

Studies on Certain Physico-Chemical Characteristic of Ajeet Sagar Dam, Khetri, Rajasthan

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Abstract – The present research work was conducted to investigate the physico-chemical Characteristics of ajeet sagar dam, khetri, jhunjhunu district, Rajasthan. The ajeet sagar dam was built by the Raja Ajeet singh of Khetri with aim of irrigation and drinking water for nearby rural areas. The physico-chemical Characteristics of water of this dam were determined using the methods described by APHA. All studied physic-chemical parameters in general appeared within permissible limits.

Keywords: Physico-Chemical Characteristics, Drinking Water, Ajeet Sagar Dam.

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INTRODUCTION

Water is considered one of the most essential and necessary ingredient for all living beings. Owing to the increasing world population growth and economic progress, our reliance on fresh water supplies has increased in the last century. As a result, fresh water supplies in many parts of the world have declined in terms of both quantity and quality. Due to manifold increase in population and industrialization has resulted in a rapid declined in water ecosystem (Simpi et al., 2011, Mohammad, M.J. et al., 2015). The health of water ecosystem and their biological diversity are directly related to health of almost every component of the ecosystem (Ramesh et al., 2007). The healthy aquatic ecosystem is depended on the physicochemical and biological characteristics (Venkatesharaju et al., 2010). Life in aquatic environment is largely governed by physico-chemical characteristics and their stability. Regular inspection of water quality is the first step that can lead to management and conservation of aquatic ecosystems. It is also valid that the protection of every aquatic environment is directed to the survival of its habitat by suitably preserving the physio- chemical content of water below appropriate levels (Garg et al., 2010). Ajeet sagar dam is very crucial temporary resource for the villagers residing around it in a thirst area like khetri town of Jhunjhunu district Rajasthan. Therefore, the Present investigation attempt to study of certain physic-chemical characteristics of ajeet sagar dam.

MATERIALS AND METHODS

Study Area

The study site ajeet sagar dam is locted in Khetri Town of Jhunjhunu. Khetri Region is located in south-eastern part of Jhunjhunu district, Rajasthan state with its geographical extension in between 27° 40' to 28° 17' north latitude and 75° 39' to 76° 12' east longitude. Geographical area of khetri is 11.31 sq.km. Ajeet Sagar dam [Bandh] is the famous Dam of the Jhunjhunu district, which is located in Bansiyal village and 11 km from Khetri. The ajeet sagar dam was built by the Raja Ajeet singh of Khetri.

Sampling and Analysis

Water samples were collected in the morning hours from two stations (A & B) during month from June 2017 to December 2017. Station A was in the center of dam, was least disturbed and Station B was southern side, was more disturb. Water samples were collected from surface area in clean and rinsed polyethylene sampling bottles and brought to the laboratory of Singhania University for analysis. The important physico-chemical Characteristics of water including temperature, water temperature, pH, transparency, dissolved oxygen, total alkalinity, Total Dissolved Solids and BOD were analyzed through methods given by Welch (1952) and APHA (2005)

RESULT AND DISCUSSION

The temperature plays a crucial role in chemical reaction and population variations of an aquatic ecosystem. The rises in temperature enhance the rate of chemical reactions and reduce the solubility of gases. Air temperature in present investigations ranged between 20.2°C to 39°C at both stations in ajeet sagar dam (Table 1 & 2). The average air temperature was 30.17°C at station A & B. The average water temperature 26.27°C and 26.82°C in station A and B respectively during June to December 2017. The water temperatures have direct relevance with air temperature as reported by Welch (1952) and Verma et.al., (2011) as surface water reacts quickly with changes in atmospheric temperature. The water temperature is slightly high in station B than station A of ajeet sagar dam. The Station B has anthropogenic disturbances, which have led to negative effects on the structure and functions of aquatic ecosystem (Gracelin, H.S and Kumar B.J.R., 2017).

In present investigation the average pH values in station A & B were 7.8 and 8.24. The water of Station A was found more alkaline in nature throughout the study period. The similar results also observed by various studies like Rajkumar (2005), Balai et al. (2016) and Patel et al., (2016). Alkaline state of pH might be due to the chemical buffering and release of bicarbonate and carbonate ions or salts (Sharma and Gupta, 2004).

The average transparency was 0.56m & 0.53m at station A and Station B respectively (Table-2). The transparency showing negative correlation with temperature in present study, similar results also recorded by Billore, 1981, Sankhla, 1981, Shekhawat, 1983 and Sahni & Yadav (2012).

Dissolved oxygen is a very vital aquatic parameter; it is essential to aquatic ecosystem. It has crucial role in the respiration process. Enough dissolve is necessary for good water quality. In the present Investigation, the DO average values 7.62mg/l & 6.17mg/l in station A and station B as shown in table 2. Previous investigation reported by Tarzwell (1957), Benerjee (1967) and Mohammad, M.J. (2015). It reported that the DO concentration of approximately 5 mg/l was found to be productive throughout the year for aquatic life. Since water DO levels dip below 5.0 mg/L, a lot of life forms are being stressed (Boman et al., 2008).

