Water Quality Status of Godavari River at Chal Nali in Kopargaon Tehsil

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***Abstract*—This study investigates the Physico-chemical characteristics of water from the Godavari River in Kopargaon Taluka, Ahmednagar District, Maharashtra. Parameters such as temperature, pH, dissolved oxygen, and concentrations of total dissolved solids (TDS), iron, fluoride, chlorides, and sulphates were analyzed. The results suggest that the water quality is within permissible limits for irrigation and domestic purposes, based on WHO standards. However, fluctuations in certain parameters highlight areas for concern. An expanded focus on microbial and heavy metal contamination is recommended for future studies to ensure comprehensive water quality management.**

I. INTRODUCTION

Rivers play a vital role in supporting life, agriculture, and industries. In recent decades, rapid industrialization and urbanization have contributed to the deterioration of river water quality in India. The Godavari River, referred to as the "Dakshin Ganga," is an essential water resource for Maharashtra and other states. Despite its significance, the river faces challenges such as pollution from industrial effluents, agricultural runoff, and untreated domestic sewage.

This study aims to assess the Physico-chemical parameters of Godavari River water at three sampling sites in Kopargaon Taluka, providing insights into seasonal trends and compliance with international standards.

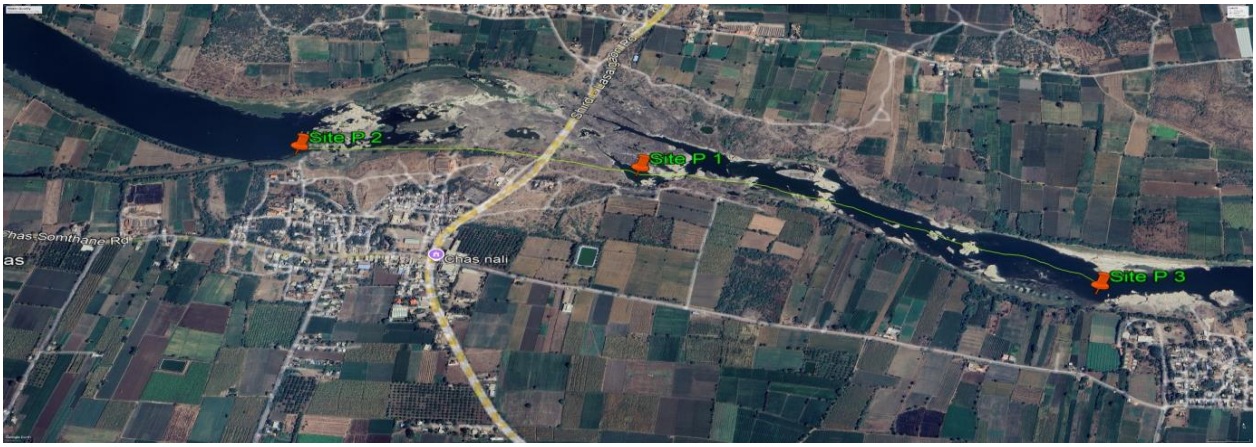
A. Materials and Methods

Water samples were collected monthly over one year (January–December 2015) from three sites, designated as A1, A2, and A3. Sampling was conducted 15 cm below the water surface using opaque, airtight containers. Physico-chemical parameters were analyzed following **APHA (1989)** standards.

B. Parameters Assessed:

1. Temperature (°C)
2. pH
3. Dissolved Oxygen (mg/L)
4. Total Dissolved Solids (TDS) (mg/L)
5. Iron (mg/L)
6. Fluoride (mg/L)
7. Chlorides (mg/L)
8. Sulphates (mg/L)
9. Hardness (mg/L)

