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Comparative Study of Seasonal Variation on Physico-Chemical Parameters of Fagne Lake Dhule District, Maharashtra, India

[1]Narendra R Borase

[2]Prashant R Badgujar

[3]Jagdish P Bhadane

[4]Sneha Pawar

[1] Assistant Professor, [2]Assistant Professor, [3] Assistant Professor, [4] Assistant Professor
[1]Civil Engineering Department, [2]Civil Engineering Department , [3]Civil Engineering Department, [4]Civil Engineering Department
[1]NESociety's Gangamai College of Engineering Nagaon, Dist.Dhule (Maharashtra). India
[2]NESociety's Gangamai College of Engineering Nagaon, Dist.Dhule (Maharashtra). India
[3]NESociety's Gangamai College of Engineering Nagaon, Dist.Dhule (Maharashtra). India
[4]NESociety's Gangamai College of Engineering Nagaon, Dist.Dhule (Maharashtra). India

Abstract: The impact of global climate change majorly affects the quality of groundwater, but the impacts to seasonal changes are not negligible. The noticeable changes also can be found by analyzing the quality of groundwater seasonally. The main objective of this study is to analyze the variation in physico-chemical characteristics of groundwater and to focus on the drinking water quality of Fagne Lake. Fagne Lake is a manmade water reservoir located on Kodi River about 1.5 km south to the Fagne village of Dhule district Maharashtra State, and constructed during 1996 to 2001. The water quality parameters of Fagne Lake were studied for 3 seasons i.e. summer, monsoon and winter from Feb. 2023 to Jan. 2024. Seasonal changes within the physico-chemical properties of water such as free CO_2, DO, pH, Transparency, Temperature, Turbidity, and Hardness were observed. After comparing the results with the previous studies it can be conclude that all the physical and chemical properties of Fagne lake water were within desirable limits.

IndexTerms **- Groundwater, Physico-chemical parameters, Seasonal impacts, Fagne Lake.**

I.INTRODUCTION

Water resources have great importance to human development and for the entire ecosystem. It is essential for agriculture, industry and human existence. The healthy aquatic ecosystem is trusted the physico-chemical and biological characteristics of water. The population of every country is facing the problem of scarcity of natural resources. Water is that the basic need of every living organism and hence use of water needs proper planning and management. So study concern with environmental and ecological sciences is important. The Fagne lake is 1.5 km away South from the Fagne vilage. It has a medium storage capacity (42.24 MCFT). It measures the entire length of 1.5 km and width is of 1 km. it's one of the important water reservoir and used for different purposes like drinking water supply, irrigation, fishing. Water is supplied to the Fagne Balapur Vadjai and Saundane vilage about 1.5 thousand acre agricultural land is irrigated by this lake of nearby villages and hence the water quality of fagne Lake should be checked at the regular interval is necessary to prevent the consumption of contaminated water. Human population and other living animals could also be suffer from number of water borne diseases. For the analysis of physicochemical properties of water the sample of water is collected from the 2 different stations i.e. S_1 & S_2 within the morning and in mid afternoon 2.30 pm. (two times) within the one liter sample polythene bottle. The physico-chemical parameter like Temp, pH and Transparency recorded at same time of collection by using Digital thermo-meter, pocket Digital PH meter, Transparency was measured by Saatchi disc, Turbidity with turbiditimeter. Dissolved O_2 & free CO_2, total hardness of water is estimated by using standard method APHA.

II. NEED OF THE STUDY.

There is a need to analyze the variation in physico-chemical characteristics of groundwater and to focus on the drinking water quality of Fagne Lake. The impact of global climate change majorly affects the quality of groundwater, but the impacts to seasonal changes are not negligible.

III. MATERIAL AND METHODS

The Fagne Lake is one among the important water reservoir and used for different purposes like drinking water supply, irrigation, fishing, water is supplied to the Fagne Balapur Vadjai and Saundane vilage.about 1.5 thousand acre agricultural land is irrigated by this lake of nearby villages. To evaluate the water quality an effort was made to investigate the water in Fagne Lake reservoir located on Kodi nala near fagne village of Dhule District, Maharashtra State of India topography 200 47'06.32 N Longitude and 740 46'32.52 Latitude E. The climatic condition of the study area was moderate in summer and winter. The region gets moderate rainfall from south west the place gets most of its rainfall from June to September during the monsoon. Lake water is employed for drinking, agriculture and fishing.

In order to determine the water quality index two stations were chosen for sample collection form the reservoir during February 2023 to January 2024 in the first and third week of every month. The number of results was recorded at the sampling stations whereas the others were recorded in the laboratory, according APHA, 2005. The study of Physico-chemical properties of water is as under study viz. The Fagne lake where administered for one year.

