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"ASSESSMENT OF RIVER WATER QUALITY AT THE CONFLUENCE OF GODAVARI AND DARNA"

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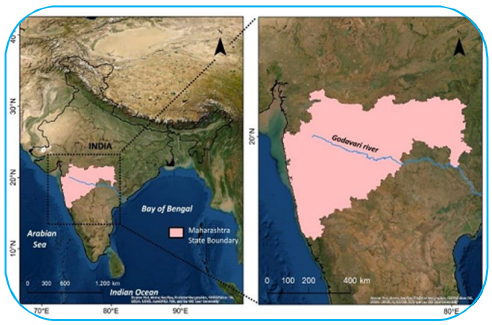
ABSTRACT :



The present study evaluates the water quality at the confluence (Sangam) of the Godavari and Darna Rivers in Nashik district, Maharashtra. This region is increasingly influenced by anthropogenic activities such as domestic sewage discharge, agricultural runoff, and religious practices, which may affect the ecological balance of the river system. Water samples were collected from selected locations around the confluence and analyzed for key physico-chemical and biological parameters, including pH, turbidity, total dissolved solids (TDS), dissolved oxygen (DO), hardness, biochemical oxygen demand (BOD), Chemical oxygen demand (COD),nitrates, phosphates, and microbial load. The results indicate variations in water quality, with certain parameters exceeding permissible limits, suggesting organic and microbial contamination. Comparative analysis with standard permissible limits (BIS/WHO guidelines).The study highlights the need for regular monitoring and effective pollution control measures to maintain water quality and public health in the Godavari–Darna river basin

KEYWORDS : *Research, Scientific, Political, Developed, Developing, Societal Issues.*

INTRODUCTION :

Water is one of the most essential natural resources for sustaining life and maintaining ecological balance. Rivers play a vital role in supporting human civilization by providing water for drinking, agriculture, industry and religious activities. However, increasing population growth, urbanization, and industrialization have significantly affected the quality of river water, especially in developing regions.

The Godavari River, often referred to as the "Dakshin Ganga," is one of the largest and most important rivers in India. It supports millions of people across several states and holds great cultural and religious significance. The Darna River is an important tributary of the Godavari, contributing to its flow and ecosystem. The confluence (Sangam) of these two rivers in Nashik is a site of both ecological importance and intense human activity.

In recent years, the water quality at this confluence has been increasingly influenced by anthropogenic activities such as discharge of domestic sewage, agricultural run off containing fertilizers and pesticides, and religious practices including mass bathing and idol immersion. These activities introduce a variety of pollutants, including organic matter, nutrients, and pathogenic microorganisms, which can degrade water quality and pose risks to aquatic life as well as human health.

Assessment of water quality involves the analysis of various physicochemical and biological parameters such as pH, turbidity, total dissolved solids (TDS), dissolved oxygen (DO), biochemical oxygen demand (BOD), chemical oxygen demand (COD), nutrients like nitrates and phosphates, and microbial load. These parameters serve as important indicators of pollution levels and help in understanding the overall health of the aquatic ecosystem.

Therefore, the present study focuses on evaluating the water quality at the confluence of the Godavari and Darna Rivers. By comparing the observed values with standard permissible limits prescribed by organizations such as the Bureau of Indian Standards (BIS) and the World Health Organization (WHO), the study aims to determine the extent of contamination and highlight the need for effective water management and pollution control strategies.

OBJECTIVES OF THE STUDY

1. To study the water quality of wells near Godavari Darna confluence
2. To assess the water quality at the confluence of the Godavari River and Darna River in Nashik.
3. To analyze key physico-chemical and biological parameters of water.
4. To compare the results with standards of the Bureau of Indian Standards (BIS) and the World Health Organization (WHO).
5. To identify pollution sources and suggest control measures.

MATERIALS AND METHODS

1. Materials -

a) Apparatus Used:

1. Clean and sterilized plastic bottles (for collecting water samples)
2. Digital pH meter
3. Turbidity meter (Nephelometer)
4. TDS meter
5. Conductivity meter
6. Thermometer
7. DO meter / Winkler method chemicals
8. Titration setup for COD
9. Flame photometer (for sodium and potassium)

b) Chemicals Used: EDTA, potassium dichromate, reagents for DO and COD

2. Methods-

a) Study Area:

The study was carried out at the meeting point (Sangam)of the Godavari and Darna rivers in Nashik.

b) Sampling Locations: Water samples were collected from three places are as follows:

Before confluence (upstream) At confluence (Sangam)

After confluence (downstream)

c) Sample Collection :

Water samples were collected in clean bottles Bottles were washed with sample water before use Samples were properly labelled with date and location Samples were stored inan ice box and taken to the laboratory For DO, samples were fixed immediately

d) Parameters Tested :

pH, TDS, EC, Temperature DO, BOD, COD, Sodium and Potassium

e) Methods of Analysis:

pH → measured using pH meter
Turbidity → measured using nephelometer TDS → measured using TDS meter
EC → measured using conductivity meter DO → measured by DO meter
BOD → measured after 5 days incubation COD → determined by titration method
Sodium & Potassium → measured using flame photometer

f) Data Analysis:

Results were compared with standard limits (BIS and WHO), Data was shown using tables and graphs.

