

## Idol immersion and physico-chemical properties of South Gujarat rivers

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### ABSTRACT

Ganesh chaturthi is one of the main festivals celebrated in India, it is the most celebrated in western India. After predetermined time idol is immersed in water bodies every year. As the extent of idol immersion increases with increasing population with limited water bodies hence water pollution increases, which is alarming situation. In present study total five sampling stations were identified during current year (2009) with respect to idol immersion sites from different cities of South Gujarat i.e. Surat, Navsari, Valsad, Autl-Pardi and Vapi. All the samples collected by means of composite sampling to know the physico-chemical quality of all river water. The analysis was carried out for pH, temperature, color, DO, COD, chloride, hardness, SS, TDS, conductivity, and phosphate parameters. The results obtained reveals that almost all river water becomes acidic after idol immersion except Par river. Parameters like hardness, chloride, color, SS, TDS increases after idol immersion in all rivers except Par river for TDS. DO is decreasing drastically after the next day of idol immersion at all the rivers which is indication of pollution. The trend of increasing such parameters indicates that idol immersion affect the water quality to the extent with respect to self purification of water and flow of stream of the river.

**Key words:** Ganesh chaturthi, pollution, idol immersion, COD, physico-chemical parameters.

### INTRODUCTION

An idol of Lord Ganesh is worshipped with all rituals during this Ganesh-chaturthi. The time span of festival may vary from one and half day to five days, seven days or ten days also and idol are immersed in lotic or lantic water bodies. We have carried out study in South Gujarat where Ganesh idol immersion takes place in huge quantity with full of rejoice, but due to that water quality gets affected at alarming rate. For such pollution effects by idol immersion many researches have done work on the same in India<sup>1-5</sup>. An analysis of water samples of the Brahmaputra conducted by the Pollution Control Board, Assam (PCBA) at Kacharighat on the post-immersion night of Durga Puja established the presence of heavy metals like lead, chromium, nickel, cadmium and zinc to a significant extent<sup>2</sup>. In Maharastra Pollution Board declares guidelines and recommendations for idol

immersion<sup>3</sup>. Tamil Nadu Pollution Control Board banned immersion of Vinayaka idols in water bodies on August 5 2009<sup>4</sup>.

We had choosen, Tapi River from Surat city, Ambika river of Navsari city, Par river of Atul-Pardi town(Valsad) and Damanganga river of Vapi city from South Gujarat. It was interesting to study the case of river Tapi because the highest numbers of idols immersed every year in the city of Surat in the whole South Gujarat region and rest of the rivers are taken up for comparison amongst them as these rivers are major source of drinking water for local as well as poor community who are not render upon municipality supply. During this current year total 25,000 idols of Ganesh were immersed in Tapi river<sup>6</sup>. In this paper we are trying to correlate the data obtained with standard drinking water norms laid down by WHO and ICMR. We also try to evaluate self purification capacity of water.

## EXPERIMENTAL

To study the effects of Ganesh idol immersion in the river water, we collected the samples from upstream and down stream of all rivers on a day before and three successive days after idol immersion. The water samples were collected from selected station by composite sampling method. Total five sampling points were selected for all the rivers where idol were immersed mainly. All samples were collected in high density polypropylene bottles (Tarson make). In all case plastic bottles were cleaned properly, first with dilute nitric acid and then with double distilled water before their usage for collection of samples. During whole study AR grade chemicals were used. All results were checked within 6 hrs where as parameters like pH, temp, DO checked at site itself. The analysis is based on APHA (1989)<sup>7</sup> for examination of water and wastewater<sup>9</sup>. Some standard preservative media was used to preserve the samples till it use for analysis in laboratory<sup>7</sup>. All results were evaluated with reference to WHO and ICMR<sup>8-9</sup> Standard for drinking water.

## RESULT AND DISCUSSION

From the data obtained from respective river it showed decreasing pH i.e. alkaline to neutral and in case of Tapi river it was acidic. This indicated acidity of water increases after the immersion of idols. All river pH ranges within permissible limit of WHO and ICMR and Irrigation water standard laid down by IS: 3307-1977.

In each sample temperature decreased at very slow rate but decrease in temperature indicates chemical as well as biological activity slow down as it is dependent on temperature.

Colour of river water samples was checked in Hazen unit. From the analysis it seems that all water samples having high colour after idol immersion, which may needs carbon adsorption or some other treatment to remove colour from water. As physically water is clean so colour is detected by SS or some ingredients dissolved in water. Color is not adversely affecting the water quality but color is aesthetically not acceptable<sup>8</sup>.

The data of DO showed drastic change after idol immersion at Surat at both places i.e. Rander and Nanpura. Rest river samples showed very slight decrease in DO after immersion of idols. This sudden decrease of DO indicated pollution and less oxygen hampered purity of water which might result into death of fish, flora and fauna. The analysis for DO is a key test in water pollution and waste treatment process control<sup>10</sup>.

