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# Analysis of Physico Chemical Parameter of Godavari River Water for Sustainability Assessment at Holy Paithan City Aurangabad, Maharashtra (India)

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**ABSTRACT:** Human beings experiencing the health impacts due to increased pollution. Environmental pollution has reached to a stage that biological species struggling for its existence. With advancement in science and technology, human population has increased dramatically. The present work has been carried out to assess physicochemical parameters and potability of the water. A laboratory study was conducted to monitor the physicochemical characteristics of water samples of Godavari River for a period of twelve months. The analysis of was done for the parameters like temperature, pH, TDS, conductivity, turbidity, DO, BOD, COD, chloride, calcium. The study was carried out during the study period from January 2021 to December 2021. The average temperature recorded from the study area was 25.1°C. The average pH recorded from the study area was 7.64. The average DO recorded from the study area was 14.875. The average BOD recorded from the study area was 12.183. The average COD recorded from the study area was 8.1. The average TDS recorded from the study area was 90.991. The average Turbidity recorded from the study area was 3.508. The average Chlorides recorded from the study area was 17.391. The average Hardness recorded from the study area was 36.9. The average Calcium recorded from the study area was 21.51. It was observed that the quality of river water was partially altered due to mixing of waste water and sewage, so it was not perfectly suitable for direct domestic use without treatment.

**KEYWORDS:** physicochemical, parameters, water, quality, average

## I. INTRODUCTION

Water plays an important role in human development. It is required for industry, agriculture and human existence. The healthy water ecosystem is dependent on the physicochemical and biological characteristics. Owing to increase in industrialization, urbanization, agriculture activity and numerous human activities results in pollution of surface water and ground water. Water is the most widely used and abundant substances found in nature [1]. Earth surface having 1400 million cubic kilometers of total water 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 located in the polar ice caps and glaciers, only 1% water is available for use. The river water is one of the most crucial resources provided by the nature. Most of the population live on the banks of River, same also observed in selected study area. The people use water for day to day activities like washing of dishes, clothes, showers, cleaning of houses and other uses and at the same time pollutants are also disposed into the rivers in addition to industrial activities that discharge chemical and physical harmful pollutants to water of river. Animals like oxen, cows, goats and dogs swim in the water. These reasons increase the risk of pollution of the river and also the need of treatment and protection of these rivers in India [18]. At the same time, it is very crucial to check the quality of well and bore well water samples too at regular interval of time because due to contaminated drinking water, human suffers from water borne diseases. It becomes very necessary to comprehend the biological phenomena fully owing to the chemistry, because water reveals much about the metabolism of the all ecosystem and explain the general hydrobiological relationship.

