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Experimental Studies of Physco-Chemical and Biological Parameter on Betwa River

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Abstract: ***The historically famous Betwa River is the lifeline of the Ganj Basoda town, as most of the inhabitants of the town, particularly those living around the lake, depend on the river's water for their general use. At present, the lake water is full of odours and harmful suspended particles because most of the waste is being discharged directly into it, particularly from the population located on the periphery of the lake. Similarly, residents of the town's hillock areas are directly discharging waste into open drains. Sewage is 99 percent water and carries domestic wastes originating in the kitchen, bathing, laundry, urine, and night soil. A portion of the wastes go into solution, and the rest are partly in colloidal suspension or true suspension. Sewage is generated by residential, institutional, commercial, and industrial establishments. It includes household waste liquid from toilets, baths, showers, kitchens, sinks, and so forth that is disposed of via sewers. In many areas, sewage also includes liquid waste from industry and commerce. The goal of this study is to analyze the water quality of Betwa river at various points, identify wastewater sources that degrade the river water quality, and propose a sewage treatment plant for Basoda city .Here, samples from four drains and four samples of lake water have been collected, and tests have been conducted to determine various parameters including pH, color, temperature, COD, BOD, conductivity, sulfate, nitrite, suspended solids, total solids, and total coli form.***
Keywords: Betwa River, BOD, Sulphates, DO. COD

I. INTRODUCTION

The importance of water on earth cannot be overstated. For survival, all living things need water. Everything will die off without water, including germs, plants, and animals. Urbanization, industrialization, and population increase have all contributed to a rise in water consumption, which has had a major negative impact on the environment and created a water crisis. Water pollution from industrial effluents and sewage has contributed to a global water crisis, including one in India. The main components of the effluent stream that is generated by the industries include hazardous chemicals and heavy metal ions including chromium, nickel, copper, lead, and arsenic. Environmental damage is caused by heavy metals, which are very poisonous by nature. India, whose economy is in transition from one of economic development to one of economic development, has two issues. Infrastructure is a problem on the one hand, while urban population growth is a problem on the other. From 25.8 million in 1901 to 1.65 billion in 2051, and 1.32 billion in 2020, the number of people living in urban areas in India has increased dramatically. Due of this, there is a water scarcity and sewage overflow, both of which self-replicating issues are. Since more than half of the country's population is predicted to reside in cities and towns by 2050, there will likely be a significant increase in the need for infrastructure amenities, which will provide a challenge to urban planners and politicians. courtesy of CPCB, India Rapid urbanisation has outpaced the ability of public services to keep up. Water, sanitation, and sewage and solid waste treatment are only available to a fraction of the urban population. According to the residents' socioeconomic status, there is a definite unfairness and discrepancy in the public services they get. In addition to the natural increase in the urban population, there has been a significant emigration of people, mostly from rural regions and small towns to large cities, and the incorporation of more recent rural areas into nearby metropolitan areas. Fewer than half of all urban areas have access to sewerage and treatment facilities. Many metropolitan areas have expanded beyond the capacity of their municipalities, but these new urban clusters are still governed by rural administrations that are unable to deal with the sewage generated by so many people. Smaller municipalities tend to have worse sewage management. Either open fields or rivers get the sewage directly, or both.

II. ORIGINS OF SEWAGE

Domestic wastes from the kitchen, bathroom, laundry, urine, and night soil make up 99% of sewage, which is water. The wastes are divided into two groups: those that enter solution and those that partially enter colloidal and true suspension.

In addition to this, human activity such as cooking, body cleaning, laundry, and urination all contribute salts to the water. In addition to sewage, night soil from people who have previously had cholera, jaundice, typhoid, dysentery, and gastroenteritis includes water-borne pathogenic organisms that cause these diseases. Institutional, commercial, residential, and industrial facilities all produce sewage. It consists of liquid home trash that is dumped into sewers from sinks, bathrooms, showers, kitchens, and other locations. Liquid industrial and commercial waste is often included in sewage systems. More and more people in the developed world are adopting the practise of separating their home waste into black water and grey water. The latter may be reused for things like flushing toilets and watering plant.

Water used for home purposes accounts for around 80% of the wastewater generated. Most of the time, wastewater is released into the environment untreated and either sinks into the earth as a possible groundwater pollutant or enters the natural drainage system, where it causes pollution in the regions downwind. The term "municipal sewage" is used to refer to any waste product that is created inside a community, and it may include both domestic wastewater and industrial discharges. It is a major contributor to water pollution in India, especially in and around the nation's largest cities. The creation of wastewater is rising along with the improvement in the availability of drinking water in metropolitan areas. Such wastewater will immediately contribute to the available freshwater body in the area if it is not adequately collected, processed, and disposed of (CPHEEO handbook 2012).

