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Comprehensive Estimation of Physico-Chemical Parameters from Godavari River Water at Paithan, Aurangabad District, Maharashtra, (India)

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ABSTRACT: Water is very crucial substance composed of the hydrogen and oxygen atoms and found in gaseous, liquid, and solid forms. It is one of the very essential of compounds. A tasteless and odorless liquid at room temperature, it has the significant ability to dissolve many other substance. The present study deals with the monthly Analysis of physico-chemical parameters of Godavari river water at Paithan. For the present research work standard methods were used prescribed by APHA. Analysis shows that, the average for the temperature is 23.73, pH is 7.34, DO is 13.49, BOD is 11.66, COD is 7.95, TDS is 85.83, turbidity is 4.13, chlorides is 15.51, hardness is 39.43 and calcium is 21.81. The results show that the physicochemical parameters are partially within permissible limits.

KEYWORDS: water, river, physicochemical, Paithan, Godavari, analysis

I. INTRODUCTION

From time immemorial, the rivers are said to be the most crucial and acts as lifeline for almost all organisms, as all types of developments, directly and indirectly based on it. That is why all the oldest civilizations socially and ecologically developed at the bank of rivers like Indus Valley at Indus, Egypt at Nile. A river is a large, natural stream of flowing water. Rivers are found on every continent and on nearly all kinds of land. Some flow all year round. Others flow seasonally or during wet years. A river may be only kilometers long, or it may be a span much of continent. The basic aim of the research study of drinking-water quality is the protection of public health [9][17]. Rivers play a crucial role in assimilating or carrying industrial, municipal waste water, manure discharge, runoff water from the agriculture fields, road ways and streets which are responsible for river contamination. In most of the countries, water becomes a commodity. The faster increase in human population, industrialization significantly influence the environment particularly the freshwater and results in decline in water quality. The basic purpose of water are providing main water resources for Agricultural activities. It also provides water for drinking purpose to nearby city area, villages, municipalities and industries of Aurangabad [1][8]. Rivers have always been the most important fresh water resources and most developmental activities are still based upon them [13]. River systems are the initial means for disposal of the waste, especially the effluents from industries. Humans use river water for irrigation, agriculture, drinking, transportation, generate electricity through hydroelectric dams and for leisure activities like swimming, boating etc. [3][7]. Each of these uses may affect on the health of a river and its surrounding ecosystems. The water is known to contain a very large number of chemical constituents, physical parameters such as temperature, turbidity and current are also known to operate aquatic Ecosystem [23]. The physico-chemical analysis also help to recognize the function and structure of any water body in relation to its inhabitants [19].

II. METHODOLOGY

Life is believed to have originated in the aquatic bodies and life depends on it. The water which flows in rivers is fresh, meaning that it contains approximately one percent salt. However, rivers still carry and distribute the crucial salts and nutrients to support plant and the animal life. For this reason, some of the most biodiverse habitats on the Earth planet can be found around rivers. Aurangabad district has Latitude: 19.901054 and Longitude: 75.352478, DMS Lat: 19° 54' 3.7944" N and DMS Long: 75° 21' 8.9208" E [12]. Paithan is one of the most historical and holy towns in the south central part of the India. It is situated at the bank of Godavari River [4]. This is located at latitude 19.51 N ° and 75.38

E° Longitude which is previously known as Pratishtan. In order to monitor the effect of pollution on the Groundwater of Paithan [18]. Godavari river selected as a freshwater body for the present research work. The water samples are collected every month from the Godavari river for estimation of different water parameters like temperature, dissolved oxygen, pH, BOD, turbidity, calcium, etc. [1][2].



Fig.1: Map shows of study area

Water temperature was measured by thermometers in degrees centigrade. pH was measured by pH sensors monitor the level of pH by measuring the activity of the hydrogen ions concentration [15]. The activity is compared to pure water, a neutral solution, using the pH scale of 0 to 14 to which determine the acidity or alkalinity. Calcium sensors are used for measuring calcium in water [9][10]. For the present research work standard methods were used prescribed by APHA.

