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Studies on the Various Physico – Chemical Parameters of dam Water in Irrukkankudi, Virudhunagar, Tamilnadu, India

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Abstract

This study is to be carried out to assess the physico-chemical parameters with reference to seasons in Irukkankudi Dam, Virudhunagar district, Tamil Nadu. The various water parameters such as temperature (TEM), Total dissolved solids (TDS), Electrical conductivity (EC) and chemical parameters such as p^H, Alkalinity and total hardness (TH) were carried out. In addition, the ions such as, sodium (Na), potassium (k), iron (Fe), magnisium (Mg), nitrate and nitrite were also analysed. From this we understand that the condition of this dam showed fluctuation in water qualities.

Keywords: Physical parameters, chemical parameters, electrical conductivity, seasonal variations.

Introduction

Water is a basic need of all living organisms on the earth. Water is in the form of ice caps, oceans and underground water etc., Most of our demand for water is fullfilled by rain water, which gets deposited in surface on ground water resources. Reservoirs are made by constructing dams across the rivers to serve a variety of purposes like industrial process, irrigation, Navigation, domestic water supply, fish culture, recreation and generation of hydroelectricity[1]. Many substances dissolved in water and because of this nature, water is rarely pure and its properties vary from pure substances. It is commonly found in all states of matter. Organic waste, if urban or rural from sewage and agriculture run off affects the quality of water[2]. In this study we refer various water qualities with reference to the physico-chemical characteristics of water reservoir in the vicinity of Irukkankudi.

The Study Site: The samples to be examined were collected from Irukkankudi dam that is situated near Irukkankudi Mariamman Temple 8 km away from Sattur Town. It is newly constructed dam across two major rivers such as Vaippar and Arjuna River. The surface density of the dam 56.850 meters, total depth of the dam is 54.850 meters, running water level of the dam 50,000 meters. More than 11 villages in that area are benefited by having water from this dam.

Methodology

In this study samples to be examined were collected during morning hours from a depth of one feet below the surface water. The water quality parameter such physical parameters, chemical parameters and ionic parameters were determined in various seasons such as summer, monsoon and winter according to standard method.

Results and Discussion

Season wise water quality parameters of Irukkankudi dam, Tamil Nadu, India has been presented in table 1 and figure-1 to 11 Bar diagrams.

Table-1
Showing the seasonal variations of physico-chemical characteristics of Irukkankudi Dam

S.No.	Parameters	Units	Summer	Monsoon	Winter
1.	Water Temperature	^{0}C	37^{0}C	32^{0}C	31^{0}C
2.	Turbidity	NTU	2.2	2.1	1.5
3.	Total Dissolved Solids	mg/l	449	775	494
4.	Electrical Conductivity	mic.mho/cm	680	1174	748
5.	P^H		8.1	8.1	8.0
6.	Total Alkalinity	mg/ml	162	202	166
7.	Total Hardness	mg/ml	113	117	119
8.	Calcium	mg/ml	31	32	32
9.	Magnesium	mg/ml	8	9	9
10.	Nitrite	mg/ml	0.05	0.21	0.04
11.	Nitrate	mg/ml	3	3	10

Physical Parameter: In this study, maximum water temperature 37°C was recorded in summer seasons and mimimum temperature 31°C was recorded in monsoon. Maximum temperature (37°C) in summer due to hyper solar radiation and high temperature (figure-1). The same results observed by Simpi *et al*. in Hosahalli tank, Karnataka.[3] For turbidity, the values were recorded in this dam 1.5 NTU to 2.2 NTU (figure-2). Maximum turbidity values were in summer and minimum turbidity values were during winter. It is due to abundant sewage waste and also due to excess growth of aquatic vegetation. Similarly the results have been reported by Verma *et al*. in Kalpi River, Gwalior[4].

In case of total dissolved solids (TDS) were recorded ranges from 449 mg/l to 775 mg/l (figure-3). 775 mg/l amount of total dissolved solids were during monsoon seasons, and 449 mg/l amount of TDS were in summer seasons due to receiving agricultural run off and sewage waste. The same results has been reported by Sinde *et al.* in Horsool-Savangi Dam, Aurangabad.[5] Recording electrical conductivity in this dam ranges from 680 mic.mho/cm to 1174 mic.mho/cm (figure-4). Maximum value of (EC) were recorded during monsoon, where as minimum were observed in summer seasons. From this fluctuation due to reflection of pollution status and tropic level of aquatic body of the river join the Irukkankudi dam.

