

Physio chemical parameters during Rainy seasons of Tapti River at Betul district (M.P)

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Abstract : Tapti river is also known as life line of Madhya Pradesh for its huge contribution to the state of M.P. It is a major source of drinking water, irrigation and hydroelectricity for M.P. In the present study water sample of Tapti River from 5 different station of Betul district (M.P) has been collected to evaluate its suitability for drinking, domestic and irrigation purpose. The important physical and chemical parameters are taken for study like pH, Temperature, conductivity, , Total dissolved solid (TDS), Alkalinity, Total hardness, Chloride, ammonia, Nitrate ,total phosphorus , Dissolved Oxygen, BOD, were examined in the laboratory. Standard method APHA, (2012) was used during the examination. After examining parameters in the lab it was concluded that the water quality is suitable and safe for drinking and irrigation purposes.

Keywords : Tapti river, betul district, physico-chemical parameters, quality of water.

Introduction

Clean water is the basic necessity of human life and healthy living. We extract water from rivers, lakes, even from small channels and utilizing it for various purposes. Water resources and water quality affect the economic, social, and political development of the society. Water is a finite resource that is very essential for the human existence, agriculture, industry etc. It is reported that inadequate quantity and quality of water have serious impact on sustainable development. (Taiwo et al, 2012).

Water is inorganic, transparent, tasteless, odorless and nearly colorless of earth's hydrosphere and the fluids of all known living organisms. It is vital for all known forms of life, even though it provides no calories or organic nutrients. Water is one of the earth most important resources that use for human life and its quality is totally depend on geological environment, recovery, utilization as per need and human activities like domestic, industrials or commercial, mining, operations, agricultural etc. In short fresh water directly linked with human welfare as it is vital concern for mankind. But today most of the surface and subsurface water bodies are unfortunately under the environmental stress. Stress are due to increase in population, urbanization and to fulfill their food demand advance agrochemicals are used. So there is a high risk of contamination of water by percolation surface runoff. Human health is threatened by most of the agriculture development activities particularly in relation to the excessive application of the fertilizer and unsanitary conditions. According to WHO organization, about 80% of all the diseases in human being are caused by water. Once the water is contaminated, its quality can't be restored by stopping the pollutant from source. It therefore becomes imperative to regularly monitor quality of water and to device ways and means to protect it. Higher amount of organic waste increases the rate of activity decomposers which is collectively called sewage, fungus and this property of becoming decomposed through microbial activity is called Putrescibility. The higher consumption thereby (indicator or pollution) causes a drop in dissolved oxygen (DO) content of water. The demand for oxygen is directly related to increasing input of organic waste and is expressed as biochemical oxygen demand (BOD). The lower oxygen content kills many sensitive aquatic organisms like planktons Molluscs , fish etc.

The objective of the present study is to provide information on the physico-chemical characteristics of river Tapti to assess the quality of river water as well as to discuss its suitability for human consumption and irrigation purposes



Tapti river and its origin in Multai District Betul (M.P) . The river is supposedly named after the goodness 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 tensile place 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.

Material and Methods

Study area

The Raniy season sample collection of water was done from the River Tapti from different five sampling sites at Betul district (M. P) on JULY '22.

S 1.) Multai (Tapti river Birth place)

S2.) Chandora dam

S3.) Parasdoh dam

S4.) Tapti pool Khedi

S5.) Theska

The water samples were collected from the Tapti river at betul district duringrainy season july 22. The river water samples were collected in acid cleaned plastic containers as per standard method suggested by APHA (2012). For investigation, water samples were brought to laboratory immediately. pH of water sample measured by pH meter using standard solutions; Temperature of water sample measured by Thermometer; Conductivity measured by conductivity meter; Turbidity of water sample measured by turbidity meter; Total dissolved solid (TDS) measured by TDS meter; Total Alkalinity determined by Acid base titration method; other parameters also measured in laboratory as per standard method.

Results and Discussion:

The analytical results for the river water samples are shown in Table 1 (a) & Table (b).

