

SEASONAL VARIATION STATUS OF HARSOOL DAM, AURANGABAD, (M.S.) INDIA.

¹A. S. Munde., ²P. R. More and ³S. E. Shinde

¹ Assistant Professor, Department of Zoology, Sambhajirao Kendre Mahavidyalaya, Jalkot Dist. Latur, (M.S.) India.

² Assistant Professor, Department of Zoology, kai. Rasika Mahavidyalaya, Deoni Dist. Latur, (M.S.) India.

³ Assistant Professor, Department of Zoology, M. J. P. V. Arts, Commerce, and Shri. V. K. K. Science College, Dhadgaon Dist. Nandurbar (M.S.) India.

Corresponding author: Dr. S. E. Shinde, Department of Zoology, M. J. P. V. Arts, Commerce, and Shri. V. K. K. Science College, Dhadgaon Dist. Nandurbar (M.S.) India.

E-mail: sunilshinde1684@gmail.com

Abstract:

It is estimated that 20% of the world population would live in countries affected by chronic water shortage, about 75% of the Earth freshwater held in ice sheets and mountain glaciers. Glaciers serve as a natural regulator of regional water supplies. Analyses of Physico-chemical parameters of water are essential for irrigation, drinking, bathing, fishing, industrial processing, etc. The study of water quality deals with the physical, chemical, and biological characteristics that provide current information on various parameters directly linked with human welfare. Water analysis is essential to preserve and protect the natural ecosystem, which depends on the existing meteorological conditions of the area and the chemical properties of the water. The present study deals with assessing the water quality, seasonal variations, and Correlation between parameters of Harsool Dam at Aurangabad [M.S.] India. The Physico-chemical characteristics were studied and analyzed during July 2008 - June 2009. The results revealed that the condition of these dam in various seasons concerning the parameters.

Keywords: water quality, seasonal variations and Harsool Dam.

INTRODUCTION

Aquatic ecosystems are essential components of the global environment. Not only do they make a significant contribution to biodiversity and ecological productivity, but they also offer a variety of services for the human population. However, freshwater ecosystems are in crisis. They have been mined more than ever and remain as fast as terrestrial or marine ecosystems. Water is an essential resource for all types of life on earth and critical to the sustainability of the earth's ecosystem. Any chemical, biological or physical change in water quality that damages a living organism or renders the water unsuitable for its intended use is water contamination. Freshwater is essential for human health. Agriculture, natural ecosystem, and industry. Rapid population growth, rising living standards in urban areas, and industrialization have led to an increased demand for high-quality water. Water covers approximately 71% of the earth's surface. It is crucial to study the physicochemical factors that affect the biological productivity of the water body (Shinde et al, 2010).

Limnology is an interdisciplinary science that includes various specific areas and laboratory studies to understand the structural and functional aspects and problems of the freshwater environment from a holistic perspective (Adoni et al, 1985). Aquatic biodiversity is primarily threatened by human abuse and mismanagement of biological resources and the ecosystems that support them. Most of the reservoirs are contaminated by household waste, sewage, industrial and agricultural wastewater (Shiddamallayya and Pratima, 2008, Shekhar et al, 2008). The assessment of water quality generally includes an analysis of the physical-chemical and biological parameters and a reflection on the abiotic and biotic state of the ecosystem (IAAB, 1998, Kushrestha and Sharma, 2006 and Mulani et al, 2009).

The quality of the water depends on the extremes of the respective water. For example, water suitable for agriculture may not be ideal for recreational purposes. Drinking water may not suit some demanding industrial applications, such as in the chemical and pharmaceutical industries. Therefore, it is essential to maintain water quality based on the best-defined use of water (Shinde et al, 2011).

Climatic conditions are different in India summer from February to May, Monsoon from June to September and winter from October to January. In tropical countries, there may be a direct link between the duration of the sun and the temperature. The present study conducted to assess the water quality of the Harsool Dam at Aurangabad [M.S.] in India, which is essential for human use in this environment. Residents use the water for drinking, domestic, agricultural, and recreational purposes.

