# Impact on Water Quality of Tamsa (TONS) River Flowing Through Satna District M. P.

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*Abstract*— River is the source of water for domestic, agriculture, as well as industrial use. Water as a universal solvent has capability to dissolve many substances including organic and inorganic compounds. Quality of water generally refers to the components of water present in desired level for the growth of plants and animals. The work was aimed to know the physical and chemical water qualities of Tamsa River flowing through Satna district of Madhya Pradesh, India. The water quality of Tamsa River depends on pollution level in areas from where the river is flowing. Some water quality parameters such as colour, turbidity, temperature, total suspended solids, odour, conductivity etc. are checked at various points. Large variation in these qualities from WHO standards are dangerous for users.

***Key words:*** Physical & Chemical Water Quality, Tamsa River, Satna, Madhya Pradesh, India, WHO

## I. INTRODUCTION

The Tamsa is also known as tons. This river rises in a tank at Tamakund in the Kaimur Range at an elevation of 610 metres (2,000 ft). It flows through the fertile districts Satna and Rewa of Madhya Pradesh. At the edge of the Purwa plateau and its tributaries form a number of waterfalls. The Tamsa river receives the Belan in UP and joins the Ganga at Sirsa, about 311 kilometres (193 mi) downstream of the confluence of the Ganga and Yamuna. The total length of the river is 264 kilometers (164 mi). It has a total drainage area of 16,860 square kilometers (6,510 sq mi).

The Tamsa River while descending through the Rewa Plateau and draining northwards makes a vertical falls of 70m known as Purwa Falls. Some of the more notable waterfalls on the tributaries of the tamsa river, as they come down from the Rewa Plateau, are: Chachai Falls (127m) on the Beehar River, a tributary of the tamsa, the Keoti Falls (98m) on the Mahana River, a tributary of the tamsa, and Odda Falls (145m) on the Odda River, a tributary of the Belah River, which is itself a tributary of the Tamsa.

This river has also got importance in Hinduism. As this is the river on which Ram spent his first night during the 14 years of forest exile. When Ram left Ayodhya people followed him and were not ready to return to their homes. In the evening Ram, Lakshman and Sita and all the people reached the banks of the Tamsa, Ram and everyone agreed to spend the night at the banks of the Tamsa river and continue the journey next morning. Ram left people sleeping and continued the journey further.

The Ashrama of sage Balmiki was at the banks of Tamsa river. When Sita was exiled by Ram, she left Ayodhya and came to the banks of Tamsa river some 15 km away from the city, where she met Valmiki. He requested Sita to live in his ashram situated at the bank of the Tamsa river. Here Sita spent all her remaining life, and here her twin.

Also on the banks of Tamsa river was the ashram of Bharadwaj, mentioned in the Valmiki Ramayana; it is here that on seeing the plight a bird couple, Balmiki created his first verse, shloka.

## II. METHODS & MATERIALS

### A. Study Area

| Tamsa River (Tons River) | |
|---|---|
| Country | India |
| States | Madhya Pradesh, Uttar Pradesh |
| Landmark | Purwa Falls |
| Source | Tamakund |
| - location | Maihar tehsil, Satna district, Kaimur Range, Madhya Pradesh |
| - elevation | 610 m (2,001 ft) |
| Mouth | Ganges |
| - location | Ballia, Uttar Pradesh |
| - coordinates | 25°16′31″N 82°4′55″E |
| Length | 264 km (164 mi) |

Table 1:

### B. Selection of Sample Site

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

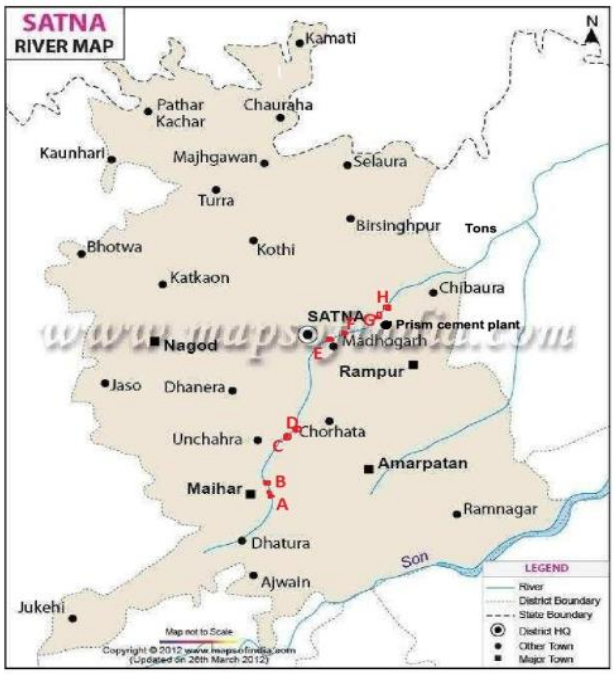


Fig. 1: Map of Tamsa River Flowing through Satna District

### C. Sampeling Stations

Water sampels are collected from eight different locations in Satna district

 

| Code Name | Site Name |
|---|---|
| A | U/S of mixing point near Maihar |
| B | D/S of mixing point near Maihar |
| C | U/S of mixing point near Unchahra |
| D | D/S of mixing point near Unchahra |
| E | U/S of mixing point near Madhogarh |
| F | D/S of mixing point near Madhogarh |
| G | U/S of influence point of Prism Cement near Rashi |
| H | D/S of influence point of Prism Cement near Rashi |

