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Limnological Study of Lentic And Lotic Water Bodies in Rajasthan

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Abstract

The freshwater ecosystem are generally classified into two major groups lentic and lotic ecosystem. The lentic ecosystem includes all standing water bodies like lakes and ponds. The lotic ecosystem include all flowing water bodies like rivers and canals. An aquatic ecosystem maintain its existence by interdependent and interrelated physico-chemical factors. The present study aimed to the limnology of lentic and lotic freshwater ecosystem in Rajasthan. The study was undertaken in "Badrana Johra" (a lentic ecosystem), Laxmangarh (27˚21' 51.1272" N and 76˚51' 31.05" E) and Sadul branch of Sirhind feeder canal (a lotic ecosystem), Hanumangarh (29˚37' 33.5856" N and 74˚17' 14.9676" E). The period of study was from January 2019 to June 2019. Limnology of studied water bodies revealed that both the waters were alkaline, hard and well oxygenated. Transparency of lotic water was constant throughout the study period, while in lentic water it showed more fluctuations. Lentic water was more alkaline than lotic water. In canal water average values of electrical conductance, dissolved oxygen and hardness were higher than water of pond. Environmental factors and limnological characters of water body have major effect on quality of water.

Introduction

Rajasthan state has a water spread area of 3 Lacs hectare including large reservoirs, medium reservoirs, tanks in villages, canals, seasonal waters, rivers and water logged areas. Most of the bodies of surface water in the indian desert region are shallow and ephemeral. Fresh water ecosystem is divided into groups : lentic (still water) and lotic (running water). An aquatic ecosystem maintains its existence by interdependent and interrelated with physico-chemical factors.

The present study aimed to the limnology of lentic and lotic ecosystem in rajasthan. Environmental factors and limnological characters of water body have major effect on quality of water.

Review and Literature

Limnology continued to develops as a field of study and expanded its geographical base during the first half of the 20th century. The study of progressive limnology begin the foundation of knowledge among the physical, chemical and biological characteristics of lakes which was done by Birge and Juday (Wetzel,1996). The term limnology was coined by Forel who established the field with his studies of lake Geneva (1892). Hydrobiological studies of a tributary of Sirhind canal at Sangrur (Punjab, India) was studied by Jindal & Vasisht (1981). Limnological studies on a desert reservoir was carried out by Saxena & Bhargava (1982). Sharma (1992) compare the ecology of a lake and village pond near Bikaner. Nama (1993) evaluated physcial and chemical features of Takhat Sagar lake, Jodhpur. Srivastava et al. (2003) investigated physico-chemical characteristics of water bodies around Jaipur. Khwaja et al. (2013) carried out limnological studies of Narsinh Mehta lake, Junagarh (Gujarat).

Sharma et. al. (2012) carried out limnological study of 2 water sheets in the Thar desert with special reference to invertebrate diversity. Shib (2014) recorded seasonal variations in physico-chemical characteristics of Rudra Sagar wetland (Tripura). Ruksana and Srivastava (2018) investigated physico-chemical characteristics of a desert and ecosystem in Churu (Rajasthan). Jately (2019) observed pollution impact of households on physico-chemical properties and faunal diversities of Gang canal and its minor of Sriganganagar. Sharma (2003) reviewed the physical chemical limnology of some desert waters around Bikaner.

Materials & Methods

The study was carried out monthly in the period of January 2019 to June 2019. Water samples were collected from three study stations of each water body. Water was examined for the selected parameters including temperature, transparency, ph, electrical conductances, total dissolved solids, dissolved oxygen, alkalinity and hardness. For parameters like temperature conductance and total dissolved solids respective meters were used. Transparency was recorded with the help of standard secchi disc. Other parameters were analysed in laboratory by using as per the standard method APHAAWW-WPCF (1981).

