Water Quality Assessment of Tamsa (TONS) River Flowing Through Satna District M.P.

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Abstract—River is a natural source of water for house use, agriculture use, as well as industrial use. Generally river water is fresh and safe for use. Water is a very good solvent and it can dissolve so many substances either they are organic or inorganic in nature. Quality of water is decided on the basis of its dissolved and suspended substances which are either useful or harmful for the growth of living organisms. Our work was aimed to know the physical and chemical water qualities of Tamsa (Tons) River flowing through Satna district of Madhya Pradesh, India. Quality of River water depends on pollution level in areas from where the river is flowing. Some water quality parameters such as Alkalinity, Total Hardness, pH, Total Solids, Dissolved Oxygen, Biochemical Oxygen Demand, Chemical Oxygen Demand, Chlorides, Fluorides, Sulphate, Phosphate, Calcium Hardness, etc are checked at various points. If limits of these water quality parameter are not as per the W.H.O. guidelines then it will be harmful for users. 

Keywords: Physical and Chemical Water Quality, Tamsa River, Satna, Madhya Pradesh, India, W.H.O

I. INTRODUCTION

The Tamsa River is also known as tons, Tons river origin is at Tama-kund in the Kaimur Range. The origin is at a height of 610 metres (2,000 ft) from mean sea level. Tons River passes through Satna and Rewa district of Madhya Pradesh. Tons forms many waterfalls in Rewa district. The Tons river ends in Belan river Sonbhadra district in U.P. and finally joins the Ganga at Sirsa U.P. Total flow length of the Tons river is 264 kilometres. It has a total drainage area of 16,860 square kilometres.

The Tamsa river is also have its religious importance. As this is the river on which Ram spent his first night at the bank of Tamsa river during his 14 year forest exile. Bharadwaj, Valmiki and many other sages had their ashram at the bank of Tamsa River.

The Tamsa River forms a vertical falls of 70m depth which is known as Purwa Falls. Beehar, Mahana, are the mains tributary of Tamsa River.

After initiation of Tamsa River it passes through many townships of Satna district some of them are Maihar, Unchehra, Madhogarh etc. These townships pollute the river by discharging their sewage discharge into the river. Madhogarh which is situated nearby of Satna City is major pollution causing township for the river. The study is actually limited to the area of Satna district from Maihar to Rashi.

II. METHODS AND MATERIALS

A. Study Area

Study is carried out about Tamsa River flow course in Satna district of Madhya Pradesh, India.

River Name- Tamsa (Tons)
Country- India
States- M.P. U.P.
District- Satna
Origin- Tamakund, kaimur range, Maihar Tehsil, Satna district, M.P. India
End Point- Ganges, Ballia, U.P. India
Running Length- 264 km
Falls- Purwa Falls

B. Selection of sample site

The study area is shown in map shown below in which red points shows the sampling stations.

Fig. 1: Map of Tamsa River flowing through Satna District.

C. Sampling stations

Water samples are collected from eight different locations in Satna district

<table>
<thead>
<tr>
<th>Code Name</th>
<th>Site Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>U/S of mixing point near Maihar</td>
</tr>
<tr>
<td>B</td>
<td>D/S of mixing point near Maihar</td>
</tr>
<tr>
<td>C</td>
<td>U/S of mixing point near Unchahra</td>
</tr>
<tr>
<td>D</td>
<td>D/S of mixing point near Unchahra</td>
</tr>
<tr>
<td>E</td>
<td>U/S of mixing point near Madhogarh</td>
</tr>
<tr>
<td>F</td>
<td>D/S of mixing point near Madhogarh</td>
</tr>
<tr>
<td>G</td>
<td>U/S of influence point of Prism Cement near Rashi</td>
</tr>
</tbody>
</table>
### Table 1: Name of Sampling Stations

| D/S of influence point of Prism Cement | near Rashi |

**D. Sampling and Field Work**

Samples were collected as per the guidelines of APHA. Each sample was taken in clean plastic bottle and kept in iceberg on the field. Water Temperature, Colour, Turbidity, Odour, Electrical Conductivity, Total suspended solids were tested in a laboratory. The physical water quality analysis of samples was performed using standard analytical methods. All samples were transported to the Madhya Pradesh Pollution Control Board Jabalpur.

**E. Methods**

The physical analysis of water sample was carried out using standard analytical methods according to procedure outlined in the standard methods for the examination of water and wastewater (APHA).

