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Physico-chemical Characteristics of Surface Water samples Collected from River Mandakini at Chitrakoot Region.

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Abstract: In the present study analyzed Physico-chemical properties of River Mandakini from the selected sampling stations. The water samples were analyzed some parameter as temperature, pH, alkalinity, DO, BOD, COD, TDS, TH, nitrate and sulphate. Temperature, pH, DO, TDS, nitrate and sulphate of all the samples were within the permissible limit set by WHO while COD of six samples was found higher than the permissible limit.

Key words: Physico-chemical Characteristics, Surface water, Mandakini River, Chitrakoot Region Satna District.

Introduction:

The river Mandakini from the hills of Khillora near Pindra village, Majhagawan block, district Satna of Madhya Pradesh at latitude 24^0 52'N and longitude 80^0 41' E the river flows generally in a south to north direction in the first and last reaches a west to east trend is also significant. The river flows in Madhya Pradesh for about 25 km, then makes a border of district Satna (Madhya Pradesh) and district Chitrakoot (Uttar Pradesh) for the next 25 km and again enters in Madhya Pradesh just downstream of Sati anusuiya. After flowing through about 15 km more in M.P. it crosses into Uttar Pradesh near Ramghat in Chitrakoot area and later flows only in Uttar Pradesh finally it joins River Yamuna near Rajapur[1].

River in India regarded as sacred from times immemorial. A dip in a holy river is believed to wash all sins being obsessed by such faith people take bath in these rivers, especially on auspicious occasions, such as Deepawali, Somwati amawashya, Sanichari amawashya, Purnima etc. This obviously causes significant impact on quality of this tiny river. The present study was undertaken to investigate water quality changes arising from mass bath in with particular reference to fecal coliform contamination during Amawashya[2].

Surface waters are most vulnerable to pollution due their easy accessibility for disposal of waste waters. River plays a major role in assimilation or carrying of the municipal and industrial wastewater and run-off from agricultural land. Pollution status of the river is generally analyzed by means of physico-chemical; bacterial plank tonic and benthic fauna studies. River water is used as potable water by municipal supplies' to the public but high–class people use independent distilled or sterile water reservoirs. It is one of the resources for all kind of life. Comparing over seventy one of the earth surface water is unquestionable the most precious natural resource that exists on our planet[3].

River play an important role not only in balancing the hydrological cycle but also not for augmenting water supply for drinking, municipal industrial and agricultural use power generation, water way transport and other purpose. Rivers are highly complex systems influenced by several variables associated with the quality of water[4].

Water quality deals with the physical chemical and biological characteristics in relation to all other hydrological properties. Any characteristics of water that effects the survival, reproduction growth and production of aquaculture species, influences management decisions, causes and safety can be considered a water quality variable. Other factors being the same, aquaculture species will be healthier and production will be more environmental impacts will be less and quality better in culture systems with good water quality than in those with poor water quality (Chatawal, 1998)[5].

River water is used for domestic, industrial and agriculture purpose and the water demand has been increasing many folds and supply decreasing due to low rain fall and failure of monsoon waste drain enter the river polluting them beyond their carrying capacity. As a result, many water borne diseases such as typhoid, hepatitis ,jaundice, cholera, diarrhea dysentery have become wide spread any they account for 2/3 of illness in India (Munawar, 1970)[6].

The present study was conducted to study the physico-chemical parameters of the river Mandakini ten sampling station were selected that are (CS1) (Near Railway line Karwi), CS2(Near Mandi Chauraha Karwi), CS3 (Near Handicapped University),CS4(Sitapur Near Bude hanuman ji), CS5 (Near Uttara bazar Ramghat), CS6 (Satna Bus Stand Chitrakoot), CS7 (Near Mandir Jankikund), CS8 (Arogyadham Near DRI), CS9 (Beside Near M.G.C.G.V) and CS10 (Near Sati Anusuiya Asharam) the sampling station.

Material and Methods:

On the of stretch of ten sampling station were selected that are Near Railway line Karwi, Near Mandi Chauraha, Near Handicapped University, Sitapur Near Bude Hanuman Ji, Satna Bus Stand Chitrakoot, Near Mandir Jankikund, Arogyadham Near DRI, Beside Near M.G.C.G.V, Near Sati Anusuiya Asharm station, The water quality was studied for only four month (from march 2015 to June 2015). Sampling was done in accordance with Grab sampling method in polyethylene bottles of one litter

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capacity to avoided leaching of metals and interaction with the surface wall of the container, bottles were, first cleaned with detergent and then socked in 1:1 HNO for 24hour. Finally the bottles were cleaned and rinsed with distill water. During sampling bottles were rinsed two to three times with the sample to be examined before filling with it. Samples were collected by immersing the rinsed bottles in river water. All the samples were labeled showing the source date and time of collection. The samples were refrigerated at 4 ^{0}C in the laboratory[7]. Locations of sampling stations were given in the **table-1.**

Table-1: Name and code of sampling station.

