International Conference on Science, Engineering & Management Trends

International Journal of Science, Engineering and Technology
ISSN: 2348-4098, P-ISSN: 2395-4752

Comparative Physico-Chemical Analysis of Tapti River Water at, Betul Dist. MP, India

Dipti Kodle[1], Dr. Bilquees J. Khan[2]

[1]Ph.D. student in Life Science (Zoology) SAM Global University, Bhopal (M.P.) INDIA

[2]Associate Professor in Life Science (Zoology) SAM Global University, Bhopal (M.P.) INDIA

Abstract- In the present study water sample of Tapti River from two different sites Theska (near Barahlinga) and bridge near NH has been physicochemically evaluated for its suitability for domestic and irrigation purposes. In Physical and Chemical Parameters Such as Temperature, turbidity, pH, Conductivity, T.D.S., Alkalinity, Total hardness, Chloride, Nitrate and Dissolve Oxygen, were analyzed in the laboratory. The Physico Chemical parameters of water were determined as per standard methods of APHA (20012). The results indicate that the Tapti River water quality is suitable and safe for domestic and irrigation purposes.

Keywords- Tapti River, Physico- Chemical parameters, quality of water, Betul.

I. INTRODUCTION

Water quality includes all physical, chemical and biological factors that influence the beneficial use of water. Physio – Chemical analysis is the prime consideration to assess the quality of water for its best utilization like drinking, irrigation, fisheries, industrial purpose and helpful in the understanding of the complex process, interaction between the climatic and biological process in the water.

Water plays an important role in the world economy. Approximately 70% of the freshwater used by humans goes to agriculture.(Baroni et al., 2007) Fishing in salt and fresh water bodies has been, and continues to be, a major source of food for many parts of the world, providing 6.5% of global protein.(Troell,et al.2014) Much of the long-distance trade of commodities (such as oil, natural gas, and manufactured products) is transported by boats through seas, rivers, lakes, and canals. Large quantities of water, ice, and steam are used for cooling and heating, in industry and homes. Water is an excellent solvent for a wide variety of substances both mineral and organic; as such it is widely used in industrial processes, and in cooking and washing.

River Tapti is the most important river system of the state of Madhya Pradesh. Tapti river and its origin in Multai District Betul (M.P) . The river is supposedly named after the goddess Tapti, the daughter of Surya. The Sun God and Chhaya. Tapti is the sister of Shani, Bhadra ,Yamuna and Yama. The history of Tapti river starts with its origin in the Betul district.Tapti river rises from Multai District Betul of Madhya Pradesh and its flow between two spurs of the Satpura hills across the plateau of Khandesh and then through the plain of Surat to the sea .it has a total length of around 724 K.M.and drainage area of 30,000 square K.M. For the last 32 km of its course at its length Multai is a small town. Tapti river has been supporting the large number of population especially the indigenous people such as Dhodia, and Bhils who are heavily dependent on it.

II. MATERIALS & METHODS

The sample site selected was, Dist.-Betul M.P. The Tapti River water samples were collected in 1 litre bottle for physico-chemical studies (Fig.1). The water samples were collected from two selected

International Journal of Science, Engineering and Technology
ISSN: 2348-4098, P-ISSN: 2395-4752

locations S1 Theska near Barahlinga upstream (Shore, Center, Opposite bank), S2 Bridge near NH Downstream (Shore, Center, Opposite bank), for two seasons summer (April-May) & Pre monsoon (June-July).. The river water samples were collected in different sampling bottles as per standard method APHA. The pH, electrical conductivity and turbidity were estimated at sampling sites. The other parameters were measured by the procedure given by APHA in the laboratory. The investigation period was divided into two seasons i.e.summer and Premonsoon. The Physico- Chemical parameters were determined by standard methods of APHA (2012).