Water Quality Comparison (BIS & WHO Standards)

Parameter	W1 (Before)	W2 (At)	W3 (After)	BIS Limit	WHO Guideline	Status
pH	7.00	6.8	7.3	7.0–7.3	6.5–8.5	Within limit
EC	850	1581	720	~1481	~1400	W2 high
Temp.	24.5	26	23.8	Ambient	Ambient	Ambient
COD	53	271	88	<250	<250	W2 high
BOD	3.5	7.0	2.8	<3	<3	W1 & W2 exceed
Turbidity	3.2	12.08	2.1	5	5	W2 high
DO	6.1	4.7	5.8	>5	>5	W2 low
TDS	540	980	430	503 (acceptable)	1000	W1slight, W2 high
Sodium	28	65	22	<200	<200	Within limit
Potassium	4.2	6.1	3.0	<10–12	<12	Within limit

1. pH

1. The pH values ranged from 7.0 to 7.3, indicating that all three wells fall within the neutral range.
2. W2 (pH 6.8) is slightly acidic, which may be due to higher organic load or local soil characteristics.
3. W3 (pH 7.3) shows slightly alkaline nature, suggesting mineral dissolution or less organic impact.
4. Overall, pH values are with in acceptable limits for drinking water

2. Electrical Conductivity (EC)

1. EC varied significantly.
2. W2 had the highest EC (1581 µS/cm), indicating a high concentration of dissolved ions.
3. W1 and W3 showed moderate EC (850 and 720 µS/cm).
4. Higher EC in W2 suggests contamination from agricultural run off, sewage leakage, or mineral dissolution.

3. Temperature

1. Temperature ranged between 23.8°C to 26.0°C, whichis normal for ground water in this region.
2. W2 (26.0°C) showed slightly higher temperature, possibly due to shallower depth or greater exposure to sunlight.

4. Chemical Oxygen Demand (COD)

1. COD values were highest in W2 (271 mg/L) compared to W1 (53 mg/L) and W3 (88 mg/L).
2. This indicates High presence of oxidizable organic matter in W2
3. Possible sewage ingress or agricultural contamination

5. Biological Oxygen Demand (BOD)

1. Similarly, BOD values followed the pattern of COD:
2. W2 = highest (7.0 mg/L)
3. W1 = 3.5 mg/L
4. W3 = 2.8 mg/L
5. Elevated BOD in W2 confirms organic pollution likely from domestic wastewater or decaying organic matter.

6. Turbidity

1. Turbidity was markedly higher in W2 (12.08 NTU), exceeding permissible limits.
2. W1(3.2NTU) and W3 (2.1 NTU) are within safe levels.
3. Higher turbidity indicates suspended solids, clay particles, or microbial contamination in W2.

7. Dissolved Oxygen (DO)

1. DO levels were
2. W1 = 6.1 mg/L
3. W2 = 4.7 mg/L (lowest)
4. W3 = 5.8 mg/L
5. Lower DO in W2 correlates with high BOD / COD as oxygen is Consumed by microorganisms during decomposition.

8. Total Dissolved Solids (TDS)

1. TDS values varied considerably :
2. W2 = 980 mg/L (highest)
3. W1 = 540 mg/L
4. W3 = 430 mg/L

The elevated TDS in W2 confirms high mineral and salt content, possibly due to agricultural run off, open defecation sites, or waste water infiltration.

9. Sodium (Na) and Potassium (K)

1. Both sodium and potassium are highest in W2 (Na = 65 mg/L, K = 6.1 mg/L), indicating:
2. Possible use of fertilizers (NPK fertilizers)
3. Anthropogenic contamination
4. Soil leaching during recharge
5. W1 and W3 show moderate to low concentrations, typical of natural ground water.

10. Overall Interpretation

6. Across all parameters, W2 consistently shows the poorest water quality, with :
7. Highest EC
8. Highest TDS
6. Highest turbidity

CONCLUSION

The present study on water quality at the confluence of the Godavari River and Darna River in Nashik reveals that the water quality is significantly influenced by anthropogenic activities. The upstream regions of both rivers showed comparatively better water quality, whereas the confluence (Sangam) exhibited higher levels of turbidity, BOD, COD, nutrients, and microbial contamination.

The decrease in dissolved oxygen and increase in pollution indicators at the confluence suggest the presence of organic and sewage-related pollution. In several cases, the observed values exceeded the permissible limits set by the Bureau of Indian Standards (BIS) and the World Health Organization (WHO), indicating that the water is not suitable for direct consumption without treatment.

Overall, the study highlights the need for continuous monitoring, proper waste management, and effective pollution control measures to protect the river ecosystem and ensure safe water quality for human use.

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