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Effects of Air Pollutants on Surface Water Contamination

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Abstract

We know that today pollution is a major problem for every country. Every engineer, scientist to find the solution of this problem. Pollution like water pollution, air pollution, soil pollution, noise pollution these pollution harmful to effect the environment, human being and wild life or ecosystem. It also affects the aquatic life and parameter of water. The air pollutant is directly affect the surface water & these changes in pH, turbidity, BOD, COD, chloride and alkalinity of the water, increase the fluoride & high concentration of sulphates. Some anthropogenic activity affecting water quality include due to fertilizers, manures & pesticides, animal activity, irrigation, deforestation pollution due to industrial effluents and domestic waste, mining and recreation activities. It is injurious to our health. In air pollution the smoke particle is a complex mixture of organic and inorganic particles like soot, smoke liquid droplets, and aerosol. Less than 10 mm particle size is very serious of human being they can get deep into your lungs & blood streams. In our study to check the water quality test of local canal it is a part of ganga river we have selected three point (Meerut, Muradnagar, Masuri, Bulandsher) of this canal and test the water or to compare the standard parameter.

Keywords: Pollution • Air pollutant • Anthropogenic activity • Concentration • Canal • Ganga river • Standard parameters • Ecosystem • Recreation activities • Human health.

Introduction

Now-a-days pollution has been one of the main topic in the environmental issues of countries the quality of the ground water is important source of drinking & daily usage for the population of the country it hardly depend on the quality of the river water. One of the huge risks to human from the surface water pollutant is also polluted with pathogens and water borne diseases. these comes from human activities, industries which become polluted when rain water runoff carries pollutant into the water which is results water lead to less oxygen production is effect the organisms in water low oxygen aquatic life cannot survive [1].

Sediments that represent that source of nutrition for microorganisms have a strong impact on the eco system. they may accumulate different contamination whereas reorganize aqueous phase, causing hazardous effect on the aquatic organism air pollution is also effect the water surface like smog may be having Strong effect on the planet water cycle. Smoke is yellowish or black formed mainly by the mixture of the particles in atmosphere which consist of the fine particle and ground level ozone. Smog is made up of mixture of various gases with dust & water vapour [2].

Smog is often caused by vehicle traffic, high temperature, sunshine, and calm winds. There are a few reasons behind the rising level of air pollution in the atmosphere. In winter months when the wind speeds are low, it helps the smoke and fog to become stagnate at a place forming smog and fog rise the pollution levels near the ground. It hampers visibility and disturbs the environment. In our study to check the water quality parameter of the ganga canal and also check the effect the surrounding local areas and effect of human health [3].

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Research Methodology

Data collection method

There are some steps to follows to attain the objective of our study:

a) Water sample & photograph have been collected from different location.

b) Water sample tested in the environmental laboratory civil engineering department.

c) Surface water samples of the canal were collected from four different points of the canal in during the period of November 2019 to February 2020 and Proper sampling procedure was followed while collecting the samples.

d) Water quality and pollution loads analyzed to find out the present water quality scenario and percent of increase in pollution loading.

e) In this the sampling depth was taken to be 15- 20 cm because our objective in this study to collect the heavy metal concentration water sample this sample is present in deeper section [4].

Sample handle and preservation

In this we ensure that how to our sample is handling and preservation properly. Some factors considered are as follow:-

- first we use clean plastic containers are typically used for inorganic samples, with glass containers.
- proper sample preservation is important if accurate results are to be obtained from the sampling efforts. In general, we take all samples are placed on ice in the dark.
- analyses should be start as soon as possible after collection to avoid sample deterioration [5].

Determination of water quality parameter

Chloride (Cl^-): Filled a square sample cell with 10 ml of sample and another one with deionized water sample pipette 1.0 ml of Mercuric Thiocyanate solution into each sample. Sample was then swirl to mix. Pipette 0.5 ml of Ferric Ion solution into each sample cell and kept the sample for two minutes. After that two cells were placed inside the spectrophotometer and the results were obtained.

Hardness: The 50 ml of sample water was taken in the beaker which was diluted with 50 ml of distilled water. Then 1 ml starch in a packet of reagent was added with the water which was then titrated. However, the reading was taken when the color become purple.

