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Estimation of Physico- Chemical Parameters of Godavari River Water at Paithan, Maharashtra, India

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ABSTRACT:Water is the most important in shaping the land resources and regulating the climatic conditions. It is one of the most important compounds which profoundly influence floral and faunal life. Rivers are getting contaminated due to waste disposal by the rapid development in the field of agriculture, urbanization and industrial development. The present research attempt was made to analyse water quality of Godavari river water. In which Temperature, pH, DO, BOD, TDS, COD, Hardness, Chloride and Calcium parameters were analysed by the standard methods given by APHA. The study was carried out during the study period from January 2021 to December 2021. The average temperature recorded from the study area was 24.34°C. The average pH recorded from the study area was 7.27. The average DO recorded from the study area was 14.29. The average BOD recorded from the study area was 12.05. The average COD recorded from the study area was 7.95. The average TDS recorded from the study area was 91.47. The average Turbidity recorded from the study area was 3.6. The average Chlorides recorded from the study area was 16.95. The average Hardness recorded from the study area was 46.23. The average Calcium recorded from the study area was 20.72. A laboratory study was conducted to estimate the physicochemical characteristics of water samples were chosen from different sampling stations around Paithan city. Present research work shows that the water quality of Godavari River is severely deteriorated possibly due to the increased human activities and improper release of industrial effluents.

KEYWORDS:Water, Physicochemical, Godavari, River.

I. INTRODUCTION

Water is essential to all forms of life and makes up 50-97% of the weight of all the plants and animals and approximately 70% of human body [1]. The quality of water may be interpreted owing to its physico-chemical and micro-biological characteristics [2]. Rivers are the crucial freshwater resource at global level. In many countries, water becomes a major commodity [3]. The tremendous increase in human population and industrialization influences the environment specially the freshwater and results in decreased water quality [4]. Rivers contribute a prime role in shaping and integrating the landscape, and molding the ecological surroundings of a basin. They are crucial key in controlling the water cycle at global level and are the most dynamic agents of the transport in the hydrological cycle [25,6].The degradation of water superiority and quantity makes the water unavailable for utilization[5]. Natural waters are enormously vary in chemical composition and the features monitoring the composition having physical, chemical and biological method [7].Aquatic biodiversity is threatened mainly by human abuse and mismanagement of both living resources and the various ecosystems that support them. Most of the reservoirs are getting contaminated due to domestic waste, sewage, industrial and agricultural effluents [8]. It is necessary that the quality of drinking water should be estimated at regular time interval, because use of contaminated drinking water, human population suffers from water borne diseases. It is very difficult to understand the biological phenomenon fully because the chemistry of liquid water reveals much about the metabolism of the ecosystem and exhibits the general hydro - biological relationship [10]. In countries that can afford to treat all water supplies, human wastewater contamination is lower, and even in some high-income countries, water quality has continued to mainly deteriorate. The decomposition of pollutants decreases the amount of dissolved O₂ in the water and reduces the river's potential to support aquatic life. Loss of oxygen directly does not jeopardize health but can have an economic impact on the fishing. Human wastewater and agro industrial wastewater are the major causes of the issue[9].Most of the rivers in the urban areas of the

developing countries are the extremes of effluents discharged from the industries. African countries and Asian countries mainly experience rapid industrial growth and this is making ecological conservation a difficult task [14].

II. MATERIALS AND METHODS

Rivers contribute a best role in shaping and integrating the landscape and molding the ecological surroundings of a basin. They are key factor in controlling the global water cycle and are the most dynamic agents of the transport in hydrological cycle [25,6]. The entire city is situated at the latitude of 19°53'50" N and longitude of 75°22'46" E. Aurangabad District is situated mainly in the river Godavari basin and partly in the Tapi river basin. Aurangabad city is covered by the hills of the Vindhya ranges.[11].