Field Analysis: Results (Field Analysis) of water samples collected from different sampling stations is depicted in Table-1(a)

Table-1(a) Water Quality at different locations of Tapti river: JULY - 2022 (Field Analysis)

| S . No | St. Name | Date | Time | Water temp. (o c) | TDS (ppm) | Conductivity (mg/l) | pH | Dissolved Oxygen (mg/l) |
|--------|------------------|----------|----------|-------------------|--------------|------------------------|------|-------------------------------|
| S1 | Multai | 7/7/2022 | 9.00 am | 24 | 119 | 912 | 7.8 | 2.2 |
| S2 | Chandora dam | 7/7/2022 | 10.00 am | 25 | 150.2 | 710 | 7.1 | 3.2 |
| S3 | Parasdoh dam | 7/7/2022 | 12.00 pm | 28 | 250 | 1033 | 7.7 | 2.3 |
| S4 | Tapti pool Khedi | 7/7/2022 | 1.00 pm | 26 | 280 | 947 | 7.72 | 2.0 |
| S5 | Theska | 7/7/2022 | 1.30 pm | 27 | 286 | 920 | 7.82 | 2.5 |

Temperature:

Temperature is one of the most important parameters that influence almost all the physical, chemical and biological properties of water and thus the water chemistry. In the present study temperature varied from 24oC to 28oC. The minimum temperature was recorded in the S1 and maximum was recorded in the S3. Sharma et al (2001), Yogesh et al (2001) also reported the same type of fluctuation in various freshwater bodies fluctuation in various freshwater bodies.

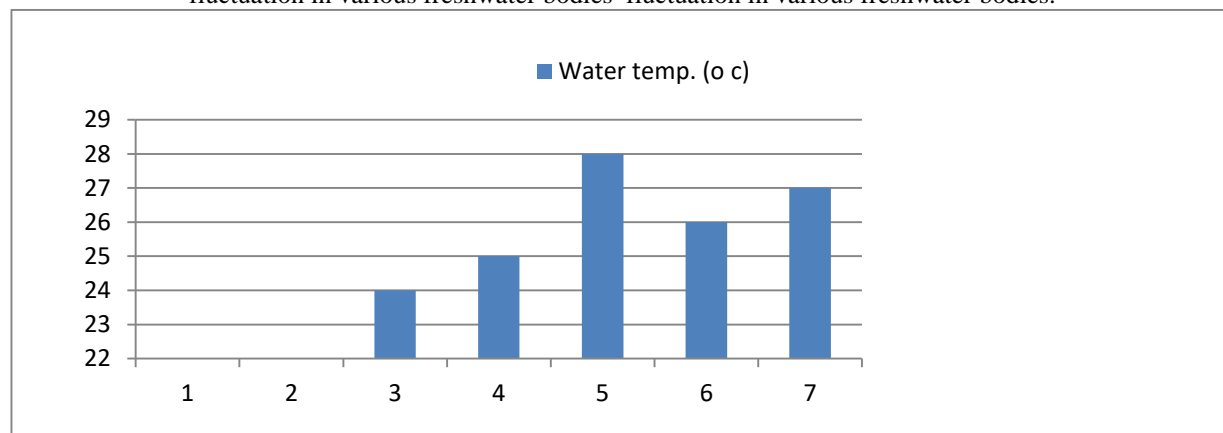
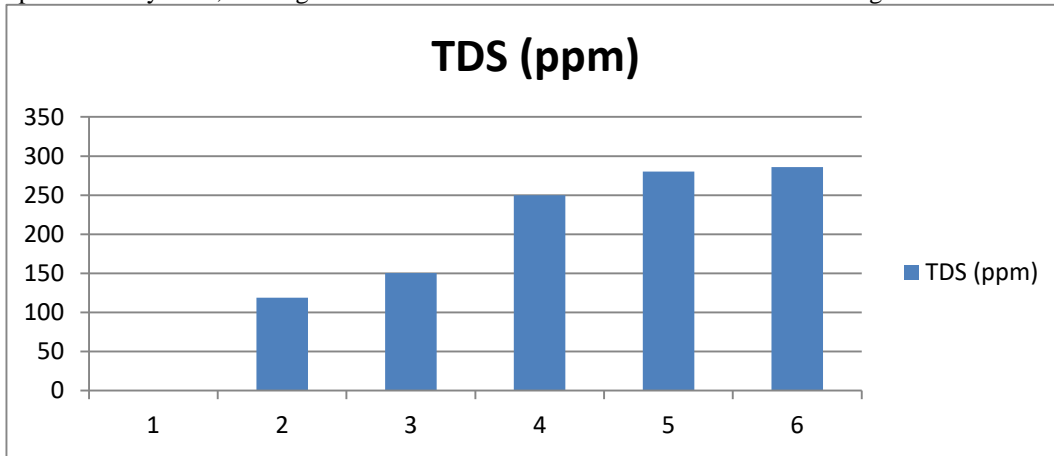


