

## **Analysis of Water Quality by Physico-Chemical Parameters in Fateh Sagar Talab in Bagar, Dist. of Jhunjhunu (Raj.), India**

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**Abstract:** *This Paper Present to study of the Physico-chemical Parameters of Fateh Sagar Talab in Bagar of Jhunjhunu district in Rajasthan. The study was carried out for a period of one year i.e. July 2012 to June 2013. Water samples were collected monthly from surface water and analyzed for Temp, pH, electric conductivity, total hardness, Alkalinity, TDS (Total dissolved solid), chloride, DO (Dissolved oxygen). This study was aimed to estimate current status of Physico-chemical characteristics.*

**Keywords:** *Water sample, physico-chemical parameters, pollution, aquatic organisms.*

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### **I. Introduction**

Water of adequate purity which is the life blood of our species, is of vital importance in the existence of life [1]. Fresh water is one of the most important natural resources crucial for the survival of all living beings. It is even more important for human beings as they depend on it for food production, industrial and waste disposal, as well as cultural requirements [2]. Ponds have been used since time immemorial as traditional source of water supply in India.

Water quality generally means the component of water which must be present for optimum growth of aquatic organisms. The productivity depends on physico-chemical characteristics of the water body. The determinant of good growth in water body includes dissolved oxygen, hardness, turbidity, alkalinity, nutrients, temperature, etc. Conversely, other parameters like biological oxygen demand, and chemical oxygen demand indicate pollution level of a given water body. In most water bodies, various chemical parameters occur in low concentrations. However, the water of the ponds, lakes and river is polluted mainly due to discharged waste water from residential areas, sewage outlets, solid wastes, detergents, automobile oil wastes, fishing facilities and agricultural pesticides from farmlands [3]. Water resources are declining day by day at the faster rate due to rapid urbanization and population load. Deterioration of the water quality is now a very big problem. Increasing water pollution causes not only the change of water quality but also threatens human health and the balance of aquatic ecosystems, economic development, and social prosperity. Therefore, urgent to need to take the important step toward applying an appropriate quality management plan in order to eliminate water pollution.

### **II. Materials And Methods**

The physico-chemical characteristics of water is important determinant of the aquatic system. Their characteristics are greatly influenced by climatic vegetation and general composition of water. The water samples were collected from different sites in plastic bottles and transported immediately to the laboratory in bottles to avoid unpredictable changes in different physico-chemical parameters. The samples were put to examination in the laboratory of Govt. Lohia P.G. college, Churu to determine some physico-chemical parameters. The selected parameters including water temperature, pH, EC (electric conductivity), TDS (total dissolved solids), TH (total hardness, Cl<sup>-</sup>, DO (Dissolved oxygen), alkalinity were analyzed.

The present study was carried out in the month of July, 2012 to June 2013 for these water ponds of Bagar of District Jhunjhunu in Rajasthan. Observation and analysis were done every month however, the results are expressed on seasonal basis as variation was of less magnitude. Three clearly defined seasons were identified as rainy (July-October), winter (November- February) and summer (March-June). The sampling was done during morning hour (7:30 to 10:30 am).

### **III. Study Area**

In present study involves the analysis of water quality in terms of Physico-chemical parameters of Fateh Sagar Talab, Bagar district of Jhunjhunu in state of Rajasthan. It is located in 28.18° N Latitude and 75.50° E longitude. It is a large reservoir built by the Ojha family in very earlier time. The pond water was originally used for bathing purposes by local people, a ramp on one side at the back was built for animals to come and drink water.

