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A Review of Water Quality Parameters along Son River District Shahdol (M.P.)

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ABSTRACT:

Water samples were collected from a section of the River near different locations and analyzed to determine various water quality parameters during dry and rainy seasons. The effects of industrial waste, municipal sewage, and agricultural runoff on river water quality have been investigated. The study was conducted within the Chattak to Sunamganj section of the River, which is important because of the presence of two major industries - a paper industry and a cement factory. Another important feature is the conveyors from India to Chattak. This study involves the determination of physical, biological and chemical parameters in surface water at different locations. It can be seen that, in the agricultural sector, polluted water pollutes the soil to the point that it becomes toxic to plants and animals. ,e plants and plants accumulate heavy metals from food waste water in their tissues in concentrations that exceed acceptable levels, which are considered dangerous to ecosystems and aquatic organisms.

Key words: Conductivity, BOD, Total solids, DO

1. INTRODUCTION

The entire district is drained by the Son River and its tributaries. Thus this area falls in the Ganges basin. The Son River flows northwards up to the northern boundary of the district, marking the western boundary of Shahdol district with Umaria district. After that, the Son River flows east and marks the northern boundary of Shahdol district with Satna district. The important tributaries of the Son River are the Kunak River and the Chuwadi River. Son river through its important tributaries like Tipan, Chandas and Bakan drains the south eastern parts of the district with dendritic pattern in north-west direction, draining the central plains of the district. Another important tributary of the Son River is the Banas River, which flows along the eastern boundary of the district, marking the boundary of District Shahdol with Sidhi District. The Banas River and its tributaries Jhanapar River, Kormar River, Rampa River and Odri River flow in the north-western part of the district. The Banas River joins the Son River at the northernmost tip of Shahdol district.

Bansagar is a multipurpose river valley project on the Son River located in the Ganges basin in Madhya Pradesh, which envisages both irrigation and hydroelectric power generation. The Bansagar dam on the Son River has been constructed on the Rewa-Shahdol road in Deolond village of Shahdol district. However, only a small area in the north of the district will benefit from irrigation through this project. Shahdol district still has poor irrigation facilities. Only 9% of the total crop gets irrigation facilities. The tribals of the district prefer to do farming in the old traditional way and are mainly dependent on rains.

Shahdol district experiences a temperate climate, with hot summers, well-distributed rainfall in the southwest monsoon season, and mild winters. The winter season starts from December and lasts till the end of February and is followed by the summer season from March to mid-June. The southwest monsoon or rainy season continues from mid-June to September when the southwest monsoon is active while the months of October and November constitute the post-monsoon or retreating monsoon season. The climate of Shahdol district, as calculated by Thornthwaite Rainfall Effectiveness Method, is a humid climate with forest type vegetation. The month of May is the warmest month with an average daily maximum temperature of 41.40°C and an average daily minimum temperature of 26.50 °C. With the onset of the southwest monsoon during June, day temperatures drop significantly, while in late September or early October, day temperatures rise marginally, but nights become progressively cooler. January is usually the coldest month with an average daily maximum temperature of 25.60°C and an average daily minimum temperature of 8.40°C. The average daily maximum temperature is around 41.40°C and the minimum temperature is around 26.50°C.

The relative humidity usually exceeds 88% (month of August) during the southwest monsoon season. The rest of the year remains dry. The driest part of the year is the summer, when the relative humidity is below 38%. April is the driest month of the year. The wind velocity is higher during the pre-monsoon period as compared to the post-monsoon period. The maximum wind velocity observed in the month of June is 6.8 km/hr and the minimum in the month of December is 2.3 km/hr. The average annual wind velocity of Shahdol district is 4.3 km/h. The normal rainfall of Shahdol district is 1131.4 mm. According to the rainfall data, the frequency of occurrence of normal drought in the region is 25% and that of mild drought is also 25%, while the occurrence of severe drought in the region is only 5%, i.e. on average one is likely to occur every seven years. Moderate or mild drought occurs frequently, while severe drought occurs once every 20 years. The region does not experience any severe drought.

