Study Physico-Chemical Parameters of Water in Sai River Raebareli (Shaheed Smarak), Uttar Pradesh

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Abstract

In the city of Raebareli, public totally dependent on Sai river for their livelihood and used for irrigation so, regular study of quality of water of sai river is very important to get information regarding the water is useable for irrigation or domestic purpose.

The purpose of this study is to examine the water quality status of the Sai River near Saheed Smarak in Raebareli. A total of 2 water samples were taken from the Sai River at different locations near Saheed Smarak Bridge, 8 physicochemical parameters Total Hardness, Conductivity, TDS, COD, Cl, DO, Ca and Mg were analyzed, these parameter values were compared with the standard values, and a quality assessment was also calculated, the results were Water quality at various points. For this purpose, the water parameters of the Sai River near Saheed Smarak were calculated. And also the objective of this study is to assess the water quality of the Sai River in the city of Raebareli to generate baseline data for future studies and to assist policymakers in developing strategies for alternative water sources.

KEYWORDS: Drinking Water, Physicochemical parameter, Water quality analysis

1. Introduction

Most ancient civilizations grew up on the banks of rivers. Even today, millions of people around the world live on the banks of rivers and depend on them for their survival. The Sai River is an important river in Uttar Pradesh, originating from a pond in the village of Bijgwan near Pihani in Hardoi District and flowing for about 600 km to form the district boundary between Lucknow and Unao. After passing through Hardoi, Raebareli

and Jaunpur districts, eventually he joins the Gomati river at Jaunpur district Rajepur [1]. In this focus area, the Sai Raebareli River is near his Saheed Smarak, between a railway bridge and a road bridge.

Water pollution has become a major problem due to rapid urbanization and industrialization. Massive urban growth due to population growth and migration from rural to urban areas has increased domestic outflow. A rapidly growing population, indiscriminate urbanization and rapid industrialization along rivers are putting tremendous pressure on water resources and their quality [1-4], [12-14]. In this study, near Shaheed smarak we determined the physicochemical parameters of the Sai River Raebareli at two different sampling points between two bridges. The purpose of this study is to estimate the current water quality of the Sai River by analyzing several selected water quality parameters and compare the results with WHO and BIS standards.

Water is an essential component for the survival of life on earth, containing minerals important for humans as well as plants and aquatic organisms. Availability of quality and quantity of water is essential for human survival. The water is mainly used for drinking, bathing, fishing and other domestic uses. More than 50% of water is wasted in households, agriculture and industry due to lack of awareness and citizenship and use of inefficient methods and technologies. Water scarcity is considered a limiting factor for the country's socio-economic development. The need for clean water is now considered one of the greatest environmental challenges of the planet. Today, worldwide, more than 1.2 billion people lack access to drinking water and about 3 billion lack access to adequate sanitation [6-8]. More than 200 diseases are caused by contaminated water, and many people die from diarrheal disease alone. Drinking water quality is a serious problem in many countries. In particular, the concern that freshwater will become a scarce resource in the future calls for a water quality monitoring program to protect freshwater resources [3-4].

In Shaheed smarak washers bring lot of clothes to the Sai river and wash clothes in the Sai River with the help of detergent here people also throw garbage in the river, due to which the water is becoming very polluted. Therefore, it is very important to maintain and check the quality of Sai River from time to time. Near Shaheed smarak Raebareli, there are schools, many houses and parks, and their garbage is dumped into the river Sai, where all Raebareli residents throw their garbage. Sai River's water is getting polluted gradually. The river used to be clean and full, but now it is dirty. The result shows different values at two different locations. All observations for each parameter are not good. The purpose of this study is to assess the water quality of the Sai River in the city of Raebareli based on monitored water quality parameters, to generate baseline data for future studies, and to assist policy makers in formulating strategies for alternative water sources.

Study Area

Two Water Samples were collected from two different sites of Sai River near Shaheed Smarak Raebareli. These two sites are between Sai River bridges.

Figure 1: Location from where water sample had been taken

2. Material and Methods

Two water samples were collected in 1 liter bottle. All the water quality parameters were analyzed as per the standard procedure given by APHA, BIS & WHO, ICMR [7-9],[15] The collected water samples from sites were subjected to physico-chemical analysis to determine, Total Hardness, Conductivity, TDS, COD, Cl, DO, Ca, Mg.