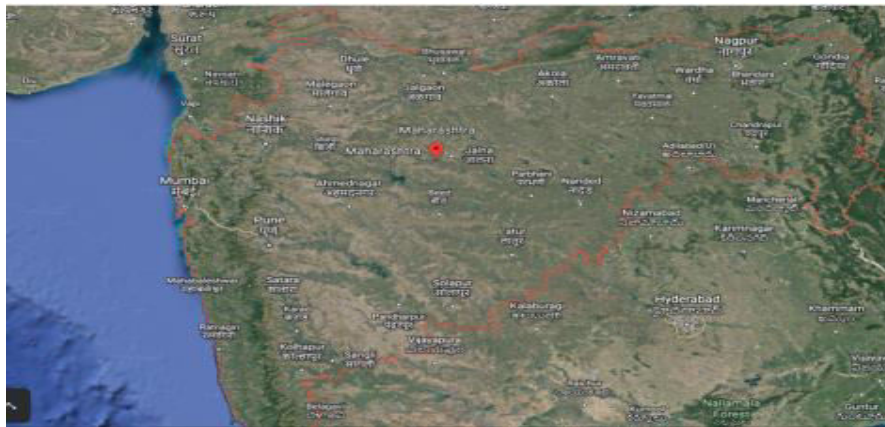


Fig.1.1: Map of Maharashtra (India)



Fig.1: Map showing study area of Aurangabad.

The Parameters like Temperature, pH and EC are tested on the sampling spot, D.O fixation is carried on the spot and other parameters were tested in ISO standard Environmental Engineering Laboratory. Standard methods as prescribed by IS 10500 were followed for the examination of various physical and chemical parameters of water[12]. Water transparency was estimated by Secchi disc having a diameter of 20 cm and partitioned into black and white quadrants. The depth at which the Secchi disc was visible was determined. After the analysis the results were compared with the standard values given in the Table 1[13].

III. RESULTS AND DISCUSSION

Water is one of the most important and abundant compounds of the natural ecosystem. All living organisms on the earth need water for their survival and growth. The samples collected from the study area were analysed for their physical and chemical properties of Godavari river water. Present research work was carried out in Paithan region of Aurangabad city to estimate the water quality of river water samples. The observed values have been tabulated in table no. 1 and graphically represented in figure no. 3 to 12.



Table 1: Estimated Results of Physicochemical parameters

Month/Parameters	January	February	March	April	May	June	July	August	September	October	November	December	Average	Max.	Min.
Temperature	25.2	23.5	22.5	26.9	24.5	24.8	26.3	23.2	22.3	23.1	24.5	25.3	24.34	26.9	22.3
pH	7.3	6.2	6.3	7.8	8.1	6.4	8	7	8.2	7.1	6.6	8.3	7.27	8.3	6.2
DO	14.2	12.5	15.5	12.4	16.1	11.9	12.3	16.2	13.8	15.6	14.8	16.2	14.29	16.2	11.9
BOD	14.4	8.8	9.2	11.4	12.8	12.8	12.9	13.5	13.9	12.6	8.8	13.5	12.05	14.4	8.8
COD	7.3	8.6	8.4	6.8	9.3	7.9	9.1	6.5	8.6	6.4	7.2	9.3	7.95	9.3	6.4
TDS	98.4	78.7	81.3	69.9	88.9	11.4	77.1	93.6	110.9	89.5	98.8	99.2	91.47	111.4	77.1
Turbidity	4.1	3.5	4.2	2.3	4.3	2.9	3.7	3.4	4.2	3.5	3.7	4.1	3.65	4.3	2.3
Chlorides	12.2	20.7	13.7	16.4	13.8	17.9	22.2	13.6	20.4	16.7	21.3	14.5	16.95	21.3	12.2
Hardness	36.8	62.9	65.2	39.7	35.8	46.9	42.4	32.9	48.6	50.4	49.9	43.3	46.23	65.2	32.9
Calcium	18.7	22.5	26.2	17.1	19.4	21.9	18.7	20.4	22.7	21.3	18.5	21.3	20.72	26.2	17.1

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.3 to 12 interpreted. Table no.2 indicates the standard table of river water showing the standard values of the physicochemical parameters.

