

A study on Physico-chemical parameters of Bilpan Pond District Dungarpur (Rajasthan)

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Abstract: The Bilpan pond is situated near Karawara village in Dungarpur, Rajasthan. This medium-sized pond is mainly constructed for irrigational purposes. Hills, agricultural fields, and the village of Karawara surround it. The present study deals with the changes in physico-chemical parameters, and we observed that the range of water temperature varied from 18.6 °C to 37.6 °C, the pH of the water sample ranged from 7.1 to 8.9, the dissolved oxygen value ranged from 5.12 mg/L to 6.83 mg/L, the total alkalinity of the pond was ranged from – 183 mg/L to 228 mg/L, the phosphate value ranged from 0.22 mg/L to 1.89 mg/L, the Nitrate value ranged from 0.20 mg/L to 0.78 mg/L and the TDS value ranged from 251.84 mg/L to 338.49 mg/L. These parameters were observed and analyzed from February 2020 to January 2021. The physical parameters, such as water temperature and pH, were recorded using a Thermometer and Digital pH Meter (Hanna). The chemical parameters of water, such as dissolved oxygen, total alkalinity, Phosphate, Nitrates, and TDS, were determined by a Digital meter (Hanna). Monthly sampling was done at both sampling stations from 9.00 am - 11.00 am.
Keywords- Physico-chemical parameters, Bilpan Pond, Freshwater.

I. INTRODUCTION-

Freshwater resources like ponds, rivers, dams, etc., are used for many purposes, such as agriculture, industrial, household, and environmental activities. Freshwater resources are precious for life on earth. The number of dams, reservoirs, tanks, etc., is increasing in our country. The development of fisheries in these freshwater resources needs to be improved through scientific development (Bhalerao, 2012). Ponds are essential wetlands in and around human settlements because they are semi-natural ecosystems created by man in the landscape that allow water to stagnate. The ecological quality of a pond is regulated by water quality. Water supports life on this planet, around which the entire fabric of life is woven. Water is essential for all lives, from microorganisms to man. Now a day, due to unplanned urbanization and industrialization, all water resources have reached a point of crisis (Sugunan, V. V. 1995a). The water quality is characterized by various Physicochemical parameters, which change widely due to many factors like water source, pollution, seasonal fluctuations, and human activities (Sharma et al., 2017; Singh et al., 2002; Parikh and Mankodi, 2012). Fish species are a good indicator of ecological health, and the abundance and health of fish will show the health of water bodies (Mohan et al., 2013; Chaudhuri, 2010). Some chemical components frequently examined in hydro-biological studies include the physico-chemical parameters such as water temperature, pH, alkalinity, nitrate, and phosphate. Only 2.8% of Earth's water is fresh (Ramanathan and Amsath, 2018).

The presence of water on the earth's surface has resulted in the existence of life, which is a major natural gift for life. Freshwater bodies and humans have an unbreakable and irreplaceable relationship. They are the primary water source for drinking, irrigation, and other domestic purposes, and they help recharge groundwater (Avinash and Prabhakar, 2009). Water is a valuable natural asset, a prime natural resource, and a basic human need. It is, without a doubt, required in all aspects of life and health to produce food, agricultural activity, life, energy generation, and the environment (Tiwari, 2000).

II. MATERIAL AND METHODS

Sampling area



Fig- 1 Sampling station 1 Bilpan Pond



Fig- 2 Sampling station 2 Bilpan Pond



Fig – 3 Study sites.

Materials and Methods - The study area of Bilpan Pond (Fig 1 and Fig 2) is in Jhonthri Tahsil of Dungarpur District, Rajasthan, India. The pond is located at a latitude of 23° 35'10" and a longitude of 73° 44'20". The catchment area of this pond is 17.61 sq. km. It is its catchment area also. The total yield available from this pond is 142.05 Mcft, while the gross capacity of this pond is 96.40 Mcft and the live storage capacity is 94.40 Mcft. The maximum height of this pond is 53.63 Ft, and the whole tank level is 435.50. This pond is earthen. It is helpful in irrigation and domestic use. The Gross command area of this pond is 620.00 Acres. The water samples were collected monthly from all four stations during the year 2020-2021 respectively and analyzed by the standard method of (APHA, 2005). In the present investigation following physico-chemical parameters were analyzed.

III. RESULTS AND DISCUSSION

Physical parameters

Temperature - During the study period, water temperature varied from 18.6°C to 37.6°C. The minimum temperature (18.6°C) was observed during January 2021, and the maximum temperature (37.6°C) was observed during June 2020. These results are in favour of Verma, (2016).

