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WATER QUALITY ASSESSMENT IN A FRESHWATER BODY, BEEHAR AND BICHHIYA RIVER OF REWA (M.P.)

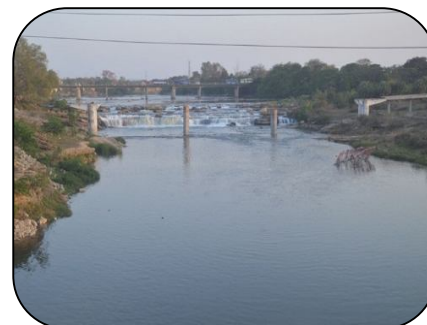
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ABSTRACT :-

Water should be safe and whole some form drinking purpose. Various national and international agencies have prescribed standards for various beneficial uses in terms of water quality parameter. The present study deals with the seasonal changes of physico-chemical parameters of water quality in Beehar and Bichhiya River Rewa. The study area is situated between 81^o-18 east longitude and 28^o-32 north latitude and is situated on Vindhya plateau at the height of 318 meter above m. s. The climate is mainly sub-tropical and sub humid. The average annual rainfall of the region is 82.953 mm and relative humidity is 79.36 %. Two water bodies namely Bichhiya and Beehar River were selected for study, because of their contribution to the development of fresh water culture fishery of Rewa district. The work was carried out for a period of one year from January 2020 to December 2020. During the present investigation some physico-chemical parameters were considered such as surface water temperature, turbidity, pH, dissolved oxygen, hardness, alkalinity, phosphate and nitrate contents. The unmanaged and unwanted activities of surrounding population of the area are deteriorating the river water quality continuously.



KEYWORDS : *Beehar and Bichhiya River, Zooplankton diversity and density.*

INTRODUCTION:-

Water is vital for sustaining life on Earth. Of all the matter on the Earth none is more basic than water. It is said that "Water is more precious than gold and more explosive than dynamite". Water is thus an essential depends on it. Water should be safe and wholesome for drinking purpose. Various national and international agencies have prescribed standards for various beneficial uses in terms of water quality.

Aquatic ecosystem is the most diverse ecosystem in the world. The first life originated in the water and first organisms were also aquatic where water was the principal external as well as internal medium for organism. Fishes are dependent on physico-chemical parameters. Any changes of these parameters may

affect the growth, development and maturity of fish. Different casual influences, which determine the quality of water, show a characteristic change from season to season.

Today, there are overarching concerns for surface water quality since being degraded by anthropogenic activities, such as urban, industrial, and agricultural developments accompanied by increasing water-resources exploitations and natural alterations caused by erosion, weathering, and precipitation processes of crustal materials (Alberto et al. 2001; Kazi et al. 2009; Strobl and Robillard 2008). Prevention and control of water pollution, as well as gaining reliable information about the water quality of rivers, reservoirs, and lakes as the main resources of inland water supply are necessary for irrigation, domestic, and industrial uses (Varol et al. 2012).

Surface water bodies are contaminated with many anthropogenic toxic chemicals that can affect their natural communities. It is necessary to assess the effects of these chemicals in order to conserve aquatic ecosystems. Among the anthropogenic chemicals, pesticides may cause the most serious problems because they are designed specially to kill organisms (both the noxious target organisms and other non-target ones) and they are released into the natural environment intentionally. It has been widely documented that pesticide concentrations in the natural environment are often high enough to kill certain organisms (Hatakeyama et al., 1991, 1994)

and affect the structure and function of natural communities (Helgen et al., 1988; Hatakeyama et al., 1990).

“A criterion designates a means by which anything is tried informing a correct judgment concerning it”. It seems obvious that progress toward improving man’s health and welfare could result only from better control over his environment. The provision of better quality water was one logical step in direction.

AIMS AND OBJECTIVE OF STUDY:-

The objective of the present study is based to investigate on “Water Quality Assessment A Fresh Water Body Beehar and Bichhiya river Rewa (M.P.)”. The study has been conducted to fulfil the following aspects.

1. The general survey of the Beehar and Bichhiya river and its climatic conditions.
2. Water Quality Assessment of River water will be recorded.

REVIEW OF LITERATURE:-

The quality of surface water plays a significant role in the development of aquatic flora and Fauna. Many Hydro geochemical models (Ghalib, Yaqub & Al-Abadi, 2019) and water quality index method were used to assess the status of water quality. Water quality index is a single numerical value used for determining the quality of water for human consumption (Asadi, Vuppala & Anji, 2007; Hoseinzadeh, Khorsandi, Wei & Alipour, 2014).

