

Assessment of the waste water quality parameter of the Chitrakoot Dham, Karwi

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ABSTRACT

Chitrakoot is a major holy place of Bundelkhand, situated at 24.48° to 25.12° North Latitude and 80.58° to 81.34° East Longitude. It is about 62 km from East to West and 57.5 km from North to South. There are more than thousand temples in the study area, which are located mainly in Kamadgiri parikrama and along the bank of river Mandakini. A number of pilgrims visit the place throughout the year. Obviously a considerable amount of waste generated from the religious activities is being discharged anywhere consequently in creation of severe solid waste problem.

Assessment of the waste water quality parameter of the Chitrakoot Dham Karwi for the parameters- pH, Temperature, Nitrate, COD, TDS, TS, TSS, Nitrite, Chloride were analyzed using standard methods prescribed as in the APHA, AWWA (2005). The result indicates that the water is unsuitable for Human body, Animals and Agriculture.

Keywords - pH, COD (Chemical Oxygen Demand), NaCl (Sodium Chloride), TDS (Total Dissolved Solid), TS (Total Solid), TSS (Total Suspended Solid).

I. INTRODUCTION

Chitrakoot is a major holy place of Bundelkhand, situated at 24.48° to 25.12° North Latitude and 80.58° to 81.34° East Longitude. It is about 62 km from East to West and 57.5 km from North to South. Chitrakoot is an ancient city, because it is situated at bank of River Mandakani.

The main problem in the city Chitrakoot is that the waste is being dumped anywhere and everywhere. Due to such type of dumping especially along the bank of river Mandakini the degradation poses serious problem to the river water quality. Also improper collection, transportation and disposal of waste lead to negative impact on the health, sanitation, environment and life style of the city. Chitrakoot is selected for the study because of the following reasons.

There are more than thousand temples in the study area, which are located mainly in Kamadgiri parikrama and along the bank of river Mandakini. A number of pilgrims visit the place throughout the year. Obviously a considerable amount of waste generated from the religious activities is being discharged anywhere consequently in creation of severe solid waste problem. High pilgrims density proliferation of slums and mushrooming of Dharamsala in the Chitrakoot. Dumping of waste in drains and Nalas are open to holy river Mandakini and degrades its water quality.

Chloride is an indicator of pollution when present in higher concentrations. Sodium chloride used as a dehydrating and antiseptic agent is the source of chloride. The present of very high amount

of chloride is responsible for high hardness and further it increase the degree of eutrophication[1]. Water quality, which is influenced by various natural processes and anthropogenic activities, is worldwide current environmental issue in research. The suspended and precipitated (non-floating) substances and organic substances in waters are capable of adhering pollutant particles. The sediments, both suspended and precipitated substances stored on the water bottom, form a reservoir for many pollutants and trace substances of low solubility and low degree of degradability. Human and ecological use of in-stream water requires to be considered for both the quantity.

II. MATERIAL AND METHOD

A study was undertaken from March 2015 to April 2015. Waste water sample were collected from seven sampling stations. All the chemicals used for this work were of analytical grades. Double distilled water was used through out the work. All glass wares used were soaked in 10% HNO₃ over night and then washed with detergent, thoroughly rinsed with tap water and then with double distilled water. All the sample were analyzed for the following physico-chemical parameters temperature, pH, nitrate, COD, chloride, nitrite, TDS, TS and TSS.

The physico-chemical analysis of water samples were carried out the accordance to standard analytical methods APHA AWWA, et.al 2005[2]. The locations of sampling stations are shown in Table-1.

Table-1 Name and description of sampling stations.

Samp ling code	Name of sample stations	Description of sampling Location
Ww1	S.D.M Colony	Near Patel Tiraha
Ww2	Bus stand	Near Swaraj Agency
Ww3	Bariar chauraha	Near gas Agency
Ww4	Bedipulia	Near Vidya Mandir Inter Collage
Ww5	J.R Handicapped University	Near Mandakini Restourant
Ww6	Sitapur	Near UP Tourist Banglo
Ww7	Ramghat	Near Matganjannath Mandir

Ww= waste water

III. RESULT AND DISCUSSION

All the results of analysis of the seven sampling stations are presented in table 2 the interpretation of data given one by one systematically.

Temperature: The temperature of waste water is higher than that of the water supply due to addition of warm water from the house hold and other human activity. The maximum temperature (34°C) was recorded at sampling stations (Ww1) S.D.M Colony. While minimum temperature (29°C) was recorded at sampling stations (Ww6) Sitapur.

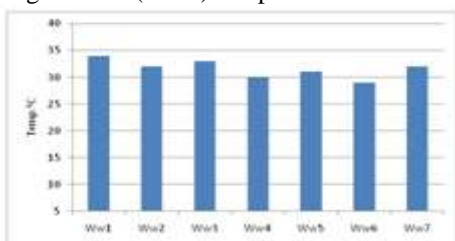


Fig.-1. Temperature at various sampling stations.

pH: The pH concentration in waste water varied between 6.40 to 8.40. The maximum pH 8.40 was recorded at sampling stations (Ww4) Bedipulia, while minimum pH 6.40 was observed at sampling stations (Ww3) Bariar chauraha. The concentration of pH at sampling stations (Ww5) J.R Handicapped university, under the permissible limit prescribed by WHO.

