

# RATE OF DETERIORATION OF WATER QUALITY OF RIVER KARAMNASA AND ITS IMPACT ON PRIMARY PRODUCTIVITY AT BUXAR, BIHAR

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## ABSTRACT

*Water quality of a water body is characterized by its physico-chemical and biological features. All these features reflect on the pristine nature of the river. Due to unplanned urbanization, rapid growth of industrialization and other anthropogenic activities such as dispersal of dead bodies, discharge of industrial and sewage wastes, the quality of a river body is deteriorated day by day.*

*The present study is an attempt to demonstrate the rate of deterioration of the water quality of river Karamnasa at Buxar, Bihar and its effects on the primary productivity of the river. For this, various physico-chemical parameters i.e. temperature, transparency, pH, DO, free CO<sub>2</sub>, BOD, COD and total alkalinity were studied fortnightly for one year from January 2017–December 2017 and noticed the changes on these parameters due to urbanization, ricemill discharge, agricultural runoff and other anthropogenic activities. The result conclude that all such parameters are well within the limit and hence the water quality of this river is not deteriorated. Water quality of this river is also suitable of growth of phytoplanktons luxuriously.*

**Keyword:** Water quality, Anthropogenic activities, Physico-chemical parameters, phytoplanktons, Karamnasa river, Buxar, Bihar

## 1. INTRODUCTION

Water is a priceless gift of nature and takes the first priority of life on earth, which serves as a basic fundamental necessity for all living creatures. The water of river plays an important role in development of country. The river serves as a source of water supply to meet our domestic, industrial, agricultural, fisheries and power generation needs. But, pollutants from domestic disposal, Agricultural runoff, industrial wastes, washing, bathing and cattle wallowing leads to water pollution which affects its physical, chemical and biological values beyond desirable limits.

The study of water quality of river in India is well documented by Sanju and Sharma (1975), Janson and Ronald (1996), Rathore et al. (2006), Yadav et al. (2008), Srivastava et al. (2009), Sharma and Kansal (2011) and many others. They told that natural water body remains usually rich in turbidity, suspended impurities and receives significant microbial load through domestic

sewage, animal and human excreta and industrial wastes which affect the aquatic life (Gonsalvas et al., 2000)

Therefore, in the present paper and assessment of physico-chemical quality of water of river Karamnasa was done at selected site to assess its pollution status and suitability for primary productivity to find out the rate of deterioration of water quality of river Karamnasa.

## 2. MATERIAL AND METHOD

River karamnasa is a tributary of the river Ganga. It originates in the Kaimur district of Bihar and flows through the Indian states of the Uttar Pradesh and Bihar along the boundary between U.P. and Bihar. It covers the districts of Sonbhadra, Chandauli, Varanasi and Gazipur on its left (U.P.) side and the districts of Kaimur and Buxar on the right (Bihar) side. The Karamnasa originates at a height of 350 meters on the northern face of Kaimur range near Sarodag in the Kaimur district of Bihar. It flows in a north-western direction

through the plains of Mirzapur, then forms the boundary between U.P. and Bihar and finally joins the river Ganga near Chausa at Buxar, Bihar. The length of river Karamnasa is approx. 192 km, out of which 116 km lies in U.P. and rest 76 km forms the boundary between U.P. and Bihar. The total drainage area of river Karamnasa along its tributaries is 4521sq. miles

The samples of water were collected from the different sites for twelve months and physico-chemical parameters were analysed as per standard methods of APHA (2005).

### 3.RESULT AND DISCUSSION

The result as presented in the table shows a annual variation in physico-chemical parameters. The range of average temperature of water was recorded from 19.8 to 32.8°C. the minimum temperature was recorded in the month of February while maximum temperature was in the month of July. The turbidity was ranged from 12.2 to 84.4. Maximum turbidity was recorded in April. There was very minor annual variation in pH value of water and ranged from 7.2 to 8.1. The DO content showed a range of 5.4 mg/l to 8.6 mg/l. the minimum DO content was recorded in the month of July. The range of free CO<sub>2</sub> was recorded from 0.0 mg/l to 7.8 mg/l. Bicarbonate alkalinity was observed throughout the year and the values recorded varied from 99.2 mg/l to 152.4 mg/l. The nitrate content ranged from 0.035 mg/l to 0.362 mg/l. The phosphate content were ranged from 0.09 mg/l to 0.44 mg/l. Carbonate values was

recorded from 0.0 mg/l to 12.8 mg/l. The BOD values as presented in the table varied between 2.0 mg/l to 6.4 mg/l. the maximum value of BOD was recorded in the month of June. The COD values was varied from 5.6 mg/l to 12.4 mg/l. The minimum value of COD was recorded in January and maximum value was recorded in June.

The different physico-chemical features of river Karamnasa were found to be within the permissible limits. As per standard findings, the desirable pH of drinking water is 7.0 to 8.5 (WHO,1984), for aquatic life 6.5 to 9.0 (USEPA,1975), for irrigation purpose 5.5 to 9.0 and for domestic uses, it is 7.0 to 9.0 (ICMR,1975). In the present study the average pH value is within the limit. The permissible DO content for living organism as per European Economic Community is 5.0 mg/l to 8.2 mg/l and according to WHO the desirable nitrate concentration in drinking water should be 45.0 mg/l. Both these parameters were found within the prescribed standard limits in the present investigation.

### 4.CONCLUSION

The values of different parameters in the present paper suggests that the sites of investigation which stretches to a distance of 5 km covering the entire length of river passing through Buxar district up to the confluence with the river Ganga, is perfectly suitable for human uses as well as this lotic water body is appropriate for fish culture. Water quality of this river is also suitable for the growth of phytoplanktons luxuriously.

**Table 1 : Physical and chemical parameters of river Karamnasa during January 2017–December 2017**

Parameters	Jan	Feb	Mar	Apl	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Temperature <sup>0</sup> C	21.6	19.8	25.6	27.6	31.6	32.8	32.7	32.1	31.8	29.2	23.2	21.4
Turbidity (NTU)	70.4	63.2	71.6	84.4	61.4	59.2	70.4	16.3	13.8	12.2	38.4	80.7
pH	8.1	7.6	7.8	7.6	7.2	7.8	7.9	7.7	7.8	7.9	7.7	7.6
DO (mg/l)	8.4	8.6	8.0	7.3	6.4	5.7	5.4	6.4	6.1	7.6	8.2	8.4

Free CO <sub>2</sub> (mg/l)	0.0	0.0	0.0	0.0	0.0	7.8	7.2	7.8	6.2	6.6	5.2	4.4
Bicarbonate (mg/l)	100.4	102.1	128.6	145.0	152.2	99.2	104.0	128.7	152.4	140.8	128.1	132.4
Nitrate (mg/l)	0.214	0.240	0.300	0.332	0.362	0.264	0.086	0.035	0.065	0.115	0.144	0.224
Phosphate (mg/l)	0.22	0.26	0.29	0.32	0.44	0.42	0.16	0.10	0.12	0.03	0.18	0.21
Carbonate (mg/l)	12.8	11.7	9.4	8.8	6.2	5.0	0.0	0.0	0.0	0.0	0.0	0.0
BOD (mg/l)	2.0	2.2	2.5	3.1	3.7	6.4	6.4	6.0	5.4	5.2	4.7	4.2
COD (mg/l)	5.6	7.2	7.8	9.7	9.7	12.4	11.8	11.0	10.6	9.2	8.8	7.0

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