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WATER QUALITY TESTING OF GANDAK RIVER

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ABSTRACT

The results of chemical characteristics during one year across five sampling places of Budhi Gandak River at Samastipur. The water quality parameters like pH, TDS, DO, BOD, COD, hardness, chloride, calcium and magnesium were studied by various analytical techniques. It was observed that most of the water quality parameters are in the acceptable limits in accordance with WHO standards.

Key Words: *Budhi Gandak, BOD, COD, TDS.*

INTRODUCTION

The Budhi Gandak, situated in north Bihar region. The Burhi Gandak originates from West Champaran in Bihar.[1] It then flows out of East Champaran, Samastipur, and Begusarai districts, finally merging into the river Ganga near Khagaria town in Khagaria district. The river Budhi Gandak, passing through the district of West Champaran, East Champaran, Samastipur, Darbhanga, Begusarai, Munger and Khagaria, covers a distance of about 410 km and finally merges into the river Ganges near a village called Mansi in the east of Khagaria. determine the extent of pollution in the river Budhi Gandak. The drainage area of the river is 10,150 square kilometres (3,920 sq mi). (Wikipedia, last edited on 27 July 2020)

Material and Methods

Water samples were collected from each point once in a month for a period of one year between 8 to 10 a.m. at monthly intervals. To determine the BOD according to the standard

method2 , samples were incubated at 200C for five days. COD, hardness, chloride, Ca and Mg were analyzed by standard methods prescribed by APHA 19952. DO, TDS and pH were determined by VSI – 06 Water Analyzer Kit.

For monitoring the chemical characteristics of Budhi Gandak river at Samastipur, five sampling stations were selected. These are Pusa, Birauli, Bela, Samastipur and Jitwarpur and are referred to in this paper as SM1, SM2, SM3, SM4 and SM5, respectively. Each sampling station was located nearly about 5-7 km from its nearest sampling station.

Results and Discussion

In the present investigation, DO range of dissolved oxygen over a period of one year was found to be high as shown in the Table 1. However, the dissolved oxygen content was found to be low during the summer season at all the five stations. BOD measures the amount of oxygen used by microorganism during aerobic decomposition of organic pollutants, which is comparatively low for the river water, indicating it to be less polluted. However, there are some fluctuations in the BOD level. This may be due to faecal pollution and discharge of domestic wastes in the river. The COD values were also found to be within the permissible level set by WHO3 of 10 mg/L. The COD is linked with heavy pollution from industries, domestic sewage, industrial effluents on the bank of river and reduced water flow in summer. TDS and hardness values of river water were also found within the permissible standard limits set by WHO. The pH values were also found within the desirable limits prescribed by WHO3 and ISI4 In our observations, it was recorded that magnesium, calcium and chloride values have similar range at different stations and found to be quite low, which is in agreement with WHO standards.

Parameters	Stations	January	February	March	April	May	June	July	August	September	October	November	December	WHO (MPL*)
Dissolved Oxygen	SM_1	6	6.2	6.4	6.1	6.5	6.4	6.0	7.1	7.9	7.8	7.6	8.1	4.0-6.0
	SM_2	5.8	6.3	6.3	7.2	6.2	6.1	6.5	7.3	7.3	8.0	7.7	8.1	
	SM_3	6.4	7.5	6.4	6.2	6.3	6.7	6.1	7.0	7.5	6.7	7.9	8.3	
	SM_4	6.5	7.3	6.2	6.5	6.1	7.1	6.5	6.8	7.6	7.9	8.2	7.9	
	SM_5	6.4	6.1	7.1	6.8	5.8	5.8	7.4	7.4	8.5	7.6	8.0	8.1	
Biological Oxygen Demand	SM_1	3.5	2.7	3.0	2.7	2.9	2.8	3.7	3.0	3.0	3.4	2.4	2.7	10
	SM_2	2.4	2.4	3.4	2.9	3.0	2.3	3.0	2.7	2.5	2.5	3.0	2.9	
	SM_3	2.6	3.1	3.2	2.7	2.4	2.7	3.4	2.9	2.8	1.9	3.1	3.1	
	SM_4	3.0	3.2	2.9	2.9	2.8	2.9	2.9	2.6	2.4	2.7	2.7	3.5	
	SM_5	2.4	3.2	2.9	3.5	2.9	3.1	3.2	2.7	2.3	2.9	2.4	2.9	