Different methods & tools were used for analyzing physicochemical variables in the laboratory

N0	Physicochemical Variables	Measurement tool used
1	pH	pH meter
2	Temperature	Thermometer
3	Conductivity	Electrical conductivity meter (EC meter)
4	Total Dissolved Solid	TDS meter
5	Alkalinity	Titration/pH meter
6	Total hardness	Colorimetric titration with an EDTA solution 9
7	Chloride	Titration
8	Nitrate	Spectrophotometric method
9	Dissolved Oxygen	Winkler method

The results achieved during the course of present study are tabulated in Tables- 1 . The result of Physico-Chemical properties obtained during the present study was found to fluctuate with the standard values of water quality given by World Health Organization, BIS (Bureau of Indian Standards) to categories the sites according to their pollution load.

III. RESULTS AND DISCUSSION

The analytical results for the river water samples in summer & pre monsoon seasons are shown in Table 1

Water quality analysis of river Tapti at Betul -2023								
S.No	Parameters	Seasons	S1Upstream Theska near Barahlinga			S2 downstream Brige near NH		
1.	PH	Summer	Shore	centre	opposite bank	Shore	centre	opposite bank
			7.58	7.34	7.24	7.35	7.46	7.38
		Pre-mansoon	8.01	8.20	8.24	8.15	8.34	8.46
2.	Temperature	Summer	23.6	22.7	23.8	23	23.4	23.2
		Pre-mansoon	21.1	20.0	22.2	22	23.1	22.5
3.	conductivity	Summer	0.32	0.29	0.29	0.28	0.32	0.3
		Pre-mansoon	0.30	0.30	0.27	0.32	0.33	0.8
4.	TDS	Summer	195.2	176.9	176.9	170.8	195.2	183
		Pre-mansoon	200	203.2	250.1	260.2	238	220
5.	Alkalinity	Summer	90	90	86	88	90	90

International Journal of Science, Engineering and Technology
ISSN: 2348-4098, P-ISSN: 2395-4752

		Pre-mansoon	80	88	80	79	93	86
6.	Total hardness	Summer	100	90	86	90	106	98
		Pre-mansoon	100.1	95	90	95	100	100
7.	Chloride	Summer	7.99	9.99	7.99	6.99	8.99	9.99
		Pre-mansoon	7.98	9.98	6.99	7.02	9.99	8.99
8	Nitrate	Summer	0.337	0.308	0.314	0.326	0.248	0.314
		Pre-mansion	0.330	0.309	0.320	0.250	0.280	0.320
9..	Free (C02)	summer	4	2	4	4	2	6
		Pre-mansoon	5	4	6	6	4	7
10.	DO	Summer	6.4	5.6	6	6.8	5.6	6
		Pre-mansoon	6.2	5.1	7.1	8	7	

PH –

The pH values in the present study ranged from 7.24 (S1) to 7.58 (S1) in summer season and 8.01(S1) to 8.46(S2) in pre- monsoon season. A similar pH range was reported in a previous study (Deshkar et al., 2014). Thus, there is no change in the pH level of the water.