Table 2: Standard Table of River.

Parameters	Unit	IDN	WJP	WHO	UK	EPA	EQS	DOE
Physical								
Temperature	° C	25	25	25	25	25	25	25
Total Suspended Solid (TSS)	mg / L	50	50	50	50	50	25	25
Chemical								
pH	-	6-9	6-9	6.5-8.5	6.5-8.5	5.5-8.5	6.5-8.5	6.5-8.5
Biological Oxygen Demand (BOD)	mg / L	2	2	4	3	5	1	1
Chemical Oxygen Demand (COD)	mg / L	10	10	10	4	25	10	10
Dissolves Oxygen (DO)	mg / L	6	6	6	7	8.5	7.5	7
Ammonia (NH3 - N)	mg / L	0.5	0.1	0.01	0.2	0.2	0.2	0.5



The average temperature recorded from the study area was 24.34. The minimum temperature was 22.3 and maximum temperature was 26.9. The average pH recorded from the study area was 7.27. The minimum pH was 6.2 and maximum pH was 8.3. The average DO recorded from the study area was 14.29. The minimum DO was 11.9 and maximum DO was 16.2. The average BOD recorded from the study area was 12.05. The minimum BOD was 8.8 and maximum BOD was 14.4. The average COD recorded from the study area was 7.95. The minimum COD was 6.4 and maximum COD was 9.3. The average TDS recorded from the study area was 91.47. The minimum TDS was 77.1 and maximum TDS was 111.4. The average Turbidity recorded from the study area was 3.65. The minimum Turbidity was 2.3 and maximum Turbidity was 4.3. The average Chlorides recorded from the study area was 16.95. The minimum Chlorides was 12.2 and maximum Chlorides was 21.3. The average Hardness recorded from the study area was 46.23. The minimum Hardness was 32.9 and maximum Hardness was 65.2. The average Calcium recorded from the study area was 20.72. The minimum Calcium was 17.1 and maximum temperature was 26.2.

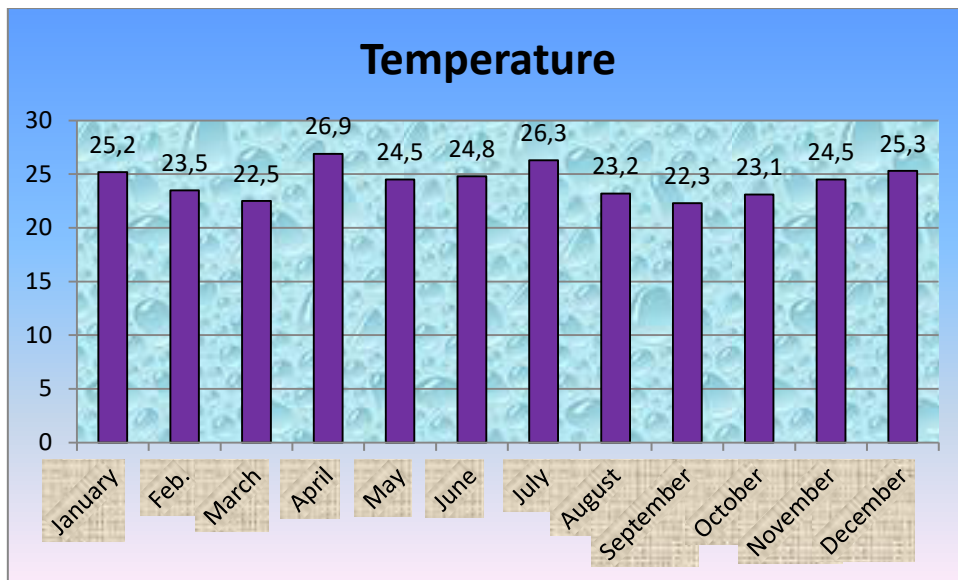


Fig.3: Values indicating monthly variation in temperature.

