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Comprehensive Estimation of Physicochemical Parameters of Godavari River Water at Paithan, Aurangabad District, Maharashtra, (India)

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ABSTRACT: Water is a crucial component of nature. Water quality generally means the component of water which must be present for optimum growth of aquatic organisms. Water plays a important role in maintaining the health and welfare of human being. Clean drinking water is now recognized as a fundamental right. The present study deals with the seasonal variation in hydro-biological parameters of Godavari river water. The hydrological parameters such as Temperature, Dissolved oxygen pH, Alkalinity, Hardness, TDS and BOD of water play an important role in the distribution of planktonic flora and fauna. The present work on hydrological parameters provides information on quality of water of Godavari River at Paithan. The average temperature recorded from study area was 23.68, pH was 7.63, DO was 13.9, BOD was 11.5, COD was 7.125, TDS was 85.82, turbidity was 3.55, chlorides was 16.7, hardness was 41.55 and calcium was 19.80. The samples collected were carefully tested by Standard methods prescribed by APHA. It was found that water quality was partially good but not completely from the perspective of drinking. The productivity depends on physico-chemical characteristics of the water body.

KEYWORDS: water, Godavari, river, Paithan, drinking.

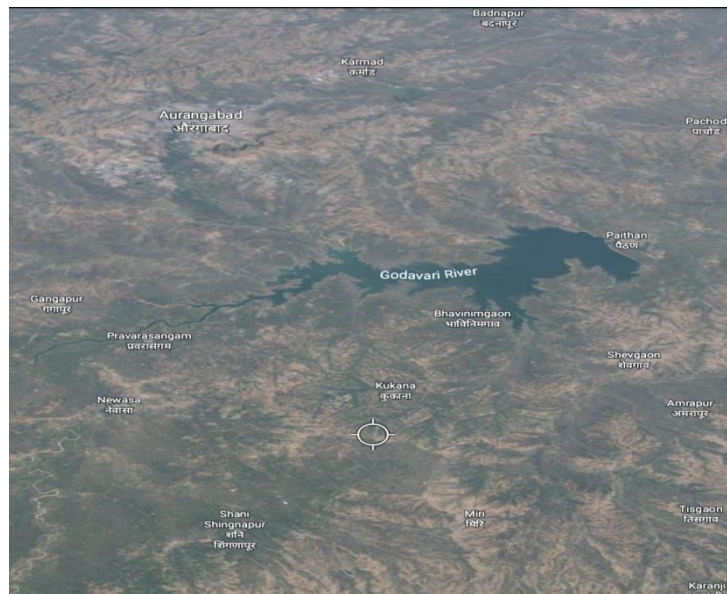
I. INTRODUCTION

Water the elixir, is needed for the survival of all forms of life on the Earth. It is important to all ecological systems, human health, food production and for economic development (Shukla and Bhadresha, 2013). Even though 71% of earth's surface is covered by water, the fresh water supply has increasingly become a major limiting factor (Arasu and Neelakantan, 2007; Saxena et al.,1978). Rivers are the most crucial freshwater resource in global level (Usharani et al.,2010). Rivers contribute a major role in shaping and integrating the landscape and molding the environmental surroundings. They are key in controlling the global water cycle and are the most dynamic crucial agents of transport in the hydrological cycle (Arimoro, 2008; Otieno et al.,2017). Pollution of water has emerged as one of the most detrimental environmental problems of recent times (Solanki, 2011). Multidimensional contamination of rivers is one of the main problems in many fast growing urban centres because the maintenance of water quality and sanitation infrastructure do not follow the population and urbanization growth especially in many developing countries (Hisseien and Kamga, 2015 ; Sundaray et al., 2006; Karbassi et al., 2007; Akoto et al.,2008; Ahmad et al.,2010). Water quality index (WQI) is valuable and unique rating to depict the overall water quality status in a single term (Kulkarni and Jain, 2014).The determinant of good growth in the water body includes dissolved oxygen, hardness, turbidity, alkalinity, nutrients, temperature, etc. Conversely, many other parameters like biological oxygen demand and chemical oxygen demand indicate pollution level of any water body. The water of good quality is needed for living organisms (Verma and Khan, 2015).The quality of water resources is usually described by its physical, chemical and biological characteristics. For the good quality of water resources large numbers of physicochemical and biological parameters need to be studied and quality must be found in normal range (Shambharkar, 2019).The present work on hydrological parameters depicts information on quality of water of Godavari river near Paithan. The river flows through rural and urban area, it receives numerous domestic, agricultural and industrial effluents; hence, water is analyzed for its water quality and the impact of various human and cultural activities on the physico-chemical and even biological characteristics (Deshmukh and Ambhore, 2006; Deshmukh and Sonawane, 2008; Deshmukh and Sathe, 2014).



