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

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ABSTRACT: Rapid growth of human population and its repetitive activities along the river pose a crucial impact on the river in system. Hydrosphere is a crucial segment of ecological system, it accounts 0.3% of the fresh water on the Earth and it is easily accessible from reservoirs, lakes and river in systems. The scientific attempt was made to analyse for river water. Physicochemical parameters were estimated by standard methods prescribed by APHA. A systematic study was carried out to assess the water quality of River Godavari at Paithan, for the analysis of physicochemical parameters i.e. Temp, pH, TDS, Turbidity, Total hardness, Dissolved oxygen, COD, BOD, Total alkalinity and phosphate. The average values were Temperature 23.77, pH 7.38, DO 13.55, BOD 11.78, COD 7.75, TDS 90.37, Turbidity 3.83, Chlorides 17.97, Hardness 48.32 and Calcium 21.14. The results revealed that the water is not completely suitable for human consumption. Present study clearly shows the water need to be treated before use.

KEYWORDS: physicochemical, parameter, quality, analysis, standard, APHA

I. INTRODUCTION

Potential sources of water contamination include geological conditions, industrial and agricultural activities and water treatment facilities [1]. Inorganic chemicals make up a larger portion of the contaminants in potable water than organic compounds. The water quality of a river is made up of a number of substances which is subject to regional and seasonal fluctuations and are also significantly influenced by the rate of water flow (Becker and Neitzel, 1992). The primary inland body of water utilized for domestic, industrial, and agricultural activity is a river, which frequently carries considerable amounts of sewage from the city area, industrial wastewater discharges, and seasonal runoff from the fields (Hu *et al.*, 2011). Due to wastewater discharges containing fertilisers, biodegradable organics, domestic effluent, and agricultural waste, the river waters have been polluted (Dimitrov *et al.*, 2012). The kind of wastewater generated by the commercial, industrial, and agricultural activity which enters surface and subterranean waters is a factor in river pollution (Vittore *et al.*, 2010). In last few years, there has been increase in global awareness and concern over surface water pollution. New strategies have been generated to address the sources of pollutants and achieve sustainable use of water. The classification of water samples into distinct groups, source apportionments, relationships, and differences in the parameters employed are all made possible by the integrated use of ecological tools, like multivariate statistical approaches (Shrestha *et al.*, 2008). The scale of human population growth and economic activity expansion has greatly raised the demand for large-scale fresh water suppliers from numerous consumers. Water contamination and negligent resource management are blamed for the deterioration in the quantity and quality of the surface water resource (Mustapha and Nabegu., 2011). Urbanization processes, industrialization, and agricultural activity all have a integrated impact on the many regions of the globe and many cities in developing nations have been established without any enough and proper planning. It has caused indiscriminate impact in the various forms like washing and bathing in open surface water bodies and throwing rubbish into the water. The repercussions of the degrading water quality on people, animals, and the plants are extensive. Identification of these basic sources and their contribution to the overall pollution of an area is crucial from an ecological, economic, and/or social viewpoint (Tobiszewski *et al.*, 2010).

II. MATERIAL AND METHODS

The Godavari River is considered lifeline of Maharashtra, especially for Marathwada region, in spite of its large catchment zone. The discharge of the river is not so potent owing to moderate average rainfall annually. The analysis was carried in laboratory as per standard methods prescribed by APHA standard methods. Various parameters like total dissolved solids (TDS), dissolved oxygen (DO), biological oxygen demand (BOD) total solids and turbidity were analyzed to evaluate the impact of urban waste on water quality. Water quality has correlation with numerous parameters (Nag and Kundu, 2018; Tyagi *et al.*, 2013). All the information summarized and analyzed with the help of graphs. Selection of sampling is based on types of artificial activities and intensity as well as area severely affected by urban waste. Temperature and pH of samples have been measured in the field during the collection. Water quality assessment is very required for the assessment of overall suitability of basic source of water. Aurangabad District is situated mainly in the Godavari river basin and partly in the Tapi river basin of Maharashtra (Potadar and Patil, 2016b). The study was carried out to observe water quality of Nathsagar (Patil and Ghorade, 2013).