Results and Discussion

Limnology of studied water bodies revealed that both the waters were alkaline, hard and well oxygenated. Transparency of canal water was constant throughout the study, while in Johra its oxygenated. Transparency of canal water was constant throughout the study, while in Johra its showed more fluctuations. Water of Johra was more alkaline than canal. In canal water average value of electrical conductance, total dissolved solids, dissolved oxygen and hardness were higher than water of Johra.

During the study period the annual average of important abiotic variables in Johra water were noted as : temperature 30˚C;, transparency 0.61m; pH 7.9; electrical conductance 0.43 mmho/cm; TDS 433 mg/l; DO 10.7 mg/l, alkalinity 90.5 mh/l and hardness 67 mg/l. While in canal annual average of these variables were noted as : temperature 25.5˚ C, transparency 0.40m; pH 8.2, EC 0.52 mmho/cm; TDS 525 mg/l; DO 11.40 mg/l; alkalinity 450 mg/l and hardness 221.5 mg/l.

Water temperature followed the similar thermal trend of hot deserts with wide seasonal fluctuations i.e. high in summer and low in winter.

Sharma et al. (2011) recorded electrical conductance upto 0.42 mmho/cm. In desert waters high range of TDS were recorded by Bugalia (2010) and Chandra (2015). Rathore (2011) recorded maximum dissolved oxygen upto 13 mg/l in desert water. Spence (1976) classified water bodies on the basis of alkalinity viz, water with 9-15 mg/l as nutrient poor, 160-60 mg/l as moderately nutrient and water with more than 60.0 mg/l as nutrient rich waters. Thus the canal was moderately nutrient and Johra was nutrient rich water body. The alkaline nature of both the waters is a common feature in the arid region.

According to the classification given by Kannan (1991) on the basis of hardness the water of Johra was moderately hard (67 mg/l) and water of canal was very hard (221.5mg/l).

TABLE-I : Physical-chemical variables at Badrana johra, Laxmangarh and Sadul branch of Sirhind feeder canal, Hanumangarh during January, 2018 to June, 2018. Values are averages of three study stations of each water body.

Months / Variables		Water Temp (ºC)	Transperency (m)	pH	Electrical Conductance (mmho/cm)	Total Dissolved Solids (mg/l)	Dissolved Oxygen (mg/l)	Hardness (mg/l)	Alkalinity (mg/l)
JAN 2018	Badrana Johra	20.2ºC	0.60	8.2	0.39	390	10.9	64	92
	Sadul Branch	17ºC	0.40	8.5	0.48	480	11.8	180	40
FEB 2018	Badrana Johra	25.2ºC	0.68	8.3	0.42	420	10	66	96
	Sadul Branch	18ºC	0.40	8.4	0.50	500	12	160	54
MAR 2018	Badrana Johra	28.2ºC	0.50	7.5	0.38	380	10.2	68	94
	Sadul Branch	26ºC	0.40	8.0	0.54	540	10.2	169	39
APR 2018	Badrana Johra	34.6ºC	0.60	7.9	0.47	470	11.3	66	98
	Sadul Branch	29ºC	0.40	8.1	0.55	550	10.8	290	34
MAY 2018	Badrana Johra	35.8ºC	0.62	8.2	0.44	440	11.7	68	96
	Sadul Branch	29ºC	0.40	8.3	0.53	530	11.0	300	51
JUN 2018	Badrana Johra	36ºC	0.70	7.8	0.50	500	10.5	70	97
	Sadul Branch	34ºC	0.40	7.9	0.55	550	12.6	230	52
AVG. 2018	Badrana Johra	30.0ºC	0.61	7.9	0.43	433	10.7	67	90.5
	Sadul Branch	25.5ºC	0.40	8.2	0.52	525	11.4	221.5	45

Conclusion

It is concluded that limnology of lentic and lotic water bodies differ to certain level. Lentic water was more alkaline than lotic water. In canal water average values of EC, DO and hardness were higher than water of Johra.

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