Chemical Parameters: In p^H of this dam ranges from 8.0 to 8.1 (figure-5). High value of pH (8.1) was recorded during summer and low value of p^H (8.0) was recorded during winter seasons. It is indicate that the water is safe for growth of plant and living organisms.[6] While considering the total alkalinity of this dam water ranges from 162 mg/l to 202 mg/l (figure-6). Maximum value 202 mg/l was noted in monsoon and 162 mg/l was noted in summer seasons. It is due to anthropogenic activities beside this dam[7]. Similarly results have been recorded by Ayode *et al*. in Rivers Garhwal Himalaya[8].

In this dam water, total hardness ranges from 113 mg/l to 119 mg/l (figure-7). Total hardness is the sum of the molar concentration of calcium and magnesium in mol/l. Water was categorized in to hard water, solf water and very hard water according to WHO. In this study the maximum 119 mg/l total hardness recorded in winter and minimum total hardness (113 mg/l) in summer seasons. Similar results have been reported by Salve and Hiwar[9].

Ionic Parameters: In this present investigation, calcium amount were recorded from 31 mg/l to 32 mg/l (figure-8). Calcium amount were higher in monsoon where as lower in summer seasons. Similar results observed by Garg *et al* in Ramsagar reservoir[10]. Regarding magnesium, the amount was noted ranges from 8 mg/l to 9 mg/l (figure-9). In winter, maximum magnesium amount was in monsoon and in winter minimum magnesium amount was recorded where as moderate value was noted in summer. Similar results observed by Prathap Singh *et al.* on Kodaikanal lake.[11] The amount of nitrites recorded in this dam water ranges from 0.04 mg/l to 0.21 mg/l (Figure-10). In monsoon 0.21 mg/l maximum nitrites amount was observed and in winter 0.04 mg/l value was observed and moderate value in summer. The same results has been noted by Avnish K. *et al*. Kalpi River, Gwalior[12]. In case of nitrate of this dam value ranges from 3 mg/l to 10 mg/l (figure-11). During monsoon nitrate value was noted as minimum where as maximum nitrate (10 mg/l) value was noted in winter seasons.

