



**SEASONAL VARIATIONS IN THE PHYSICO-CHEMICAL PARAMETERS OF PANNA
SAGAR TALAB IN KHETRI, JHUNJHUNU (RAJ.) INDIA**

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ABSTRACT

Pond water is used for domestic, drinking, irrigation, aquaculture and in many other purposes. Present work focused on the seasonal variations in the physico-chemical parameters of the Panna sagar talab at Khetri in Jhunjhunu district of Rajasthan (India) during summer, monsoon and winter. For the study period pond was selected and the parameters analyzed were electrical conductivity (EC), total dissolved solids (TDS), pH, temperature, dissolved oxygen (DO), alkalinity, total hardness and chloride. The observed values of various physico-chemical parameters of water samples were compared with standard values recommended by World Health Organization (WHO) for drinking purposes. Present research work concludes that pond water is not very good for drinking purposes.

KEYWORD: Pond, pollution factors, biological diversity, fresh water, physico-chemical parameters.

INTRODUCTION

Water is essential for the survival of all organisms on this planet. It is most wonderful, abundant and most useful chemical compound gifted by nature with physicochemical and biological properties and unique characteristics. Ponds constitute an ecosystem that supports a wide array of organisms ranging from lower plants to higher plants. In some developing countries they are a contributing source of water for domestic use such as washing of cloths, bathing and sometimes as a source of drinking water.^[4]

The global freshwater resources are under increasing pressure. Quality of an aquatic ecosystem is dependent on the physicochemical qualities of water and also on the biological diversity of the system.^[18] Anthropogenic emissions due to domestic raw sewage, cloth washing, bathing, oil and gasoline combustion and religious activities such as idol immersion may also contribute to metal contamination.^[6] Industrialization, urbanization and modern agriculture practices have direct impact on the water resources. These factors influence the water resources quantitatively and qualitatively.^[3] Increasing water pollution causes not only the deterioration of water quality but also threatens human health and the balance of aquatic ecosystems, economic development, and social prosperity.^[14] Given the effects of human activities on water quality, it is necessary to notice the quality of water resources.^[13] Due to increasing pollution pressure on these water bodies the water quality is deteriorating leading to the changes in the aquatic biodiversity, which

need urgent attention. The objective of this paper was to investigate some physico-chemical parameters pH, temp, EC, DO, Alkalinity, Hardness, Chloride, TDS. The analyzed data were compared with standard values recommended by the World Health Organization (WHO) for drinking purposes.^[19] The water analysis of physico-chemical and biological parameters is very important for public health studies. The studies are also main part of pollution studies in the environment.^[10]

MATERIALS AND METHODS

Sampling and analysis

Physico-chemical parameters of Panna sagar Talab were analysis during July 2012 to June 2014. The water samples were collected from the surface of water bodies and stored in wide mouth plastic bottles and transported immediately to the laboratory to avoid unpredictable changes in different physico-chemical parameters. The observed values of various physico-chemical parameters of water samples were compared with standard values recommended by World Health Organization (WHO) for drinking purposes. The chemical properties of water bodies will be analysed periodically. The year round physico-chemical characteristics like pH, conductivity, chloride, hardness, alkalinity, TDS, and dissolved oxygen will evaluate as per standard methods.^[1,8,9] Temperature of the water is also recorded at the site.

Study area

Jhunjhunu district is located in the extreme north eastern part of Rajasthan State and lies between 27°38' & 28°31' North latitudes and 75°02' & 76°06' East longitudes. The climate of the district can be classified as semi-arid. The district comprises an area covering 5926 km², an average annual rainfall of 565 mm, and a population density of

361 persons/km².^[16] Khetri is situated at the foothills of the Aravalli ranges. Panna Sagar Talab is an artificial pond in Khetri town, 70 km away from the head quarter of Jhunjhunu district. It is constructed in 18th century A.D. It is a big man made pond used for bathing purposes in ancient time.

