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Assessment of Physio-Chemical Properties of the Gomti River Lucknow (UP)

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A B S T R A C T

The purpose of this study was to determine the current state of water in the Gomti River along the Lucknow stretch. Physio-chemical characteristics, levels of organic materials, various heavy metals and sewage pollution and their variation have been studied from top to bottom over Lucknow, and the study shows that water quality from Gaughat to Gomti barrage has deteriorated due to discharge of untreated waste from about 26 major drains throughout its course. The water of Gomti river of Lucknow i.e. Gaughat showed minimum pH 7.55 and maximum pH 8.58 of mohanmeakin, minimum dissolved oxygen 1.7 mg/lit of Parag factory and maximum 4.0mg/lit of kudiyaghat minimum TDS is 357.5 mg/lit in ghaughat and maximum 620 mg/lit in parag factory, minimum arsenic 0.029 mg/lit kudiyaghat and maximum 0.079 mg/lit in daligaunj and chloride minimum 3.059 mg/lit in Gaughat and maximum 88.157mg/lit in pakkapul. But due to presence of 26 drains the dissolved oxygen level decreases with its stretch and showed minimal DO at Laxmanamela Park.

Introduction

Water is fundamental to life on our planet, but this precious resource is increasingly in demand and in danger. Pollution of a river first affects its chemical quality and then systematically destroys the community disrupting the delicate food web. In India it is reported that about 70% of the available water is polluted. The chief source of pollution is identified as sewage constituting 84 to 92 per cent of the waste water. Industrial waste water comprised 8 to 16 percentage (Kumar Alok *et al.*, 2009). Water quality concerns have often been neglected because good quality water supplies are plentiful and readily available. Water is necessary for the sustenance of life. Most cities in India are experiencing rapid growth and consequently are facing both problems with the quality and quantity of surface water as

significant amounts of heavy metals from River water have been met. Increasing urbanization, population explosion, and intensive agriculture are some of the factors contributing to the decline in groundwater quality. Drinking water with heavy metals marks is dangerous to health. (Vinodini and Narayanan, 2008). The study focused on a quantitative assessment of the physico-chemical parameters of water, to identify pollution, and to determine its quantity. Gomti originates from Gomti Tal which is formally known as PhulharJhel near MadhoTanda, Pilibhit, India (Blum, 1953).

Monitoring of river water quality is particularly necessary where water acts as sources of drinking water, with the course of the river being threatened by pollution resulting from various human activities (Ahmed *et al.,* 2010). Some algae can be used as bioindicators of water pollution (Dwivedi, 2010). The drains are the main source of water pollution especially for the rivers flowing within the city, which deteriorate water quality, carry industrial waste, household waste, sewage and medicinal waste (Srivastava, 2011). The extent is that these drains pollute the water quality of the Gomti River in the city of Lucknow Hg, Pb are also discharged from industries (Namdev and Singh, 2012). Both biological and chemical contaminants can affect water quality. Accidental disposal of waste may contaminate water as toxic chemicals and may adversely affect organisms. If they are found to be beyond the permissible limit then water pollution has a direct relationship with physio-chemical parameters. Some of these parameters such as nitrate, fluoride, hardness, alkalinity, chloride, temperature, pH, heavy metals etc. are toxic and have a very harmful effect on public health and the environment (WHO, USEPA 2006). Surface water physio-chemistry is an interdisciplinary science related to human consumption, crop production, and industrial use. The natural state of surface water is usually of excellent quality, although harmful concentrations of some ions, such as iron and sodium; Which can happen naturally, leads to problems. Rivers are the major source of fresh water for the supply of life necessities and economic activities of man (Usharani *et al.,* 2010). Contamination of the environment with toxic metals has become a problem worldwide, affecting crop yields, soil biomass and fertility, contributing to biochemulation and biomagnulation in the chain (Lapedes, 1974). Water pollutants include sewage, both organic and inorganic pollutants including oils, greases, plasticine plasticizers, metal wastes, suspended solids, phenols, acids, greases, salts, dyes, cyanides, DDT and some heavy metals such as Cu, Cr, CD included. Distillery, dairy industries, all vegetable oil industries, flow directly into Gomti and in addition domestic wastewater also flows into the Gomti River (Ajmal *et al.,* 1988). Studied the harmful effects of heavy metals measuring levels of copper and cadmium in water, sediment, organic detritus, and aquatic environments. Screening of microorganisms in the Gomti River was carried out under various environmental conditions (Pathak, 1991). Studied pollution and biomonitoring of Indian rivers (Trivedi, 2000). Presented a report on the quality monitoring and evaluation of the Gomti River in Lucknow (Singh, 2001). Heavy metals cause environmental pollution and are phytotoxic in nature (Prasad, 2004). Heavy metals are carcinogenic to humans, High concentrations of metal in water and sediment during the rainy season may come into the river due to industrial, agricultural or domestic runoff (Gaur *et al.,* 2005). Assessed water quality based on biomonitoring of rivers in Uttaranchal in view of their religious importance and ecological sustainability. At present, there is only one treatment plant located at Gaughant to receive the sewage from Sakata, Pata, and Nagaria as well as from Gaughat itself (Semwal and Akolkar, 2006). Heavy metals reveal a large amount of high-density problems but the physical properties are left in vain (Appenroth, 2007). The study on surface water and land resource management planning indicated should be taken forward for the conservation of precious water (Joshi *et al.,* 2007). Investigation, monitoring seasonal variations in concentrations of heavy metals Pb, Fe, Zn, Mn, Cd, Co, Cu, Cr and Ni in Yamuna River water flowing through Delhi.). High concentrations of all metals such as Cr, Cu, Ni, Pd and Zn were observed in the