MATERIAL AND METHODS

Water samples were taken for physicochemical analysis at the Harsool Dam in Aurangabad [M.S.], India, early in the morning between 8:00 and 11:00 in the first week of each month from July 2008 - June 2009. Samples were collected in an acid-washed five-liter plastic container at a 5 to 10 cm depth below the water's surface. Separate samples were collected to dissolve the oxygen in 250 ml bottles, and the dissolved oxygen was fixing in the field by adding an alkaline iodide-azide solution immediately after collection. The samples were analyzed directly and returned to the laboratory.

The status of the Dam water quality has been determined seasonally, that is, summer, monsoon, and winter. Physicochemical properties such as Rainfall, Atmospheric and Water temperature, pH, dissolved oxygen (DO), Free Carbon Dioxide (CO₂), and Calcium have been seasonally determined in monthly variation in Site A. and B. using standard methods (APHA, 2005, Trivedi and Goel, 1987).

RESULT AND DISCUSSION

The water parameters were examined and recorded in three seasons: Summer, Monsoon, and Winter. The table shows seasonal data on the physicochemical parameters of the Harsool Dam in Aurangabad [M.S.] India. The present study deals with the physicochemical properties of the Harsool Dam at Aurangabad [M.S.] in India.

Rainfall

Table 1 and 2 shows that the rainfall values were ranged from 0 to 192mm. The average rainfall values were maximum in Monsoon 130.5±53.56 mm and minimum during winter 12.5±23.14 mm as recorded. In Harsool dam it was positively correlated with Calcium ($r=0.740$, $P<0.01$), Phosphates ($r=0.625$, $P<0.05$), Total dissolved solids ($r=0.602$, $P<0.05$).

The trophic, the amount of rainfall, plays a significant part in regulating the various seasonal biological rhythms. The change in the concentration of individual chemical constituents observed here consequent to the entrance of rainwater into the dams suggests its effects on them, which in turn influence and quality of plankton.

Atmospheric and Water temperature

Temperature is vital for its effects on specific chemical and biological activities in the organism attributing in aquatic media. The water temperature and air temperature were found to go more or less hand in hand. In the Indian subcontinent, most water bodies' temperature ranges between 7.8 °C - 38.5 °C (Singhal et al, 1986).

Table 1 and 2 shows that the atmospheric temperature values were ranged from 21°C to 33°C. The average atmospheric temperature values were maximum in summer 23±2.61 °C and minimum during winter 29±3.46 °C as recorded. The water temperature values ranged from 19 to 30 °C. The average water temperature values were maximum in summer 27±3.29 °C and minimum during winter 21.5±2.87 °C as recorded. In the Harsool dam, the water temperature was positively correlated to atmospheric temperature, while it was no negatively correlated.

The water temperature was always less than air temperature except during winter. Water temperature showed its maximum and minimum values in May and December. Similar trends in the benefits of atmospheric and water temperature noticed in the dam; further, the advocacy that water temperature closely follows the air temperature except for a short spell of winter when the water temperature is slightly higher than the air temperature is supported by Jayanti (1994) for the different water bodies studied by them.

pH

pH is the scale of intensity of acidity and alkalinity of water and measures the concentration of hydrogen ions. Most of the biological processes and biochemical reactions are pH-dependent. pH is considered as an indicator of overall productivity that causes habitat diversity (Minns, 1989).

Table 1 and 2 shows that the pH values ranged from 7.1 to 8.7. The average pH values were maximum in summer 8.05±0.42 and minimum during Monsoon 7.63±0.29 as recorded. In the Harsool dam, pH positively correlated with dissolved oxygen ($r=0.877$, $P<0.01$). No negative correlation was observed.

Barbieri et al. (1999) also observed the positive co-relation of pH with Calcium, magnesium, alkalinity, and negative co-relation with nitrates. Patil and Goudar, (1985) noticed the positive co-relation of pH with dissolved oxygen and conductivity and negative co-relation with phosphates. Zafar, (1966) observed that the pH of water appeared to be dependent upon the relative quantity of Calcium, carbonates, and bicarbonates. The water tended to be more alkaline when it possessed more significant amounts of these ions.

Dissolved Oxygen (DO)

Dissolved oxygen is one of the critical parameters for assessing water quality and reflects the biological and physical processes in the water. Its essential presence, the oxygen in the system in water to maintain a long natural life form, is mainly determined. Unpolluted surface water is usually saturated with dissolved oxygen.