Fig.1 Fluctuation in the value of water Temperature at different sites of Tapti river in rainy season

Total dissolved solids (TDS):

The TDS content of fresh water generally ranges from 10 to 500 mg/lit. The total dissolved solid (TDS) is the sum of the cations and anions concentration. A high content of solids elevates the density of water, reduces solubility of gases like oxygen and mitigates the utility of water for drinking, irrigation and other purposes. The maximum permissible limit of TDS for drinking water is 500

mg/liter. present study TDS, 119 mg/lit was the lowest value recorded at site 1 and 286 highest value recorded at site 5 during rainy



season.

Fig.2 Fluctuation in the value of TDS at different sites of Tapti river in rainy season

pH:
 pH is defined as the intensity of the acidic or basic character of a solution at a given temperature. pH is the negative logarithm of hydrogen ion concentration ($pH = -\log [H^+]$). The pH in water samples ranges of 7.0 to 7.85 and it reported that the pH of water is important for the biotic communities as most of the plant and animal species can survive in a narrow range of pH from slightly acidic to slightly alkaline condition (Paul w et.al 2011). pH is an indicator of the existence of biological life as most of them thrive in a quite narrow and critical pH range. The pH is important parameter of water, which determines the suitability of water for various purposes such as drinking, bathing, cooking, washing and agriculture etc. (WHO)

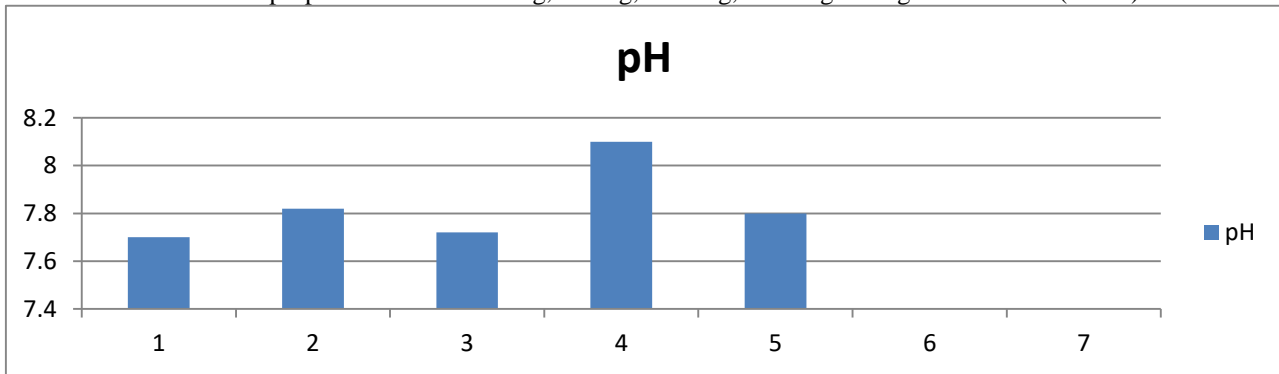


Fig.3 Fluctuation in the value of PH at different sites of Tapti river in rainy season

Conductivity (us/cm):

Conductivity value of Tapti river at Betul district was ranged from 912 to 1145us/cm. Minimum range. 912us/cm was recorded at site 1 & maximum range 1145us/cm was recorded at site 3. site 1 & maximum range 1145us/cm was recorded at site 3.