Gomti river (Mishra and Mishra, 2008). It extends agricultural runoff from its vast catchment area directly or throughout the course to 10 districts, receiving untreated row wastewater and industrial waste through its five major tributaries. And more than 40 drains in Lucknow (UPPCB, 2013).

Materials and Methods

The geographical study area of Gomati River in lucknow is located as 26.30°C north latitude And 27.10°C located in the central Gangetic Plain and 80.30°C and 81.13°C eastern longitude. The city has a humid dry subtropical climate with cool dry winters from December to February and strong summers from April to June. Temperatures range from 48.9°C in summer to 1.67°C in winter. The city receives about 900 mm of annual rainfall from the southwest monsoon between July and September. The height of the city varies from 100 to 130 meters above sea level and generally slopes to the east.

Water Sampling Process

The process of collecting a representative portion of water from natural the process of collecting a representative portion of water from the natural environment or from an industrial site, for the purpose of analysing it for components. The process of taking a part of water for analysis or other testing. Such as drinking water to check if it complies with pollutants, or river water to test bath water, to check that it is safe. The primary goal of a water sample is to observe and measure how water quality changes over time. If a sample of flowing water body is taken, point the bag upward and your hands downward to avoid contamination. If a sample is taken from a water tap, run the tap for 1 minute before receiving the sample. Rinse the bag twice with sample water before filling and closing. Fill the bag as much as you can. Half filling the bottle leaves more room for oxygen which will promote erosion of your sample. Collect data such as temperature and pH that affect the solubility of many ions. Whether your water causes disease, plumbing, zigzag coagulation or stains on poor taste, water analysis identifies the problem and enables you to make knowledgeable decisions about water treatment

Sample collection sites

Water Quality Parameters

Temperature of surface water from Gaughat to Gomti barrage.

The pH value of surface water from Gaughat to Gomti barrage.

Total suspended solids of surface water from Gaughat to Gomti barrage.

Total suspended solids in surface water Gaughat to Gomti barrage.

Dissolved oxygen in surface water samples from Gaughat to Gomti barrage.

Surface water cadmium from Gomukh to Gomti barrage.

Surface water samples from Gaughat to Gomti Barrage.

Total hardness of surface water samples from Gaughat to Gomti barrage.

Chloride of surface water samples from Gaughat to Gomti Barrage.

Copper of surface water samples from Gaighat to Gomti barrage.

Iron Surface water samples from Gaughat to Gomti Barrage.

Nitrate of samples of surface water from Gaughat to Gomti Barrage.

Nitrite of surface water samples from Gaughat to Gomti Barrage.

Drinking Water Quality

The water quality standards suggested by World Health Organization (WHO), Indian Council of Medical Research (ICMR) and Bureau of Indian Standards (BIS) for drinking use were used in the suitability analysis of the groundwater for drinking purposes and the guidelines suggested by Food and Agricultural Organization (FAO) were used for predicting the suitability of groundwater for agricultural irrigation.

Irrigation Water Quality

Irrigation water quality refers to the chemical characteristics of water that can exert direct impact on soil-plant-water relationship. These include salinity, water infiltration rate, pH, specific toxic ions concentration and excess nutrients (Ayers and Westcot, 1985; Bauder *et al.,* 2004). In agricultural activities, pH and toxic ions can affect the potential growth of plants on the other hand the combined effect with total salinity pose more complicated and hazardous effects to produce yield. The guidelines for evaluating the quality of water in respect of irrigation are given in Table 3 (Ayers and Westcot, 1985) and Table 2 (BIS, 2012).

Results and Discussion

The water quality of the Gomti river on the Lucknow section is shown in the table: 2. The total stretch is divided into the number of reaches: Gaughat to Hussainabad, Hussainabad to Gulalghat, Gulalghat to Kudiyaghat Nala, Kudiyaghat Nala to Pakkapul, Pakkapul to Mohan Meekin. Pollution of river Gomti from Mohan Makakin to Daliganj, Daliganj to Hanuman Setu, Hanuman Setu to Boat Club, Laxman Fair to Boat Club, Monkey Bridge to Laxman Fair, Monkey Bridge to Parag Factory, Parag Factory to Baikuntha Dham and Baikuntha Dham to Gomti Barrage. The quality of water has deteriorated due to the disposal of sewage from the drains. The various water quality parameters of the Gomti River are discussed below. Water samples the Gomti River at all fifteen experimental sites was analyzed for various physico-chemical parameters such as Temp, pH, DO, TDS, TSS, water hardness, cadmium (Cd), copper (Cu), arsenic (As), chloride (Cl), nitrite, nitrate, and iron are all described in the below table 3.

