Seasonal Variations of some Physico-Chemical Parameters of Bolinj Ram Mandir Talao, Virar, Palghar, Maharashtra, India

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Abstract

Bolinj Ram Mandir Talao is situated in Bolinj, Near Virar Town, Palghar District, Maharashtra at 19° 28’ 0'' N and 72° 47’60” E. Talao water is used for various purposes like Ganpati Idol Immersion, ritual ceremony, washing, irrigations etc. Current study analysis the seasonal variations of various important Physico-Chemical parameters of Bolinj Ram Mandir Talao, Virar. Most of the parameters are Turbidity, pH, Carbonates and Bicarbonates, B.O.D., Sulphate, Hardness etc. Our observation suggest that Talao water is fairly contaminated by adopting and implementing modern scientific-cum-technological measures, the lake can be reconstituted for a variety of purposes.

Keywords: Bolinj, Talao, Parameters.

Introduction

One of the most vital part of ecosystem are lakes. It provides important habitat and food resources to the diverse aquatic life. The lake is subjected to a range of physical, chemical and biological problems due to human activities, climate change has is of major concern as it can diminish their aesthetic beauty, recreational value, water quality and habitat suitability¹. Most of the lakes, especially near residential areas are polluted because of anthropogenic activities. The deterioration of lake water affects the aquatic life and causes hindrance in its traditional uses.

India has a large number of beautiful lakes and water bodies. India being a religious country which celebrates many festival like Ganesh Chaturti and Durga Puja that includes the worship and immersion of idols of God and Goddess into water bodies. Instead of traditional methods currently the idols of deities are made of low grade plastic, cement and plaster of Paris and are painted with harmful toxic dyes² these paints contain non-degradable metals and organic pollutants that tend to accumulate in various vital organs of fishes which may lead to long term toxic effects and the intake of such fishes in one’s diet also induce structural and functional abnormalities in different organs of fishes and humans³. The environment faces serious problem due to idol immersion as it disturbs the entire ecological balance by polluting water and adversely affecting the flora and fauna. Water is the basic need from microorganisms to man. Currently all water resources have reached to a point of crisis due to unplanned urbanization and industrialization⁴.

Qualitative and quantitative hydrological investigations and monitoring should be done at regularly basis to study the current status of the habitat and socio-economic activities to identify possible solutions.

Materials and Methods

Study area: Ram Mandir Lake, Bolinj, Virar, Palghar District, Maharashtra was selected to study the physico-chemical characteristics. Its geographical location is 19° 28’ 0” N and 72° 47’60” E. During the study of this lake it is observed that, hundreds of painted Ganesh idol were immersed during Ganesh festival, even water of this lake is used for washing activities, irrigation, religious ritual practices, and fishing by local people.

Sample Collection: Sample collection was done using the plastic containers which were washed in non-ionic detergent, rinsed with tap water and later soaked in 10% HNO₃ for 24 hours. Finally it was rinsed with de-ionized water prior to usage. During sampling, sample bottles were again rinsed with sample water three times. After sampling, the sample containers were labeled and stored in the refrigerator at about 4°C prior to analysis.

Analysis: Water samples were collected in triplicates and were analysis. In total 17 different physico-chemical parameters of water quality were studied following the standard methodologies of APHA³ that includes 7 physical and 10 chemical parameters. List and Results of the parameters are presented in Table-1.

Results and Discussion

The physicochemical features of Ram Mandir lake water were affected due to various human activities such as immersion of idols of god and goddess during festival season, surface run off resulting from rainfall and washing activities by local people.
Satellite view of Ram Mandir Lake

Table 1
Mean values (Mean±SE) of water physicochemical parameters of Ram Mandir Lake, Bolinj, Virar, Palghar District, Maharashtra