Total Dissolved Solids (TDS): The sample water was taken in the beaker and the probe of the multimeter was placed inside the beaker for few minute. The static result shown on the screen of the multimeter was the TDS of the water.

Biochemical Oxygen Demand (BOD 5): The sample was taken in the bottle and diluted with the water. The probe of the multimeter was placed inside the bottle and the reading was taken and finally the bottle was placed inside the refrigerator at 200°C of temperature for 5 days. After 5 days, the data was taken again trough the multi meter and the result was obtained [6].

Turbidity: The sample water was taken in the small tube of the turbidity meter. The switched was on and then the reading was taken from the meter.

pH: The sample water is taken in small beaker then the probe of the pH meter is placed inside the water and kept for some time. The reading was shown on the pH meter but the final value took when the reading on the screen became static (Tables 1 and 2 and Figure 1).

Total Hardness value range from 128–152 mg/l. Total Hardness is caused due to Dissolved calcium and magnesium from soil and aquifer from soil and aquifer from soil and aquifer minerals containing limestone [7].

Chloride concentration varied from 38–90.5 mg/l. Chlorine in water may indicate pollution due to fertilizers, sewage, industrial waste and human waste. Sewage, industrial waste and human waste (Figure 2).

TDS is the measure of the total solids dissolved in water. In this includes salts, some organic materials ranging from nutrients to toxic materials. High TDS in water affects dissolved oxygen and increases BOD and COD. TDS values in the present study ranged from 155 – 440 mg/l. High value of TDS indicate the mixing of sewage, cloth washing and garbage dumping. The main sources of TDS are sewage, septic system, landfills, nature of soil, Hazardous waste landfills urban runoff, industrial waste water and chemicals used in water treatment process (Figure 3).

Turbidity is the amount of suspended particle such as clay, silt, sand or some other finely divided organic material present in water. According to Indian Standards: 10500 (Drinking water specifications), maximum value of turbidity should be 5 NTU. But here, it is much more than that. It depends upon the finesse and concentration of particles present in water. The turbidity value varies from 8.7-9.9 NTU (Figure 4).

Dissolved oxygen value varied from 1.8 mg/l to 3.7 mg/l. This low value will cause aquatic life to perish because of the deficiency of oxygen as it is a direct measure of the extent of water pollution (Figure 5) [8-12].

Table 1. Limiting value of different water quality parameters.

Parameters	Standard
Chloride	0.2 mg/l
Hardness	200-500 mg/l
Total Dissolved Solids (TDS)	1000 mg/l
Biochemical Oxygen Demand (BOD 5)	0.2 mg/l
Turbidity	10 NTU
pH	6.5-8.5
Dissolved Oxygen (DO)	6 mg/l
Chemical Oxygen Demand (COD)	4 mg/l

Table 2. Hardness range of water.

Hardness	Characteristics of water
0 – 60 mg/l	Soft
61 – 120 mg/l	Moderately Hard
120 – 180 mg/l	Hard
>180 mg/l	Extremely Hard

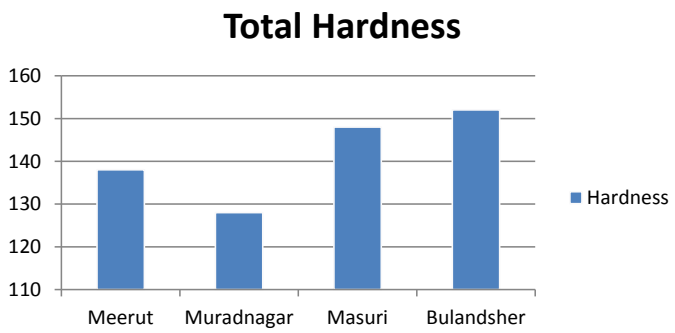


Figure 1. Total hardness (mg/l).