Temperature

The study samples varied from 20.0ºC to 12.0 ºC along the Gomati River during the sampling period. The lowest temperature was recorded at 12. ºC at 500 meters from the point source of the UFFL in the winter season. High environment temperature can be dangerous to human body and acceptable range for drinking water is 20 ºC and for irrigation water is 13 ºC. The temperature graph of study area shown in fig. 3

pH

A measurement which determines the level of acidity or alkalinity of the water. Most water samples have a pH greater than 7.0. Acidic water (<6) could cause corrosion of metal parts in irrigation equipment. The pH is one of the most important factors that influence the aquatic production. In the present study the pH was found normal at all station. The range of pH was 6.5-8.5 good for drinking water. When we drink liquids that are too acidic or too alkaline it can disrupt the bodies delicate balance, like disease, illness and bacteria. Irrigation water with Ph outside the normal range may causes the nutritional imbalance or may contains a toxic ion, corrode piplines sprinkler. The pH graph of study area shown in fig. 4

Total Dissolved Solids

Related to the amount of dissolved salts in the water. Higher salinity results in higher electrical conductivity. As the salt level increases, the plant must expend more energy to take in nutrients dissolved in the water from fertilizer and the soil. Some plants are very sensitive to salinity, while others can tolerate a wide range. TDS is calculated from the Electrical Conductivity, which is the analytical test used to determine salt concentration. In drinking water high level of TDS mean unfit for consumption and several diseases like Nausea,

Lungs, Irritation rashes, vomiting, dizziness etc. The TDS graph of study area shown in fig. 5

Total Suspended Solids

The analysis showed higher values of suspended solids at Lucknow i.e. Mohan Meakin, Upstream barrage, Piperaghat. It might be due to presence of high organic matter. The total suspended solids are composed of carbonates, bicarbonates, chlorides, phosphates and nitrates of calcium, magnesium, sodium, potassium, manganese, organic matter, salt and other particles. Higher values of suspended solids were found in post monsoon which might be due to run off from many bathing ghats, drain water discharge, industries, agricultural fields and garbage dump sites. Study showed lower values during winter and summer seasons. The total suspended solids graph of study area shown in fig. 6.

Dissolved Oxygen (Do)

The stretch of Gomti river from Gaughat to Pipraghat showed decreasing trend of dissolved oxygen. Gaughat showed the maximum content whereas Pipraghat showed the minimum. The DO at Gaughat is maximum because the water at this site is least polluted from industrial, sewage and domestic waste. However, when river reaches the Gomti barrage and Pipraghat, it gets heavily polluted due to discharges from various cis and trans drains emptying into the river round the year which is shown in figure 7. During rainy season dissolved oxygen decreases as compared to summer and winter as in rainy season runoffs from the agricultural fields and industries directly enter into the river without any treatment. At Gaughat, the water of the river is clean and no turbidity has been found. The water at Kudyaghat is slightly polluted due to the discharge from drains. The content of dissolved oxygen is sufficient enough so that the fishes can survive here. The dissolved oxygen level at Mohan Meakin during the winter and summer seasons is high as compared to the rainy season because of the heavy runoff. At this sampling location dissolved oxygen level decreases because of the pollution from drains and industries.

Table.1 The samples collected from the different location of the study area Gomti river

1. Gaughat	**10.Boat Club**
2. Hussainabad	9. Hanuman Setu
3. Gulalghat	11.LaxmanMela
4. Gudiyaghat	12. Monkey Bridge
5. Pakkapul	13. Parag
6. Mohenemkin	14. BaikunthDham
7. Mankameshwar	15 Gomti barrage
8. Daliganj	

Table.2 Drinking water standards suggested by Bureau of Indian Standards

S.No.	Parameter	Standard Value*
1	pH	8.00
2	Turbidity	5.00
3	Electrical Conductivity	300.00
4	Total Dissolved Solids	500.00
5	Total Hardness	200.00
6	Ca	75.00
7	Mg	30.00
8	Cl	250.00
9	Alkalinity	200.00
10	Dissolved Oxygen	5.00
11	Nitrate	45.00

*Source :*BIS *IS: 10500-2012; *except pH and Turbidity (NTU) the units are in mg/l*

At Nishatganj drain sampling location there is heavy depletion of dissolved oxygen because of the higher BOD level. This sampling site is almost at the middle of the city, therefore sullage content is high. This variation of DO is shown in figure no.6. The Gomti barrage constructed at downstream end of the town impounds most of the sewage entering the river. This also stops the river from flowing. The flow will become stagnant and there is high depletion of dissolved oxygen.