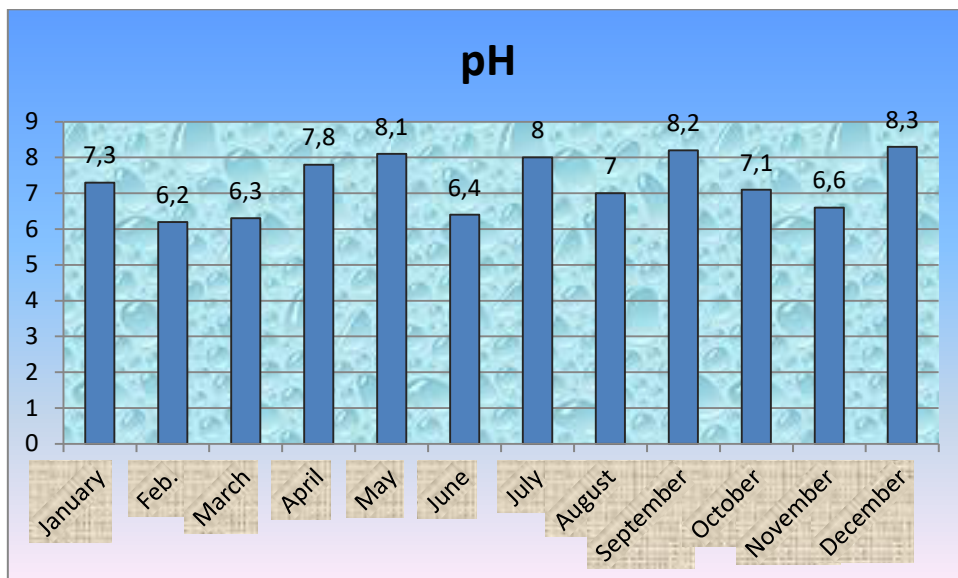


Fig.4: Values indicating monthly variation in pH.

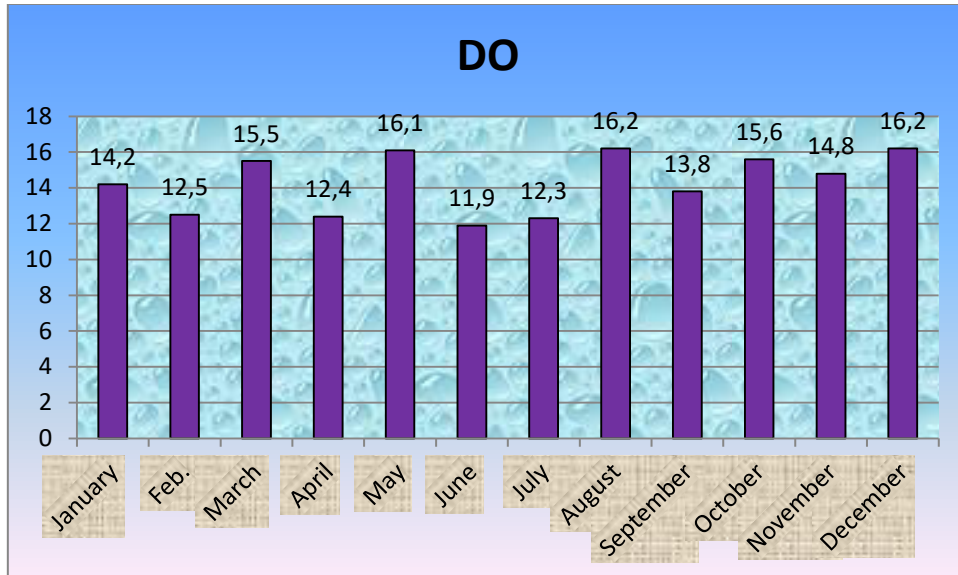


Fig.5: Values indicating monthly variation in DO.