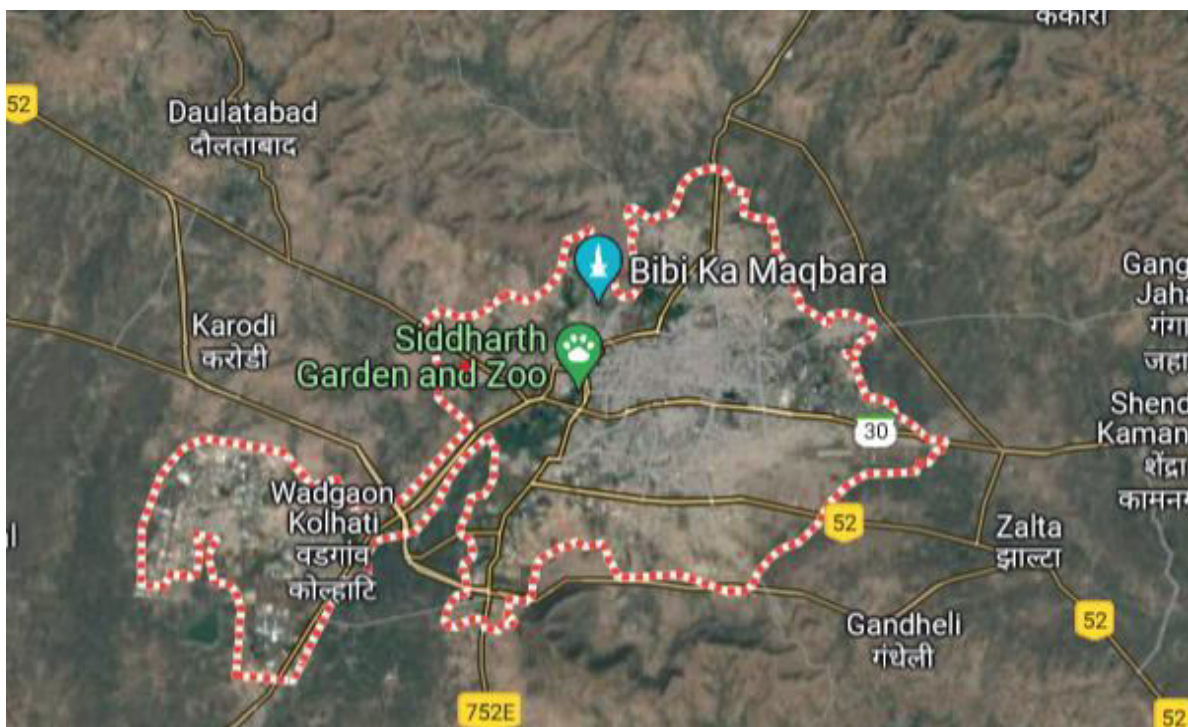
## II. METHODOLOGY

The healthy ecosystem is fully dependent on the physicochemical and biological characteristics of water. Due to increase in industrialization, urbanization and agriculture activities with various human activities has increase the contamination of surface water and ground water. Aurangabad is the headquarters of the district as well as the division Marathwada. It is situated on the river. Its geographical location is latitude 19 53' north and longitude 75 20' east. Aurangabad city has an area approximately about 137.4 Sq. Km. with more than 16 lakhs of the population as per of Indian census. The samples were systematically collected from River Godavari at Paithan city continuously for 12 months. Standard methods were adopted for the estimation of physicochemical parameters. [5]

Methodology for the present research work has been adopted given by [17][11][18][13][16]. The samples were systematically collected in plastic cans of 1L capacity. Before sampling, all the bottles were washed thoroughly with the detergent, tap water, ethanol and then with distilled water. The pH was measured by digital pH meter. Chlorides, calcium were measured by the standard methods given APHA. The temperature was measured with standard thermometers. Like parameters like Dissolved Oxygen (DO), Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Chloride (Cl), Calcium (Ca), Total Suspended Solids (TDS), Total Hardness (TH), Total Dissolved Solids (TDS) and Turbidity were analyzed in the laboratory for assessment quality of water of river from selected locations and make water quality index.

## III. RESULT AND DISCUSSION

Fig1: Map showing study area



The estimated values from the analysis carried out in the present research work tabulated in the Table no.1 and graphically represented in Graph no.2 to 11 interpreted. The collected water sample from different stations was greenish colored and having little odour. pH is a measure of how acidic/basic water is. Its range is 0 - 14, with 7 being neutral. pH of less than 7 indicate acidity, whereas a pH of greater than 7 shows a base.

