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Environment Impact of our Actions on the Local Stream and River

Prof. Pallavi R. Pekhale[1], Prof. Shraddha S. Shelar[2], Monali Ratan Sangamnere[3], Kaveri Indrabhan Godhade[4], Arti Raju Sonawane[5], Dhanshri Anil Tile[6]
Project Guide, Diploma in Civil Engineering[1]
Head of Department, Diploma in Civil Engineering[2]
Students, Diploma in Civil Engineering[3-6]
Matoshri Aasrabai Polytechnic, Nashik, India

Abstract: *Rivers have long been the cradle of civilizations and continue to play a crucial role in sustaining ecosystems and supporting human livelihoods. In recent decades, however, the health of many river systems in India has deteriorated due to unchecked anthropogenic activities. This study aims to assess the impact of such activities on three important rivers flowing through Nashik—Godavari, Darna, and Kadwa—by analyzing water quality parameters through laboratory testing. Water samples were collected and analyzed for turbidity, residual chlorine, dissolved oxygen (DO), biochemical oxygen demand (BOD), chemical oxygen demand (COD), and pH. The results revealed varying degrees of contamination, with the Kadwa River showing alarmingly high BOD and COD levels, pointing to significant organic pollution. The Godavari, a religiously significant river, also displayed poor oxygen levels, raising concerns for both environmental and public health. The Darna River, although relatively better, was not free from pollution either. The study provides not only a snapshot of current pollution levels but also aims to raise awareness about the urgent need for conservation strategies, wastewater treatment, and sustainable urban planning. It emphasizes the importance of routine monitoring and public participation in restoring river ecosystems for future generations.*

Keywords: Oxygen Demand, residual chlorine, dissolved oxygen, pH, Chemical oxygen demand, Biological oxygen demand

I. INTRODUCTION

Water is one of the most precious natural resources on Earth, and rivers serve as the lifelines of both nature and civilization. Throughout history, rivers have nourished ecosystems, supported agriculture, enabled transport, and provided communities with drinking water. In India, rivers hold not just ecological importance, but also deep cultural and spiritual significance. Nashik, a city located in Maharashtra, is blessed with three prominent rivers—the Godavari, Darna, and Kadwa—which play a vital role in the region's ecology and economy.

The Godavari River, often referred to as the 'Dakshin Ganga' (Ganges of the South), is the second-longest river in India and has immense religious importance. Every twelve years, Nashik hosts the Kumbh Mela on its banks, attracting millions of devotees. Similarly, the Darna River serves as a crucial source of irrigation and domestic water supply in the region, while the Kadwa River supports agricultural activities and acts as a drainage channel for surrounding villages.

This research is a step toward understanding the current health of these rivers. By analyzing critical physico-chemical parameters—such as turbidity, pH, residual chlorine, dissolved oxygen (DO), biochemical oxygen demand (BOD), and chemical oxygen demand (COD)—this study aims to present a scientific assessment of pollution levels and their probable sources. With the help of laboratory testing and literature-based comparisons, this paper also attempts to highlight areas that need immediate attention for environmental restoration and sustainable development.

In the context of rising concern over water pollution and public health, especially in semi-urban and rural belts, this study seeks to provide actionable insights for both local authorities and citizens. After all, the revival of a river doesn't begin with government plans—it begins with awareness and responsibility at the grassroots level.

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II. PROBLEM STATEMENT

The Godavari, Darna, and Kadwa rivers in Nashik are vital water sources that support drinking, irrigation, and cultural practices. However, increasing human activities such as improper waste disposal, agricultural runoff, and urbanization have led to a decline in water quality. Despite their significance, these rivers are subjected to untreated sewage, industrial effluents, and harmful pollutants that are deteriorating their ecological balance.

The absence of consistent monitoring and lack of public awareness further contribute to this environmental issue. There is a pressing need to assess the current condition of these rivers using scientific analysis to understand the extent of pollution. This study addresses the growing concern of river water degradation in Nashik and aims to provide reliable data to support future conservation efforts.

III. OBJECTIVES OF THE STUDY

1. To assess the present water quality of the Godavari, Darna, and Kadwa rivers by collecting and analyzing samples from different locations in Nashik.
2. To evaluate key physico-chemical parameters such as turbidity, residual chlorine, dissolved oxygen (DO), biochemical oxygen demand (BOD), chemical oxygen demand (COD), and pH to determine the pollution levels.
3. To identify the possible sources of pollution affecting each river, including domestic sewage, industrial discharge, agricultural runoff, and human activities along riverbanks.
4. To compare the water quality between the three rivers and understand how various environmental and human factors impact each of them differently.
5. To raise awareness and encourage sustainable water management practices among local communities and stakeholders based on the study's findings.
6. To provide scientific data that can support future action plans or policy decisions for the conservation and restoration of these rivers.

IV. METHODOLOGY

To assess the environmental impact on the Godavari, Darna, and Kadwa rivers, a systematic and scientific approach was adopted. The methodology was carefully planned to ensure that the data collected is both reliable and reflective of the actual conditions of the rivers.

