



ISSN : 0973-7057

## Studies on the Physico-chemical profile in a limited stretch of river Subernarekha at Ranchi (Jharkhand)

D.Kerketta Dadel<sup>a\*</sup> & Soumitra Mallick<sup>b</sup>

<sup>a\*</sup>Dept. of Zoology, Ranchi Women's College, Ranchi

<sup>b</sup>Dept. Of Zoology, St. Paul's College, Ranchi.

*Received , 27th December, 2012 ;Revised: 18th February, 2013*

**Abstract :** Study of physico-chemical parameters has been done in a limited stretch of river Subernarekha at Ranchi, selecting three-site-I, II, and III. Profound effect of pollutants discharged by river Harmu at site-II was recorded in the study period (January 2007-June2008 ).

**Key words :** Physiochemical profile, River Subernarekha.

### INTRODUCTION

The aquatic environment in lentic & lotic systems have been altered due to various human activities. Many disastrous incidents have been recorded in past. Many rivers in India have also been affected by human activities. River Subernarekha, being in the heart of Ranchi, provides both drinking and agricultural water supply as well as in fish culture. The day by day deteriorating water quality of the river Subernarekha necessitates to conduct a study of its physico-chemical profile in a limited stretch of the river at Ranchi during January 2007 to June 2008.

### STUDY AREA

River Subernarekha is a rain-fed river with mostly sandy bed . It swells up during the monsoon and get reduced to narrow stream in summer . It originates from the village Nagri , about 15Km south-west of Ranchi city and terminates in the way of Bengal in Midnapur (West-Bengal) traversing 416 Km. .In its course through the plains, it is joined by a number of

tributaries like Hinu , Harmu , Jumar , etc.

Three sampling sites namely Site-I , Site-II , and Site-III were selected for the measurement of Physico-chemical parameters .

Site-I is the clean freshwater upstream zone;

Site-II is situated about 100 mts. away from Site-I, the polluted water zone which receives huge drainage water from Harmu river and localities of Chutia , and

Site-III is designated as the recovery zone situated about 200 mts. away from the Site-II downstream.

### MATERIALS AND METHODS

Collections of water was made early in the morning during the months of January, 2007 for several days.

Different physico-chemical parameters were estimated by methods described in APHA (1975)<sup>1</sup> and Trivedi et.al. (1987)<sup>6</sup>.

### OBSERVATION

The average value of different physico-chemical parameters recorded during the study period at all the three sites have been shown in the Table I.

\*Corresponding author :

Phone: 0

E-mail :

**Table 1:- Showing average value of physico-chemical parameters recorded at clean water upstream zone (Site-I) , polluted water zone (Site-II) , and recovery zone (Site-III) in a limited stretch of river Subernarekha at Ranchi (Jharkhand) .**

Parameter	Winter Season			Summer season		
	Site-I	Site-II	Site-III	Site-I	Site-II	Site-III
Water Temp.(°C )	22.00	22.00	22.00	32.00	32.00	32.00
pH	6.0	8.0	7.0	5.0	7.0	8.0
D. O <sub>2</sub> ( mg Lit. )	8.4	4.3	8.6	7.0	1.75	7.0
D. CO <sub>2</sub> (mg Lit. )	27.852	257.84	32.252	11.0	22.0	11.0
Suspended particles In (mg Lit. )	254.0	784.0	35.8	82.0	222.0	69.4
Conductivity(ms cm)	390.1	1150.8	55.07	126.2	341.5	106.76
Nitrate (mg Lit.)	14.14	32.71	29.17	2.65	11.93	34.48
Phosphate (mg Lit.)	2.7	6.0	5.1	0.00	4.1	11.5
Nitrate nitrogen in (mg Lit.)	3.2	7.4	6.6	0.6	2.7	7.8
Sulphate (mg  Lit.)	19.0	41.0	20.0	5.0	10.0	25.0
Iron (mg Lit.)	0.00	0.07	0.00	0.5	0.2	0.07Clo
Chloride (mg Lit.)	46.0	170.0	68.0	12.0	40.0	148.0

The water temperature did not show variations at site I, site II and site III during winter and summer months. pH also did not show much variations at three sites during winter, however at site I pH was 5.0 but at site II & site III shows 7.0 & 8.0 value. Dissolved oxygen at site II was comparatively low compared to site I & III during winter season, low value was also encountered at site II during summer. Variation was also noted in dissolved CO<sub>2</sub> at site II compared to site I & II during both the seasons. Similarly suspended particles were much higher at site II in both the seasons. Nitrate, phosphate, nitrate nitrogen sulphate. Iron, chloride were also found to be higher at site II during both the seasons, nevertheless conductivity showed fluctuating trend.

