



PHYSIO-CHEMICAL AND BACTERIOLOGICAL ANALYSIS/CHARACTERIZATION OF WATER NATURE OF HINDON RIVER IN GAZIABAD AND NOIDA.

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ABSTRACT

Stream Hindon, a vital tributary of waterway Yamuna moving through the regions of Western Uttar Pradesh, is subjected to fluctuating level of contamination brought about by various untreated and additionally incompletely treated waste contributions of civil and mechanical effluents. The review was done to evaluate the contamination profile along Hindon River .The quality was evaluated as far as physio-compound and natural parameters .There was 5 inspecting locales were chosen for the gathering of test and tests were gathered in month to month interims from the review territory amid three months time frame from January 2017 to march 2017 .The physico-synthetic and natural parameters were water temperature(15.4-22.7 0C) shading (Colorless-light yellow), pH (7.3- 8.9), turbidity(70.4-116.8 NTU), alkalinity (189-487 ppm), acidity(12.0-34.9 ppm), Total Solids (TS) (3900-7340ppm), Total Suspended Solids(TSS)(680-1910ppm) , Total Dissolved Solids(TDS)(3019-6120ppm) Biological Oxygen Demand (BOD)(200- 400ppm) Chemical Oxygen Demand (COD)(200-700ppm) and so forth. The microbial distribution shows the presence of E.coli and other bacteria in water sample.The river water is unfit for the consumption of humans is not possible due to excessive level of coliforms. Water contamination showing parameters were complex higher than as far as possible by the National Pollution Control Agency, i.e. CPCB. This is simply the primary review and the interrelationship of human exercises and waterway water quality makes the review noteworthy and intriguing to evaluate the contamination

stack releases in catchments of Hindon at Ghaziabad. Generally speaking, the water nature of Hindon was moderately poor as for its utilization for local purposes.

Keyword- physico-chemical, microbial analysis BOD, COD, Coliforms

Introduction

Hindon River, a tributary of Yamuna stream, is a waterway in India that begins in the Saharanpur District, from Upper Shivalik in Lower Himalayan Range. The stream is altogether rainfed and has a catchment region of 7, 083 km². It is situated at 28.40 53' N and 77 04' E. It streams between Ganges also, Yamuna streams, for 400 km through Muzaffarnagar Region, Meerut District, Baghpat Region, Ghaziabad, Noida, Greater Noida before it joins Yamuna stream simply outside Delhi. The Hindon Air Force Base of the Indian Air Force additionally lies on its bank in the Ghaziabad locale on the edges Delhi. River likewise assumes a noteworthy part in the digestion and transportation of local and modern waste waters, which shape constant contamination sources and agrarian spillover, which is worldly and generally influenced by atmosphere [1]. River is profoundly inclined to contamination, along these lines it ends up noticeably important to keep beware of surface water quality and translate the worldly and spatial varieties [2]. Consistent observing of the nature of water is fundamental in light of the fact that clean water is obligatory for human health and the integrity of aquatic ecosystems.

Crisp water is a limited asset, basic for horticulture, industry and even human presence, without crisp water of satisfactory amount and quality, practical advancement won't be conceivable [3]. Rivers assume a noteworthy part in absorption or stealing away of civil and mechanical wastewater and overflow from horticultural land, the previous constitutes the consistent contaminating source though the later is an occasional wonder [4]. With the quick advancement in agribusiness, mining, urbanization and industrialization exercises, the stream water contamination with perilous waste and wastewater is becoming a typical marvel. In India right around 70% of the water has turned out to be dirtied because of the release of residential sewage and mechanical effluents into regular water source, for example, waterways, streams and additionally lake [5]. Since water quality and human wellbeing are firmly related, water investigation before utilization is of prime significance. Certain physical, compound and microbiological norms, which are intended to guarantee that the water is tasteful and safe for drinking before it can be depicted as consumable [6]. Therefore, display think about was aimed to break down the relative physicochemical and microbial investigation of five stream water tests utilizing standard strategies. Water is a standout

amongst the most essential parts of survival and a valuable asset of the earth. The nature of the water is quickly changing as per its source. The adjustment in its quality will bother the agreement in nature, and would turn out to be less appropriate for utilize [7]. The wellbeing of water would improve dependability in any group.

Material and method

Study Area

The waterway starts from the upper Siwalik (lower Himalayas), and lies between the scope 28°4' to 35° 5'N and longitude 77°8' to 77° 4' E. The atmosphere of this area is tropical to calm with outrageous temperature conditions in summer (up to 43°C) and winter (up to 3°C). The mean yearly precipitation in this area is 702 mm changing spatially in various sub locales of the areas. The waterway is described by lazy stream consistently, aside from amid rainstorm when precipitation causes a complex increment in the spill over [8]. The review region of the waterway under exhibit consider gone from its passageway in the Ghaziabad to its conversion with the Yamuna River in Tilwada town, Noida, add up to 8 destinations were recognized what's more, chosen for the gathering of tests.

