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Study of Water Quality Assessment during Ganesh Idol Immersion and its Impact on Machna River Water, District - Betul, (M.P.)

Dr. D. S. Saluja

Professor, Department of Chemistry, J. H. Govt. P. G. College, Betul (MP), India

Abstract: ***Rivers in India are regarded as sacred from an ancient time. The quality of water is most important as compared to quantity of water, especially for potable purpose, purity is of the prime requirement. The immersion of idols of lord Ganesh during Ganesh festival is one of the major sources of contamination to the river water. Idols are made of clay but non-biodegradable thermocol and paints containing heavy metals are also used. The immersion practices lead to degradation of water quality. With this view point, to check the water quality during idols immersion the study has been carried out at five different sampling points through which river Machna is flowing during the period of Ganash idols immersion. The parameters like Temperature, Turbidity, pH, Total Hardness, Total Alkalinity, Chlorides, DO, BOD, COD, and Oil and Grease have been studies to river water at Betul. The samples were collected 10 days before the Ganash idols immersion, during immersion and 10 days after the immersion. The analytical results reveal that some parameters need treatment before the use for drinking purpose whereas all the remaining water quality parameters have been found to be safe from potability consideration and there is need to aware masses to use eco-friendly material for idols making so that culture and environment can be preserved in a cohesive manner.***

Keywords: Water quality parameters, idol immersion, contaminations, portability, River Machna, heavy-metals.

1. Introduction

The most vital resource for life on the planet is water. There can be no life without fresh water, which is only 2.7% of total water on the earth. The issue of water are becoming increasingly important to environment particularly with respect to human health and their food. Festivals are an integral part of rich and divers culture heritage of India. In India idol immersion is anthropogenic activity (Gadhila Mohini,et.al, 2014). A religious idol is an image of a god which is used as an object of worship and worshipped with all rituals in different time in a year. These idols are immersed into water body and made by plaster of paris (POP), clay, cloths, small iron rods, bamboo and decorated with different paints such as varnish, water colors etc. POP idol immersion in natural water leads to pollution (Madhusudanet.al, 2014). Plaster of paris which is cheap and lighter, has become the favored material to mould these idols. POP contains phosphorus, gypsum, sulphur and magnesium.(Chandrashekhar Patel et.al, 2015)

Betul city has population above 1,66,219 lakhs as per the census of 2011. Due to rapid urbanization and industrialization, it has done constant development in all sectors, but pollution of this river has been increased in the same ratio. The water of Machna river is used for drinking as well as irrigation purpose. The Machna river has been polluted by different activities but one of the major activity is idol immersion which generally takes place during festival seasons. The immersion practice ideas to degradation of water quality on account of immersion, materials like clay, bamboo, grass, wooden, metals, jute, colour, paints, cloths, flowers, essence sticks, incense, camphor, ash etc. are released in water body, The deficiency and excess of essential micro-nutrients may produce undesirable effects.

Machna river is an important source of potable water for the people of Betul city but during these festivals about 2800 Ganesh and 500 Durga idols are immersed in the water of this river (Year 2019).

2. Study Area

Machna river is a important tributary of Tawa river, which joins to river Narmada. This river has historical importance as this is flowing from ancient time and Betul city grew along the bank of this river. We have taken five main sampling points where this activity has large impact on water quality. These five sampling stations receive large amount of pollutants due to idol immersion activity.

3. Material and Methods

The water samples were collected during morning hours during pre immersion, immersion and post immersion period of idols immersion. The measurement of Temperature and fixation of dissolved oxygen was completed at sampling stations and for the analysis of various parameters, samples were collected in well rinsed and pre-cleaned plastic canes and immediately brought to research laboratory of Department of Chemistry. For analysis of water samples, standard methods of Trivedi and Goel and APHA were followed.

4. Results and Discussion

The result of this study has been shown in table1. The results are demonstration by the range and 95% confidence limit (CL) of the parameters.

Temperature ranged from 27 to 31^{o}C during the study periods. Continuous rise in temperature were observed during the study period. The rise in temperature is

responsible for increasing the chemical as well as biological reactions in water and reducing solubility of gases (Murugesan et al, 2004).

The pH of water is important because it governs solubility of nutrients. The pH ranged from i.e. 6.7 to i.e.7.6. The minimum value of pH i.e. 6.7 was observed during immersion while the maximum value of pH i.e. 7.6 was found during pre immersion period of idols. It was reported to be 6.9 to 8.0 by Kalita et al (2006).

The clarity of water is an important factor for determining its health and productivity. Turbidity in water is caused by suspended and colloidal matter such as clay, slit, finaly divided organic and inorganic matters, paints and other microscopic organisms. The turbidity was found to be ranged from 4.8 to 14.8 NTU. It was found higher value during immersion. It is due to heavy sedimentation during immersion period of Ganesh idols.

Specific Coductivity (EC) reflects the capacity of water to conduct electrical current and it is directly related to the concentration of salts dissolved in water. Variation in EC in collected water samples was recorded 3254.62 to 3660.12 µmhos/cm during immersion period.

The Total Hardness, Total Alkalinity and Total Calcium varied from 114.0 mg/l to 184.0 mg/l; 210.0 mg/l to 360.0 mg/l and 56.0 mg/l to 96.0 mg/l respectively. Hardness increases due to the mixing of domestic waste and increase in temperature as also observed by Goyal et al (2010). The alkalinity increases due to various religious activities, domestic waste and especially due to soap and detergents, as also reported by Patil et al, (2003). The Total Alkalinity was observed more than the hardness, which may be due to the presence of basic salts of sodium and magnesium as also observed by Jadhav et al (2009). The Total Calcium was observed high 91.0± 9.8 during the immersion period resulted cumulative effect of religious activities.

