PHYSICOCHEMICAL PARAMETERS OF POND WATER FROM KALYAN, AMBERNATH AND BADLAPUR CITY

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ABSTRACT
The surface water quality of some stagnant water bodies like ponds in Kalyan, Ambernath and Badlapur have been investigated experimentally by analyzing the physicochemical parameters. Pond water has been analyzed to find the suitability for drinking and irrigation purpose. The physicochemical parameter of water such as pH, temperature, alkalinity, TDS, TSS, total hardness, phosphate, nitrate, chloride, DO and BOD have been studied. By observing the result it can be concluded that the parameters which were taken to study are above the permissible limit of drinking and irrigation standards (BIS, IS-10500, FAO). The results reveal that overall water quality was found unfit for drinking and irrigation purpose. Among all the three ponds Badlapur pond shows maximum values of TSS, TDS, DO and BOD.

KEYWORDS: Pond, physicochemical parameter, DO, BOD, alkalinity.

INTRODUCTION
Water is universal solvent dissolving a number of substances that it comes in contact with. However water for human consumption and other domestic purposes should be free from disease causing organisms, poisonous substances, excessive amount of minerals and organic matter. It should also be free from color, turbidity, taste and odour.¹ Fresh water is essential for agriculture, industry and human existence. It is a finite resource of earth. Rapid growth of urban areas directly or indirectly affected existence of the pond such as over exploitation of resources and improper waste disposal practice.¹³

India receives about 1400-1800mm of rainfall annually. About 96% of this water is used for agriculture, 3% of domestic use and 1% for industrial activity. An analysis revealed that
about 70% of all the available water in our country is polluted due to the discharge of effluent from the industries, domestic waste, land and agricultural drainage.\[^{13}\]

Physicochemical parameters have important significance in determining the trophic status of aquatic habitats.\[^{12}\] Quality of water is vital concern for the welfare of the society, since it is directly linked to health of living beings.\[^{9}\] Without adequate quality and quantity of freshwater sustainable development will not be possible.\[^{10}\] The present study involves the analysis of water quality in terms of physicochemical parameters of pond water near Kalyan, Ambernath and Badlapur city, Thane district, Maharashtra state.

**MATERIAL AND METHODS**

**Study area**

**Sample collection**

For the collection and analysis of pond water 3 ponds located in three cities were chosen i.e. Kalyan, Ambernath and Badlapur. For each pond three sites viz. at Kalyan K\(_1\), K\(_2\), K\(_3\), at Ambernath pond A\(_1\), A\(_2\), A\(_3\) and at badlapur B\(_1\), B\(_2\), B\(_3\) were chosen for the analysis. Pond water was collected by using plastic container of one liter capacity. The bottle was rinsed with pond water before collection. During sampling containers were dipped and filled it at a depth of 30cm below the surface of the pond. The samples were labelled and transported to the laboratory.

**Physicochemical analysis**

The collected samples were analyzed for the different physicochemical parameters such as pH, temperature, TDS, TSS, alkalinity, chloride content, phosphate content, nitrate content, total hardness, DO, BOD as per standard methods APHA (2005) The experimental results were compared to the permissible limit of drinking and irrigation water quality standards (BIS, IS-10500, FAO)

**RESULTS AND DISCUSSION**

In the present study TDS, alkalinity, nitrate, BOD were very high in Badlapur ponds compared to irrigation and drinking water quality standards (BIS, IS-10500, FAO). Thus the data of study indicate that the ponds are highly polluted and unsafe for human use.
Table 1: Results of physicochemical parameters of various ponds near Kalyan, Ambernath and Badlapur city.

