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Analysis of Water Quality Parameters of River Gomti from up to Down Stream Area in Lucknow

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Abstract:

River water contamination is a foremost global predicament. All over the world, it's been seen that the rivers have become the easiest disposal sites for industrial effluents and domestic sewage. The River Gomti is no exception. In this research paper the physicochemical characteristics of the river water are analyzed in terms of its pH, hardness, DO, BOD, and COD during pre-monsoon season in May 2019. Water samples were collected from eight different sites and the parameters were compared with the standard data to analyze the river health. The results showed that there was not much variation in the pH value of the river water. However, the experimental values of DO, COD, and BOD showed the situation is alarming and the river health is declining throughout the river in the city.

Keywords: Gomti, Lucknow, water pollution, water quality, physicochemical parameters.

Introduction:

Water is an indispensable natural resource without which the existence of life is not possible. From the prehistoric times till now the history, all the great civilization and development took place revolved around the rivers and at river banks [A.B. Heinemann et al, 2002]. The river is an arrangement of the mainstream of water and its tributaries carrying dissolved and particulate matter. Rivers have been an essential component of human development since the crack of dawn of civilization. However, these days due to uncontrolled population growth, unorganized and unplanned urbanization and rapid industrialization along, the quality and quantity of rivers are declining continuously [AQUASTAT Website, 2016]. The rivers and their tributaries are being treated as the site for disposal of municipal and industrial waste runoff from agricultural land causing great damage to the health of rivers. Discharge of industrial and municipal waste is continuous, while surface runoff is a seasonal [R.M. Pink, 2016].

The River Gomti is an alluvial plain river which originates from Gomat Taal in Madho Tanda in Uttar Pradesh, between latitudes 25º-26.9'N and 28º-9.1'N, longitudes 80ºE - 83º-9.6'N [Neha Shukla, 2009]. The total length of the river is about 940 km It flows through the districts Pilibhit, Shahjahanpur, Sitapur, Hardoi, Lucknow, Barabanki, Amethi, Faizabad, Sultanpur, Jaunpur, Ghazipur and Varanasi after which it finally confluences with the river Ganga near Saidpur Kaithi in Ghazipur district. It has a total 22 tributaries out of which Sai river is its major tributary. Lucknow, the City of Nawabs and the capital of Uttar Pradesh, is situated on both the banks of the Gomti, the right side of the river is called cis Gomti area and the left side area is called trans Gomti area [The Times Of India, 2008]. After flowing around 340 km, Gomti enters Lucknow where it covers about 17 km with water coverage of about 22700 square km. The summer months have always been tough on the river's health. The

pre-monsoon average flow of Gomti river is less than 500 MLD, however, during the monsoon season it reaches up to 45000 MLD. This shows that its flow chiefly depends upon rain and therefore the flow in the river is moderate during monsoon. The major pollution sources in river Gomti at Lucknow are the untreated sewage and industrial wastewater. A Pumping station at Gaughat had installed to supply Gomti river water to Aishbagh and Balaganj Water Treatment Plants [Shashi Chawla, 2011]. The present investigation was carried out the six different sites of river Gomti in Lucknow District to study the status of water quality pre-monsoon.

Objectives of the study: The objective of the study is to analyze the physicochemical parameters at different sites to check the river health in May 2019.

Materials and Methods:

The present study was conducted on May 2019 at Lucknow, India. For the investigation water samples were collected in triplicate form eight different site of river Gomti namely Gaughat Pumping Station(S1), Harding Bridge (S2), Daliganj Bridge (S3), Hanuman Setu (S4), Nishatganj Bridge (S5), Kukrail Drainage in Gomti (S6), Gomti Barrage (S7), and Water from Gomti under Amar Shaheed Path Bridge (S8). All the physicochemical parameters including hardness, pH, DO (Dissolved Oxygen), BOD (Biochemical Oxygen Demand), and COD (Chemical Oxygen Demand) were analyzed and tested according to American Public Health Association [APHA, 2005]. The pH value was determined using Systronics pH meter model 335.

Results and Discussions:

Water samples collected from eight different sites in Lucknow were analyzed for the physicochemical characteristics of Gomti River water. The parameters analyzed were pH, hardness, Do, BOD, and COD. Table-1 shows the data obtained after the analysis of the river water.

Table-1. Physicochemical characteristics of Gomti River water from different sampling sites in May 2019

S. No	Sampling site	pH	Hardness (mg/l)	DO (mg/l)	BOD (mg/l)	COD (mg/l)
1	Gaughat Pumping Station (S1)	7.72	228	4.2	3.2	11.20
2	Harding Bridge (S2)	7.92	223	3.4	5.28	15.45
3	Daliganj Bridge(S3)	8.05	232	3.4	10.40	17.71
4	Hanuman Setu (S4)	7.94	228	2.6	8.04	18.82
5	Nishatganj Bridge (S5)	7.93	212	3.4	9.40	18.22
6	Kukrail Drainage in Gomti(S6)	8.03	207	3.0	12.50	22.60
7	Gomti Barrage(S7)	7.05	204	3.4	12.61	23.56
8	Amar Shaheed Path Bridge (S8)	7.76	211	4.2	18.52	24.80