The surface water being exposed to anthropogenic influences and atmospheric deposition of pollutants becomes a very sensitive and critical issue in many countries (Sener et al. 2017; Kumar and Singh 2018). Anthropogenic influences, geochemical factors, chemical composition of river basin (Giridharan et al. 2010) and natural processes like interaction of water with lithogenic structure through which the river flows (Subramani et al. 2009; Sener et al. 2017) degrade surface water quality making it unsuitable for drinking, industry, agriculture and other purposes (Simeonov et al. 2003; Sánchez et al. 2007; Kazi et al. 2009).

According to Yaseen et al., (2020), Dams that break the river continuum play an important role in promoting economic and social development as well as providing important services such as flood control, agricultural expansion, domestic use and generation of electricity here ecologists have provided their valuable suggestion regarding such the study which are not cited here but, considered for the presentation

of further study. After having studies on various literatures of river, ponds, springs and anthropogenic dams it becomes essential to have a long course study of all these natural resources which are being affected by human activities. Thus, present study is intended to bridge the gap.

MATERIAL AND METHODS:-

Samples were collected regularly at monthly intervals by using plankton net and preserved in 5% formalin during Jan.2020 to Dec.2020 for water quality following the standard method (APHA,1999). The physico-chemical parameters of water quality samples were collected separately from fixed from five sampling sites (A, B, C, D and E) of the river to study the seasonal variations. Water samples were collected monthly in the morning at 8 am to 10 am from surface layer of the river. Physico-chemical parameters analysis of water samples were made following standard methods suggested by APHA, AWWA, WPCI (2005).

STUDY AREA

The study area is situated between 81^o-18' east longitude and 28^o-32' north latitude and is situated on Vindhya plateau at the height of 318 meter above m. s. l. The climate is mainly sub-tropical and sub humid. The average annual rainfall of the region is 82.953 mm and relative humidity is 79.36 %. Two water bodies namely Bichhiya and Beehar River were selected for study, because of their contribution to the development of fresh water culture fishery of Rewa district.

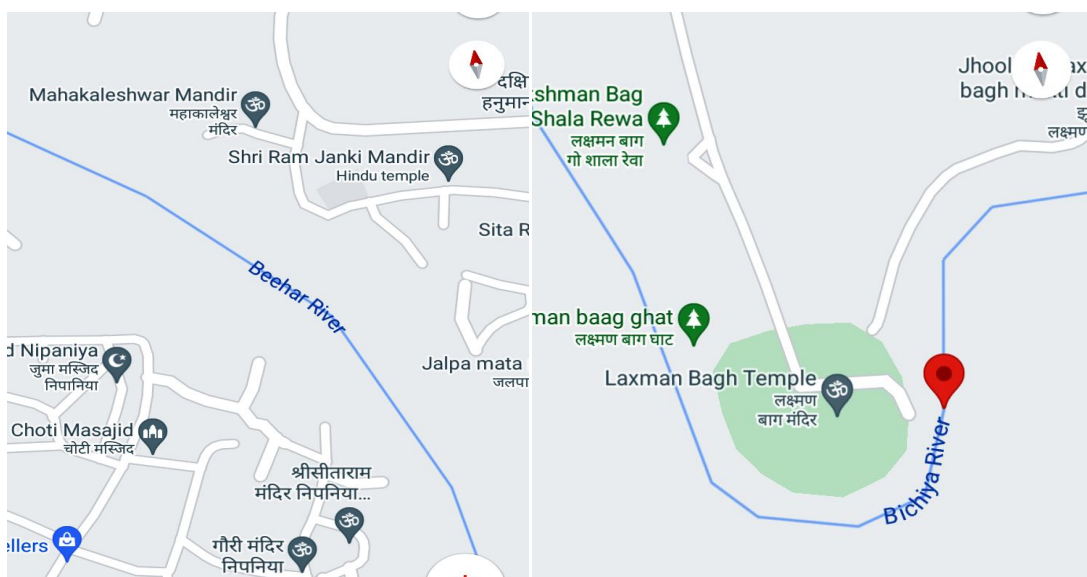


Fig. 1. Location map of Beehar and Bichhiya River Rewa M.P.

RESULT AND DISCUSSION :-

Rivers are the most important sources of water to global population. Rivers provide water for industry, agriculture, commercial, aquaculture and domestic purposes. Unfortunately this important source of water is being polluted by indiscriminate disposal of sewage, industrial wastes and plethora of human activities. The significant role played by river in almost in every development program of country hardly needs many elaborations. Peoples living along bank of these rivers largely depends on them for their water needs for everyday for living.

