



WATER QUALITY ASSESSMENT OF GOMTI RIVER AROUND INDUSTRIAL AREA AT DISTT. SULTANPUR

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ABSTRACT

Water sample of river Gomti were collected from six different Sampling stations, situated near industrial area at distt. Sultanpur. Sample were analyzed for the physico-chemical parameter with respect to BIS 1998 standard for fresh water. Research finding reveals that the value of Physico-chemical parameter e.g pH , Total hardness, DO, BOD, COD, free carbon dioxide, free ammonia, sulphate, chloride were cross their standard limit of fresh water standard and point out proper treatment of industrial waste, domestic waste in that areas.

KEY WORDS: Assessment, Gomti river, physico-chemical parameter

INTRODUCTION

Water is most abundant natural resource on earth which is extremely essential for the survival of human being living organism and plants. The river Gomti, the life-line of millions of people has over the year, been subjected to tremendous pressure in India. Most of its water in upper reaches is diverted into canals, untreated sewage and industrial effluent are dumped into the river at numerous places and residues of pesticides and insecticides use in the farms are washed into it. These waste contains organic matter, inorganic dissolve solid, fertilizing materials, thermal constituents etc. Which causes different type of disease and harmful for the human health, living organic and plants. Approximately 45% population of district sultanpur are suffering from the water of river Gomti at these places.

MATERIAL & METHODS

Study Area :

The study area Kadunala, Zaferganj, Kauthara are situated to the west direction at the distance 35km., 55km. and 60km. respectively, Kamtaganj is at distance 25km. to east direction, Naugavanteer is in North West direction at the distance of 18 km. apart, where as Sitakund a situated on the bank of river Gomti at the Northern end of district head quarter sultanpur.

Collection of Sample :

Sampling of different sampling stations were done during Aug. 2011. A clean, high grade plastic bottle (approximately 2 liter) were used for the collection of the sample. The bottle were dipped in the mid of river approximately 30 min., after then taken out very slowly and sealed on mouth for analysis in laboratory.

Analysis of Sample :

The analytical methods (APHA, AWWA & WPCF) were used for analysis of water sample. Total 9 parameters were used for analysis of water samples, they are pH , Total hardness, DO, BOD, COD, free carbon dioxide, free ammonia, sulphate, chloride, which are very essential to know the water quality for domestic purpose. The finding of present investigation are explain with the help of table-1 and it has been compared with limit of fresh water standard are shown with the help of table-2 pH value of water sample were recorded with the help of pH meter. Total hardness was determined by the titrating (sample + ammonia buffer) by EDTA solution using Erichrome black T as indicator. Dissolve Oxygen (DO) was measured by winkler method. For the determination of BOD a known amount of water sample was diluted to 50% by distilled water and filled in two BOD bottles (one for initial and other for final reading). The initial value of DO was taken immediately from the first bottle by (Winkler method) and second bottle was incubate. On the 5th days at 20 °C in BOD incubator. At last day the DO content of second bottle was determined by the same method. The COD was determined by the titration of test sample (river water) and blank sample (distilled water) with ferrous ammonium sulphate solution. Free carbon-di-oxide was determined by titrating sample with NaOH using phenolphthalein as indicator. Free ammonia was determined by titrating with standard sulphuric acid solution using mixed indicator of methyl red and methylene blue. Sulphate was determined by gravimetrically in form of Barium as Barium sulphate by adding an excess of Barium Chloride solution. Chlorides were determined by titrating with standard silver nitrate solution using potassium chromate as indicator.

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Observation and discussion :

Six water sampling stations situated at the bank of river Gomti in distt. Sultanpur were selected for the purpose of analysis. Which are Kathaura (S_1), Zafarganj (S_2), Kadunala (S_3), Naugawanteer (S_4), Seetakund (S_5) and Kamtaganj (S_6). Among these six sampling station (S_1, S_2 & S_3) belong to industrial areas. The two sampling stations (S_4 & S_5) are situated in rural areas where as the sixth sampling station belong to urban area. These samples are analyse for different physico-chemical parameters as mentioned below.