In the present study 8 key parameters were taken for the water quality analysis and their standard and observed values were compared.

Calculation of Water Quality Index

The calculation of WQI was made using weighed Arithmetic method in following steps,

a). Let there be water quality parameters and quality rating (qn) corresponding to nth term parameter is a number reflecting relative value of this parameter in the polluted water with respect to its standard permissible limits value qn values are given by the relationship .

$qn = 100 (Vn – Vi) / (Vs – Vi)$

Where Vs- standard value, Vi- ideal value, in most cases Vi = 0 except in certain parameters like pH, dissolved oxygen etc., calculation of quality rating for pH and DO (Vi was not zero).

$q PH = 100 (V pH – 7.0) / (8.5-7.0)$ and $q DO = 100 (V DO – 14.6) / (5.0-14.6)$ [1]-[3], [5]-[6], [11]-[15]

b). Calculation of Unit Weight

The unit weight (Wn) to various water quality parameters is inversely proportional to the recommended standards for the corresponding parameters.

Wn = k /Sn

Where Wn = unit weight for the nth parameter, Sn= standards permissible value for nth parameter,

 k= proportionality constant

The unit weight (Wn) values in the present study are taken study are taken.

WQI = Σ qn Wn / Σ Wn , Where n= i-n

The suitability of WQI values for human consumption is rated as follows

0-25 = Excellent, 26-50 = Good, 51-75 = Bad, 76-100 = Very bad and above it = Unfit [1]-[3], [5]-[6], [11]-[15]

Table 1: Physico-chemical analysis of water Samples of Sai River at two sampling locations.

Parameter.	Unit	Standard	Sample of site 1	Sample of site 2
Temperature	K	-	16`C	18`C
Total Hardness	(mg/l)	500(WHO)	183.2	198.6
Conductivity	(us/cm)	300(BIS)	737	748
TDS	(mg/l)	1000(WHO)	1273	1084
COD	(mg/l)	150(WHO)	27.68	29.28
Cl	(mg/l)	25(WHO)	69.89	72.33
DO	(mg/l)	6.0(BIS)	7.8	7.92
Ca	(mg/l)	200(BIS)	28	30
Mg	(mg/l)	100(BIS)	34	33

Table 2: Showing the procedure for Calculations of Parameters of river sai at site-1

Parameter	Standard. Value (Sn)	Observed Value(Vn)	Unit wt. (Wn)	Quality rating (Qn=Vn-Vi0/Sn-Vi0x100)
Conductivity (μs/cm)	300 (BIS)	737	$7.7664*10^{-4}$	245.667
TDS (mg/l)	1000(WHO)	1273	$2.32*10^{-4}$	127.33
Total Hardness (mg/l)	500 (BIS)	183.2	$4.65*10^{-4}$	36.64
COD (mg/l)	200(WHO)	27.68	$1.16*10^{-3}$	18.4533
DO (mg/l)	6.0 (BIS)	7.8	0.0388332	79.8697
Ca (mg/l)	200 (WHO)	28	$1.164*10^{-3}$	14
Mg (mg/l)	100(BIS)	34	$2.3299*10^{-3}$	34
Cl (mg/l)	250(WHO)	69.89	$9.31972*10^{-3}$	279.56

Table 3: showing the procedure for Calculations of Parameters of river sai at site-2

| Parameter	Standard. Value (Sn)	Observed Value(Vn)	Quality rating (Qn=Vn-Vi0/Sn-Vi0x100)
Conductivity (µs/cm)	300 (BIS)	748	249.33
TDS (mg/l)	1000(WHO)	1084	108.4
Total Hardness(mg/l)	500 (BIS)	198.6	39.77
COD (mg/l)	200(WHO)	29.28	19.52
DO (mg/l)	6.0 (BIS)	7.92	77.6744
Ca (mg/l)	200 (WHO)	30	15
Mg (mg/l)	100(BIS)	33	33
Cl (mg/l)	250(WHO)	72.33	289.32

3. Results

The Observed values assessed by the various physico-chemical parameters at two sampling sites and their results are shown below. Here we discuss the observed values of eight parameters,