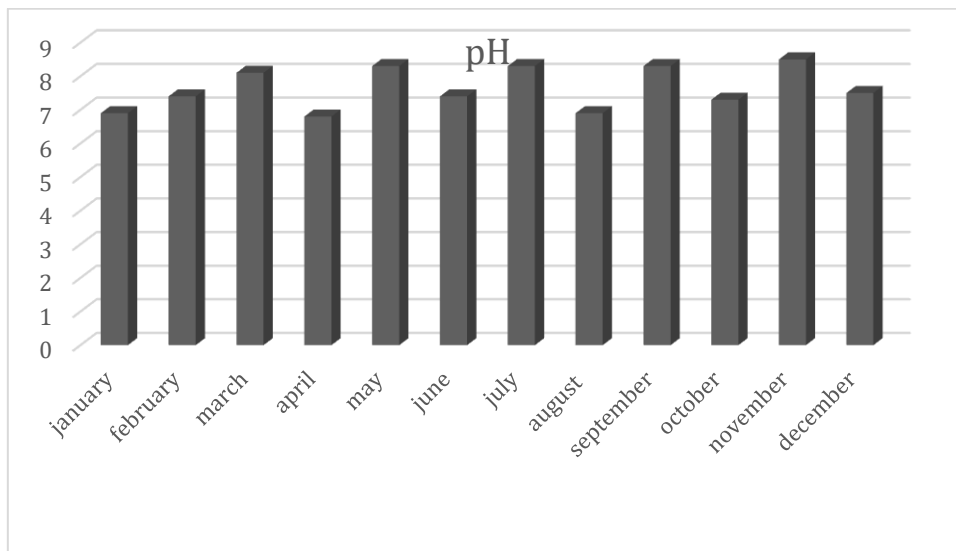


**Table 1: Estimated values physicochemical parameters**

	January	Feb.	March	April	May	June	July	August	September	October	November	December	Average
Temperature	24.8	25.1	26.3	23.7	25.8	25.5	26.5	25.6	24.8	23.9	25.8	24.9	25.18
pH	6.9	7.4	8.1	6.8	8.3	7.4	8.3	6.9	8.3	7.3	8.5	7.5	7.641
DO	13.4	15.5	12.6	15.4	14.1	13.9	16.3	16.2	13.8	15.6	16.5	15.2	14.875
BOD	10.4	12.6	13.2	14.4	12.8	13.8	15.3	9.5	12.9	10.6	9.2	11.5	12.183
COD	9.2	8.6	7.4	6.5	5.8	8.9	9.9	7.5	8.1	9.4	6.6	9.3	8.1
TDS	112.4	93.7	78.3	80.9	91.5	100.4	82.1	112.6	68.9	109.5	77.4	84.2	90.991
Turbidity	4.1	3.8	3.9	2.1	3.2	4.4	2.6	3.4	4.2	2.8	3.7	3.9	3.508
Chlorides	17.2	15.7	21.7	16.4	22.1	10.9	18.2	15.6	14.4	21.7	19.3	15.5	17.391
Hardness	22.8	35.9	55.2	45.7	35.8	54.9	32.4	25.9	42.6	18.4	52.9	20.3	36.9
Calcium	17.7	19.5	25.2	16.1	18.4	26.9	24.7	20.9	19.7	24.3	25.5	19.3	21.51

The maximum value of temperature is 26.5 and minimum is 23.7. The maximum value of pH 8.5 and minimum value is 6.8. The maximum value of DO 16.5 and minimum value is 12.6. The maximum value of BOD is 15.3 and minimum value is 9.2. The maximum value of COD is 9.9 and minimum value is 5.8. The maximum value of TDS is 112.4 and minimum value is 68.9. The maximum value of Turbidity is 4.4 and minimum value is 2.1. The maximum value of Chlorides is 22.1 and minimum value is 10.9. The maximum value of Hardness is 54.9 and minimum value is 18.4. The maximum value of Calcium 26.9 and minimum value is 16.1.

pH is really a measure of the relative amount of free hydrogen and hydroxyl ions in the liquid. The standard range pH is 6.5 to 8.5 given by ISI and WHO [3].



**Fig. 2: Graph showing pH levels**

Chemical oxygen demand (COD) of all water samples were carried out by using common method i.e. dichromate refluction method and biochemical oxygen demand (BOD) were carried out by alkali azide method [2].