Cadmium

Rivers containing excess cadmium can contaminate surrounding land, either through irrigation for agricultural purposes, dumping of dredged sediments or flooding. It has also been demonstrated that rivers can transport cadmium for considerable distances, up to 50 km, from the source (WHO, 1992), Nonetheless, studies of cadmium contamination in major river systems over the past twenty to thirty years have conclusively demonstrated that cadmium levels in these rivers have decreased significantly since the 1960s and 1970s (Cook and Morrow, 1995), The lowest level of cadmium 0.011mg/l at kudiyaghat and highest level of cadmium 0.02 mg/l at laxmanmela. The cadmium graph of study area shown in fig. 8

Fig.1 Location of study area map of Gomati river Lucknow U.P in India

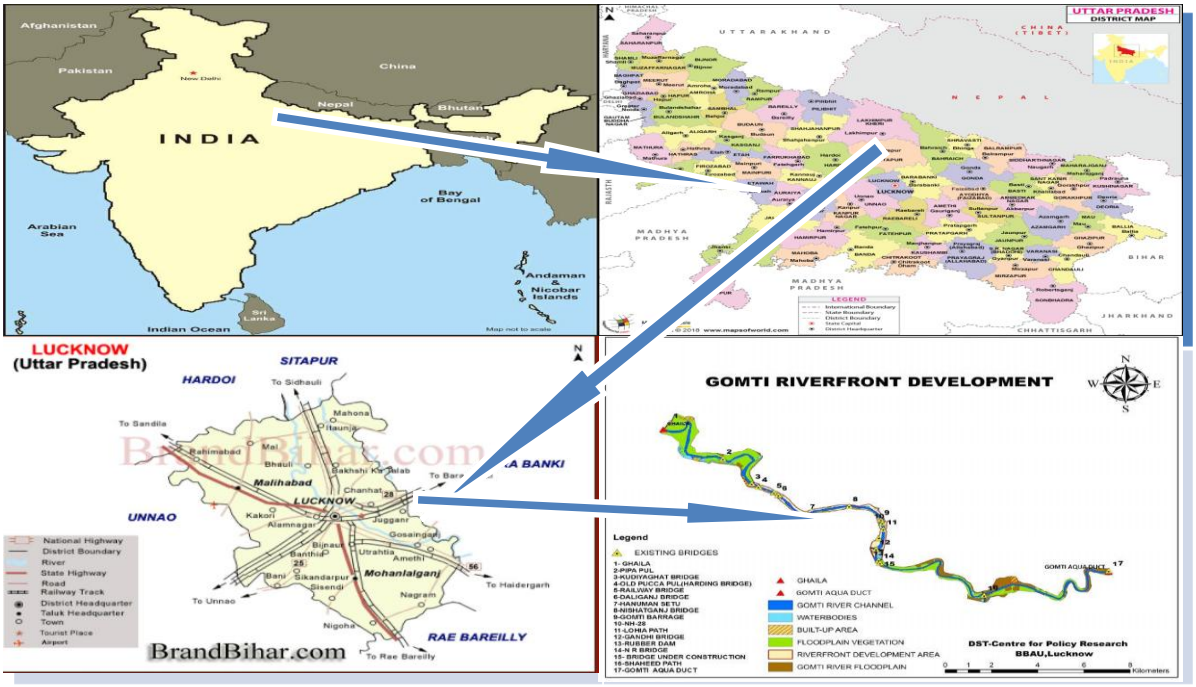


Fig.2 Flow chart of the proposed work

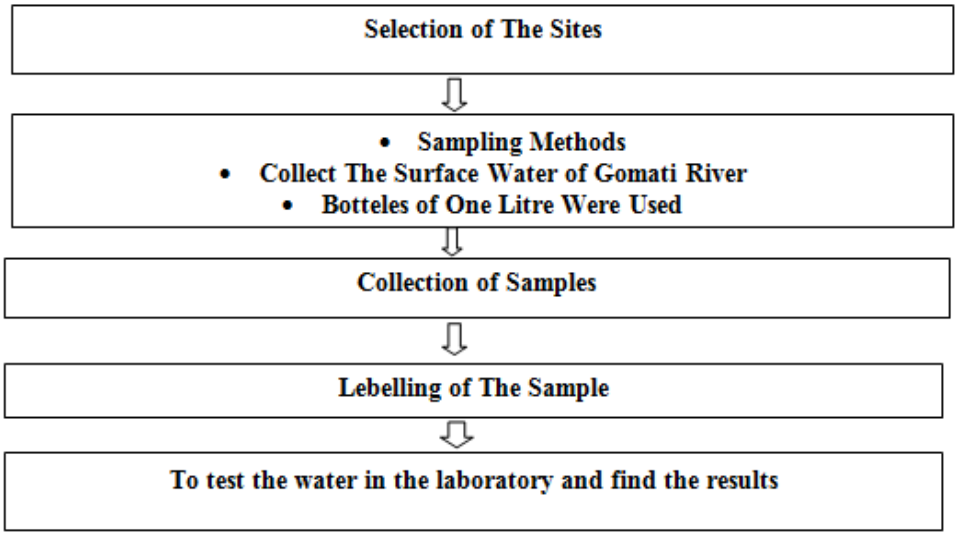


Table.3 Different physio-chemical paramerter tested in the adhita bio-science laboratory lucknow U.P