The observation of the physicochemical data enlisted in table- 1 shows that the pH of the river water at different sites did not show much variation (ranging from 7.72 to 8.05). This is generally found due to strong buffering capacity of water. Fig-1 represents the graph showing pH at different sampling sites in Lucknow. Total hardness of water sample was calculated and the results show that the highest hardness value of 232 mg/l was found to in the river water sample near Daliganj Bridge. However, the total hardness of the water sample came under permissible limit 300mg/l. High BOD values showed the potential depletion in water quality of Gomti River. The highest value of BOD of 18.52 mg/l was found in the sample taken from the river near Amar Shaheed Path Bridge. Data given in table -1 show the variation in the value of dissolved oxygen below the standard value 6mg/l. The low values of DO are due to an increase in organic pollution load due to sewage water disposal in the river water. The highest value of DO was found to be 4.2 mg/l in the sample taken from Gaughat pumping station. Site wise analysis of COD shows that the highest value of COD was 24.80 mg/l in sample near Amar Shaheed Path Bridge and the lowest value was found to be 11.20 mg/l in the sample taken from Gaughat pumping station.

The results of the physicochemical parameters viz. pH, hardness, DO, BOD, and COD are shown in Fig -1 to Fig-5.

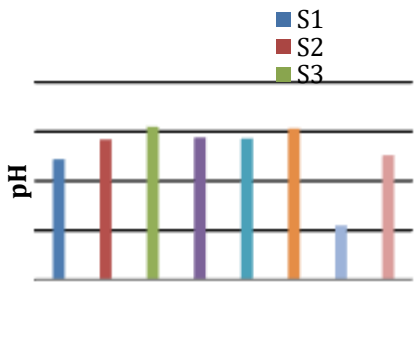

Fig 1. Graph representing pH of water samples of River Gomti at different sites in Lucknow

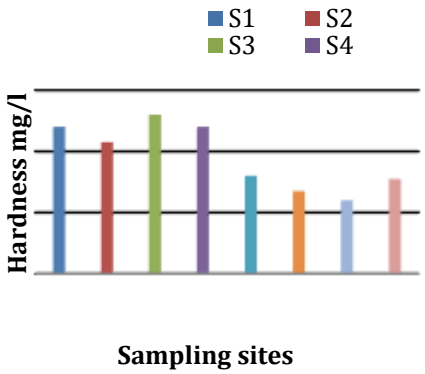

Fig 1. Graph representing hardness of water samples of River Gomti at different sites in Lucknow

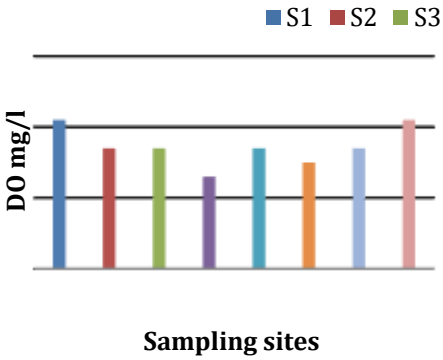

Fig 1. Graph representing DO (Dissolved Oxygen) of water samples of River Gomti at different sites in Lucknow

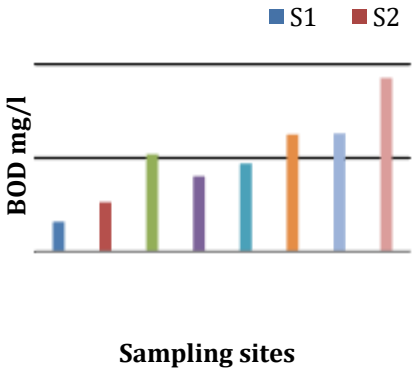

Fig 1. Graph representing BOD (Biological Oxygen Demand) of water samples of River Gomti at different sites in Lucknow

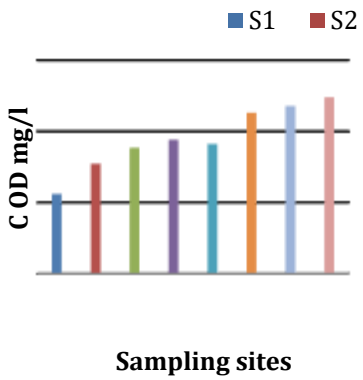

Fig 1. Graph representing COD (Chemical Oxygen Demand) of water samples of River Gomti at different sites in Lucknow

Conclusion:

The experimental data showed that there was not much variation in the pH and hardness of the river water throughout the stretch. The value of dissolved oxygen in all the sample was less that than the standard value required. The BOD and COD data showed that they are crossing the standard limit of river water due to increase in organic pollutants when the rives passes across the city.The analysis of the parameters shows that the need of an hour is to save the river Gomti. The water quality and the river health is constantly declining mainly due to untreated discharge from industries, domestic sewage. Drains from sever and industries need to take some appropriate and severe steps to save the river. During the summer season, there is a significant decrease in water quality due to the lean flow of river water. Removing the silt from the river bed and reviving the tributaries of Gomti can be a better option for maintaining the minimum dilution flow. It is also realized that rapid urbanization is also one of the major causes of river water pollution. Thus, it can be concluded that the water quality of the river Gomti can be checked and improved by environmental surveillance and increasing awareness among people.

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