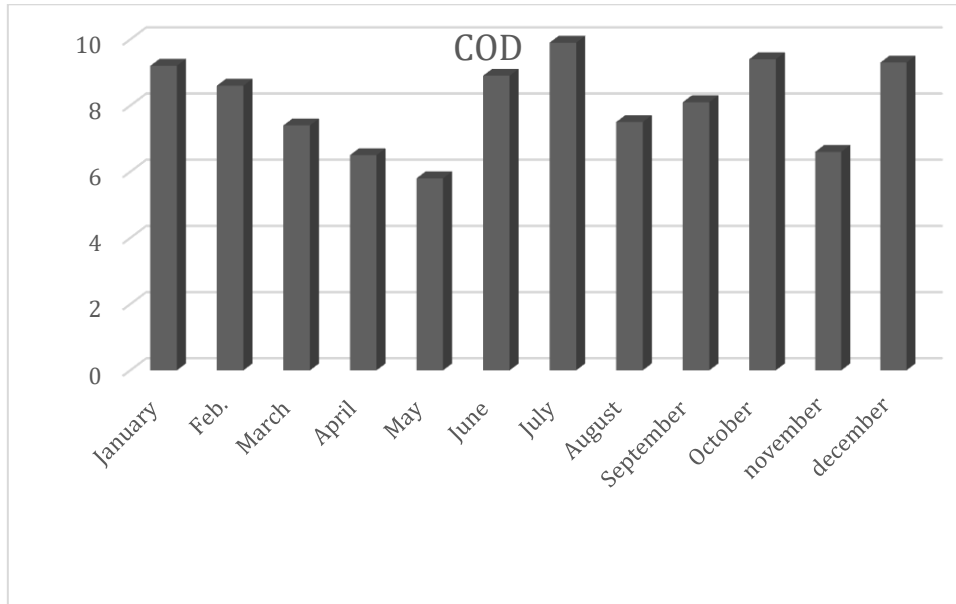


Fig. 3: Graph showing COD levels

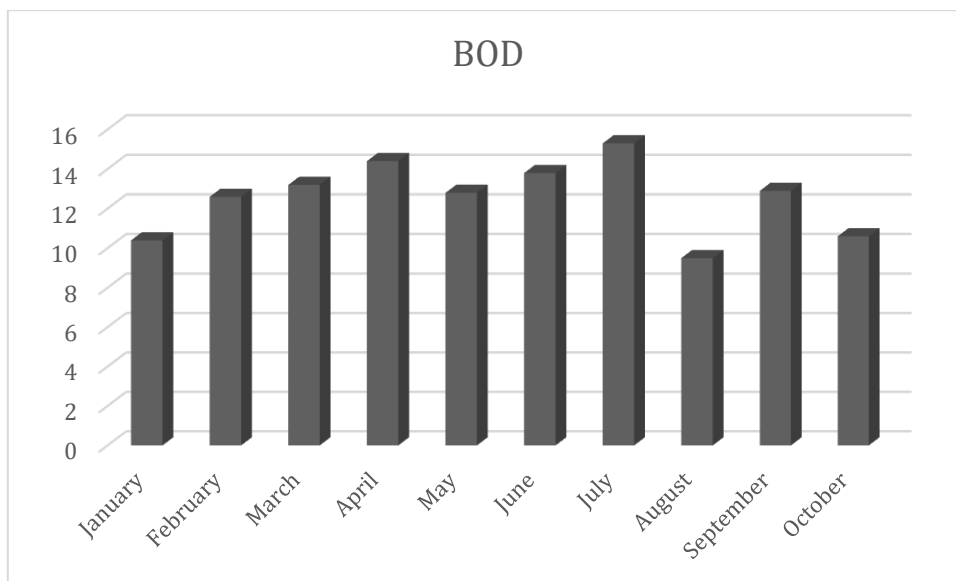


Fig. 4: Graph showing BOD levels

The high values hardness may be due to the addition of calcium and magnesium salts. Results revealed that river water is not perfectly suitable for drinking in terms of total hardness.