Chemical Oxygen Demand	SM_1	6.9	7.1	7.3	9.7	9.8	9.1	8.9	8.3	7.2	7.6	9.3	9.9	
	SM_2	8.1	8.1	8.0	9.1	9.1	7.9	8.5	7.9	8.2	9.1	9.1	9.4	
	SM_3	8.0	9.5	8.3	8.1	9.0	7.9	9.0	7.5	8.6	8.3	8.1	8.7	10
	SM_4	7.0	7.9	8.5	8.5	8.4	7.2	9.1	8.0	8.7	8.0	8.3	8.9	
	SM_5	8.9	8.0	9.0	7.9	8.3	8.0	9.5	9.0	9.0	9.1	7.9	9.0	
Total Dissolved Solids	SM_1	289	240	245	256	288	290	343	340	350	358	392	381	
	SM_2	292	225	255	250	285	285	375	355	372	300	305	252	
	SM_3	300	240	392	275	392	300	265	382	390	362	300	300	500
	SM_4	295	280	359	395	345	355	300	255	242	385	355	255	
	SM_5	290	295	260	300	372	245	375	282	300	392	285	345	
pH	SM_1	7.5	8.0	7.5	7.7	7.5	7.5	8.3	8.1	7.8	7.5	7.2	7.5	
	SM_2	8.0	7.9	8.4	7.5	7.9	8.0	8.1	8.4	7.3	8.2	7.5	7.1	
	SM_3	7.2	7.9	8.0	7.1	7.8	7.1	8.2	8.0	7.0	8.0	8.0	8.0	6.5-8.5
	SM_4	7.5	7.7	7.5	8.4	8.3	7.2	7.5	7.6	7.5	8.1	8.1	8.2	
	SM_5	7.1	8.0	7.9	8.0	8.0	7.5	7.0	7.9	7.2	7.9	7.9	7.9	
Hardness	SM_1	160	147	135	189	130	152	137	160	124	185	176	152	
	SM_2	175	156	115	196	137	190	148	153	127	153	120	147	
	SM_3	142	196	155	215	156	135	155	190	190	140	145	160	500
	SM_4	145	134	180	184	184	128	142	180	160	138	131	190	
	SM_5	168	175	148	155	120	200	137	135	123	147	164	156	
Chloride	SM_1	28.6	28.0	31.3	32.5	29.5	30.0	43.5	54.4	40.2	39.9	37.2	29.3	
	SM_2	33.5	45.3	32.8	40.9	40.9	45.3	45.8	51.5	56.8	42.5	55.5	27.3	
	SM_3	39.4	36.9	45.5	38.7	56.8	44.5	47.9	53.0	59.5	47.3	57.3	33.4	500
	SM_4	42.8	45.5	49.8	34.9	47.3	49.5	53.2	44.0	54.3	39.5	39.8	42.2	
	SM_5	44.2	42.9	58.3	28.4	45.5	55.3	60.2	37.8	49.7	41.2	45.7	44.5	
Calcium	SM_1	36.5	24.3	20.8	24.2	33.3	36.0	41.3	28.0	32.3	37.2	22.3	48.5	
	SM_2	25.9	33.0	28.5	35.5	35.4	32.2	36.4	42.3	33.8	39.9	39.4	46.3	
	SM_3	22.5	31.2	24.2	39.6	38.6	39.0	30.0	24.8	28.4	34.2	46.2	49.8	100
	SM_4	28.3	29.5	31.6	42.3	28.5	28.4	31.4	41.2	22.7	42.0	42.8	30.1	
	SM_5	32.8	34.3	33.5	37.4	22.1	38.5	38.4	44.5	22.0	45.5	28.7	22.5	
Magnesium	SM_1	10.2	17.4	19.5	21.5	27.3	18.3	19.2	21.5	22.2	20.0	17.3	17.5	
	SM_2	23.4	12.5	18.7	22.3	20.5	15.5	21.5	18.3	18.3	17.8	18.2	10.2	
	SM_3	24.2	18.2	21.2	24.7	21.3	14.0	17.8	15.0	21.0	19.1	15.1	11.9	150
	SM_4	11.6	12.3	14.7	22.5	22.5	15.7	13.3	14.9	16.5	17.1	11.2	21.2	
	SM_5	12.3	14.8	12.1	24.8	19.2	18.9	10.0	18.2	12.3	19.5	19.7	12.8	

CONCLUSION

Comparing the observations with the maximum permissible limits (BIS5 and WHO4), it was noted that the water of Budhi Gandak river at Samastipur is permissible for drinking, bathing and even survival of aquatic life. To summarize, the present studies indicate that the Budhi Gandak water quality along Samastipur city is in permissible limits due to high level DO and consequent low BOD and COD values. Similarly, TDS, hardness, pH, chloride, Ca and Mg are within permissible limits. However, the final conclusion regarding the pollution status of Budhi Gandak requires the assessment of heavy metal pollution, which is in progress.

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