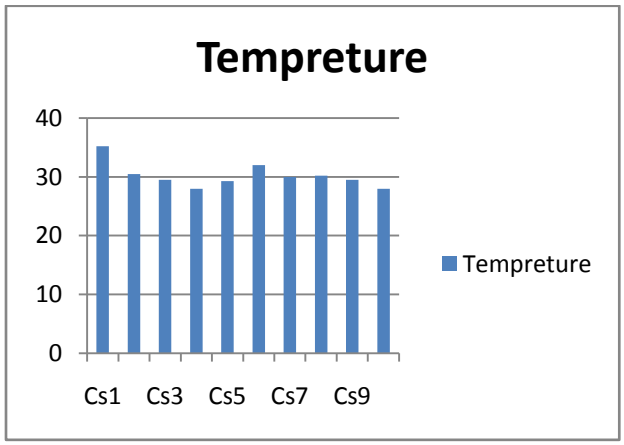
S.N.	Sampling code	Sampling station
1	CS_1	Near Railway Line Karwi.
2	CS_2	Near Mandi Chauraha Karwi.
3	CS_3	Near Handicapped University.
4	CS_4	Sitapur, Near Bude Hanuman ji.
5	CS_5	Near Uttara Bazar Ramghat.
6	CS_6	Satna Bus Stand Chitrakoot.
7	CS_7	Near Mandir Jankikund.
8	CS_8	Arogyadham Near DRI.
9	CS_9	Beside Near M.G.C.G.V.
10	CS_{10}	Near Sati Anusuiya Asharam.

Result and Discussion:

Physico-chemical characteristics of surface water samples. The water samples were analyzed some parameter as temperature, pH, Alkalinity, DO, BOD, COD, TDS, TH, Nitrate, Sulphate. Analyzed all the results are given in table-2 and drinking water standard values are given in Table-3 The present research works identify physico-chemical characteristics of water of River Mandakini in Chitrakoot are given below.

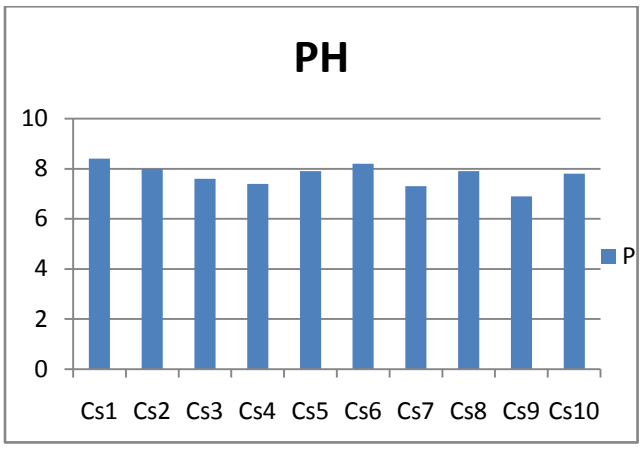
Temperature

The River Mandakini water was found to be maximum 35.2^{0}C at sampling station CS_1 (Near Railway line Karwi) and the minimum water temperature 28^{0}C was recorded at sampling stationCS_{10} (Near Sati Anusuiya Asharm).



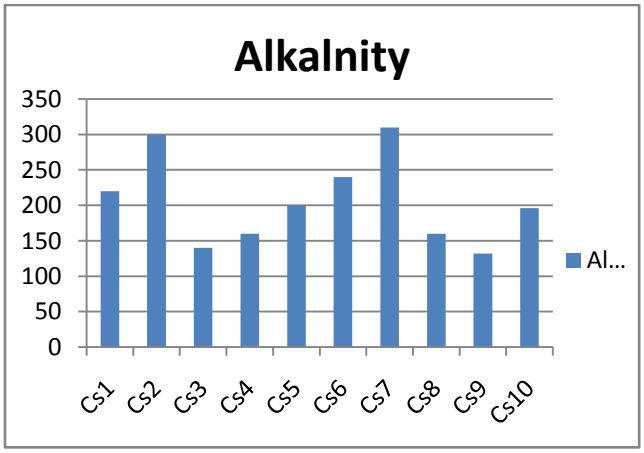
pH

The values of pH were recorded ranges between 6.9 to 8.4 maximum pH value 8.4 was observed at sampling location CS_1 (Near Railway line Karwi) while minimum pH value 6.9 was recorded at sampling station CS_9 (Beside near M.G.C.G.V.)



