



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

# IJIRSET

International Journal of Innovative Research in  
**SCIENCE | ENGINEERING | TECHNOLOGY**



# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 12, Issue 1, January 2023

**ISSN** INTERNATIONAL  
STANDARD  
SERIAL  
NUMBER  
INDIA

**Impact Factor: 8.118**

# Comprehensive Analysis of Physicochemical Parameters of Water Samples from Godavari River for Sustainability Studies at Paithan, Maharashtra (India)

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**ABSTRACT:** Water is one of the most important of all natural known resources on the Earth. It is important to all living organisms, ecological systems, human health, food production and economic development. The Godavari River water was analysed for various parameters 12 months i.e. January to December 2021 at Paithan (Aurangabad district, Maharashtra). For analysing parameters standard methods were used as prescribed by APHA. Deteriorated water quality of river has potential health risks to consumers and aquatic organisms in river basin. Water sample were collected to estimate value of the temperature 24.35, pH 7.41, Dissolved Oxygen (DO) 13.9, Biochemical Oxygen Demand (BOD) 11.4, Chemical Oxygen Demand (COD) 7.6, Turbidity 3.5, Hardness 39.8, Total Dissolved Solids (TDS) 87.2, Calcium 19.1, Chlorides 16.7. The present work carried out to analyse physicochemical parameters indicated that the quality of water has partially contaminated. Numerous activities at sampling location having numerous impacts on water quality. The safety of drinking water is important for the health.

**KEYWORDS:** water, drinking, analysis, river, physicochemical.

## I. INTRODUCTION

Access to clean and safe water for consumption of human being was declared a human right by the United Nation General Assembly in the July, (UN, 2016). Water is very precious natural resource of the Earth on which rely the overall sustainability of agriculture and the civilization (1). The healthy water ecosystem is dependent on physical and chemical characteristics (6). The availability of good quality water is an indispensable feature for prevention of diseases and improving quality of life. In last few decades the water pollution has become one of the most burning issues of environment at global level. When toxic matter mixed into the lakes, streams, rivers and various water bodies they get dissolved and sedimented. Polluted water are turbid, unpleasant, having bad smell and mostly unsuitable for drinking and various purpose. It is necessary to know in detail about various physical parameters like colour, temp, total hardness, pH, chlorides, DO, BOD, COD and alkalinity which is used to test water quality. The water quality index exhibits the suitable criteria required for the human beings (4). However water quality index based on some very important parameters express a simple indicator of water quality. In general water quality indices incorporate data from multiple water quality parameters which affects the health of water bodies with number (5). Due to increase in industrialization, urbanization, agriculture activity and various human activities has increased the pollution of surface water (7). Water is the most widely circulated and abundant substances found in the nature. On an average there is 14000 million billion litres of water on the Earth but most of this water is not used for drinking purpose because 97% is sea water and only 3% is fresh water out of which 2% is locked in the polar ice caps and glaciers, only 1% water is available for drinking purpose (8). Seasonal variations in both artificial and natural precipitation affect the quality of river water and lead to numerous attributes for different seasons (9)(10)(11). Monitoring of the physicochemical water quality parameters play a major role in assembling the water ecological ecosystem, hydrochemistry and ecology and restoring water quality (13)(12)(16).

## II. METHODOLOGY

Water the elixir, is needed for the survival of all lifeforms on the Earth. It is very important to all ecological systems, human health, food production and for most of the economic activities (23). *Aurangabad is one of the fast growing, renowned industrial hub of Maharashtra state. The district has geographical area of 10,107 sq.km.* Aurangabad is the headquarters of the district as well as the division of Marathwada region. It is located on the Kham River. The entire city is located on the latitude of 19°53'50" N and longitude of 75°22'46" E. Aurangabad District is located most