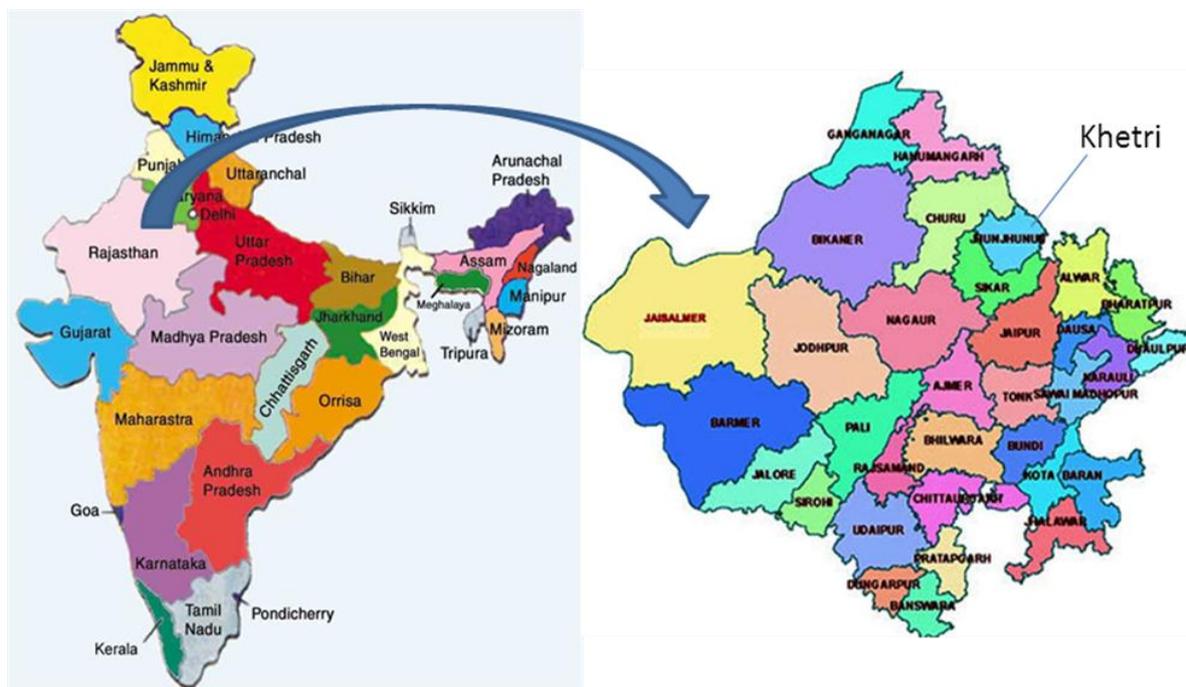


Fig. 1: Map showing Khetri town of Jhunjhunu district in Rajasthan (India)

RESULT AND DISCUSSION

The quantitative analysis of various physico-chemical parameters are presented in Table 1. The water temperature varied with variation of season as lowest in winter and highest in monsoon. In the present investigation temperature values were recorded between 15.6°C to 31.8°C. High temperature value were recorded in summer and lowest temperature in winter. In the present investigation pH values fluctuate from 7.3 to 8.3. High pH during the dry season could be due to increase in photosynthetic activity during this period hence increasing primary productivity.^[7] Electric conductivity (EC) were found maximum during summer and minimum in monsoon. It ranged from 0.27 to 1.23. Total dissolved solid (TDS) concentration from the pond

varied from 299.35 to 375.34 mg/l. In water, total dissolved solids are composed mainly of carbonates, bicarbonates, chlorides, phosphates and nitrates of calcium, magnesium, sodium, potassium and manganese, organic matter, salt and other particles.^[11] In the present study maximum value of chloride reaches in summer. It ranged from 141.81 mg/l to 186.77 mg/l. Similar results were reported by Swarnalatha and Narsing rao.^[17] Total alkalinity ranged from 95.18 mg/l to 213.26 mg/l. The alkalinity was maximum in summer due to increase in bicarbonates in water.^[12] The range of hardness value shows a variation from 167.4 to 222.40 mg/l. Hardness is the property of water which prevents lather formation with soap and increases the boiling point of water.

Table 1: Chemical analysis of various parameters (mean values) of water in Panna Sagar Talab during 2012-14. (All the values except temp, EC, pH are in mg/l)

S.No.	Parameter	First year			Second year		
		Monsoon	Winter	Summer	Monsoon	Winter	Summer
1	Temperature	23.5	16.8	31.8	23.1	15.6	31.0
2	pH	7.4	7.7	7.9	7.3	8.3	8.0
3	Electric conductivity	0.27	0.57	1.20	0.27	0.42	1.23
4	TDS	341.97	372.67	299.35	339.49	375.34	307.97

5	Chloride	141.81	151.69	161.04	143.75	152.46	186.77
6	Alkalinity	100.06	182.13	211.51	95.18	171.45	213.26
7	Hardness	176.05	190.34	221.65	167.4	185.22	222.40
8	Dissolved oxygen	4.24	5.41	3.03	4.15	4.98	3.08

