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A COMPARATIVE STUDY OF PHYSICO-CHEMICAL PARAMETERS OF THE FRESHWATER PONDS FROM SANGAMNER TALUKA OF AHMEDNAGAR, MAHARASHTRA, INDIA

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Abstract: A comparative study of physico-chemical parameters of two freshwater ponds was conducted to assess the seasonal variation in temperature, pH, dissolved oxygen, free carbon dioxide, alkalinity and hardness. The result showed that the value of the dissolved oxygen was recorded in the range of 3.6 mg/L to 7.9 mg/L, free carbon dioxide in the range of 33.8 mg/L to 50.0 mg/L, alkalinity in the range of 140 mg/L to 330 mg/L, hardness from 41 mg/L to 130 mg/L. During entire study period from July 2018 to June 2019, authors observed a great seasonal variation in the values of physico-chemical parameters.

Keywords: Ahmednagar, Physico-chemical parameters, Ponds, Sangamner Taluka.

INTRODUCTION

Water is very precious for every living organism on this earth. The available fresh water is hardly 0.3 to0.5% of the total water available on the earth and therefore its judicious use is imperative. In today's scenario, unplanned urbanization, rapid industrialization and indiscriminate use of chemicals are causing a heavy and varied pollution in aquatic environments leading to deterioration of water quality and depletion of aquatic fauna including fish. Ponds are important part of aquatic ecosystem. Though relatively small in size, ponds perform significant environmental, social and economic functions, ranging from being a source of drinking water, recharging groundwater, acting as sponges to control flooding, supporting biodiversity and providing livelihoods. The biodiversity is needed for ecological balance and human survival (Verma 2017, 2018) but it is largely influenced by

the climate change (Prakash and Srivastava, 2019). Biodiversity conservation is necessary for inclusive and sustainable development (Verma, 2019a).

Ponds have been used since time immemorial as a traditional source of water supply in India. Freshwater ponds are one of the most important surface water resources for the living beings. During rainy season rainwater is stored in such ponds which are used by the local communities for domestic use. It is mainly used by the animals for the drinking purpose therefore it is necessary to check its water quality. Study of physico-chemical parameters is useful to know the water quality. There is a necessity of ecological balance for widespread biodiversity and human survival (Verma 2017b, 2018).

Review of literature showed that several researchers have carried out such studies in India and abroad. In Maharashtra especially in Ahmednagar district Bhagde *et al.,* (2019), Bhoye *et al*., (2019) and Pingle *et al.,* (2019) has done the work regarding physicochemical parameters. Tamizhazhagan and Pugazhendy (2016) have studied the physico-chemical parameters of the freshwater ponds from Mannapadaiyur and Swamimalai. Vethanayagam *et al.,* (2017) during the rainy season studied the water quality of giant tank situated in Mannar, Sri Lanka and predicted its domestic utility. In Maharashtra, Shrirame *et al.,* (2014) have carried out statistical examination of water quality of Ghagardara pond in Nanded while Saket and Pandey (2019) has analysed the physicochemical parameters of Ranitalab pond in Rewa in Madya Pradesh. Anad *et al.,* (2016), Haque (2016), Prakash (2001 and 2020), Prakash *et al*., (2002, 2015a, 2015b, 2015c and 2020), Verma *et al.,* (2016a, 2016b), Sugumaran *et al*., (2020), Verma (2016a, 2016b, 2019b and 2020), Verma and Prakash (2018, 2020a and 2020b) studied the physico-chemical and biological properties of pond in relation to fish food organisms (plankton) and aquaculture. In the present study, authors attempted to perform a comparative study of physico-chemical parameters of two ponds of Ahmednagar district in Maharashtra, India.

MATERIALS AND METHODS

For the present study, two ponds *namely* Nizerneshwar and Nimon (Fig 1) were selected. Authors visited the study sites fortnightly over a period of one year from July 2018 to June 2019. Water samples were collected between 7 and 8 a.m. from the ponds studied twice in a month and physicochemical analysis was done. Temperature and pH were recorded by using a thermometer and a digital pH meter on spot. Dissolved oxygen was estimated by using Winkler's method; Free CO_2, alkalinity and hardness were estimated by using standard methods by APHA (2005).