Collection of water samples

Water tests were gathered in 1 liters BOD bottles from the examining locales in month to month interims and taken to the research facility at Gautam Buddha University Greater Noida Lab. The five examining locales S1,S2,S3,S4,S5,were chosen along Hindon stream .Temperature and pH were measured on the spot at testing locales utilizing mercury thermometer and advanced pH meter also, different parameters were investigated prompt at research center and result were contrasted and the Indian Standards.

Physico-chemical parameters

The pH temperature of the water is resolved in situ with a thermometer and digital pH meter. The other physico-chemical parameter like Total solid, Total dissolved solid (TDS) Total suspended solid (TSS), Total hardness (TH) Dissolved oxygen (DO), BOD, COD, chloride, phosphate, Nitrate were inspect. The sampling method were carried out form following standard methods. Analysis of sample from every sites is performed three times and the mean value were used for the further calculations and compared with the standards given by world health organization as summarized in Table 2 and analyzed.

Table 1: Site location and there codes

S1	Road Bridge	
S2	Railway Bridge	
S3	Kulesar	
S4	Shafipur	
S5	Tilwada	

Table 2. Water quality parameters, units and analytical methods for analysis of water quality

S.No.	Parameter	Unit	Method	Instrument
1	pH	-	Instrument	pH Meter
2	Temperature	Degree Celsius	Instrument	Thermometer
3	Total dissolved Solid	Mg/l	Filtration and Gravimetric	Oven
4	Total hardness	Mg/l	EDTA Titration	Titration Assembly
5	Calcium	Mg/l	EDTA Titration	Titration Assembly
6	Total alkalinity	Mg/l	Titration	Titration Assembly
7	Biological oxygen Demand	Mg/l	5 days incubation at 20 degree	BOD incubator
8	Chemical oxygen Demand	Mg/l	Fast incubation	spectrophotometer
9	Nitrate	Mg/l	Instrument	Spectrophotometer
10	Chloride	Mg/l	Titration	Titration assembly
11	Sulphate	Mg/l	Titration	Titration Assembly

Barteriological analysis

Standard techniques were used for microbial analysis of sample. Microbiological analysis were performed to check the presence of total coliform and fecal coliform. Multiple tube techniques were used for enumeration of the coliform bacteria. Nutrient agar used as a basal

medium and Macconkey agar as a differential medium were used. (APHA 1998). All plates were incubating at the 37°C for 24 hrs. Presumptive colony were confirmed by gram staining and biochemical test. Morphologically different colonies were identified using Bergy`s manual of determined bacteriology.

Result & Discussion

Physio- chemical properties of hindon river water

Water is basic forever and access to clean drinking water is a need for good wellbeing .In any case, clean drinking water is not accessible all around, because of water shortage and contamination of existing water assets. The contamination can be as characteristic or anthropogenic exercises [9]. The nature of stream water is influenced by different common elements for example, precipitation, temperature and weathering of rocks and anthropogenic exercises which change the hydrochemistry of River water. Unplanned urbanization and fast development of industrialization increment waterway contamination emergency in stream biological community [10]. The issue of water quality weakening is fundamentally because of human exercises, for example, release of mechanical and sewage squanders and horticultural spillover which cause natural harm and posture genuine wellbeing perils [11].

Table 3 physicochemical Analysis of water samples From water sources.

PARAMETER	WHO	Units	S1	S2	S3	S4	S5
pH	6.5	-	7.9	7.8	8.2	7.9	7.9
Temperature	-	°C	14.7	14.7	16	16.8	16.5
Total hardness	500	Mg/l	459	480	478	496	432
Total dissolved solid	1000	Mg/l	2425	2448	2329	2473	2389
BOD	5.0	Mg/l	41	38	35	43	39
Alkalinity	75	Mg/l	367	456	421	413	432
COD	10.0	Mg/l	67	76	63	64	65
Calcium	49	Mg/l	64.5	66	65	64.7	64.9
Sulphate	200	Mg/l	163	165	162	154	164
Nitrate	45	Mg/l	107	109	108	116	109
Chloride	220	Mg/l	122	134	135	133	137

The physico-synthetic attributes of the water of river Hindon are given in Table 3. The pH of the river Hindon water fluctuates from 7.5 to 8.4, which shows that water is slightly alkaline and it is higher from the permissible limit of WHO norms. The yearly air temperature run in the Hindon River was 16°C to 45.2°C.

TDS is the measure of the solids broken up in the water. This incorporates salts, some natural materials extending from supplements to lethal materials. High TDS in water antagonistically influences the broke up oxygen and expands the organic and substance oxygen request. TDS values in the present review extend from least of 120 mg/l to most extreme 2500 mg/l. High estimations of TDS show the blending of sewerage, fabric washing and junk dumping. The principle wellsprings of TDS in waterway water are common sources, sewage, urban spillover, modern waste water and chemicals utilized as a part of water treatment handle. Alkalinity values lies between 150-505 mg/l. The high estimation of alkalinity demonstrates the sewerage blending in the waterway. Add up to hardness is created because of cations of calcium, magnesium, iron and strontium. In present review TH values ranges from 120 to 500 mg/l. Calcium hardness fluctuates from 32.06 to 123.4 mg/l among various review destinations. Higher calcium content in the stream water is the demonstrative of sewerage and urban overflow [13].