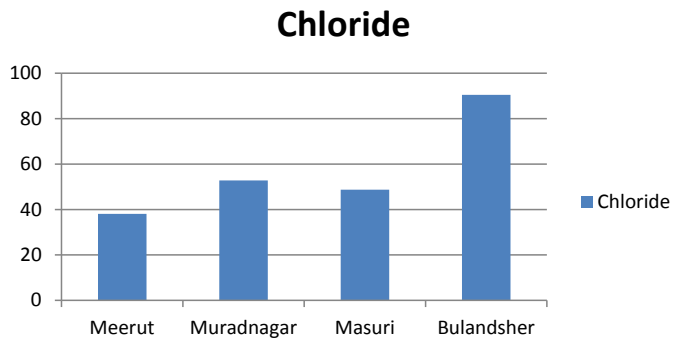


Figure 2. Chloride (mg/l).

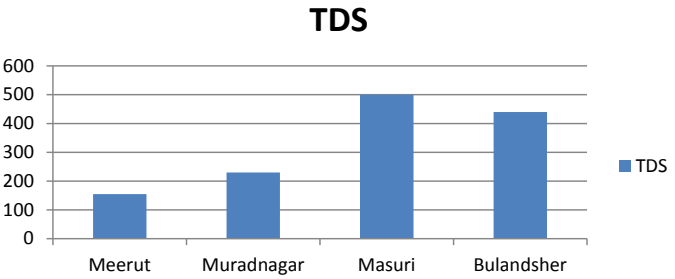


Figure 3. Total dissolved solids (mg/l).

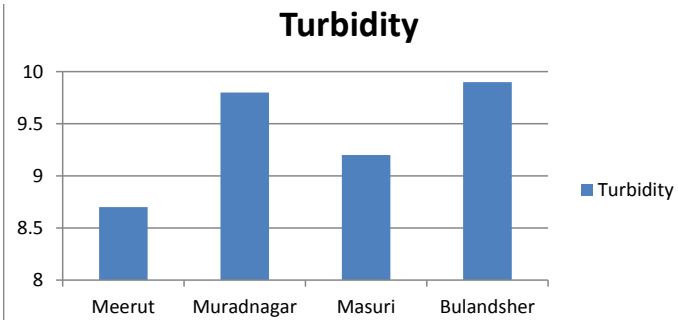


Figure 4. Turbidity (NTU).

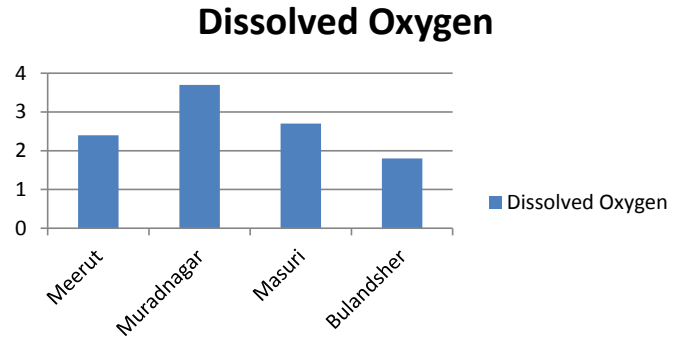


Figure 5. Dissolved oxygen (mg/l).

PH is the log of reciprocal of H+ ion concentration. It is an indicator of the acidity or alkalinity of water. The pH value varies from 7.2-8.5. This showed a slightly alkaline nature of the canal water. High pH value is indicative of bicarbonates and carbonates of calcium and magnesium in the canal water (Figures 6 and 7 and Table 3).

Results and Discussion

Water is a main component of the environment which its quality must be maintained and free from pollution. The researchers made use of standard