Chromium concentration was found within 38.2 ppb in our present study. Shiddiky (2002) reported that the chromium concentration of Buriganga and Shitallahkha river was 20.6 ppb. The level of chromium is well below the permissible limit for livestock watering and drinking recommended by EU (Claes, et. al., 1997) and BD (Bangladesh Gazzet, 1997). The standard limit for lead in domestic water and irrigation water is 50 ppb. On the other hand, the river is not polluted according to Cr. Zinc concentration is higher in dry season than monsoon value. The zinc concentration was found to be highest in the downstream during the dry season (1.48 ppm) and the zinc concentration was least in the upstream during the monsoon (0.0022 ppm). Pollution from industries, various domestic and household sources enhances zinc concentration during the dry season. Copper concentration was found to be within 4.2 ppb in our present study. Shiddiky (2002) reported that the copper concentration of the Indus River in Pakistan was within 91ppb. The level of copper is far below the permissible limit for livestock irrigation and drinking recommended by EU (Claes, et. al., 1997) and BD (Bangladesh Gazzet, 1997).

It is important to note, however, that many miles of streams and rivers did not have sufficient data to determine whether they met water quality standards, and in fact, the Texas Water Quality Authority has identified hundreds of miles of streams and rivers with water quality concerns. but with insufficient data to meet their criteria for calling a stream or river "damaged." Between 1994 and 2002, support for the use of dams dropped from 98 percent to 70 percent, indicating a significant drop in water quality. The decline in overall consumption support has been attributed to mercury deposition in reservoirs from the environment, high levels of dissolved oxygen, high levels of metals and organic matter, as well as high or low pH levels, high levels of chloride and high levels of total dissolved solids. solids (Texas Environmental Profiles, 2006). In another study, the Songhua River was found to be polluted.

Figure 1. Water flow Site for sample collection

Figure 2. Bridge Site for sample collection

2. GROUND WATER EXPLORATION

Groundwater exploration through deep drilling was carried out by deploying four direct rotary rigs to drill through semi-consolidated Gondwana sediments. The Central Ground Water Board undertook exploratory drilling program in the area between 1990 and 1994 and 16 exploratory wells and 7 observation wells were drilled during this period. For the purpose of water level monitoring, 4 piezometers were drilled in Shahdol district under the Hydrology Project.

3. GROUND WATER RESOURCES

The ground water resources of the district are undeveloped and under-utilised. 513 tube wells and 2470 wells provide irrigation facilities to an area of 50.98 sq km. of agricultural land in the district as against 2714.12 sq km of cultivable area and 2313 sq km of net sown area. The net ground water availability of the district is 639.09 MCM while the gross annual ground water draft in the district is only 43.43 MCM. The level of ground water development of the district is only 6%. From the point of view of groundwater development, Shahdol comes under safe category.

4. QUALITY OF GROUND WATER FOR IRRIGATION PURPOSES

The chemical quality of groundwater is an important factor in evaluating its suitability for irrigation purposes. Parameters such as EC, Sodium Absorption Ratio (SAR), Percent Sodium (% Na) and Residual Sodium Carbonate (RSC) are used to classify the quality of water for irrigation purpose. The American Salinity Laboratory suggested a diagram for the classification of water for irrigation purposes in 1954. It is evident that more than 82% of the groundwater samples in the district come under the C2-S1 class (moderate salinity and low sodium), which means that these waters can be used. All types of crops on soils of low to high permeability, without causing salinity problems. The groundwater representing wells of Singhpur, Gohparu and Bohri are grouped under C3-S1 (high salinity and low sodium) class, indicating that groundwater from these areas is used for irrigation on well-drained soils. Or it can be done for salt tolerant crops like groundnut. , Kusum etc.

5. DIGESTIONS OF WASTE WATER SAMPLES FOR HEAVY METAL DETERMINATION

a well-mixed sample was taken from a fumed silica container and acidified to methyl orange with conc. H2SO4, and 5mL conc. HNO3 is also added. 2mL of 30% H2O2 was added to reduce chromate (if present). Next, the mixed sample was evaporated with 10mL water and mixed with 5mL conc. HNO3 for the purpose of transfer to a 125 conical flask. , the contents are not allowed to dry during grinding. 1-2 ml of concentrated HNO3 was added again to dissolve the remaining residue, a few glass beads were added to prevent explosion, and 50mL of distilled water was added. The solution was boiled to dissolve the solid and filtered through a sintered glass crucible.

