

ASSESSMENT OF WATER QUALITY IN TONS RIVER IN AND AROUND THE CHAKGHAT AREA, USING NSF-WQI

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ABSTRACT: Water pollution is a chemical or biological substance that builds up in the environment enough to be toxic, harmful, or a nuisance to humans, other animals, or other living things. Water pollution, especially in river system is caused due to directly discharge of domestic sewage, industrial waste, agricultural run-off, etc. Most of the major towns are located on the catchment area of river systems, discharging their waste water directly or indirectly into surface water bodies e.g. rivers, etc. The present study is going to centralize on the Tons River around Chakghat, Rewa district in Madhya Pradesh. Chakghat is a town and a Nagar Panchayat in Rewa district located on Coordinates: 25°1'29'' N 81°44'15'' E. Physico-chemical analysis of the water does not provide the direct conclusions on the quality of water. Water quality index calculates all the parameters and gives an easy decision making output to analyze the quality of water. A Simple but useful index is the National Sanitation Foundation-Water Quality Index (NSF-WQI). This index can be calculated by determining only selected physicochemical parameters. Change in water temperature, pH, dissolved oxygen, biochemical oxygen demand, total phosphorus, nitrates, and turbidity were used for the calculation of the index. From the listed data the quality of water was concluded.

KEYWORDS: Water quality index, River Tons.

INTRODUCTION

All biological reactions occur in water and it is the integrated system of biological metabolic reactions in an aqueous solution that is essential for the maintenance of life. Most human activities involve the use of water in one way or other. It may be noted that man's early habitation and civilization sprang up along the banks of rivers. Although the surface of our planet is nearly 71% water, only 3% of it is fresh. Of these 3% about 75% is tied up in glaciers and polar icebergs, 24% in

groundwater and 1% is available in the form of fresh water in rivers, lakes and ponds suitable for human consumption (Dugan, 1972). Due to increasing industrialization on one hand and exploding population on the other, the demands of water supply have been increasing tremendously. Moreover considerable part of this limited quality of water is polluted by sewage, industrial waste and a wide range of synthetic chemicals. Fresh water which is a precious and limited vital resource needs to be protected, conserved and used wisely by man. But unfortunately such has not been the case, as the polluted lakes, rivers and streams throughout the world testify. According to the scientists of National Environmental Engineering Research Institute, Nagpur, India, about 70 % of the available water in India is polluted (Pani, 1986).

WQI is widely used tool in different parts of the world to solve the problems of data management and to evaluate success and failures in management strategies for improving water quality. The index is a numeric expression used to transform large quantizes of water characterization data into a single number, which represents the water quality level (Abbasi 2002). A number of indices have been developed to summarize water quality data for communication to the general public in an effective way. In general water quality indices incorporate data from multiple water quality parameters into mathematical equation that rates the health of water body with a single number. That number is placed on a relative scale to justify the water quality in categories ranging from very bad to excellent. This number can be easily interpreted and understood by political decision makers, non-technical water manager and the general public.

The water quality index (WQI) has been considered as one criteria for drinking water classification based on the use of standard parameters for water characterization. A commonly used WQI was developed by the National Sanitation Foundation (NSF) in 1970 (Brown et. al.

1970). The WQI is one of the most widely used of all existing water quality procedures. WQI was the intent of providing data (Liou et al., 2003). The index ranges from 0 to 100, where 100 represent an excellent water quality condition.

The present investigation is going to centralize on the Tons River around Chakghat, Rewa district in Madhya Pradesh aims to weigh up the suitability of water for various human activities and for the protection of aquatic life based on NSF-WQI.

MATERIALS AND METHODS

Study Area- The present study is going to centralize on the Tons River around Chakghat, Rewa district in Madhya Pradesh. Chakghat is a town and a Nagar Panchayat in Rewa district located on Coordinates: 25°1'29'' N 81°44'15'' E. The water from this river is mainly used for the Cattle bathing, washing clothes, irrigation and other domestic purpose. **Sampling and Analysis-** Composite surface water sampling methods was followed for the collection of samples between 9 to 11 am on first week of every month throughout the year (August 2012 to July 2013). Black plastic carboys of one liter capacity were used for collecting the samples. Temperature and pH were analyzed on the spot and winkelerization was done in separate 300 ml bottles for the estimation of Biochemical Oxygen Demand (BOD). For transportation of samples to laboratory dark coloured ice box was used in order to avoid the exposure of samples to sunlight variations in temperature. Samples were analysed for physic-chemical variables following methods APHA, 1998).