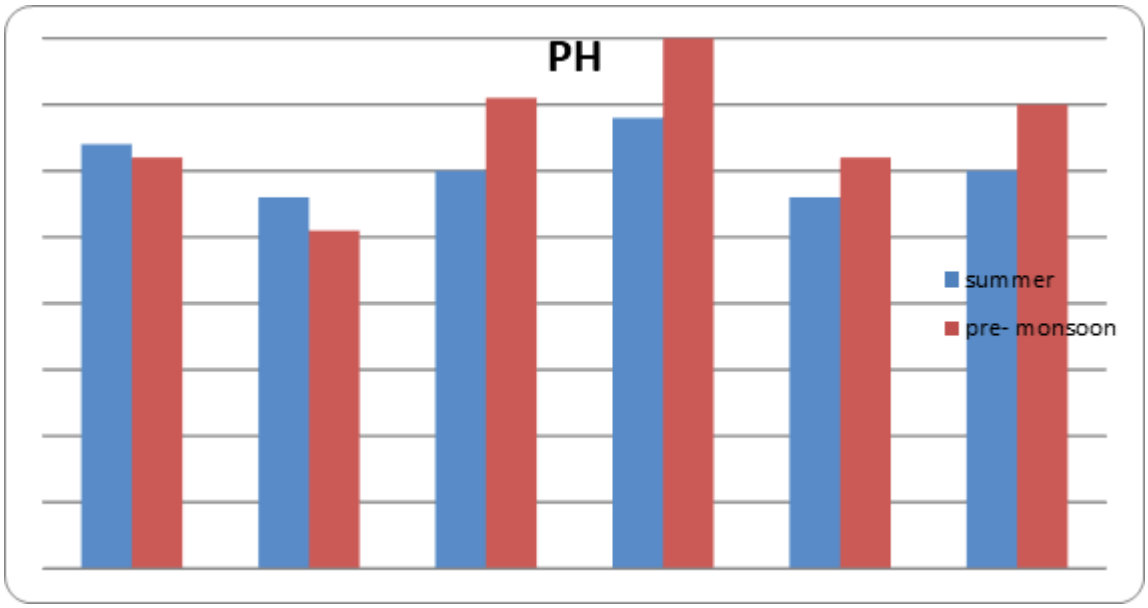

Fig. 1 Water pH recorded in the present study

Temperature: Minimum temperature value 20°C was recorded at S2 in Pre- monsoon season and maximum temperature value 23.8 °C was recorded in summer season at S1. Water temperature is a physical and ecological factor that has important repercussions on both living and non-living components of the environment, thus affecting organisms and the functioning of an ecosystem.

International Journal of Science, Engineering and Technology
ISSN: 2348-4098, P-ISSN: 2395-4752

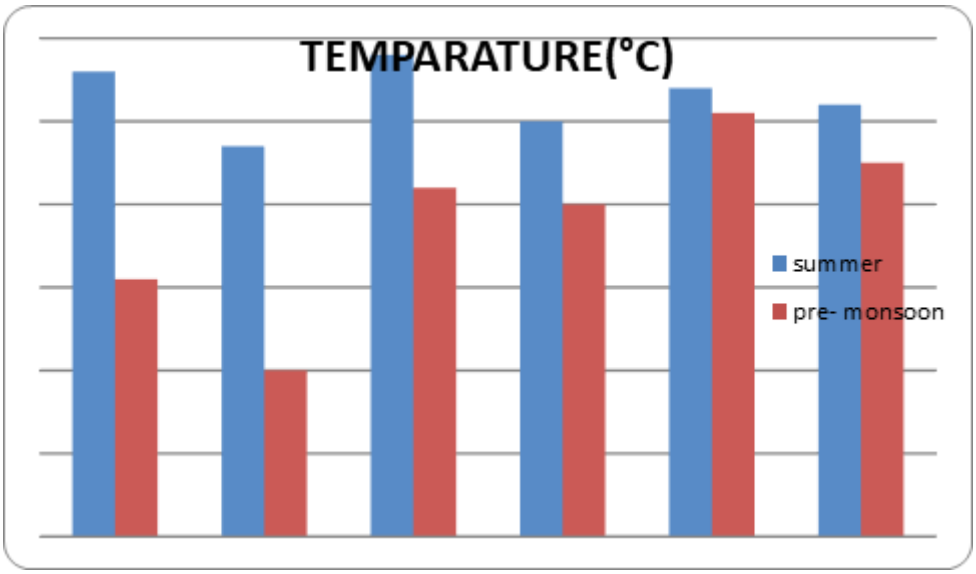

Fig. 2. Water temperature recorded in the present study

Conductivity-

Conductivity is a measure of the ability of aqueous solution to behave an electric current and this depends upon the presence of ions, their concentration, mobility and temperature of water. It is constructive indicator for measuring salinity or total salt content of waste water (Sudaram et al., 2014).The Minimum conductivity value 0.28 µS/cm was recorded at S2 in summer season and maximum conductivity value 0.33 µS/cm was found at S2 in Pre- monsoon Season.

