A Project Report On

STUDY OF PHYSICO-CHEMICAL PARAMETERS OF NILWANDE DAM WATER FROM AKOLE TALUKA, AHMEDNAGAR DISTRICT, MS, INDIA

Submitted in partial fulfillment of the

T.Y.B.Sc Zoology CBCS 2019 Pattern

ZO-3611 Project

(2022-2023)

Submitted by

Miss. Santoshi Shantaram Madhurkar

Under graduate Department of Zoology

Under the guidance of

Prof. S. D. Bhosale

Assistant Professor, Department of Zoology

Satyaniketan's

Adv. M. N. Deshmukh Arts, Science and Commerce College Rajur, Akole

CERTIFICATE

This is to certify that the project entitled **"Study Of Physico-Chemical Parameters Of Nilwande Dam Water From Akole Taluka, Ahmednagar District, MS, India"** submitted by **Miss. Santoshi Shantaram Madhurkar** was carried out satisfactory under the guidance of **Prof. S. D. Bhosale** , Assistant Professor, Department of Zoology, Adv. M. N. Deshmukh Arts, Science and Commerce College Rajur, Akole during the academic year 2022-2023.

Date:

Place: Rajur

Prof. J. D Arote   **Examiner**   **Prof. S. D. Bhosale**

Head of the

Department of Zoology   Project Guide

DECLARATION

I hereby declare that the data presented in the Project entitled **"Study Of Physico-Chemical Parameters Of Nilwande Dam Water From Akole Taluka, Ahmednagar District, MS, India"** is submitted to the U. G. Department of Zoology, Adv. M. N. Deshmukh Arts, Science and Commerce College Rajur, Akole, in fulfillment of the requirement for the T.Y.B.Sc Zoology CBCS 2019 Pattern **ZO-3611 Project**. It was the result of my research work carried under the guidance of **Prof. S. D. Bhosale**, Assistant Professor, Department of Zoology, Adv. M. N. Deshmukh Arts, Science and Commerce College Rajur, Akole during academic year 2022-2023.

Miss. Santoshi Shantaram Madhurkar

ACKNOWLEDGEMENT

INDEX

Abbreviations :

T: Temperature

pH: Potential of hydrogen

TA: Total Alkalinity

Cl: Chloride

TH: Total Hardness

Ca: Calcium

Mg: Magnesium

DO: Dissolved Oxygen

List of Tables :

Table 1 List of methodology used for water analysis.

Table 2 Monthly distribution of water parameter from Nilwande Dam

PROJECT TITLE

"Study Of Physico-Chemical Parameters Of Nilwande Dam Water From Akole Taluka, Ahmednagar District, MS, India"

SIGNIFICANCE OF PROJECT

- Water quality monitoring can help researchers predict and learn from natural processes in the environment and determine human impacts on an ecosystem.
- The Physico-Chemical parameters are very essential and important to test the water, before it is used for drinking, domestic, agricultural or industrial purpose

OBJECTIVES

1. To determine different ways of testing water quality
2. To discuss about water quality parameters and standards
3. To gain some basic analytical knowledge through analysis of water samples
4. To obtain quantitative information on the physical, chemical, and biological characteristics of water via statistical sampling.

    .

CHAPTER 1: INTRODUCTION

Nilwande Dam is located Near Akole in the Ahmednagar district, Maharashtra. Nilwande Dam is built across the river Pravara, near the village Akole. Nilwande Dam refers to two associated gravity dams built using roller compacted concrete, the first use in India. Both dams create a lower and upper reservoir for the 250 MW pumped-storage hydroelectric power station. The upper Nilwande dam is 15 m (49 ft.) tall and on the Pravara River, a tributary of the Godavari River. The lower Nilwande dam is 86 m (282 ft.) tall and on the Shahi Nalla River directly to the southwest of the upper reservoir in a steep valley.