<table>
<thead>
<tr>
<th>Sampling site parameters</th>
<th>Kalyan pond</th>
<th>Ambernath pond</th>
<th>Badlapur pond</th>
<th>Irrigation standards BIS-FAO</th>
<th>Drinking standards IS:10500</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>8.1</td>
<td>7.9</td>
<td>8.7</td>
<td>6.5-8.5</td>
<td>6.5-8.5</td>
</tr>
<tr>
<td>Temperature</td>
<td>22ºC</td>
<td>21ºC</td>
<td>25 ºC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>color</td>
<td>colorless</td>
<td>Light green</td>
<td>brownish</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TDS (mg/L)</td>
<td>1600</td>
<td>2310</td>
<td>2520</td>
<td>2100</td>
<td>2000</td>
</tr>
<tr>
<td>TSS (mg/L)</td>
<td>670</td>
<td>1650</td>
<td>1700</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alkalinity (mg/L)</td>
<td>76</td>
<td>60</td>
<td>142</td>
<td>140</td>
<td>600</td>
</tr>
<tr>
<td>Chloride (mg/L)</td>
<td>10.3</td>
<td>11.4</td>
<td>41.7</td>
<td>500</td>
<td>600</td>
</tr>
<tr>
<td>Phosphate (mg/L)</td>
<td>2</td>
<td>2</td>
<td>6</td>
<td>0-2</td>
<td>5</td>
</tr>
<tr>
<td>Nitrate (mg/L)</td>
<td>57</td>
<td>78</td>
<td>79</td>
<td>5.30</td>
<td>45</td>
</tr>
<tr>
<td>Total hardness (mg/L)</td>
<td>192</td>
<td>178</td>
<td>198</td>
<td></td>
<td>600</td>
</tr>
<tr>
<td>DO (mg/L)</td>
<td>6.2</td>
<td>5.4</td>
<td>9.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BOD (mg/L)</td>
<td>150</td>
<td>100</td>
<td>152</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

The pH values were found in the range of 8.1-8.7 and thus slightly alkaline trend reveals in every pond sites. The pH affects most of the biological processes and biochemical reactions in water body (Arya et al 2011a, b). Temperature is one of the most important factor of aquatic environment. Temperature play a crucial role in physicochemical and biological behavior of aquatic ecosystem (Mahima Chaurashia, 2007). Temperature values were ranging from 21ºC to 25 ºC. It shows the variation in temperature according to its location.

The total alkalinity values ranged between 60mg/L to 142mg/L. It was minimum in Ambernath pond (60mg/L) where maximum in Badlapur pond (142mg/L). According to Durrani (1993), withdrawal of CO2 from bicarbonates for photosynthesis by algae may increase total alkalinity. Total alkalinity may be used as a tool for measurement of productivity.

Chloride content ranges from 10.3mg/L to 41.7mg/L in Kalyan and Badlapur pond whereas Ambernath pond has 11.4mg/L chloride content. Similar trend was observed by Gunale (1981) and he has reported chloride concentration ranged between 11.4 mg/L and 36.4 mg/L for various sites in Pune. Chlorides are toxic to most plants so they should be checked for irrigation water.

Total hardness of Kalyan, Ambernath and Badlapur pond was calculated as 192mg/L, 178mg/L and 198mg/L respectively. Due to addition of sewage and large scale human use,
this might cause elevation of hardness (Dakshini & Soni, 1997; Kumar, 2000; Mohanta & Patra, 2000).

Phosphate and nitrate values varied from 2mg/L, 2mg/L, 6mg/L and 57mg/L, 78mg/L, 79mg/L for Kalyan, Ambernath and Badlapur ponds respectively. This might be discharge of sewage into ponds. Phosphate concentration was found above the permissible limit (2mg/L) in Badlapur pond. Whereas nitrate concentration found above the permissible limit (45mg/L) in all ponds. Nitrate concentration above the permissible limit in drinking will affect the oxygen carrying capacity in the infants blood known as methenoglobinemia (blue baby syndrome). The higher inflow of water and consequent land drainage cause high value of Nitrate. (Thilanga et al. 2005).

Dissolved oxygen is important parameter in water quality assessment and reflects the physical and biological processes of aquatic life (2). BOD depends on temperature, extent of biological activity, concentration of organic matter and microbial population such as bacteria and fungi (prasanna & Ranjan 2010). In this study maximum Do and BOD value was found in Badlapur pond is 152mg/L and 9.7mg/L where minimum value found in Ambernath pond is 100mg/L and 5.4mg/L respectively. Same as values of total dissolved solids and total suspended solids for Kalyan, Ambernath and Badlapur ponds were 1600mg/L, 2310mg/L, 2520mg/L and 670mg/L, 1650mg/L, 1700mg/L respectively. Badlapur pond shows the maximum values of TDS and TSS. TDS and TSS increased mostly by sewage discharge.

**CONCLUSION**

In the present investigation results of physicochemical parameters of Kalyan, Ambernath and Badlapur ponds clearly shows that the water is unfit for drinking purpose without treatment and also struggle for their existence. Badlapur pond is highly polluted because of sewage discharge. So there is a need of proper treatment and restoration for humans and environment.

There is a need of awareness among the local people to maintain the ponds. Intermittant cleaning of these ponds may helpful to retain water purity.

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