II. METHODOLOGY

The quality of water resources is usually described by its crucial physic-chemical and biological characteristics. 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 19o53’50” N and longitude of 75o22’46” E. Aurangabad District is located mainly in the basin of Godavari river and partly in the Tapi river basin (Thorat and Patil, 2020). The city is surrounded by the hills of the Vindhya ranges and the Kham river passes through it. The water samples were scientifically collected for water quality assessment from Godavari River and analyzed at regular intervals of one month (Kulkarni, 2014) for period of twelve months from January to December 2021. Water samples were collected from sampling station and they were brought to the laboratory. The temperature of water was measured by thermometer on the spot, the dissolved oxygen was estimated in the laboratory by using the Wrinkler’s method, Hardness of water was estimated by using Erichrome black ‘T’ indicator. Dissolved oxygen (DO), biological oxygen demand (BOD), total hardness, chlorides (Chaudhari and Patil, 2021), etc were estimated by following APHA standard methods.



I. FIG1: SHOWING STUDY AREA

III. EXPERIMENTAL RESULTS

Present research work was carried out in Paithan city area to analyze the water quality of river water sample. The observed values have been tabulated in the table no. 1 and graphically presented in graph no. 2 to 11.

	Janu ary	Feb.	Marc h	April	May	June	July	Aug ust	Sept embe r	Octo ber	Novem ber	Dece mber	Aver age	Max.	Min.
Tem perat ure	21.8	23.5	25.8	21.9	24.3	22.9	24.4	25.3	22.9	21.9	23.7	25.8	23.6 8	25.8	21.8
pH	7.3	7.4	7	8.2	7.7	8.4	6.9	7.7	8.8	7.3	8	6.9	7.63	8.8	6.9



	Janu ary	Feb.	Marc h	April	May	June	July	Aug ust	Sept embe r	Octo ber	Nov ember	Dece mber	Aver age	Max.	Min.
DO	12.5	14.5	13.2	16.4	14.1	12.9	11.3	12.2	16.2	14.6	13.7	15.2	13.9	16.4	11.3
BOD	11.1	12.6	8.5	9.4	12.8	11.8	13.3	14.5	9.9	10.6	12.9	11.5	11.5 7	14.5	8.5
COD	7.8	9.6	8.4	5.6	8.8	6.9	9.9	8.5	8.1	6.4	2.2	3.3	7.12 5	9.9	2.2
TDS	70.4	82.7	92.3	100. 9	88.5	99.4	112. 1	69.6	73.9	94.5	77.4	68.2	85.8 2	112. 1	68.2
Turb idity	3.8	2.6	4.9	4.1	2.2	4.5	2.6	3.4	4.2	2.8	3.7	3.8	3.55	4.9	2.2
Chlo rides	18.2	10.7	13.7	17.4	21.8	22.9	16.2	13.6	10.4	17.7	22.3	15.5	16.7	22.9	10.4
Hard ness	55.6	40.9	65.2	59.7	35.8	56.9	29.4	32.9	58.6	20.4	19.9	23.3	41.5 5	65.2	19.9
Calci um	17.7	22.5	12.2	22.1	21.4	26.9	17.7	20.4	16.7	21.3	23.5	15.3	19.8	26.9	12.2