The hydropower project diverts Godavari River basin water outside the basin area to a west-flowing river of Western Ghats. The power station is located between both the upper and lower reservoirs. During peak electricity demand hours, water from the upper reservoir turns two 125 MW reversible Francis turbine generators. When energy demand is low, such as at night, the turbines reverse direction and pump water from the lower reservoir back to the upper. Construction on the project began in 1995. The dams were placed beginning in 2001 and were complete by 2006, The power station was commissioned in 2008.

Water :

Water (H_2O) is the most precious resource and abundant compound on earth surface, covering more than 70 percent of the planet (Mohammad Zakir Husain, 2015). In nature, water exists in three states such as liquid, solid and gas. It is the most common, widely distributed and useful liquid on the earth. It is the essence of life without water there is no life (Bharti *et al.,* 2011). Thus it is most indispensable requirement for all living organisms and any alterations in water may lead to the issue of survival for these organisms. It is need for the survival of all organisms from micro-organisms to complex form of organisms and also used for food production, economic development and other human activities. Two thirds of the earth surface is covered by water. Approximately 98% of the water is sea water and is unusable for drinking because of the high concentration of salt. About 2% of planet water is fresh, but 1.6% is locked up in polar icecaps and glaciers. Another 0.36% is found underground in aquifers and wells. Therefore only about 0.036% of the planets water supply is accessible in lakes and rivers (Rozina Khatun, 2017). The quality of water in every ecosystem provides major information about the available resources for sustaining life in that ecosystem.

The healthy aquatic ecosystem depends on the biotic and abiotic characteristics of water (Venkatesharaju *et al.,* 2010). Water is considered as a superb solvent and a critical component that make the processes of life possible. Water is the most important for shaping the land and regulating climate (Gorade *et al.,* 2013). Due to availability of minerals in water, it is essential for survival of life on earth. It is used in many ways from drinking to industrial and agricultural purposes (Venkatesan *et al,* 2013).

Water plays an important role of human life. It is necessary for industry and living thing resistance. All living organisms on the earth need water for their survival and growth, on our earth having about 70% of water (Balsane *et al*. 2015). Though water is abundant on earth it is precious for living organisms because out of total water reservoir of the world about 97% is salty and only 3% is fresh water (Kamble *et al,* 2011). The healthy water reservoir is dependent on the physico-chemical and biological characteristics. Although statistics the WHO report that approximately 36% of urban and 65% of rural Indian were without access to safe drinking water. The human activities like industrialization, urbanization and domestic activates which been affecting water qualities and leads to large scale water pollution. The industries like tanneries and textile relies to large quantities of heavy metals into the natural environmental (Kharde *et al.,*2014). The quality of ground water depends on various constituent and their concentration which are mostly derived from the geological data of the particular region.

There are many sources of drinking water, mainly river, lakes, wells and dams. Humans should have access to potable water, but in modern times large quantities of drinking water are being polluted, mainly due to industrial water conditions. The water is being polluted by chemical fertilizers and pesticides produced from agriculture. It requires water analysis and water testing as well as the study of water parameters (Kamble *et al,* 2011). Man uses water for various purposes, mainly for drinking water, for industry, agriculture and various reasons. As the population grows, so does the use of water, which is causing massive pollution. Humans are responsible for water pollution. Human socio-economic status depends on water In short, human economic development and social development depends on the availability of water (Balsane *et al.*, 2015). Where water is available, human existence and population density is high and economic development is high. The quality of water is of main role for man since it is directly linked to human health . Topography affects the river system

as well as the nature of the river depending on the geological structure and rainfall (Arangale *et al.,* 2018).

Water is one of the most important compound to the ecosystem. Better quality of water described by its physical, chemical and biological characteristics. But some correlation was possible among these parameters and the significant one would be useful to indicate quality of water. Due to increased human population, industrialization, use of fertilizers in agriculture and man-made activity the natural aquatic resources are causing heavy and varied pollution in aquatic environment leading to water quality and depletion of aquatic biota. It is therefore necessary that the quality of drinking water should be checked at regular time interval because due to use of contaminated drinking water, human population suffers from a variety of water borne diseases. It is difficult to understand the biological phenomenon fully because the chemistry of water reveals much about the metabolism of the ecosystem and explain the general hydro biological relationship. The Physico-chemical parameters of water and the dependence of all life process of these factors make it desirable to take as an environment (Manjare *et al.*, 2010).