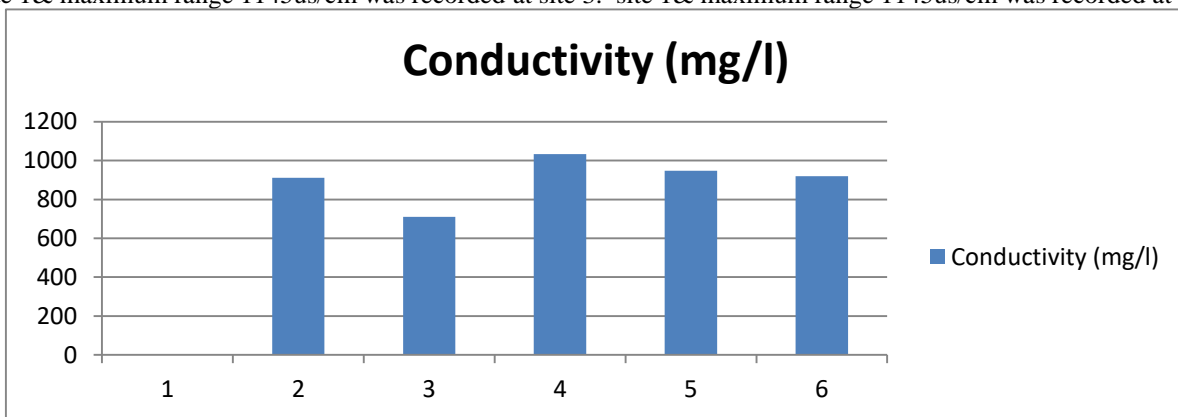


Fig.4 Fluctuation in the value of Conductivity at different sites of Tapti river in rainy season

Dissolved Oxygen:

Dissolved oxygen in natural and waste water depends on the physical, chemical and biological activities in the water body. Dissolved Oxygen (DO) content, plays a vital role in supporting aquatic life and is susceptible to slight environment changes. DO an important limnological parameter indicating level of water quality and organic pollution in the water body (Wetzel and Likens, 2006). The value of DO fluctuated from 2.0 mg/l to 3.2 mg/l. The maximum values (2.0 mg/l) was recorded in the site 4 and minimum values (3.2mg/l) was recorded in the site 2.

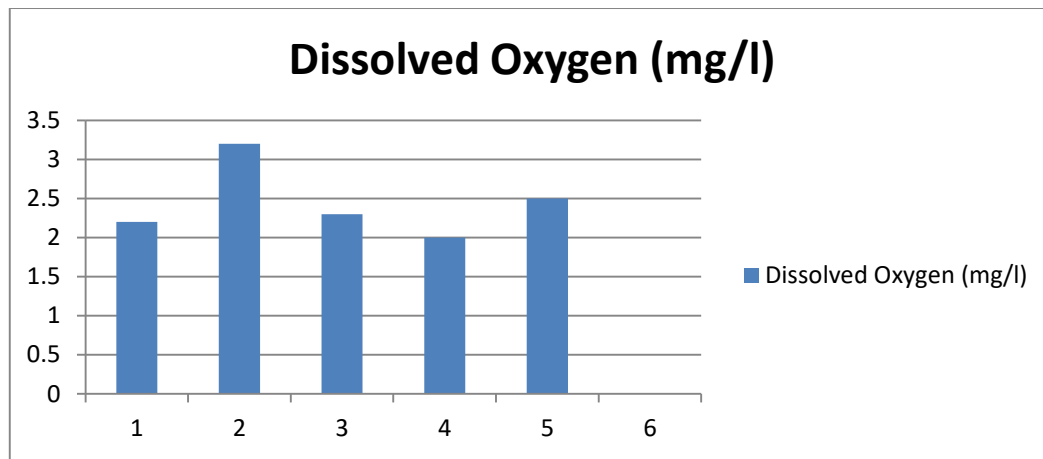


Fig.5 Fluctuation in the value of Dissolved oxygen at different sites of Tapti river in rainy season

Laboratory Analysis:

Results of water samples collected from different sampling stations is depicted in Table-1(b)

Table-1(b) Water Quality at different locations of Betul district july 2022 (Laboratory Analysis)

| | St. Name | Taste | BOD (mg/l) | Chloride (mg/l) | Hardness (mg/l) | NO3 (mg/l) | Alkalinity (mg/l) |
|----|------------------|-----------|---------------|--------------------|--------------------|---------------|----------------------|
| S1 | Multai | Agreeable | 4.2 | 24 | 120 | 42 | 210 |
| S2 | Chandora dam | Agreeable | 4.5 | 22 | 110 | 43 | 150 |
| S3 | Parasdoh dam | Agreeable | 3.5 | 23 | 170 | 45 | 110 |
| S4 | Tapti pool Khedi | Agreeable | 3.7 | 26 | 150 | 43 | 115 |
| S5 | Theska | Agreeable | 3.9 | 18 | 170 | 40 | 110 |

Biological Oxygen Demand (BOD):

The BOD value of water samples under present investigation varied 3.5 to 4.5 mg/l. BOD indicates the amount of oxygen required for stabilizing biological decomposable organic matter in waste under aerobic condition by micro organisms. The reason of high value of BOD could be due to fact that several microbes accelerated their metabolic activities with concentrated amount of organic matter discharged due to human activities, and hence required more amount of oxygen. (Kumar P. et al, 2005).

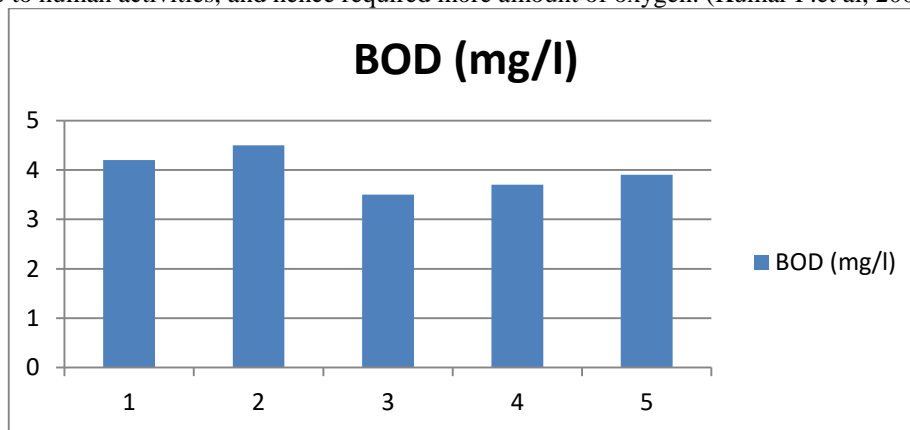
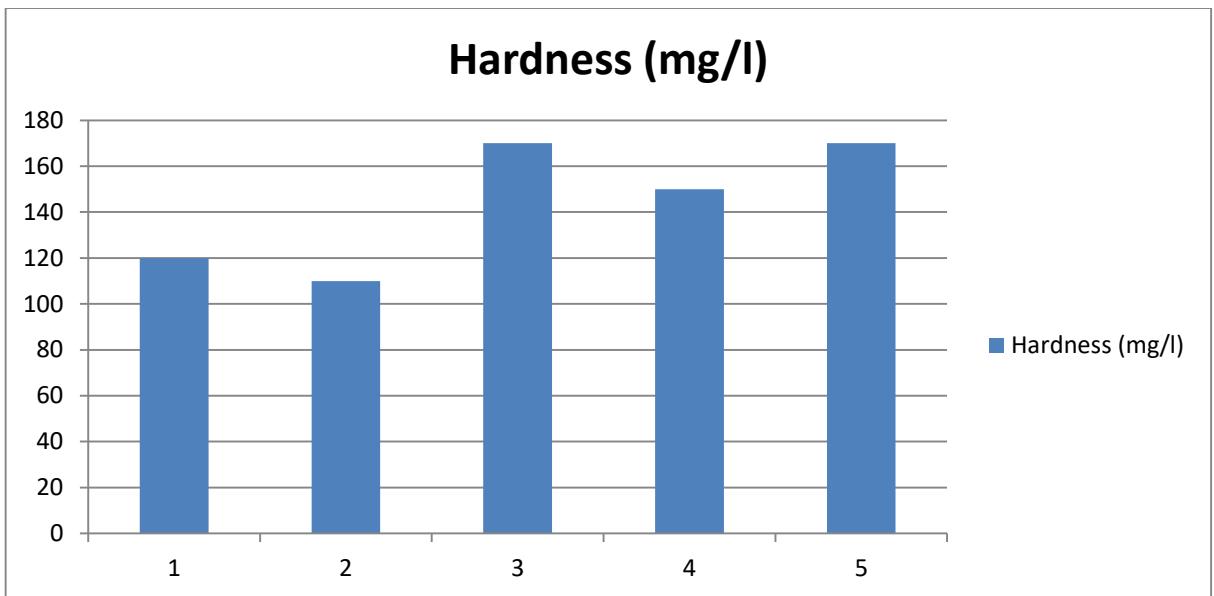