Location	P^H	TDS	TSS	As	Cd	Nitrate	chloride	iron	cu	hardness	Nitrite	Do	Temp
		Mg/lit	Mg/lit	Mg/lit	Mg/lit	Mg/lit	Mg/lit	Mg/lit	Mg/lit	Mg/lit	Mg/lit	Mg/lit	℃
Gaughat	7.55	357.5	417.5	0.0375	0.0181	44.795	3.059	0.665	0.0145	175.5	0.55562	3.33	18
Hussainabad	7.84	404	525.5	0.062	0.021	55.065	7.8525	1.021	0.061	166.5	0.1305	2.3	16
Gulalaghat	7.76	611	465	0.04	0.0199	41.68	8.426	0.077	0.0325	175.5	0.09269	2.65	20
Kuriyaghat	7.88	405	485.5	0.029	0.0118	45.87	25.881	0.725	0.018	149	0.45935	4	17
Pakkapul	8.26	556.5	460	0.07	0.021	53.925	88.157	0.092	0.0315	249.5	0.1239	2.55	18
Mohan Meakin	8.58	555.5	565	0.046	0.0163	31.275	32.374	0.85	0.017	214.5	0.26669	1.95	19
Mankameshwar	7.54	504	494.5	0.049	0.0202	66.475	62.655	0.715	0.0525	231	0.3772	2.15	16
Daliganj	6.88	600	55.7.5	0.079	0.023	77.39	41.505	1.075	0.0195	206	0.18275	2.6	12
Hanuman setu	7.85	525	453.5	0.039	0.0208	73.545	20.665	0.8015	0.024	183.5	0.1706	2.85	14
Boat Club	8.47	440	537	0.0305	0.0242	51.33	14.61	0.405	0.0185	169	0.0441	2.55	16
Lakshamanmela	7.51	455	538	0.0495	0.01755	89.805	18.657	0.72	0.026	175	0.68005	1.7	19
Monkey bridge	7.79	486.5	485	0.06	0.0197	45.75	16.868	1.685	0.023	140	0.12795	2.1	18
Parag	7.88	620	678.5	0.0360	0.0176	57.55	2.61	1.485	0.0255	198	0.36455	1.7	19
BaikunthDham	7.65	417.5	469	.0385	0.0144	57.205	16.2995	1.545	0.025	179	0.40025	2.05	18
Gomti Barrage	8.28	573.5	595	0.0705	0.0223	64.58	19.265	1.525	0.026	161	0.314	2.65	16

Table.4 Comparation for the drinking water on the basis of BIS and tested parameter from the laboratories

Parameters	BIS Standards for Drinking water	No. Of Sample Exceed Permissible Limit	Percentage Of Sample Exceeding Permissible Limit(%)	Permissible OR not Permissible
pH	6.5-8.5	0	0%	Permissible
Total dissolved solids	500	7	45%	Not Permissible
Total suspended solids	75.0	14	95%	Not Permissible
Arsenic	0.05	4	30%	Not Permissible
Cadmium	0.01	7	45%	Not Permissible
Nitrates(NO3)	45	12	85%	Not Permissible
Chloride(Cl)	250	0	0%	Permissible
Iron	0.3	13	90%	Not Permissible
Copper(Cu)	0.05	1	5%	Partially
Hardness	300	0	0%	Permissible
Nitrite(NO2)	0.5	1	5%	Partially
Dissolve Oxygen(DO)	4.0	0	0%	Permissible
Temperature	20	0	0%	Permissible

Table.5 Comparation for the irrigation water on the basis of BIS and tested

Parameters	BIS Standards for Irrigation water	No. Of Sample Exceed Permissible Limit	Percentage Of Sample Exceeding Permissible Limit(%)	Permissible OR not Permissible
pH	6.5-8.4	0	0%	Permissible
Total dissolved solids	500	8	50%	Not Permissible
Total suspended solids	50.0	15	100%	Not Permissible
Arsenic	0.10	0	0%	Permissible
Cadmium	0.30	0	0%	Permissible
Nitrates(NO3)	50	10	70%	Not Permissible
Chloride(Cl)	140	0	0%	Permissible
Iron	5.0	0	0%	Permissible
Copper(Cu)	2.0	0	0%	Permissible
Hardness	100	15	100%	Not Permissible
Nitrite(NO2)	0.3	0	0%	Permissible
Dissolve Oxygen(DO)	5.0	0	0%	Permissible
Temperature	13	14	95%	Not Permissible

Fig.3 The temprature graph of the study area the different location of the lucknow which are mention in the fig.