The recorded values from the analysis carried out in present research work tabulated in the table and interpreted. The average temperature recorded was 23.680C and maximum temperature recorded from the study area was 25. 80C, the minimum temperature was 21.80C. The average pH recorded was 7.63 and maximum pH recorded was 8.8 and minimum pH recorded was 6.9. The average DO recorded was 13.9 and maximum DO recorded from the study area was 16.4, the minimum DO was 11.3. The average BOD recorded was 11.5 and maximum BOD recorded from the study area was 14.5, the minimum BOD was 8.5.The average COD recorded was 7.125 and maximum COD recorded from the study area was 9.9, the minimum COD was 2.2. The average TDS recorded was 85.82 and maximum TDS recorded from the study area was 112.1, the minimum TDS was 68.2.The average turbidity recorded was 3.55 and maximum turbidity recorded from the study area was 4.9, the minimum turbidity was 2.2. The chlorides recorded was 16.7 and maximum chlorides recorded from the study area was 22.9, the minimum chlorides was 10.4. The average hardness recorded was 41.55 and maximum hardness recorded from the study area was 65.2, the minimum hardness was 19.9. The average calcium recorded was 19.80 and maximum calcium recorded from the study area was 26.9, the minimum calcium was 12.2. Temperature is the measure of hotness or coldness express in terms of any of the several scales. pH is a measurement of the level of acid or alkali in a substance. Dissolved oxygen (DO) is a indicator of how much oxygen is dissolved in the liquid. Biological oxygen demand (BOD) is the amount of dissolved oxygen needed for micro-organisms to decompose organic matter. TDS refers to the total concentration of dissolved substances in the drinking water. Turbidity is the indicator of relative clarity of a liquid. The hardness is the amount of dissolved calcium and magnesium in the water.

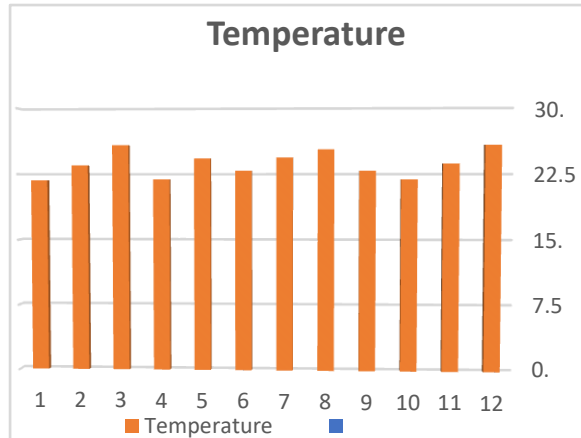


Fig2: Graph showing Godavari River Temperature.

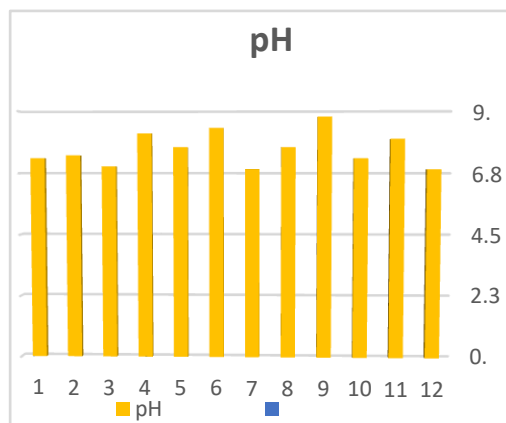


Fig3: Graph showing Godavari River pH.

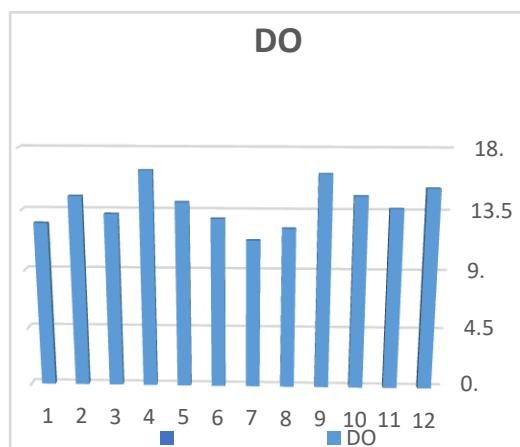


Fig4: Graph showing Godavari River DO.