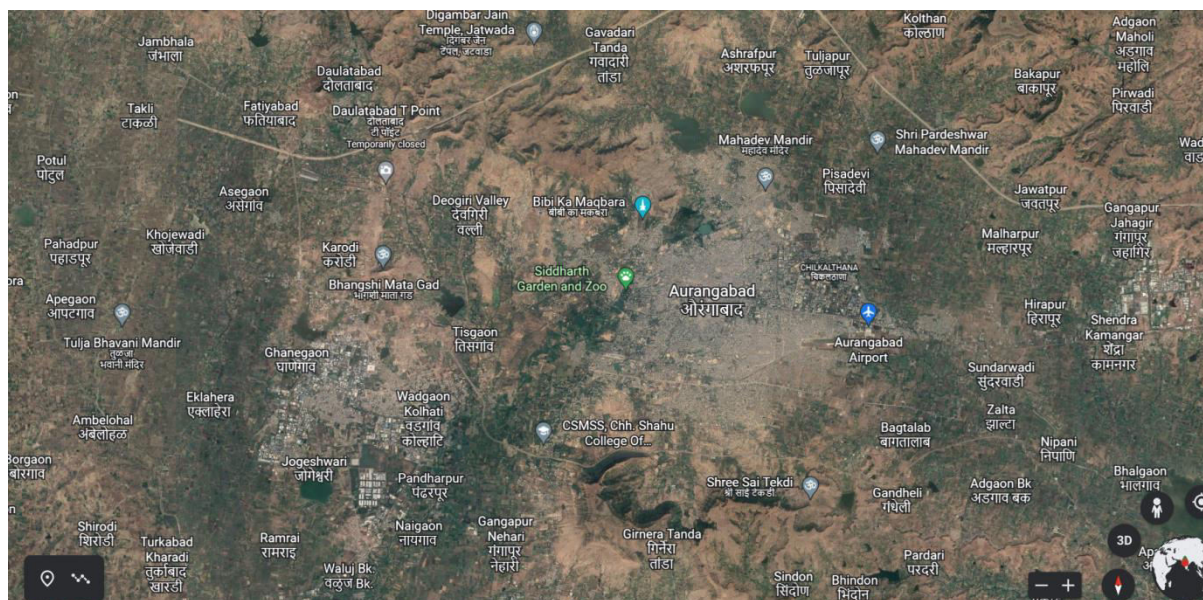


Figure 1: map of study area

III. RESULT AND DISCUSSION

Jayakwadi dam is an earthen dam situated on the Godavari River at the site of Jayakwadi village in Paithan taluka, Aurangabad district of Marathwada region in Maharashtra, India. The harsh project is one of the largest irrigation projects in the Maharashtra. It is one of the multipurpose project.

Table1: Average values of physicochemical parameters

Months / parameters	Jan uary	Feb rua ry	Mar ch	Ap ril	Ma y	Ju ne	Jul y	Aug ust	Septem ber	Oct ober	Nove mber	Dece mber	Aver age	Max	Min
Temperat ure	24.5	21.5	22.3	21.9	26.3	25.6	23.1	21.6	21.4	24.1	26.7	23.3	23.77	26.7	21.4
pH	8.3	6.4	7.3	8.5	7.1	6.9	6.4	8	7.3	8.1	7.6	6.6	7.38	8.5	6.4
DO	16.2	13.5	12.5	11.4	14.1	13.9	11.3	13.2	13.8	15.6	13.5	15.2	13.55	15.6	11.3
BOD	11.4	13.6	10.2	9.4	13.8	9.8	13.3	16.5	10.9	13.6	9.9	8.9	11.78	16.5	8.9
COD	9.3	6.6	7.4	5.5	9.8	8.9	7.1	7.5	6.1	9.4	7.2	8.3	7.75	9.8	5.5
TDS	112.	102.	68.3	98.	88.	87.	68.	111.	100.9	77.4	88.4	92.2	90.37	111.6	68.1

	4	7		9	5	4	1	6							
Turbidity	4.1	2.8	2.4	3.7	4.2	2.7	4.6	3.4	4.2	4.1	3.7	3.9	3.83	4.6	2.7
Chlorides	21.2	11.7	12.7	13.4	18.8	19.9	14.2	15.6	22.4	19.7	16.3	21.5	17.97	22.4	13.4
Hardness	45.8	23.9	22.2	39.7	19.8	46.9	38.4	68.9	53.6	44.4	59.9	63.3	48.32	68.9	19.8
Calcium	26.7	19.5	22.2	26.1	21.4	16.9	15.7	16.4	22.7	23.3	26.5	21.3	21.14	26.5	15.7

It is observed that temperature of water in month January 24.5°C then decreases in February up to 21.5°C. Then in March increases slightly about by point 1 22.3°C. In April again decreases by 0.4 become 21.9°C. then incredible change in month may because its summer it change from 21.9°C to 26.3°C.