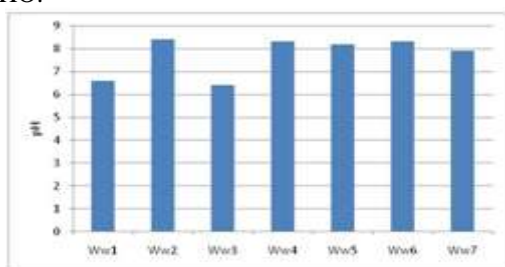


Fig. - 2. pH at various sampling stations.

Nitrate: Concentration of nitrate ion varied from 2.6 to 33.0 mg/l. The highest value nitrate 33.0 was recorded at the sampling stations (Ww3) Bariar Chauraha. While the lowest value nitrate 2.6 was recorded at the sampling (Ww6) Sitapur. All the sampling stations nitrate concentrations were observe below the permissible limit prescribed by WHO as 45mg/l.

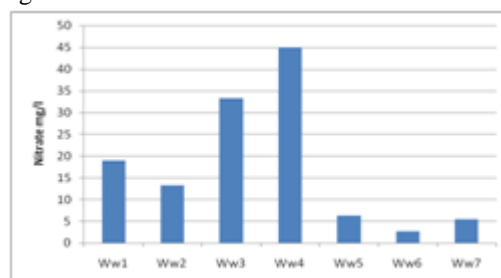


Fig.-3. Nitrate at various sampling stations.

Chemical Oxygen Demand: COD of the waste water was ranged 15.2 mg/l to 101 mg/l. The lowest value 15.2mg/l was recorded by at the sampling stations (Ww7) Ramghat. While highest value 101mg/l was absorbed at sampling stations (Ww3) Bariar chauraha. All sample as- Ww1 (58.6) S.D.M Colony, Ww2 (70.6) Bus stand, Ww3(101) Bariar chauraha, Ww4(47) Bedipulia, Ww5 (43) J.R Handicapped University, Ww6 (18.7) Sitapur, Ww7 (15.2) Ramghat are recorded the COD value more than the permissible limit of 10 mg/l prescribed by WHO. Biodegradable organic are principally composed of proteins carbohydrates and fat and are commonly measured in terms of COD. If discharged untreated to the environment, their biological stabilisation to can lead to depleted oxygen level and the development of septic, condition. It the COD exceeds the required limits. Intervention is required to rectify the situation (e.g. optimise, operation at the treatment plant).

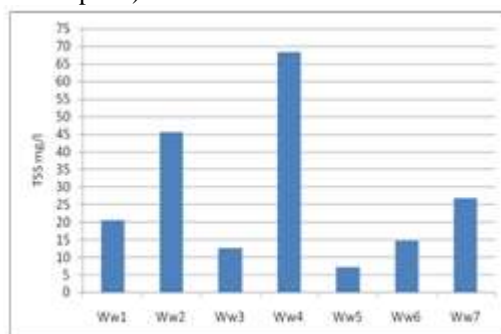


Fig.-4. COD at various sampling stations.

Total Dissolved Solid: Total dissolved solids varied from 168 to 486 mg/l. TDS value of all the stations are within the range of permissible limit. Chemical

analysis of the Raw municipal waste water recorded the TDS concentration 224mg/l[3].

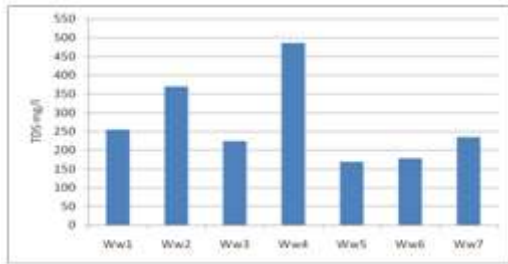


Fig.-5. TDS at various sampling stations.

Total Solid: Total suspended solids are ranged 175.1 to 554.3mg/l. The minimum value 175.1 was recorded at the sampling stations (Ww5) J.R. Handicapped University. While the highest value 554 was observed at the sampling stations (Ww4) Bedipulia. The observed that the values of total solids varied from 297 to 346mg/l during summer period in river Paiswani at chitrakoot[4].

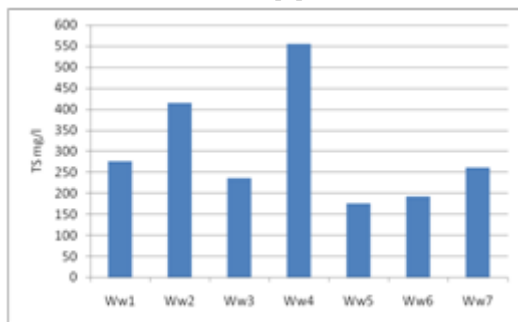


Fig.-6. TS at various sampling stations.