It is necessary and important for us to test the water before using it as a drinking, domestic and irrigation purposes or industrial purpose. Water quality must be analyzed for various physico-chemical and bacteriological parameters. Heavy metals will also be analyzed as these are harmful for the aquatic life present in the lake water. Selection of parameters is mainly depends upon the purpose we are going to use the water and up to which extent of quality and quantity we needed. Most of the water streams contain dissolved, suspended, floating and bacteriological impurities. Some physical tests are performed to check pH, turbidity, temperature, colour, odour etc. while some chemical tests are performed to check BOD, COD, DO, alkalinity, hardness etc. Once all

these parameters will analysed then we should come to know about the purity of water and up to which extent we can make the use of it. All these parameters are strictly monitored in the developed countries. It is one of the major sources of water supply to a considerable part of the city. Water from lake is used by the residents of Rewa city majorly for drinking purpose here considerable good quality of water is required to make it safe and potable. There may be various sources of contamination to the lake that may result in increased concentration of various physico-chemical parameters of concentration. As a result various waterborne diseases is labeled to attack the health of the people therefore analysis of various parameters required.

Water temperature (°C):-

During the present study period water temperature ranged from $19.6 \pm 0.15^\circ\text{C}$ to $31.54 \pm 0.12^\circ\text{C}$ (Jayabhaye et al; (2006), Salve and Hiware (2006), observed that during summer, water temperature was high due to low water level and clear atmosphere. Similar results were obtained in the present study (Graph No.1).

pH:-

The pH values ranges from 7.14 ± 0.06 to 8.1 ± 0.08 . The maximum value was recorded from June and Minimum in the month of January. pH was alkaline throughout study period (Graph No.2).

Dissolved Oxygen (mg/l):-

The value of DO fluctuate from 7.34 ± 0.19 mg/l to 9.20 ± 0.20 mg/l. The maximum values were recorded in the month of April (Summer) and minimum value in the month of December (winter) (Graph No.3). The high DO in summer is attributed to increase in temperature and duration of bright sunlight. The long days and intense sunlight during summer seems to accelerate photosynthesis by phytoplankton's, utilizing CO_2 and giving off oxygen. This accounts for the greater quality of O_2 recorded during summer. The quantity is slightly less during winter as reported by Masood Ahmed and Krishnamurthy (1990).

Hardness (mg/l)

The value of hardness fluctuates from 164.2 ± 2.39 mg/l to 258 ± 1.58 mg/l. The maximum value was recorded in the month of June (summer) and minimum in the month of December (winter) (Graph No.3).

Alkalinity (mg/l):-

Total alkalinity ranges from 178 ± 1.88 mg/l to 212.2 ± 2.40 mg/l. The maximum value was recorded in the month of July (monsoon) and minimum value in the month of December (winter) (Graph No.3).