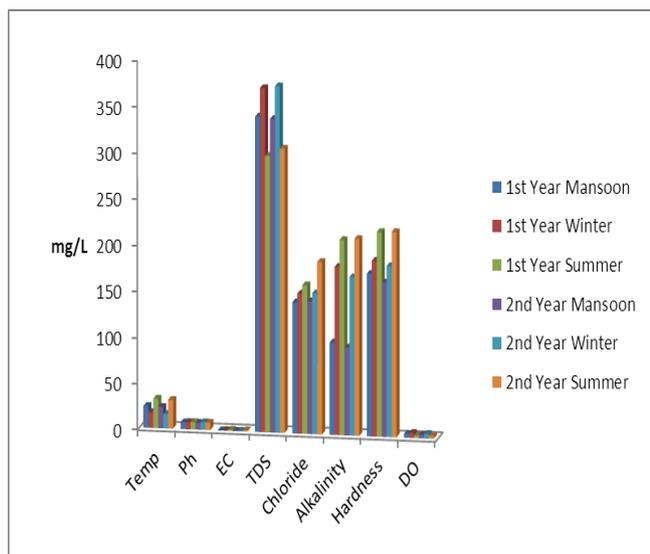


Fig. 3: Graph showing seasonal variation of physico-chemical parameters

Hardness of water mainly depends upon the amount of calcium or magnesium salts or both.^[15] In the present investigation dissolved oxygen values recorded between 3.03 to 5.41mg/l. When the temperature decreases, the oxygen content increases and vice versa. This is due to lesser solubility of gas in winter at higher temperature. The oxygen concentration decreases with increase in the salinity.^[2] This is a measure of the amount of gaseous oxygen dissolved in aqueous solution that plays a vital role in the biology of cultured organisms.^[5]

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, domestic, agricultural and industrial purposes. The present investigations conclude that the quality of water samples subjected to study was slightly alkaline in nature and was unfit for drinking. The pollution and other discharge from near by areas has changed the ecology of ponds. There is considerable need for better understanding of the importance of pond so that they can be managed effectively. Awareness should be created among people in and around villages regarding water pollution and its effects. It is also suggested that all the freshwater ponds should be regularly monitored to preserve and maintain the aquatic systems which would benefit the organisms and their environment.

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REFERENCES

1. APHA. Standard methods for the examination of water and waste water. 16 th Edition. Apha Ind, New York, 1985.
2. Ayyanna, A and Y, Narayuda. Hydrological study of fresh water pond at Kakinada rural village, P.Venkatapuram, E.G. Dist, Andhrapradesh. Jour. Applied Chemistry, 2013; 3(6): 1-5.
3. Charu, P., V, Neelam., D, Savita and S, Rajneesh. Multivariate analysis of drinking water quality parameters in Bhopal, India. Environment Monitor Assess, 2007; 140: 119-122.
4. Chia, A.M., D.S. Abolude., Z. Ladan., O. Akanbi., and A. Kalaboms. The presence of microcystins in aquatic ecosystems in northern Nigeria: Zaria as a case study. Research Journal of Environmental Toxicology, 2009; 3: 170-178.
5. Dhawan, A., S. Karu. Pig dung as pond manure: Effect on water quality pond productivity and growth of carps in poly culture system. The International Centre for Living Aquatic Resources Management. ICLARMM Manila, 2002; 25(1): 1-14.
6. Dixit, S., S. Tiwari. Impact Assessment of Heavy Metal Pollution of Shahpura Lake, Bhopal, India. International Journal of Environment Research, 2008; 2(1): 37-42.
7. Hammer, U.I. Limnological Studies of the Lakes and Streams of the Upper Qu' Appelle River System, Saskatchewan, Canada. Hydrobiologia, 1971; 37: 437-507.
8. ICMR. Manual of Methods for Examination of Water Sewage and Industrial Waste. ICMR, New Delhi, 1963.
9. ISI. Indian Standard Specification for Drinking Water. Ind. Std. Inst, New Delhi, 1983.
10. Kot, B., R. Baranowski. And A. Rybak. Analysis of mine water using X-ray fluorescence spectrometry, Polish Journal of Environment Studies, 2000; (9): 429.

11. Mahananda, M.R. "Physico-Chemical analysis of surface water and ground water of Bargarh District, Orissa, India." *International Journal of Research and Review in Applied Sciences*, 2010; 2(3): 284-295.
12. Manjare, S.A., S.A. Vhanalakar. and D.V. Muley. Analysis of water quality using physico-chemical parameters tamdalge tank in kolhapur district, Maharashtra. *International Journal of Advanced Biotechnology and Research*, 2010; 1(2): 115-119.
13. Mansouri, B., E. Ravangard., Z. Rezaaei. And A. Mansouri. Determining the concentration parameters of quality of drinking water; a case study in Birjand, Iran. *International Journal of Current Research and review*, 2011; 3(9): 33-6.
14. Milovanovic, M. Water quality assessment and determination of pollution sources along the Axios/Vardar River, Southeastern Europe. *Desalination*, 2007; 213(1-3): 159-73.
15. Murhekar, K.G. *International Journal of Research in Chemistry and Environment*, 2011; 1(2): 183-187.
16. Shekhawat, D.S. and C. Bhatnagar. Guild, status and diversity of avian fauna in the Jhunjhunu district, Rajasthan, India. *Journal of Asia-Pacific Biodiversity*, 2014; 7(3): 262-267.
17. Swaranlatha, S. and A. Narsingrao. Ecological studies of Banjara lake with reference to water pollution. *Journal of Environment Biology*, 1998; 19(2): 179-186.
18. Tiwari, A and S.V.S. Chauhan. Seasonal phytoplankton diversity of Kitham lake, Agra. *Journal of Environmental Biology*, 2006; 27: 35-38.
19. World Health Organization. Guidelines for drinkingwater quality. Geneva, Switzerland: World Health Organization, 2008.