III. LITERATURE REVIEW

Sohil jain studied that This is an old age saying but ever new, and it is most befitting in context of river, lake or pond quality management. Due to rapid industrialization and intensive irrigation the flow in our streams is ever decreasing, which is posing more Stress on self purifying capacity of stream. It has been felt lately that the Lakha Banjara Lake which is a substantial lake in Bundel khand region is fast losing its importance because of the degradation in its water quality. Various physical and chemical tests are carried out on the samples of the two sources and quality index of each is studied. The main focus is to compare the quality of the two sources and point out the deterioration of water quality, changes in its properties and adverse effects on environment

Rahashyamani Mishra, Rajesh Kumar Prajapati, In order to evaluate the effects of human activities, the current research examines the water quality of Rani Lake in Rewa (M.P.), India. Over a two-year period (Jan. 2008 to Dec. 2009), water samples were taken each month from the lake's six sampling locations for the examination of different physico-chemical parameters. In contrast with the suggested guidelines, the outcomes showed more significant levels of electrical conductivity (422 mg/l), turbidity (33.9 mg/l), complete disintegrated solids (673.25 mg/l), absolute hardness (177.58 mg/l), alkalinity (217.16 mg/l), chlorides (81.52 mg/l), organic oxygen interest (17.47 mg/l), compound oxygen interest (54.74 mg/l), phosphate (2.35 mg/l), and nit The investigation found that the water was alkaline and hard and had a lower dissolved oxygen level than required. Water quality metrics varied according to the season. The findings have amply shown that sewage discharge and other human activities have caused this lake to become contaminated and eutrophic in character

IV. LOCATION OF TESTING SAMPLE

Udayeshwar Nilkantheshwar Temple, a Shiva temple in Udaipur, is one of the most significant sights close to Ganj Basoda (Madhya Pradesh). It is reported in two Hijri inscriptions from the years 737 and 739 that the mosque was established during the reign of Muhammad Tughlaq. It was likewise implicit Hijri 856 during the standard of Islam Shah Suri, and in Hijri 894 subject to the authority of Muhammad Shah Khaliji of Mandu. The UtraKin Devi Deities, whose bones are still on display at the Temple Pragnan, were in charge of the architectural Muslim governance of the main Nilkantheshwar Temple after its outside walls were destroyed.

There are three entrances to the main temple, which is located in the centre. On the day of Shivratri, the Shivalinga is placed in the sanctuary where only the rising sun's rays are allowed to enter. Shivaling, an 8-foot-tall sculpture made of bronze that is only ever hurled on Shivratri day, is located in the sanctum sanctorum of the main temple. Lord Shiva is being adored at the Archana temple. The Shivlinga in the Bhojpur Shiva temple, close to Bhopal, is comparable to the Shivlinga built at this shrine.

On the outside of the temple, there is an etched stone idol of a number of gods and goddesses, the majority of which feature different manifestations of Lord Shiva. Lord Shiva's Natraj Murthy is a prominent sculpting method that has been used to create statues like Mahatmasur Mardini, Kartikeya, etc. in the guise of a dancer. The woman is attractive, as well.

Gamakar Village, around 10 miles from Basoda Town, is home to another magnificent old Shiva Temple. It is a cave temple of natural origin. Each day, this temple receives hundreds of pilgrims. Every year during Maha Shivratri, a sizable fair is held. On this day, thousands of people come here. About 500-year-old Garhis, or little forts where Jagirdars formerly resided, may be found in the hamlet of Gamakar.

These Garhis are home to the Raghuwanshi community. The settlement and Basoda Town are well linked by road. For followers of Jainism and Buddhism, Pathari, which is situated 30 kilometres away from Basoda, is an ancient location with significant historical significance. Here in Pathari, you may see 10th–11th century temples (including the Jain 24 Thirtankars, the Gadrmal Temple, and the BHIM Gaja, which is around 50 feet tall of a single stone block). One may find a one-of-a-kind statue of Varah (Lord Vishnu's incarnation) in the town of Muradpur, which is 18 kilometres from Basoda and close to the village of Udaipur. One may travel the motorable road from Basoda to Udaipur, Muradpur, and Pathari (badoh) by using the following route. Ganj Basoda (0 km), Bareth (10 km), Udaipur (16 km), and Pathari (30 km). For Muradpur (3 km from Udaipur on branch route). In the centre of Basoda, you may go to the contemporary temple dedicated to Goddess Sheetala Mata. To avoid confusion with a similar-sounding city in the Indian state of Rajasthan, see Udaipur