The Total Solids was recorded maximum 1027.0 mg/l during immersion period while pre immersion and post immersion period relatively lower value ranged from 446.3 to 479.2 mg/l and 750.10 to 838.7 mg/l respectively.

The Chloride concentration in water indicates the presence of organic wastes in water. It was found to be ranged from 212.0 to 514.20 mg/l and the maximum value was found during immersion period.

The value of DO, BOD and COD were found to vary from 5.8 mg/l to 7.4 mg/l; 3.0 mg/l to 6.2 mg/l and 18.1 mg/l to 48.6 mg/l respectively. The dissolved oxygen plays an important role in survival of aquatic organisms. There was a slight changes observed in DO during the study period while the value of BOD and COD were observed high during the idols immersion period. The higher value of BOD have direct correlation with the increase of nutrient level in the water body due to the immersion activity [McCoy et al, 1986]. The components (BOD) and (COD) are helpful to know the toxic condition and presence of biologically resistant organic substances in water is also reported by Rajkumar et al, (2003).

The Oil and Grease content found to be in the range of 0.38 mg/l to 1.6 mg/l and it was maximum 1.26 ± 0.66 during the immersion period. The Oil and Grease found in water of Machna river revealed that paint and oil colors are used for making the idols of lord Ganesha.

The concentration of Copper and Lead were found ranged from 0.018 to 1.46 mg/l and 0.032 to 1.96 mg/l respectively. The maximum value of copper and lead were found during immersion period.

5. 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, lakes and rivers are not suitable for human uses. The main reason of the deterioration of water quality in Machna river is Ganesh idol immersion because the plaster of paris, clothes, iron rod, chemical colors, varnish and paints used for making the idols deteriorate water quality of Machna river. No one can stop these religious activities but awareness among the people. The analytical results reveal that few parameters need treatment before use for drinking purpose whereas all the remaining water quality parameters have been found to be safe from potability consideration and there is need to aware masses to use eco-friendly material for idols making so that culture and environment can be preserved in a cohesive manner.

Table 1: Water Quality Parameters of Machna River at Betul (M.P.)

S.No.	Parameters	Unit	Pre Immersion	Immersion	Post Immersion	Specification for Drinking Water IS:10500-1991	
						Desirable Limits	Permissible limits
1.	Temperature	°C	27.0-27.2 (27.1± 0.19)	31.4-31.6 (31.5± 0.19)	28.7-28.9 (28.8± 0.19)	–	–
2.	pH	-	7.2-7.6 (7.4± 0.39)	6.7-7.4 (7.05 ± 0.68)	7.1-7.4 (7.25 ± 0.29)	6.5 To 8.5	–
3.	Turbidity	NTU	4.8-6.2 (5.5± 1.37)	12.0-14.8 (13.04 ±2.03)	8.0-10.2 (9.1 ± 2.15)	5.0	10.0
4.	Specific Conductivity	µmhos/cm	1128.02- 1232.04 (1180.03 ± 101.94)	3254.62-3660.12 (3457.37 ± 397.39)	2878.24-3252.12 (3065.18 ± 366.40)	–	–
5.	Total Alkalinity	Mg/l	210-280 (245.0 ± 68.60)	272-360 (316.0 ± 86.24)	254-278 (266.0 ± 23.52)	200.0	600.0
6.	Total Hardness	Mg/l	114-162 (138.0 ± 47.04)	152-184 (168.0 ± 31.36)	124-168 (146.0 ± 43.12)	300.0	600.0

7.	Total Calcium	Mg/l	56.0-78.0 (67.0± 21.56)	86.0-96.0 (91.0 ± 9.8)	78.0-88.0 (83.0 ± 9.8)	75.0	200.0
8.	Total Solids	Mg/l	446.3-479.2 (462.75 ± 32.24)	880.6-1027.0 (953.8 ± 143.47)	750.0-838.7 (794.35 ± 86.92)	–	–
9.	Chloride	Mg/l	212.0-368.12 (290.06 ± 152.99)	418.64-514.20 (466.42 ± 93.64)	378.16- 408.34 (393.25 ± 29.57)	250.0	1000.0
10.	DO	Mg/l	6.2-7.3 (6.55 ± 0.29)	6.0-7.4 (6.70 ± 1.37)	5.8- 6.8 (6.30 ± 0.98)	–	–
11.	BOD	Mg/l	3.2- 4.6 (3.90 ± 1.37)	3.8-6.2 (5.0 ± 2.35)	3.0-3.4 (3.20 ± 0.39)	–	–
12.	COD	Mg/l	18.1- 42.8 (30.45 ± 24.20)	44.4-48.6 (46.50 ± 4.11)	32.6-36.4 (34.50 ± 3.72)	–	–
13.	Oil & Grease	Mg/l	0.38-0.68 (0.53 ± 0.29)	0.92-1.6 (1.26 ± 0.66)	0.64-0.84 (0.74 ± 0.19)	–	–
14.	Copper	Mg/l	0.018-0.026 (0.02 ± 0.008)	0.94- 1.46 (1.25 ± 0.60)	0.42-0.68 (0.55 ± 0.25)	0.05	1.5
15.	Lead	Mg/l	0.032-0.042 (0.036 ± 0.008)	1.20-1.96 (1.58 ± 0.74)	0.76-0.88 (0.82 ± 0.11)	0.05	–

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