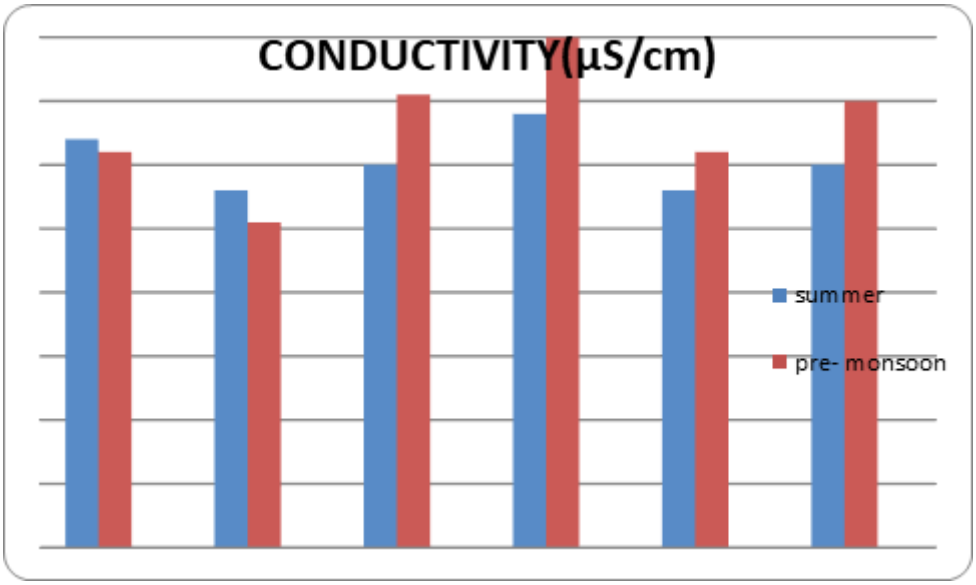

Fig. 3 Water Conductivity recorded in the present study

Total dissolved solids (TDS)

Total dissolved solids (TDS) include salt and variety of organic substances, which readily dissolve in water and often impart a degree of hardness (Watkar A.M et al. 2015). The maximum permissible limit of TDS for drinking water is 500 ppm as suggested by WHO and BIS.Present study Minimum TDS value 170.8 ppm was recorded at S2 in Summer season and maximum TDS value 238ppm was observed at the same site in pre- monsoon season.

International Journal of Science, Engineering and Technology
ISSN: 2348-4098, P-ISSN: 2395-4752

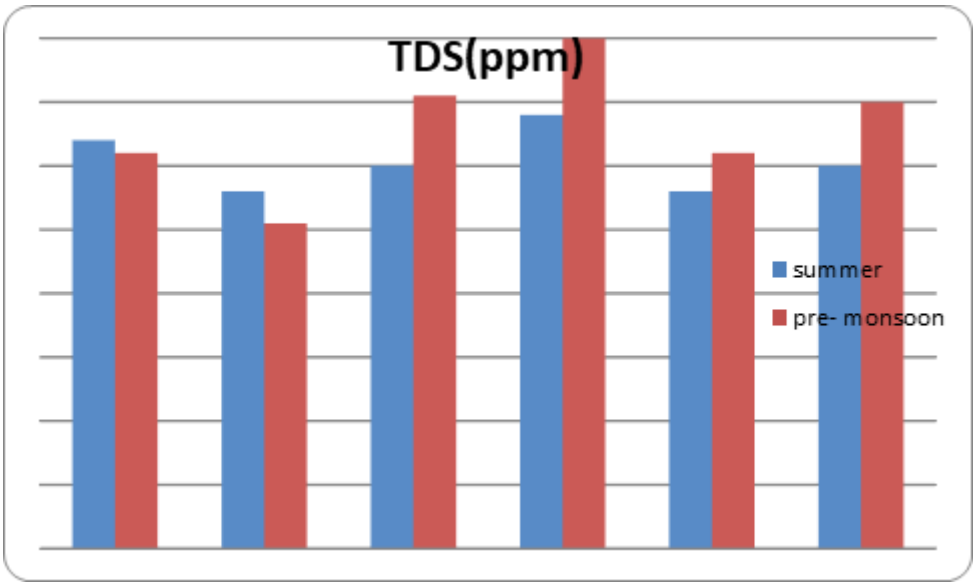

Fig 4 Water TDS recorded in the present study

Alkalinty-

Alkalinity of the water is the capacity to neutralize strong acids that gives primarily a function of carbonate, bicarbonate and hydroxide content and formed due to the dissolution of carbon dioxide in water.Minimum alkalinity value 79 mg/l recorded in the pre -mansoon season at S2 and maximum value93 mg/l in pre-mansoon seasons at S2.