III. RESULTS AND DISCUSSIONS

The physico-chemical parameters are very essential and fundamental to know the physical and chemical parameters like temperature, pH, Dissolved Oxygen, BOD, COD, TDS, Turbidity, Chlorides, Hardness, Calcium. Table No. 1 represent the monthly variation in physico-chemical parameters of the Godavari river water at Paithan, Aurangabad District.

Table No.1: Average values of physico-chemical parameters

	Temperature (°c)	pH	DO (mg/l)	BOD (mg/l)	COD (mg/l)	TDS (mg/l)	Turbidity (mg/l)	Chlorides (mg/l)	Hardness (mg/l)	Calcium (mg/l)
Jan	25.1	8	16.4	12.4	7.7	80.4	4.1	12.2	54.2	17.7
Feb	24.5	7.4	12.5	11.6	8.6	102.7	2.8	13.7	45.9	22.5
March	22.3	6.63	13.5	9.2	5.4	70.3	3.9	21.8	60.2	20.2
April	24.8	7	11.4	8.9	6.5	95.9	4.1	18.7	54.7	22.1
May	23.5	7.9	12.1	13.8	8.8	88.5	3.2	14.8	33.8	24.4
June	21.5	8.4	14.9	11.7	9.2	69.4	4.7	16.9	56.9	19.9
July	25.1	7.2	15.3	13.3	8.1	100.1	5.6	13.2	22.4	20.7
Aug	22.9	6.9	13.2	12.5	7.5	92.6	3.4	11.7	42.9	24.4
Sept	26.4	7.3	12.9	14.5	9.1	80.9	4.2	10.4	16.6	25.7
Oct	24.2	6.2	14.6	10.6	6.4	65.5	5.1	16.9	27.4	21.3
Nov	22.7	7.1	11.9	11.9	8.2	88.4	4.7	21.3	19.9	23.5
Dec	21.8	8.1	13.2	9.5	9.9	95.2	3.8	14.5	38.3	19.3
Avg.	23.73	7.34	13.49	11.66	7.95	85.83	4.13	15.51	39.43	21.81
Max.	26.4	8.1	16.4	14.5	9.9	102.7	5.6	21.8	60.2	17.7
Min.	21.5	6.2	11.4	8.9	5.6	65.5	2.8	10.4	16.6	25.7

