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A case study of comparison of hydrobiological parameters in rainy season of Gagan River

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Abstract
Present paper deals with the assessment of water quality of Gagan River in the rainy season between two year time duration. In Gagan river water quality is adversely effected by improper sewage and effluent discharge from small and large scale discharges, human activities etc. The result obtained from different parameters studied are pH (6.54-8.02), BOD (22.1-49.0), COD (45.5-68.55), Alkalinity (235-269), Turbidity (125-666) etc. Each of which is greater or lesser in quantity.

Keywords: hydrobiological, Gagan River, quality, duration

1. Introduction
It is fascinating fact that only 0.01% of total water on earth is in atmosphere. On a global scale, total abundance of water is not the problem, the problem is water's availability in the right place at the right time and in the right form. Today the easy availability of pure water is a major problem. As 80% of our rivers are polluted due to industrial and domestic discharge. With increasing pollution problem in water, availability of pure water is decreasing at a greater rate. Most of the cities of India are facing water crisis and availability of freshwater for human consumption become a dream.

Today it is estimated that about 15-20 liter of water is consumes/person /day and after used by particular person it becomes sewage or waste water. Water industry introduced a rapid entry of new technologies for water purification. Some of them are membrane filtration, advanced oxidation, ion exchange and biological filtration. Membrane filtration technology is vigorously becoming accepted in the water treatment industry. Low pressure membrane (MF and UF) is now replacing conventional filtration for surface water treatment at several locations.

Moradabad- a major city of Northern India and it situated at the bank of Ram Ganga River. It's altitude from sea level is approx 670 feet and is at 28°20', 29°15' N and 78°4', 79°E having urban population more than 3.7 million and has seen rapid industrialization during last few decades. The city is full of brass & glass cottage industries. A paper industry, some electroplating plants & other small-scale industries situated in the heart of Moradabad city. The annual turnover of this city is nearly rupees 10,000 million. Most of the industries are dumping off their effluents in two major rivers of the city- Gagan & Ram Ganga

2. Study area
Gagan River is originated from a pond at Harganpur of Nazibabad, which is located in district Bijnor. It travels through J.P. Nagar and Moradabad covering the total area of about 150 km. In South-East of Moradabad, Gagan and Ram Ganga river mixes at Seekanderpur Patti. Two small rivers, Bann and Karula-I originating from district Bijnor are mixing at the right bank of Gagan River at Moradabad city. A large number of densely populated villages are situated on both side of Gagan River. Thousands of people are dependent on Gagan river water for their daily life. The Gagan water seems to be highly polluted and unfit for human and animal consumption.

Five different sites in and around Moradabad along river Gagan is selected for the collection of sampling (1) chaudharpur (2) upstream river at Moradabad delhi bridge (3) downstream river at Moradabad- delhi bridge (4) upstream river at Moradabad – sambhal bridge (5) downstream river at Moradabad- sambhal bridge.

3. Material and Methods
10L of water samples collected from 5 different locations from the five stretches of the Gagan River. Sampling has been done in the month of August and September (2017-2018). Collection of samples takes place in polythene bags. Transparency, temperature were recorded on the site. For the guesstimaton of BOD and DO the samples were fixed on the sampling spot. Other parameters like calcium, alkalinity, turbidity etc are estimated in laboratory. Transparency by secchii disk method alkalinity by physical method pH by pH meter turbidity by Turbidity meter Electrical conductivity by EC meter Biological Oxygen Demand (BOD) by 5 days incubation method Dissolved Oxygen (DO) by Titration method Chemical Oxygen Demand (COD) by Dichromate titration method Total Dissolved Solids (TDS) by Gravimetric method after filtration Calcium (Ca^{2+}) by EDTA titrametric method Nitrate (NO_3^-) by Ion selective electrode method (B) Total Biomass