Chemical parameters

pH: During the present investigation, the pH of the water sample ranged from 7.1 in January 2021 to 8.9 in February 2020. This range indicates that the water is alkaline. These results are in favour of Singh (1983).

Dissolved oxygen: During the present investigation, the dissolved oxygen value ranged from 5.12 mg/L in April 2020 to 6.83 mg/L in January 2021.

Total alkalinity: During the present investigation, the total alkalinity of the pond ranged from – 183 mg/L. in February 2020 to 228 in April 2020.

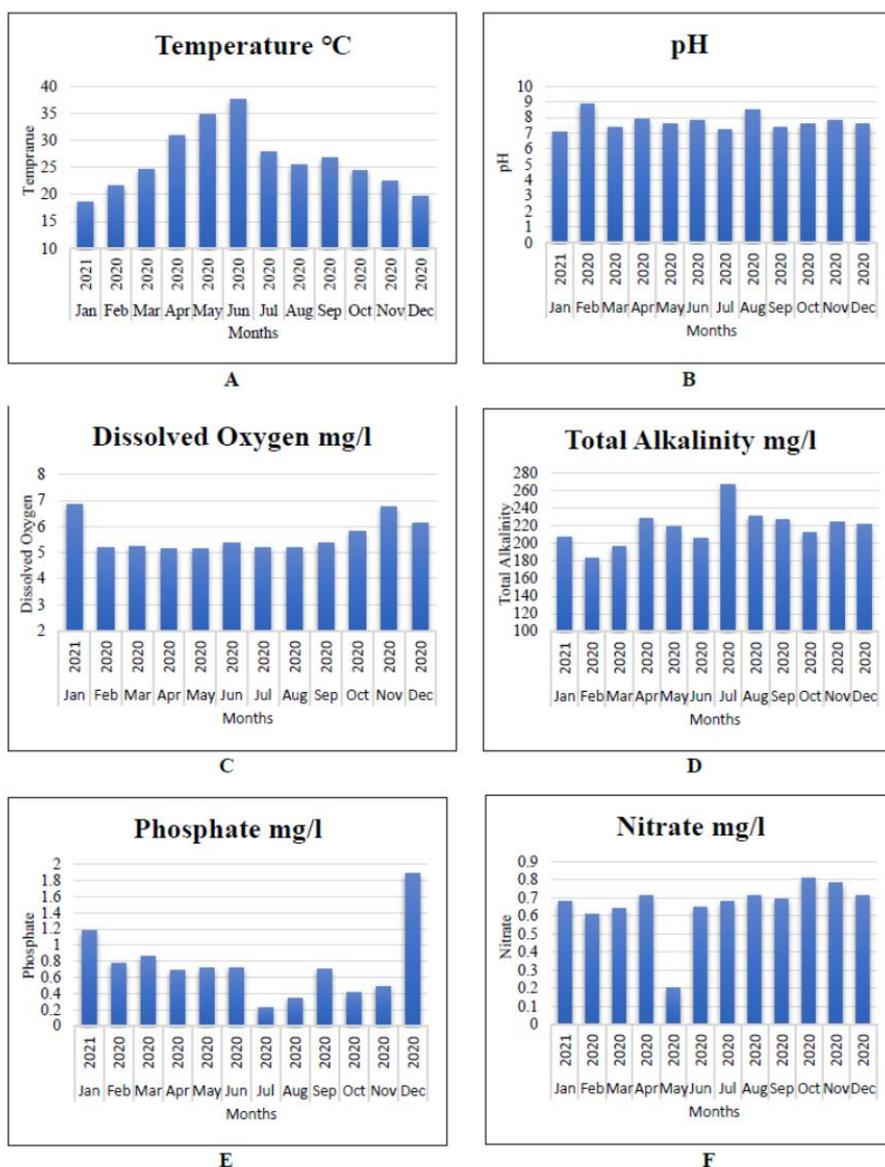
Phosphate: During the present investigation, the phosphate value ranged from 0.22 mg/L in July 2020 to 1.89 mg/L in December 2020.

Nitrates: During the present investigation, the Nitrate value ranged from 0.20 mg/L in May 2020 to 0.78 mg/L in November 2020.

TDS: During the present investigation, the TDS value ranged from 251.84 mg/L in February 2020 to 338.49 mg/L in August 2020. Our results are similar to Goel, Khatavkar, Kulkarni and Trivedi (1986).

The data on the physicochemical analysis of Bilpan pond water has been given in the table.