Table 1. Name of Sampling Stations

*D. Sampling & Field Work*

Samples were collected following the standard sampling guidelines and methods. At each sampling location water samples were collected at site and stored in clean jericane bottles. Parameters turbidity, colour, odour, conductivity, total suspended solids were tested in a laboratory while temperature was tested in field during sample collection. The sample were kept in ice on the field and there after refrigerated at 4ºC in the 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 were carried out using standard analytical methods according to procedure outlined in the standard methods for the examination of water and wastewater (APHA).

| S.N. | Parameters | Method & Instrument |
|---|---|---|
| 1 | Temperature | Simple dipping of digital Thermometer |
| 2 | Colour | Colour matching technique |
| 3 | Turbidity | Using Naphelometer |
| 4 | Odour | Dilution Method |
| 5 | Conductivity | Digital Conductivity Meter |
| 6 | Suspended Solids | By Filtration Method |

Table 2: Standard Physical Water Quality Parameters Determination Methods & Instruments Used

## III. Results & Discussion

*A. Physical Water Quality Parameters*

*1) Water Temperature ($W_T$)*

The temperature of water affects some of the important physical properties and characteristics of water: thermal capacity, density, specific weight, viscosity, surface tension, specific conductivity, salinity and solubility of dissolved gases and etc. Chemical and biological reaction rates increase with increasing temperature. Reaction rates usually assumed to double for an increase in temperature of 10 °C. The temperature of water in streams and lakes throughout the world varies from 0 to 35 °C. The temperature of various points was found as shown below-

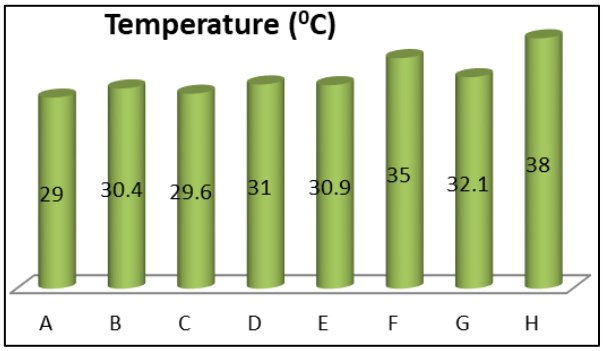


Fig. 1: Temperature Variation Chart

*2) Colour*

Colour in water is primarily a concern of water quality for aesthetic reason. Coloured water gives the appearance of being unfit to drink, even though the water may be perfectly safe for public use. On the other hand, colour can indicate the presence of organic substances, such as algae or humic compounds. More recently, colour has been used as a quantitative assessment of the presence of potentially hazardous or toxic organic materials in water. Colour of various points is shown below-

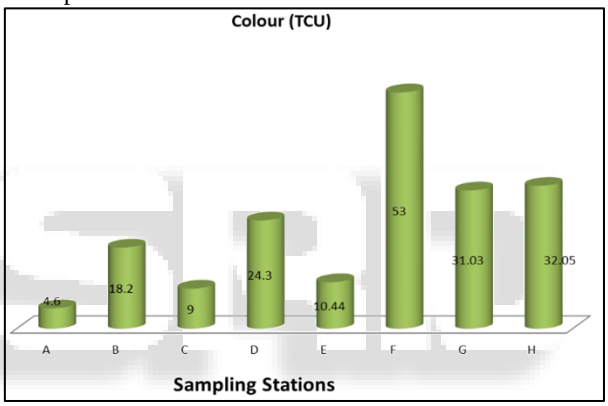


Fig. 2: Colour Variation Chart

*3) Turbidity*

Turbidity is a measure of the cloudiness of water. Cloudiness is caused by suspended solids (mainly soil particles) and plankton (microscopic plants and animals) that are suspended in the water column. Moderately low levels of turbidity may indicate a healthy, well-functioning ecosystem. However, higher levels of turbidity pose several problems for stream systems. Turbidity blocks out the light needed by submerged aquatic vegetation. It also can raise surface water temperatures above normal because suspended particles near the surface facilitate the absorption of heat from sunlight. Turbidity of various points is shown below-

 

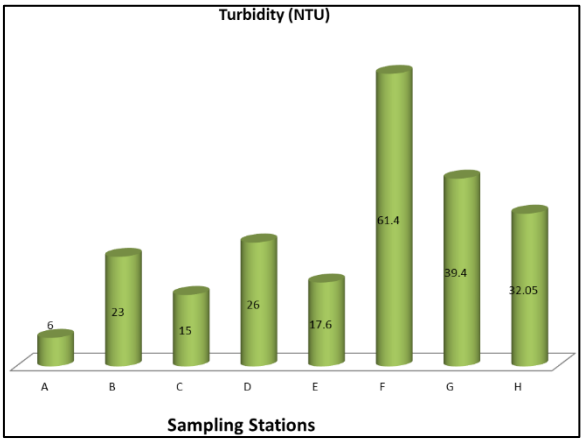


Fig. 3: Turbidity Variation Chart

*4) Odour*

Odour is human perceptions of water quality. Organic materials discharged directly to water, such as falling leaves, runoff, etc., are sources of tastes and odour-producing compounds released during biodegradation. Odour of various points is shown below-

