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Analysis of Physico-Chemical Factors of Ramganga River Water in Bareilly District

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ABSTRACT

The systematic study was carried out to determine the physico-chemical parameters of water samples of Ramganga River in Bareilly district. The rivers are an essential water resource and used for several purposes. The water quality of all fresh water ecosystems is assessed by the physico-chemical. Water samples were collected from 3 sites along the river and analyzed using standard methods in laboratory. The physico-chemical characteristics were studied and analyzed for a period of 6 months from April 2022 to September 2022. Various physico-chemical parameters such as Temperature, PH, transparency, total dissolved solids, total suspended solids, DO, FCO_2, Carbonates, Bicarbonates, chlorides, Calcium, Magnesium, Total hardness of lake were estimated throughout the year.

Keywords- Ramganga River, physico-chemical factors, DO, TDS, TSS.

I. INTRODUCTION

Water is an important component of the living being on this globe, without water life is impossible. Water is an essential need of human activities which are associated with agriculture, domestically, industry and others. We know that earth is the only planet having about 70 % of water. In india ponds, rivers and ground water are the main sources of water. Rivers play an essential role in development of substances of life and nation. But due to increased human population, industrialization, use of fertilizers in the agriculture and man-made activity it is highly polluted with different harmful contaminants. The quality of drinking water is essential for life. Therefore it is necessary that the quality of drinking water should be checked at regular time interval, because due to use of contaminated drinking water, human population suffers from varied of water borne diseases. Most of the Indian town and cities do not have access to safe drinking water. It is difficult to understand the biological phenomenon fully because the chemistry of water revels much about the metabolism of the ecosystem.

Various researches have been recorded by many researchers on water quality assessment. As of now contaminated water kills more people than cancer, AIDS, wars, terrorism or accidents. Ramganga River is a main river of UP, originated from Garhwal hills and traverses through Kalagarh, Moradabad and Bareilly. It finally merges into Ganga River at Farukhabad. Temperature, turbidity, nutrients, hardness, alkalinity and dissolved oxygen are some of the important factors that play an essential role for the growth of the aquatic living beings. Water quality indicates the relation of all hydrological properties including physical, chemical and biological properties of the water body. Hence, water quality assessment involves analysis of physico- chemical, biological and microbiological parameters that reflects the biotic and abiotic status of ecosystem. Water quality index (WQI) provides a nominal number that represent overall water quality at a certain location and time, based on several water quality parameters. The objective of water quality index is to turn complex water quality data into detailed information useful for public.

The present study deals with the assessment of physico-chemical characteristics of water and on the basis

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of these various parameters, water quality index is determined which revealed in the Ramganga River, Bareilly, Uttar Pradesh India.

II. METHODS AND MATERIAL

Study area - Ramganga is a holy river situated at south west part of Bareilly. The holy river Ramganga deserves a significant status among nearby residents. But with the passage of time and uses of water deterious effects on water quality is being noticed. So with an aim the present project is undertaken to monitor the water quality of Ramganga river in its six months phase of analysis in related tenure of project.

Methods- Monthly analyzed data of physical and chemical paramaters in water samples drawn from 3 sampling sites i.e. village Gautara (15km away from bareilly city), village Sujanpur (25km away from bareilly city) and Ramganga Bridge Ghat (10km away from bareilly city), adjascent to Holy Ramganga river. One liter sterilized polythene bottles were used for sample collection. The calander annual schedual was April 2022 to September 2022 (seasonal monsoon and summer). For unstable parameters such as temperature, pH, and dissolved oxygen (DO) were measured at the sampling site. Samples were brought to the laboratory for analysis of other physico-chemical parameters like sodium, total alkalinity, total hardness, calcium, magnesium, chlorides, sulphate, nitrate, phosphate and biochemical oxygen demand (BOD). Grab sampling procedure were taken for the analysis of different quality parameters as suggested by the standard methods of analysis (APHA, 1999). The weighted arithmetic index method was used for the calculation of water quality index (WQI) of the water body.

III. RESULTS AND DISCUSSION

The physico-chemical parameters such as temperature, pH, transparency, total dissolve solid, total suspended solid, dissolved oxygen, free carbon di oxide, carbonate, bicarbonate, chloride, calcium, magnesium and total hardness of water were analyzed for the water samples collected from the Ramganga River. These parameters were collected at the three sites of the river season wise (monsoon and summer). All parameters with the mean value of the data with standard error were calculated as shown in table.

The tabulated data reveal the mean values of three study sites both air and water temperature ranged from 35.00 to 41.00 degree Celsius and 21.0 to 34.2 degree Celsius respectively. Whereas pH and transparency showed minimum value in post monsoon season of the experimental year. Total Dissolved Solids as well as Total Suspended solids reflected maximum values of 371 and 367mg/L were recorded in post monsoon season of month September 2022.