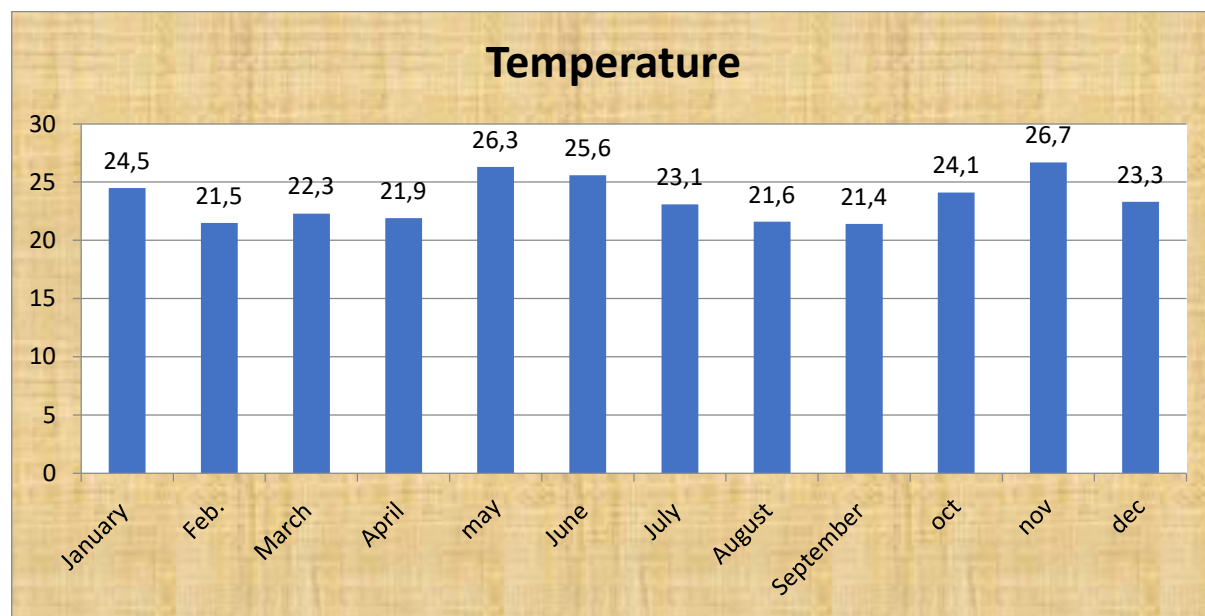


Fig. 2: Average values of Temperature

Then June slightly decreases by 0.7 it become 25.6°C in July again decreases up to 23.1°C in August also decreases by 1.5 and become 21.6°C in September slightly change of 0.2 21.4°C In October it unexpectedly increases up to 24.1°C then also in November 26.7°C In December temperature decreases become 23.3°C

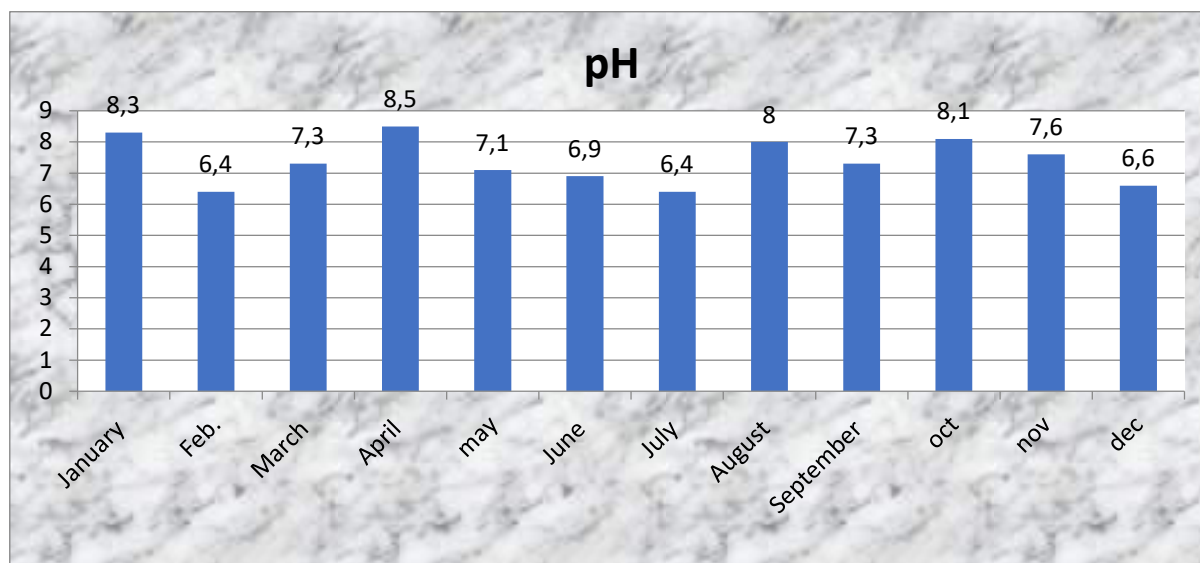


Fig. 3: Average values of pH

It is observed that in January pH of water is 8.3 it direct decreases in February to 6.4 crucial drop of pH observed then it increases in March and become 7.3. April graph pH value is max and is 8.5 then decreases in may unexpectedly up to 7.1, again in June slightly change of 0.2 become 6.9, in July 0.5 change become 6.4. Then in August it changes direct up to 8 incredible change observe herein this month. September readings say value decreases by 0.7 become 7.3 then increases in October to 8.1. Then in November it come to 7.6 and December decreases and become 6.6