The pH value of water which is the measure of the acidic nature plays an important role in deciding human health and nutation. The higher value of pH increases the temperature of water and also germicidal potential of chlorine. Acidic water also increases the solubility of metals which posses harmful effects on aquatic life. It is observed that the pH value of different samples is found in the range 7.8 to 8.7. Which are well within the standard limit for fresh water standards (Yashodhara & Ashok, 2003).

The hardness of water is a key-factor for deciding the pollution level in water. The large amount of total hardness may be due to the presence of large amount of Ca, Mg and other minirals, disposal of waters,

consuming of more detergent etc., which affects the quality of water. The ground water quality controlled by the composition of its recharges components as well as bio-logical and hydrological variation. Hard water causes problem in washing clothes, textiles finishing and to human and aquatic life. The total hardness value of the samples under study were found in the range 225.8 to 510.5 mg/l. which are observed that the samples collected from the sampling stations (S_4 & S_5) are found well within the standard limit. Where as all other samples crosses their standard limit (Amita and Arun, 2007).

In these samples the DO level varies from 5.2 to 7.0 m//l which are well within the standard limit except the samples from sampling station (S_1, S_2, S_3 & S_5). The excess value of DO, for the samples from the industrial areas are due to discharge of industrial effluent, large deposit of slage etc. Their waste contains decomposable organic matter and decreases the value of oxygen in water which also affect the aquatic life as well as human health. The cause of deoxygenating of aquatic system is due to the presence of organic substance because when these substances enters a water way, the DO is consumed. Thus DO level decrease appreciably (Sunil and Puttaiah, 2006).

The BOD level for all the sample (S_1, S_2, S_3, S_4, S_5 & S_6) are found in range from 5.9 to 7.4 m//l which are more than the standard limit for a fresh water slandered. The BOD is a measure of Oxygen utilized by micro organism during the oxidation of organic material during 5th day period. The demand of oxygen is directly proportional to amount of organic waste which has to be broken-down, hence BOD is the direct measure of oxygen requirement and indirect measure of Bio-degradable organic matter. Drinking water usually has a BOD of less than 1 mg/l and water is considered freshly pure with a BOD 3 mg/l. But when BOD value reaches 5mg/l the water is of doubtful purity (Tiwari & Rajak, 2005).

TABLE-1

Physico-chemical characteristics of water quality data of river Gomti at different sampling stations

S.No.	Parameter	Sampling stations					
		S_1	S_2	S_3	S_4	S_5	S_6
1.	pH	8.6	8.2	8.7	8.1	8.4	7.8
2.	Total Hardness	440.5	432.3	334.6	225.8	415.2	200.8
3.	DO mg/l	6.4	6.2	7.0	5.4	6.5	5.0
4.	BOD (mg/l)	7.0	7.4	6.4	7.2	6.2	5.9
5.	COD (mg/l)	20.5	22.5	24.5	18.8	21.9	18.6
6.	Free CO ₂ (mg/l)	8.4	8.6	7.8	5.2	6.9	5.4
7.	Free ammonia (mg/l)	8.4	8.0	8.6	7.8	7.4	7.2
8.	Sulphate (mg/l)	225.6	220.4	218.5	175.5	150.5	195.8
9.	Chloride (mg/l)	664	628	525	185	552	165

TABLE-2

Comparison of water quality data of river Gomti with fresh water standard (BIS, 1998)