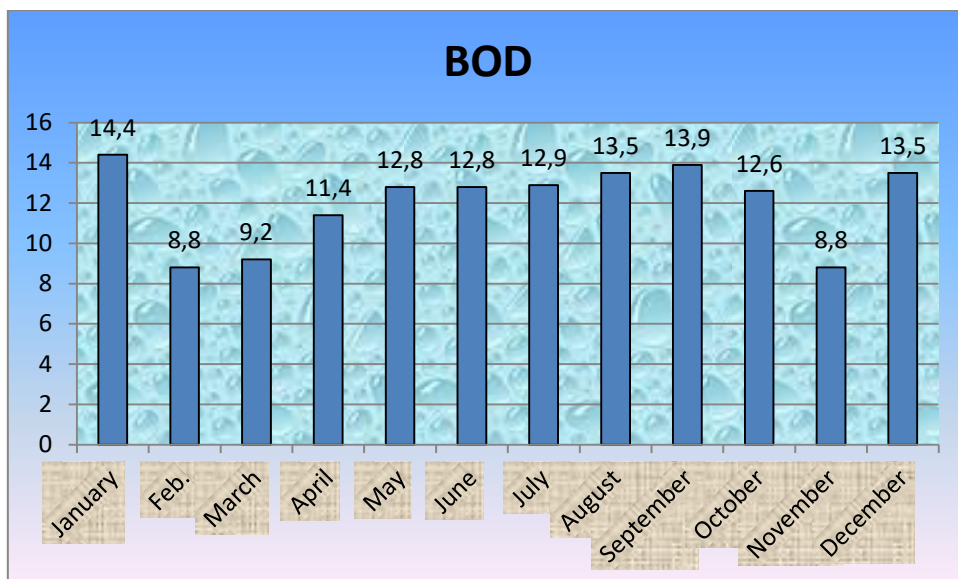


Fig.6: Values indicating monthly variation in BOD.

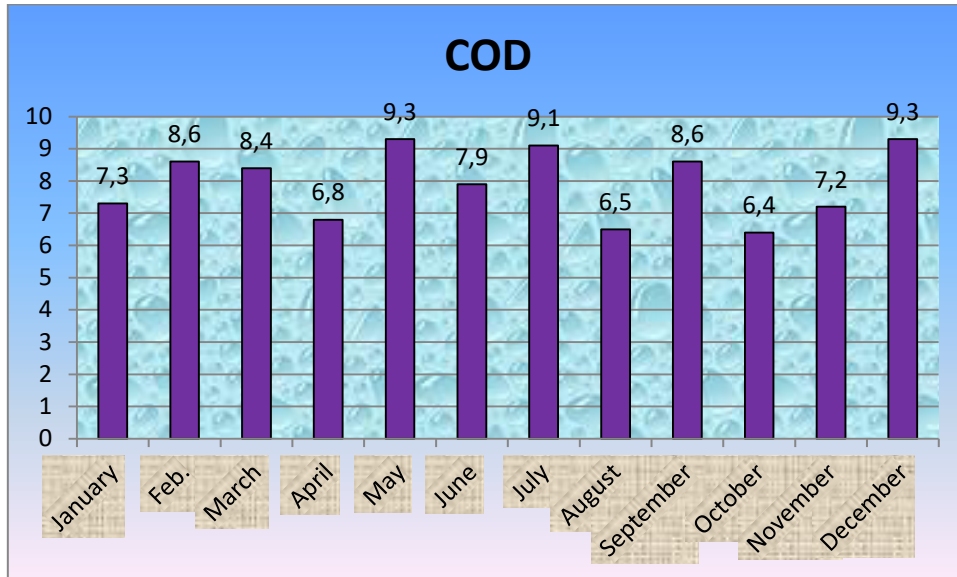


Fig.7: Values indicating monthly variation in COD.