Oxygen required by smaller scale creatures to corrupt natural matter and is the demonstrative of natural toxins in the water. Actually microscopic organisms use natural matter amid breath and expel oxygen from the water. Here, BOD qualities are in the range from 11.4 to 82.7 mg/l, blending of waste waters from various sources is the conceivable reason for high BOD values at a few focuses. The COD is the measure of oxygen proportionate to the natural matter substance of the water defenseless to oxidation by a solid synthetic oxidant and consequently is the list of natural contamination in the stream. COD values run from 16 to 160 mg/l among different destinations. Mechanical waste water stream into the stream is described to the higher COD values in the waterway framework [14].

Nitrate and sulfate values in the river water ranges from 5.61-133.8 mg/l and 18.5-141.2 mg/l individually. Essential profitability of a stream is advanced by nitrate and higher nitrate in the surface waters is considered as an alert of algal blossom. Higher nitrate and sulfate values demonstrate the anthropogenic weight on the waterway. Conceivable well springs of nitrate tainting incorporate manures, creature squanders, septic tanks, sewage treatment frameworks [16].

The nearness of magnesium, calcium, sodium, potassium, chloride and carbonates don't meet the Indian Standards (1974). The utilization of waterway water for waste transfer is conspicuous. At different phases of treatment, the dung of man in the type of sewage starts things out. The utilization of rate of sewage gushing is a parameter for the evaluation of value also, has an incredible legitimacy as it keeps away from itemized thought of every last parameters in a sewage known at present. Result of microbial analysis of the hindon river are present in table 4. The total cfu range were quite high from normal range from 6.3×10^2 cfu/ml to 3.04×10^2 cfu/ml.

Total coliforms include bacteria that are found in the soil, in water that has been influenced by surface water, and in human or animal waste. Total coliforms can be measured by using regression analysis. This will ease the calculations Total coliforms. If coliform bacteria are present in your drinking water, your risk of contracting a water-borne illness is increased.

Fecal coliforms are the group of the total coliforms that are considered to be present specifically in the gut and feces of warm-blooded animals. Because the origins of fecal coliforms are more specific than the origins of the more general total coliform group of bacteria, fecal coliforms are considered a more accurate indication of animal or human waste than the total coliforms. Fecal coliform can be measured by using regression analysis. It indicates the Untreated organic matter that contains fecal coliform can be harmful to the environment. Aerobic decomposition of this material can reduce dissolved oxygen levels if discharged into rivers or river. This may reduce the oxygen level enough to kill fish and other aquatic life. Reduction of fecal coliform in wastewater may require the use of chlorine and other disinfectant chemicals. Such materials may kill the fecal coliform and disease bacteria. They also kill bacteria essential to the proper balance of the aquatic environment, endangering the survival of species dependent on those bacteria. So higher levels of fecal coliform require higher levels of chlorine treatment; threat to aquatic organisms.

Table.4: Bacteriological Analysis of water

s.no.	Sample site	Appearance On Plate	Morphology	Bacteria	Cfu/ml	
1	S1	Mucoid	Spherical	Staphylococcus	$5.5 \pm 0.39 \times 10^2$	
			Rod	Bacillus		
2	S2	Mucoid	spherical	Staphylococcus	$5.9 \pm 0.29 \times 10^2$	
			Rod	Bacillus		
3	S3	Mucoid	Spherical	Staphylococcus	$6.8 \pm 0.19 \times 10^2$	
4	S4	Mucoid	Rod	Bacillus	$6.02 \pm 0.21 \times 10^2$	
			Spherical	Staphylococcus		

5	S5	Mucoid	Rod	Bacillus	5.09±0.23 x 10 ²	
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Table. 5 : Count of coliform bacteria.

S.No.	Site	Total coliform MPN/100	Fecal coliform//MPN
1	S1	24000	1100
2	S2	2.6x 10 ⁴	1400
3	S3	4.9x10 ⁴	1200
4	S4	3.210 ⁴	1250
5	S5	2.3x10 ⁴	1320

Conclusion

The ascent in the inflow waste is plainly because of the quick development of private and business exercises in the review region. because of the release of sewage and household squanders and human exercises the phosphate stack in hindon waterway was exceeded the point of confinement give by the WHO drinking water standards. the sewage blends with the stream framework, the waterway water could be utilized for water system yet this is inadmissible for drinking reason because of presence of fecal coliforms, E.coli, other bacterial populace and higher centralization of phosphate, BOD and COD. The bacteriological tallies in the waterway water make the water unfit for the humans. it is presumed that the waterway is contaminated as it is utilized as a sewer transfer site, but at the same time is experiencing self sanitization and has potential for critical change in water quality if release is dealt with standard checking of stream and taking appropriate therapeutic measures like accumulation of residential sewage and setting up the regular treatment plant before release of sewage into waterway framework it ought to be dealt with this will control contamination and keep the consumption of the nature of river water.

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