6. SAMPLE COLLECTIONS

wastewater samples were collected from five selected points (P1–P5) in the drainage or kitchen drains of hotels and restaurants selected from P1 to P5 in hard glass bottles (2 L), thoroughly cleaned with non-ionic detergent. , washed with tap water and after some time, added to 10% HNO3, and finally with distilled water. pH. The pH (potential hydrogen) of a solution refers to its hydrogen ion activity and is defined as the logarithm of the multiplication of the hydrogen ion activity at a given temperature. The pH of the samples ranged from 7.80 to 10.20 as presented in Table 1. Point P4 has the lowest value (7.80), while point P1 has the highest pH value of 10.20. The tolerance limit of Ph varies from 6.0 to 9.0 of the wastewater can be discharged into the sewage line without point P1. According to the Bureau of Indian Standards, the permissible limit of pH for drinking water ranges from 6.5 to 8.5, the difference occurred in the pH values due to changes in the amounts of CO2, carbonate, and bicarbonate in the water. , low pH values may cause tuberculosis. Higher values may produce incrustation, sediment, deposition, and some difficulties in chlorination and water disinfection. In the meantime In the study, the pH values of all the collected water samples ranged from 9.0 to 10 except at point P1 which are all within the limit.

7. SULPHATE, NITRATE AND PHOSPHATE

The concentrations of sulfate, nitrate, and phosphate at all sampling points varied between 80.45 mg/L and 110.35 mg/L for sulfate, 20.15 mg/L and 30.35 mg/L for nitrate, and and 10.33 mg/L and 12.65 mg/L phosphate, respectively, refer to Table 1. The highest concentration of sulfate, nitrate, and phosphate was observed in the P1 area, while the lowest concentration varied in different areas of sulphate (P2), nitrate (P2), and phosphate (P4). High amounts of sulfate give a bitter taste to water. Sulphate like magnesium sulphate causes laxative effects in children especially in hot weather or climate. Sulfate concentrations at five sampling points ranged between 85.25 and 115.35 mg/L. Point P2 showed the lowest concentration, while the highest level of sulfate was observed at point P1. ,e nitrate levels exceeded the WHO limits of 45 mg/L and the Indian guideline of 0.20 mg/L. Nitrate concentrations were above the limit, while sulfate was below the WHO limit of 200 mg/L for wastewater discharge.

8. ANALYTICAL METHOD

Analytical tests of the collected water samples are carried out for various parameters such as pH, temperature, turbidity, chemical oxygen demand (COD), biological oxygen demand (BOD), dissolved oxygen (DO), TOC, conductivity, total dissolved solid (TDS), total suspended solids (TSS), alkalinity, sulfate, nitrate, and phosphate. , the sampling point for the collection of food waste water samples throughout the study was the kitchen of various restaurants. Observations and findings were continuously recorded to assess parameters such as pH, temperature, turbidity, conductivity, TDS, TSS, BOD, COD, DO, TOC, sulphate, nitrate, and phosphate to assess the extent of pollution parameters as a whole. Total dissolved solids (TDS), biochemical oxygen demand, sulfate, nitrate, and phosphate were analyzed.

9. MATERIALS AND METHODS

In this world-wide situation, the ground water used by restaurants, hotels, and various food outlets contains different levels of pollutants. , the low quality of discharged water is the result of poor management of food waste water. Pollutants are intentionally or unintentionally released into the environment, discharged directly or indirectly into public sewers, landfills, and ponds. It is considered that heavy metals such as Pb, Cu, Fe, Ni, Hg, and Zn are found in food waste water. , it not only produces toxic or chronic toxins for aquatic animals but is also harmful to the environment. Wastewater used for irrigating fields contains a large number of potentially toxic substances including dissolved salts and heavy metals such as Fe2+, Cu2+, Zn2+, Mn2+, Ni2+, and Pb2+. It can be seen that, in the agricultural sector, polluted water pollutes the soil to the point that it becomes toxic to plants and animals. Plants and plants accumulate heavy metals from food waste water in their tissues in concentrations that range from more than acceptable levels, which are considered harmful to ecosystems and aquatic organisms.

1. 1 L polypropylene bottles are used for water quality parameter analysis and 1 L glass bottles are used for insect analysis.

2. Before sample collection, all bottles were washed with diluted acid followed by distilled water and dried in an oven.

3. At each sampling site, water samples were collected in two polypropylene and one glass bottles.

4. Before taking the water storage samples, the bottles are washed three times with the water to be collected.

5. Sample bottles are labeled with the date and source of the samples.

6. Information was also collected about the types of pesticides and fertilizers used near the sampling sites.

7. it helps the user to predict the variation of BOD, DO, Nitrogen, Phosphorus and Heavy Metal as these move through the river system.

10. DETERMINATIONS

Testing of various physicochemical parameters, i.e. pH, temperature, turbidity, BOD, COD, DO, TOC, conductivity, TDS, TSS, alkalinity total, sulfate, nitrate, and phosphate and heavy metal concentrations (iron, copper, lead, nickel, and zinc) are performed.