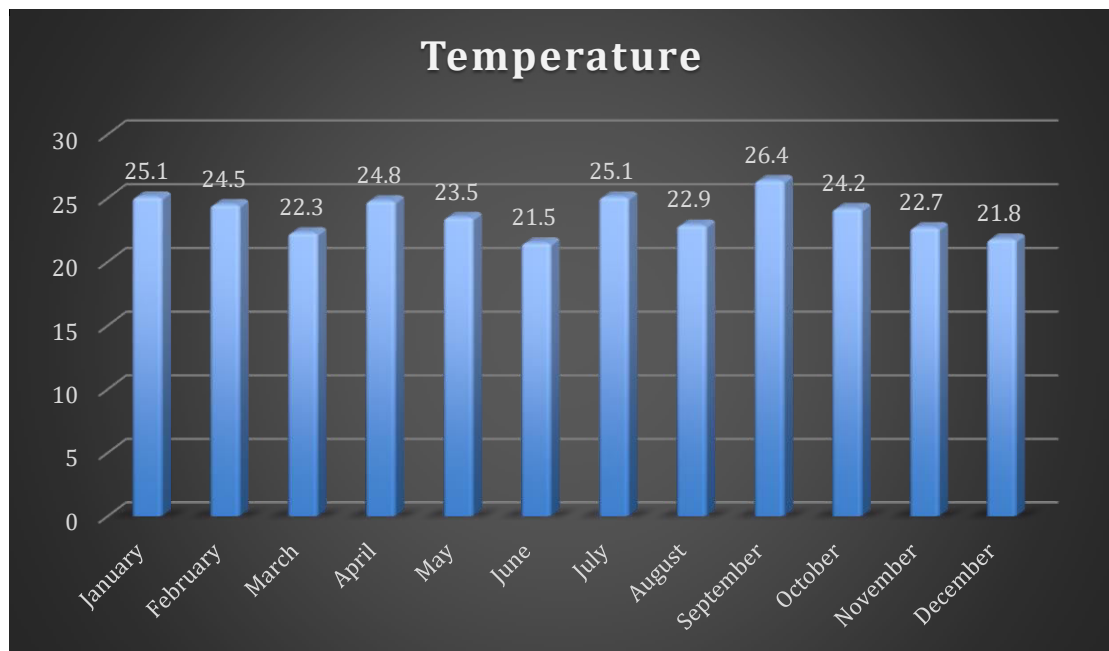


Fig.2: Graph showing Godavari River Temperature.

In the present study it was observed that temperature ranged from 21.5°C to 26.4. The pH of water determines that the water is acidic or basic [11][6].

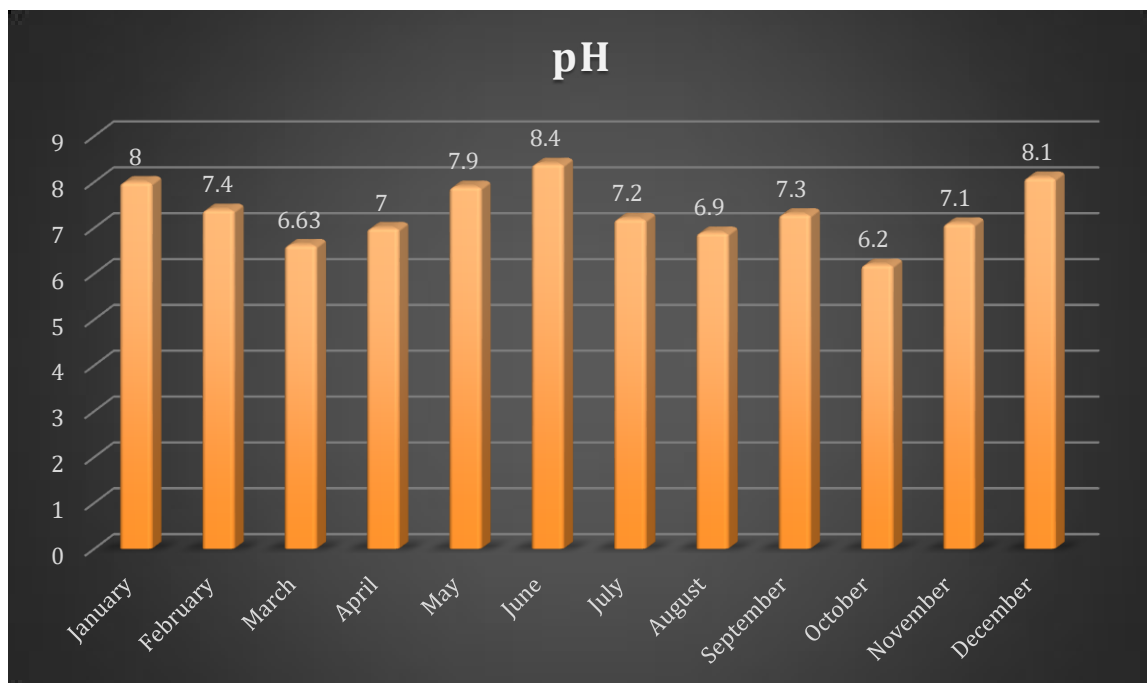


Fig.3: Graph showing Godavari River pH

Basically contamination free water should contain dissolved water concentration of 6.5-8 mg/l or more so in this study the average concentration of DO is 13.49 mg/l which is considered good. DO concentration range from 11.4 to 16.4 mg/l [8].