Result and Discussion

Table 1

S.No	Temperature		Transparency		pH	
	2017	2018	2017	2018	2017	2018

Site A	29.7	29.3	22.6	22.4	8.28	8.02
Site B	30	30.3	14.25	13.06	7.59	7.55
Site C	31.6	30.7	10.13	10.00	6.54	6.84
Site D	27.2	29.6	19.5	18.91	7.81	7.23
Site E	31.7	29.7	18.875	17.32	7.845	7.89
	nitrate		Total Dissolver Solids		Dissolved Oxygen	
	2017	2018	2017	2018	2017	2018
Site A	2.31	2.35	295	280	6.21	6.73
Site B	2.225	2.09	236	238	3.2	3.89
Site C	1.9	2.22	245	253	1.75	2.04
Site D	1.235	2.70	197	205	2.05	3.88
Site E	2.065	2.93	59	50	1.6	2.96
	B.O.D		C.O.D.		Electrical Conductivity	
	2017	2018	2017	2018	2017	2018
Site A	22.1	23.5	68.5	68.55	268	365
Site B	30	32.5	45.5	47.03	520	566
Site C	46.5	49.5	58	58.23	535	609
Site D	44	39.8	60.5	62.50	445	410
Site E	38	37.2	56	56.06	475	505
	Turbidity		Alkalinity		Calcium	
	2017	2018	2017	2018	2017	2018
Site A	125	127	235	229	14.5	10.89
Site B	210	220	250	238	29.058	25.073
Site C	360	377	255	245	15.03	10.83
Site D	630	666	267.5	269	19.038	18.35
Site E	50	57	265	267	20.038	15.66
	Total biomass		color			
	2017	2018	2017		2018	
Site A	3.01	4.02	Almost transparent		Off white	
Site B	3.909	3.881	Off white		Off white	
Site C	4.833	4.573	Off white		Off white	
Site D	2.903	1.909	Off white		Off white	
Site E	3.781	3.783	Off white		Off white	

Dissolve Oxygen (DO): Dissolve oxygen is one of the key factor of natural or waste water and is influenced by the physio-chemical parameter and biological activity. Dissolved oxygen varies from 1.6 mg/l to 6.73 mg/l during rainy season of 2 year (2017 and 2018) study time of Gagan River

Total Dissolve Solid (TDS): TDS shows the common salinity nature of river water. High amount of TDS causes a thin layer of salt in cooking utensils. TDS value determined in the study area varies from 59 mg/l to 295 mg/l in the rainy season of year between 2017 and 2018

Temperature-Temperature controls the behavioral characteristics of organisms, solubility of gases and salts in water, no other factor has so much importance as temperature the temperature range lies between two year varied from 27.2^{o}C to 30.7^{o}C

Turbidity-Turbidity is the measurement of extent to which light is either absorbed or scattered by suspended material in water the range of turbidity varies from 50 NTU to 666 NTU in the rainy season of both year 2017 and 2018.

Electrical Conductivity- It is the measure of capacity of a substance to conduct the electric current. Most of the salts in water are present in their ionic form and capable of conducting current. The vlue of Electrical conductivity varies from 268 µmoh /cm to 609 µmoh /cm in the rainy season of year between 2017 and 2018

Alkalinity**:** The capacity of water to neutralize strong acid is known as alkalinity. The alkalinity of the samples is in the value range from 229 mg/l to 269 mg/l in the rainy season of both year 2017 and 2018.

Calcium: (Ca2+) ions are important element to develop proper bone growth. Its nature is alkaline. Calcium content is very common in groundwater because they are available in most of the rocks in abundant amount. Calcium of water samples ranged from 10.83 mg/l to 29.058 mg/l in the rainy season of 2017 and 2018.

Chemical Oxygen Demand: COD is the amount of oxygen consumed by oxidisable organic substance. In the present study, COD value varies from 45.5 mg/l to 68.55 mg/l in rainy season between two year (2017-2018) study period.

Biological Oxygen Demand – BOD is the amount of degradable organic matter present in a water sample. BOD values between year 2017 and 2018 comes under the range of 22.1 to 49.5.

pH- pH gives an idea of the concentration of hydrogen ions, which in turn yields indirect information of free CO_2 content, alkalinity, dissolved oxygen, dissolved solids and thus may serves as test of several environmental conditions The observed value of pH ranging from 6.54 to 8.28 in the rainy season of both the year 2017 and 2018.

Nitrates-Total nitrogen in the sediments comprises nitrates, nitrites and ammonical nitrogen. Almost dead animal and plant tissues release nitrogen to the soil and from the soil to the sediments. In the rainy season of year 2017 and 2018, the pH value varies from 1.235mg/l to 2.93 mg/l.

Total biomass-Biomass is the mass of living plant characteristic material, and generally in respect to volume. Total biomass observed in the present study min. range 1.909 mg/l of site D and max. 4.833 mg/l of site

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