VARIA**T**ION IN PHYSICO-CHEMICAL PROPERTIES OF RAJALWADI WATER RESERVOIR NEAR SILLOD TOWN DISTRICT AURANGABAD (M.S.)

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**ABSTRACT**
The highest rate of increasing variation in the properties of water is one of the most serious situations in India. In India highest number of religions are Hinduism, which they celebrates Ganesh Chaturthi festivals every year. Every Hindu Worship construction of Lord Ganesh idol and immerges it into the water bodies is a traditional part of every community. Due to idol immersion in the water body causes variation in the properties of water. The biological wealth of a water body is mainly dependent on its water quality and it is of major issue of concern to mankind today. In this paper the work is done on physicochemical properties of water on Rajalwadi water reservoir, near Sillod town during pre and post immersion period of Ganesh idol. The water samples were collected at afternoon hours during pre and post immersion period of Ganesh idol. From these water samples different physico-chemical parameters analyzed and observed that most of the value shows variation in the water properties in post immersion period compare to pre immersion period. Generating awareness among the people and society about reducing variation in the properties of water due to festival waste will help in conserving ecosystem of the water bodies.

**KEYWORDS:** Idol Immersion, Rajalwadi reservoir, Religious activity, Water Properties.

**INTRODUCTION**
“SAVE WATER SAVE LIFE” mostly this word used up by various advertisements through Government channel and social agencies. Because water is an universal solvent and essential to human health and food securing as well as ecosystem which contains food chain and food web. On the other hand India is a place where number of culture and religions occurred, from them religion Hinduism celebrates number of festivals. Festivals are an integral part of rich and diverse cultural heritage of India. In India idol immersion is anthropogenic activity (Kaur, 2012). Increased anthropogenic activities in and around the water bodies damage the aquatic ecosystems and ultimately the physico-chemical properties of water (Anu, et al, 2011). In India Ganesh Chaturthi is the biggest festival celebrated by Hinduism every year. Every Hindu constricts and worship of Ganesh idol then immerges it into the water bodies (Reddy, et al, 2001). Now a day the Non- biodegradable materials are used to make Lord Ganesha idol. In which mostly harmful substances are plaster of paris which contains gypsum, sulfur, phosphorous and magnesium (Yuvraj, 2013). The artificial chemicals used in paints to decorate the Ganesha idol. Mostly harmful chemicals are mercury, lead, cadmium and carbon which increase the acidity of the water. As well as several accessory materials also used for decoration and for worship, these are thermacol, camphor, gugal powder, cloths, plastic flower etc all these makes variations in the physico-chemical properties of water. 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).

**MATERIALS AND METHODS**
The present work is done on Rajalwadi water reservoir. It is 3 Km away from Sillod town in Marathwada region of Maharashtra. Thousands of Ganesh idol immerges into this water body. (Fig 2 and 3) Although this water is used for different purpose like irrigation, home use and drinking for pet animals. For the present study, water sample were collected from surface area of water body during afternoon hours. These samples were collected and preserved at the site of immersion, Rajalwadi reservoir near Sillod town (Figure 1) during the Ganesh festival in the month of August and September 2014 at different intervals i.e. every third days at afternoon hours during Pre-immersion and post-immersion period. Pre-immersion samples and Post-immersion samples were collected a week before and after the idol immersion. These samples were subjected to analyze the physico-chemical properties including pH, Temperature, Salinity, Alkalinity, Chlorides, Dissolve of oxygen, Biological oxygen demand, Chemical oxygen demand, Total dissolve solids, Total suspended solids, Total solids, Hardness, Turbidity, Conductivity. For analysis of the the physico-chemical properties of water samples standard methods are used (APHA 1985).
RESULTS AND DISCUSSION
The results of the present study have been shown in the Table 1 and co-relate their values in the Graph 1 and Graph 2 and Figure 1 and 2. These data indicated that the variation occurs in the water properties of Rajalwadi reservoir are due to the immersion of Ganesh idols.

Table 1. Table showing values of physico-chemical properties of water during pre and post immersion period.

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Parameters</th>
<th>Pre-Immersion Period</th>
<th>Post-Immersion Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>pH (mg/lit)</td>
<td>8.3</td>
<td>8.7</td>
</tr>
<tr>
<td>02</td>
<td>Temperature (°C)</td>
<td>25</td>
<td>28</td>
</tr>
<tr>
<td>03</td>
<td>Salinity (%)</td>
<td>7.0</td>
<td>11.9</td>
</tr>
<tr>
<td>04</td>
<td>Alkalinity (mg/lit)</td>
<td>35.5</td>
<td>58.5</td>
</tr>
<tr>
<td>05</td>
<td>Chlorides (mg/lit)</td>
<td>32.1</td>
<td>48.5</td>
</tr>
<tr>
<td>06</td>
<td>D O (mg/lit)</td>
<td>6.1</td>
<td>3.9</td>
</tr>
<tr>
<td>07</td>
<td>B O D (mg/lit)</td>
<td>3.0</td>
<td>8.5</td>
</tr>
<tr>
<td>08</td>
<td>C O D (mg/lit)</td>
<td>25.0</td>
<td>32.1</td>
</tr>
<tr>
<td>09</td>
<td>T D S (mg/lit)</td>
<td>310</td>
<td>650</td>
</tr>
<tr>
<td>10</td>
<td>T S S (mg/lit)</td>
<td>14.0</td>
<td>19.0</td>
</tr>
<tr>
<td>11</td>
<td>T S (mg/lit)</td>
<td>190</td>
<td>225</td>
</tr>
<tr>
<td>12</td>
<td>Hardness (mg/lit)</td>
<td>710</td>
<td>856</td>
</tr>
<tr>
<td>13</td>
<td>Turbidity (NTU)</td>
<td>5.0</td>
<td>6.1</td>
</tr>
<tr>
<td>14</td>
<td>Conductivity (µs)</td>
<td>200</td>
<td>260</td>
</tr>
</tbody>
</table>
Graph 1. Graph showing co-relation between physico-chemical properties of water during pre and post immersion period.