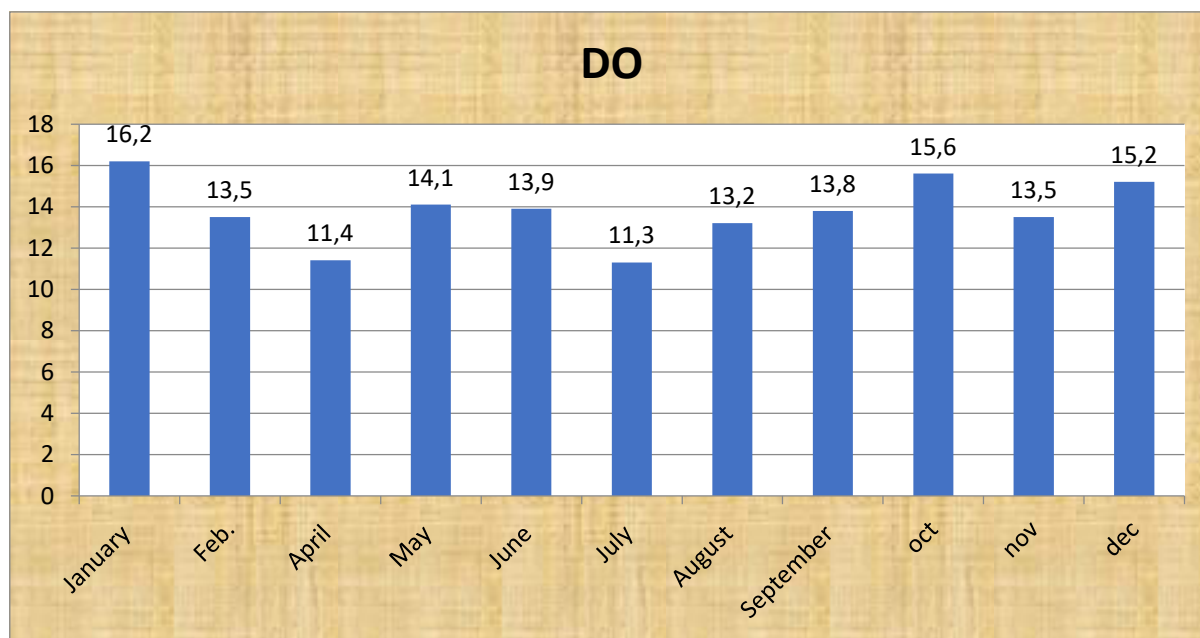


Fig. 4: Average values of DO

It is observed that in January value of DO 16.2 then in February it become 13.5 then in March it decreases to 12.5. In April again decreases to 11.4 in May it unexpectedly increases up to 14.1 and then decreases in June by 0.2 become 13.9 and incredible drop of DO in July to 11.3 then in August increases by 1.9 and value is 13.2 in September it increases by 0.6 and value become 13.8 in October it become 15.6 and November it decreases 13.5 and in December again increases by 1.7 and changes to 15.2