Table 1 and 2 shows that the dissolved oxygen values were ranged from 9.9 to 12.8 mg/l. The average dissolved oxygen values were maximum in Monsoon 11.42±1.26 mg/l and minimum during summer 10.5±0.92 mg/l as recorded. In Harsool the dissolved oxygen has negative co-relation with carbon dioxide ($r=0.754$, $P<0.05$) and ($r=0.671$, $P<0.05$). The dissolved oxygen has positive correlation with pH ($r=0.877$, $P<0.01$).

Similar observations were also made by Patil and Goudar, (1985). They reported the existence of a positive correlation between DO and pH. Muragavel and Pandian, (2000) published a positive correlation between DO chlorides, Phosphates, and nitrates. These studies support our findings.

Free Carbon Dioxide (CO₂)

Carbon dioxide releases water and forms carbonic acid (H₂CO₃), which dissociates into H⁺ and HCO₃⁻ ions. It leads change pH water when the H⁺ ions are removed, and the HCO₃⁻ reacts with the calcium to form calcium carbonate, which is insoluble in water. If free carbon dioxide is not available, calcium carbonate is converted to insoluble calcium carbonate and lost to water.

Table 1 and 2 shows that the free carbon dioxide values were ranged from 4.2 to 9.7 mg/l. The average free carbon dioxide values were maximum in summer 8.42±0.98 mg/l and minimum during winter 6.07±1.57 mg/l as recorded. In Harsool

dam it showed positive correlation with water temperature ($r=0.610$, $P<0.05$), and negative co-relation with dissolved oxygen ($r=0.754$, $P<0.01$).

Calcium

Calcium is considered more critical because it is an integral part of plant tissue and increases the availability of other ions. The high calcium content in the lake sediments favors the growth of Mollusca. It is also required as a nutrient for various metabolic processes and helps in the correct translocation of carbohydrates and facilitates other ions. (Wetzel, 1975).

Table 1 and 2 shows that the Calcium values were ranged from 16.3 to 30.8 mg/l. The average Calcium values were maximum in winter 23.01 ± 2.97 mg/l and minimum during summer 17.11 ± 3.72 mg/l as recorded. In Harsool dam, calcium positively correlated with atmospheric temperature ($r=0.672$, $P<0.05$), and rainfall ($r=0.740$, $P<0.01$), with no negative Correlation observed.

Barbieri et al. (1999) reported that Calcium showed significant positive co-relation of Calcium with total hardness, TDS, and Magnesium. These studies support our findings.

CONCLUSIONS

The present study shows detailed research regarding the quality of water in Harsool Dam at Aurangabad [M.S.] India. The summer, monsoon, and winter seasons show different seasonal fluctuations of the other physical-chemical parameters. During the present investigation, the observed interval is lower than the permitted limit values specified by the ISI, which indicates that the dam's water is suitable for consumption. Today dam water is helpful for drinking, irrigation, and fish farming. In the present study, it appears that the Correlation of the physicochemical parameters between them. To increase water quality, the level of contamination must be monitored continuously to maintain favorable conditions for the survival and reproduction of fish in the Harsool Dam in Aurangabad [M.S.], India.

ACKNOWLEDGMENTS

The authors are thankful to the Department of Zoology, Sambhajirao Kendre Mahavidyalaya, Jalkot Dist. Latur, (M. S.) India for providing laboratory and library facilities.