Fig.6 Fluctuation in the value of BOD at different sites of Tapti river in rainy season

Total Hardness :

The total hardness was found to be high in all water bodies. This is highest (170 mg/l) in site 5. during and lowest (110mg/l) at site 2 study in rainy season. The hardness is due to dominance of salts of calcium and magnesium which indicated surge in eutrophication of river resulting to greater pollution level. The presence of lower pH and higher hardness may affect their



continued use.

Fig.7 Fluctuation in the value of Total hardness at different sites of Tapti river in rainy season

Chloride:

The chloride values fluctuated in between 26-18 mg/lit. Chloride of this river water was not-high. The amount found in the sample did not exceed minimum permissible limit for drinking water prescribed by BIS.

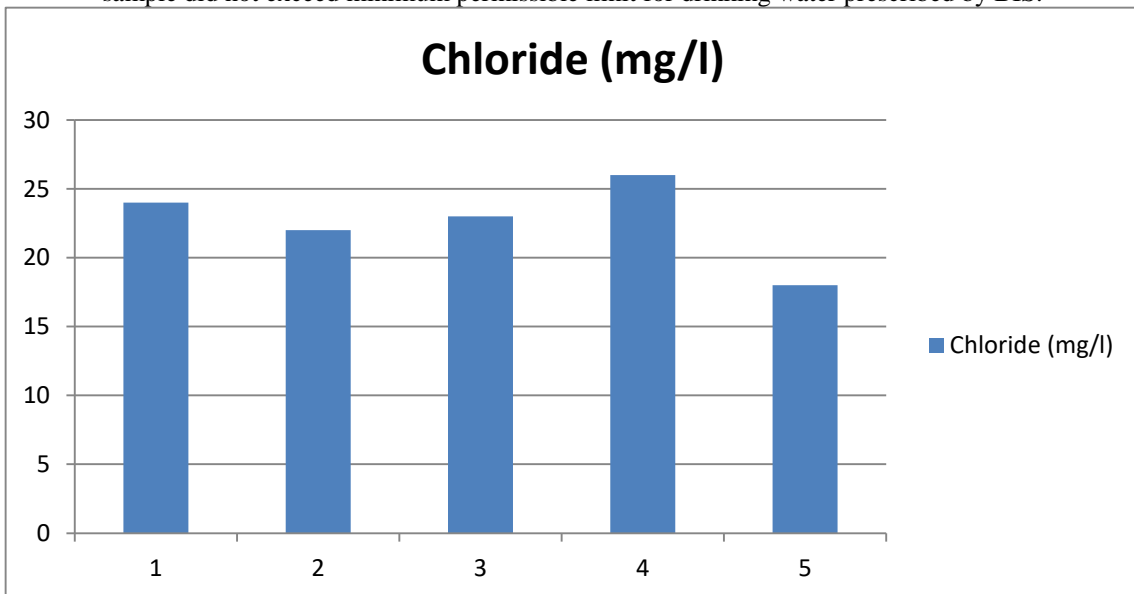


Fig.8 Fluctuation in the value of Chloride at different sites of Tapti river in rainy season

Nitrate:

The values of nitrate ranges from 40mg/l to 45 mg/l. the maximum value (42mg/l) was observed in the site 1 and minimum (45mg/l) in the site 3.