11. DIGESTIONS OF WASTE WATER SAMPLES FOR HEAVY

A mixed sample was taken from a fumed silica container and acidified to methyl orange with conc. H2SO4, and 5mL conc. HNO3 is also added. 2mL of 30% H2O2 was added to reduce chromate (if present). Next, the mixed sample was evaporated with 10mL water and mixed with 5mL conc. HNO3 for transfer purposes to 125 conical flasks. the contents were not allowed to dry during grinding. 1-2 ml of concentrated HNO3 was added again to dissolve the remaining residue, a few glass beads were added to prevent explosion, and 50mL of distilled water was added. The solution was boiled to dissolve the solids and filtered through a sintered glass crucible.

12. DETERMINATIONS OF PHYSICOCHEMICAL PARAMETERS

Estimation of various physicochemical parameters like pH, temperature, turbidity, BOD, COD, DO, TOC, conductivity, TDS, TSS, total alkalinity, sulfate, nitrate, and phosphate and heavy metal concentration (iron, copper, lead, nickel). zinc) was done.

River modeling

The proposed model is capable of simulating the one dimensional steady state behavior of the pollutant

Transport in the river system Currently, it consists of four sub-models. BOD-DO sub model and nitrification sub model.

Formulation BOD-DO sub model

The need for BOD-DO model of any river is estimating the pollution status at different locations. The effects of low DO concentrations or anaerobic conditions are reflected in unbalanced ecosystems, fish mortality, odors, and other aesthetic nuisances. The DO problem originates from the entry of waste into the river. Re-aeration from the atmosphere and incoming tributaries or effluents includes DO as sources of DO and oxidation. Oxidation of carbonaceous wastes and nitrogenous wastes are considered as sinks.

13. CONCLUSIONS

The results of the data analysis show that, the water is not suitable for drinking without any kind of treatment, but for other purposes of surface water use, it can still be considered quite acceptable. But as we know, once a dirty habit starts, it usually quickly causes a serious breakdown. So a few years from now, a major deterioration in water quality is likely. However, there may be significant differences in the test results of some samples in different laboratories in the country, which can limit the use of these data for critical policy issues. Differences may be due to the method used by the laboratories in the preservation of the sample, the quality of the chemicals used, the test method used or the qualification or expertise of the technicians or testers. This research involves determination of physical, biological and chemical properties of surface water in different areas. The river was found to be very turbulent during the monsoon season. But BOD and faecal coliform concentration were found to be higher in the dry season.

REFERENCES

1. Alam, J.B. (1996). Risk assessment due to pesticide use in Bangladesh. M. Sc. Engineering Thesis, Civil Engineering Thesis, Bangladesh University of Engineering and Technology, Dhaka.
2. American Public Health Association (APHA-AWWA-WPCF), (1989). Standard methods for the examination of water and wastewater, 1989.
3. Asian Development Bank, (2006) Report ADTA 4061-PRC: Songhua river basin water quality and pollution control Management. Department of Environment (DOE), (1993) Environmental
4. Himesh, S., Rao, C.V.C., Mahajan, A.U., (2000) Application of Steady State Stream Water Quality Model,. J. IAEM, **27**, 33-37.
5. Hossain, A., (2001). Evaluation of Surface water Quality: A case study on River, B.Sc. Engineering Thesis, Civil and Environmental Engineering Department, Shahjalal University, Bangladesh.
6. Majid, M.A., Sharma, S.K., (1999). A study of the water quality parameterof the Karnaphuly River, J. Ban. Chem. Soc., **12** (1), 17-24.
7. Muyan, Z., Mamun, M., (2003). Predication of pollution status of the River by Simulation',. B.Sc. Engineering Thesis, Civil and Environmental Engineering Department, Shahjalal University.
8. Quality Standard for Bangladesh, , Ministry of Environment and Forestry, Government of Bangladesh. European Community (EC), (1986). Guidelines for drinking water quality.
9. Shiddiky, M.J.A., (2002). A study on the water quality parameters of the River, M.Sc. Thesis, Chemistry Department, Shahjalal University, Bangladesh. Claes, M., (1997)**.** Comparison Study on river quality, Sci. Tot. Env. , **207**, 141-148.
10. Thomann, R.V., Mueller, J.A., (1987). Principles of water quality modeling and control, Harper and Row, 1987. Texas Environmental Profiles, (2006).