Alkalinity

Alkalinity of the sample were recorded between 96-310mg/l higher alkalinity value found 310mg/l at CS_7(Near Handicapped University) and low alkalinity value 96mg/l CS_{10} (Near Sati Anusuiya Asharm).Value of Alkalinity at sampling station CS_1, Near Railway line Karwi (220) CS_2, Near Mandi Chauraha karwi (300) CS_6, Satna Bus Stand Chitrakoot (240) and CS_7, Near Mandir Jankikund (310) higher than the permissible limit prescribed by WHO 200 mg/l.



DO

In river Mandakini dissolved oxygen (DO) ranged 1.2 mg/l to 3.8mg/l the minimum value DO was found 1.2mg/l CS_6 (Satna Bus Stand Chitrakoot) and maximum 3.8 CS_3 (Near Handicapped University). Singh et al[8] 2012 studied assesment of physico-chemical status of ground water samples of Dholpur District, Rajasthan reported the DO value varied from 3.2 to 6.8mg/l.

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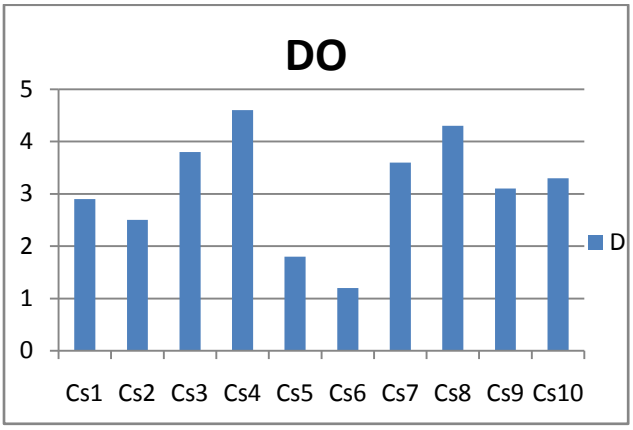
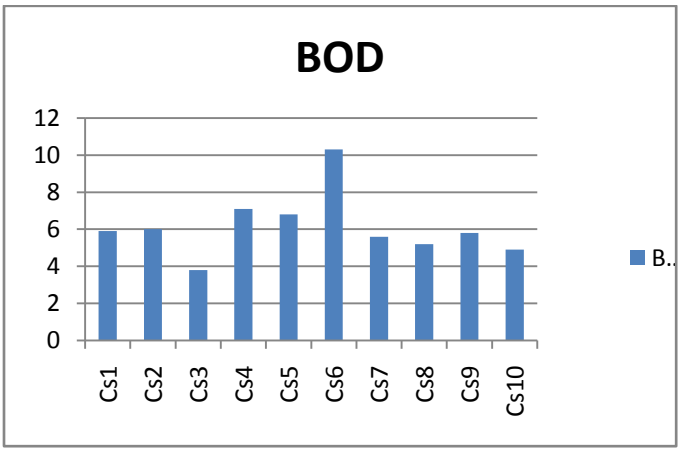


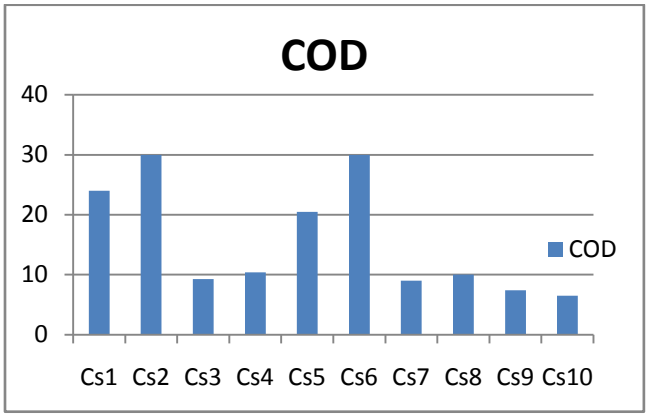
BOD

BOD varied from 3.8-10.3mg/l. The lowest value 3.8 mg/l was observed at sampling station CS_3 (Near handicapped university) while highest value 10.3mg/l was observed at sampling station CS_6 (Satna Bus Stand Chitrakoot) BOD value of all the sample ware below the permissible limit except two station is CS4, Sitapur Near Bude Hanuman Ji (7.1) and CS_6, Satna Bus Stand Chitrakoot (10.3mg/l). Sharma et al[9] 2013studied the monitoring of water quality of yamuna river at Mathura, U.P., bio-chemical oxygen demand was found ranged between 6.8 to 24.5.