of the part in the basin of Godavari river and some of the part in the Tapi river basin (22). The city is surrounded by the hills of the famous Vindhya ranges and the Kham river passes through it. Paithan is a city positioned nearly (56km) south of Aurangabad. Paithan river is the major source of water supply to the city. The river reservoir is about (55km) long and 27km wide and spans approximately 350sq.km. Total reservoir is nearly 36,0000 hectares. Aurangabad is one of the fast growing, renowned industrial region and which is best known globally for its industrial auto cluster and brewery industries. The permissible limit of COD for drinking purposes is within 4 mg/L according to the standard of DoE (1997), DPHE (2019) and WHO (14) (15). USEPA (2012) determines the irrigation standard at 200 mg/L. *Drinking water has crucial effects on the human health. Among all the types of ecological contamination, water pollution is one of the most detrimental threat to the public health especially in the many developing and underdeveloped region, as drinking water quality is poorly managed (18) (2). The Methodology for the present research work was adopted given by APHA. The collected water samples were brought to the laboratory and analysis was performed. pH was determined using pH meter and similarly turbidity was measured by Turbidity meter. Alkalinity, Chloride, Calcium, Hardness, Temperature, BOD, COD, DO were determined by standard method according to table (17).* The present work on hydrological parameters depicts information on quality of water of the Godavari River near Paithan. The river flows through rural and urban area, it receives domestic, agricultural and industrial effluents. Hence, water is estimated for its water quality and the impact of various human and cultural activities on the physicochemical and even biological characteristics (19) (20) (21).