4.1 Sample Collection

Water samples were collected from strategically selected locations along each river within the Nashik district. These locations were chosen based on accessibility, human activity, and potential pollution sources nearby such as bathing ghats, agricultural fields, and residential or industrial areas.

Clean and sterilized bottles were used to collect the water samples, and they were labeled properly with details like river name, location, date, and time of collection. Special care was taken to avoid contamination during sampling.

4.2 Testing Parameters

The following tests were conducted in a laboratory to assess water quality:

- Turbidity (in NTU): Measures the clarity of water and presence of suspended particles.
- Residual Chlorine (in mg/L): Indicates the amount of chlorine left after disinfection, which affects safety for human use.
- Dissolved Oxygen (DO) (in mg/L): Represents the amount of oxygen available for aquatic life.
- Biochemical Oxygen Demand (BOD) (in mg/L): Measures organic pollution based on oxygen consumption by microorganisms over 5 days.
- Chemical Oxygen Demand (COD) (in mg/L): Indicates the amount of oxygen required to chemically oxidize pollutants in the water.
- pH: Reflects the acidity or alkalinity of the water.

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4.3 Laboratory Analysis

The water samples were submitted to an authorized testing laboratory, where standard procedures were followed as per the Bureau of Indian Standards (BIS) and APHA guidelines for each test.
Turbidity was measured using a nephelometer.
Residual chlorine was tested using the DPD colorimetric method.
DO, BOD, and COD values were determined through titration-based methods.
pH was measured using a calibrated digital pH meter.

4.4 Additional Data Collection

Since some environmental parameters like PFAS (Per- and polyfluoroalkyl substances) and nitrate/phosphate content were not tested due to time constraints, secondary data was collected from reputable environmental reports, academic publications, and government databases to support the study.

4.5 Data Interpretation and Comparison

Once all the data was collected, it was analyzed and compared across the three rivers. Observations were recorded, and each parameter was discussed individually to understand its significance and impact. Graphs and tables were used to visually interpret differences in pollution levels between rivers.

V. OBSERVATIONS AND RESULTS

5.1 Water Quality Test Results (Turbidity, DO, Residual Chlorine, pH, Nitrate, Phosphate)

Parameter	Godawari	Darna	Kadwa
Turbidit y (NTU)	3.15	3.26	3.34
Residual Chlorine (mg/L)	0.4 (Approx)	0.7	0.3 (Approx)
Dissolved Oxygen (mg/L)	2.5 - 2.7	3.5 - 4.0	2.5 - 3.0
pH	6.9	7.1	6.8

Observation for Table 5.1: Water Quality Parameters

The test results reveal a moderate level of pollution across all three rivers, with some parameters showing more serious concern than others.

- **Turbidity** levels are relatively similar across the rivers, slightly above the ideal limits for drinking water, indicating the presence of suspended particles—likely from soil runoff, domestic waste, and organic matter.
- **Residual Chlorine** is present in all three rivers, especially high in Darna. This suggests either recent chlorination or contamination from urban wastewater treatment. Excessive chlorine, while used for disinfection, can be harmful to aquatic ecosystems if unregulated.
- **Dissolved Oxygen (DO)** levels are lowest in the Godavari and Kadwa rivers, reflecting the depletion of oxygen due to organic waste and reduced aeration. Only the Darna river shows a relatively healthier oxygen range, though still below ideal for aquatic life.

The **pH** values of all rivers fall between 6.8 to 7.1, which is close to neutral. However, slight deviations can affect aquatic organisms and signal the influence of wastewater or industrial discharge.

5.2 Biochemical Oxygen Demand (BOD)

River	BOD (mg/L)
Godawari	17.9
Darna	10.4
Kadwa	23.5

Observation: BOD values indicate high organic pollution, with Kadwa being the most affected. These results reflect heavy biodegradable waste input into the rivers.

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5.3 Chemical Oxygen Demand (COD)

River	COD (mg/L)
Godawari	38.9
Darna	27.1
Kadwa	44.7

Observation: COD levels confirm the presence of chemically oxidizable pollutants. High values in the Kadwa and Godavari rivers indicate a mix of industrial and domestic waste.

VI. CONCLUSION

This study on the Godavari, Darna, and Kadwa rivers in Nashik reveals that increasing human activities are significantly impacting the natural quality of these vital water bodies. Through lab-tested data and research, it is evident that all three rivers are facing moderate to high levels of pollution—primarily due to organic waste, agricultural runoff, and possible industrial discharge.

The Kadwa River shows the highest pollution load, with extremely elevated BOD and COD values, as well as higher nitrate and phosphate levels. The Godavari River, despite its cultural and religious importance, also displays concerning signs of pollution, especially in terms of oxygen demand and turbidity. The Darna River, while slightly better in comparison, still contains residual chlorine and fluctuating oxygen levels, indicating its own share of environmental stress. The presence of pollutants not only threatens aquatic life but also poses health risks to people who use this water for drinking, bathing, or farming. The study emphasizes the urgent need for better wastewater treatment, pollution control policies, and regular monitoring of river health.

If no action is taken, the ecological balance of these rivers will continue to deteriorate, leading to long-term environmental damage. Therefore, it becomes our collective responsibility—as individuals and as a society—to protect and restore these rivers for future generations.

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