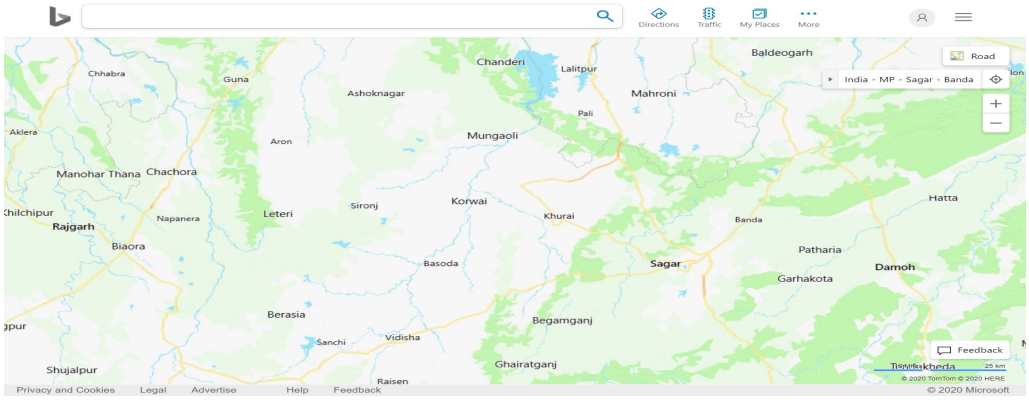

Fig 1 Location Plan of Experiment Work

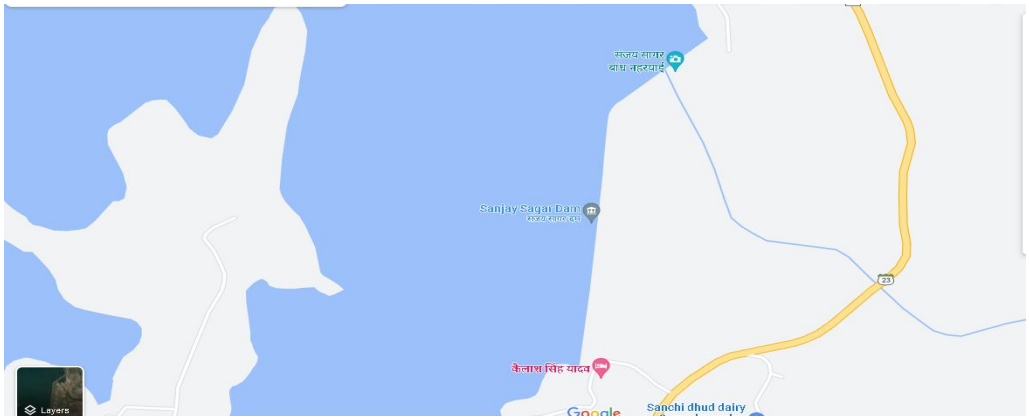

Fig 2 Location Map of Sanjay sagar Dam Vidisha

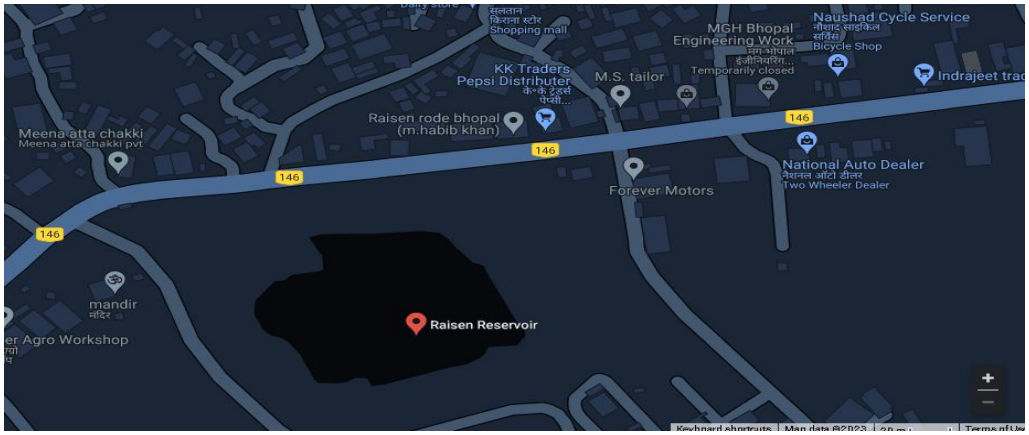

Fig 3 Location Map of Raisen Reservior

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Fig 4 Location map of Bewtwa River in Ganj Basoda

V. RESULTS

A. *pH*

Table 1 pH Values at different cities

DAY/PLACE	RAISEN	VIDISHA	GANJ BASODA
DAY 1	7.90	7.86	7.88
DAY 2	8.06	8.00	7.80
DAY 3	8.10	8.11	7.76
DAY 4	7.93	8.18	7.68
DAY 5	7.78	8.06	7.62