RESULTS AND DISCUSSION

The seasonal variations in physico-chemical parameters of the freshwater ponds are mentioned in Table 1. The value of dissolved oxygen was in the range from 3.6 mg/L to 6.2 mg/L in Nizerneshwar pond and 5.2 mg/L to 7.9 mg/L in Nimon. The minimum value was recorded during the summer season and the maximum during winter. The value of free carbon dioxide was in the range from 33.8 mg/L to 50 mg/L in case of Nizerneshwar and 40 mg/L to 48 mg/L for Nimon. The minimum value was recorded during the monsoon season and the maximum during the summer. The value of alkalinity was in the range from 140 mg/L to 223 mg/L for Nizerneshwar and 160 mg/L to 33 mg/L for Nimon. The minimum value was recorded in the monsoon season and the maximum in the summer. The value of hardness was in the range from 58 mg/L to 120 mg/L for Nizerneshwar and 41 mg/L to 130 mg/L for Nimon. The minimum value was recorded in the monsoon season and the maximum value in the summer season. The value of temperature was in the range from 28.2°C to 32.3°C for Nizerneshwar and 28°C to 31.4°C for Nimon. The minimum value was recorded in the winter season and the maximum value in the summer season. The value of pH was in the range from 7.2 to 8.1 for Nizerneshwar and 7.1 to 8.2 for Nimon. More or less similar observations are reported by Mahobe and Mishra (2013), Mahajan and Billore (2014), Ghosh (2018) and Ramanathan and

Amsath (2018). The minimum value was recorded in the winter season and the maximum value in the summer season. Fig 2 shows graphical representation of seasonal variations in the physicochemical parameters.3

Mahobe and Mishra (2013) observed that the water temperature remain high in summer and lowest in winter. The pH was maximum in summer and minimum in winter. Dissolved oxygen was maximum in winter and minimum in summer. Hardness was maximum in summer and minimum in winter, maximum alkalinity in summer and minimum in winter.

Mahajan and Billore (2014) observed that there is seasonal variation in physicochemical parameters in pond water. Ghosh (2018) observed that the water temperature was high in June and low in January. The pH was maximum in August and minimum in January. Dissolved oxygen was maximum in May and minimum in December. Carbon-dioxide was maximum in November and minimum in February, maximum alkalinity in March and minimum in July. Ramanathan and Amsath (2018) also observed that there is seasonal variation in physicochemical parameters in pond water.

Nizerneshwar Pond
Latitude and longitude coordinates:
19°34'49.4"N 74°19'42.4"E

Nimon Pond
Latitude and longitude coordinates:
19°42'44.5"N 74°11'31.9"E

Fig 1: Google Map Images of Study Sites with Latitude and Longitude.

Table 1: Seasonal variations in the physico-chemical parameters of two ponds.

Season	Collection site	D.O.	CO_2	Alkalinity	Hardness	Temp	pH
Monsoon	Nizerneshwar	6.2	33.8	140	58	30	7.5
	Nimon	6.1	40	160	41	29	7.4
Winter	Nizerneshwar	6.4	35.1	180	75	28.2	7.2
	Nimon	7.9	42	188	90	28	7.1
Summer	Nizerneshwar	5.2	50	223	120	32.3	8.2
	Nimon	3.6	48	330	130	31.4	8.1

CONCLUSION

In the light of present findings, it can be concluded that there is a clear cut seasonal variation in physico-chemical parameters of water of experimental waterbodies. After studying all the parameters, it can be concluded that the ecological condition of Nizerneshwar pond is better than Nimon pond.