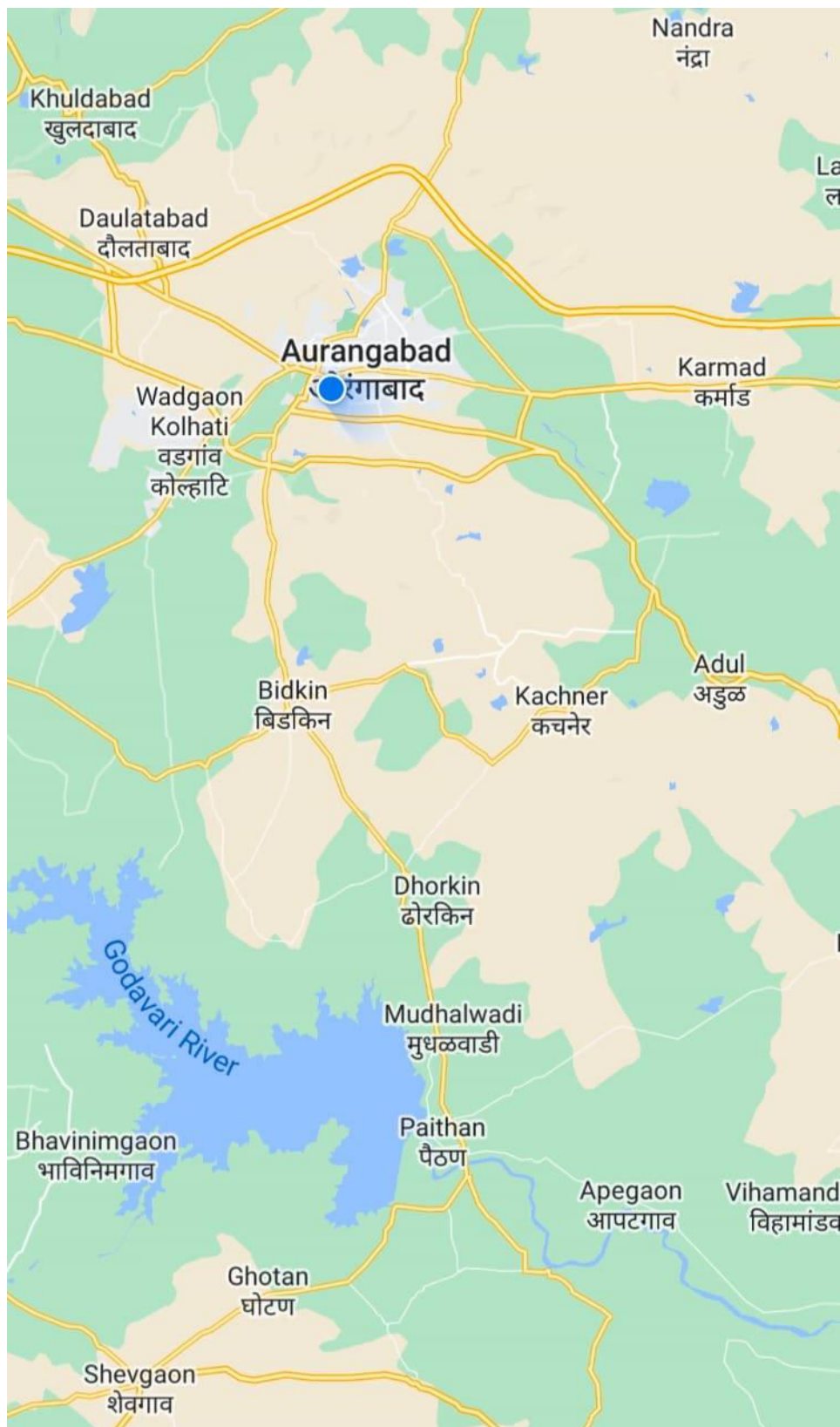


Fig1:Map Showing Area of Aurangabad City

**III. RESULT AND DISCUSSION**

Environmental degradation, particularly related to widely decreasing forest areas followed by numerous agricultural practices ignoring the conversation rules, has given major contribution to the alternation of river flow characteristics and even the increase of turbidity. Turbidity is the amount of granules inundated in the water. Substance causing turbidity include clay, mud sediment, organic and non-organic materials having of fine granules, soluble organic colour mix, plankton and the microorganisms.

Table 1: Physicochemical Parameters of the Paithan River.

Month/ Parameter s	Janua ry	Feb .	Marc h	Apri l	Ma y	Jun e	Jul y	Au gus t	Septe mber	Oct obe r	Nove mber	Dece mber	Avera ge	Max .	Min .
Temperatu re	25.8	24. 5	22.8	23.9	26. 3	24. 9	26. 4	22. 3	23.9	21.9	23.7	25.8	24.35	26.4	21. 9
pH	8.3	6.6	7	6.2	6.7	7.4	7.9	8.4	6.8	7.3	8	8.3	7.41	8.4	6.2
DO	12.5	13. 5	14.2	16.4	14. 1	12. 9	14. 3	12. 2	16.2	14.6	11.7	15.2	13.98	16.4	11. 7
BOD	13.1	10. 6	9.5	13.4	9.8	12. 8	13. 3	11. 5	9.9	10.6	12.9	9.5	11.41	13.4	9.5
COD	7.8	8.6	9.4	5.6	8.8	7.9	9.9	7.5	8.1	6.4	2.2	9.3	7.63	9.9	2.2
TDS	100.4	82. 7	92.3	100. 9	89. 5	79. 4	99. 1	77. 6	73.9	84.5	97.4	69.2	87.24	100. 9	69. 2
Turbidity	2.8	2.6	4.9	3.1	4.2	4.5	2.6	3.4	4.2	2.8	3.7	3.8	3.55	4.9	2.6
Chlorides	13.2	10. 7	18.7	17.4	19. 8	22. 9	16. 2	13. 6	10.4	20.7	22.3	15.5	16.78	22.9	10. 4
Hardness	25.6	19. 9	65.2	59.7	35. 8	56. 9	29. 4	52. 9	48.6	20.4	39.9	23.3	39.8	65.2	19. 9
Calcium	17.7	20. 5	12.2	22.1	19. 4	21. 9	18. 7	20. 4	16.7	21.3	23.5	15.3	19.14	20.4	15. 3

Temperature of water samples taken at the time of collection ware in the max range was 26.4°C, the average temperature recorded was 24.35, the minimum temperature was 21.9. The average pH recorded was 7.41, maximum was 8.4 and minimum was 6.2. The average value of DO was 13.9, minimum was 11.7 and maximum was 16.4. The TDS of all water samples were carried out at room temperature by using TDS meter. TDS average recorded was 87.24 and the minimum was 69.2, maximum was 100.9. Chemical oxygen demand (COD) of all water samples were carried out by using dichromate reflection method. The average COD recorded was 7.63, minimum was 2.2, maximum was 9.9. Biochemical oxygen demand (BOD) was carried out by using alkali azide method. The average BOD recorded was 11.41, maximum was 13.4 and minimum was 9.5. The average turbidity recorded was 3.55, maximum turbidity was 4.9 and minimum was 2.6. The average value of the chloride recorded was 16.78, minimum was 10.4 and the maximum was 22.9. The average value of hardness recorded was 39.80, minimum was 19.9 and the maximum was 65.2. The average value of calcium was 19.1, minimum was 15.3 and maximum value was 20.4. Present research work was carried out at Paithan city area to analysed the water sample. The observed values have been tabulated in the table no.1 and graphically presented in fig no.2 to 5. Turbidity is the amount of granules inundated in the water. Substances causing turbidity having clay, organic and nonorganic materials consist of fine granules, soluble organic colour mix, plankton and microorganism (13). Total hardness of water samples was carried out by most widely used method i.e. using titration method with EDTA solution. Chloride is reported the higher which was associated with increased level of pollution. Dissolved oxygen is a most crucial aquatic parameter, whose existence is essential to aquatic fauna.