Graph 2. Graph showing co-relation between physico-chemical properties of water during pre and post immersion period.

**pH:** It is the most important factor which determines the stability of the water. pH of water found alkaline 8.3 mg/lit during the pre-immersion and 8.7 mg/lit at post-immersion period respectively. The results of the present study are similar to the results of earlier study reported by (Kalita et al. 2006) in Beel water of Assam and the values are (6.9 to 8.0).

**Temperature:** The temperature of water found 25oC during the pre-immersion and 28oC at post-immersion period respectively. The temperature of water usually depends on the climatic condition of location at the time of sampling. 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).

**Salinity:** The Salinity of water sample found 7.0% during the pre-immersion and 11.9% at post-immersion period respectively. The percentage of salinity from the water sample increased by 4.9% due to ganesh idol immersion.
Alkalinity: Alkalinity of the water sample found 35.5 mg/lit during the pre-immersion and 58.5 mg/lit at post-immersion period respectively. Alkalinity of natural waters is due to primarily to the salts of weak acids, although weak or strong bases may also contribute. Bicarbonate represents the major form of alkalinity. It indicates the high level of Bicarbonates. The results of total alkalinity in the present study are correlated to the findings of (Gupta et al. 2011) from Varanasi (Uttar Pradesh).

Chlorides: The chlorides content of water found 32.1 mg/lit during the pre-immersion and 48.5 mg/lit at post-immersion period respectively. High concentration of Chlorides is considered to as harmful to aquatic life, (Rajkumar et al. 2004).

Dissolved oxygen: It is most essential to living organism for survive. Dissolve oxygen of water found alkaline 6.1 mg/lit during the pre-immersion and 3.9 mg/lit at post-immersion period respectively. It was found comparatively low in post immersion period than pre-immersion period. (Devi et. al. 2005) and (Jadhav et. al. 2009) also reported low DO level during the immersion period in water bodies of Karnataka. Low dissolved oxygen and high temperature during various religious activities were observed by (Malik et al., 2010, 2012) and (Ujjania et al, 2011) in different rivers of southern Gujarat. (Devi et al., 2005) also reported low dissolved oxygen during the immersion period in water bodies of Karnataka. These findings are supported to the present study.

Biological Oxygen Demand: BOD of water found 3.0 mg/lit during the pre-immersion and 8.5 mg/lit at post-immersion period respectively. It is one of the pollution indicating parameter. A higher BOD value indicates the presence of organic material. Concentration of BOD also increased at the immersion period earlier reported by (Ujjania et al., 2011).

Chemical Oxygen Demand: COD was recorded 25.0 mg/lit during pre-immersion period while 32.1 mg/lit at post-immersion period. The COD values were higher respectively during immersion period and post-immersion period is an important parameter for knowing the quality of water. The study is supported by (Kaur 2012). The high value of COD indicates pollution due to oxidizable organic matter

Total dissolved solid: TDS was recorded 310 mg/lit during pre-immersion period while 650 mg/lit at post-immersion period. Similar findings as increasing value of TDS were found by (Kaur, 2012).

Total suspended solids: It was found high 19.0 mg/lit during post-immersion period as compare to pre-immersion 14.0 mg/lit. Total solids, total dissolved solids and total suspended solids increased during immersion and then declined during post-immersion. The finding of the present study is supported by (Kaur 2012).

Total Solids: Total solids found in the water sample were 190 mg/lit during pre-immersion period while 225 mg/lit during post-immersion period. It shows that total solids increases during initial post-immersion period as compared to pre-immersion period. These findings are supported by (Kaur, 2012).

Total hardness: It was observed as 710 mg/lit during pre-immersion period while 856 mg/lit during post-immersion period. (Vyas et al., 2008), (Gupta et al. 2011) and (Malik et al. 2012) reported increase in total hardness due to idol immersion. Hardness increases due to mixing of domestic waste and increase in temperature as also observed by (Goyal et al, 2006).

Turbidity: Turbidity of water found alkaline 5.0 during the pre-immersion and 6.1 post-immersion period respectively. Turbidity in water is caused by suspended and colloidal matter such as clay, silts, finely divided organic and inorganic matter, paint and its effects on microscopic organisms (Ansari et al., 2014).

Conductivity: It was observed as 200 µs during pre-immersion period while 260 µs during post-immersion period. These findings are similar to the findings reported by (Kaur, 2012) and the values are found 200 and 268 µs during pre and post immersion period respectively.
CONCLUSION
Investigation of this water sample indicates that the value of physico-chemical properties of water increased due to immersion of Ganesha idol. Variation occurs in the physico-chemical properties of water of Rajalwadi water reservoir is due to immersing coloured idol along with the accessory material. Ganesha idol immersion can’t be controlled but may reduce the chance of water pollution. Use natural soil for making idol, Avoid the plastic material along with idol during immersion, Use of natural colour paints for decoration to idol, All Hindus in one society will get organized single Ganesha idol, Avoid use of polluted water by idol immersion. Water quality parameters like turbidity, conductivity, TDS, TSS, salinity, BOD and COD have significantly increased during the immersion period. The non-biodegradable chemicals and materials that were used in to make Ganesh idol are the most hazardous to biotic and abiotic components of an ecosystem.

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