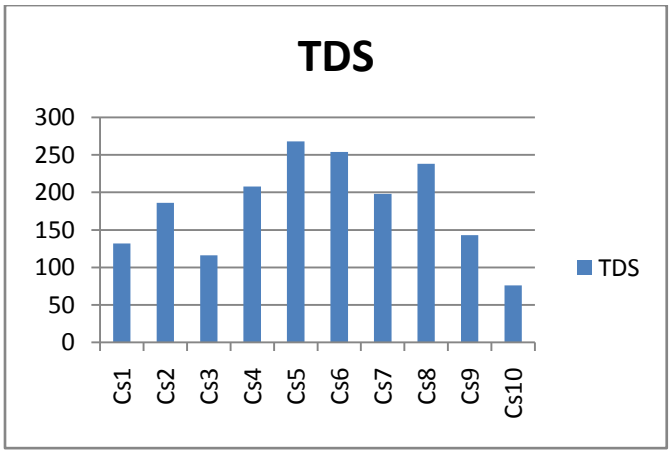
COD

The COD values ranged between 6.5-30.5mg/l as show in table-2. The highest COD was form at sampling station CS5, Stana Bus Stand Chitrakoot (30.5 mg/l).Value of COD at sampling station CS_1, Near Railway line karwi (24mg/l), CS_2, Near mandi chauraha karwi (30mg/l), CS_4 Sitapur, Near Bude Hanuman Ji (10.4mg/l), CS_5 Near Uttara Bazar Ramghat (20.5mg/l), CS_6 Satna Bus Stand Chitrakoot (30.0mg/l) and CS_8 Arogyadham Near DRI (10.0mg/l) are more than the recommended limits as per WHO standard. Singh et al[10] 2013 studied the Physico-chemical analysis of Yamuna River Water, reported the chemical oxygen demand varied between 13.8 to 54.8.



Total Dissolve solid

The Dissolved solid of river water was ranged from 76-268mg/l the maximum value of TDS was observed 268mg/l at CS_5 (Near Utara Bazar, Ramghat). TDS of all the samples are below permissible limit prescribed by WHO as 300mg/l. Sharma et al[11] 2014 studied A Physico-chemical analysis and management of ground water bodies from 20 location of Jodhpur District, TDS was found ranged between 960 ppm to 3650 ppm.



TH

The Total Hardness was found ranged from 180 to 720mg/l. TH of all the samples were below the permissible limit except only two station CS_3 (Near Handicapped University) and CS_8 (Arogyadham Near DRI) and value were recorded 720mg/l are 665mg/l respectively. Kumar et al[12] 2013 studied contamination of ground water due to solid waste disposal and toxtile effulents in and around Erode city, Tamil Nadu and found nitrate concentration range from 0.01 to 123 mg/l.

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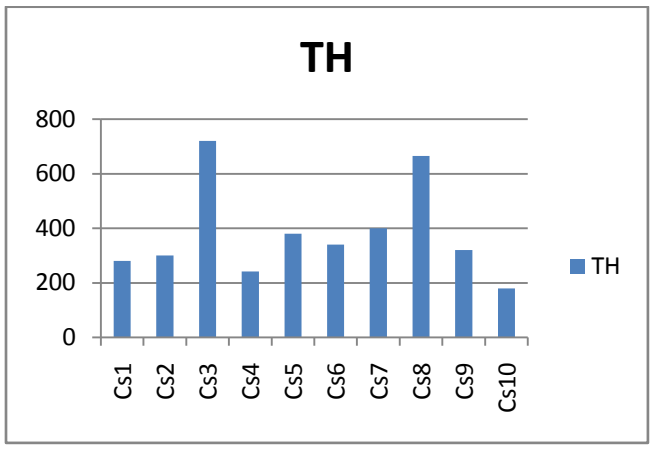
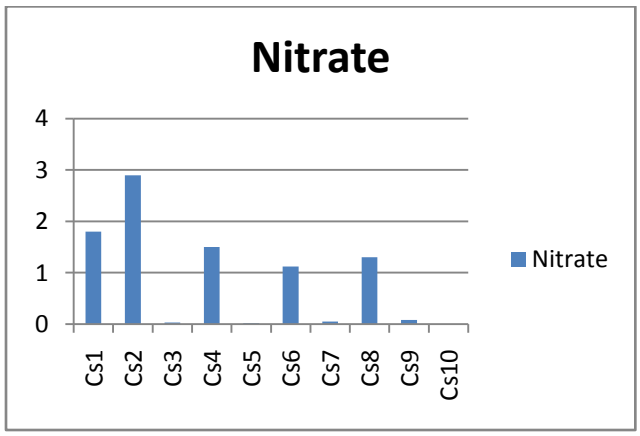