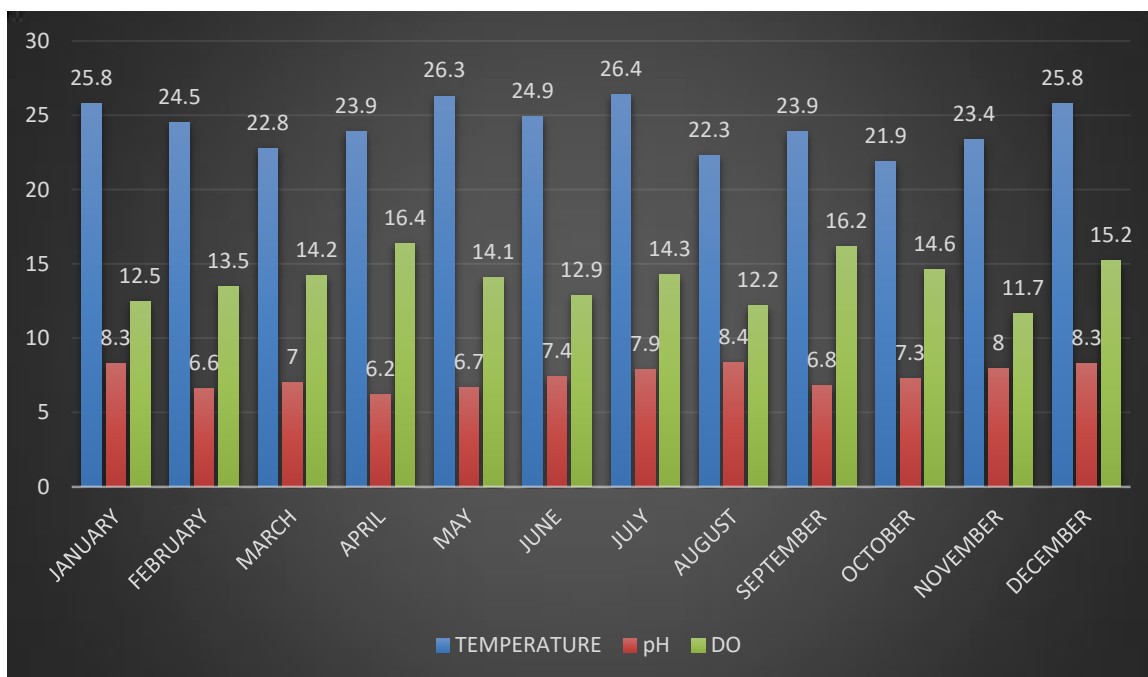


Fig 2: The Graphical Presentation of Godavari River.

