygen, total

hardness, calcium hardness, total alkalinity, biological oxygen demand, chemical oxygen demand and oil and grease following the standard methods of Trivedi and Goel, (1986) and APHA, (2005).

## RESULTS AND DISCUSSION

Values of water parameters recorded during the study period are represented in table 1.

Table 1. Water quality

S.No.	Parameter	Pre-immersion	Immersion	Post-immersion
1	Temperature (°C)	32.5	30.2	30.0
2	pH	8.2	8.5	8.8
3	Turbidity (NTU)	98	126	54
4	Conductivity (ms)	4.6	12.2	0.5
5	TS (mg/L)	930	1260	650
6	TDS (mg/L)	371	650	480
7	TSS (mg/L)	569	610	170
8	Total Alkalinity (mg/L)	224	96	104
9	Total Hardness (mg/L)	340	1510	160
10	Calcium Hardness (mg/L)	100	310	50
11	Dissolved Oxygen (mg/L)	1.62	4.45	3.24
12	BOD (mg/L)	20.2	32.4	12.2
13	COD (mg/L)	27.8	63.2	34.5
14	Oil & Grease (mg/L)	0.70	0.90	0.54

The value of temperature during the pre-immersion, immersion and post-immersion period was found 32.5, 30.2 and 30°C respectively. Turbidity of water during immersion period was found highest (126 NTU) while it was observed comparatively low during the pre-immersion (98 NTU) and post immersion (54 NTU). Conductivity was found 12.2 ms during immersion period while it was 4.6 and 0.5 ms during pre-immersion and post-immersion respectively. High value of total solids 1260 mg/L was observed during the immersion period that was comparatively low 930 mg/L during pre immersion and 650 mg/L during post immersion period. Similarly total dissolved solid was recorded 650 mg/L during immersion period while pre-immersion and post-immersion period, it was found low 370 mg/L and 480 mg/L respectively. Total suspended solids was found high 610 mg/L during immersion period compare to pre-immersion 569 mg/L and post-immersion period 170 mg/L respectively. The pH of water found

alkaline 8.5 during the immersion period while it was 8.2 and 8.8 during the pre-immersion and post-immersion period respectively. In present study total alkalinity was found 224.0 mg/L during pre-immersion period compare to immersion and post-immersion period 96.0 mg/L and 104.0 mg/L respectively. Total hardness was observed as 1510.0 mg/L during immersion period while 340 mg/L during pre-immersion and 160 mg/L in post-immersion period. The calcium hardness was observed as 310 mg/L during immersion period while 100 mg/L during pre-immersion period and 50 mg/L during post-immersion period respectively. During immersion period dissolved oxygen was observed 4.35 mg/L while it was observed comparably high during the pre-immersion 1.62 mg/L and post-immersion 3.24 mg/L. BOD was observed 32.4 mg/L during the immersion period that was significantly high compare to pre-immersion 20.2 mg/L and 12.2 mg/L during post-immersion period. High value of COD 63.2 mg/L was

observed in the immersion period that was comparatively low 27.8 mg/L during pre-immersion and 34.5 mg/L during post-immersion period. Oil and grease was observed high 0.90 mg/l during immersion period while pre-immersion and post-immersion period, it was found low 0.70 mg/L and 0.54 mg/L respectively. Temperature is one of the most important physical parameter that governs the physical, chemical and biological properties of aquatic environment. Every aquatic species has an ideal temperature for their reproduction and growth. According to Boyd, (1998) 25°C to 32°C is appropriate for tropical fish (Table 1).

Significant changes in various physico-chemical parameters viz. turbidity, conductivity, TS, TDS, TSS, total hardness, calcium hardness, BOD, COD and oil and grease etc. were observed during immersion period due to pollution load and the results are supported by Dhote *et al.* (2001), Vyas *et al.* (2006, 2008) Khapekar and Nandkumar (2009), Sarkar (2013), Mehta (2013), Ansari *et al.* (2014). Total hardness is one of the important parameter for detecting pollution load in aquatic system. High value of total hardness during immersion was observed by different workers (Dhamijia and Jain, 1995; Vyas and Bajpai, 2008; Gupta *et al.*, 2011; Kaur, 2012; Malik *et al.*, 2012) support the present findings. According to ICMR (1975), higher BOD indicates the presence of more biodegradable organic matter and has direct correlation with nutrient level (Mc Coy and Olson, 1986). In the present investigation maximum BOD value was observed during immersion period due to increase amount of decomposition of organic matter into the river water. Increase in the quantity of oil and grease was observed during the immersion period due to oil paint and other decorative materials of the idol. Similar results were present noted by Vyas *et al.*, (2006) in Lake of Bhopal, Azahar (2011) and Ansari *et al.*, (2014) in Tapi River. Water quality parameters like TSS, TDS, TS, turbidity, conductivity and hardness were significantly increased during the immersion period due to heavy load of materials used in idols followed by a decrease in post-immersion period of eight days. It was due to dilution effect of water released by Ukai reservoir and tidal influences.

The current research indicates that the pollution load on river water has increased significantly during idol immersion period which might cause negative impact on living being of water body of sample site.

## CONCLUSION

The current research indicates that the pollution load on river water has increased significantly during idol immersion period which might cause negative impact on living being of water body of sample site. Creating awareness among the people may be the most appropriate way of dealing this problem. Use of eco-friendly clay idols and immersing the idols in artificial pond may save the natural water bodies.

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