Total Suspended Solid: Total suspended solid was ranged 7.1 to 68.3 mg/l. TSS value are found in all the sampling stations were below the permissible limit prescribed by WHO. Study on the phytoremediation potential of pharmaceutical waste water spiked with nutrient through municipal waste water-a case study in indian context recorded the TSS concentration 213mg/l[5-8].

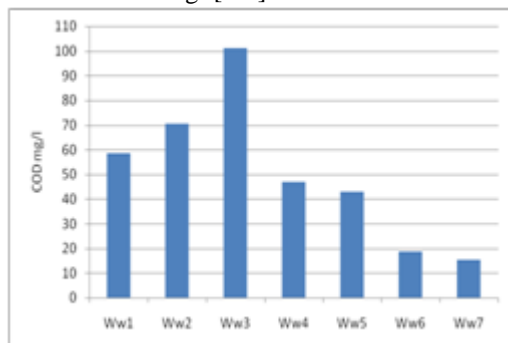


Fig.-7. TSS at various sampling stations.

Nitrite: Nitrite ion in waste water varied from 3.9 to 24.6mg/l. Value of Nitrite at sampling stations Ww1 (18.4) S.D.M Colony, Ww2 (23.4) Bus stand, Ww3 (24.6) Bariar Chauraha, Ww4 (16.4) Bedipulia, are higher than the permissible limit prescribed by WHO.

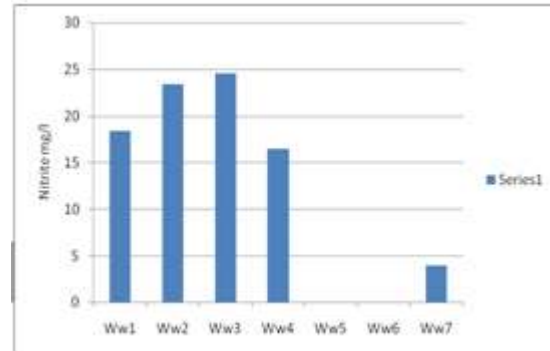


Fig.-8. Nitrite at various sampling stations.

Chloride: The Chloride ranged was 31 to 123 mg/l. All the samples are within the permissible limit as prescribed by WHO standards[9].

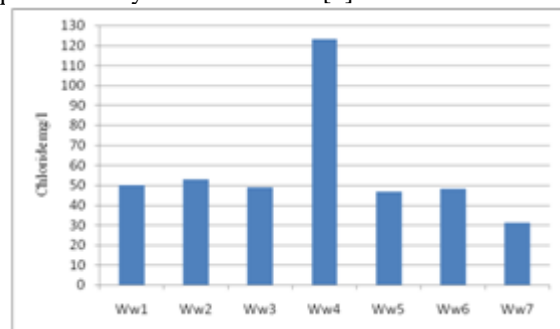


Fig.-9. Chloride at various sampling stations.

IV. CONCLUSION

On the basis of the assessment of the waste water quality parameter of the Chitrakoot Dham Karwi the parameters like- temperature, pH, nitrate, chemical oxygen demand, total dissolved solid, total solids, total suspended solid, nitrite, chloride were analysed. The maximum temperature (34°) was recorded at the sampling stations Ww1 S.D.M Colony and the maximum pH (8.40) values were recorded at the sampling stations Ww4 Bedipulia. Chemical oxygen demand values of the all sampling stations recorded was higher than the permissible limit prescribed by WHO (1994) as 10mg/l. Nitrite value 65% samples of nitrite concentration are higher than the permissible limit. Nitrate, chloride, total dissolved solid, total solids, total suspended solid are observed below the permissible limit prescribed by WHO and BIS[10-12].

Table -2: Assessment of waste water quality parameter of Karwi Chitrakoot Dham.

Sampling code	Tem °C	pH	Nitrate mg/l	COD mg/l	TDS mg/l	TS mg/l	TSS mg/l	Nitrite mg/l	Chloride mg/l
Ww1	34°C	6.6	19.0	58.6	255	275.5	20.5	18.4	50
Ww2	32°C	8.4	13.2	70.6	369	414.2	45.5	23.4	53
Ww3	33°C	6.4	33.3	101	223	235.5	12.5	24.6	49
Ww4	30°C	8.3	45	47	486	554.3	68.3	16.5	123
Ww5	31°C	8.2	6.3	43	168	175.1	7.1	ND	46.7
Ww6	29°C	8.3	2.6	18.7	178	192.6	14.6	ND	48
Ww7	32°C	7.9	5.4	15.2	234	260.8	26.8	3.9	31

ND = Not Detectable

Table -3: WHO guideline for water quality, 2005

Parameter	Standard value
Temperature	25-35°C
pH	6.5-9.5
Nitrate	50mg/l
Chemical Oxygen Demand	10 mg/l
Total Dissolved Solid	600-1000 mg/l
Total Solid	250 mg/l
Total Suspended Solid	50 mg/l
Nitrite	50mg/l
Chloride	250 mg/l

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