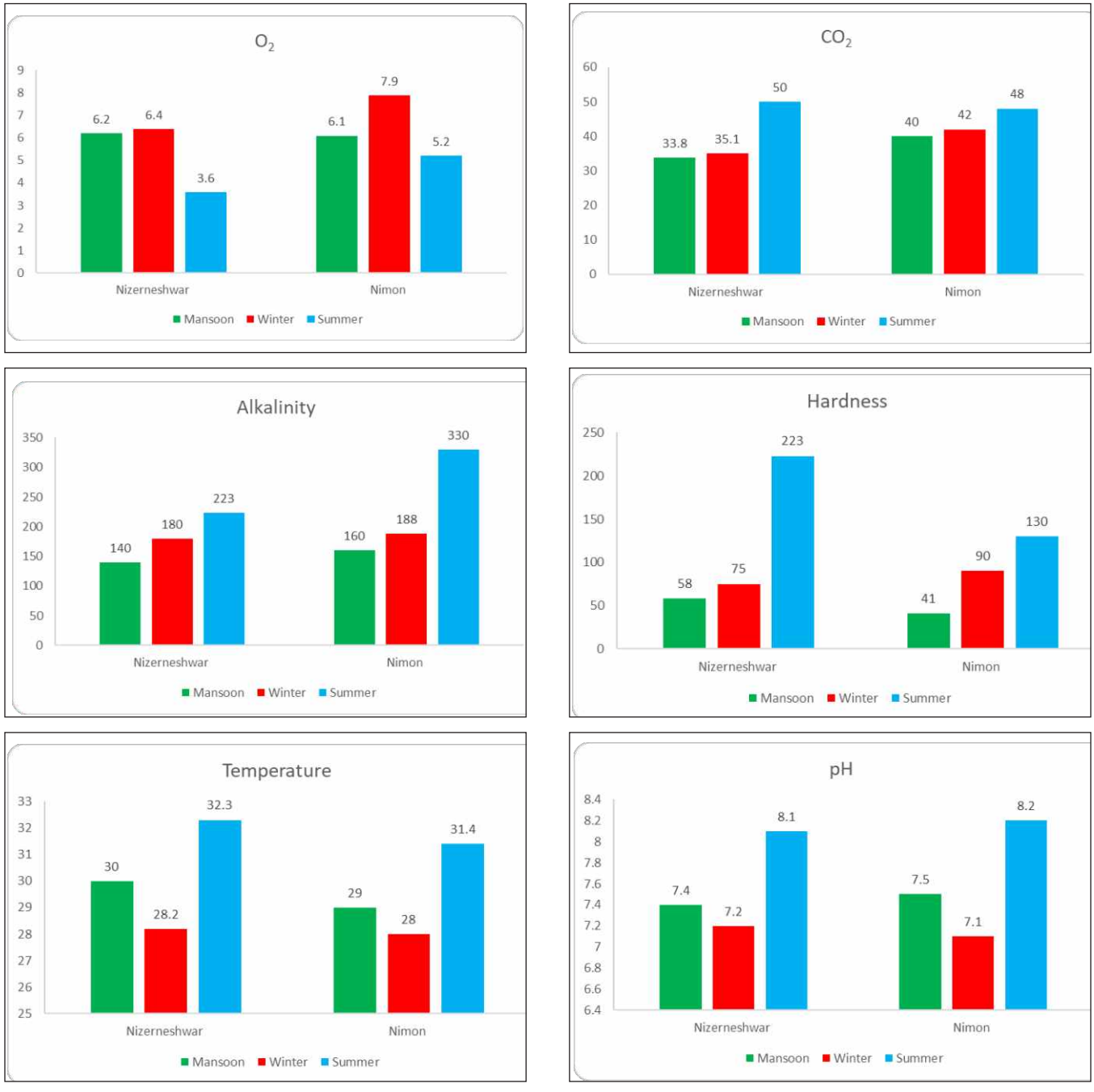

Fig 2: Graphs showing seasonal variations in the physicochemical parameters.