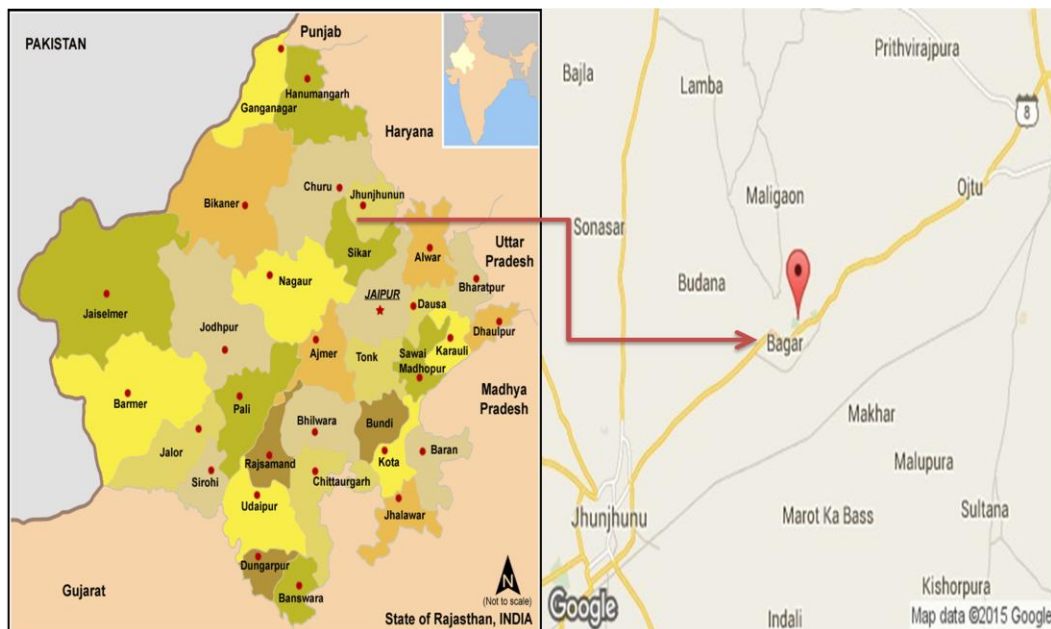


Fig. 1. Map of Jhunjhunu district in state of Rajasthan (India).



Fig. 2: Fateh Sagar Talab in Bagar, district Jhunjhunu in Rajasthan

#### IV. Result And Disussion

The physico-chemical parameters are essential and fundamental to know the tropical status of an aquatic ecosystem. Table No. 1 represent the seasonal variation in physico-chemical parameters of the Fateh Sagar Talab.

**Table 1 Seasonal Variation of Physico-chemical Parameter in Fateh Sagar Talab, Jhunjhunu (Rajasthan) during 2012 - 2013. (All parameters are in mg/l exept temp, EC and pH)**

S.No.	Parameter	First year			Second year		
		Mansoon	Winter	Summer	Mansoon	Winter	Summer
1	Temperature	22.4	15.5	29.5	21.6	14.1	29.4
2	pH	7.3	7.9	8.2	7.2	7.7	8.3
3	Electric conductivity	0.30	0.32	0.56	0.28	0.33	0.55
4	TDS	233.21	263.64	301.11	254.74	266.68	309.91
5	Chloride	73.01	86.94	103.67	70.94	85.42	102.49
6	Alkalinity	111.99	144.16	150.65	108.86	138.47	149.23
7	Hardness	33.16	74.18	100.74	41.8	61.7	102.54
8	Dissolved oxygen	5.18	5.71	4.36	5.24	6.02	4.32

#### **4.1 Water Temperature:**

Water temperature directly as well as indirectly influences many abiotic and biotic components of aquatic ecosystem. It is the basic environmental factor that effects chemical and biological reaction in water. All the metabolic and physiological activities of life processes are greatly influenced by water temperature. Water temperature is important for calculating the solubility of oxygen and carbon dioxide and bicarbonate and carbonate equilibrium [4]. During winter month the water temperature was found to be minimum, whereas the summer month exhibited the maximum water temperature. Many workers observed similar trends while working on different water bodies [5, 6, 7, 8). In the present investigation atmospheric temperature varied from 15.95°C to 29.45°C. Rise in temperature speed up the biochemical reactions and reduce the solubility of gases. The atmospheric temperature was always found higher than the water temperature.

#### **4.2 pH:**

pH is considered as an important ecological factors and is the result of the interaction of various substances in solutions in the water. It is the scale of intensity of acidity and alkalinity of water and measure the concentration of H<sup>+</sup> ions. In the present investigation, the pH is recorded between 7.7 to 8.2 in Fateh Sagar Talab. The maximum pH were reported during summer seasons and minimum during monsoon. High values of pH during summer might be low water levels and concentration of nutrients in water. The decrease pH values were due to dilution caused by the rainwater during monsoon. Jakher and Rawat [9] observe the maximum pH during summer and explained this by correlating rise of temperature with increase in rate of photosynthesis which results in higher consumption of carbon dioxide. Kataria et al. [10] observe that maximum pH in the months of May indicates high rate of photosynthesis.

