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STUDY OF WATER QUALITY PARAMETERS OF CANALS IN SRI GANGANAGAR DISTRICT

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ABSTRACT

Canals IGNP, Bhakhara and Gang Canal are flowing through the Sri Ganganagar District in Rajasthan. Water quality parameters of these canals were analysed in 2012. Although the parameters are within the permissible limits, high values were noticed in some stations.

Key words: Water quality parameter, Canal, Sri Ganganagar.

INTRODUCTION

Canals are an important part of Earth's water cycle. Canal provide a home, drinking water and a hunting ground for many organisms. Canal provide irrigation water, transportation, hydro-electrical power drainage, food and recreation opportunities. Physico-chemical and biological parameters of canals in general were investigated by several researchers[1-23]. The present work is an attempt to examine the water quality parameters of the canals IGNP, Bhakhara and Gang canal in Sri Ganganagar District of Rajasthan in 2011-2012.

EXPERIMENTAL

Materials and method

Water samples were collected from the canals IGNP, Bhakhra and Gang canal different stations during monsoon and post monsoon season in 2011-2012. The months of April-Oct. and Nov.-Jan. were considered as Monsoon and post Monsoon, respectively. The physico-chemical parameters like pH, conductivity, alkalinity, CO_2, dissolved oxygen, hardness and chloride were analysed as per standard methods[24].

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RESULTS AND DISCUSSION

pH measurement is the determination of the activity of hydrogen ions in aqueous solution. In applications ranging from industrial operations to geological and chemical processes, it is important to have an accurate and precise measurement of pH. The pH of canal varied between 6.9 to 8.4. pH of canal water was found within the acceptable range in almost all the stations, which are used for analysis. Conductivity is the ability of a material in the water where these are present in the acidic forms, capable of conducting current and therefore, conductivity is a good and rapid measure of the total dissolved solids. The conductivity fluctuated between 237 to 700 mg/L. In the present study, the stagnation of water due to sand mining, low quantum of water, the minerals coming in through drainage and paddy fields may be responsible for the higher values of conductivity during post-monsoon, the values of conductivity showed slight fluctuation. With the onset of the monsoon, the conductivity falls, sharply as the rain water diluted the salt contents of the canal. Low seasonal values of conductivity in the range 169 to 199 mg/L were observed at station **7**, **8** and **9**. due to the less anthropogenic activities.

Alkalinity is a measure of the acid-neutralizing capacity of water. Alkalinity is basically a measure of how much an acid is dissolved in the water. The seasonal alkalinity values registered during monsoon period ranged from 70 to 190 mg/L and from 64 to 210 mg/L during post monsoon period. The alkalinity values were comparatively low in all stations. The maximum seasonal value of 210 mg/L was registered at station **3** during monsoon.

In the present study, the alkalinity values are high in post monsoon period i.e. ranged between 64 to 210 mg/L. This may be due to the sewage and waters, which are flowing into the canal from the market and town close to the station. The low alkalinity value found in all stations during the monsoon season may be due to the dilution by the rainwater. Samples of industrial and agricultural areas showed alkalinity and some residential areas also indicated slight alkalinity. As per the Bureau of Indian Standard[25], the desirable level of total alkalinity for drinking water is below 200 mg/L. The observed values in the study was under the permissible limit.

Carbon dioxide is present in all surface waters, generally in amounts less than 10 mg/L. However, higher concentrations are not uncommon in ground waters. Dissolved carbon dioxide has no harmful physiological effect on human and is used to recarbonate water during the final stages of water softening process and to carbonate soft drinks. High concentrations of carbon dioxide are corrosive and have been known to kill fish. The amount

of carbon dioxide fluctuated from 2.9 mg/L to 44 mg/L during monsoon season and 6 to 49 mg/L during post monsoon season. The maximum seasonal values observed at stations **3** during post monsoon period. In the present study, the concentration of carbon dioxide observed are very low due to its lentic and oligotrophic nature. Due to sand mining, the water of the canal is always turbid. Hence, the photosynthetic effect would not make glaring utility of carbon dioxide.

