Impact of Ganesh Idol Immersion Activities on the Water Quality of Tapi River, Surat (Gujarat) India

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Abstract

In this paper the impact of Ganesh idol immersion on water quality of Tapi River is discussed, for this purpose Ashwanikumar immersion point (Ovara) was selected as sampling station because large number of Ganesh idols immersed on this Ghat of Tapi River. Water samples were collected at morning hours during pre immersion, during immersion and post immersion periods of Ganesh idols. The changes in physico-chemical properties of Tapi River were observed except temperature, pH and DO with minor changes while CO₂, BOD, COD, total alkalinity, total hardness, total calcium, and oil & grease were observed with major changes during immersion period. On the basis of these changes it is concluded that level of water pollution increases in Tapi River due to these religious activities and causes adverse effect on the aquatic ecosystem. No one can stop these religious activities but awareness among the people and society can reduce the pollution.

Keywords: Idol Immersion, Religious Activities, Water Pollution, Tapi River Gujarat

1. Introduction

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 compounds. Water pollution occurs due to the city sewage and industrial waste discharge into the river in addition to many religious activities and now become a threat to the ecosystem (Bajpai et al, 2002; Variya, 2009 and Varsani, 2009).

Surat is situated on the bank of Tapi River that plays important and crucial role in its economic growth and development. Tapi River is a river of western India. It is one of the major rivers of west coast river system of India with a length around 724 km. It originates from the Satpura range of hills, Betul district of Madhya Pradesh. The flow of Tapi River covers Maharashtra, Madhya Pradesh and Gujarat state and empty into the Arabian Sea.

In India, lot of religious activities take place all round the year. Most of the temples and ritual places are located near the aquatic resources like pond, lakes, rivers etc. The people of Surat city are always excited for celebration of festivals. Ganesh Chaturathy is one of the important festival of them. In this festival number of Ganesh idols in different sizes are immersed in Tapi River after worship of 10 days. In Tapi river, about 2700 idols were immersed during 2010 (Anonymous, 2010). When the idols are immersed, their colors, chemicals and other components that are used for idol preparation get dissolved and lead to significant changes in the water quality (Dhote et al, 2001). Reddy et al (2001) observed that Ganesh idol increases pollution in Hussainsagar Lake, Hyderabad. Malik et al (2010) reported deterioration in water quality of rivers due to idol immersion in south Gujarat. The input of biodegradable and non biodegradable substances deteriorates the river water quality and enhances silt loaded in the river. The floating materials released through idol in the river and lake after decomposition result in eutrophication of the river, lake etc. (Leland et al, 1981).
2. Material and Methods

The water samples were collected during morning hours from Aswanikumar idol immerses point (Figure 1) during pre-immers, immerse and post-immers periods of idols immersion. The measurement of temperature and fixation of dissolved oxygen was completed in situ and for analysis the various parameter samples were collected in well rinsed and pre-cleaned plastic canes and immediately brought to the research laboratory of Department of Aquatic Biology. For analysis of the water samples, standard methods of Trivedi and Goyal (1986) and APHA (2005) were followed for the analysis.

3. Results and Discussion

The results of this research work have been shown in Table 1 and Figures 2 A to 2 J. These data revealed that water of Tapi River is deteriorated due to the immersion of Ganesh idols.

Temperature ranged from 28 to 31°C during the study period (Figure 2 A). Continuous rise in temperature were observed during the study period. The rise in water temperature is responsible for increasing the chemical as well as biological reaction in water and reducing solubility of gases (Murugesan et al, 2004). Effect of various religious activities and rise in temperature was also observed by Devi et al (2005).

The pH of water is important because it governs solubility of nutrients. The pH ranged from 6.9 to 7.6. The minimum pH (6.9) was observed at pre immersion while acidic pH (7.6) was observed during immersion period of idols (Figure 2 B). It was reported to be 6.9 to 8.0 by Kalita et al (2006).