Physico -Chemical Parameters/ Months	Temp. °C	pH	DO mg/lit.	Total Alkalinity mg/lit.	Phosphate	Nitrates	TDS
Feb 2020	21.62	8.9	5.19	183.05	0.78	0.61	251.84
March 2020	24.61	7.4	5.25	196.02	0.86	0.64	298.41
April 2020	30.88	7.9	5.12	228.03	0.69	0.71	305.23
May 2020	34.69	7.6	5.16	218.86	0.71	0.20	294.18
June 2020	37.64	7.8	5.36	205.58	0.72	0.65	280.68
July 2020	27.86	7.2	5.18	267.45	0.22	0.68	260.49
August 2020	25.42	8.5	5.17	231.59	0.34	0.71	338.49
September 2020	26.81	7.4	5.38	227.45	0.70	0.69	297.58
October 2020	24.43	7.6	5.79	212.49	0.41	0.81	294.57
November 2020	22.46	7.8	6.75	224.12	0.49	0.78	269.81
December 2020	19.58	7.6	6.14	221.26	1.89	0.71	300.87
January 2021	18.6	7.1	6.83	207	1.18	0.68	268.94



Graph of Physico-chemical Parameters

IV. CONCLUSIONS

A study of Physico-chemical parameters of Bilpan pond, Jhonthri tehsil (Dungarpur, district, Rajasthan) was carried out by considering important parameters like temperature, pH, dissolved oxygen, total alkalinity, etc., from February 2020 to January 2021.

REFERENCE

- [1]. Bhalerao, S.N. (2012). Study of fish diversity and water quality at kasar sai dam, hinjewadi, Pune, MS, India. *I. Res. J. Biological Sci.*, 1(4), 51-55.
- [2]. Sugunan, V.V. (1995a) Reservoir Fisheries of India, *F.A.O. Fisheries Tech.*, 345,
- [3]. F.A.O. Rome.
- [4]. Sharma, I., Dhanze, R. and Rana, P. (2017). Physico-chemical parameters of lentic water bodies from Mid- Himalayan region (H.P.) India. *International Journal of Fisheries and Aquatic Studies*, 5(2), 674-678.
- [5]. Singh, S. P., Pathak, D. and Singh, R. (2002). Hydrobiological studies of two ponds of Satna (M.P) India. *Ecol. Env. & Cons.*, 8(3), 289-292.
- [6]. Parikh, A. N. and Mankodi, P.C. (2012). Limnology of Sama pond, Vadodara city Gujrat. *Res. J Rec. Sci.*, 1(1), 16-21.
- [7]. Mohan, V. C., Sharma, K. K., Sharma, A. and Watts, P. (2013). The study of ichthyofaunal diversity of Chennai hydroelectric reservoir, Udhampur (J&K) India. *Int. Res. J. Environment Sci.*, 2(6), 8-12.
- [8]. Chaudhuri, S.K. (2010) Freshwater fish diversity information system as a basis for a sustainable fishery. Department of Library and Information Science, Jadavpur University, Kolkata, 32.
- [9]. Verma, A. K. (2016). Hydrobiological studies of Muntjibpur pond of Allahabad (UP). *International Journal on Agricultural Sciences*, 7(2), 164-166.

- [10]. Singh S. R. (1983). Observation of the seasonal variation in the water quality of Dah lake (Ballia). Proc. Nat. Acad. Sci. India. 53(B):142-147.
- [11]. Goel P. N, Khatavkar A. Y, Kulkarni A. Y, Trivedi R. K. (1986). Limnological studies of a few freshwater bodies in southwestern Maharashtra with special reference to their chemistry and pollution. Poll. Res. 5(2):79-84.
- [12]. Ramanathan, S., & Amsath, A. (2018). Seasonal variations in physico-chemical parameters of Puthukulam pond, Pudukkottai, Tamilnadu. *Research Journal of Life Sciences, Bioinformatics, Pharmaceutical and Chemical Sciences*, 4(6), 656-662.
- [13]. Karne, A. V., & Kulkarni, P. D. (2009). Studies on physico-chemical characteristics of freshwater bodies in Khatav tahsil, Maharashtra. *Nature, Environment and Pollution Technology*, 8(2),247-251.
- [14]. Yadav, P., Yadav, V. K., Yadav, A. K., & Khare, P. K. (2013). Physico-chemical characteristics of a freshwater pond of Orai, UP, Central India. *Octa Journal of Biosciences*, 1(2).
- [15]. Gupta, P., Vishwakarma, M., & Rawtani, P. M. (2009). Assessment of water quality parameters of Kerwa Dam for drinking suitability. *International Journal of Theoretical & Applied Sciences*, 1(2), 53-55.