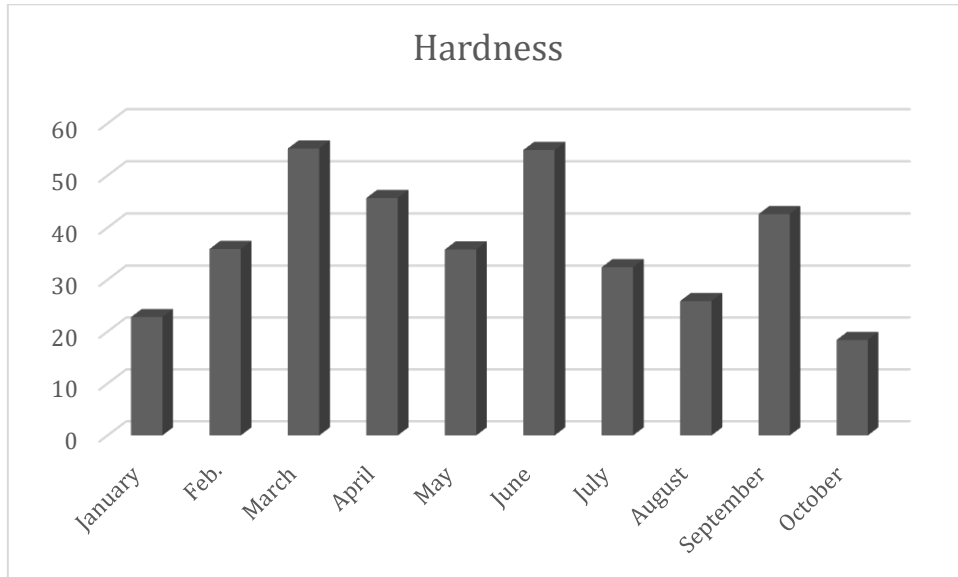


Fig. 5: Graph showing Hardness levels

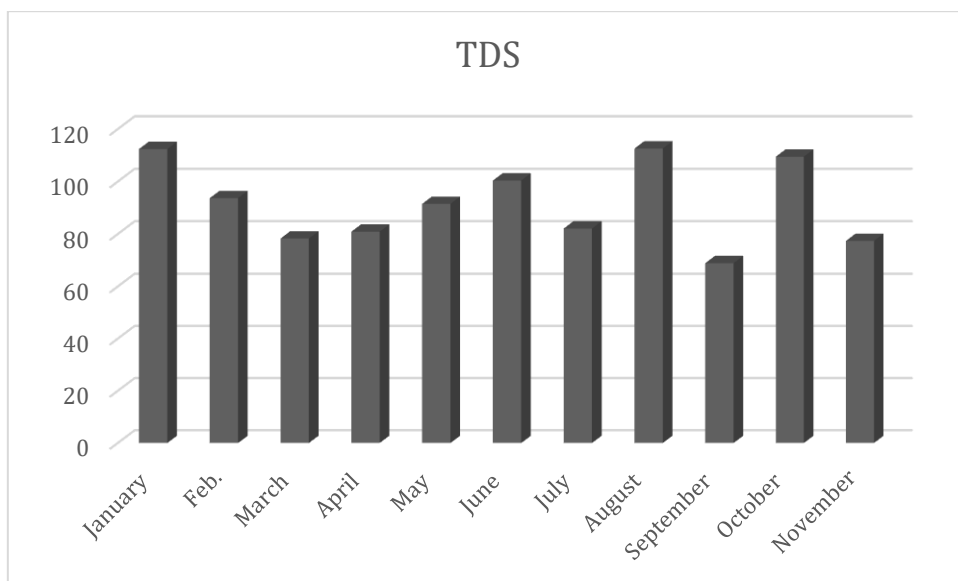


Fig. 6: Graph showing TDS levels

TDS conductivity and Turbidity are positively related with each other [10]. In an established system the water temperature check the rate of all chemical reactions and affect aquatic organisms growth, reproduction and immunity. Drastic temperature changes can also be be fatal to aquatic organisms.