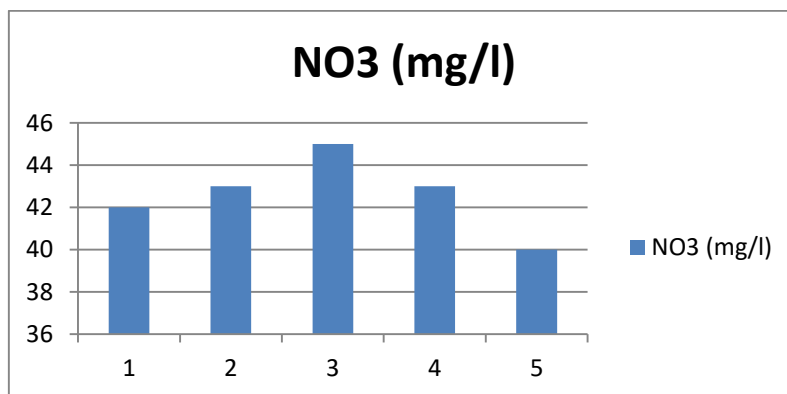


Fig.9 Fluctuation in the value of Nitrate at different sites of Tapti river in rainy season

Alkalinity:

The alkalinity values fluctuated in between 110 to 210 mg/lit. Mean average alkalinity of samples analyzed is 150 mg/ lit. During the course of investigation. Alkalinity values found below the range prescribed by BIS.

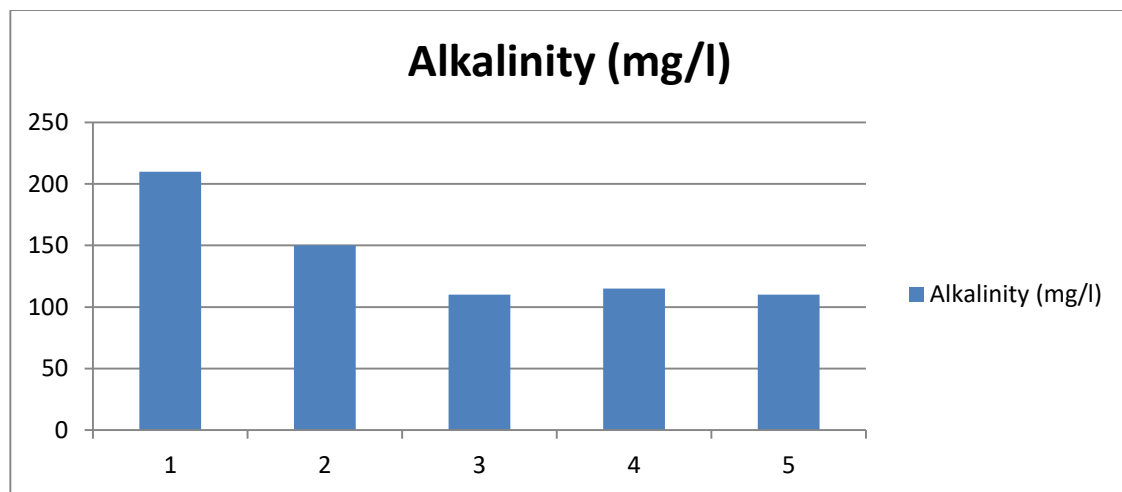


Fig.10 Fluctuation in the value of Alkalinity at different sites of Tapti river in rainy season

Conclusion:

Present study provides an informative data and helps to understand water characteristics and indicates that the water of Tapti River can serve as a good habitat. The pH value indicates the alkaline water which may be due to the solubility of carbon dioxide in water. The overall analysis of quality of water of Tapti River in District Betul (M.P.) shows that various physico-chemical parameters studied during Rainy season are within permissible limit suggested by WHO and BIS:10500 and the river water is suitable for drinking and irrigation purposes and may be used after proper treatment.

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