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REFERENCES

1. **Anand Y. A., Linz B. G. and Hyacinth N. H.** (2016). Study of Physicochemical Parameters and Zooplankton of Lapkaman pond, Ahmedabad, Gujarat, India. *International Research Journal of Environmental Sciences.* 5(7):1-6.
2. **APHA** (2005). Examination of Water and Waste Water American Public Health Association, DC; PP. 1-1368.
3. **Bhagde R., Ban R., Pingle S. A. and Borgave S.** (2019). Study of Physicochemical Parameters of Lentic Ecosystems in Ahmednagar District of Maharashtra State

India. *International Journal of Scientific Research in Science and Technology*. 5(4):91-95.

4. **Bhoye M., Pansambal S., Bhadge R., Oza R., Ingale P. and Deshmukh R.** (2019). Analytical study of groundwater from Sangamner Taluka of Ahmednagar District Maharashtra, India. *International Journal of Scientific Research in Science and Technology*. 5(4): 118-121.

5. **Ghosh B. B.** (2018). Physicochemical analysis of pond water in PurbaBarddhaman, West Bengal, India. *International Research Journal of Environmental Sciences*. 7(2):54-59.

6. **Haque M. S.** (2016). Physicochemical seasonal analysis and Fish culture, Pond of Shahadol, Madhya Pradesh. *International Journal of Research in Applied Science and Engineering Technology*. 4(X):313- 316.

7. **Mahajan S and Billore D.** (2014). Seasonal Variations and Assessment of Water Quality of Nagchoon pond of Khandwa District (MP) India. *Current World Environment*. 9(3): 829-836.

8. **Mahobe H. and Mishra P.** (2013). Study of Physico-Chemical Characteristics of Water Ponds of Rajnandgaon Town, Chhattisgarh. *International Journal of Scientific & Engineering Research*. 4(8):738-748.

9. **Pingle S. A., Pawar P., Borgave S. and Bhagde R. (2019)**. Hydrochemical Study of Agricultural Ponds Near Sangamner in Ahmednagar District of Maharashtra State India. *International Journal of Scientific Research in Science and Technology*. 5(4):70-74.

10. **Prakash S.** (2001). Seasonal dynamics of Plankton in a fresh water body at Balrampur. *GEOBIOS*. 28(1):29-32.

11. **Prakash S.** (2020). Conservation status of fishes reported from SemaraTaal of District Siddharthnagar (U.P.). India. *International Journal of Fauna and Biological Studies*. 7(3): 21-24.

12. **Prakash S. and Srivastava S.** (2019). Impact of Climate change on Biodiversity: An Overview. *International Journal of Biological Innovations*. 1(2): 60-65. DOI: https://doi.org/10.46505/IJBI.2019.1205.

13. **Prakash S., Ansari K.K. and Sinha M.** (2002). Seasonal dynamics of Zooplankton in a fresh water pond developed from the wasteland of Brick-kiln. *Poll. Res*. 21(1): 82-83.

14. **Prakash S., Verma A.K. and Prakash S.** (2015a). Limnological Studies of Alwara Lake of Kaushambi (U.P.). *International Journal on Biological Sciences.* 6 (2): 141-144.

15. **Prakash S., Verma A.K. and Prakash S.** (2015b). Seasonal variation of Zooplankton and Zoobenthos Population in Alwara lake of District Kaushambi (UP) India. *Journal of Zoology Studies.* 2(5): 13-16.

16. **Prakash S., Verma A.K., Kumar S. and Mishra B. K.** (2015c). Monthlies variations in phytoplankton density inAlwara lake of District- Kaushambi (U.P.). *Global Journal for Research Analysis.* 4(12):34-35.

17. **Prakash S., Kumar A., Prakash S. and Mishra B. K.** (2020). A Survey of Fish Fauna of Rapti River, Balrampur (U.P.), India. *International Journal of Biological Innovations*. 2(1): 76-81. DOI: https://doi.org/10.46505/IJBI.2020.2110

18. **Ramanathan S. and 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.

19. **Saket S. and Pandey U.** (2019). Studies on physicochemical parameters of Ranitalab pond Rewa (M.P.). *International Journal of Advanced Science and Research*. 4(5):16-18.