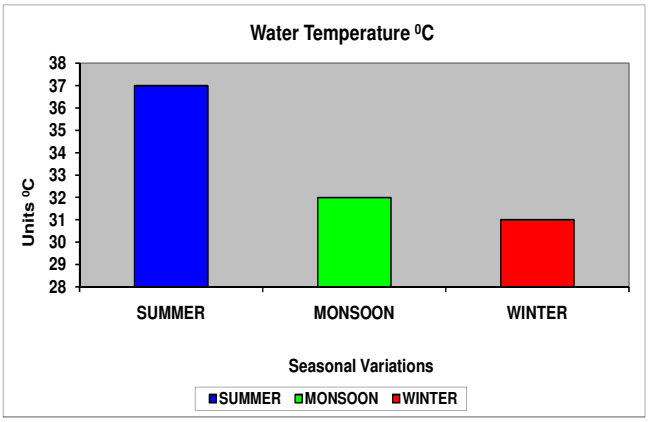

Figure-1

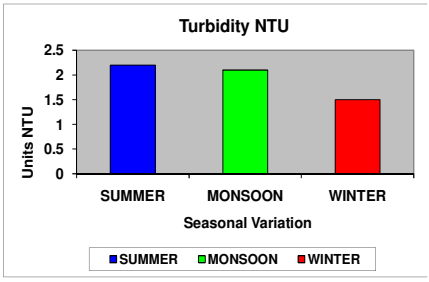

Figure-2

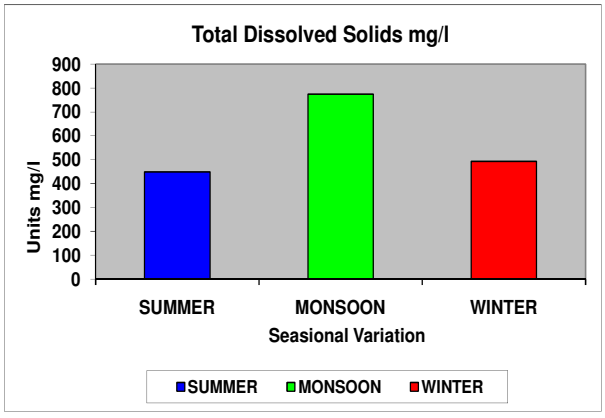

Figure-3

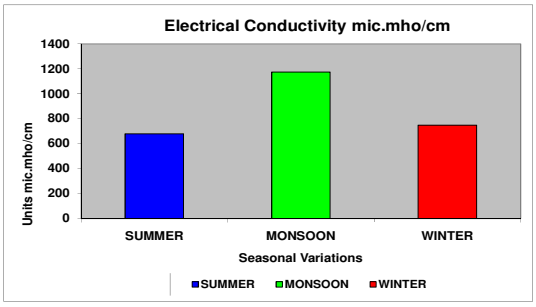

Figure-4

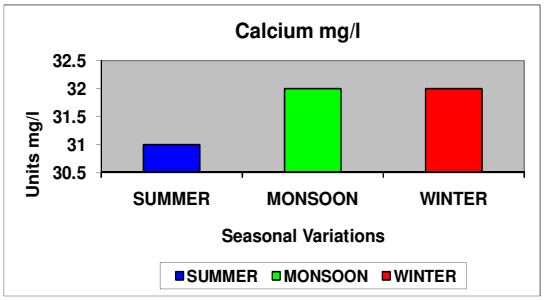

Figure-8

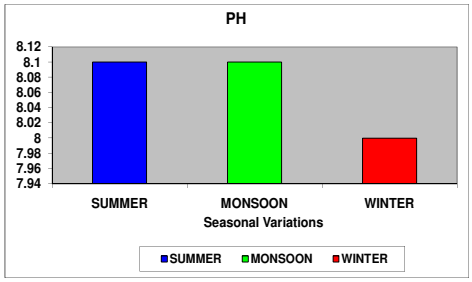

Figure-5

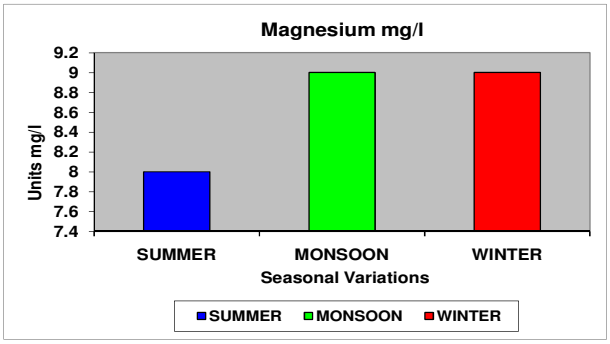

Figure-9

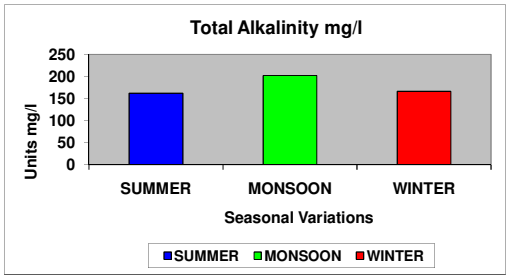

Figure-6

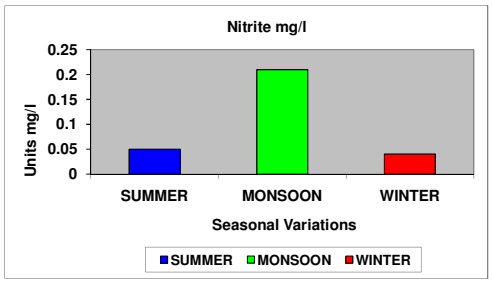

Figure-10

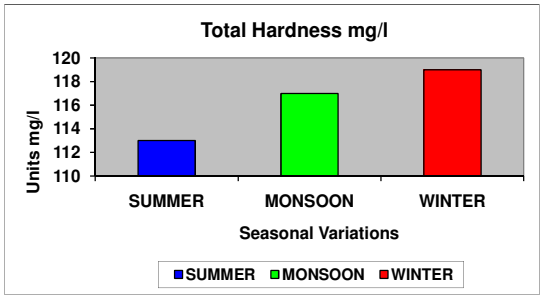

Figure-7

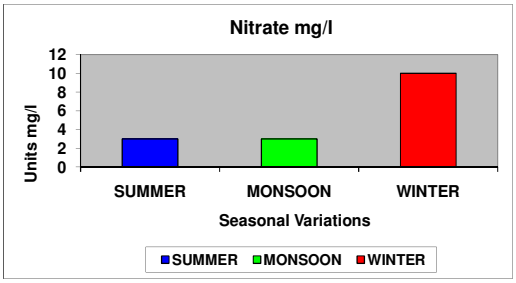

Figure-11

Figure-1 to 11
The Bar Diagrams showing Seasonal Variations of Physico-chemical characteristics of Irukkankudi Dam

Conclusion

The present study proves the seasonal changes in physical, chemical and ionic parameters of Irukkandkudi Dam water. Some parameters indicate that the reservoir is just above permissible limit in the monsoon seasons. If this condition exists more the dam water becomes inactive soon. So that steps should be take to reduce the pollution level and to maintain favorable condition for the growth of plant and living organisms.

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