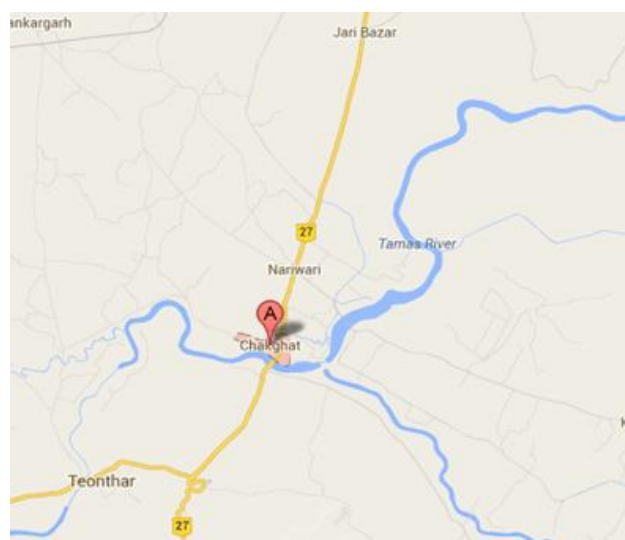


Figure 1. Study Site Tons River around the Chakghat

RESULT AND DISCUSSION

There are several reports on standing water body water quality assessment using physico-chemical parameters (Hosmani et. al., 1980 Ravikumar et. al., 2011, Giriappanavar et. al. 2013). The water quality index (WQI) integrates complex analytical raw data and generates a single number that expresses subjectively the water quality. Such a rating scale allows for simplicity and consumer comprehensibility. The water quality index approach has many variant in the literature, and comparative evaluations have been under taken (Dunnette 1979, Miller et. al., 1986). A water quality index can be of different types depending on its final intended purpose. It can highly specific for different water bodies or could be a general one for all types of waters meant for human consumption. A WQI can also be used not just on readings at a single point of time but also on data collected over a period of time. The water quality index was calculated using NSF information software (Ramakrishnaiah 2009) and compared with standard water quality rating (table no.1).

Table No. 1: Water Quality Index Rating of the standing water

WATER QUALITY INDEX (WQI)	RATING
90-100	Excellent(E)
70-90	Good (G)
50-70	Medium
25-50	Bad (B)
0-25	Very Bad (VB)

The index values ranged from a minimum of 55.25 during the month of July and reached a maximum of 66.75 during November. The water quality of Tons river is rated medium during the all the month of study (table no.2). The conditions in it often stray from the normal levels. It is evident from the results that water quality in the river under study is degraded considerably due to contamination of water by sewage from the villages, Nagar Panchayat Chakghat and diverse anthropogenic activities. Zaheeruddin and Khurshid (1998), Manish and Pawan (1998) have attributed industrial growth, urbanization and agricultural activities as the major source of water contamination. However in the present study, it is observed that the stress on the river under study is largely due to entry of domestic sewage.

Table No. 2 : Monthly variations of Physico-chemical parameters and WQI of the Tons River around the Chakghat (August 2012 to July 2013)

Parameters	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.
pH	7.4	8.4	7.8	7.5	8.3	8.5	8.2	7.9	7.4	7.8	7.9	8.0
Temp.(0°C)	26.5	26.8	25.2	24.5	21.5	20.8	22.4	23.4	26.0	29.5	32.0	29.8
Turbidity(NTU)	16.8	12.0	8.3	9.6	3.5	4.5	6.2	5.0	6.5	4.0	12.2	15.5
B.O.D(mg/l)	4.1	3.7	6.4	6.2	5.5	7.2	4.1	4.2	2.8	4.2	5.5	5.4
D.O.(mg/l)	4.9	4.1	6.3	3.4	6.2	6.0	7.7	4.12	4.2	2.8	2.5	2.6
Phosphate(mg/l)	2.54	0.25	0.19	0.40	0.57	0.16	0.18	0.20	0.24	0.22	0.17	2.13
Nitrate(mg/l)	0.52	0.45	0.25	0.21	0.18	0.28	0.15	0.14	0.19	0.14	0.11	0.12
WQI	55.5	60.12	59.65	66.75	59.20	59.4	58.55	59.70	62.80	64.25	61.56	55.25
Rating	M	M	M	M	M	M	M	M	M	M	M	M

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