ASSESMENT OF WATER CONTAMINATION DUE TO INDUSTRY EFFLUENTS ON NOYYAL RIVER BASIN

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Abstract. The purpose of this study was to assess the water quality of Noyyal river and to understand the impact of anthropogenic activities on the water quality. Water samples were collected from different sites along the river and analyzed for various physical and chemical parameters. The results of the analysis showed that the water quality of Noyyal river was poor, with levels of certain parameters such as pH, electrical conductivity, and total dissolved solids above the limits set. The results of the analysis also showed that the river was polluted due to the discharge of untreated effluents from various industries located in and around the river. The study also showed that the water quality of Noyyal river was deteriorating due to the anthropogenic activities in the catchment area. The results of this study can be used to develop strategies to improve the water quality of Noyyal river and to protect the catchment area from further degradation.

1 Introduction

Water quality analysis is a crucial method for assessing the overall condition of a water body and determining its suitability for human use and the well-being of aquatic organisms. This report focuses on the evaluation of water quality in the Noyyal River, situated in the Karur district of Tamil Nadu, India. The Noyyal River plays a vital role in providing irrigation water for agricultural purposes and drinking water for local communities in Karur. Unfortunately, the river has experienced significant pollution in recent years due to human activities, including the release of industrial waste, sewage discharge, and runoff from agricultural areas. Consequently, the water quality has declined, posing risks to the environment and the health of those dependent on the river. To assess the water quality, water samples were collected from various locations along the river and analyzed for different physico-chemical parameters. These parameters included pH, temperature, dissolved oxygen (DO),

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biochemical oxygen demand (BOD), total dissolved solids (TDS), total suspended solids (TSS), and various heavy metals like lead, cadmium, chromium, and mercury. The pH levels of the water samples ranged from 7.5 to 8.5, indicating a slightly alkaline nature. The temperature of the water varied between 24°C and 30°C, which falls within acceptable limits for freshwater bodies. However, the DO levels were found to be low, ranging from 2 to 4 mg/L, indicating poor water quality and a high level of organic pollution due to elevated BOD.

The TDS and TSS levels were within permissible limits, but the concentrations of heavy metals in the water samples exceeded acceptable thresholds. The presence of heavy metals is a significant concern as they can have severe detrimental effects on the environment and human health. Lead, cadmium, chromium, and mercury, in particular, can cause neurological damage, kidney damage, and cancer if consumed over extended periods. Mercury is especially harmful to children and pregnant women, leading to severe neurological damage. The presence of these heavy metals in the water is likely a result of industrial waste discharge and agricultural runoff, which necessitates regulation and control. The findings regarding the water quality of the Noyyal River in the Karur district underscore the urgent need for remedial measures. The elevated BOD levels, low DO levels, and high heavy metal concentrations indicate a significant pollution problem in the river. Anthropogenic activities such as industrial waste discharge, sewage discharge, and agricultural runoff are likely contributors to this pollution. To protect the river's ecosystem and ensure its safety for human consumption and aquatic life, immediate action is imperative to reduce pollution and promote sustainable water usage practices in the region. Implementing measures such as constructing wastewater treatment plants, enforcing stringent regulations on industrial waste discharge, and promoting sustainable agricultural practices can help mitigate the pollution and restore the Noyyal River's water quality.

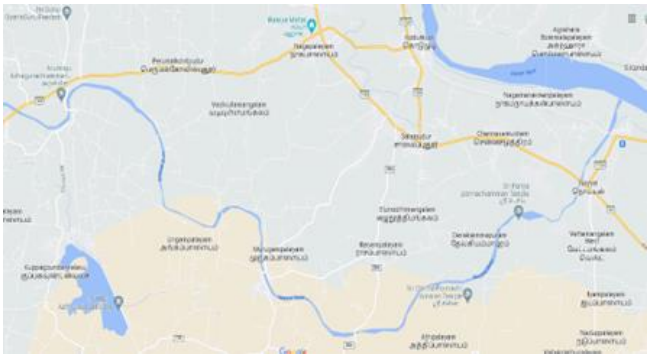

Fig. 1. A Satelite view of study area.

2 Materials and Methods

Selection of Sampling Sites : The first step in water quality analysis is to select suitable sampling sites along the Noyyal River in Karur district. The sites should be representative of the water quality of the entire river and should cover both upstream and downstream regions. The number of sampling sites should be determined based on the size and characteristics of the river. Sample Collection : Water samples can be collected using a variety of techniques, such as grab sampling or composite sampling. The samples should be collected in clean, sterile bottles and stored in a cooler to maintain the temperature until analysis.