REFERENCES

- Adoni, A.D. 1985. Work Book of Limnology, Bandna printing service, New Delhi.
- APHA, 2005. Standard methods for the examination of water and waste waters, 21st Edn., Washington, DC. U.S.A.
- Barberi, Alberto, Veronesi, Mauro., Simona, Marco., Malusardi Stefano. And Straskrabova, Viera 1999. Limnological survey of eight high mountain lakes located in Lago Maggiore watershed (Switzerland). *J.Limnol.* 58(2):179-192.
- IAAB, 1998. Methodology for water analysis, IAAB Editorial Board, Hyderabad (from 1889- 2000) Indian Association of Aquatic Biologists (IAAB), Hyderabad.
- Jayanti, M. 1994. A comprehensive study of three contrasting lentic system in the content of Aquaculture, Ph.D. Thesis, Bharathidasan University, Tiruchirappalli.
- Kulahrestha, H. and S. Sharma 2006. Impact of mass bathing during Ardhkumbhon water quality status of river Ganga. *J. Environ Biol.*, 27,437-440.
- Minns, C. K. 1989. Factors affecting fish species richness in Ontario lake. *Transactions of American Fisheries Society*, 118, 533-545.
- Mulani, S.K. Mule, M.B. and Patil, S.U. 2009. Studies on water quality and zooplankton community of the Panchganga River in Kolhapur city *J.Environ.Biol.*, 30,455-459.
- Murugavel, P. and Pandian, T.J. 2000. Effect of altitude on hydrology productivity and Species richness in Kodayar – A tropical peninsular Indian Aquatic System. *Hydrobiologia.* 430(1-3) 33-57.
- Patil, C.S. and Gaudar, B.Y.M. 1985. Ecological study of fresh water zooplankton of a subtropical pond (Karnataka State India) *Int. Revue, Ges. Hydrobiol.* 70(2):259-267.
- Shekhar, T.R. Kiran, B.R. Puttaiah, E.T. Shivaraj, Y. and Mahadevan, K.M. 2008. Phytoplankton as indicator of water quality with reference to industrial pollution. *J. Environ. Biol.*, 29, 233-236.
- Shiddamallayya, N. and Pratima, M. 2008. Impact of domestic sewage on freshwater body. *J. Environ.Biol.*, 29, 303-308.
- Shinde S.E. Pathan, T.S. Raut, K.S. More, P.R. and Sonawane, D.L. 2010. Seasonal variations in physico-chemical characteristics of Harsool-Savangi Dam, district Aurangabad, India. *The Ecoscan* 4 (1); 37-44.
- Shinde, S.E. Pathan, T.S. Raut, K.S. and Sonawane, D.L. 2011. Studies on the Physico-chemical Parameters and Correlation Coefficient of Harsool-savangi Dam, District Aurangabad, India. *Middle-East Journal of Scientific Research* 8 (3): 544-554.
- Singhal, R.N. Swaranjeet and Davis, R.W. 1986. The physico-chemical environment and the plankton of Managed ponds in Haryana, India, *Proc. Indian Acad. Sci. (Sec B)*, 95, 253-63.
- Trivedi, R.K. and Goel, P.K. 1987. Chemical and biological methods for water pollution studies. Environmental publications Karad, India.
- Wetzel, G.R. 1975. *Limnology* W.B. Saunders, Philadelphia pensilvania 743 pp.
- Zafar, A.R. 1966. *Limnology of Hussain Sagar lake, Hyderabad, India* *Phykas.* Vol 5: 115 -126.

TABLE 1 SEASONAL VARIATIONS IN PHYSICO-CHEMICAL PARAMETERS OF HARSOOL DAM JULY 2008 - JUNE 2009.

Parameters	Rainfall (MM)	Atmospheric Temp. (°C)	Water Temp. (°C)	pH	(DO) mg/l	(CO ₂) mg/l	Calcium mg/l
Monsoon	130.5±53.56	24.5±1.77	23.5±1.19	7.63±0.29	11.42±1.26	8.8±0.52	22±4.34
Winter	12.5±23.14	23±2.61	21.5±2.87	7.27±0.20	11.3±0.46	6.07±1.57	23.01±2.97
Summer	17.5±32.40	29±3.46	27±3.29	8.05±0.42	10.5±0.92	8.42±0.98	17.11±3.72
Range	0-192	21-33	19-30	7.1-8.7	9.9-12.8	4.2-9.7	16.3-30.8

TABLE 2 CORRELATION COEFFICIENT OF THE PHYSICO-CHEMICAL VARIABLES OF HARSOOL DAM DURING JULY 2008 - JUNE 2009.

Parameters	At. Temp	Ca ²	CO ₂	DO	pH	Wt. Temp	Rainfall
At. Temp	1	0.672*	0.253	0.190	0-078	0.895**	0.541
Ca ²		1	-0.023	0.399	0.082	-0.451	0.740**
CO ₂			1	-0.754*	0.906	0.610*	-0.253
Do				1	0.877**	0.030	0.571
pH					1	-0.343	0.392
Wt. Temp						1	0.152
Rainfall							1

** Correlation is significant at the 0.01 level

* Correlation is significant at the 0.05 level

