Physico-Chemical Characteristics of Water of Juggar Dam Hindaun City, In Karauli District, Rajasthan

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Abstract

The paper deals with the analysis of some physico-chemical characteristics of water of a fresh water reservoir, Juggar dam Hindaun city, for a period of six months from January to June 2009. The study revealed that the parameters (Temperature, pH, Total dissolved solids, Dissolved Oxygen, Free Co_2, Nitrate, Chloride, Calcium hardness, Magnesium, and Biochemical Oxygen Demand) are within the permissible limits and support good water quality in terms of cleanness and potability. The study emphasized the need to utilize this water body resource for pisciculture and drinking purposes by application of scientific management technique for the socio-economic development of the neighboring people.

Keywords: Juggar dam Hindauncity, Physico-chemical parameters, Fresh water reservoir

INTRODUCTION

Indian reservoirs offers livelihood for millions of people. The reservoir is a large water body with a dynamic ecosystem where water, land and air interact continuously. This man made ecosystem offers considerable scope for increasing the production at low capital investment. India having about 3.0 million ha. of reservoir area can play a significant role in terms of productivity to increase the fish Production. Though accurate data are not available a rough estimate indicates that around two million people are engaged in the reservoir fisheries work of India (Somvanshi *et al*. 2007). In recent years, the degradation of water bodies (reservoirs and dam) due to population explosion, industrialization, urbanization and agriculture, might lead to change in their trophic status and render them unsuitable for aquaculture and potable purposes (Shaw *et al*. 1991). The physico-chemical analysis of the water of a wetland provide beneficial baseline data for maintenance of ecology and sustained commercial exploitation. Water quality study of reservoirs, dams, lakes etc. were carried out by several workers ie. Daimari *et al*. (2005), Deka *et al*. (2007), Gupta *et al*. (2009), Devi Prasad *et al*. (2009) and recently by Gupta and Sharma (2009).

A number of natural fresh water dam's and lakes are located in the eastern Rajasthan (aravali regions) which have great scientific and socio- economic values. Juggar dam was constructed on Juggar river a tributary of river Gambhir in 1957 to provide irrigation facilities to the villages of Tehsil Hindaun city (Karauli).

The available literature indicates that attention has not been paid regarding the hydro-biological studies of Juggar dam and hence the physico-chemical analysis of water of the dam has been designed to understand the functioning of the wetland ecosystem for commercial utilization in terms of fish culture and drinking purposes.

MATERIALS AND METHODS

Juggar dam is located in the eastern Rajasthan (Aravali regions) towards east 10 km away from Hindauncity District Karauli, Rajasthan, India. The longitude and latitude of the juggar dam are $26^0$45'N and $77^0$7'N respectively.

Samples were taken in polythene bags from the four sites bimonthly. The physico-chemical parameters like p^H, temperature, Total Dissolved Solids (TDS), Total alkalinity, Dissolved oxygen (D.O.), free CO_2, Total hardness (TH), Calcium hardness (CaH), magnesium, nitrate, chloride and Biochemical oxygen demand (BOD) were analysed by the methods given by Trivedi and Goyal (1992) and APHA (2005) from Feb.2009 to June 2009. The data were subjected to statistical analysis to get mean and standard error.

RESULTS AND DISCUSSION

The results of physico-chemical analysis of the dam are presented in Table 01.

- **Temperature: I**t ranges in between 25 to 29 degree centigrade.
- **pH**: p^H ranges between 7.46 to 7.73. is most suitable for fish culture (Deka *et al*. 2007).
- **Total Dissolved Solids (TDS)** : TDS values are within the permissible limits and the dam water is suitable for drinking and fish culture.
- **Total Alkalinity** : Total alkalinity ranges from 113.25 mg/L to 125.00 mg/L which is considered to be favorable for fresh water fish culture (Deka *et al*. 2007).
- **Dissolved Oxygen (DO)**: Favourable condition for fish fauna require more than 5ppm D.O. In the present study D.O. ranges 5.6 to 8.00 ppm (Feb.), 8.8 to 12.00ppm (April) and 4.00 to 4.8 ppm (June) that is suitable for fish culture (Deka *et al*. 2007).
- **Free Co_2** : In the present study free Co_2 ranges 8.8 to 13.2 ppm (Feb.), 4.4 to 8.8ppm (April) and negligible ppm (June).
- **Total Hardness** (TH) : According to Usha *et al*. (2006) the lake water could be classified as soft when the hardness range is less than 75 mg/L. In the present study the TH ranges 53-60 mg/L (Feb.), 45-50mg/L (April) and 60-65 mg/L (June).
- **Calcium and magnesium** : In the present study it has been noted that as compared to magnesium the amount of calcium is higher. Co_2 reacts more rapidly with calcium than magnesium. This preferential behavior of Co_2 towards calcium is possibly responsible for comparatively low amount of magnesium.
- **Nitrate**: The amount of nitrate is below 1.00 ppm in the present investigation
- **Chloride**: According to *Sreenivasan* (1965) the chloride concentration between 4 to 10 ppm indicate purity of water and concentration of chloride above 60ppm is indicative of heavy pollution. In the present study it ranges 35.5 to 49.7ppm (Feb.), 21.3 to 28.4ppm (April) and 21.3 to 28.4ppm (June).Variations in the chloride content with respect to months have been recorded.
- **Biochemical Oxygen Demand (BOD)**: BOD indicates the presence of organic load in a water body, the maximum tolerance limit of which is 3ppm for aquaculture and public use (Usha *et al*. 2006). In the present studies the BOD values are in the tolerance limit which shows negligible amount of organic pollution in the dam.

CONCLUSION

It may be concluded that the water of juggar dam is of good quality and without serious impact of pollution. The dam ecosystem functioning is in harmony within the environmental condition of the area. The dam has

the potentiality of pisciculture and potability with scientific management approach and this will help in improving the socio-economic condition of the dependent people of neighboring area.

Table 01: Physico – chemical Parameters of Juggar dam Hindauncity

Parameters	Febuary mean ± S.E	April mean ± S.E	June Mean ± S.E.
1. Temperature	25°C	26°C	29°C
2. p^H	7.73±.0398	7.46±.0453	7.58±0861
3.TDS	160±.20.50	152±.22.17	184±.30.42
4. Alkalinity	113.75±32.50	125±19.26	125±19.25
5. D.O.	6.4±.626	10.9±.882	4.3±.220
6. Free Co_2	11±1.46	5.50±1.27	9.9±1.27
7.TotalHardness	56.5±1.79	46.25±2.76	61.25±1.43
8. Calcium	48±3.26	26.4±.576	32±.576
9. Magnesium	8.5±1.79	19.85±2.92	29.25±4.15
10. Nitrate	.003±00063	.0715±.0357	.0610±.0257
11. Chloride	41.05±3.93	23.07±2.04	25.07±2.04
12. BOD	1.2 ±0.12	1.3 ± 0.21	1.06 ± 0.11

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