#### **4.3 Electrical Conductivity:**

The specific conductivity of water or a solution in its capacity to conduct electric current and depends on the nature and concentration of ionized salts. The conductivity of a sample is a numerical expression of its ability to carry on electric current which in turn depend on the ionic strength. In the present investigation seasonally maximum conductivity was recorded during summer season and minimum recorded during the monsoon season. It ranged from 0.28 to 0.56. Narayana et al. [11] recorded the maximum conductivity during the summer season in Basavanbole tank at Sagar taluk of Shimoga district. Kedar et al. [12] too recorded the maximum conductivity during the summer and minimum during the monsoon season in Yedshi lake in Mangarulpir tahsil of Washim district, Maharashtra.

#### **4.4 Total dissolved solid:**

In the present investigation, high values of total suspended solids during summer and lower in monsoon. It ranged from 233.21 mg/l to 309.91 mg/l were recorded. Higher values of TDS during summer can be attributed to low water level and high rate of evaporation of water and addition of calcium and magnesium salts and lower in rainy due to dilution. Same result are also founded by Rao et al [13] and Jena et al. [14].

#### **4.5 Alkalinity:**

Alkalinity is a measure of buffering capacity of the water. It is generally imparted by the salts of carbonates, bicarbonates, phosphate, nitrates, borax, silicates etc., together with the hydroxyl ions in a free states [15]. In the present investigation the total alkalinity ranged 108.86 mg/l. to 150.65 mg/l. The alkalinity values were maximum during summer and minimum during monsoon. The increased alkalinity during summer and winter was due to the concentration of nutrients in water. The decrease was due to dilution caused by the rainwater during monsoon. The result is also in close conformity with the finding of Mishra et al [16] and Arya et al. [17].

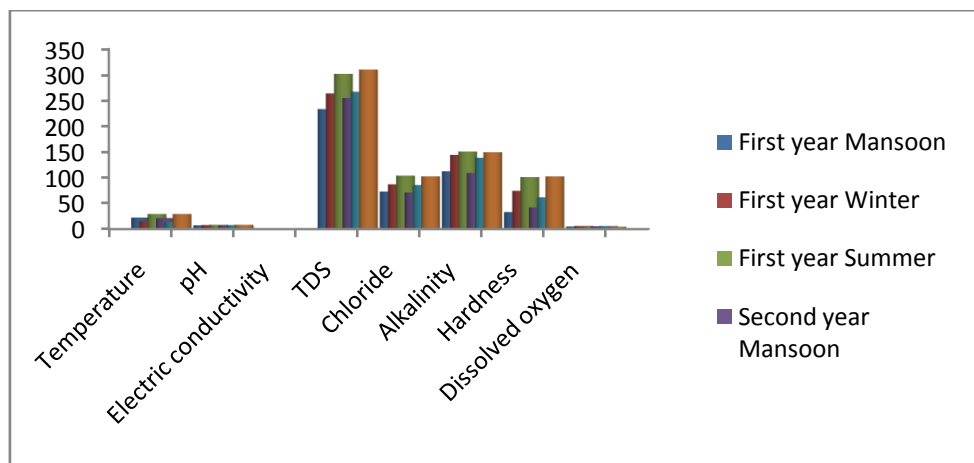


Fig. 3: Comparative study of two year Physico-chemical parameter during 2012-2014.

#### 4.6 Total Hardness:

Total hardness of water is the sum of the concentrations of alkaline earth metals cations. Hardness is generally governed by calcium and magnesium salts which largely combines with bicarbonates and carbonates giving temporary hardness and with sulphates, chlorides and others anions of a minerals acids causing permanent hardness. In the present investigation the total hardness was recorded in the range of 33.16 mg/l. to 102.54 mg/l. Total hardness were higher during the dry season and lower in rainy season. This could be as a result of low water levels, increases in rate of evaporation at high temperature and the lower rainy season value could be due to dilution. Similar observations were found by various workers [18, 19, 20, 21]. Kiran [22] reported that water can be categorised according to degree of hardness as soft (0-75 mg/l) moderately (75-150 mg/l) hard, hard (150- 300 mg/l) and above 300 mg/l-1 as very hard. On the basis of the observation, the water of the present pond appears to be hard.