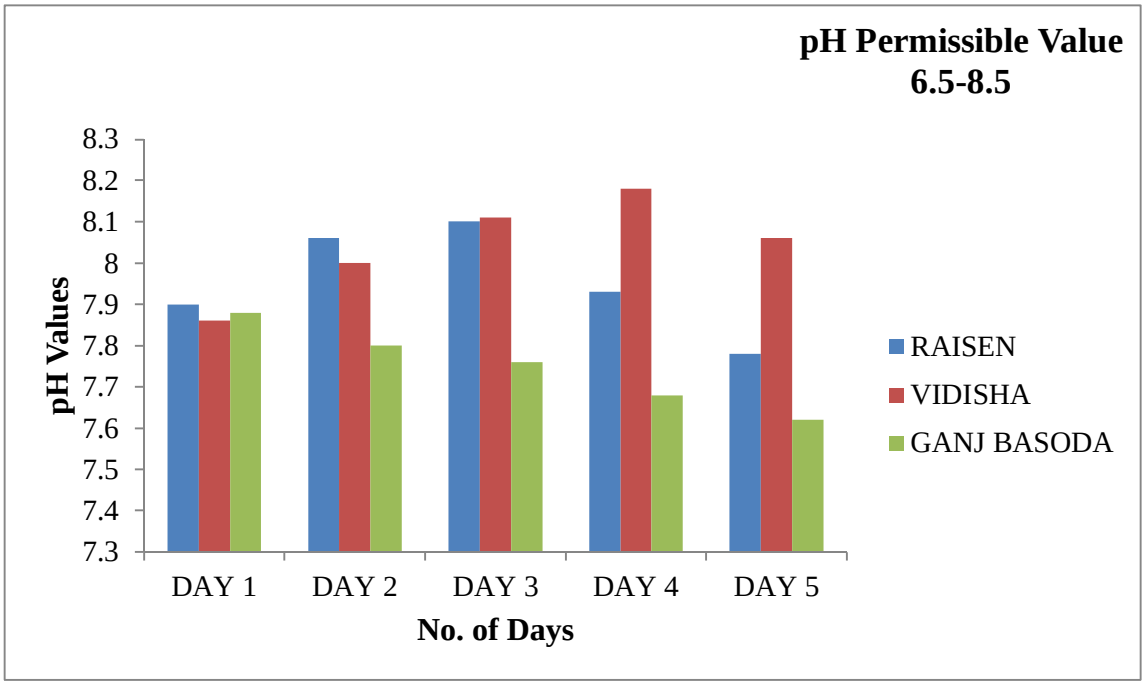

Fig 5 pH Value Vs No of Days

B. Conductivity

Table 2 Conductivity Values at different cities

DAY/PLACE	RAISEN	VIDISHA	GANJ BASODA
DAY 1	507.2	478.3	489.1
DAY 2	578.4	481.2	491.2
DAY 3	544.6	491.8	475.9
DAY 4	537.5	501.2	487.1
DAY 5	531.1	511.8	489.4

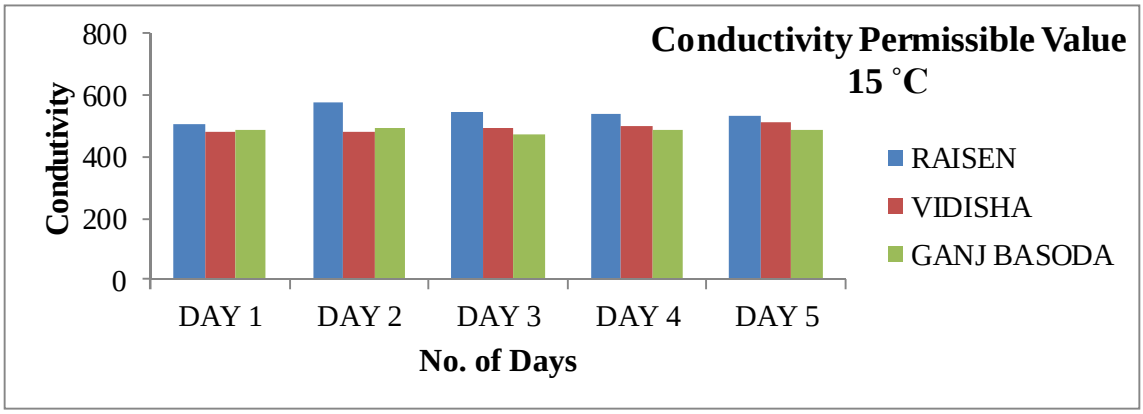

Fig 6 Conductivity Value Vs No of Days

DISSOLVED OXYGEN

Table 3 DISSOLVED OXYGEN Values at Different Cities

DAY/PLACE	RAISEN	VIDISHA	GANJ BASODA
DAY 1	3.2	4.1	2.9
DAY 2	3.1	4.9	3.2
DAY 3	3.6	5	3.3
DAY 4	3.7	4.6	2.8
DAY 5	3.9	4.0	2.7

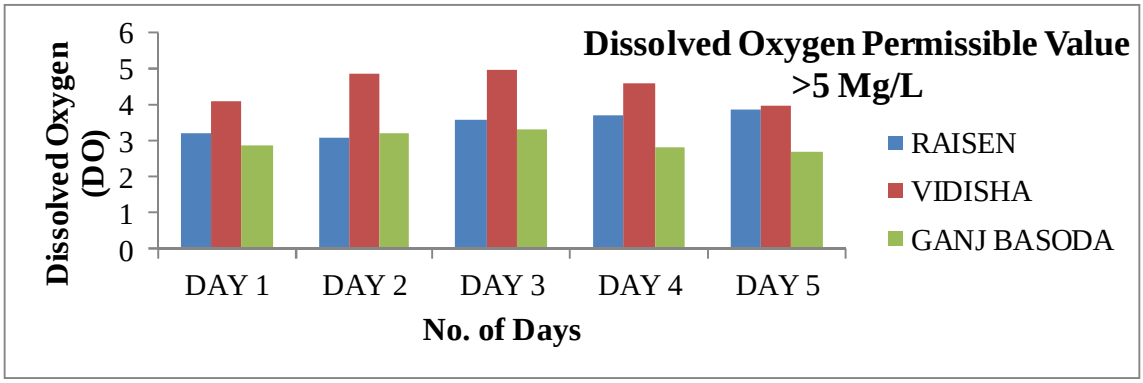

Fig 7 Dissolved Oxygen Value Vs No of Days

B.O.D

Table 4 B.O.D Values at Different Cities

DAY/PLACE	RAISEN	VIDISHA	GANJ BASODA
DAY 1	19.3	19.5	16.5
DAY 2	20.1	22.4	15.8
DAY 3	20.7	23.6	16.7
DAY 4	19.9	24.5	16.1
DAY 5	19.1	22.9	16.9