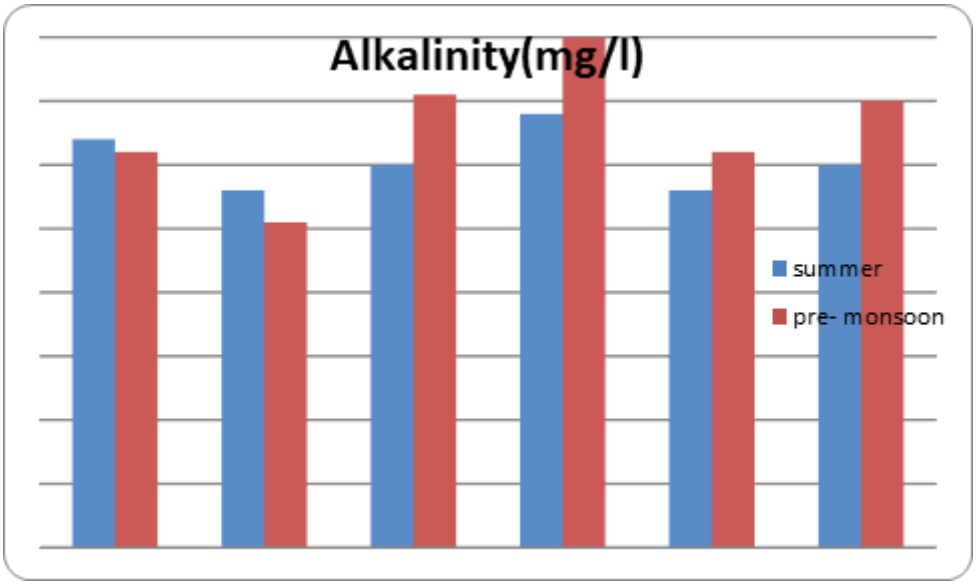

Fig. 5 Water Alkalinity recorded in the present study

Total Hardness-

Hardness is the parameter of water quality used to describe the effect of dissolved minerals (mainly Ca and Mg), determining suitability of water for domestic, industrial, and drinking purpose attributed to presence of bicarbonates, sulphate, chlorides of calcium and Magnesium .minimum Total Hardness value 86 mg/l recorded in the summer season at S1 and maximum values106 mg/l in the Summer season at S2.

International Journal of Science, Engineering and Technology
ISSN: 2348-4098, P-ISSN: 2395-4752