Phosphate (mg/l):-

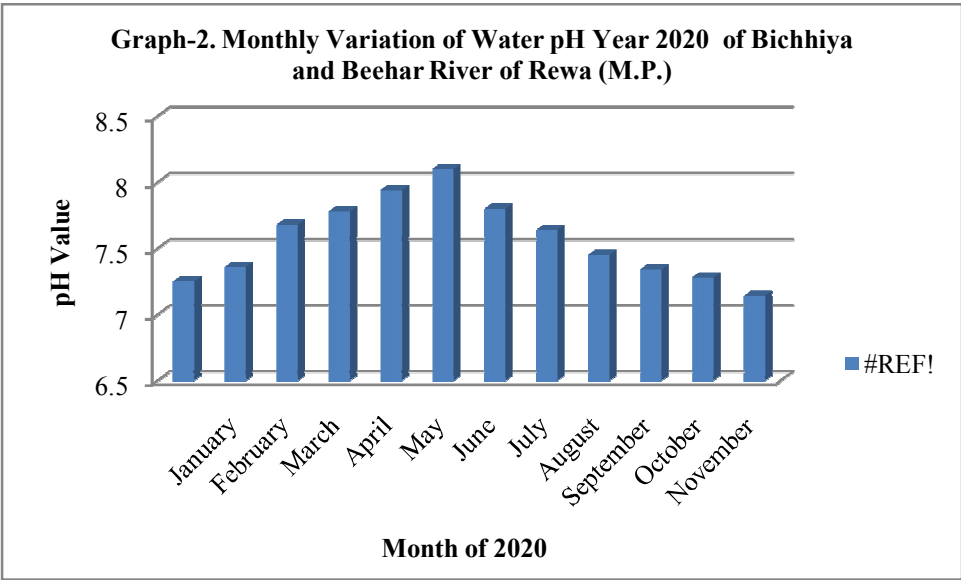
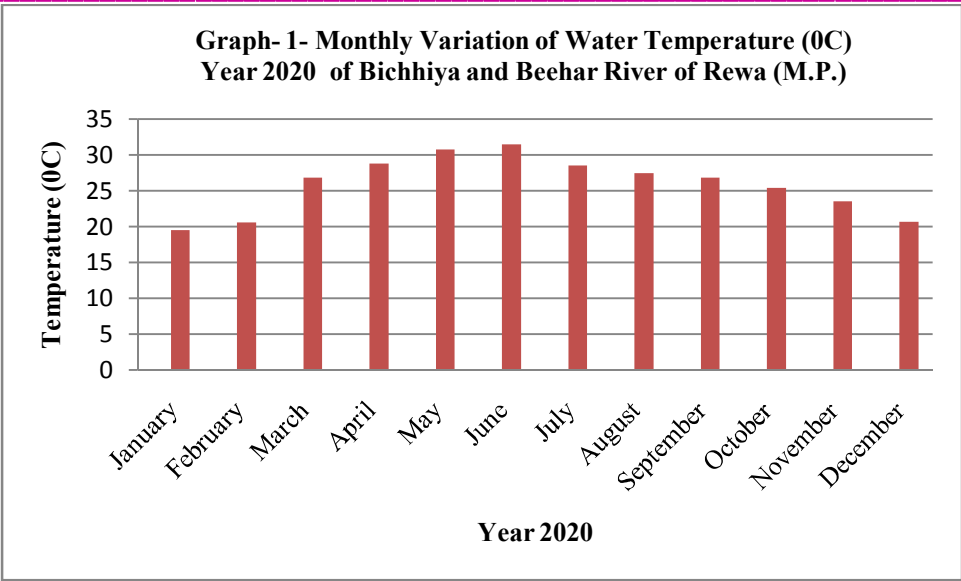
The value of phosphate ranged from 0.19±0.02 mg/l to 0.34±0.01 mg/l. The maximum value was recorded in the month of August (monsoon) and minimum values in the month of April (summer)(Graph No.3). The high values of phosphate in August (monsoon) months are mainly due to rain, surface run-off, agricultural run-off; washing activities that contributed to the inorganic phosphate content. Similar results were reported by Arvind Kumar ((1995).