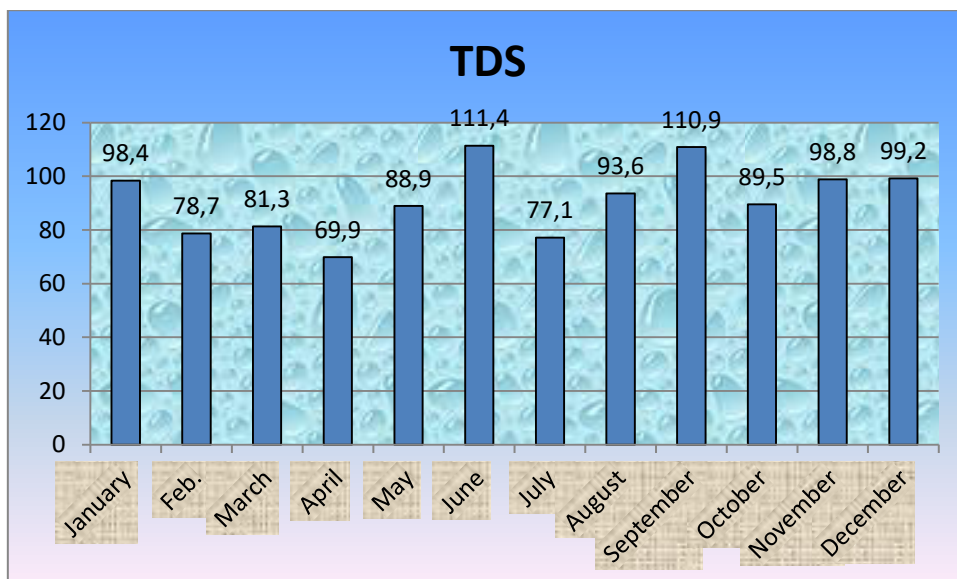


Fig.8: Values indicating monthly variation in TDS.

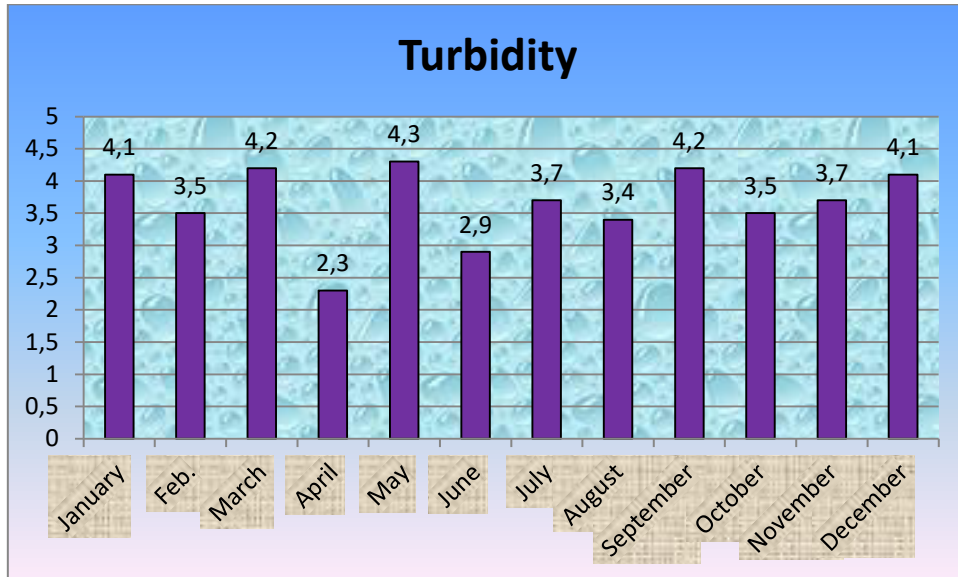


Fig.9: Values indicating monthly variation in Turbidity.