Nitrate

Concentration of nitrate varied 0.02 to 2.9mg/l. All two nitrate value is below the permissible limit prescribed by WHO[13] as 45mg/l.



Sulphate

The value of sulphate was recorded in the range of 1.8 to 7.8mg/l. The highest value was recorded 7.8 mg/l at sampling station CS_6 (Satna Bus Stand Chitrakoot).

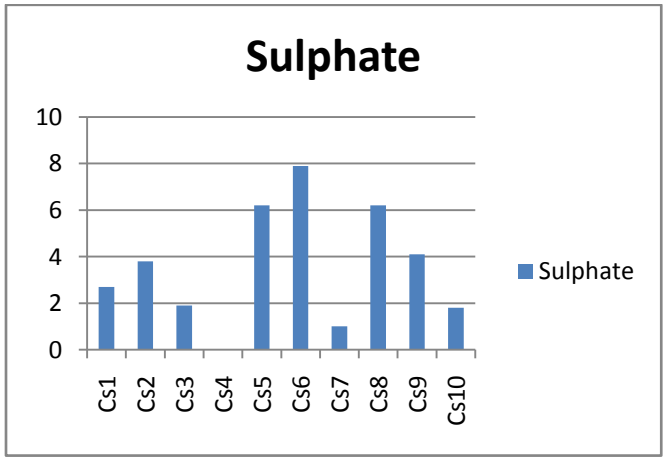


Table-2: Physico-chemical characteristics of water of River Mandkini in Chitrakoot.

SN	Parameter	Cs1	Cs2	Cs3	Cs4	Cs5	Cs6	Cs7	Cs8	Cs9	Cs10
1.	Temperature	35.2	30.5	29.5	28.0	29.3	32.0	30.0	30.2	29.5	28.0
2.	PH	8.4	8.0	7.6	7.4	7.9	8.2	7.3	7.9	6.9	7.8
3.	Alkalinity	220	300	140	160	200	240	310	160	132	196
4.	DO	2.9	2.5	3.8	4.6	1.8	1.2	3.6	4.3	3.1	3.3
5.	BOD	5.9	6	3.8	7.1	6.8	10.3	5.6	5.2	5.8	4.9
6.	COD	24	30	9.3	10.4	20.5	30.0	9.0	10.0	7.4	6.5
7.	TDS	132	186	116	208	268	254	198	238	143	76
8.	TH	280	300	720	242	380	340	400	665	320	180
9.	Nitrate	1.8	2.9	0.03	1.5	0.02	1.12	0.05	1.3	0.08	ND
10	Sulphate	2.7	3.8	1.9	ND	6.2	7.9	1.0	6.2	4.1	1.8

Table -3: WHO guideline for drinking water quality-

Parameter	WHO standard values
PH	8.5
Alkalinity	200 mg/l
DO	4 mg/l
BOD	5mg/l
COD	10 mg/l
TDS	300 mg/l
TH	600 mg/l
Nitrate	10 mg/l
Sulphate	250mg/l

Conclusion:

In the present study analyzed Physico-chemical properties of River Mandakini from the selected sampling stations. Samples were collected determined the following parameters, temperature, pH, Alkalinity, DO, BOD, COD, TDS, Nitrate and Sulphate. Temperature, pH, DO, TDS, Nitrate and Sulphate of all the samples were within the permissible limit set by WHO. Value of alkalinity at sampling station CS_1, Near Railway line Karwi (220) CS_2, Near Mandi Chauraha Karwi (300) CS_6, Satna Bus Stand Chitrkoot (240) CS_7, Near Mandir Jankikund (310) are higher than the permissible limit. BOD was found all the sampling station are within the limit but only two station BOD was found higher than the limit. Total hardness of all the samples were below the permissible limit except two station CS_3, Near Handicapped University (720) and CS_8, Arogyadham Near D.R.I. COD of six samples was found higher than the permissible limit and their main sources are combined of anthropogenic sources. Proper monitoring is needed to avoid anthropogenic contamination.

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