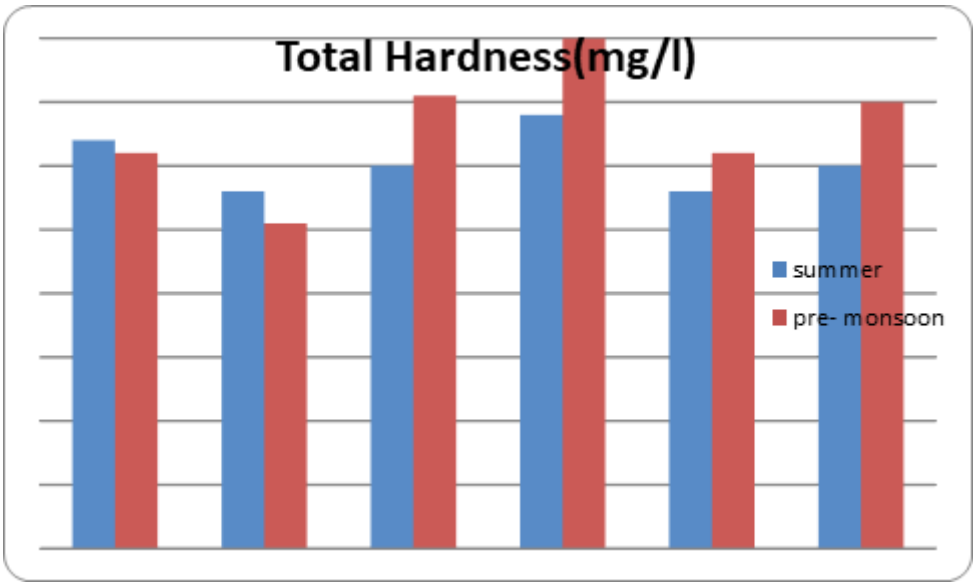

Fig. 6 Water Total Hardness recorded in the present study

Chloride -

The chlorides are present in all natural waters, mostly at low concentrations. It is highly soluble in water and is important in detecting the contaminations of ground water by waste in water. The Permissible limit for Chlorides is 250 mg/l as suggested by WHO and BIS. The present study Minimum Chloride value 6.99 mg/l recorded in the Pre- monsoon season at S1and maximum value 9.99 mg/l in the summer seasons at S2.

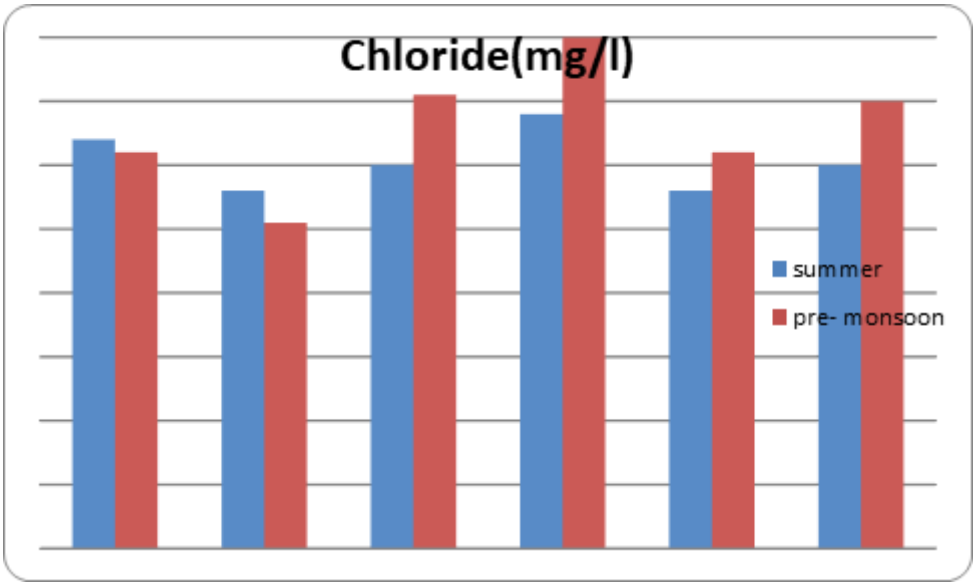

Fig. 7 Water Chloride recorded in the present study

Nitrate-

Nitrate is attributed mainly due to anthropogenic activities such as run of water from agricultural lands, industrial wastes, discharge of household and municipal sewage from the market place and other effluents containing nitrogen. Such observations were also reported by Royer et al (2004). The minimum Nitrate value 0.2348mg/l recorded in the Summer season at S2 and maximum value 0.337 mg/l during the summer season at S1.

International Journal of Science, Engineering and Technology
ISSN: 2348-4098, P-ISSN: 2395-4752