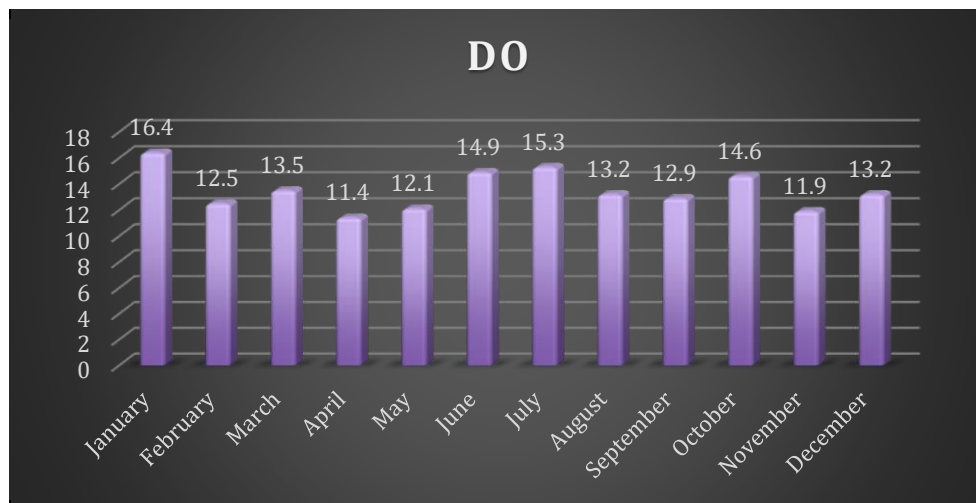


Fig.4: Graph showing Godavari River Dissolved Oxygen

Biochemical Oxygen Demand (BOD) is the amount of oxygen consumed in one litre of water by the microorganisms while they oxidize the total organic matter present in it at a specified temperature. Chemical Oxygen Demand (COD) is a measure of the oxygen equivalent of the organic matter in a water sample which is susceptible to oxidation by a strong chemical oxidant[22].



Fig.5: Graph showing Godavari River Biochemical Oxygen Demand

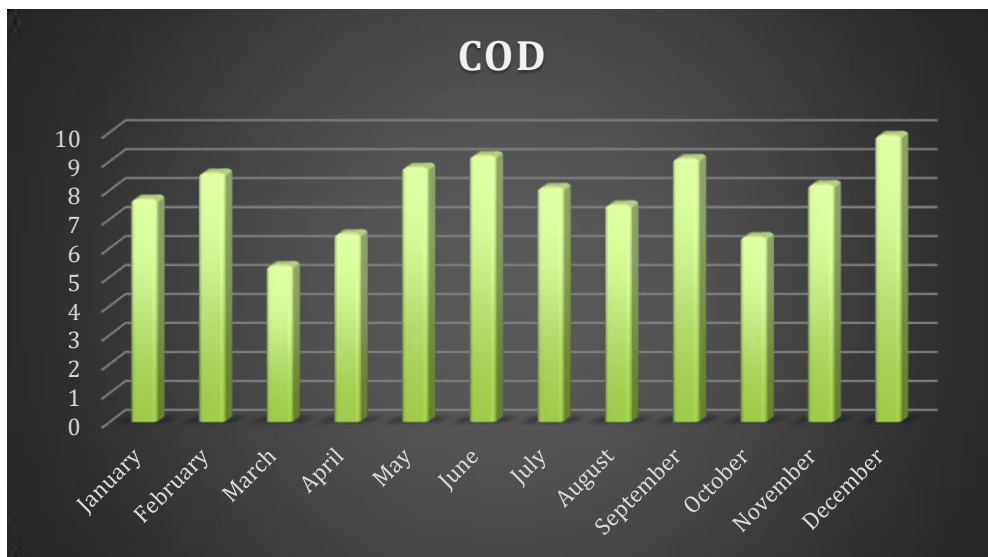


Fig.6: Graph showing Godavari River Chemical Oxygen Demand

TDS stands for Total Dissolved Solids and exhibits total concentration of dissolved substances in drinking water. TDS comprises inorganic salts and very small amount of organic matter as well. Generally, the TDS level between 50-150 is considered as the best.