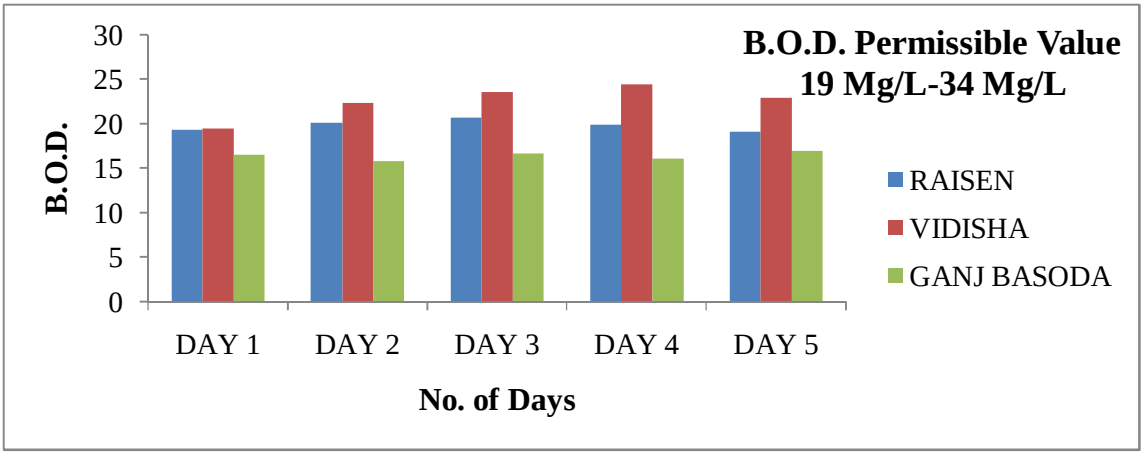

Fig 8 B.O.D Value Vs No of Days

C. C.O.D

Table 5 C.O.D Values at Different Cities

DAY/PLACE	RAISEN	VIDISHA	GANJ BASODA
DAY 1	124.2	116.4	232.8
DAY 2	126.5	118.1	231.5
DAY 3	128	119.7	230.1
DAY 4	131.1	120	232.1
DAY 5	131.5	121.4	233.5

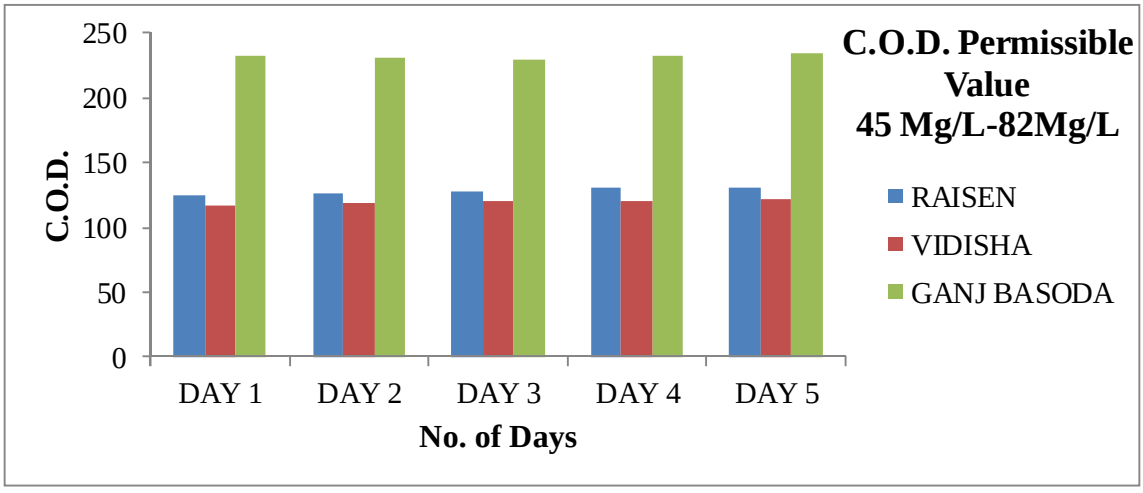

Fig 9 C.O.D Value Vs No of Days

D. Nitrite

Table 6 Nitrate Values at Different Cities

DAY/PLACE	RAISEN	VIDISHA	GANJ BASODA
DAY 1	0.19	0.13	0.23
DAY 2	0.21	0.11	0.25
DAY 3	0.23	0.15	0.27
DAY 4	0.25	0.17	0.28
DAY 5	0.24	0.19	0.26