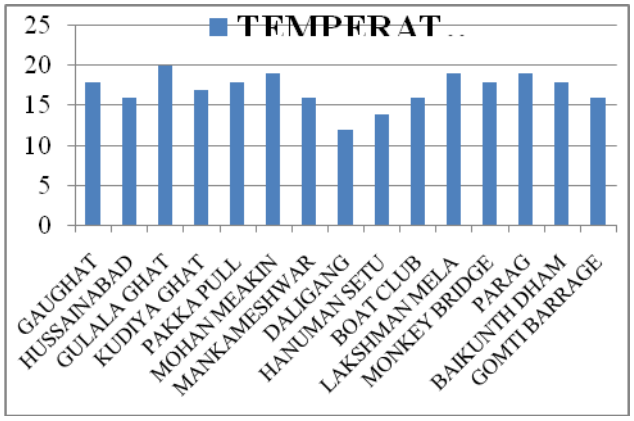


Fig.4 The pH graph of the study area the different location of the lucknow which are mention in the fig.

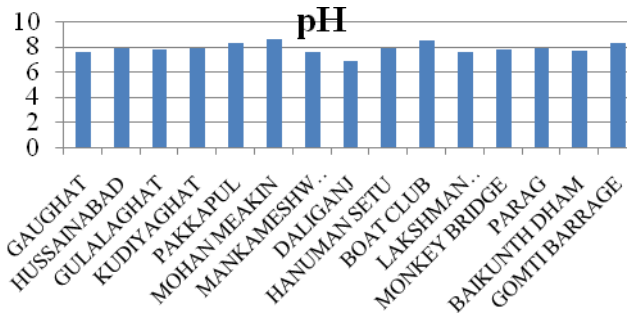


Fig.5 The Total dissolved solids graph of the study area the different location of the lucknow which are mention in the fig**.**

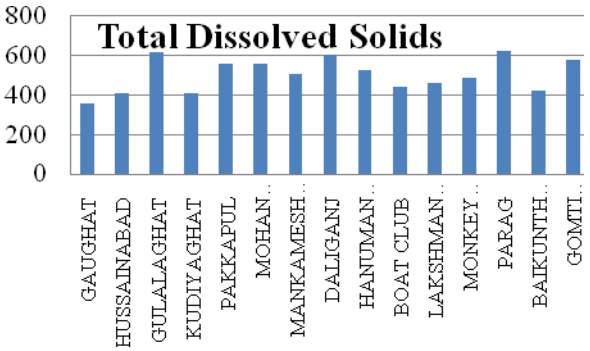


Fig.6 The Total suspended solids graph of the study area the different location of the lucknow which are mention in the fig

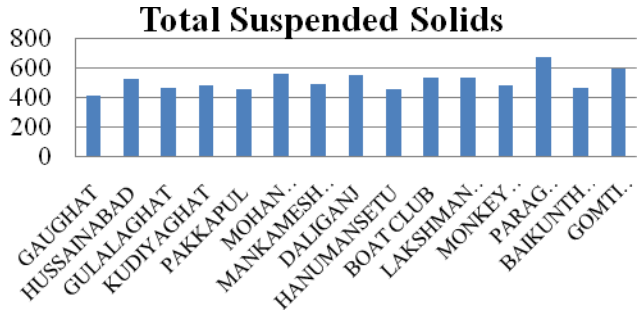


Fig.7 The Dissolve oxygen graph of the study area the different location of the lucknow which are mention in the fig

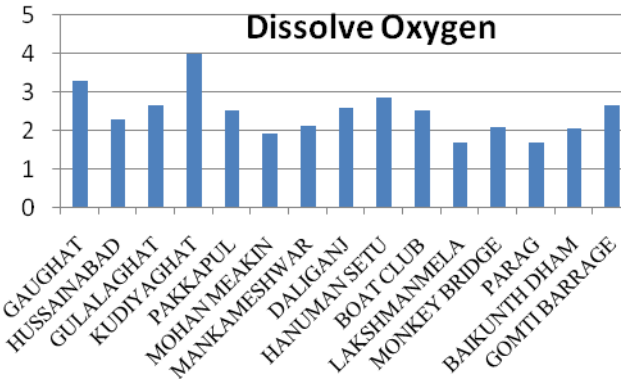


Fig.8 The Cadmium graph of the study area the different location of the lucknow which are mention in the fig.