<table>
<thead>
<tr>
<th>S.N.</th>
<th>Parameters</th>
<th>Method &amp; Instrument</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Temperature</td>
<td>Simple dipping of digital Thermometer</td>
</tr>
<tr>
<td>2</td>
<td>Colour</td>
<td>Colour matching technique</td>
</tr>
<tr>
<td>3</td>
<td>Turbidity</td>
<td>Using Naphelometer</td>
</tr>
<tr>
<td>4</td>
<td>Odour</td>
<td>Dilution Method</td>
</tr>
<tr>
<td>5</td>
<td>Conductivity</td>
<td>Digital Conductivity Meter</td>
</tr>
<tr>
<td>6</td>
<td>Suspended Solids</td>
<td>By Filtration Method</td>
</tr>
</tbody>
</table>

**III. RESULTS AND DISCUSSION**

#### A. Physical Water Quality Parameters

1) Water Temperature (WT)

Temperature of river varies from $29^\circ C$ at up stream of mixing point at Maihar to $38^\circ C$ at downstream of mixing point near Rashi. Temperature rise along the river course is due to mixing of sewage discharge into river, before inclusion of sewage waste the water temperature was fit to public use. The highest temperature was recorded at downstream of mixing point of cement factory effluents, because water flowing from cement factory have high temperature. Township of Madhogarh has highly polluted and hot effluent which results in rise of water temperature after mixing.

![Temperature Variation Chart](image)

2) Colour

As per W.H.O. guidelines the acceptable limit for colour in terms of true colour unit is 0 to 5 TCU. Colour of water at Maihar before mixing was adoptable for drinking but after interference of human waste the colour of water becomes beyond the permissible limit. Water at Madhogarh after mixing was highly unacceptable and it was 53 TCU. Water colour was muddy near Madhogarh after mixing of sewage water, after this water becomes clearer but still it was not safe for drinking purpose. Colour variation for different points shown below -

![Colour Variation Chart](image)

3) Turbidity

As per W.H.O. guidelines the acceptable limit for turbidity in terms of nephelometer turbidity unit is 0.3 to 3 NTU which can not exceed 10 NTU in any case. Turbidity level of river water was high through out the course but before human interface it was acceptable for drinking purpose but after mixing of waste water turbidity of water increases. Turbidity before pollution was 6 NTU and highest turbidity was recorded at Madhogarh after mixing of pollutants it was 61.4 NTU. The effluent from cement factory does not make water highly turbid but water at the location of cement waste mixing was not of acceptable limits. Turbidity variation for different points shown below-

![Turbidity Variation Chart](image)

4) Odour

Odour of stream water is generally negligible due to free air contact of water. Odour of water was found within acceptable limits. Initially odour of river water was 2 TON and just after mixing at Maihar the odour becomes to 5.6 TON then it becomes 3.42 TON before mixing at Unchehra and 6.83 after mixing of sewage at Unchehra. Muddy odour produces at
Madhogarh after mixing point and it was found 9.24 TON. Odour at Madhogarh is found objectionable due to heavy sewage mixing in river. Odour variation for different points shown below-

<table>
<thead>
<tr>
<th>Sampling Station</th>
<th>Temperature (°C)</th>
<th>Colour (TC U)</th>
<th>Turbidity (NTU)</th>
<th>Odour (TON)</th>
<th>Electrical Conductivity (µS/cm)</th>
<th>Suspended Solids (mg/l)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>29.00</td>
<td>4.60</td>
<td>6.00</td>
<td>2.0</td>
<td>368.26</td>
<td>14.60</td>
</tr>
<tr>
<td>B</td>
<td>30.40</td>
<td>18.20</td>
<td>23.00</td>
<td>5.6</td>
<td>467.64</td>
<td>39.00</td>
</tr>
<tr>
<td>C</td>
<td>29.60</td>
<td>9.00</td>
<td>15.00</td>
<td>3.4</td>
<td>435.34</td>
<td>26.70</td>
</tr>
<tr>
<td>D</td>
<td>31.00</td>
<td>24.30</td>
<td>26.00</td>
<td>6.8</td>
<td>586.46</td>
<td>43.42</td>
</tr>
<tr>
<td>E</td>
<td>30.90</td>
<td>10.40</td>
<td>17.60</td>
<td>3.7</td>
<td>540.46</td>
<td>28.70</td>
</tr>
<tr>
<td>F</td>
<td>35.00</td>
<td>53.00</td>
<td>61.40</td>
<td>9.2</td>
<td>630.47</td>
<td>98.40</td>
</tr>
<tr>
<td>G</td>
<td>32.10</td>
<td>31.00</td>
<td>39.40</td>
<td>6.2</td>
<td>623.06</td>
<td>56.50</td>
</tr>
<tr>
<td>H</td>
<td>38.00</td>
<td>32.00</td>
<td>42.60</td>
<td>6.7</td>
<td>645.07</td>
<td>67.80</td>
</tr>
</tbody>
</table>

IV. CONCLUSION

Physical water quality parameters of the river were found satisfactory before inclusion of waste water from township but after mixing of the waste water the quality of water decreases along the course of river and it were not suitable for drinking purpose. Most of the water quality parameters have higher values than the standard values given by Bureau Indian Standard as well as World Health Organisation guidelines. Some positive steps should be taken by local authority to improve the water quality of river. Local public should be aware about the water pollution and adopt preventive measures for controlling the river water pollution.

REFERENCES