Physico-chemical parameters of water:

The quality of water in every ecosystem provides major information about the available resources for sustaining life in that ecosystem. The healthy aquatic ecosystem depends on the biotic and abiotic characteristics of water. Due to vast population and negligence of human being the quality of water is being deteriorated day by day (Jasper *et al.*, 2006). An enormous industrial growth has taken place throughout the world in the past few decades, to fulfill the increased demand of human civilization, which has created an overexploitation of available resources and caused pollution of water, land, and air. Rapid industrialization, urbanization and anthropogenic activities consequently cause water pollution which has brought a variable water crisis. Environmental pollutants arising from anthropogenic source have the potential to affect the aquatic ecosystem in a synergistic manner. Due to different physical and anthropogenic activities, there is degradation in the water quality and it has direct impact on the climate and public health.

The interaction of physical and chemical properties of water play an important role in abundance, composition, diversity, growth, reproduction and the movement of aquatic organisms (Murangan and Prabhaharan, 2012).

So Physico-chemical analysis is very essential and important to test the water before it is used for drinking, domestic, agricultural or industrial purpose. The - chemical parameters such as pH, temperature, total hardness, total alkalinity, calcium hardness, magnesium, dissolved oxygen, biological oxygen demand. Monitoring of Physico-chemical parameters is necessary to recognize the magnitude and the source of any pollution load, availability of minerals and also nutrition in water body. These characteristics help to identify the essential condition of the ecology of living organism for recommending suitable conservation and management strategies. This sort of work is being carried out by various researchers like (Prasana and Ranjan, 2010).

The present investigations of the study of Physico-Chemical parameters of Nilwande dam water in Ahmednagar District of Maharashtra. Three samples were collected from the month of February to April 2023. The dam water is basically used for Domestic, Agriculture Purpose and Fisheries Activity.

CHAPTER 2: MATERIAL AND METHODOLOGY

Material and methodology is used:

For water sample collection:

1) pH meter

2) 1/10 thermometer

3) Plastic container

4) BOD bottle (300 ml)

5) Winkler A and B solution

Methodology of water sample analysis:

Sr. No.	Water Parameters	Unit	Method used
1	Temperature	Degree Celsius	Thermometric method
2	pH	-	Digital pH meter
3	Total Alkalinity	mg/l	Titrimetric method (with HCl)
4	Chloride	mg/l	Titrimetric method (with Agno3)
5	Total Hardness	mg/l	Titrimetric method (with EDTA)
6	Magnesium	mg/l	Titrimetric method (with EDTA)
7	Calcium	mg/l	Titrimetric method (with EDTA)

Table.1 List of methodology used for water analysis.

1) **Temperature**: Temperature were recorded at site during sampling, by using 1/10 thermometer.

2) **pH:** It was measured by using pH probe (HANNA made).

3) **Alkalinity**: Total (TA) was estimated by titrimetric method (Trivedi and Goel 1994). The water sample titrated against the 0.1 N HCl by using methyl orange and phenolphthalein as an indicator. The end point was colorless for phenolphthalein and the end point is yellow to pink.

Calculation done by using this formula:

$$\textbf{Total Alkalinity (mg /L)} = \frac{(\textbf{MBR} \times \textbf{0.1} \times \textbf{1000} \times \textbf{50})}{\textbf{50}}$$

4) **Chloride :**

It was estimated by titrimetric method of Trivedi and Goel (1994). The water sample was titrate against the 0.02N AgNO3 and also used the Potassium chromate until the red tinge colour appear.