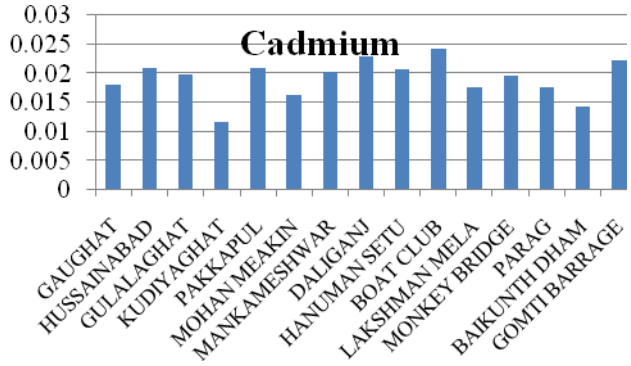


Fig.9 The Iron graph of the study area the different location of the lucknow which are mention in the fig.

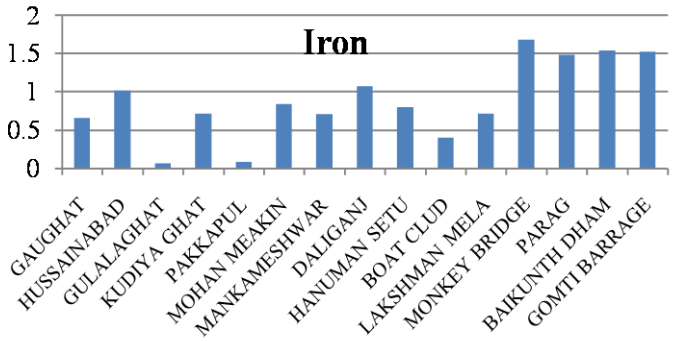


Fig.10 The Total hardness graph of the study area the different location of the lucknow which are mention in the fig.

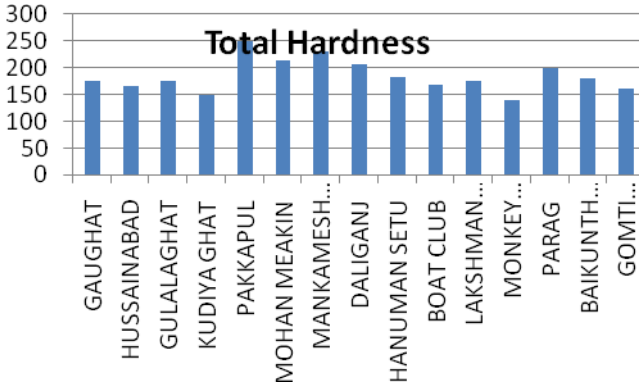


Fig.11 The Chloride graph of the study area the different location of the lucknow which are mention in the fig.

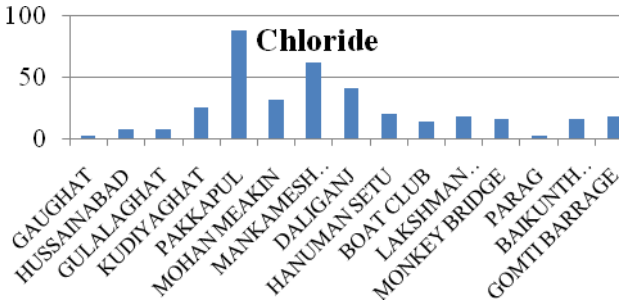


Fig.12 The Copper graph of the study area the different location of the lucknow which are mention in the fig.

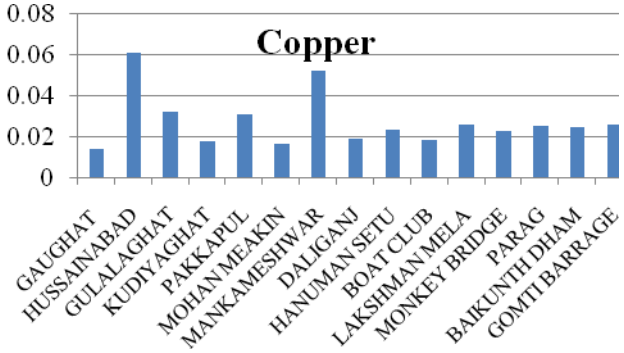


Fig.13 The Arsenic graph of the study area the different location of the Lucknow which are mention in the fig

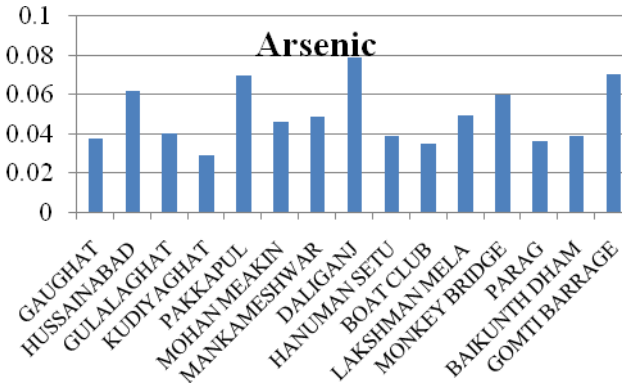
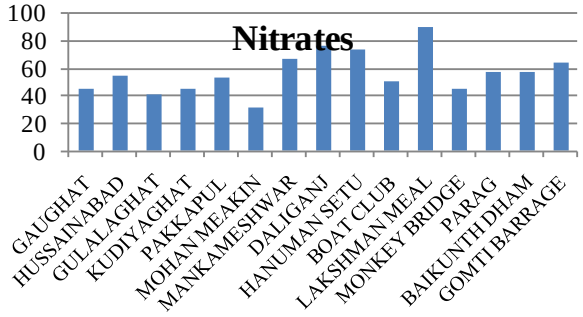


Fig.14 The Nitrates graph of the study area the different location of the Lucknow which are mention in the fig.