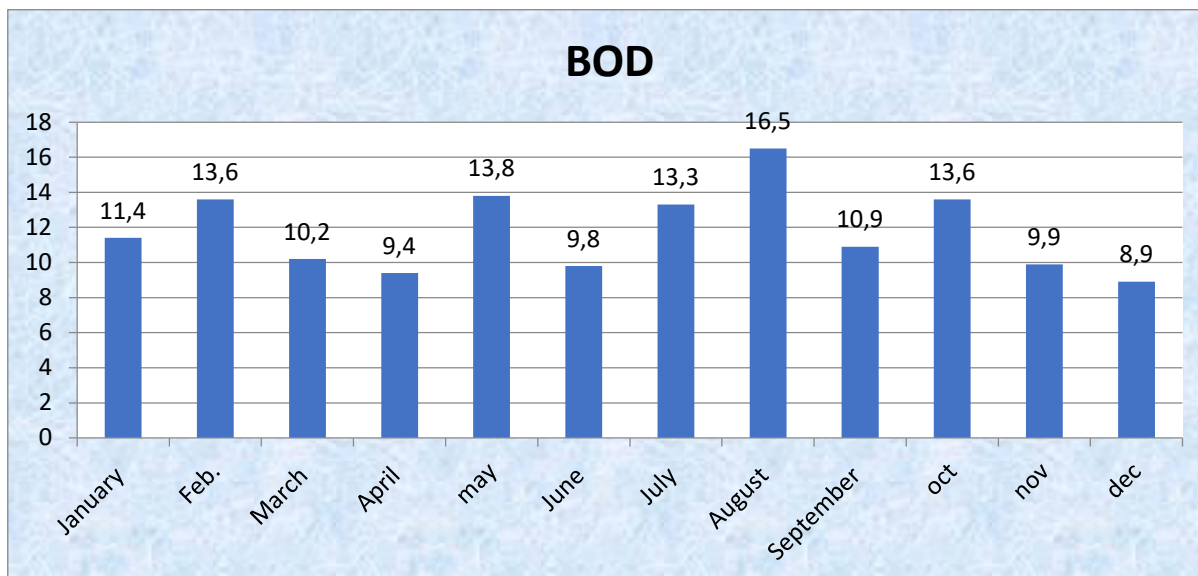


Fig. 5: Average values of BOD

It is observed that January BOD was 11.4 then in February it was 13.6 in March it become low up to 10.2 again decreases in April and become 9.4. In unexpectedly increases in May to 13.8 then drastically decreases in July to 9.8 and again increases in August up to 13.3 again increases at max in August and was 16.5 again incredible drop to 10.9 in September. In October increases to 13.6 again decreases up to 9.9 and same trend in December and changes to 8.9

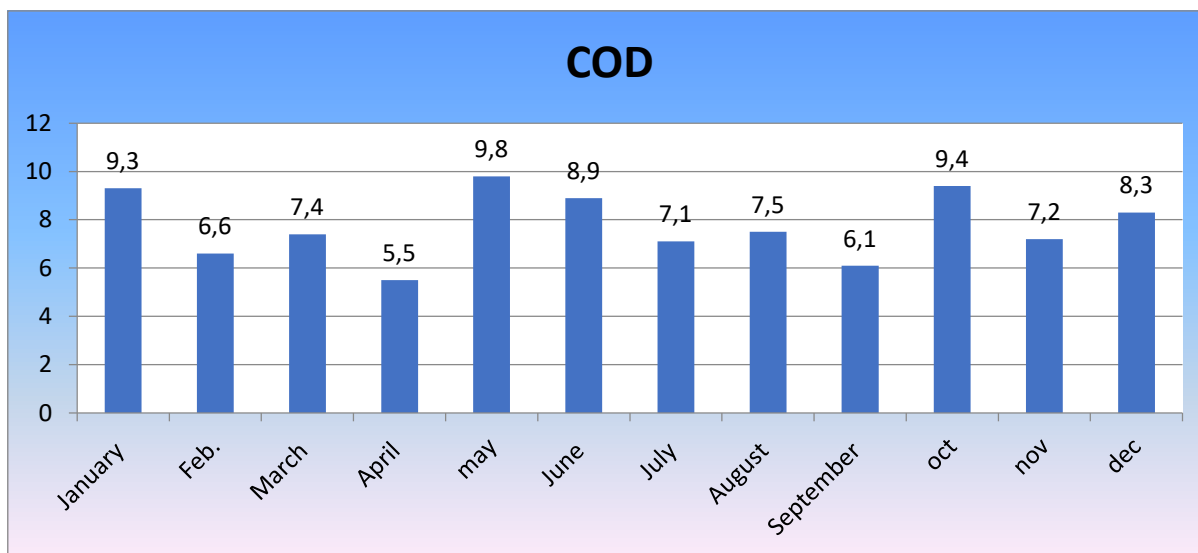


Fig. 6: Average values of COD

It is observed that in January it starts with value 9.3 then decreases In February to 6.6 in March it slightly increases up to 7.4 but again decreases in April and become 5.5 but in May it incredibly increases at max to 9.8 then again decreases in June up to 8.9 again same trend up to July and value is 7.1 slightly increases in August by 0.4 become 7.5 again decreases in September to 6.1 then in October increases to 9.4 again decreases in November and become 7.2 in December increases to 8.3