In regards to chemical parameters, the mean values of Dissovled Oxygen, Free Carbon Di Oxide, Carbonate and Bicarbonate alkalinity were ranged between 6.10-9.7, 0-82.00, 0-88.00 and 180.00-360.00 mg/L respectively. Furthermore ionic species i.e. Chloride, Calcium, Magnesium as well as Total Hardnes reflected maximum and minimum values in between month of April 2022 and September 2022.

Table 1: monthly variation chemical parameters of Ramganga river at site 1

PARAMETRS	MONTHS NAME					
	APRIL 2022	MAY 2022	JUNE 2022	JULY 2022	AUGUST 2022	SEPTEMBER 2022
AT*	38.0	39.4	43.0	41.0	39.9	37.8
WT*	29.1	30.0	21.0	32.0	33.0	34.2
pH	8.50	8.62	8.70	8.64	7.77	7.50
Trp#	44	43	32	25	20	25
TDS**	210	220	242	310	316	340
TSS**	108	129	140	310	334	350
DO**	9.7	8.8	8.1	7.4	6.9	6.3
F CO2**	0	0	0	15	62	50
Carbonate**	60	72	84	0	0	0
Bicarbonate**	360	355	310	190	200	210
Chloride**	4.60	4.80	5.00	2.80	2.82	2.60
Calcium**	52.18	51.93	45.71	40.98	40.58	36.10
Magnesium**	41.31	42.31	47.14	33.53	28.90	37.42
TH**	308	300	310	242	225	245

***°C #cm **mg/L**

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Table-2: Monthly variations in chemical parameters of Ramganga River at site 2

Parameter	Month name					
	April 2022	May 2022	June 2022	July 2022	August 2022	September 2022
AT*	35.0	38.0	39.0	37.0	35.0	35.0
WT*	26.0	28.0	30.0	32.0	32.0	34.0
pH	8.40	8.20	8.20	8.28	7.40	7.10
Trp#	38	39	30	23	17	24
TDS**	230	236	278	312	340	349
TSS**	120	139	151	332	354	359
DO**	8.20	8.40	7.60	6.42	6.51	6.20
FCO2**	0	0	0	18	76	45
Carbonate**	60	75	84	0	0	0
Bicarbonate**	359	350	320	185	197	204
Chloride**	4.58	4.78	5.07	2.75	2.52	2.45
Calcium**	32.60	54.34	45.32	31.80	40.00	32.82
Magnesium**	39.50	40.11	43.59	34.22	24.12	37.85
TH**	280	290	300	220	210	230

***°C #cm **mg/L**

Table -3: Monthly variations in chemical parameters of Ramganga River at site-3

Parameter	MONTH NAME					
	April 2022	May 2022	June 2022	July 2022	August 2022	September 2022
AT *	34.0	36	38	33	35	35
WT*	28	29	30	30	31	33
pH	8.30	8.40	8.50	8.10	7.30	7.20
Trp#	34	30	21	20	13	20
TDS**	240	250	293	315	338	371
TSS**	130	155	168	330	356	367
DO**	7.80	7.60	7.40	6.10	6.20	6.20
F CO2**	0	0	0	17	82	45
Carbonate**	358	350	325	180	185	195
Chloride **	4.9	5.1	5.3	3.0	2.8	2.5
Calcium**	52.3	53.1	45.0	32.5	41.1	32.3
Magnesium**	38.40	40.10	46.40	53.80	24.30	38.20
TH**	290	220	300	220	208	230

***°C #cm **mg/L**

Table-4: Monthly mean variations in chemical parameters of Ramganga River

Parameter	MONTH NAME					
	April 2022	May 2022	June 2022	July 2022	August 2022	September 2022
AT *	35.6	37.8	40.0	37.0	36.6	35.9
WT*	27.7	29.0	27.0	31.3	32.0	33.7
pH	8.40	8.41	8.52	8.38	7.46	7.26
Trp#	38.6	37.3	27.6	22.6	16.6	22.5
TDS**	226.6	235.3	271.0	312.3	331.3	353.3

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TSS**	119.3	141.0	153.0	324.0	348.0	358.6
DO**	8.57	8.27	7.70	6.63	6.53	6.23
F CO2**	0	0	0	16.67	73.33	46.67
Carbonate**	60.0	74.0	85.60	0	0	0
Bicarbonate**	359	351	318	185	194	203
Chloride **	4.7	4.8	5.1	2.8	2.7	2.5
Calcium**	45.70	53.12	45.34	35.09	40.56	33.74
Magnesium**	39.74	40.84	45.71	40.52	25.77	37.82
TH**	292.6	270	303.3	327.3	214.3	235.0

***°C #cm **mg/L**

IV. CONCLUSION

Some of the samples have total dissolved solids, pH, alkalinity, total hardness, magnesium, calcium and dissolved oxygen values exceeding the permissible limits as prescribed by Indian standards. The analysis of Physico- chemical parameters on Ramganga River has indicated that most of the parameters were within the permissible amount as per W.H.O. norms. Physico-chemical parameter analysis of the river water showed seasonal variations throughout the study period.

River water analysis revealed that values are generally higher in summer season. The results indicate that river water is good condition and can be used for domestic and irrigation purposes.

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