The dissolved oxygen (DO) content plays an important role in supporting aquatic life in running water and is susceptible to environmental changes. Dissolved oxygen (DO) refers to the volume of oxygen that is contained in water. The DO is in the IGNP canal ranged between 0 to 6.4 mg/L. In canal Bhakhara, DO ranged between 5.3 to 6.7 mg/L. In Gang canal, the DO values ranged between 1.3 to 8.1 mg/L. The content of DO at all the stations was higher during monsoon period. In the present study, low DO may be due to the organic contents and higher DO may be due to the impact of rain water. As per the BIS[25], the minimum DO recommended is 3/mg/L. The comparatitvely low DO observed during post monsoon may be due to the decomposition of organic matter and restricted flow of canal water.

Calcium and magnesium ions are the most common factors that comprises hardness. It usually determines both ions in the form of “total hardness”. Hardness should be expressed as a concentration of divalent ions in mg/L (ppm). The values fluctuated between 90 to 190 mg/L in IGNP canal. In Bhakhara canal, hardness fluctuated between 82 to 106 mg/L. The hardness of water in Gang canal fluctucated between 78 mg/L to 88 mg/L. In present study, comparatively maximum hardness value of 190 mg/L was observed at station **3** during monsoon season due to the accumulation of calcium and magnesium salts in the canal. As per BIS[25], the observed hardness of canal water was within the permissible limit of 300 mg/L.

The chloride of sodium, potassium, calcium and magnesium are highly soluble in water. The concentration of chloride in canal IGNP is between 16 to 45 mg/L. In canal Bakhra, it ranges between 20 to 24.3 mg/L during post monsoon periods and in Gang canal between 16 to 21 mg/L. In the present study, the highest value of 45 mg/L reported at stations **3** during monsoon may be due to the influence of mass bathing and cleaning clothes. The chloride content throughout the present study was found within limits.

The result of the present work indicates that there are significant variations in the physicochemical parameters in the all these canal water systems. The investigation reveals that the quality of canal water at these stations is found to be safe and can be used for the domestic purposes without any treatment.

Table 1: Physico-chemical parameters of the canal IGNP, Bhakhara and Gang canal during monsoon period

Canal	Stations	pH	Conductivity (mg/L)	Alkalinity (mg/L)	Free CO_2 (mg/L)	Dissolved oxygen (mg/L)	Hardness (mg/L)	Chloride (mg/L)
IGNP	**1**	8.3	244	72	14	6.4	90	16
	2	7.8	251	78	10	5	100	18
	3	6.9	800	210	49	0	190	40
Bhakhara	**4**	8	268	78	11	6.5	90	20
	5	7.5	271	86	13	5.3	90	20
	6	8.2	285	90	6	6.7	90	20
Gang canal	**7**	8.4	237	64	7	6.5	80	16
	8	7.5	267	76	18	1.3	80	18
	9	7.71	245	72	7	8.1	80	18

Table 2: Physico-chemical parameters of the canal IGNP, Bhakhara and Gang canal during post monsoon period

Canal	Stations	pH	Conductivity (mg/L)	Alkalinity (mg/L)	Free CO_2 (mg/L)	Dissolved oxygen (mg/L)	Hardness (mg/L)	Chloride (mg/L)
IGNP	**1**	8.93	194	76	5.1	10.4	94	20
	2	8.39	180	78	7	5.3	102	25
	3	7.4	5.99	190	44	0.2	188	45
Bhakhara	**4**	7.78	228	79	8	7.5	99	22.2
	5	7.69	198	95	13	6.3	82	23
	6	1.39	205	81	29	7.7	106	24.3
Gang canal	**7**	8.88	177	70	32	8.5	80	19
	8	7.98	169	91	12.9	3.3	78	18.1
	9	7.99	199	76	3.3	9.2	88	21

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