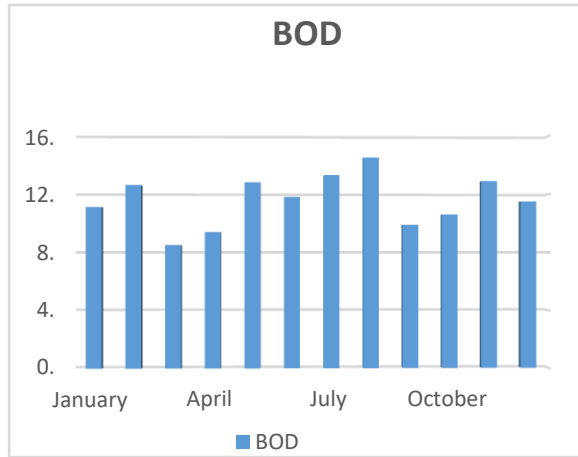


Fig5: Graph showing Godavari River BOD.

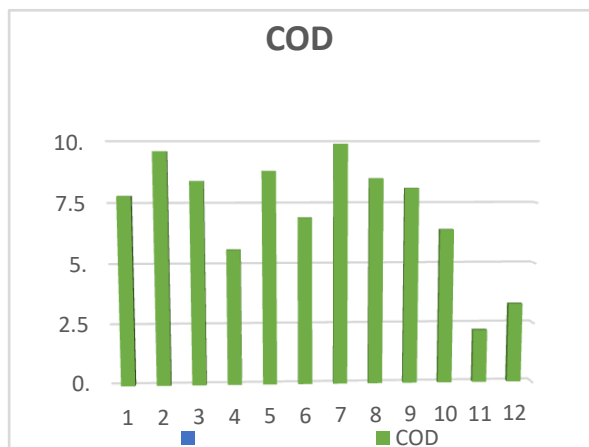


Fig6: Graph showing Godavari River COD.

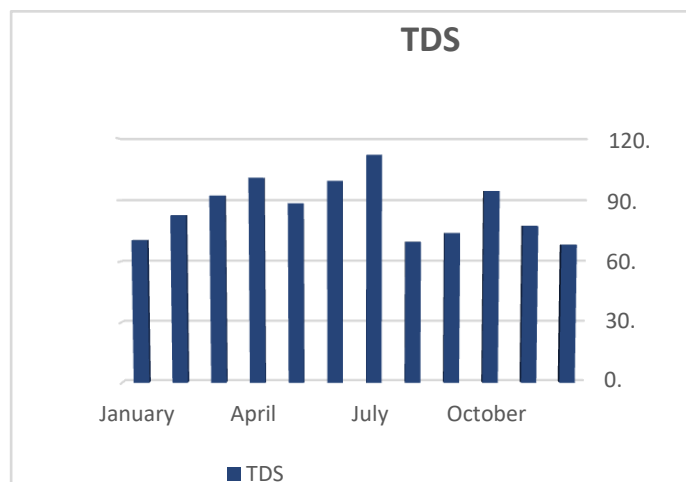


Fig7: Graph showing Godavari River TDS.

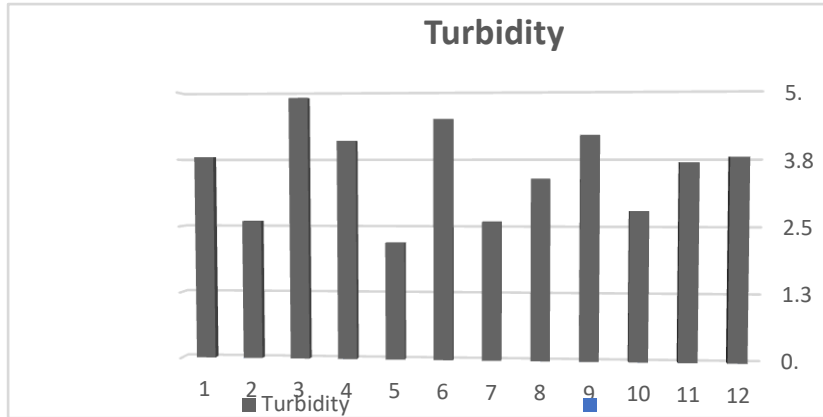


Fig8: Graph showing Godavari River Turbidity.