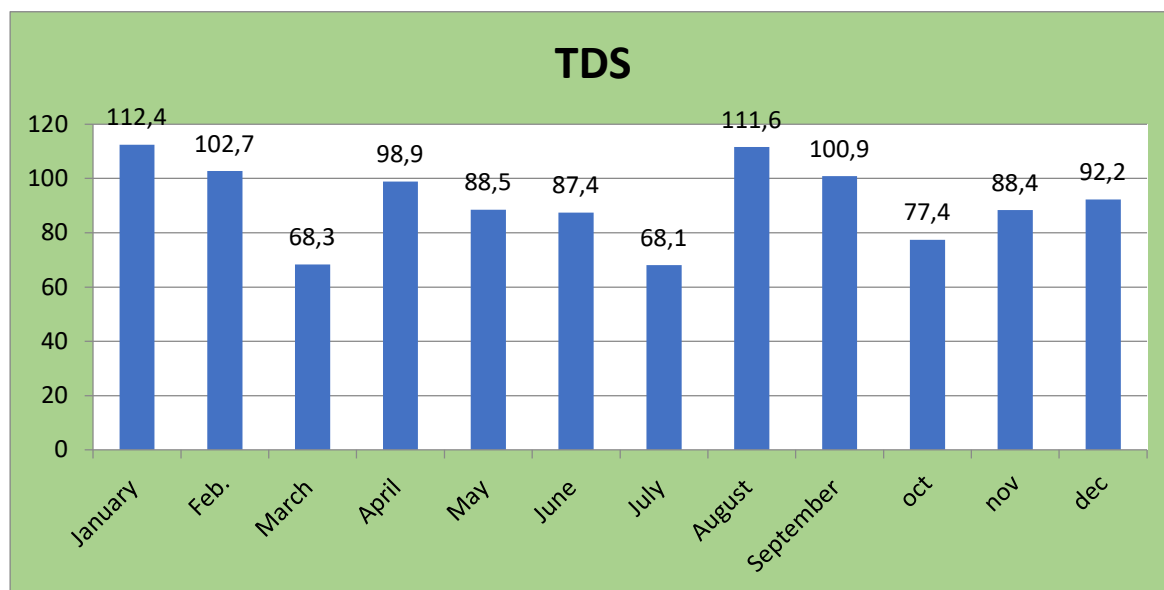


Fig. 7: Average values of TDS

It is observed that in January the max value and was 112.4 then in February become 102.7 and drastically decreases in March up to 68.3. In April increases up to 98.9 again decreases in may to 88.5 In June slightly decreases to 87.4 again become min in July again drastically increases up to 111.6 in August and again decreases in September to 77.5 same trend followed in October become 77.5 . In November it increases to 88.4 and in December it become 92.2

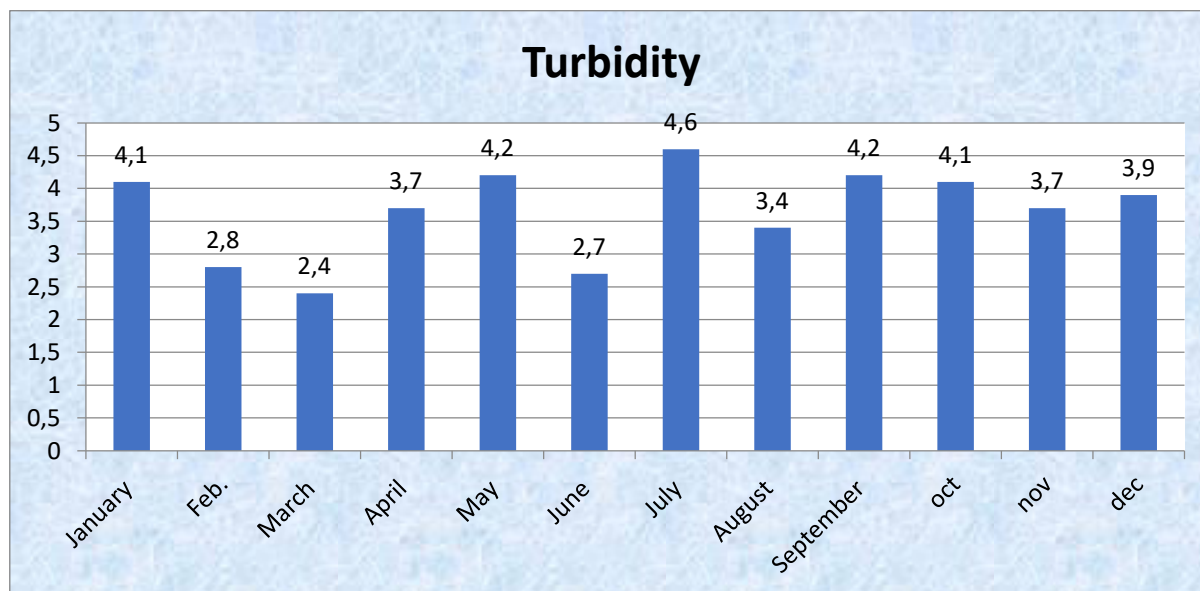


Fig. 8: Average values of Turbidity

It is observed that in January value is 4.1 then in February decreases to 2.8 again in March slightly decrease by 0.4 become 2.4. In April increases to 3.7 then again followed by same become 4.2 in May. Decreases in June to 2.7 and become max in July i.e 4.6 and decreases in August up to 3.4 again increases in September to 4.2 and slightly decreases in October to 4.1. In November decreases the value to 3.7 and slightly increases up to 3.9

