

# Study of Physical Parameters in Bichhiya River and Govindgarh Lake of District Rewa (M. P.) India

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**Abstract-** All life on earth depends on water. Fresh water is a critical, finite, vulnerable, renewable natural resource on the earth and plays an important role in our living environment without it life is impossible. In this study we are analyzed to seasonal variation in physical parameters like Temperature, Transparency, Current speed and pH in Bichhiya River and Govindgarh Lake of Rewa (M. P.) in all months of year 2009 and 2010.

**Index Terms-** Bichhiya River, Govindgarh Lake and Physical parameters.

## I. INTRODUCTION

Water is one of the abundantly available substances in nature. It is an important and life sustaining drink to human and is essential for the survival of all the organisms. Living organisms require large quantities of water for their sustenance. The enormous quantity of water covers most of the globe and riddles the continents with lakes and rivers, water is the medium, participant in all of the chemical reactions occurring in the environment, including the life processes. Indeed water is an important condition of life. Water is essential for all socioeconomic development and for maintaining healthy ecosystems. Natural surface water bodies like rivers and streams are subjected to pollution comprising of organic and inorganic constituent. [1]

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 programme 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.

Lakes play an important role in the development programmes of country. They can serve as sources of drinking and for industries for agriculture, power development and fisheries. Unfortunately domestic wastes from human settlement and industrial effluents pollute majorities of our lakes and river system. Water pollution severely affected aquatic life. Massive fish killing and distraction of other aquatic life due to industrial pollutants have become a common feature in many lakes and rivers of country. [2]

The physical parameters (temperature, transparency) of water have significant influence on aquatic life. They determine the type of organisms that can live there. In this reference the physical parameters of Bichhiya River and Govindgarh Lake such as Water Temperature, Transparency, Current speed and pH were seasonally determined. [3]

The present study aims at acquiring the first hand knowledge of the water quality of Bichhiya River and Govindgarh Lake in order to assess its production potential.

## II. MATERIALS AND METHODS

### Study sites

The study area is situated between 81°-18' east longitude and 28°-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 River and Govindgarh Lake were selected for study, because of their contribution to the development of fresh water culture fishery of Rewa district. The Govindgarh Lake is located 24°-20' 25'' longitude and 81°-15' 20'' latitude of Rewa district while Bichhiya River is located on 24°-10' N and 81°-15' longitude east of Rewa town.

### Sampling Station

Four sampling stations were selected for physical analysis of river. They are-

**Station 1<sup>st</sup>** - The 1<sup>st</sup> station was Gurh where the river Bichhiya originated. It is about 27k.m. away from Rewa town.

**Station 2<sup>nd</sup>** - The 2<sup>nd</sup> station was established at Laxman Bag Mandir 6 km away from Rewa District.

**Station 3<sup>rd</sup>** - The 3<sup>rd</sup> station was established before Rajghat the characteristics of the station is PHE Deptt. Pumping.

**Station 4<sup>th</sup>** - The 4<sup>th</sup> station was marked on Chhotipul which is half km from Old Rewa Bus Stand.

The four sampling stations were selected after preliminary observation of Lake for the purpose of present study. The four sampling sites for present investigation as A, B, C and D water sample were collected from all these four stations,

**1<sup>st</sup> Sampling station A** - Fort - This is a point located east of the lake.

**2<sup>nd</sup> Sampling station B** - Corner of Lake

**3<sup>rd</sup> Sampling station C** - Gopal Bag - This site is situated at centre of the lake.

**4<sup>th</sup> Sampling station D** - Fish form

### Physical conditions of water

### Temperature

Temperature recorded by an Alcoholic Thermometer calibrated to a fifth of a degree both air and water temperature (surface and bottom) were recorded once in a month (on 15<sup>th</sup>) at different spot of experimental station.

### Transparency

Transparency of water was measured with sacchi's disc.

### Current Speed

With the help of a float and stop-clock the speed of current was estimated. The distance covered by the float in ten second was measured and converted into a scale of cm/sec.

### pH of water

The hydrogen ion concentration was measured by colorimetric method using a pH comparator, a comparator disc and bromothymol blue was found suitable as the indicator for the entire period of pH observation.

conversely, when turbidity is the result of living organisms, measurements of transparency become indices of productivity.

In this study the transparency ranged between, in the Bichhiya river is, **S<sub>1</sub>** 32.5cm to 115.1 cm, **S<sub>2</sub>** 33.0 cm to 117.0 cm, **S<sub>3</sub>** 33.2 cm to 116.2 cm, and **S<sub>4</sub>** 33.5 cm to 115.0 cm. In Govindgarh lake water greatly varied with the season and space. During present observation the transparency ranged between 22.0 cm to 107 cm (Table 1 and 2). The decrease in transparency may be due to increases the suspended matters.