#### 4.7 Chloride:

Chloride as anion occurs in all natural waters in widely varying concentrations. The origin of chloride in surface water is from weathering and leaching of sedimentary rocks, domestic and industrials wastes discharge, municipal influence etc. In the present investigation, the values of chloride recorded are as under 70.94 mg/lit. to 103.67 mg/lit. The chloride content was at its peak in summer and lowers down during rainy season. The higher concentration of chloride is considered to be an indicator of pollution. Concentration of higher chloride in the summer period could be also due to sewage mixing and increased temperature and evaporation by water. Similar result were obtained by Trivedi et al. [23].

#### 4.8 Dissolved oxygen

Dissolved Oxygen levels are considered as the most important and commonly employed measurement of water quality and indicator of a water body's ability to support desirable aquatic life. Like terrestrial animals, fish and other aquatic organisms need oxygen to live. Dissolve oxygen plays an important role in precipitation and dissolution of organic substances in water. In the present investigation the values of dissolve oxygen recorded ranges between 4.32 mg/lit. to 6.02 mg/lit. in Fateh Sagar Talab. In the present investigation the high values of dissolve oxygen during winter seasons was due to low temperature and high photosynthetic activities and low values of dissolve oxygen during summer is due to high temperature and high rate of oxidation of organic matter, lesser solubility of gase at high temperature and high metabolic rate of organisms. The oxygen concentration also decreases with increase in the salinity. Same observations were found by various workers [24, 25]. Hazalwood and Parker [26] stated that the maximum dissolve oxygen in winter may be due to low atmospheric temperature and minimum dissolve oxygen in summer may be due to high metabolic rate of organisms. Salve and Hiware [27] observe maximum dissolve oxygen was recorded during the winter and minimum during the summer season from Wana Prakalp reservoir, Nagapur.

### V. Conclusion

Understanding the quality of water is as important as that of its quantity, since, it is the main factor determining the suitability of water for drinking, agricultural, domestic and industrial purposes [28]. In the Present study provides a base line data for the conservation and monitoring of the pond. It was found that the pond water was unsafe for drinking purposes. Therefore some effective measures are required to enhance the

drinking water quality by conservation of water bodies and making water quality management plan for this region.