20. **Shrirame N.V., Gyannath G., Mulgir M. T. and Kanse O. S.** (2014). A Statistical Examination of Water Quality of Ghagardara Pond Nanded, Maharashtra State.

International Journal of Scientific and Technology Research. 3(2):213-219.

21. **Sugumaran E., Shabeen B. and Radhakrishnan M. V.** (2020). Zooplankton Diversity in Sathanur Reservoir of Thiruvannamalai (Tamilnadu), India. *International Journal of Biological Innovations*. 2 (2): 95-101. DOI: https://doi.org/10.46505/IJBI.2020.2203
22. **Tamizhazhagan V. and Pugazhendy K.** (2016). Physico-Chemical Parameters from the Mannapadaiyur and Swamimalai Freshwater Ponds. *Indo American Journal of Pharmaceutical Sciences*. 3(5):444-449.
23. **Verma A.K.** (2016a). Hydrobiological Studies of Muntjibpur Pond of Allahabad (U.P.). *International Journal on Agricultural Sciences*. 7(2). 164-166.
24. **Verma A.K.** (2016b). A Preliminary Survey of Fresh Water Fishes in Muntjibpur Pond of Allahabad (U.P.). *Indian Journal of Biology*. 3(2): 99-101. DOI: http://dx.doi.org/10.21088/ijb.2394.1391.3216.2
25. **Verma A.K.** (2017). Necessity of Ecological Balance for Widespread Biodiversity. *Indian Journal of Biology*. 4(2): 158-160. DOI: http://dx.doi.org/10.21088/ijb.2394.1391.4217.15
26. **Verma A.K.** (2018). Ecological Balance: An Indispensable Need for Human Survival. *Journal of Experimental Zoology India*. 21 (1): 407-409.
27. **Verma A.K.** (2019a). Sustainable Development and Environmental Ethics. *International Journal on Environmental Sciences*. 10(1). 1-5.
28. **Verma A.K.** (2019b). Studies of Hydrobiological Properties of Balapur Pond of Prayagraj (U.P.). *Hortflora Research Spectrum*. 8(1). 9-11.
29. **Verma A.K.** (2020). Limnological Studies of Muntjibpur pond of Prayagraj (U.P.) in relation to planktons. *International Journal of Fauna and Biological Studies*. 7 (4): 27-30.
30. **Verma A.K., Prakash S. and Mishra B.K.** (2016a). Phytoplankton diversity in Alwara lake of district Kaushambi (U.P.). *Journal of Entomology and Zoology Studies*. 4(1): 170-172.
31. **Verma A.K., Kumar S. and Prakash S.** (2016b). Seasonal Correlation between physico-chemical factors and phytoplankton density in Alwara Taal of Kaushambi, U. P., India. *International Research Journal of Biological Sciences*. 5(3): 40-45.
32. **Verma A.K. and Prakash S.** (2018). Qualitative and quantitative analysis of macrozoobenthos of Beghel Taal, a wetland of U.P. *Indian Journal of Biology*. 5(2): 127-130.
33. **Verma A. K. and Prakash S.** (2020a). Limnological Studies on SemaraTaal, A wetland of District Siddharthnagar, Uttar Pradesh, India. *Journal of Fisheries and Life sciences*. 5(1): 15-19.
34. **Verma A. K. and Prakash S**. (2020b). Zooplankton Diversity in Guthia Taal, Wetland of Bahraich (U. P.), India. *International Journal of Zoology and Research*. 10(2):9-16.
35. **Vethanayagam C. A., Ponipus T. J. J., Ranganathan K. and Shivatharsiny R.** (2017). Water Quality Study on Giant Tank Situated in Mannar, Sri Lanka during the RainySeason: Prediction towards Its Domestic Utility. *Middle-East Journal of Scientific Research*. 25(6):1280-1287. DOI: 10.5829/idosi.mejsr.2017.1280.1287.