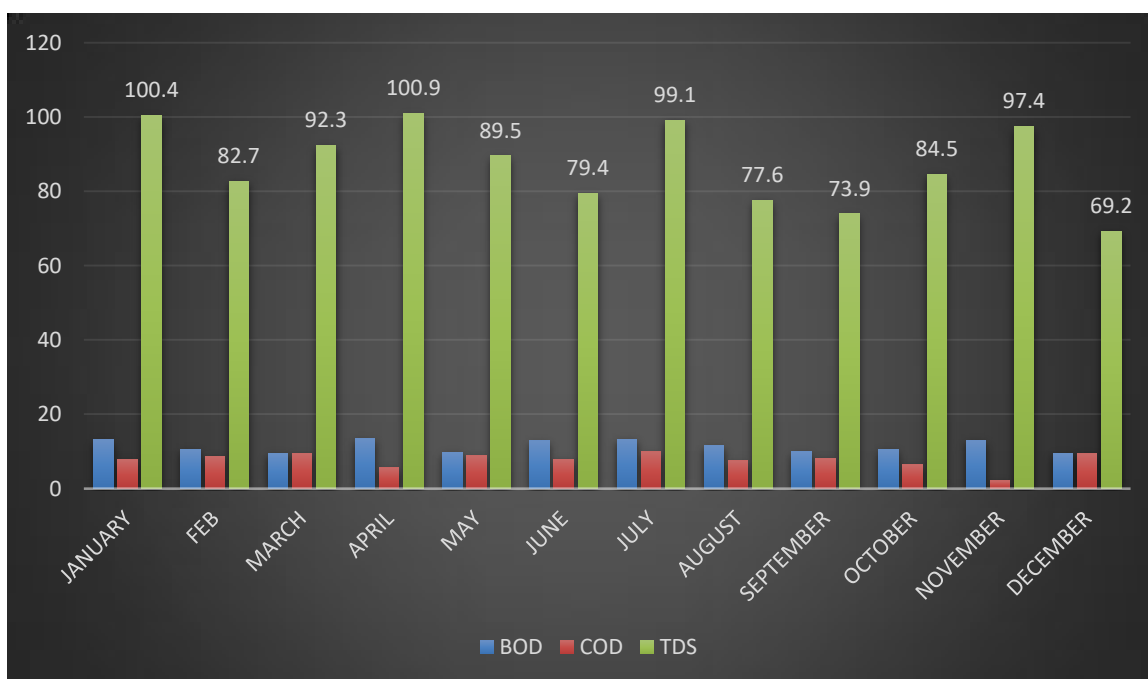


Fig 3: The Graphical Presentation of Godavari River.

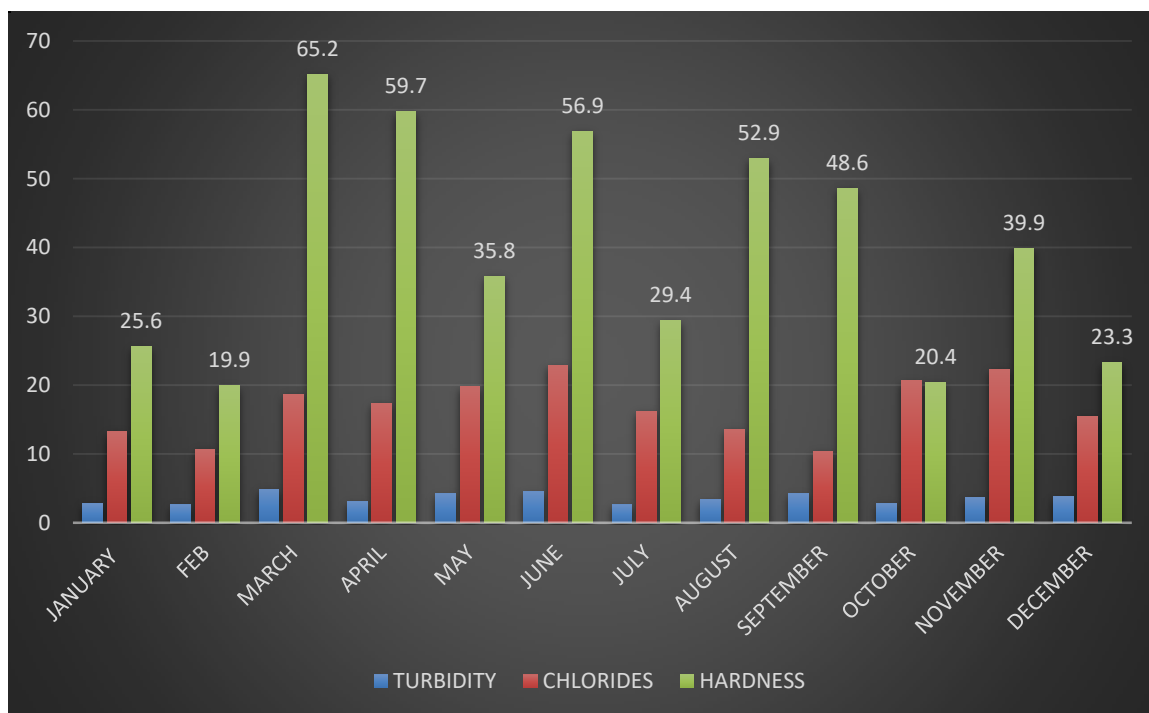


Fig 4: The Graphical Presentation of Godavari River.