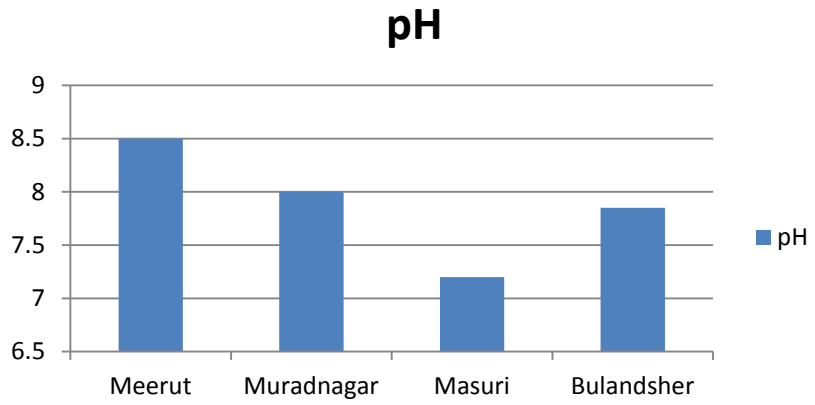
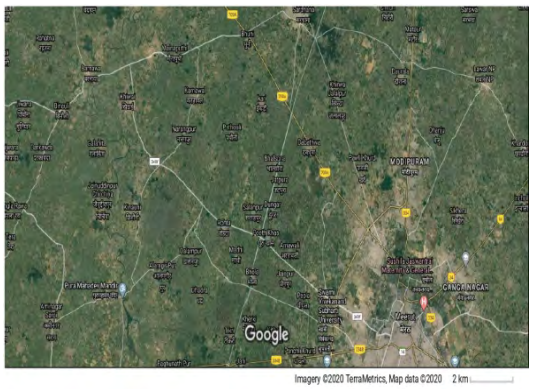


Figure 6. pH.



Location 1: Bhalsona (Meerut district).

Location 2: Masuri.

Location 3: Muradnagar.

Location 4: Bulandsher.

Figure 7. Physicochemical parameter of water in four locations.

Table 3. Physicochemical parameters of water in four location and comparison with desirable limit.

Property	Sample 1 (Meerut)	Sample 2 (Muradnagar)	Sample 3 (Masuri)	Sample 4 (Bulandsher)	Desirable limit
Hardness	138	128	148	152	300 mg/l
pH	8.5	8	7.2	7.85	6.5-8.5
Chloride	38.10	52.8	83	90.5	Not more than 250 mg/l
TDS	155	230	500	440	Not more than 1000 mg/l
Turbidity	8.7	9.8	9.2	9.9	10NTU
Dissolved Oxygen	2.4	3.7	2.7	1.8	4-6 mg/l

method including questionnaire, review of relate literature, sampling and laboratory analysis for obtaining data and information from the field. The Previous studies by authors showed that surface water pollution arises from pollution, anthropogenic activities by transporting sediments from different land uses into nearby surface water bodies. Generally, it is of common knowledge that regions with high human population, pollution and high rate of urbanization tends to suffer more of surface water pollution because human and industries has a mindset that river, canal are dumpsite for disposing off their waste so we should try to understand our environment now these days is not safe for every human being, wild life, aquatic life. Government to take a big step to against the pollution and to make a strict law of pollution.

Conclusion

It can be concluded on the basis of the above parameters that the canal water is polluted. The high value of turbidity has made the water unfit for drinking purpose. The value of hardness prevents the formation of lather with soap. The value of pH is within the permissible limit but the water is not fit for human consumption. In addition, it also makes the water unfit for agricultural purpose. Although some parameters were within the specified limit, but the overall condition of water was not satisfactory [13-16].

Recommendations

In this research four selective locations were used for water sampling. In future these locations that are more representative may be selected in addition to the defined stations.

1. Heavy metal concentration in the river water samples like Mercury, Lead, Cobalt, etc may be measured the future studies at different locations where there is a wastewater outfall from industries.
2. Samples should be tested as early as possible after bringing to the laboratory, preferably by 24 hours. If it is not possible, samples should be refrigerated appropriately.
3. Unavailability of sufficient data required for trend analysis limits the use of such data. So, it is recommended that continuous water quality data be monitored and collected at important locations of the river system.
4. Management plan to restrict the dumping of wastes into surface water bodies is needed in order to reduce the effect on water quality and pollution related health problems. This can be achieved through effective waste management strategy and provision of reliable public water supply.
5. Regular monitoring exercises should be carried out by government agencies and the locals on the activities along the river bank in order to ensure those effluents standards and other sanitary conditions are complied with.
6. Time to time check of environmental effects of surface water pollution should be conducted by researchers to

indicate the trend in pollution loads of rivers, stream and lakes across the globe.

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