## DISCUSSION

The changes in the surface water temperature were directly related to the sunshine hence minimum and maximum values of surface water temperature was recorded in winter month ( January ) and in summer month ( June ) respectively in the present study , which supports the observations of Upadhyaya and Verma ( 2004)<sup>7</sup> .

Although acidic pH was recorded in January and June at Site-I in the present study , pH remained alkaline at Site-II and Site-III in Winter as well as in summer months Upadhyaya and Verma ( 2004)<sup>7</sup> were also of the same opinion in the river Subernarekha.

Low values of Dissolved O<sub>2</sub> at Site-II , in the

**Dadel & Mallick: Studies on the Physico-chemical profile in a limited stretch of river Subernarekha at Ranchi (Jharkhand)**

present study, show the effect of pollution which may mainly be due to- (I<sup>st</sup>) retarded photosynthesis and (II<sup>nd</sup>) large consumption of O<sub>2</sub> by dissolved organic matter in turbid water. Sharma (1999),<sup>2</sup> Shivani and Tripathi (2003)<sup>3</sup> and Upadhaya and Verma (2005)<sup>8</sup> were also have similar conclusion. Upadhaya and Verma (2005)<sup>8</sup> recorded minimum value of phosphate and nitrate in summer months and maximum value of these two parameters in winter months in river Subernarekha. The present observation supports the results of above mentioned authors. High value of Nitrate and phosphate in polluted water zone (Site-II) in comparison to Site-I and III recorded in present study, which is quite similar to the observations obtained by Singh *et.al.* (2006)<sup>5</sup> in polluted discharge zone in river Damodar at Sindri (Dhanbad).

Singh *et.al.* (2006)<sup>5</sup> in river Damodar, recorded high value of suspended particles. In present study too high value of suspended particles has been recorded in Site-II (Polluted zone) in winter as well as in summer both in comparison to Site-I and Site-III.

High value of pH, CO<sub>2</sub>, Chloride, etc. were recorded at polluted zone of Subernarekha river by Singh and Singh (1988)<sup>4</sup>. A general high to very high value of different physico-chemical factor except DO<sub>2</sub> in present study, definitely indicates pollution due to discharge of various types, into the river Subernarekha at Site-II.

Thus these results also require a confirmation from the biotic characteristics in this river in Site-II

in comparison to Site-I (upstream) and Site-II (recovery zone). This study is being conducted.

**REFERENCES**

1. **APHA 1975** - Standard methods for Examination of water. 12<sup>th</sup> Amer. Publ. Hlth. Assoc. New York.
2. **Sharma, A 1999**. Limnological studies of Ban Ganga and distributional pattern of Stream bottom fauna. Ph. D. Thesis University of Jammu.
3. **Shivani A.K. and Tripathi 2003**. Longitudinal and seasonal variation of pH, O<sub>2</sub> and CO<sub>2</sub> in river Ganga. Proc. Zool. Soc. India. 2(2): 35-38.
4. **Singh, D.K. and Singh, C.P. 1988**. Fish fauna and Environmental conditions of River Subernarekha at Ranchi (Bihar), India. J. Inland Fish Soc. India, 20 (1): 50-56,
5. **Singh, L.B., Kumar Meena and Pandey, P.N. 2006**. Studies on Biotic Parameter in relation to Factory Effluents in Damodar river at Sindri (Dhanbad). Pro. Zool. Soc. India. 5(1): 127-134
6. **Trivedi, R.K., Goel R.K. 1987**. Practical methods of Ecology and Environmental science.
7. **Upadhaya, R.K. and Verma Nupur Ranjana. 2004**. Studies on the physical characteristics of Subernarekha river Ranchi (Jharkhand). Proc Zool Soc. India. 3(2): 67-71.
8. **Upadhaya, Rajesh Kumar and Verma Nupur Ranjana. 2005**. Studies on common chemical characteristics of Subernarekha river at Ranchi (Jharkhand). Proc. Zool. Soc. India. 4(2): 33-34.

\* \* \*