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Units</th>
<th>Before immersion</th>
<th>During immersion</th>
<th>Post-immersion</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>-</td>
<td>7.33</td>
<td>6.67</td>
<td>7.20</td>
</tr>
<tr>
<td>Carbonates</td>
<td>Me/L</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td>T.S</td>
<td>Mg/L</td>
<td>250</td>
<td>360</td>
<td>285</td>
</tr>
<tr>
<td>T.S.S</td>
<td>Mg/L</td>
<td>120</td>
<td>180</td>
<td>160</td>
</tr>
<tr>
<td>T.D.S</td>
<td>Mg/L</td>
<td>190</td>
<td>250</td>
<td>210</td>
</tr>
<tr>
<td>D.O</td>
<td>Mg/L</td>
<td>4.4</td>
<td>2.57</td>
<td>4.3</td>
</tr>
<tr>
<td>B.O.D</td>
<td>Mg/L</td>
<td>2.8</td>
<td>6.8</td>
<td>4.7</td>
</tr>
<tr>
<td>C.O.D</td>
<td>Mg/L</td>
<td>22</td>
<td>28</td>
<td>25</td>
</tr>
<tr>
<td>Alkalinity</td>
<td>Mg/L</td>
<td>120.2</td>
<td>421.3</td>
<td>200.85</td>
</tr>
<tr>
<td>Nitrates</td>
<td>Mg/L</td>
<td>0.0335</td>
<td>0.0723</td>
<td>0.04452</td>
</tr>
<tr>
<td>Nitrites</td>
<td>Mg/L</td>
<td>0.0281</td>
<td>0.031</td>
<td>0.0232</td>
</tr>
<tr>
<td>Inorganic Phosphates</td>
<td>Mg/L</td>
<td>0.0016</td>
<td>0.0030</td>
<td>0.0015</td>
</tr>
<tr>
<td>Organic Phosphates</td>
<td>Mg/L</td>
<td>0.0016</td>
<td>0.0031</td>
<td>0.0022</td>
</tr>
<tr>
<td>Total Phosphates</td>
<td>Mg/L</td>
<td>0.0032</td>
<td>0.0062</td>
<td>0.0037</td>
</tr>
<tr>
<td>Hardness</td>
<td>Mg/L</td>
<td>126</td>
<td>184</td>
<td>133</td>
</tr>
<tr>
<td>Conductivity</td>
<td>m ohms</td>
<td>2.79</td>
<td>3.57</td>
<td>3.21</td>
</tr>
<tr>
<td>Turbidity</td>
<td>N.T.U</td>
<td>3.2</td>
<td>8.3</td>
<td>4.2</td>
</tr>
</tbody>
</table>
pH value of water is an important indication of water quality. pH plays an important role in productivity of a lake. The decreasing rate of photosynthetic activity, the assimilation of carbon dioxide and bicarbonates are responsible for increase in pH. During summers the temperature is high due to which the oxygen values are low. There are various factors bring about changes in the pH of water. During monsoon season (during idol immersion) high pH value is observed whereas during pre-monsoon (before immersion) slightly acidic pH value is observed. pH of water samples in general were slightly alkaline and were within maximum limit set for domestic use by APHA. High value of pH is attributed to the presence of sufficient quantities of carbonates in the water samples.

Turbidity: In natural water bodies is caused by clay, silt, organic matter, phytoplankton and microscopic organism’s etc. turbidity in lake water restricts light penetration for organic matter, phytoplankton and microscopic organism’s etc. aquatic system indicates higher pollution causing adverse ability of a water body to support and sustain aquatic life.

**Total Dissolved Solids:** Include salt and variety of organic substances, which readily dissolve in water and often impart a degree of hardness. The higher values of Total dissolved solid in natural water is determined by the geology of the drainage, rainfall and the water balance. The higher values of Total Solids, Total Suspended Solids and Total Dissolved solids are observed. Elevation in these values during idol immersion (monsoon period) are determined i.e. 360mg/lit, 180mg/lit and 250mg/lit respectively. Higher concentration of total solids, total suspended solids and total dissolved solids are due to anthropogenic activities, offering flowers, garlands and other religious matter during Ganpati festival which lies during monsoon season and the surface runoff due to rain fall.