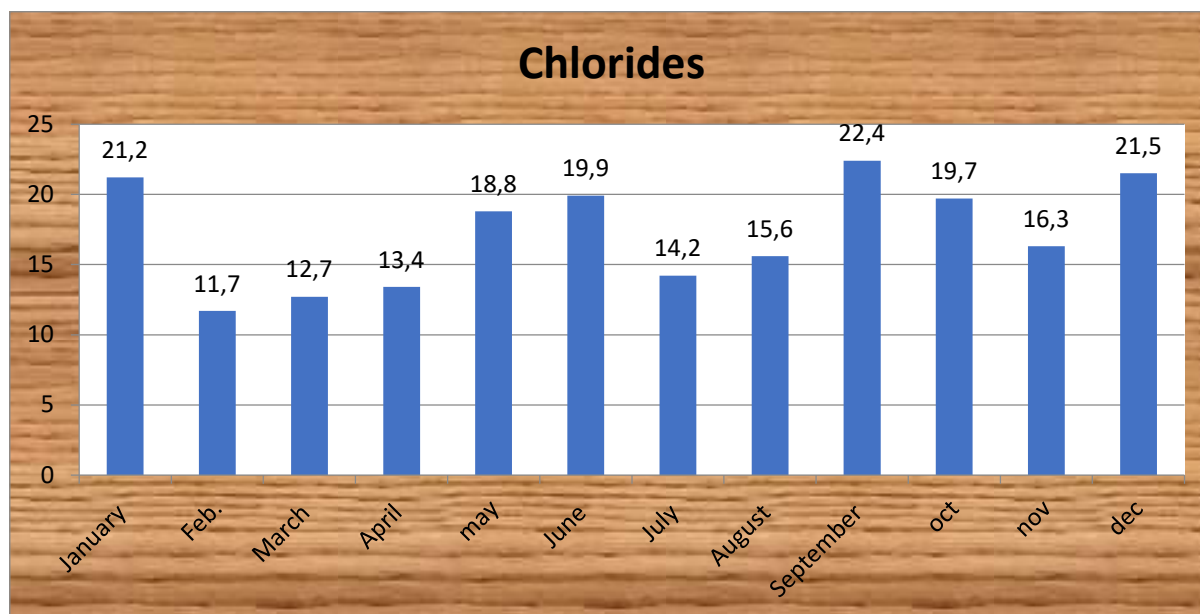


Fig. 9: Average values of Chlorides

It is observed that in January the chlorides are 21.2 then it become min in February 11.7 the small change in March it was 12.7 again same trend followed up for April, May, June and 13.4, 18.8, 19.9 respectively. In July it decreases to 14.2 and slightly increases in August to 15.6 the become max in September 22.4 is max value then decreases in October and become 19.7 again decreases in November and was 16.3 and finally in December increases to 21.5.