Iron

The median iron concentration in Gomti rivers has been reported to be 0.665 mg/litre Gaughat and 1.525 mg/l at Gomti barrage. concentrations will usually be 0.5–10 mg/litre, Concentrations of iron in drinking-water are normally less than 0.3 mg/litre but may be higher in countries where various iron salts are used as coagulating agents in water-treatment plants and where cast iron, steel, and galvanized iron pipes are used for water distribution. The iron graph of study area shown in fig. 9

Total Hardness

Hardness is most commonly expressed as milligrams of calcium carbonate equivalent per litre. Water containing calcium carbonate at concentrations below 60 mg/l is generally considered as soft; 60-120 mg/l; moderately hard; 120-180 mg/l and more than 180 mg/l very hard (McGawn, 2000). Although Total Hardness level are commonly reported in lowest hardness level 140 mg/l at Monkey Bridge and maximum hardness level 249.5 mg/l at Pakkapul. The total hardness graph of study area shown in fig. 10

Chloride (Cl)

Although chloride is essential to plants in very low amounts, it can cause toxicity to sensitive crops at high concentrations. An anion element that can be very damaging to plants in high concentrations.

This is especially true when it is accompanied by high concentration of sodium. Like sodium, high chloride concentrations cause more problems when applied with sprinkler irrigation. Leaf burn under sprinkler from both sodium and chloride can be reduced by night time irrigation or application on cool, cloudy days. Drop nozzles and drag hoses are also recommended when applying any saline irrigation water through a sprinkler system to avoid direct contact with leaf surfaces. The lowest value of Chloride is 2.61 mg/l at Parag Colony. Whereas highest level of concentration is 88.15 mg/l at Pakkapul. The chloride graph of study area shown in fig. 11**.**

Copper

Copper concentrations in surface water Range from 0.0005 to 1 mg/l and River water copper concentrations Range from 0.003 to 0.019 mg/l by studies in USA. Concentration of copper in Gomti River water is commonly reported from the lowest value of Copper is 0.014 mg/l at Gaughat. Whereas highest level of concentration is 0.052 mg/l. The copper graph of study area shown in fig. 12

Arsenic

Geothermal water can be a surface of inorganic arsenic in surface water and ground water (welch *et al.*, 2000). As per BIS Standard (IS 10500:2012) the maximum permissible limit of Arsenic in water is 0.01 mg/l. The lowest value of Arsenic is 0.02 at Kudiyaghat. Whereas highest level of concentration is 0.07 at Gomti Barrage. The arsenic graph of study area shown in fig. 13

Nitrates

The U.S Environmental Protection Agency (EPA) standard for Nitrates permissible limit for drinking water is 10 mg/l or below 10 mg/l is considered safe for everyone. The Nitrates in surface water is normally low (0-18 mg/l).But can reach high level as a result of Agriculture, Runoff, Refuse dump, with contamination with human or animal waste. Gomti river Nitrates reported as the lowest value of nitrates is 31..27 mg/l at Mohan meakin. Whereas highest level of nitrates is 89.80 mg/l at Laxmanmela. An anion element that can cause problems in high concentration in drinking water, but not in irrigation water. High nitrates in irrigation water provide nutrients to the crop. The nitrates graph of study area shown in fig. 14

Nitrite

Nitrite level in drinking water are usually below 0.1 mg/l. The maximum acceptable concentration of

nitrite 3 mg/l (equivalent to 1 mg/l nitrite to nitrogen). Nitrite levels above 0.75 ppm in water can causes stress in fish and greater than 5 ppm can be toxic to human and animals. The lowest value of Gulalaghat is 0.0926 mg/l and highest value of Laxmanmela is 0.6800 mg/l.

Summary

Study revealed that water quality of Gomti river was found to be more polluted at the downstream of the stretch as compared to the other sampling sites. Physio-chemical and microbiological quality of Gomti river was poor, unsafe and not acceptable for any purpose. The level of all the indicators are above the standards which are the serious concern for the ecology of the river. The deterioration of water was due 26 drains along its stretch. Various industrial waste, agricultural waste and domestic wastes are the main cause of increasing urbanization and population resulted in the increase in generation of waste that is being discharged into the river. It leads to increase in the content of heavy metals those results in pollution of river water. Due to huge amount of organic and inorganic matter, river lost its self-purification nature, resulting higher bacterial growth. That is why it is very necessary to treat the waste coming from industries and other sources before merging into the river so that the aquatic as well as human life may not get affected.

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