Conductivity, TDS and DO, values for both sites sample are much higher than the Standard value and Ca, Mg, Cl, COD and Total Hardness are smaller than its Standard Value. Sai river water is not good for use as the two different site parameters quality rating suggested.
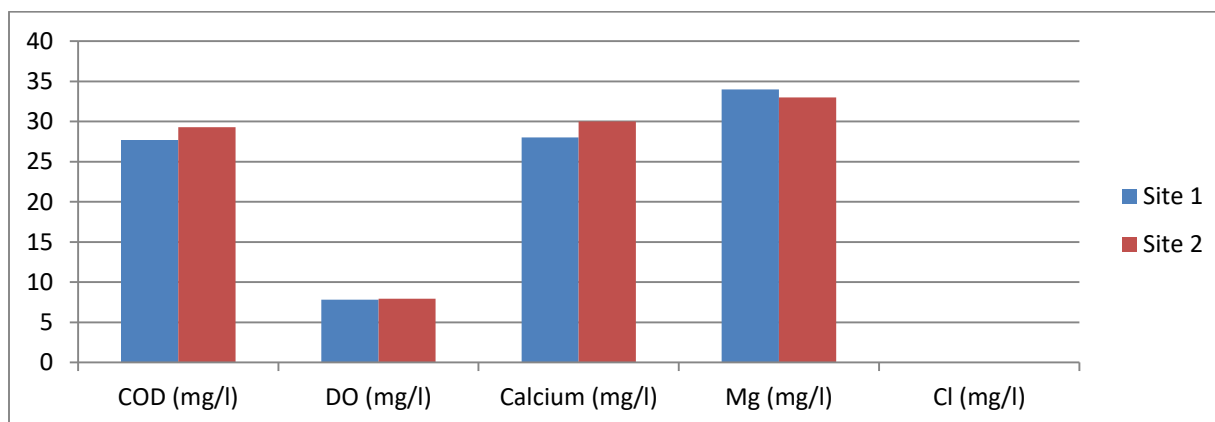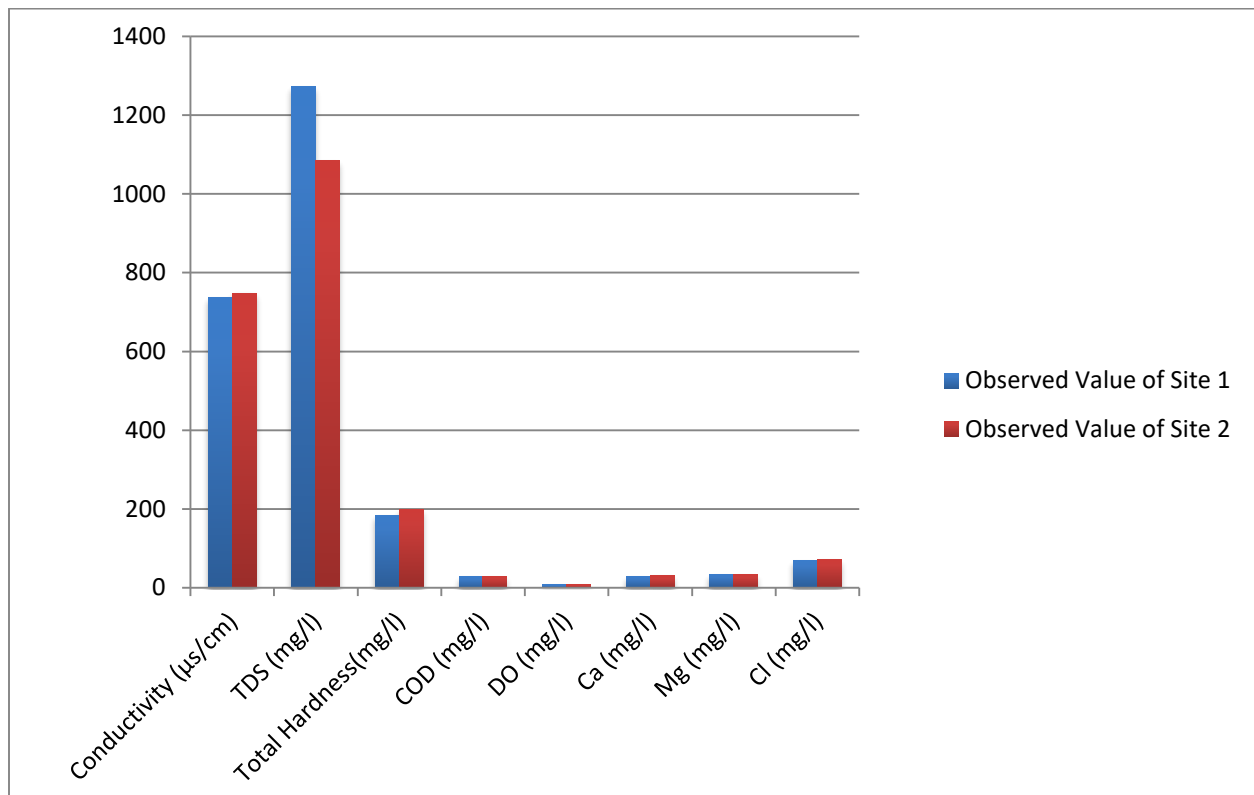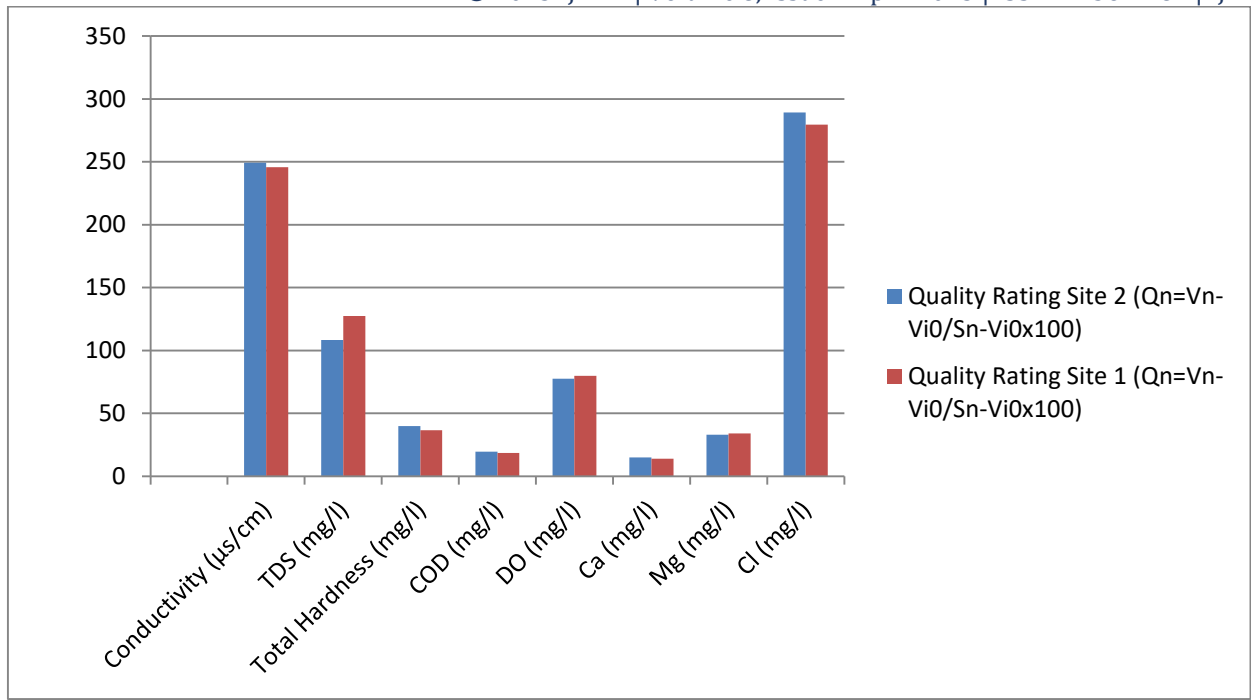
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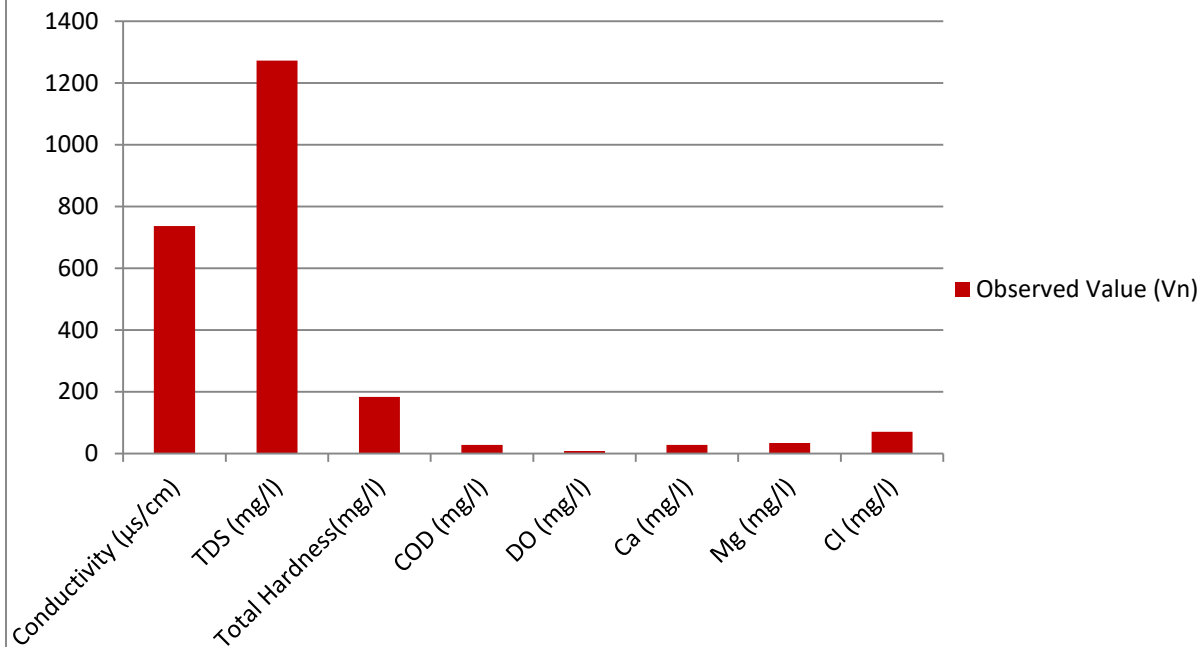