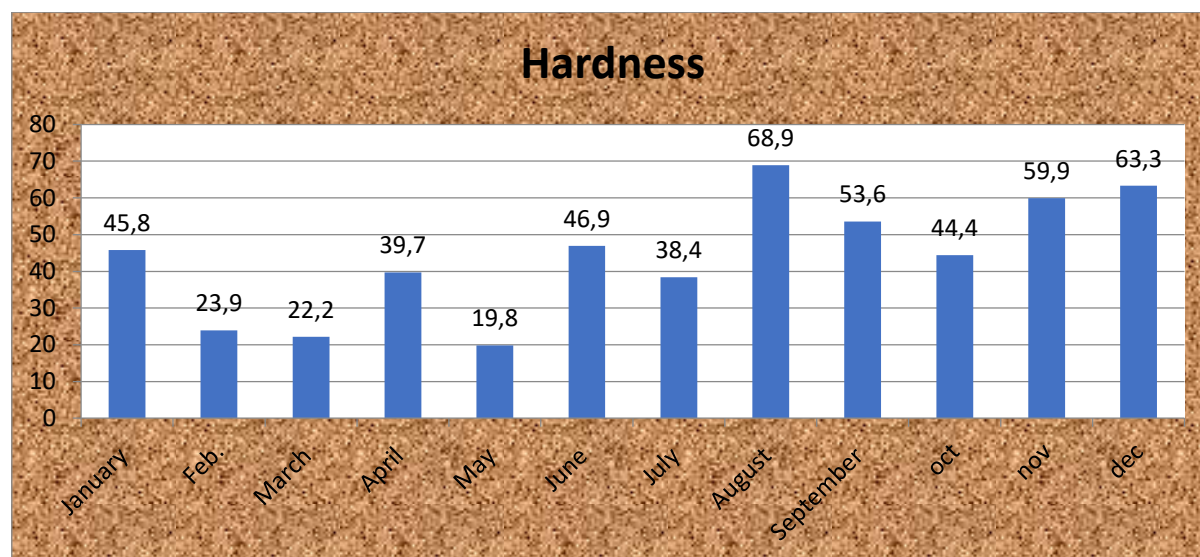


Fig. 10: Average values of Hardness

It is observed that in January the hardness is 45.8 the it decreases in February and become 23.9 and same trend by March slightly decreases to 22.2 and in April it increase to 39.7 and become min in May and was 19.8 the increases in June to 46.9 and again decreases in July become 38.4. In August increases to 68.9 and decreases in September to 53.6 followed by same trend for October become 44.4 then in November increases to 59.9 and in December slightly increases to 63.3.

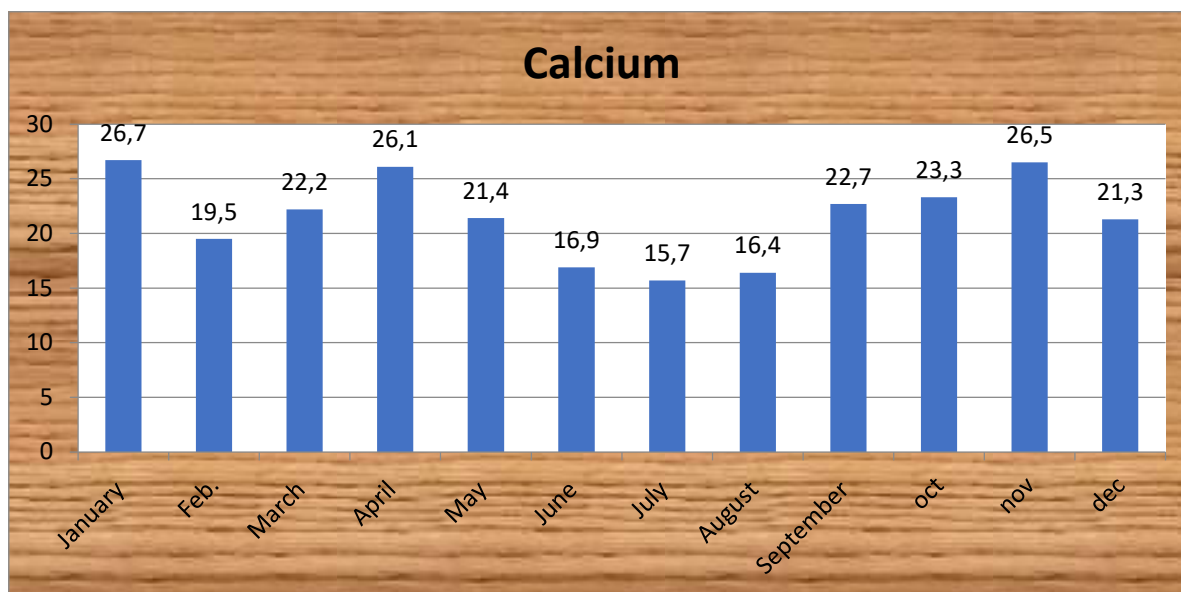


Fig. 11: Average values of Calcium

It is observed that Calcium in the month of January it was 26.7 in February 19.5 the increased in the month March to 22.2 and in April also increased to 26.1 then trend changes it decreases for May, June, July and September 21.4, 16.9, 15.7 and 16.4 then increased up to November it is 22.7 for September 23.3 for October 23.3 and for November 26.5 in December it decreases to 21.3

IV. CONCLUSION

Rivers play a very crucial role in the development of nation. The physicochemical parameters revealed that significant monthly variations in the values of physicochemical parameters. In present investigation, water samples collected and analysed by standard methods prescribed by APHA. Rivers plays great role in the socioeconomic and ecological development. In the present investigation analysis of the parameters were carried out. This analysis carried out in Aurangabad Godavari River and by standard method APHA. The average values Temperature 23.77 pH 7.38, DO 13.55, BOD 11.78, COD, 7.75, TDS 90.37, Turbidity, 3.83, Chlorides, 17.97, Hardness 48.32 and Calcium 21.14. It is found that water quality is not perfectly suitable for drinking. Before the consumption water need to be treated.

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