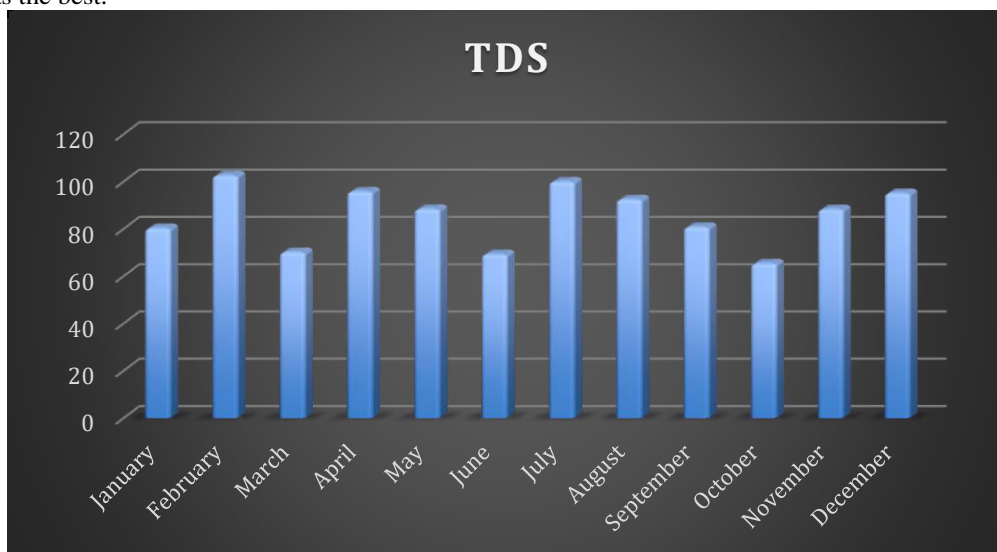


Fig.7 Graph showing Godavari River Total Dissolved Solid

All the things are used to find hardness of water so all the concentration should be very less and average turbidity is 4.13, chlorides is 15.51, hardness is 39.43 and calcium is 21.81 [14][19].