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### References

- [1] A. U. Uduma and M.B. Uduma, Physico-chemical analysis of the quality of Sachet water consumed in Kano metropolis. *Americal Journal of Environmnt Energy and Power Res*, (2)1, 2014, 01-10.
- [2] S. Abdullah, M.A. Iqbal, M.I. Fazil, Physico-chemical Analysis of the Fresh Water at Kundalika Dam, Upli Dist. Beed, (M.S.) India. *Global Journal of Environmental Research*, 4 (1), 2010. 01-05.
- [3] M.M. Bhat, K. Narain, A. Ahmad, R.N. Shukla and M. Yunus, Seasonal Variations of Physico-chemical Characteristics in several Ponds of Lucknow city affected by Urban Drainage. *Advanced in Environmental Biology*, 6(10), 2012, 2654-2663.
- [4] G.E. Hutchinson, A treatise on limnology Vol. I & II Geography, Physics and Chemistry. John Willey Inc. New York, 1957.
- [5] B.K. Dwivedi and G.C. Pandey, Physico-chemical factors and algal diversity of two ponds, (Girija Kund and Maqubara pond), Faizabad. *Poll. R.S.* 21, 2002, 361-370.
- [6] V. Kannan and S.V. Job, Diurnal depth-wise and seasonal changes of physico-chemical factors in Sathiar reservoir. *Hydrobiologia*, (70)1-2, 1979, 103-117.
- [7] R.R. Mishra, B. Rath and H. Thatoi, 2008. Water Quality Assessment of Aquaculture Ponds Located in Bhitarkanika Mangrove Ecosystem, Orissa, India. *Turkish Journal of Fisheries and Aquatic Sciences*, 8, 2008, 71-77.
- [8] R. Sharma and A. Capoor, Seasonal Variations in Physical, Chemical and Biological Parameters of Lake Water of Patna Bird Sanctuary in Relation to Fish Productivity *World Applied Sciences Journal*, 8 (1), 2010, 129-132.
- [9] G.R. Jakher and M. Rawat, M. Studies on physico-chemical parameters of a tropical lake, Jodhpur, Rajasthan, India. *Journal of Aquatic Biology*, 18(2), 2003, 79-83.
- [10] H.C. Kataria, S.A. Iqbal and C.B. Chandilya, Limnochemical studies of Tawa reservoir. *Indian Journal of Environment Protection*, 16(11), 1996, 841-846.
- [11] J. Narayana, R. Purushothama, B.R. Kiran, K.P. Ravindrakumar and E.T. Puttah, Investigation of drinking water quality of Basavanahole Tank with reference to physical chemical characteristics. *Fundamental of limnology*. 2005, 201-206.
- [12] G.T. Kedar, G.P. Patil and S.M. Yeole, Rotifer biodiversity of Yedshi lake, Maharashtra. *Journal of Aquatic Biology*, 22(1), 2007, 8-12.
- [13] C.S. Rao, B.S. Rao, Hariharan, A.V.L.N.S.H. and Bharathi, M.N. 2010. Determination of water quality index of some areas in Guntur District Andhra Pradesh. *International Journal of Applied. Biol. Pharma.Technol*, 2010, 79-86.
- [14] V. Jena, S. Dixit, R. Shrivastava and S. Gupta, Study of Pond water quality by the assessment of physico-chemical parameters and water quality index. *International Journal of Applied Biology and Pharmaceutical Technology*, 4(1), 2013, 47-52.
- [15] C.K. Jain and P.V. Seethapati, Limnological studies of kay Amkula Lake. *Indian Journal of Environment Protection*, 16, 1996, 61-568.
- [16] M.K. Mishra, N. Mishra and D.N. Pandey, An assessment of physico-chemical characteristics of Bhamka pond, Hanumana, Rewa District, India. *International Journal of Innovative Research in Science, Engineering and Technology*, 2(5), 2013, 1781-1788.
- [17] S. Arya, V. Kumar, M. Raikwar, A. Dhaka and Minakshi. 2011. Physico-chemical Analysis of Selected Surface Water Samples of Laxmi Tal (Pond) in Jhansi City, UP, Bundelkhand Region, Central India *Journal of Experimental Sciences*. 2(8), 2011, 01-06.
- [18] A. Kumar, Observation on the diel variations in abiotic and biotic components of the river Mayurakkshi (Santal Pargana), Bihar. *Indian. Journal of Ecology*, 22(1), 1995, 39-43.
- [19] S. Naik and K.M. Purohit, K.M, "Physicochemical analysis of some community ponds of Rourkela", *International Journal of Environment and Pollution*, 16(9), 1996, 679-684.
- [20] M.S.R. Nair, Seasonal variations of physicochemical factors and its impact on the ecology of a village pond at Imala (Vidisha)". *Journal of Ecobiol.* 12(1), 2001, 21-27.
- [21] P. Yadav, V.K. Yadav, A.K. Yadav and P.K. Khare, Physico-chemical Characteristics of Fresh Water Pond of Orai, U.P. *Central India. Octa. Journal of Bioscience*, 1(2), 2013, 177-184.
- [22] B.R. Kiran, 2010. Physico-chemical characteristics of fish ponds of Bhadra project at Karnataka, *RJCABP*, 3, 2010, 671-676.
- [23] P. Trivedi, A. Bajpai, A. and S. Thareja, Evaluation of Water Quality: Physico-Chemical characteristics of Ganga river at Kanpur by using correlation study. *Nature and Science*, 1(6), 2009, 91-94.
- [24] M. Ali, A. Salam and M.Z. Hussain, 1994. "Effect Of Seasonal Variations on Physico-chemical Parameters of Zaidi Fish Farm", *Punjab Univ. Journal of Zoology*, 9, 1994, 53-58.
- [25] A. Salam, M. Ali, B.A. Khan and S. Rizvi., "Seasonal changes in physico-chemical parameters of river Chenab Muzaffar Garh, Punjab, Pakistan", *Journal of Biology Science*, 4, 2000, 299-301.
- [26] D.H. Hazelwood, and R.A. Parker, Population dynamics of some freshwater zooplankton. *Journal of Ecology*. 42, 1961, 266-274.
- [27] B.S. Salve and C.J. Hiware, C.J., Studies on water quality of Wanaprakalpa reservoir, Nagapur near Parali Vajjnath, Dist. Beed, Marathwada region. *Journal of Aquatic Biology*, 21(2), 2006, 113-117.
- [28] S. Venkateswaran, M. Elangomannan, M. Suresh, M.V. Prabhu, Evaluation of Physico-Chemical Characteristics in Groundwater Using GIS –A case Study of Chinnar Subbasin, Cauvery River, Tamil Nadu, India. *CLEAR IJRAGS*, 1(1), 2011.