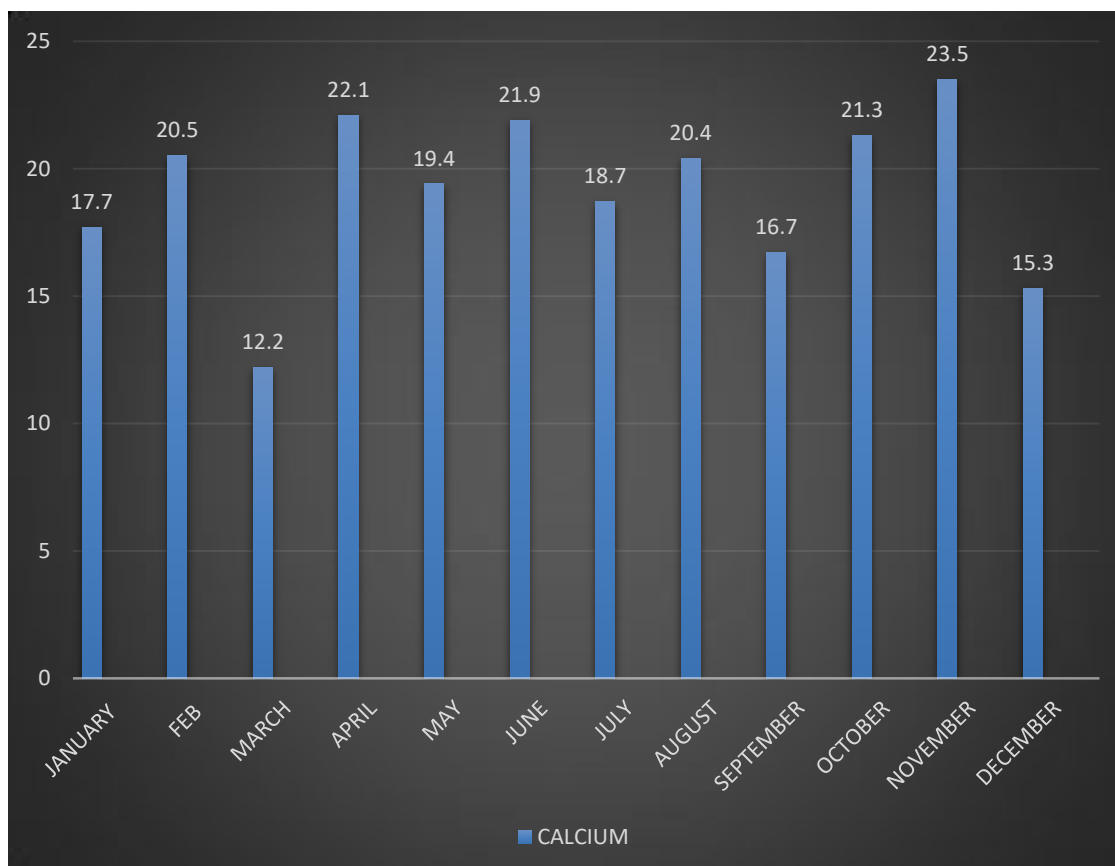


Fig 5: The Graphical Presentation of Godavari River.

## IV. CONCLUSION

*Water is essential for life. It is used for many purposes including drinking, food preparation, irrigation and manufacturing. Although water covers more than 70% of the surface of the Earth, less than 1% of that resource is available as fresh water and this is evenly distributed at global level.* Potable water is water safe enough to be consumed by human or used with low risk of immediate or long harm. The analysis of Physical and Chemical parameters of river water like temperature, pH, TDS, BOD, DO, COD, Hardness, Turbidity were determined. The average temperature recorded from study area was 24.35. The average pH was 7.41, DO 13.9, BOD was 11.4, COD 7.6, TDS 87.24, turbidity 3.55, chlorides 16.78, hardness 39.80 and calcium was 19.14. In the present research work it is found that most of the parameters were within permissible limits. Further it is suggested that the water from river is not perfectly suitable for drinking purpose. Therefore, some effective measures are needed to improve the drinking water quality by adopting conservation measures of water bodies and preparing best water quality management plans. *Drinking water must safe, of adequate quantity, accessible and affordable.*

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