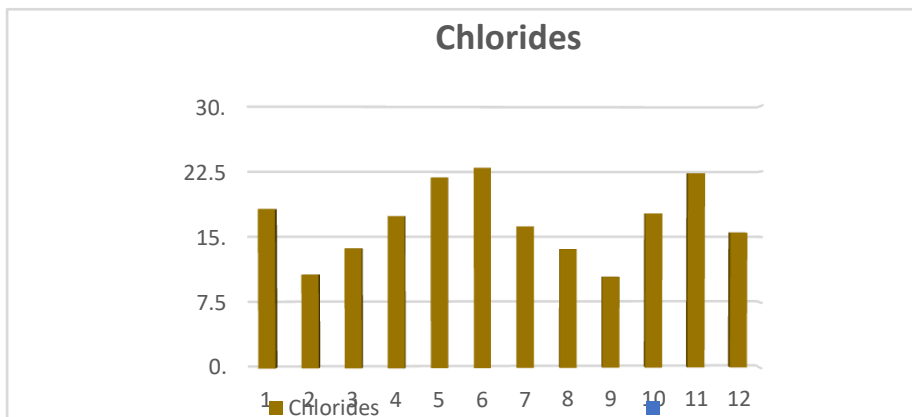


Fig9: Graph showing Godavari River Chlorides.

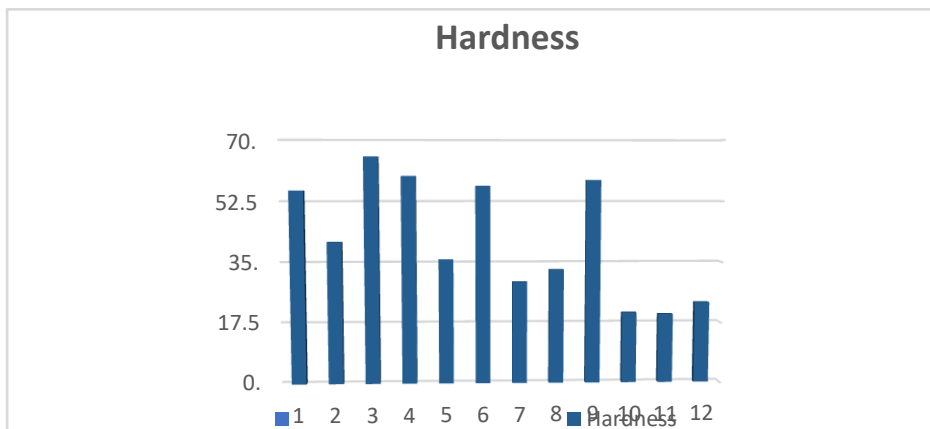


Fig10: Graph showing Godavari River Hardness.

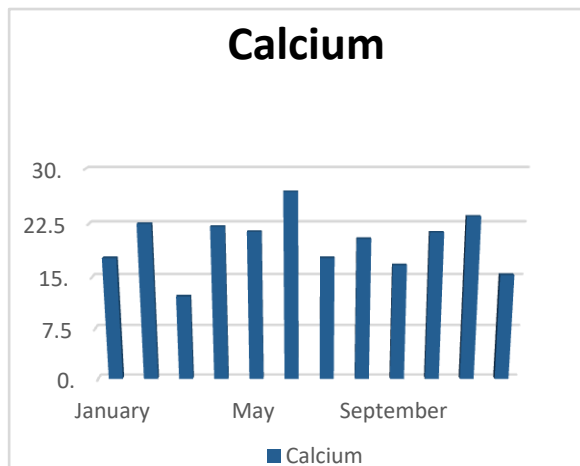


Fig11: Graph showing Godavari River Calcium.

IV. CONCLUSION

Water is the most vital element among natural resources on the Earth. The present research work is carried out at Paithan, which is one of the major holy places of Maharashtra in the January to December month of 2021. Samples were collected and analyzed to know the water quality. It was determined by studying ten parameters. The average temperature recorded from study area was 23.68. The average pH recorded from study area was 7.63. The average DO recorded from study area was 13.9. The average BOD recorded from study area was 11.5. The average COD recorded from study area was 7.125. The average TDS recorded from study area was 85.82. The average turbidity recorded from study area was 3.55. The chlorides recorded from study area was 16.7. The average hardness recorded was 41.55. The average calcium recorded from study area was 19.80. It was found that the water was partially unsafe for drinking purposes. 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 plan for this region.

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