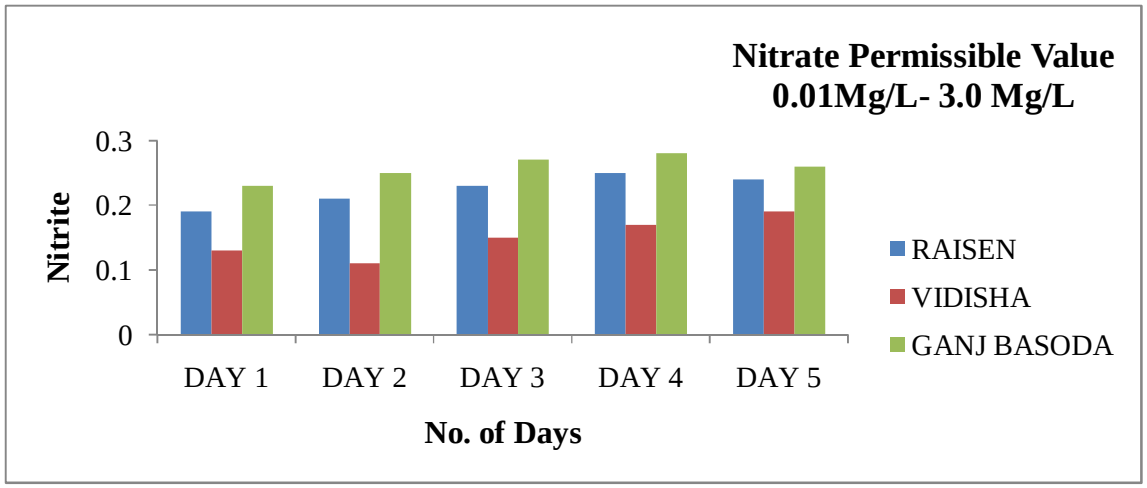

Fig 10 Nitrate Value Vs No of Days

E. Total Solids

Table 7 Total Solids Values at Different Cities

DAY/PLACE	RAISEN	VIDISHA	GANJ BASODA
DAY 1	506	442	780
DAY 2	511	449	783
DAY 3	513	456	789
DAY 4	521	459	791
DAY 5	527	461	801

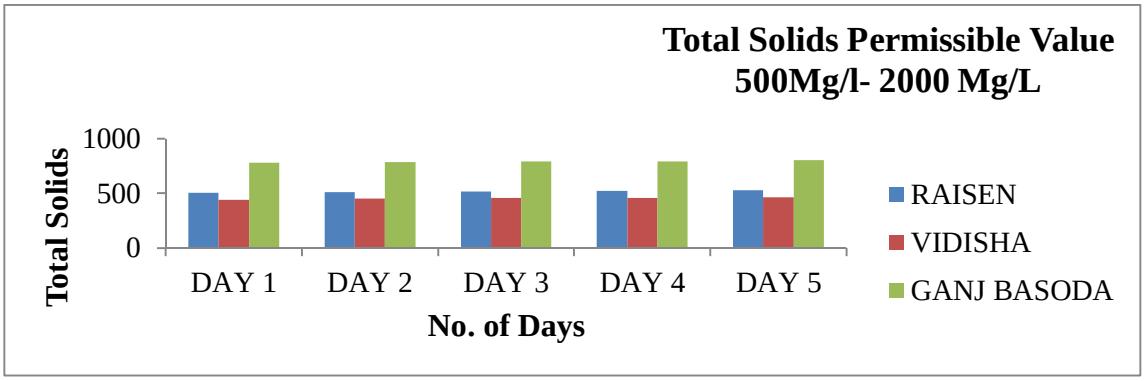

Fig 11 Total Solids Value Vs No of Days

F. Total Suspended Solids

Table 8 Total Suspended Solids Values at Different Cities

DAY/PLACE	RAISEN	VIDISHA	GANJ BASODA
DAY 1	428	370	570
DAY 2	435	375	576
DAY 3	439	383	583
DAY 4	444	391	589
DAY 5	456	401	594

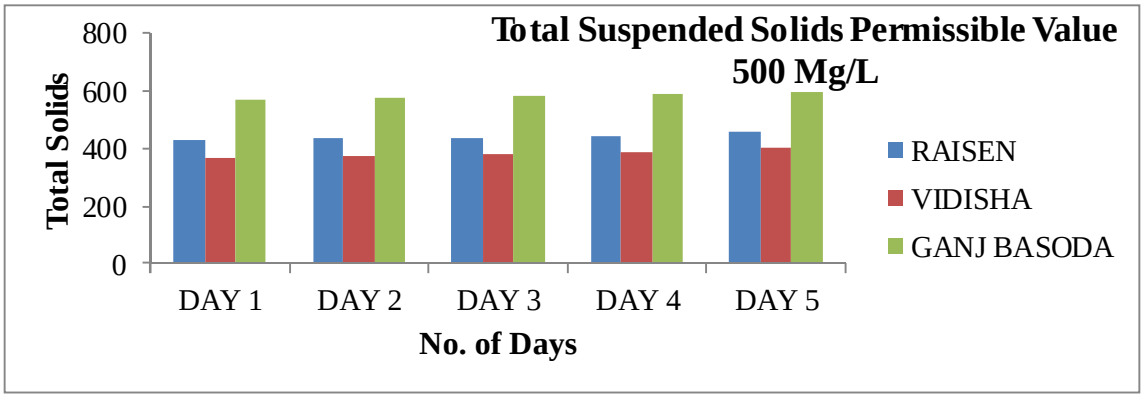

Fig 12 Total Suspended Solids Value Vs No of Days

G. Sulfhate

Table 9 Sulphate Values at Different Cities

DAY	RAISEN	VIDISHA	GANJ BASODA
DAY 1	16.9	16.5	19.9
DAY 2	16.8	16.3	19.2
DAY 3	17.1	16.8	20.1
DAY 4	16.7	16.5	19.5
DAY 5	16.5	16.3	19.2