Normal water alkalinity is attributable to carbonate, bicarbonate and silicate phosphates salts and hydroxyl ions. In the current research, the average alkalinity values in stations A and B during the time analyzed were 71.18 mg/l & 72.66 mg/l. Goldman & Wetzel man (1963) and Sreenivasan (1964) reported the direct relation of alkalinity to productivity. The degradation of plants, living organism and organic waste might also be one of the reasons for increase in a carbonate and bicarbonate, resulting an increase in

alkalinity value (Jain et al. 1997, Chaurasia and Pandey 2007).

Total Hardness of water is due to calcium and magnesium carbonate in the water. In present study, the average total hardness in station A and Station B were 324.72mg/l & 329.24mg/l during June-December 2017. Hardness is a measure of the consistency of the water, based on the concentration of calcium, magnesium, sulphate chloride, or other mineral acid anions. Hardness is directly positively correlated with temperature as shown in present study because high temperature increases the evaporation of water. Hutchinson (1957) and hujare (2008) findings support the present study.

The average value of BOD were 6.28mg/ and 6.70mg/l (2017) & 6.58mg/l (2016) in station A and station B. The station B is showing slightly higher BOD value than station A. The similar results also reported for higher values of B.O.D. in Swaroop sagar lake ranging between 4.6 ppm to 14.0 ppm by Shekhawat (1983). B.O.D. values for Rang sagar lake have been reported to range between 7.8 to 14.2 ppm (Shukla, 1986).

In the present analysis, the excessive B.O.D. values are representative of water contamination due in particular to emissions from cattle excreta and garbage. The BOD show positive correlation with temperature, Total Alkalinity, pH, Chloride and TDS while negative with DO and Transparency in present study which are similarly supported in the work of Shekhawat (1983), Shukla (1986), Gautam (1999), Patra et al. (2010), and Mohammad, M.J. (2015).

Table-1:- Monthly physico-chemical limnological characteristics of water at station A&B (surface) in ajeet sagar dam, during June 2017 to December 2017

Parameters	Station A								Station B							
	June 2017	July 2017	August 2017	Sept. 2017	Oct. 2017	Nov. 2017	Dec. 2017	June 2017	July 2017	August 2017	Sept. 2017	Oct. 2017	Nov. 2017	Dec. 2017	June 2017	July 2017
Air Temperature (°C)	39.2	36.4	34.7	32.4	27.2	25.8	20.2	39.2	36.4	34.7	32.4	27.2	25.8	20.2	39.2	36.4
Water Temperature (°C)	34.0	31.8	30.0	27.8	25.7	20.6	14.0	34.8	32.2	30.7	31.0	23.4	18.4	17.3	34.8	32.2
Ph	7.8	7.4	7.5	7.6	8.2	8.1	8.3	8.6	7.8	7.5	7.8	8.4	8.7	8.9	8.6	7.8
Transparency (m)	0.50	0.45	0.40	0.46	0.49	0.80	0.86	0.44	0.31	0.37	0.43	0.52	0.89	0.77	0.44	0.31
Dissolved oxygen (mg/l)	5.7	6.8	7.2	7.4	8.1	8.4	9.9	5.3	5.7	6.2	6.8	5.8	6.2	7.2	5.3	5.7
Total alkalinity (mg/l)	106.04	92.08	84.27	81.44	72.10	62.38	63.20	109.23	98.84	87.36	84.16	70.33	58.72	60.85	109.23	98.84
Total Hardness (mg/l)	372.2	375.2	352.5	314.9	267.6	318.6	272.1	378.2	390.6	350.2	321.8	268.8	316.6	277.8	378.2	390.6
BOD (mg/l)	9.2	7.3	6.8	6.9	5.4	4.8	3.6	9.8	9.2	7.8	6.7	5.0	4.2	3.4	9.8	9.2

Table – 2:- Average of physico-chemical characteristics of water at station A&B (surface) in ajeet sagar dam, during June 2017 to December 2017

Parameters	Station A	Station B
Air Temp.	30.17 ^o C	
Water Temp	26.27 ^o C	26.82 ^o C
pH	7.8	8.24
Transparency (m)	0.56	0.53
Dissolved oxygen (mg/l)	7.64	6.17
Total alkalinity (mg/l)	71.18	72.66
Total Hardness (mg/l)	324.72	329.24
Total Dissolved Solids (mg/l))	832	880.42
BOD (mg/l)	6.28	6.70

CONCLUSIONS

All the physico-chemical parameters in general appeared within permissible limits prescribed by different researchers. Hence, it can be inferred that the ajeet sagar dam is suitable for drinking, irrigation, etc. These findings are also showing that anthropogenic activity disturbing the physic-chemical characteristics of aquatic ecosystem which may harmful for human being.

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