Study Area Geospatial Map



Enhanced Data Table

Parameter	Site A1 Min-Max	Site A2 Min-Max	Site A3 Min-Max	Remarks
Temperature (°C)	22.1 - 24.5	22.3 - 24.8	22.0 - 24.6	Seasonal variation observed
pH	7.4 - 8.3	7.5 - 8.4	7.6 - 8.53	Slightly alkaline; within range
Dissolved Oxygen (mg/L)	4.5 - 6.8	4.4 - 6.9	4.6 - 7.0	Sufficient for aquatic life
TDS (mg/L)	300 - 700	320 - 740	310 - 730	Suitable for drinking and farming
Iron (mg/L)	0.1 - 0.3	0.15 - 0.35	0.2 - 0.4	Occasional exceedance observed
Fluoride (mg/L)	0.035 - 0.11	0.04 - 0.12	0.05 - 0.14	Within permissible range
Sulphates (mg/L)	1.28 - 3.0	1.30 - 3.1	1.35 - 3.2	Minimal industrial impact
Hardness (mg/L)	90 - 120	95 - 140	100 - 164	Moderate; suitable for use

II. RESULTS AND DISCUSSION (ENHANCED WITH JAN TO JUNE 2023 OBSERVATIONS)

A. Temperature

Temperature plays a vital role in biochemical reactions and the solubility of gases in water. From January to June 2023, temperatures ranged from 22.0°C at Site P3 in January to 23.8°C at Site P2 in June, demonstrating seasonal variation with a gradual rise during summer. This pattern aligns with earlier studies, reflecting how warmer months reduce oxygen solubility while increasing metabolic and evaporation rates. The observed range is consistent across all sites, indicating minor climatic differences within the study area.

B. pH

The pH values of the water remained within a slightly alkaline range of **7.4 to 8.53** during the study. The maximum pH (8.53) was recorded at Site P3, potentially linked to increased photosynthetic activity in the warmer months that reduce CO_2 levels, while the minimum value (7.4) occurred at Site P1 in January, reflecting reduced biological activity. These values indicate a stable aquatic environment and fall within the WHO-recommended range of 6.5–8.5.

C. Dissolved Oxygen (DO)

DO levels fluctuated from 4.4 mg/L at Site P2 in June to 7.0 mg/L at Site P3 in January. Higher DO concentrations in winter are due to cooler temperatures enhancing oxygen solubility, while summer declines are attributed to higher microbial activity and decomposition. The observed levels are sufficient to support aquatic life, underscoring the river's health.

D. Total Dissolved Solids (TDS)

TDS values ranged from **300 mg/L** at Site P1 in January to **740 mg/L** at Site P2 in June, reflecting a summer increase due to evaporation and reduced flow. Despite the variations, TDS remained below the permissible limit of 1000 mg/L, indicating the water's suitability for domestic and agricultural use.

E. Iron

Iron concentrations ranged from 0.1 mg/L at Site P1 in February to 0.4 mg/L at Site P3 in May. Occasional exceedance of the WHO permissible limit (0.3 mg/L) at Site P3 suggests localized contamination from industrial effluents or sediment leaching, requiring further investigation and management strategies.

F. Fluoride

Fluoride concentrations remained well within safe limits, ranging from **0.035 mg/L** at Site P1 in January

to 0.14 mg/L at Site P3 in May. These values indicate minimal risk to both drinking water quality and agricultural applications, staying far below the WHO guideline of 1.5 mg/L.

G. Sulphates

Sulphate levels varied between 1.28 mg/L at Site P1 in January and 3.2 mg/L at Site P3 in June. The slight summer increase can be attributed to evaporation and minor agricultural runoff. These values confirm the absence of significant industrial pollution, remaining well within the permissible limit of 250 mg/L.

H. Hardness

The hardness ranged from 90 mg/L at Site P1 in January to 164 mg/L at Site P3 in June. The moderate increase in summer suggests concentration effects from evaporation. The water remains moderately hard and suitable for domestic and agricultural purposes, falling below the acceptable limit of 300 mg/L.

III. CONCLUSION

The Godavari River near Chas Nali in Kopargaon Teshsil exhibits water quality parameters largely within permissible limits for irrigation and domestic usage. However, occasional fluctuations in iron and other parameters highlight localized contamination. A broader analysis, including microbial and heavy metal assessments, is recommended for holistic water quality management.

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