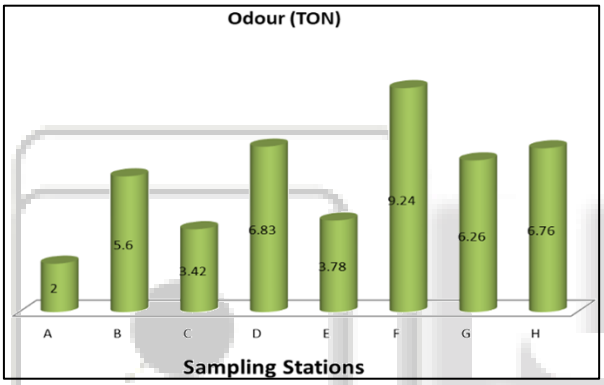


Fig. 4: Odour Variation Chart

*5) Conductivity*

Conductivity is a measure of water's capability to pass electrical flow. This ability is directly related to the concentration of ions in the water. These conductive ions come from dissolved salts and inorganic materials such as alkalis, chlorides, sulphides and carbonate compounds. Compounds that dissolve into ions are also known as electrolytes. The more ions that are present, the higher the conductivity of water. Likewise, the fewer ions that are in the water, the less conductive it is. Distilled or deionised water can act as an insulator due to its very low (if not negligible) conductivity value. Sea water, on the other hand, has a very high conductivity. Conductivity of various points is shown below-

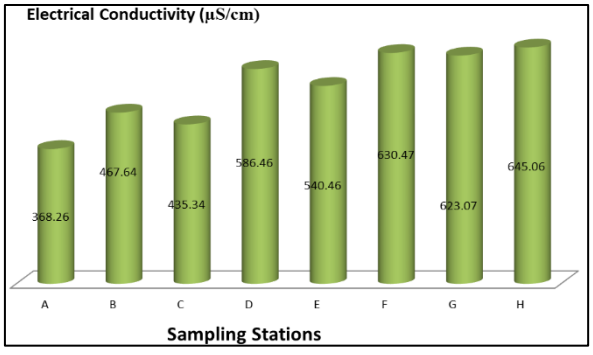


Fig. 5: Electrical Conductivity Variation Chart

*6) Suspended Solids*

Suspended Solids are those that can be retained on a water filter and are capable of settling out of the water column onto the stream bottom when stream velocities are low. They include silt, clay, plankton, organic wastes, and inorganic precipitates such as those from acid mine drainage. Dissolved solids are those that pass through a water filter. They include some organic materials, as well as salts, inorganic nutrients, and toxins. Suspended Solids concentration of various points is shown below-

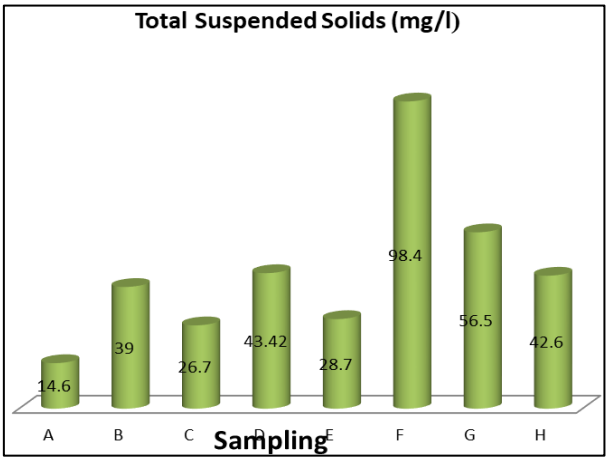


Fig. 6: TSS Variation Chart

*B. Results of Physical Water Quality Parameters*

| Sampling Station V | Temperature ($^0$C) | Colour (TCU) | Turbidity (NTU) | Odour (TON) | Conductivity (µS/cm) | Suspended Solids (mg/l) |
|---|---|---|---|---|---|---|
| A | 29.00 | 4.60 | 6.00 | 2.00 | 368.26 | 14.60 |
| B | 30.40 | 18.20 | 23.00 | 5.60 | 467.64 | 39.00 |
| C | 29.60 | 9.00 | 15.00 | 3.42 | 435.34 | 26.70 |
| D | 31.00 | 24.30 | 26.00 | 6.83 | 586.46 | 43.42 |
| E | 30.90 | 10.44 | 17.60 | 3.78 | 540.46 | 28.70 |
| F | 35.00 | 53.00 | 61.40 | 9.24 | 630.47 | 98.40 |
| G | 32.10 | 31.03 | 39.40 | 6.26 | 623.06 | 56.50 |
| H | 38.00 | 32.05 | 42.60 | 6.76 | 645.07 | 67.80 |

Table 3:

## 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.

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