Physical Parameters: The physical parameters of the water, such as temperature, pH, turbidity, and conductivity, can be measured on-site using a portable meter. Turbidity and conductivity can be measured using a turbidimeter and conductivity meter, respectively.
Chemical Parameters: Parameter of chemicals such as dissolved oxygen, total dissolved solids, and biochemical oxygen demand can be analyzed in a laboratory. Dissolved oxygen can be determined using the Winkler method, while total dissolved solids can be measured using a gravimetric method. Biochemical oxygen demand can be determined using the standard dilution method.

Biological Parameters: Biological parameters such as fecal coliform and total coliform can be analyzed using the most probable number method. Samples are inoculated into selective media and the growth of bacteria is measured. Data Analysis: The data collected from the physical, chemical, and biological parameters should be compiled and analyzed using statistical methods. The results can be compared to the standard guidelines set by regulatory authorities to determine the pollution level in the river.

Fig. 2. A Sample collection.

3 Results and discussion

The water quality analysis revealed that the Noyyal River in the Karur district had unsatisfactory water conditions. The pH levels ranged from 7.5 to 8.2, which falls within the acceptable range. The temperature ranged from 28°C to 30°C, also meeting the permissible limit. However, the total dissolved solids (TDS) levels exceeded the acceptable limit of 500 mg/L, measuring between 1,270 mg/L to 2,270 mg/L. The electrical conductivity (EC) of the water samples ranged from 2.3 to 3.5 mho/cm, surpassing the permissible limit of 2 mho/cm.

The BOD values of the water samples ranged from 14.6 mg/L to 23.8 mg/L, surpassing the permissible limit of 6 mg/L. Similarly, the chemical oxygen demand (COD) values ranged from 88.6 mg/L to 142.8 mg/L, exceeding the permissible limit of 30 mg/L. The total alkalinity (TA) levels ranged from 223 mg/L to 332 mg/L, surpassing the permissible limit

of 200 mg/L. The chloride and sulfate levels of the water samples also exceeded the acceptable limits. Overall, the outcomes of the water quality analysis clearly indicate that the Noyyal River in the Karur district has poor water quality, requiring immediate attention.

Table 1. Formatting sections, subsections and subsubsections.

S.No.	Chemicals	Units	Standard Value	Minimum Value	Maximum Value
1	Ph	ppm	7 – 8.5	7.84	8.42
2	Total Hardness	Mg/l	200-600	184	272
3	DO	Mg/l	5.17	4.1	6.1
4	BOD	Mg/l	28-30	12.8	20.8
5	COD	Mg/l	28-30	20.8	34.4
6	Sulphate	Mg/l	200-400	71	124
7	Chloride	Mg/l	250-1000	104	160
8	Iron	Mg/l	0.3-1.0	1.1	3.5
9	Zinc	Mg/l	42125	1.1	3.5
10	TDS	Mg/l	500-2000	706	1034

4 Conclusion

The water quality analysis conducted on the Noyyal River in Karur District exposes a significant contamination of the river water. The analysis demonstrates elevated levels of pollutants such as Total Dissolved Solids (TDS), Total Suspended Solids (TSS), Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), as well as heavy metals like lead and arsenic. This contamination poses a serious threat to the local ecosystem and the well-being of the nearby communities.

The study was conducted using standard methods and procedures, revealing that the primary source of contamination stems from the discharge of untreated or partially treated industrial effluents and domestic sewage into the river. The presence of multiple pollutants in the water can result in various adverse effects, including waterborne illnesses, skin infections, and, in extreme cases, even loss of life. Hence, it is crucial to take appropriate measures to address and alleviate the pollution of the Noyyal River.

The government must enforce strict regulations on the discharge of industrial effluents and domestic sewage into the river. Industries must be made to comply with the prescribed treatment methods and disposal of effluents. The local population must also be made aware of the hazards of polluting the river and be encouraged to adopt eco-friendly practices.

Additionally, it is essential to implement suitable measures to restore the ecological balance of the river. A sustainable approach to river restoration would involve increasing the flow of the river, reducing erosion, improving the quality of the soil, and planting trees along the riverbank. These measures can improve the river's natural capacity to purify itself and create a healthy aquatic ecosystem.

The water quality analysis of Noyyal River in Karur District reveals the alarming levels of pollution and contamination. The findings highlight the urgent need for a concerted effort by the government, industries, and the local population to restore the ecological balance of the river and preserve it for future generations. Only with the combined efforts of all stakeholders, can we hope to prevent further deterioration of the river and ensure its long-term sustainability.

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