The free CO$_2$ released by microbial activity is important for algal growth, as it is required for the photosynthesis. Low free CO$_2$ (17.2 mg/L and 17.6 mg/L) was found during pre immersion and post immersion period while high free CO$_2$ (18.8 mg/L) was found during immersion period (Figure 2 C). The values of DO, BOD and COD were found to vary from 5.6 mg/L to 7.6 mg/L; 2.4 mg/L to 5.6 mg/L and 19.4 mg/L to 44.0 mg/L respectively (Figure 2 D, 2 E and 2 F). The dissolved oxygen play important role in survival of aquatic organisms. There were no major changes observed in DO during the study period while the value of BOD and COD were observed high during the idol immersion period. The higher values of BOD have direct correlation with the increase of nutrient level in the water body due to the immersion activity (McCoy et al, 1986). These components (BOD and COD) are helpful to know the toxic conditions and...
Figure 2. Physico-Chemical Properties of Water of Tapi River (Average Basis)
Table 1. Water Quality Parameters of Tapi River at Ashwanikumar Ovara

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Pre immersion</th>
<th>Immersion</th>
<th>Post immersion</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Temperature (°C)</strong></td>
<td>28.0-31.0 (29.1 ± 0.7)</td>
<td>29.0-31.0 (29.8 ± 0.6)</td>
<td>29.8-30.5 (30.1 ± 0.2)</td>
</tr>
<tr>
<td>pH</td>
<td>7.2-7.5 (7.3 ± 0.1)</td>
<td>6.9-7.6 (7.4 ± 0.2)</td>
<td>7.0-7.4 (7.3 ± 0.1)</td>
</tr>
<tr>
<td>Free CO₂ (mg/L)</td>
<td>14.08-19.36 (17.2 ± 1.3)</td>
<td>15.8-21.1 (18.8 ± 1.6)</td>
<td>17.6-21.1 (17.6 ± 2.0)</td>
</tr>
<tr>
<td>Dissolve Oxygen (mg/L)</td>
<td>6.4-6.8 (6.6 ± 0.1)</td>
<td>6.0-7.6 (6.7 ± 0.5)</td>
<td>5.6-6.8 (6.4 ± 0.4)</td>
</tr>
<tr>
<td>BOD (mg/L)</td>
<td>3.2-4.8 (4.2 ± 0.3)</td>
<td>3.6-5.6 (4.8 ± 0.6)</td>
<td>2.4-2.8 (3.2 ± 0.8)</td>
</tr>
<tr>
<td>COD (mg/L)</td>
<td>19.4-41.7 (28.57 ± 4.8)</td>
<td>40.6-44.0 (42.7 ± 1.1)</td>
<td>36.6-38.3 (37.3 ± 0.5)</td>
</tr>
<tr>
<td>Total Hardness (mg/L)</td>
<td>110-168 (131 ± 13.4)</td>
<td>144.0-174.0 (160.0 ± 8.7)</td>
<td>124.0-170.0 (142.0 ± 14.2)</td>
</tr>
<tr>
<td>Total Alkalinity (mg/L)</td>
<td>220-290 (252.5 ± 18.9)</td>
<td>280.0-350.0 (310.0 ± 20.8)</td>
<td>260.0-290.0 (267.0 ± 8.8)</td>
</tr>
<tr>
<td>Total Calcium (mg/L)</td>
<td>60.0-82.0 (73.5 ± 4.8)</td>
<td>82.0-96.0 (88.7 ± 4.1)</td>
<td>76.0-86.0 (80.7 ± 2.9)</td>
</tr>
<tr>
<td>Oil &amp; Grease (mg/L)</td>
<td>0.43-0.69 (0.59 ± 0.1)</td>
<td>0.9-1.3 (1.1 ± 0.1)</td>
<td>0.7-0.8 (0.8 ± 0.04)</td>
</tr>
</tbody>
</table>

The sequence of data shown in table is minimum – maximum (mean ± standard error)

presence of biologically resistant organic substances in water as also reported by Rajkumar et al (2003).

The total hardness, total alkalinity and total calcium varied from 110 to 174 mg/L; 220 to 350 mg/L and 60.0 to 96.0 mg/L respectively (Figure 2 G, 2 H and 2 I).

Hardness increases due to mixing of domestic waste and increase in temperature as also observed by Goyal et al (2006). The alkalinity increases due to various religious activities, domestic waste and especially due to soaps and detergents, as also reported by Patil (2003). The total alkalinity was observed more than the hardness, which may be due to the presence of basic salts of sodium and potassium in addition to those of calcium and magnesium as also observed by Jadhav et al (2009). The total calcium was observed high (88.7 ± 4.1) during the immersion period resulted cumulative effect religious activities.

The oil and grease content found in the range of 0.43 to 1.30 mg/L and it was maximum (1.1 ± 0.1) during the idol immersion period (Figure. 2 J). The oil and grease found in water of Tapi River revealed that paint and oil color and devotees offer oil to the god.

4. 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 Tapi River is various religious activities. Ganesh idol immersion also plays an important role because the plaster of paris, clothes, iron rods, chemical colors, varnish and paints used for making the idols deteriorate water quality of Tapi River. No one can stop these religious activities but awareness among the problem.

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References