Transparency followed indirect relationship with that of nutrients. Lowest transparency during summer and rainy seasons and gradually increasing from late monsoon on words with fluctuation and attaining the highest in winter, these data coincided with observations of Vyas *et al.* (1968). [5]

### Speed of water current

The speed of water current is important, not only directly but indirectly as it influences the type of water bed, the amount of silt deposition. Several authors, among them Mishra *et al.* (1978) [6] have quoted the relation between the current and the nature of water bed, which gives a general indication but in practice of course the current is not uniform in river as well as all over the lake bed not it is invariable.

In the present study the current speed ranged in Bichhiya river between 15 cm/sec to 46.2 cm/Sec. The minimum value was recorded in river during rainy season and maximum in March. All these data was based on wind flow, which travel across the water surface of the river as well as lake. The Govindgarh Lake ranged between 5 cm/sec to 35.2 cm/sec., **A** 5 cm/sec. to 34.5 cm/sec., **B** 5.2 cm/sec to 35.1 cm/sec, **C** 5.1 cm/sec to 35 cm/sec, **D** 5.4 cm/sec to 35.1 cm/sec.

## III. RESULTS AND DISCUSSION

Water is an incredibly important aspect of our daily life. Every day we drink water, cook with water, bath in water and participate in many activities involving water. It is essential for all dimensions of life. Table 1 and 2 shows the range of different physical parameters.

### Temperature

All metabolic and physiological activities of aquatic life are greatly influenced by water temperature. Thus temperature is perhaps the most common and important ecological factor. In the present studies the surface water temperature of Bichhiya River ranged between at station Gurh 16.7°C to 30.1°C at station Laxaman Bag 17°C to 30.2°C at station Pumping Station 17.2°C to 30.5°C at station Chhotipul 16.5°C to 30.6°C and Govindgarh Lake temperature ranged upto **A** 17.2°C to 31.2°C, **B** 17.5°C to 32.5°C, **C** 17.7°C to 31.3°C & **D** 16.9°C to 28.1°C (Table 1 and 2). Allen (1920) [4] stated that temperature is the determining factor for the seasonal distribution of Flora and fauna.

### pH

pH is major of the acid base equilibrium achieved by pH is a vital environmental factor for all aquatic media. The pH value of water during the present study remains alkaline interaction with ranged of 7.20 to 9.00 at all the sampling stations. During the year of observation in the river the pH value varied from min. 7.21 to max. 7.92 at station first, **S<sub>2</sub>** min. 7.23 - max. 7.96, **S<sub>3</sub>** min. 7.24 - max. 9.00, **S<sub>4</sub>** min. 7.20- max. 8.92 and in lake it varied from **A** min. 7.2 - max. 8.4, **B** min. 7.2 - max. 8.2, **C** min.7.3 - max 8.3, **D** min. 7.2 - max. 9. The least in river of pH 7.2 was recorded in the season of Rainy 2010 at stations **S<sub>4</sub>**. In lake the valued pH 7.2 was recorded in the season of rainy at station **A, D**.

Raina *et al.* (1984) [7] have reported PH values of river Jhelam to range from 7.45 to 8.20 and have stated that PH values are within the acceptable range and no problems are likely to be encountered by using water for various purposes.

### Transparency

Light penetration depends upon the available intensity of the incident light, which varies with the geographical location of the river and the lake. Penetration of light is limited by the suspended materials, restricting the photo synthetic zone where ever aquatic habitats have appreciable depth when turbidity is caused by clay and silt particles, it becomes a limiting factor,

**Table 1- Physical Parameters of Bichhiya River (Oct. 2009 to Sep. 2010)**

Station No.	Temperature (in °C)		Transparency (in cm)		Speed current (in cm/sec)		pH	
	Min	Max	Min	Max	Min	Max	Min	Max
S1	16.7	30.1	32.5	115.1	15.2	44.1	7.21	7.92

S2	17.0	30.2	33.0	117.2	15.4	46.2	7.23	7.96
S3	17.2	30.5	33.2	116.2	15.5	44.8	7.24	9.00
S4	16.5	30.6	33.5	115.0	15.0	45.1	7.20	8.92

**Table 2- Physical Parameters of Govindgarh Lake (Oct. 2009 to Sep. 2010)**

Station No.	Temperature (in °C)		Transparency (in cm)		Speed current (in cm/sec)		pH	
	Min	Max	Min	Max	Min	Max	Min	Max
A	17.2	31.2	22.0	105.0	5.0	34.5	7.2	8.4
B	17.5	32.5	23.2	107.0	5.2	35.1	7.2	8.2
C	17.7	31.3	23.1	106.0	5.1	35.0	7.3	8.3
D	16.9	32.0	23.0	105.0	5.4	35.2	7.2	9.0

#### IV. CONCLUSION

This study provides an informative data and helps to understand water characteristics and indicate that the water of Bichhiya River and Govindgarh Lake can serve as a good habitat. All the parameters are quite suitable for growth of Fish. Finally, it is concluded that the water of Bichhiya River and Govindgarh Lake are quite suitable for human consumptions.

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