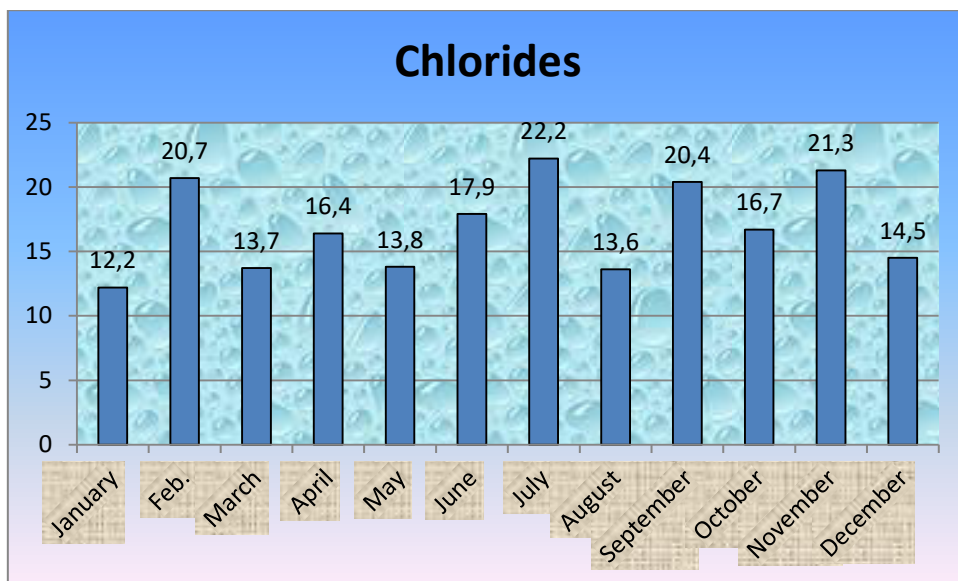


Fig.10: Values indicating monthly variation in Chlorides.

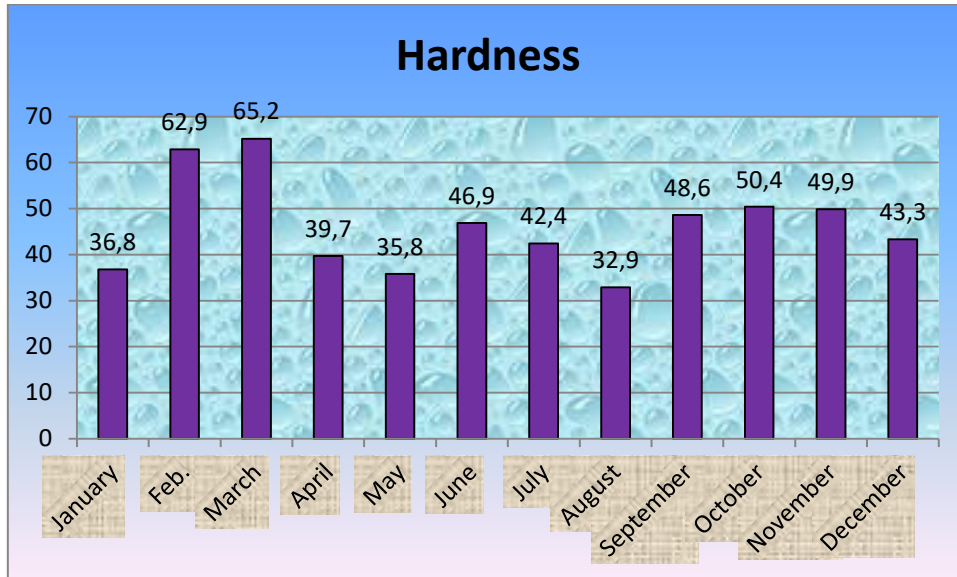


Fig.11: Values indicating monthly variation in Hardness.