Calculation done by using formula:

$$\textbf{Total Chloride (mg /L)} = \frac{(\textbf{MBR} \times \textbf{0.02} \times \textbf{1000} \times \textbf{35.5})}{\textbf{50}}$$

5) **Total Hardness (TH) :**

It is estimated by titrimetric method. Water sample titrated against the 0.01 M EDTA by using Erichrome Black T indicator.

Calculation done by using formula:

$$\textbf{Total Hardness (mg /L)} = \frac{(\textbf{MBR} \times \textbf{1000})}{\textbf{50}}$$

6) **Calcium:**

It was estimated by titrimetric method. The water sample titrated against the 0.01M EDTA solution by using Muroxide as an indicator.

Calculation done by using the formula,

$$\text{Calcium (mg /L)} = \frac{(\text{MBR} \times 400.8)}{50}$$

7) Magnesium :

It was calculated by the using following formula,

$$\text{Magnesium (mg /L)} = \frac{(\text{Hardness} - \text{Calcium})}{1.645}$$

CHAPTER 3: RESULT AND DISCUSSION

In the present study, the month wise mean data of Physico-chemical parameters for three months (February 2023 to April 2023) from Nilwande dam were obtained and compared with the BIS and WHO standards. Total Seven water parameters *viz.* Water temperature, pH, Total alkalinity, Chloride, Total hardness, Calcium and Magnesium were studied.

During this study, the value of water temperature was recorded in the range between 24°C to 36°C. The observed water temperature was maximum in the month of April and low in the February. The value of pH was recorded in the range from 7.43 to 8.4. The observed pH was maximum in the month of February and low in the April. The value of total alkalinity was recorded in the range between 221.33 mg/lit. to 304 mg/lit. The observed total alkalinity was maximum in the month of March and low in the April. . The value of chloride was recorded in the range between 56.07 mg/lit to 82.81 mg/lit. The observed chloride was maximum in the month of April and low in the February.

The value of total hardness was recorded in the range between 72.62 mg/lit to 120.1 mg/ lit. The observed total hardness was maximum in the month of March and low in the April. The value of calcium was recorded in the range between 14.85 mg/lit to 33.93 mg/lit. The observed calcium was maximum in the month of March and low in the April. The value of magnesium was recorded in the range between 76.73 mg/lit to 102.95 mg/lit. The observed magnesium was maximum in the month of February and low in the April.

Sr. No.	Test	February	March	April
1	Temperature	24.°C	29°C	36°C
2	pH	8.43	8.1	7.4
3	Total Alkalinity (ppm)	221.33	304	225
4	Chloride (ppm)	56.07	68	82.81
5	Total Hardness (ppm)	90	120.1	72.62
6	Calcium (ppm)	22	33.93	14.85
7	Magnesium (ppm)	102.95	85	76.73

Table 2 Monthly distribution of water parameter from Nilwande Dam

Saravanakumar and Ranjith Kumar (2011) studied about groundwater quality of Ambattur industrial area in Chennai City. They studied parameters such as pH, total alkalinity, total hardness, turbidity, chloride, sulphate, fluoride, total dissolved solids and conductivity. It was observed that there was a slight fluctuation in the -chemical parameters among the water samples studied. Comparison of the Physico-chemical parameters of the water sample with WHO and ICMR limits showed that the groundwater is highly contaminated and account for health hazards for human use

Manjare et al. (2010) studied the Physico-chemical Parameters of Tamadalge Water Tank in Kolhapur District, Maharashtra. Monthly Changes In Physical and Chemical Parameters Such as Water Temperature, Transparency, Turbidity, Total Dissolved Solids, pH, Dissolved Oxygen, Free Carbon dioxide, and Total Hardness, Chlorides, Alkalinity, Phosphate and Nitrates. Were analyzed for a periods of one year. All Parameters were within the Permissible limits. The results indicate that the tank is Non-polluted and can be used for Domestic and Irrigation.

CHAPTER 4: CONCLIUSION

The analysis of water quality parameters of Nilwande Dam showed that the values are well within the permissible limits. The result of study reveals that the quality of Dam water is though fit for domestic, irrigation and drinking purposes, and need continuous monitoring of - Chemical parameters to improve the quality of water.