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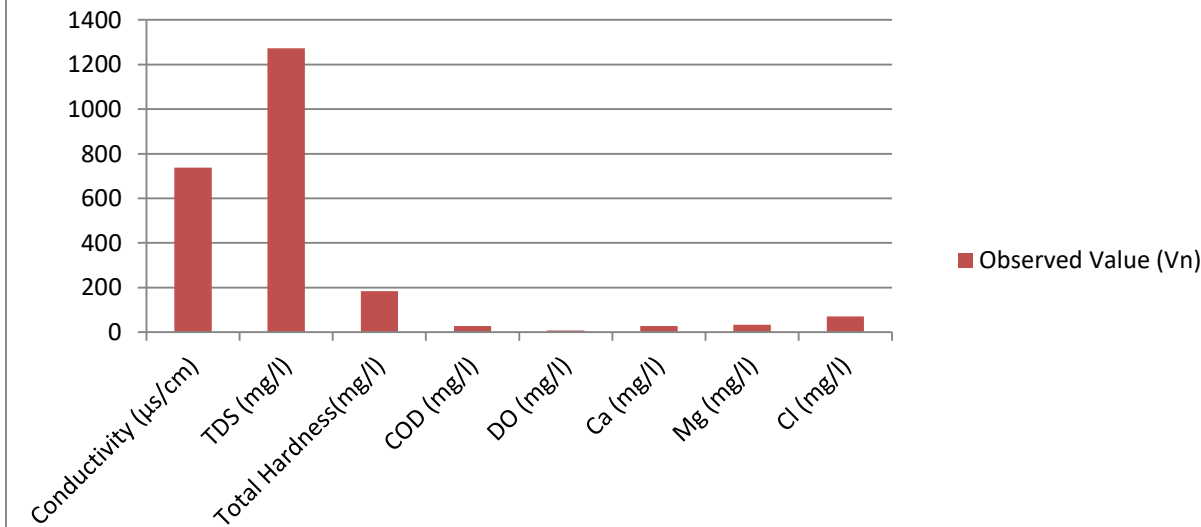
4. Conclusion

Sai River Raebareli is Base of agriculture and drinking for formers. These studies provide the information about water running in the Sai River is suitable for drinking or not. Regular monitoring quality of water and aware public about the quality of water, and tell people about good practices to clean river and make beneficial for everyone. In this study we provide information regarding the quality of water of Sai River through Standard

parameters, we take sample from two different locations and calculate quality rating of different parameters by following standard procedure of WHO, APHA, BIS, & ICMR. From this study I have taken out the quality rating and observed value of each parameter, so that we can easily tell what components are lacking in it for irrigation use.

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