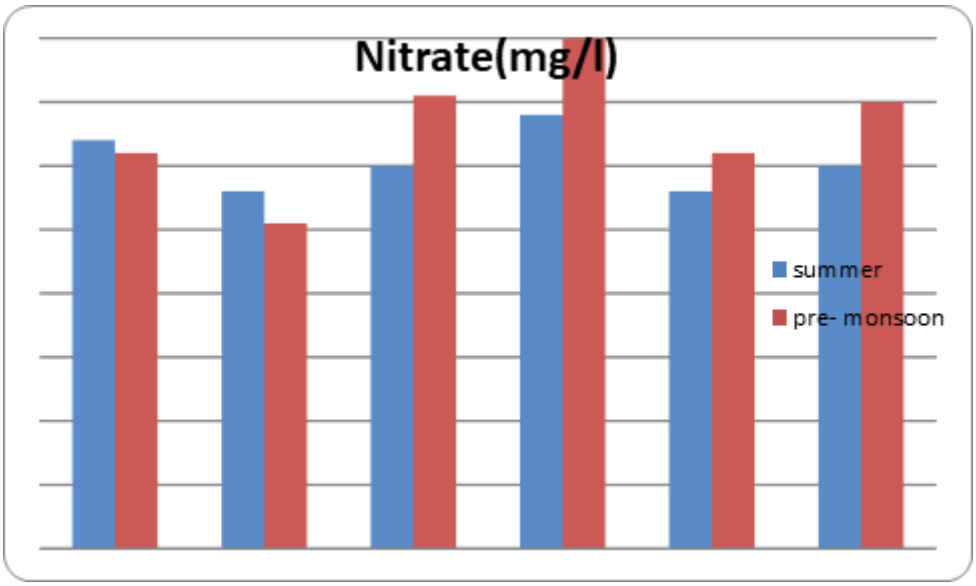

Fig. 8 Water Nitrate recorded in the present study

Free CO2 -

Minimum free CO2 value 2 mg/L was observed at S1 and S2 in Summer season and maximum free CO2 value 7 mg/L was S1 in Pre- monsoon season.

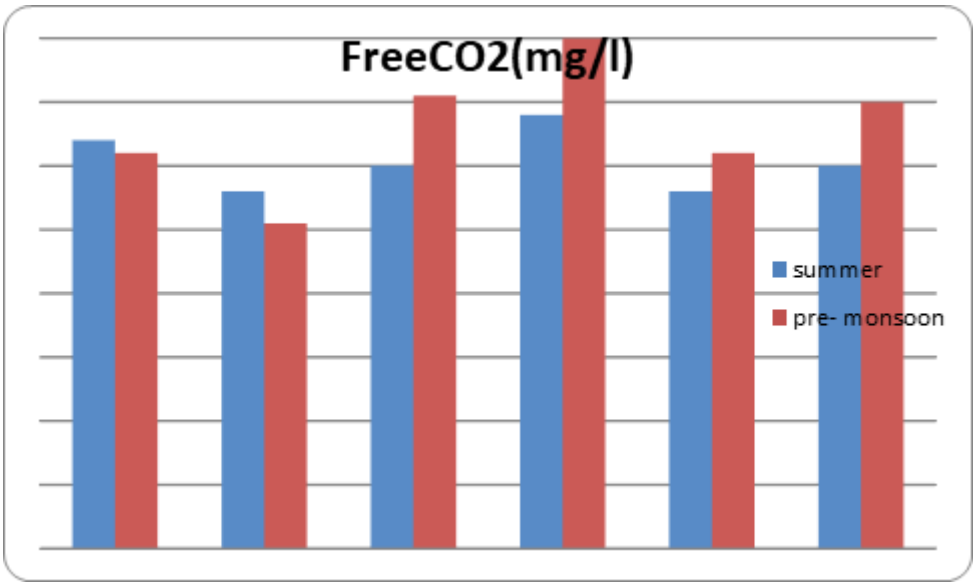

Fig. 9 Water Free CO2 recorded in the present study

Dissolved Oxygen

Dissolved Oxygen (DO) refers to the volume of oxygen that is contained in water. Oxygen enters the water as rooted aquatic plants and algae undergo photosynthesis, and as oxygen is transferred across the airwater interface. The amount of oxygen that can be held by the water depends on the water temperature, salinity and pressure. Gas solubility increases with decreasing temperature (colder water holds more oxygen).

The dissolved oxygen is an important parameter in assessing water quality because of its influence on the organisms living within a body of water. DO an important limnological parameter indicating level of water quality and organic pollution in the water body (Wetzel and Likens, 2006). Minimum DO value 5.1

International Journal of Science, Engineering and Technology
ISSN: 2348-4098, P-ISSN: 2395-4752

mg/L was observed at S1 in Pre- monsoon season and maximum value 7.1 mg/L was S1 in Pre-monsoon season.

