Study of Limnochemistry of lotic water of the North-Western Region of Rajasthan

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Introduction

Water is soul of life. Man and nature can neither develop nor survive without water. The greatest civilization in the world developed along the natural flowing waters normally called as rivers. The rivers and flowing waters have thus played immeasurable and invaluable role in making the man what he is today.

The limnochemistry of lacustrine water is considerably different than that of lotic waters. The limnochemistry of lotic water is more dynamic as the water picks up part of earth during the flow and by erosion and leaching partially dissolves the some of its components. These components such as carbonates, bicarbonates, phosphates, silicates etc. are the same in any waters but in a lotic system their concentration are more variable due to change in flow and other seasonal effects. Our knowledge of canal and river dynamics and ecological relationship is not as extensive as that of ponds and lakes. Only work in India available on manmade canal is by Vashist and Jindal (1980) and Jindal and Vashist(1981) on pucka stream in Patiala (Punjab) and tributaries of Sarhind canal at Sangrur again in Punjab. Hence in the present study an attempt was made to study the physico-chemical parameters of the LNP canal situated near town Sri Ganganagar (Rajasthan).

Material and Methods:-

The area of study (LNP Canal) is located in the district Sri Ganganagar in the North-Western part of the state of Rajasthan (Lat.29^0 8' to 30^0 12', Long. 73^o05; to 73^0 58'). The LNP Canal is a tributary of Gang Canal. The canal system is brought to this region from the river Sutlej (Punjab).The present work was carried out a period of one year (August, 09 to July, 2010) and the sample was collected at 30 days interval. For determining the physico chemical characters sample were collected from one station in plastic bottles and were brought to the laboratory and kept in refrigerator (4^0 C) for analysis. The temperature, pH, and transparency of the sample were noted at the site itself. The pH of water sample was noted by the portable electronic pH meter. The temperature of the water was noted by using a thermometer. Sacchi disc was used to measure the transparency of water. Estimation of dissolved oxygen, free CO_2, total alkalinity, TDS, phosphate, nitrate and silicates were estimated by the methods of APHA (1998) and Trivedy and Goel (2008).

Result and Discussion

The parameter of physico-chemical characteristics of the canal is presented in table no.1. The temperature of the canal water was under direct influence of the air. Temperature varied with climate and season. This support the statement of Welch (1952) that the thermal characteristics of small stream follow the air temperature much closer than those of large river. The water temperature was highest (27.6^0 C) during August, 09 and lowest (13.7^0C) during winter month of January, 10. In canal water transparency ranged from 6.3 cm (Sept.09) to 26.6 cm (Jan.10) lowest transparency was in monsoon month when high silt was transported from upper reaches of canal and highest value was during winter month of January when silt load was low. The pH of canal was neutral to alkaline which is general characteristic of any flowing water. The highest value of pH 7.6 (Jan. 10) was due to higher photosynthetic activity and the low value 6.6 (Aug. 09) due to the low photosynthetic activity. Similar views expressed by Elmore(1961). The total alkalinity of the canal water varied from 39 mg/l (Aug.09) to 53 mg/l (Jan.10). The DO contents of canal water was poor, ranged from 4.8 mg/l (Aug. 09) to 6.1 mg/l (Jan. 10). D.O. contents low during monsoon due to high load of sediments and low photosynthetic activity and high in winter due to low sediment load and high photosynthetic activity. Absence of free CO_2 favors the neutral pH of the canal water. This was due to the absence of macrophytes and decomposed organic matter. The T.D.S. contents of canal water varied from 182 mg/l (Jan. 10) to 201 mg/l (Aug. 09). The peak was in monsoon due to high load of sediments and minimum in winter month due to low sediment load. T.D.S. has inverse relationship with transparency i.e. peak of T.D.S. follows low transparency. The main source of nitrate and phosphates in streams are rainfall and the land drainage. In the present study the phosphate contents ranged from .04 mg/l (Dec.09) to 0.31 mg/l (Sept.09). The maximum value recorded in monsoon due to high silt content and low density of phytoplankton. The low value in winter when silt content and phytoplankton low. The low value of phosphate of LNP canal could be compared with similar result in river Jhelum (Shyamsunder, 1988). The nitrate content of canal varied from 0.07 mg/l (Sept.09) to 0.10 mg/l (Jan. 10). The lowest value in monsoon and highest in winter. The silicates value ranged from 1.74 mg/l (Jan.10) to 3.1 mg/l (Aug.09).The highest value of silicates in monsoon due to high contents of silt and low value in winter due to low value of silt contents.

On the basis of this study, it could be concluded that the chemical parameters of LNP Canal water would be useful for irrigation, drinking and domestic uses.

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Table No. 1

Physico-chemical parameters of LNP Canal

S.No.	Month / Parameters	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar	April	May	June	July
1	Temperature (^{0}C)	27.6	26.4	24.7	22.8	19.6	13.7	14.4	15.7	22.8	25.6	27.2	27.5
2	pH	6.6	7.1	6.9	7.4	7.2	7.6	6.9	7.1	6.8	7.3	7.2	7.1
3	Transparency (cm)	7.2	6.3	12.2	18.8	19.4	26.6	26.2	21.8	18.5	13.6	18.3	9.8
4	Dissolved Oxygen(mg/l)	4.8	5.1	4.9	5.2	5.6	6.1	6.0	6.7	5.8	5.9	5.3	5.1
5	Free CO_2 (mg/l)	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab
6	Total alkalinity(mg/l)	39	48	46	47	51	53	48	50	46	48	42	40
7	T.D.S.(mg/l)	201	197	184	198	196	182	186	190	188	192	188	194
8	Nitrate(mg/l)	0.08	0.07	0.09	0.09	0.08	0.1	0.09	0.09	0.08	0.08	0.09	0.08
9	Phosphate (mg/l)	0.28	0.31	0.1	0.1	0.14	0.09	0.1	0.16	0.16	0.18	0.2	0.24
10	Silicate(mg/l)	3.1	2.3	2.6	2.4	2.2	1.74	1.88	2.02	2.12	1.94	2.2	2.8