A Physico-Chemical Assessment of the Rapti River at Balrampur U.P.

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Abstract

Various physic-chemical characteristics of river Rapti flowing in district Balrampur were studied in the summer, rainy & winter seasons. Ecological parameters like dissolved oxygen, Biochemical oxygen demand, temperature, PH, nitrate, phosphate etc. were analyzed and compared with standard permissible limits to assess the best designated use of the river water for various purposes.

Keywords: Rapti, River, Physico-chemical, Assessment, Balrampur.

Introduction

The Rapti river at district Balrampur is situated in the northeast corner of Uttar Pradesh and Indo Nepal Border. It is an important district of Tarai belt of eastern Uttar Pradesh nearing the foothills of Himalayas. River Rapti is situated approximately 4Km. north of the Kuwana forest and near of the M.L.K.(P.G.) College Balrampur between 27^0 24' - 29^0 27' N. latitude and $82^0$9 E-$82^0$12 E longitude above the mean sea level. Rapti river is highly polluted near many villages on its bank. The problems of pollution at many other place, is due to sewage inflow, animal carcasses, unclaimed human bodies, plastic bags etc.

River has always been the most important fresh water resources along the banks of which our ancient civilizations have flourished and most developmental activities are still dependent upon them. River water has multiple uses in every field of development like agriculture, aquaculture etc. The growing problem of degradation of our river ecosystem has necessitated our the monitoring of water quality for various rivers all other the country to evaluate their production capacity, utility potential and to plan restorative measures. In any system where organic matter is present, the organic matter can be broken down to inorganic matter by the action of microbes, oxygen is utilized during the biodegradation process.

It has been found that the rate of biodegradation of the organic matter at any given time is proportional to the amount of organic matter and also the microbial population present in the system at the time (Ademoroti, 1982). Dissolved oxygen is the amount of oxygen in the gaseous form present in water available for aerobic organisms to carry out their life processes. A well balanced warm water where fish can thrive requires a dissolved oxygen level of not less than 5 mg/l. The dissolved oxygen in highly polluted waste water is used up by microorganisms (Ademoroti, 1996).

The parameter used as a measure of the amount of oxygen required by microorganisms "Biochemical Oxygen Demand (B.O.D). The B.O.D. is an empirical biological test in which the water condition such as temperature, oxygen concentration of type of bacteria plays a decisive role. These and other factors cause the reproducibility to be much less than that of pure chemical test. This parameters also measures the strength of any given waste water (Ademoroti, 1984). Inspite of the disadvantage, the B.O.D. is of special importance in the assessment of pollution in waste water. A high dissolve oxygen is an indication of a high state of purity of water and a low dissolve oxygen is an indication of pollution. The present paper deals with a physic-chemical assessment of the River Rapti of Balrampur eastern Uttar Pradesh.

Materials and Methods

The three study sites namely Bijlipur Ghat, Belha and Mirzapur were chosen for the purpose of the study, River water samples were collected at each site during every month. All the samples were collected from mid stream at depth of 10 to 15 cm. from surface Estimation of temperature, PH, D.O. and alkalinity were done at the site immediately after the collection of the sample 2.5 liters samples collected from each sites were brought back to the laboratory for the estimation of other parameters such as B.O.D., nitrate phosphate etc. All sample were

analyzed as described in the stand and methods for the examination of water and waste water and standard methods for water and effluent analysis (APHA, 1992).

Results and Discussion

The physic-chemical analysis shows in Table: 1 that the Rapti water remained alkaline throughout the study period Bijlipur Ghat showed lower value of D.O. and high values of B.O.D. Acidity value were low. The results indicate that Rapti water was found to be rich in nitrate and phosphate. In rainy season show, the low value of alkalinity and phosphate. Temperature is high in the month of June and minimum in January. However, the value of alkalinity varied as compared to other physico-chemical parameters. Acidity value was maximum at Mirzapur. The dissolved oxygen concentration was found to be minimum in the month of June at Bijlipur Ghat. Low dissolved oxygen content as noticed in summer may be due to high atmospheric temperature and low flow rate and dissolved volume of water, which the disposal of waste water and sewage remains, virtually the same (Tiwari, 1983). However, the lower value of D.O. at Bijlipur Ghat may be due to discharge of huge quantity of domestic sewage at these sampling site.

The high B.O.D. values at Bijlipur Ghat may be due to discharge of domestic sewage at these point. The low value of D.O., B.O.D. alkalinity, phosphate and nitrate in rainy season could possibly be due to the large volume and high flow rate (Imerbore, 1970, Tiwari, 1983). A minor fluctuation in the PH of Rapti water has also been noticed. Low PH value as recorded in rainy season may be due to large volume of water and high flow rate which are expected to bring changes in the levels of carbon dioxide and carbonate and hence a fall in the PH values.

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Table 1

Seasonal Variation in Physico-chemical properties of Rapti water at different study sites 2013-2014*

Study site	Season	Parameters							
		Temp ^0C	PH	Alkalinity mg-1	Acidity mg-1	NO_3 mg-1	PO_4 mg-1	D.O. mg-1	B.O.D. mg-1
Bijlipur Ghat	Summer	30.00	8.30	334.00	15.00	1.22	1.05	4.53	10.30
	Rainy	31.00	7.60	218.00	11.00	1.00	0.35	4.95	8.55
	Winter	24.00	8.44	314.00	14.00	1.16	0.62	5.47	9.00
Belha	Summer	30.25	8.34	257.00	14.50	0.95	0.82	6.10	3.52
	Rainy	30.00	7.86	175.75	13.00	1.00	0.25	6.50	2.85
	Winter	25.00	8.50	262.00	14.00	0.92	0.52	6.37	3.00
Mirzapur	Summer	31.00	8.34	208.00	15.25	1.18	1.32	6.80	9.30
	Rainy	29.75	7.65	107.00	15.00	1.74	0.85	6.25	8.00
	Winter	25.00	8.37	212.00	17.00	1.00	0.80	7.10	9.00

* Average of three replication all data.