**Dissolved Oxygen:** DO is an important factor that indicates the ability of a water body to support and sustain aquatic life. Decreased concentration of DO (< 3mg/lit) in fresh water aquatic system indicates higher pollution causing adverse effects on aquatic ecosystem. The aquatic life distressed and hampered when DO levels drops to 4-2 mg/lit. And when there is a steep drop in DO level undesirable changes like odor, taste and color reduces the usefulness of water. In the current study DO value ranges between 3-4.5mg/lit. Though the values are in normal limits, the water body can tend to lower the normal limits of DO.

**Biochemical Oxygen Demand (BOD):** Indicates the substances (pollutants) that consume dissolved oxygen and add to the Biochemical Oxygen Demand (BOD). Such substances come from human waste. The amount of dissolved oxygen used up during oxidation by bacteria of the organic matter in a sample of water is called Biochemical Oxygen Demand. Water is rated as pure if the BOD is 1ppm or less, fairly pure with a BOD of 3ppm and suspect when the BOD reaches 5ppm. In present study, BOD value ranges 2-7mg/lit. During idol immersion (monsoon season) BOD value reaches up to average of 6.8 mg/lit. which shows the effect of anthropogenic activities on water quality.

**The Chemical Oxygen Demand (COD):** Determination is a measure of the oxygen equivalent of that portion of the organic matter in a sample that is susceptible to oxidation by a strong chemical oxidant. In the present investigation, COD values lie between 20-30 mg/lit. The highest values are obtained in monsoon season. Pre-monsoon and post-monsoon season shows almost similar values for COD i.e. 22mg/lit and 25mg/lit respectively.

**Hardness:** The water hardness is caused by ions such as calcium and magnesium in combination with bicarbonates, carbonates sulphide sulphates and other. Hard water may also create problems to human health causing gastritis. Hardness was recorded in the range of 120- 190mg/lit. It is observed that hardness of water to be increased in monsoon season but found in the normal ranges.

**Alkalinity:** is a phenomena of water which has the capacity to neutralize acids. It is a measure of the water ability to absorb hydroxyl ions without significant pH change. in the current study values were high during idol immersion (monsoon) and low during before immersion (pre-monsoon) and after immersion (post-monsoon).

**Electrical Conductivity:** is an estimate of total dissolved salts in water and water with EC values between 2.5 and 10.0mScm-1 is not recommended for human consumption and normally not suitable for irrigation. Present study shows the increase in conductivity value during monsoon season.

**Nitrates:** The concentration of Nitrates indicates the level of micronutrients in water bodies which has ability to support plant growth. Higher concentrations of Nitrate favored growth of phytoplankton. In nature the non-polluted tropical waters are generally deficient in nitrate but the factors like discharge of sewage, run-off and nitrogen fixation may increase its concentration in water bodies. Organically polluted waters in general have higher concentration of ammonia, nitrogen than the others. Amount of nitrates obtained from study area is in very less amount but the rise in value can be observed during the changes occurred in monsoon period.

**Phosphates:** naturally are in limited source and it acts as a limiting factor for productivity of water body. Phosphate may occur in lake as result of domestic waste, detergent and agricultural runoff containing fertilizer. Increased value of phosphates during idol immersion (monsoon season) is observed in this study.

**Conclusion**

The present scenario of water, its resources, indiscriminate utilization including contamination has led to its depletion and scarcity resulting into undue stress on human welfare. The present study indicates the water is fairly contaminated and its resources have to be effectively conserved, reconstituted, treated and managed using scientific techniques to serve the biosphere.
of Ram Mandir Lake. By doing this it can then be utilized for variety of purposes.

**Recommendations:** Undertake area development program to maintain the water pollution. Schemes to be planned for the development of areas around the water bodies into parks or picnic spots. Arrangement of artificial ponds especially for Ganesh Visarjan and Durga puja. Open defecation of animals and vehicle/ animal washing into lake should be prohibited. Sewage should not be disposed in this water bodies. Public awareness programs to be arranged for using the eco friendly Ganesh idols.

**References**