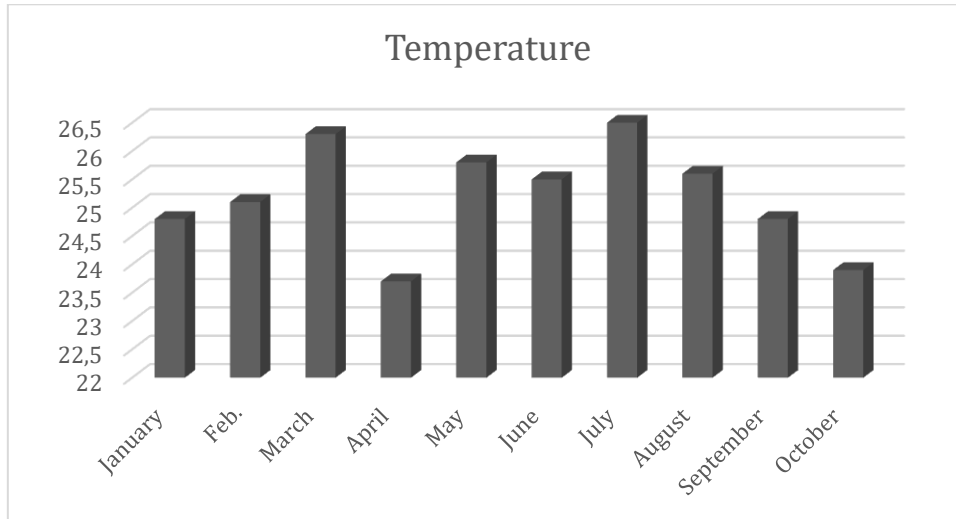


Fig. 7: Graph showing Temperature levels

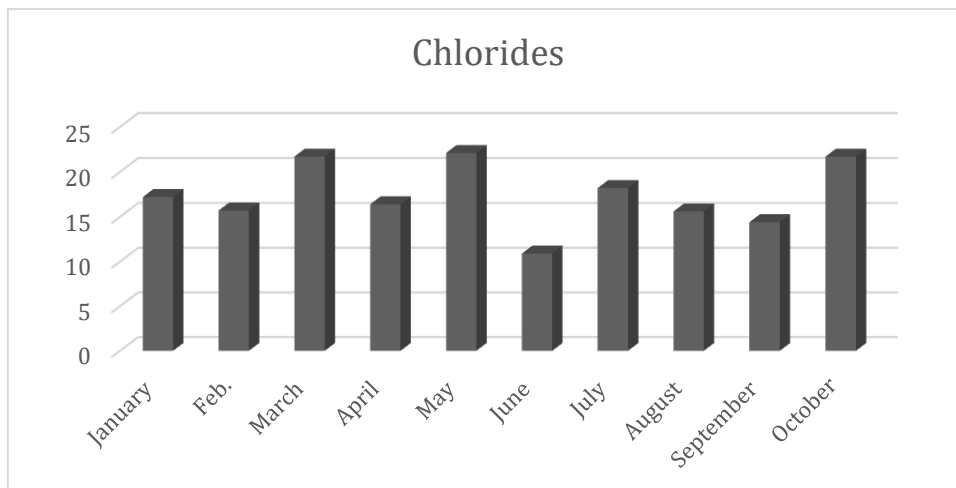


Fig. 8: Graph showing Chloride levels

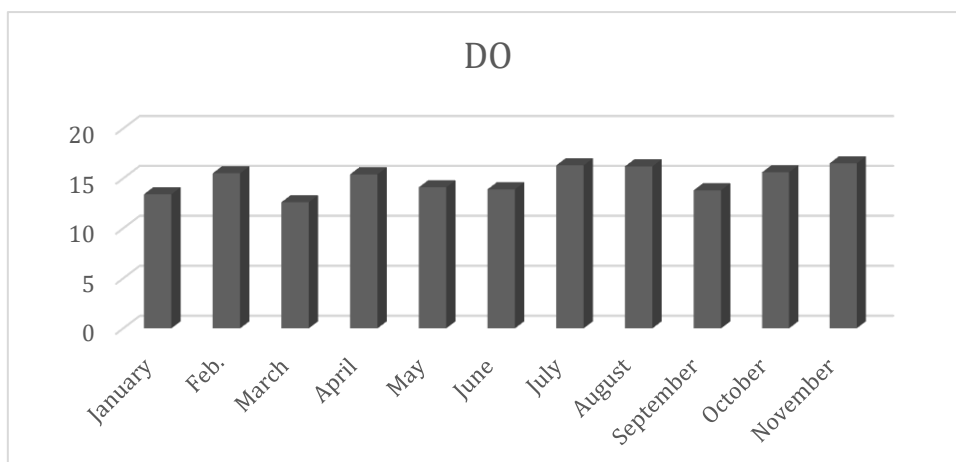




Fig. 9: Graph showing DO levels

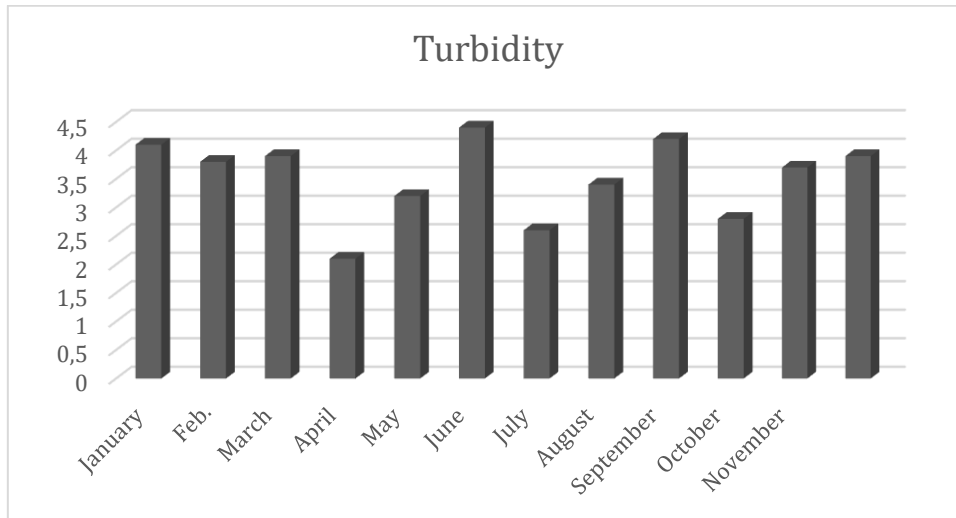


Fig. 10: Graph showing Turbidity levels

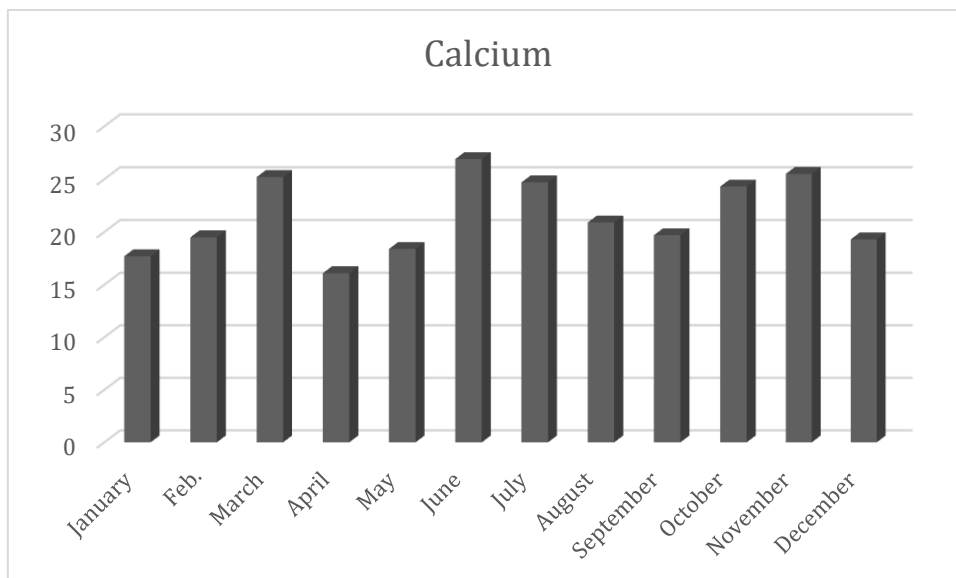


Fig. 11: Graph showing Calcium levels

Dissolved oxygen (DO) of water samples was estimated by using titrimetric method. Turbidity is a crucial parameter used for the characterization of water quality. It is a general expression of optical property of a sample containing insoluble substance which generally affects light to be scattered rather than transmitted in the straight lines. The amount and angular distributions of this scattered light is controlled and regulated not only by the quantity of the insoluble substances but also with their size, shape and the refractive index [4].

#### IV. CONCLUSION

Water is a very important element in human life and development. The present research work was carried out at Paithan region which is one of the holy place of Aurangabad of district of Maharashtra State in January to December 2021. For the present research work the standard methods given by APHA were used. The analysis of Physical and Chemical



parameters of river water like Temperature, pH, DO, BOD, TDS, COD, Hardness, Chloride and Calcium were determined. The average temperature recorded from the study area was 225.1. The average pH recorded from the study area was 7.64. The average DO recorded from the study area was 14.87. The average BOD recorded from the study area was 12.183. The average COD recorded from the study area was 8.1. The average TDS recorded from the study area was 90.991. The average Turbidity recorded from the study area was 3.508. The average Chlorides recorded from the study area was 17.391. The average Hardness recorded from the study area was 36.9. The average Calcium recorded from the study area was 21.51. It is concluded that water quality of river water samples was not completely suitable for drinking purposes. It is suggested that water used for river water samples need to be tested, treated and may be used.

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