S.No.	Parameter	Sampling stations						Standard value
		S ₁	S ₂	S ₃	S ₄	S ₅	S ₆	
10.	pH	8.6	8.2	8.7	8.1	8.4	7.8	6.5-8.5
11.	Total Hardness	440.5	432.3	334.6	225.8	415.2	200.8	300
12.	DO mg/l	6.4	6.2	7.0	5.4	6.5	5.0	6.0
13.	BOD (mg/l)	7.0	7.4	6.4	7.2	6.2	5.9	3
14.	COD (mg/l)	20.5	22.5	24.5	18.8	21.9	18.6	-
15.	Free CO ₂ (mg/l)	8.4	8.6	7.8	5.2	6.9	5.4	6.0
16.	Free ammonia (mg/l)	8.4	8.0	8.6	7.8	7.4	7.2	1.2
17.	Sulphate (mg/l)	225.6	220.4	218.5	175.5	150.5	195.8	400
18.	Chloride (mg/l)	664	628	525	185	552	165	250

Chemical Oxygen Demand is total oxygen required to oxidize the entire organic matter chemically for a given sample, the value of COD is always be greater than BOD. The COD level for all the sample are found in the range 18.6 to 24.5 mg/l which further are too high than the standard limit thus such water can't be used for drinking purpose and also harmful to the aquatic life (Singh and Malik, 2006).

The CO₂ value for the sampling stations (S₁, S₂, S₃, S₅) are found in range 6.9 to 8.6 ml/l which are above the standard limit for fresh water standard, whereas the CO₂ Value for the samples obtain from sampling station S₄ & S₆ are 5.2 & 5.4 ml/l respectively which is well within the standard limit. The CO₂ - CO₃ system through complex is important system in hydrosphere, it involve in atmosphere-surface water interchange, the chemistry of water system & the biological structure of organism Similar to oxygen, CO₂ concentration in surface water is function of partial pressure of the gas. The surface water in pacific ocean is unsaturated. Whereas the surface water of Indian ocean near the equator is super saturated, thus in Indian ocean, dissolve CO₂ concentration increase with increase in temperature. The CO₂ contribute to the fitness of natural water as well as in the environment. All the living matter continuously releases CO₂ in atmosphere and consumes oxygen during respiration. The CO₂ being rejected into water by decay of organic matter, disposal of combustion of fuels, ash of dead bodies industrial influent etc. (Neera and Meena, 2003)

The free ammonia value for all these sample are found in the range 7.2 to 8.6 ml/l which is well beyond the standard limit of 1.2 ml/l. The large value of free ammonia at all these places is due to the presence of nitrogenous organic matter, sewage disposal etc. The presence of excess amount of ammonia in water thus causes threat to human and aquatic life, dependent on such water (Seema & R. K., 2003).

The samples taken for analysis from all the sampling stations (S₁ to S₆), the sulphate values were found to be 150.5 to 225.6 mg/l which are well under the

limits for the standard value of 400 mg/l in all these cases. The sewage consisting of organic sulphur compound are decomposed by protolitic bacteria to H₂S in absence of oxygen. Which then get oxidised into sulphuric acid, which is a source of SO₄ in water, even at a very low concentration of the sulphate ion (0.5 to 1.0 ppm) is lethal to fish and the presence of H₂S also inhibits oxygen utilization like cyanides (Alexander, 1961).

In the present investigation the chloride value for the samples taken from the sampling stations (S₁, S₂, S₃, & S₅) are in the range 525 to 664 mg/l which are above the range of the standard limit, where as for the sampling stations (S₄ & S₆) are 185 and 165 mg/l respectively, which are well within the standard limit. The high value of chlorine present in water is due to the dumping of waste desposal by living being as well as the organic matter discharged by industries etc. The excess amount of chlorine makes the water salty and posses serious problem to health (Ravi prakash & Krishan Rao, 1998).

CONCLUSION

This investigation is a step toward the direction of treatment of pollution at these sites of Gomti river at distt. Sultanpur due to higher fluctuated values of physico - chemical parameter. This is due to release of waste product of industries, large amount of sewage, detergent from the residential localities into river Gomti. The water quality of the river has become from bad to worse. The water contains both organic, inorganic and other type of pollutants. It can be concluded that quality of river Gomti has decreased at these sampling stations. This study will help us to take some measures to reduces pollution in all the sampling stations.

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