CHAPTER 5: REFERENCES

1) Arangale, K. B., Raut, V. R., Gavit, M. G., & Shinde, Y. P. (2018). Physico-Chemical Parameters Assesstment Of Dam Water In Different Sites Of Ahmednagar District Of Maharashtra. International Journal Of Researches In Biosciences, Agriculture And Technology, 6, 7-9.

2) Balsane V.K., Bansode R.D., Atre A.A, (2015) Environmental flow: Water quality assessment of Mula river, International Journal of enhanced research in science technology and engineering, Vol-4:44-49

3) Bharti Dattatray et al., (2011) Physico-chemical characteristics of borewell water quality in Nagpur region, Volume-3, Issue-2, pp.922-927.

4) Gorade, S. P. and Jadhav, M. V. (2013) Assessment of water quality parameters: A review, J. Engineering Res. and application, Volume-3, Issue-6, pp.2029-2035.

5) Jasper, M. Dalhuisen and Peter Nijkamp (2006) Regulatory impacts on sustainable drinking water supply: a comparative study on Dutch water companies, Int. J. of Environmental Technology and Management, Volume-6, Issue-6, pp.564-582.

6) Kamble, P.N. and S.R. kuchekar, 2011. Monitoring of -chemical parameter and quality assessment of water from bhandardara reservoir. Pelagia research library, 229-234.

7) Kharde, A.K. (2014). Study of chemical properties of ground water in Pravara Area in Ahmednagar District, India. Research Journal of Resent science, Vol-3(IVC-2014):71-75.

8) Manjare, S. A., Vhanalakar, S. A., & Muley, D. V. (2010). Analysis of water quality using Physico-chemical parameters Tamdalge tank in Kolhapur district, Maharashtra. International journal of advanced biotechnology and research, 1(2), 115-119.

9) Marten, G. G. and J. W. Reid. (2007) Cyclopoid copepods. J. Am. Mosq. Contr. Assoc. Volume-23, pp.65- 92.

10) Mohammad Zakir Hus Jadhav, S.D. and D.G. Kanase, 2005. Physico-chemical assessments of Nira and mutha river, pune , (Maharashtra, India), J.indianchem.Soc, 62, vol.6: 1038.ain (2015) Water: The most precious resource of our life, Volume-2, Issue-9, pp.1436-1445.

11) Murangan, A. S. and Prabhaharan, C. (2012) Fish diversity in relation to chemical characteristics of kamala basin of Darbhanga District , India, Int, J. Pharma and Bio Archi., Volume-3, Issue-1, pp.211-217.

12) Prasana, M. and Ranjan, P. C. (2010) Physico-chemical properties of water collected from Dharma estuary, Int. J. Envi. Sci., Volume-1, Issue-3, pp.334-342.

13) Rozina Khatun (2017) Water Pollution: Causes, Consequences, Prevention Method and Role of WBPHED with Special Reference from Murshidabad District, Int. J. of Scientific and Research Publications, Volume-7, Issue-8, ISSN 2250-3153.

14) Saravanakumar, K., & Kumar, R. R. (2011). Analysis of water quality parameters of groundwater near Ambattur industrial area, Tamil Nadu, India. Indian Journal of Science and Technology, 4(5), 660-662.

15) Venkatesan, G., Swaminathan, G. and R. Nagarajan (2013) Study on groundwater quality in and around solid waste landfill site at Tiruchirappalli, Tamil Nadu, India, Int. J. of Environmental Engineering, Volume-5, Issue-2, pp.179-196.

16) Venkatesharaju, K., Ravikumar, P., Somashekar, R. K. and Prakash, K. L. (2010) Physico-chemical and bacteriological investigation on the river Cauvery of Kollegal Strectch in Karnataka, J. Sci. Engin and Technol., Volume-6, Issue-1, pp.50-59.