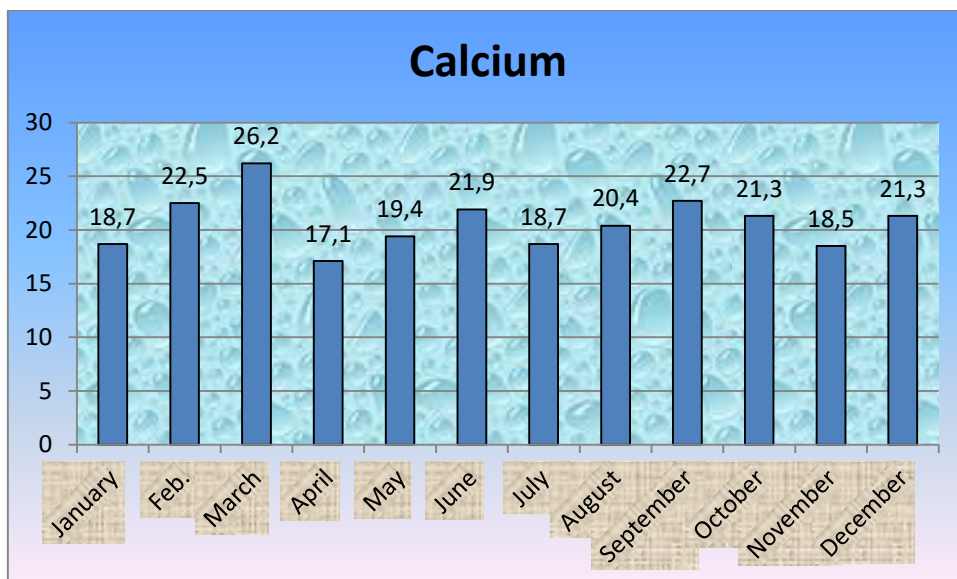


Fig.12: Values indicating monthly variation in Calcium.

In an established system the water temperature controls the rate of all chemical reactions and mainly affects fish growth, reproduction and immunity. Drastic temperature alterations can be detrimental to fish [15]. pH is most important in determining the corrosive nature of the water. Lower the pH higher is the corrosive nature of water. pH has positive correlation with other parameters like electrical conductance and total alkalinity [16]. DO is one of the most crucial parameter. Its correlation with water body gives direct and indirect data e.g. bacterial activity, photosynthesis, stratification, availability of nutrients, etc. [17]. BOD exhibits a quantitative index of the degradable organic substances in water and is used as a measure of the waste strength. The low BOD value in all samples express good sanitary condition of the water. In many instances it is found that all the water provided is most of the times within the permissible limit [18]. Chemical oxygen demand (COD) is the amount of oxygen consumed by the oxidation of the oxidizable organic matter by a strong oxidizing agent potassium dichromate with sulphuric acid in determination of COD [19]. According to drinking water standards, prescribed by [20] USPHS (United States Public Health Services),

TDS should not exceed 500 mg/L beyond which they may influence toxicity of heavy metals and organic compounds in the fish and other aquatic life[21]. Turbidity shows to how clear the water is. The TSS in groundwater is may be due to the presence of various impurities carried out by the natural and artificial forces results into the turbid nature of liquid. TSS and Conductivity may have relations in terms of the conductivity. Conductivity basically expresses the ability of water to carry electric current [22]. Chlorides is measured by titrating a known volume of the sample with standardized silver nitrate solution using potassium chromate solution in the water or eosin/fluoresce in solution in alcohol as a indicator[15].Hardness is one of the crucial parameter which exhibits the presence of calcium and magnesium salts in the river water. Calcium is crucial component of natural water and is released from the stones and soil [23]. High calcium values are direct attribute of the calcium presence in rocks [24].

IV. CONCLUSION

Physico-chemical parameters are very important to determine the quality of the aquatic environment. The present research work was carried out in Paithan region of Aurangabad city of Maharashtra State in 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 ions were determined. The parameters were analysed over a period of 12 months seasonally from January 2021 to December 2021 and ten physiochemical parameters were taken for the water analysis. The average temperature recorded from the study area was 24.34. The average pH recorded from the study area was 7.27. The average DO recorded from the study area was 14.29. . The average BOD recorded from the study area was 12.05. The average COD recorded from the study area was 7.95. The average TDS recorded from the study area was 91.47. The average Turbidity recorded from the study area was 3.65. The average Chlorides recorded from the study area was 16.95. The average Hardness recorded from the study area was 46.23. The average Calcium recorded from the study area was 20.72. 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 scientifically treated and may be used.

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