Pattern of Seasonal Variations in the Physical Parameters of Brijghat, Ganga River

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Abstract- Water is important for all forms of life, including agriculture, processing, transport and other activities. Water quality is decreasing as natural events grow further and pose a significant danger to human life. The relationship between the variables examined in this analysis was calculated. A correlation matrix and its statistical analysis of the matrix of the correlation of physicochemical parameters were established. A strong positive correlation suggested that the variables studied, namely temperature, COD, EC, pH, TDS, TSS, BOD, COD, DO, redox potential, turbidity, and colour, are strongly correlated. A few variables also showed negative association with the parameters studied, such as DO and EC with redox while BOD and COD with DO. It revealed that the physicochemical properties of a certain set of water parameters are determined and their frequency and concentrating are likely to affect it. However, there is still a minor deviation in some areas, possibly due to domestic and industrial dumping.

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Keywords: Seasonal variations, physical characteristics, water quality.

I. INTRODUCTION

Water is important for every kind of life like agriculture, development, transport and many other human activities (Biswas, 2004). Water is the world's worst-managed and polluted asset, considering its value (Soll, 2013). The quality of water is increasingly deteriorating and poses a significant challenge to human survival, as the amount of human actions and natural processes grows (Todd *et al.*, 2012). The main environmental issues impacting water quality are the non-point and non-point source emissions (Shi *et al.*, 2018). Failure to treat household waste aggravates the problem. In rural fields, the most significant cause of pollution is the systematic use of agricultural fertilisers (Smith and Siciliano, 2015). The carefree dumping of industrial effluents and other waste in urban areas may lead significantly to water pollution and poor quality (Qu and Fan, 2010; Parris, 2011).

Rivers are the primary drinking water reservoirs and agricultural drainage sources. They are also important in transport, soil fertility conservation, forest resource growth, and habitat restoration (Chukwuka, 2009). In urban cities, the low quality of water in rivers can be significantly impacted by inadequate sewage disposal from factory effluents and other city waste. Many waterways are also at the end of effluents emitted by factories in urban areas of developed countries (Lindholm-Lehto *et al.*, 2016; Conley *et al.*, 2019).

Today, the urban and industrial development of developing countries is rapid, making protection of the environment challenging (Munksgaard *et al.*, 2019). Municipal waste management methods are of low consistency (Munksgaard *et al.*, 2019). Besides the natural elements affecting water flow, the quality of river water is adversely influenced by human activities such as domestic and agricultural activity (Charalampous *et al.*, 2015). Regular follow up of the chemical and physical parameters of bodies of drinkable water agents has been conducted for decades in the various developing countries (Raja *et al.*, 2008; Delpla *et al.*, 2009). Evaluations have been systematically undertaken on the average water content and metals dissolved in marine environments.

II. MATERIALS AND METHODS

The present thesis took place from 2017 to 2020 in Brijghat, (Garhmukteshwar) on the various Ghats located on the Ganga River, Uttar Pradesh, India. Depending on the suitability of the sample collecting, samples of water have been obtained from three different locations in Brijghat. There is no reproduction of the same water and consistency of the sample collection were taken care thus be more feasible and an authentic study may be drawn as conclusions. Before the sampling, we retained a stock of plastic containers and a sterile sampling bottle and scheduled daily visits and collections from each Ghat, on the basis of a sampling schedule. Each jar was washed with deionised wate or diluted nitric acid prior to each sampling visit. Tap water was rinsing the washed containers several times. The washed containers were dry and often heated dried at room temperature. Each Ghats analysis was visited with a constant interval based on the test plan and a sampling was

carried out when collecting sample was convenient. Since sampling was so crowded often, even entry itself was an exhaustive job so we strictly avoided sampling in those cases.

In addition, a high degree of care is taken when sample containers were fully submerged in the lotic water and wait until the sample containers were fully filled. When the bottle sample has been packed with the sample, each container is tightly equipped with cork sealed and so the probabilities of bubbling have been taken into account. The sample obtained was processed and transmitted to refrigerators for sample analysis. The fresh samples obtained and processed were analysed by the separate basic parameter protocols. A systematic hierarchy was structured to state the date and the day of the study's data collection month. The MS Excel sheet with data was supplied. During data entry in an Excel sheet, the preorganized data and the well-plan focus have been taken care.

III. RESULTS AND DISCUSSION

The present study is exploring about the pattern of seasonal variations in the water quality and its associated parameters. The results of water quality analysis showed that the value of measured parameters is varied with month and seasons. In this present, the recorded pH value was scaled from 7.0 to 7.3, 7.1 to 7.20 and 7.5 to 7.7 over the pre-monsoon, monsoon and post-monsoon respectively. However, the mean value of river pH (water) was noted 7.3, 7.1 and 7.6 over pre-monsoon, monsoon and post-monsoon respectively. In the present study, results showed, the water is having a tendency to become alkaline with the merging of domestic and industrial pollutants which are mainly situated around the Brijghat and closer to Gajraula area. Sometimes heavy rainfall and leased space for the dumping of waste materials around the study area.

The dissolved oxygen content was ranged from 6.3 to 7.4, 6.4 to 7.2 and 6.5 to 7.5 mg/l in the period of pre-monsoon, monsoon and post-monsoon time respectively The highest dissolved oxygen was estimated as 8.84 during the monsoon season, where the lowest dissolved oxygen was recorded in post-monsoon season i.e. 7.59 however the annual mean of dissolved oxygen was found as 7.59 ± 1.05 (SD). Higher fluctuations in the range amount of dissolved oxygen exist because of severe rain during the rainy years, field slurry at every crop end and poor management of the resources and nutrient enrichment fusing in the river water (Babanyara *et al.*, 2013). The concentration of dissolved oxygen was also found to be considerably higher in the monsoon season than in the non- and post-monsoon seasons. It might be favourable and enhances the physicochemical properties of Brijghat environment.