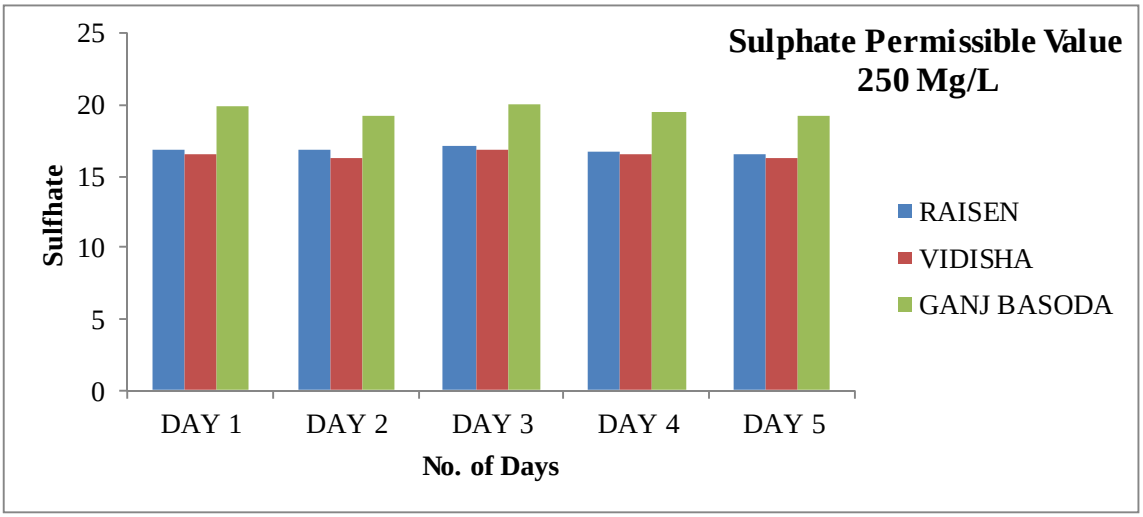

Fig 13 Sulphates Vs No of Days

VI. CONCLUSION

1) The data discovered that there were significant variations in physic-chemical parameters at different stations of Betwa River. The water eminence in the stretch of the river betwa extending from different cities like Raisen, Vidisha & Ganj Basoda area remains deprived because of the usual inflow.
2) From the current examination it is understandable that the water excellence of River Betwa has been despoiled qualitatively and the concentration of a number of constituents has passed the tolerable limits and this might create a huge risk to the all kinds of life directly or indirectly consequently steps have to be taken to shelter this marvelous gift of environment and the current study is a step towards the same. Study of various physico-chemical parameters exposed that the concentration of contamination increased as the river was subjected to sewage.
3) Therefore to decrease the contamination load of river Betwa it is suggested that the municipal waste, domestic sewage and industrial effluents should not be discharged into the river. As an alternative a central sewage arrangement must be provided and the industrial effluents should be treated appropriately before they are drained out. Further regular monitoring of drinking water sources must be made for signifying the corrective actions as and when necessary.
4) Result of the study indicated that BETWA RIVER is contaminated and not totally safe for consuming purpose. It requires proper monitoring and environment management plans to control the release of effluents.
5) It is suggested to arrange the proper drainage facility and avoid the dumping of waste in river as it deteriorates the water the quality. We should give awareness to people about the need for protecting the water river from pollution.
6) Legal should be taken against those who are responsible for the pollution of river water. Betwa River can be reused if proper treatment plant established and prevent the contamination source surrounding the water body.
7) pH values (7.9 to 8.6) of all sites were close to standard value (6.5-8.5) of water for drinking purpose, it was observed that the pH value of the water appears to be reliant upon the comparative quantities of calcium, carbonates and bicarbonates. When water possessed carbonates it tends to be more alkaline.
8) Total suspended solids indicate presence of various minerals in water; TSS is primarily on account of carbonates, bicarbonates, chlorides, sulphates, phosphate nitrate, calcium, potassium, Iron. TDS level experienced at all sites were within the acceptable limits. The allowable limit is 500mg/l but WHO advise 300mg/l. A high value (594 mg/litre) was observed at stream of Ganj Basoda.
9) Dissolved oxygen content is an indicator of organic contamination. It's valued lower than 4 mg/litre is not suitable for aquatic life. Dissolve oxygen at various site fluctuated from 3.4 to 6.5 mg/l. Dissolved oxygen values were very small at Raisen Stream and Ganj Basoda Stream but at Vidisha Stream DO Values rises, which is not good for health.
10) The high BOD value indicates additional organic waste available in the water source. BOD ranged from 19 to 34 mg/l. These values are higher than the normal limit for drinking water recommended by BIS. Values are under the recommendation value.
11) Chemical Oxygen Demand (COD) value ranged between 45-82 mg/l the upper limit value are observed which may assign to high concentration of organic matter source discharged from the adjoining areas. These ranged of value are more than the maximum allowable limit as per BIS recommended that water sample is further rigorously affected with organic contamination.
12) High conductivity is not necessarily a cause for concern due to its lack of direct health impacts.3 However, dissolved ion sable solids may cause frustrating water hardness or alkalinity and therefore impact consumer satisfaction.
13) Water with high levels of TS around 1000 ppm is considered unfit for human consumption. High levels of TS are caused due to the presence of potassium, chloride and sodium and toxic ions in larger amounts. It is also undesirable to drink as it may taste salty, metallic or bitter. But in Betwa River TS value is under 800ppm which will be used for drinking water.
14) Sulfate levels above 250 mg/L may make the water taste bitter or like medicine. High sulfate levels may also corrode plumbing, particularly copper piping. In areas with high sulfate levels, plumbing materials more resistant to corrosion, such as plastic pipe, are commonly used.