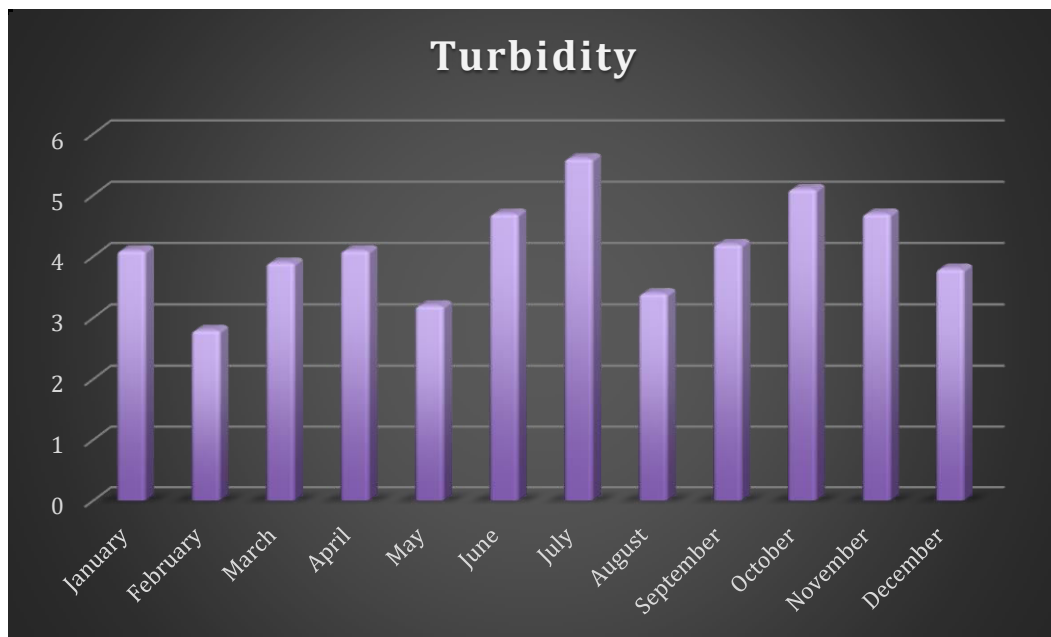


Fig.8: Graph showing Godavari River Turbidity

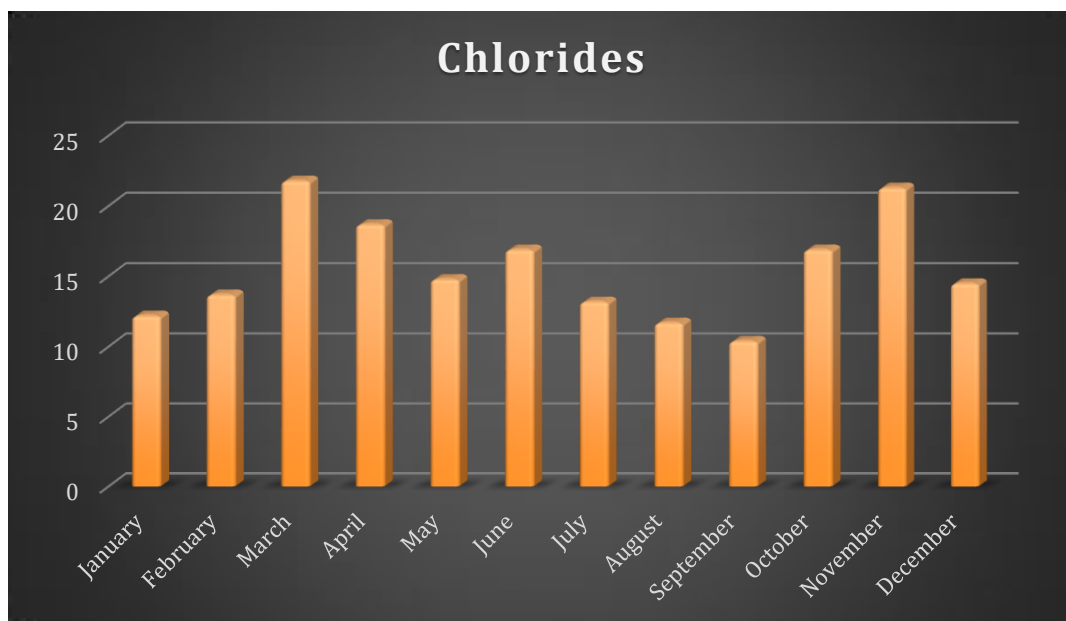


Fig.9: Graph showing Godavari River Chlorides

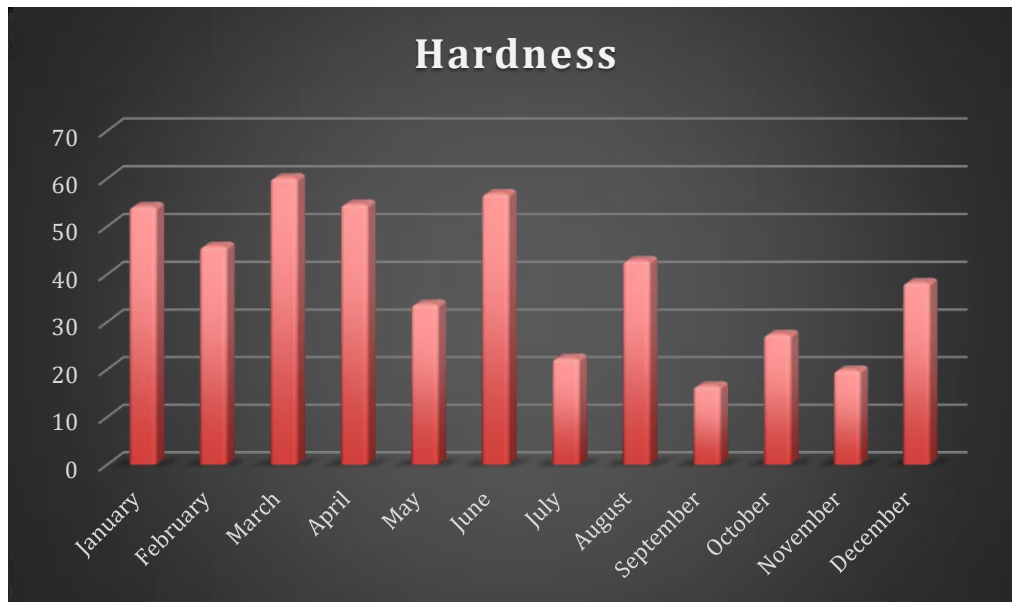


Fig.10: Graph showing Godavari River Hardness

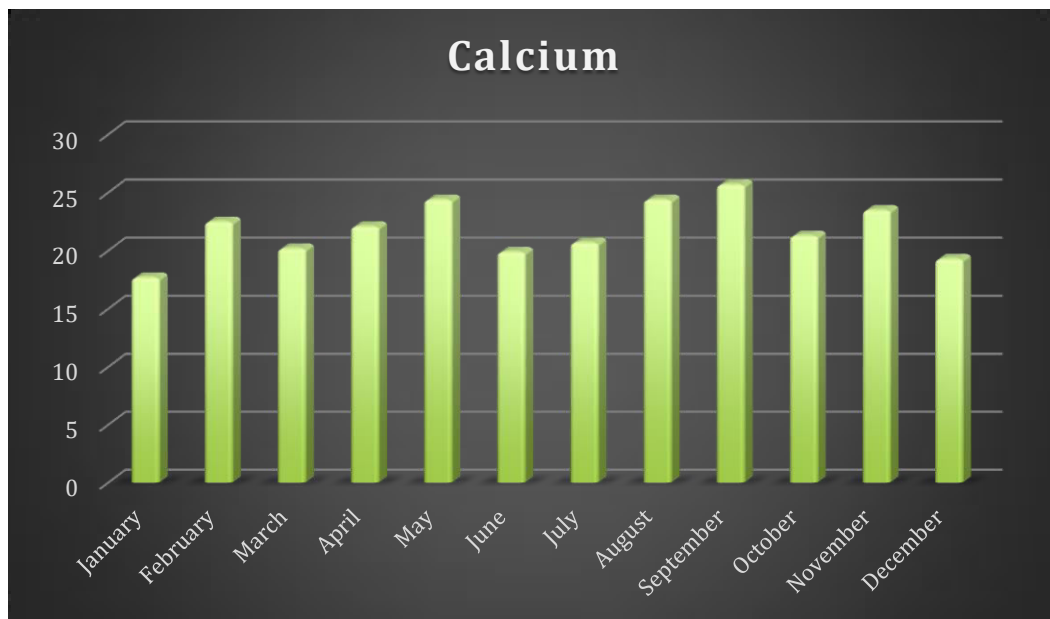


Fig.11: Graph showing Godavari River Calcium

IV. CONCLUSION

Water is a natural resources that are potentially used for living things and there developments. The present research work was carried out at Paithan region of Aurangabad of district of Maharashtra State in January to December 2021. The standard methods given by APHA were used for the present research work. From the study the variation in temperature is minor it ranges from 21.5°C to 26.4°C. Average pH value is 7.34. Dissolved Oxygen goes on decreasing from January to April and then increases and decreases the range of DO is from 11.4mg/l to 16.4mg/l. The average value of BOD and COD are 11.66mg/l and 7.95mg/l respectively. The variation in TDS is from 65.5mg/l to 102.7mg/l. The average value of Turbidity, hardness, Calcium and Chlorides are 4.13, 39.43, 21.81 and 15.51 mg/l respectively. The results show that the physicochemical parameters are partially within permissible limits. Hence water of Godavari River can be used after treatment for drinking, domestic and agricultural purpose.

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