The water of Brijghat having a standard level of biological oxygen demand in pre-monsoon season but slightly higher in monsoon season and higher in post-monsoon season. Generally, it is happened due to presence of many waste materials into the water but good for fish production. It was found that when biological oxygen demand is increased at the same, dissolved oxygen decrease probably due to the presence of oxygen consuming bacteria of the water. We found that electoral conductance (EC) of the haor was found 330 µS/cm as highest in the month of December while the lowest EC was recorded as 87 µS/cm in October month with the annual mean of 230 ± 87 µS/cm however the standard of EC of the river water was categorised as 700 µS/cm (Figure 1). In this study, the results showed within the range of favourable scale. A total dissolved solid (TDS) of the studied sample was found 50.0 ± 9.1 mg/l at the different locations of the Brijghat. In case of its variations, it exhibits a wide range of variations as it was recorded as higher in the month of December while in the case of lower case, it was recorded in October month.

The alkalinity of the sampled water was recorded as highest 120 mg/l monsoon season and lower most value was recorded as 119 mg/l in the summer season. At the standard glance, the range alkalinity range was category as >100 mg/l. It shows the sample water have a higher alkalinity in compression to standard marked value. Generally, it is happened due to the presence of domestic and industries effluents in the water and ultimately it is merged in the aquatic system and put an extra pressure on water bodies and faunal survivals (Sun *et al.*, 2011).

We have tried to estimate the relationship between the variables studied in this study. A correlation matrix was developed and its statistical analysis of the correlation matrix between the physicochemical parameters of the water samples obtained from different locations in Brijghat was shown in Table 1. A strong positive correlation matrix suggested that the variables studied, namely temperature, COD, EC, pH, TDS, TSS, BOD, COD, DO, redox potential, turbidity, colour, are strongly correlated. A few variables also showed negative association with the parameters studied, such as DO and EC with redox while BOD and COD with DO. It indicated that a certain set of water parameters determines the physicochemical properties and is likely to be influenced by their frequency and concentration. However, a small deviation is also observed in some sites, probably due to the presence of dumping by the domestic and industrial sectors.

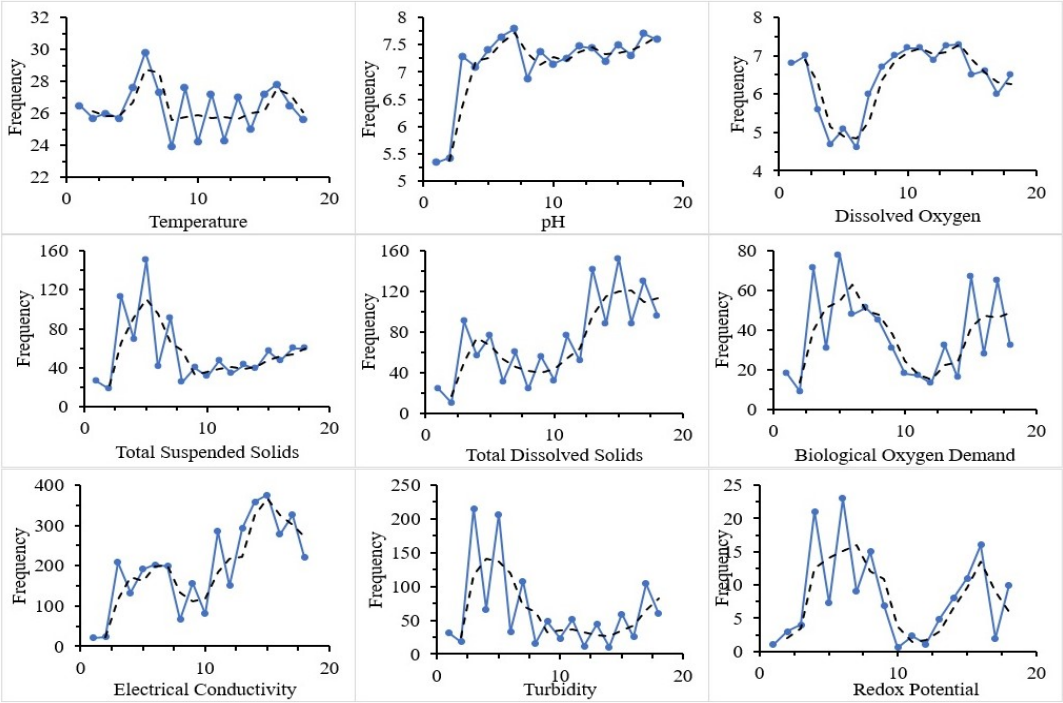

Figure 1. Mean pattern of seasonal variations in the different physicochemical parameters of the studied water

Table 1. Correlation matrix of the studied physicochemical parameters.

Parameters	Temperature	pH	DO	TSS	TDS	BOD	COD	EC	Turbidity	Redox Potential
Temperature	1									
pH	0.02	1								
DO	-0.05	-0.20	1							
TSS	0.35	0.07	-0.05	1						
TDS	0.20	0.65*	0.02	0.27	1					
BOD	0.03	0.63*	-0.15	0.60*	0.31	1				
COD	0.54*	0.57*	-0.41	0.85*	0.69*	0.78*	1			
EC	0.61*	0.61*	-0.43	0.26	0.02	0.32	0.31	1		
Turbidity	0.17	0.21	-0.39	0.72*	0.21	0.50*	0.23*	0.03	1	
Redox Potential	-0.33	-0.24	0.57*	-0.03	0.05	-0.12	-0.12	-0.98*	0.03	1

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