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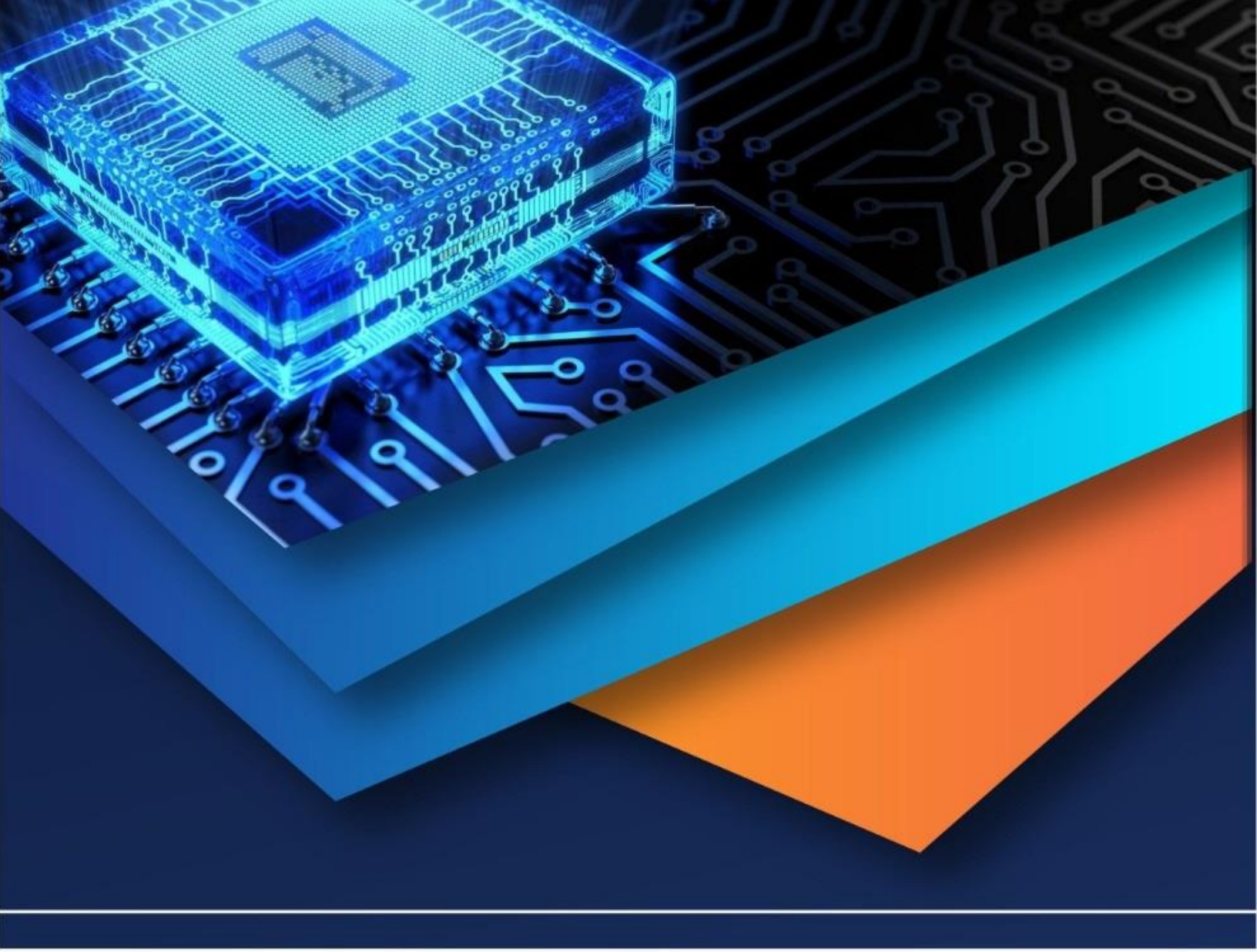

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