SS is aesthetic quality of water. From the sampling and data obtained it was found that in Nanpura sample there was sudden increase of SS after idol immersion i.e. 40 ppm to 1840 ppm, which showed sludge generated from idol immersion. More SS directly depicts that the bottom of river is shallow and drinking water quality is deteriorated too.

COD is the main parameter to access waste water quality, as far as drinking water quality is concern no limits of COD is given, but the COD data interprets the status of chemical load of the water bodies. From the results of COD all rivers showed increase in COD after idol immersion except Par river. Highest COD was evident at Nanpura from 108 ppm to 155 ppm after idol immersion.

There is no standard laid down by WHO or ICMR for conductivity in drinking water. Pure water is a poor conductor of electricity<sup>8</sup>. More conductivity shows absorption of atmospheric CO<sub>2</sub>, even from conductivity TDS can be calculated<sup>8</sup>.

From the results obtained, chloride was found within the stipulated limit for drinking water standard. From the results obtained chloride increased after idol immersion at all sites. High chloride reacts with sodium and makes water salty in taste. It also may increase TDS values of water. Chlorides is not usually harmful to people; however, the sodium part of table salt has been linked to heart and kidney disease. Sodium chloride may impart a salty taste at 250 mg/l; however, calcium or magnesium chloride is not usually detected by taste until levels of 1000 mg/l are reached<sup>10</sup>.

Total hardness at all places was found beyond the limits in both the cases of before idol immersion and after idol immersion. Maximum

Table 1.

| Parameters in ppm      | Rander I | Rander II | Nanpura I | Nanpura II | Navsari I | Navsari II | Par I | Par II | Daman ganga I | Daman ganga II |
|------------------------|----------|-----------|-----------|------------|-----------|------------|-------|--------|---------------|----------------|
| pH                     | 7        | 7.5       | 7         | 5.6        | 8.2       | 7.2        | 6.8   | 7.6    | 7.8           | 7.3            |
| Temp. (°C)             | 30       | 28        | 32        | 30         | 29        | 28         | 31    | 28     | 30            | 30             |
| Colour (Hz)            | 40       | 65        | 29        | 38         | 13        | 19         | 08    | 11     | 10            | 15             |
| DO                     | 3.0      | 1.5       | 4.2       | 2.23       | 4.2       | 4.0        | 3.4   | 3.5    | 5.2           | 5.34           |
| SS                     | 30       | 10        | 40        | 1840       | 25        | 240        | 0.1   | 1.7    | 09            | 10             |
| TDS                    | 200      | 300       | 2600      | 4000       | 205       | 415        | 122.5 | 117    | 190           | 300            |
| COD                    | 124      | 62        | 108       | 155        | 06        | 22         | Nil   | 35     | 28.2          | 77.6           |
| Conductivity (Siemens) | 0.409    | 0.521     | 0.406     | 0.659      | 0.227     | 0.46       | 0.245 | 0.234  | 0.199         | 0.182          |
| Chloride               | 70       | 120       | 60        | 115        | 37        | 78         | 64    | 72     | 50            | 65             |
| Ca Hardness            | 500      | 600       | 600       | 800        | 620       | 612        | 480   | 480    | 1000          | 1200           |
| Mg Hardness            | 600      | 700       | 240       | 300        | 530       | 608        | 460   | 480    | 1200          | 1200           |
| Total Hardness         | 1100     | 1300      | 840       | 1100       | 1150      | 1220       | 940   | 960    | 2200          | 2400           |
| Phosphate              | 2        | 1.8       | 3         | 3.5        | 1.0       | 1.8        | 0.8   | 1.2    | 2.8           | 4.2            |

Note: All parameters in ppm except pH, colour, temperature and conductivity (I = before immersion data and II = Average data after immersion of three successive days)

hardness observed at Damanganga river sample i.e. 2200 ppm before idol immersion and 2400 ppm after idol immersion. All river water samples contained above 700 ppm total hardness which needs to be softened before taking it directly as drinking water. Even Ca and Mg hardness was high as compared to WHO (75 ppm and 50 ppm respectively) in all the river before and after idol immersion.

Phosphate is an indicator of nutrient present in water. In Surat sample phosphate found quite high before and after idol immersion. The trend of phosphate with idol immersion is increasing. Surat samples showed high phosphate mean more nutrient present in water bodies and which may result into enrichment of water body and making algal bloom on surface of water body, which may deteriorate DO and self purification capacity of water.

## CONCLUSION

It can be concluded from the results that water of all rivers deteriorated after idol immersion. Increase in SS and number of idol immersed clearly indicated that too much sedimentation was done at rivers and which may result into swallowing the rivers and increase in pollution too. At all locations Hardness was found above prescribed limit so it needed softening before direct drinking purpose. Samples of Tapi at Surat showed drastic change in almost all data due to the number of idol immersed were more compared to other locations.

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