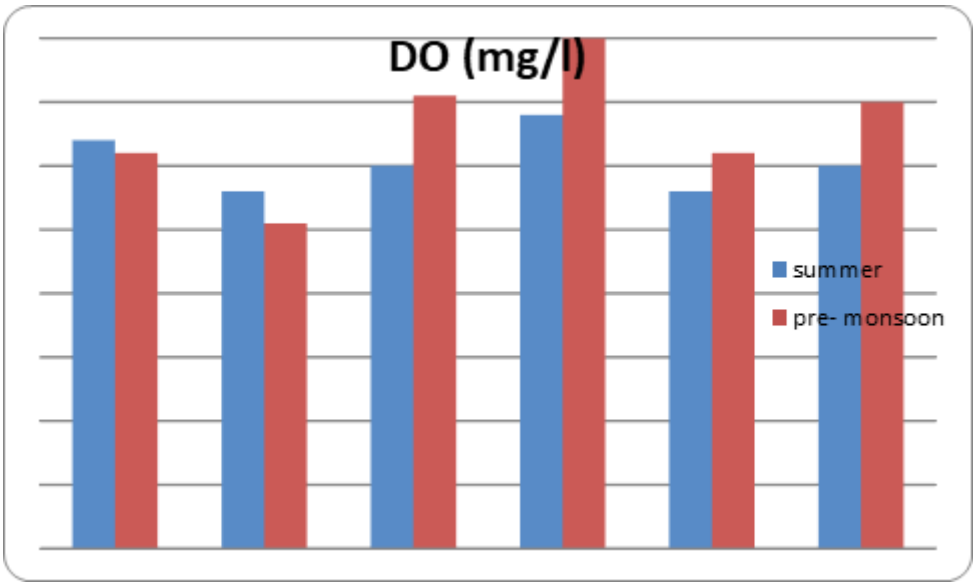

Fig. 10 Water DO recorded in the present study

IV. CONCLUSION

In the present study many physicochemical parameters and its characteristic behavior of a river water samples in different seasons and different sampling stations, the water quality of river is deteriorated due to domestic, industrial effluents direct discharge into river and various human activities along the banks of the river. From the above study, it may conclude that except little variation, all the physico-chemical parameters were in permissible limit at the study site of the Tapti River. It is suggested that proper measures are necessary to avoid contamination as water is used for drinking purposes. At present the river is suitable for irrigation and all purposes.

REFERENCES

1. APHA (2012), Standard Methods for the Examination of Water and Waste Waters, 22nd Edition,
2. American Public Health Association, Washington, DC.
3. BIS (2012), Specifications for Drinking Water, IS: 10500; 2012, Bureau of Indian Standards, New Delhi.
4. Baroni, L.; Cenci, L.; Tettamanti, M.; Berati, M. (2007). "Evaluating the environmental impact of various dietary patterns combined with different food production systems". European Journal of Clinical Nutrition. 61 (2): 279–286. doi: 10.1038/sj.ejcn.1602522. PMID 17035955.
5. Deshkar S., Mewada K. and Gavali D.: Spatial difference in pollution levels across Vishwamitri River, International Journal of Environmental Biology, Universal Research Publications 2014.
6. GL. Thermal pollution, influence of temperature on aquatic life. B.T.I. Ministry of Agriculture. 1968, pp: 224-881.
7. Troell, Max; Naylor, Rosamond L.; Metian, Marc; Beveridge, Malcolm; Tyedmers, Peter H.; Folke, Carl; Arrow, Kenneth J.; Barrett, Scott; Crépin, Anne-Sophie; Ehrlich, Paul R.; Gren, Åsa (16 September 2014). "Does aquaculture add resilience to the global food system?". Proceedings of the National Academy of Sciences. 111 (37): 13257–13263.

International Journal of Science, Engineering and Technology
ISSN: 2348-4098, P-ISSN: 2395-4752

8. Watkar A.M.., Barbate M.P. (2015); Seasonal variations in Physico-chemical Properties of Chandrabhaga River in Dhapewada, Dist. Kalmeshwar Maharashtra, India. Research Journal of Recent Sciences ISSN 2277-2502 Vol. 41- 4.
9. Wetzel R.G., Likens G.E. (2006) Limnological analysis.3rd ed. Springer-Verlag, New York, 391.