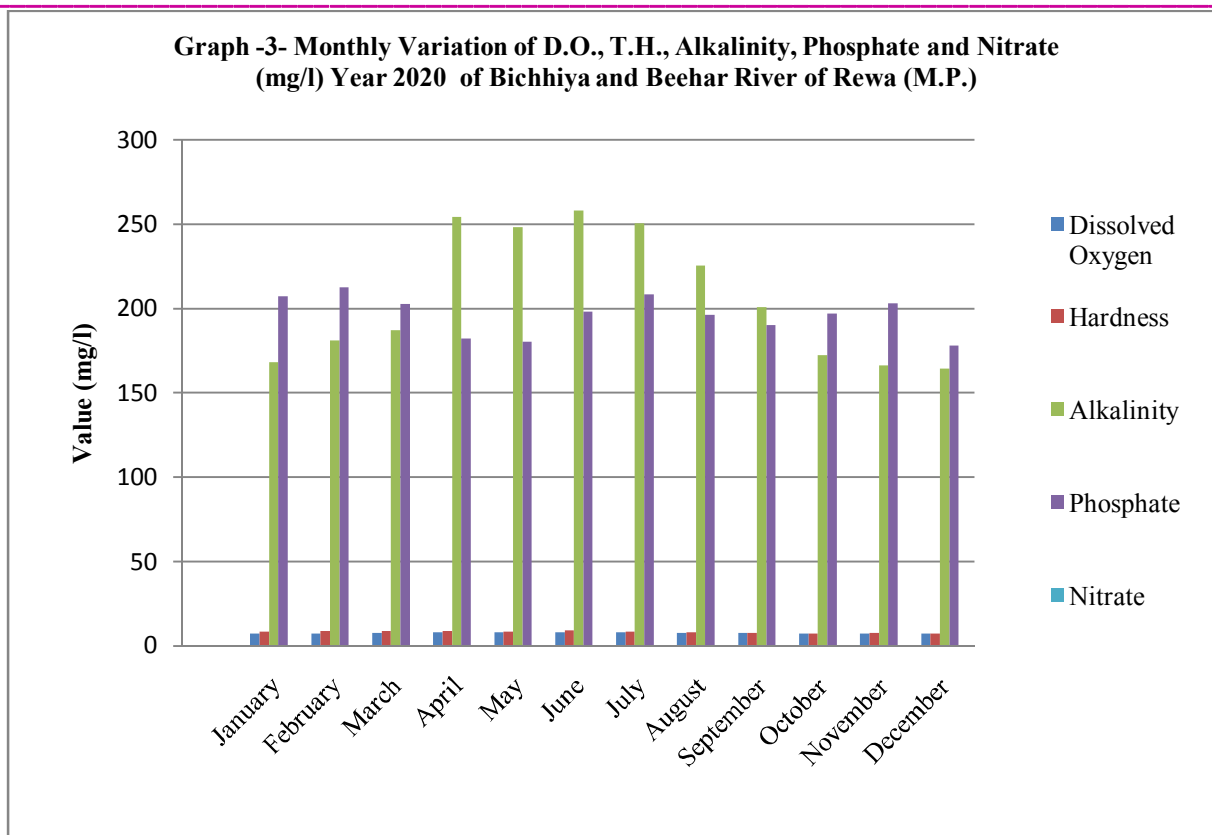
Nitrate (mg/l):-

The value of nitrate ranges from 0.31 ±0.02 mg/l to 0.47 ±0.04 mg/l. The maximum value was recorded in the month of August (monsoon) and minimum in the month of January (winter)(Graph No.3). *Swaranlatha and Narsingrao (1998)* reported that nitrates are in low concentration in summer and high during monsoon which might be due to surface run-off and rain. Similar results were obtained in the present study.

Table No. 1- Monthly Variation of Physico-chemical parameters of water samples of Bichhiya and Beehar River water of Rewa (M.P.) During the Period of 2020.

Months 2020	Temp °C	pH	Dissolved Oxygen(mg/l)	Hardness (mg/l)	Alkalinity (mg/l)	Phosphate (mg/l)	Nitrate (mg/l)	
January	19.5±0.15	7.25±0.10	8.50±0.34	168.2±1.4	207±1.60	0.37±0.03	0.31±0.02	
February	20.62±0.14	7.36±0.17	8.68±0.28	180.8±1.3	212.2±2.40	0.30±0.02	0.47±0.04	
March	26.88±0.13	7.68±0.22	8.76±0.24	187±1.68	202.6±2.08	0.26±0.02	0.42±0.03	
April	28.84±0.10	7.78±0.23	8.60±0.16	254±1.59	182.1±2.24	0.19±0.02	0.44±0.03	
May	30.76±0.18	7.94±0.20	8.50±0.15	248±1.57	180.1±2.07	0.23±0.02	0.39±0.02	
June	31.54±0.12	8.10±0.08	9.20±0.20	258±1.58	198±1.58	0.22±0.02	0.34±0.02	
July	28.56±0.11	7.80±0.12	8.5±0.16	250.4±1.34	208.4±2.07	0.24±0.02	0.47±0.04	
August	27.48±0.16	7.64±0.17	7.8±0.28	225.2±2.77	196±2.26	0.34±0.03	0.32±0.02	
September	26.86±0.11	7.45±0.08	7.5±0.20	200.6±1.14	190±1.54	0.27±0.02	0.33±0.02	
October	25.4±0.16	7.34±0.12	7.36±0.11	172±3.16	196.8±1.92	0.294±0.02	0.32±0.02	
November	23.5±0.15	7.28±0.11	7.50±0.29	166±3.16	202.8±1.93	0.32±0.02	0.33±0.02	
December	20.64±0.11	7.14±0.06	7.34±0.19	164.2±2.39	178±1.88	0.28±0.02	0.36±0.02	
Range	Min	19.6±0.15	7.14±0.06	7.34±0.19	164.2±2.39	178±1.88	0.19±0.02	0.31±0.02
	Max	31.54±0.12	8.10±0.08	9.20±0.20	258±1.58	212.2±2.40	0.34±0.03	0.47±0.04





CONCLUSION:-

This study provides an informative data and helps to understand water characteristics and indicate that the water of Bichhiya and Beehar River. The unmanaged and unwanted activities of surrounding population of the area are deteriorating the dam water quality continuously. Due to the increase in environmental temperature and accumulation of sewage these are two main factors which are responsible for creation and problem of eutrophic condition of river. Identification of these common patterns is helpful for predicting the ecological risks of environmental problems created by human activities, and is thus an important research topic in both ecotoxicology and fundamental ecology. Accordingly, more emphasis needs to be placed on ecological analysis in future ecotoxicology research.

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