IV. OBSERVATIONS

Table 4.1: Physico-chemical data of Fagne Lake during Feb.2023 to Jan. 24

Season	Month	Physicochemical parameter of Water						
		Temperature	pH	Dissolved O_2	Free Co_2	Total Hardness	Transparency	Turbidity
Summer	Feb. 23	25.4	7.5	5.1	5.2	180	60.5	6.9
	Mar23	26.2	7.6	6.8	5.1	150	48.5	9.8
	Apr 23	28.8	8.2	6.9	4.5	155	35.4	10.1
	May 23	30.5	8.4	7.0	5.9	160	21.5	10.5
Monsoon	June23	31.5	7.4	7.2	6.1	145	25.3	5.8
	July 23	28.5	7.6	6.8	6.3	290	24.5	4.5
	Aug 23	23.6	7.2	6.5	5.8	260	30.5	3.8
	Sept 23	25.4	7.1	6.6	5.2	230	55.5	2.3
Winter	Oct 23	23.2	7.3	6.7	4.9	220	60.8	2.5
	Nov 23	20.5	7.5	6.4	5.0	210	70.7	0.7
	Dec 23	19.1	7.4	6.2	5.1	230	67.5	0.8
	Jan 24	19.5	7.2	6.3	5.3	210	65.4	4.9

Fig No. 1 Physico-chemical data of Fagne Lake during Feb.-2023 to Jan.24

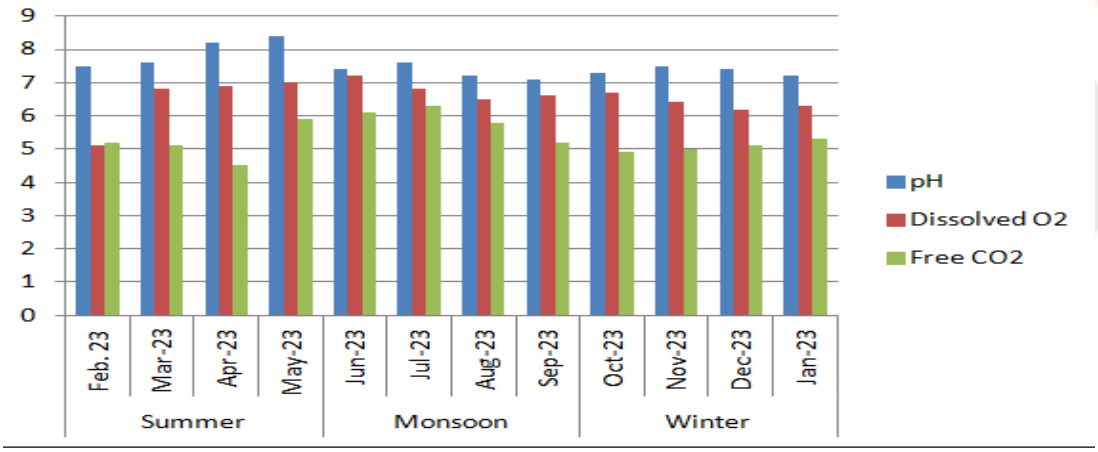
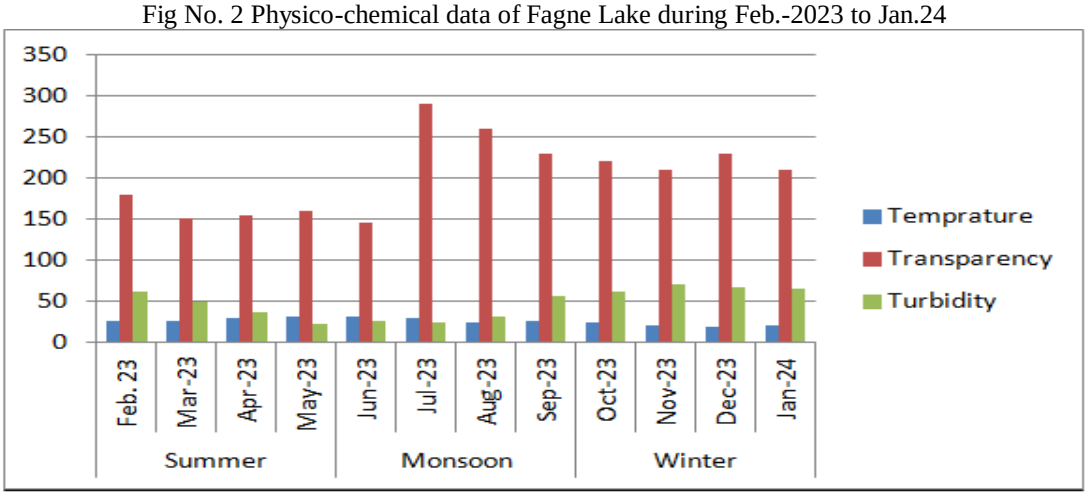


Fig No. 2 Physico-chemical data of Fagne Lake during Feb.-2023 to Jan.24



V. DISCUSSION

Water Temperature: The temperature of water of Fagne lake during year 2018 is 19.1 ^{0}C to 31.5 ^{0}C. Minimum temperature is recorded in the month of Dec. and Maximum in the month of May. The average temperature of Lake in the year 2023 were recorded to be 23.5 ± 5 ^{0}C.

pH (Hydrogen ion Concentration) : The pH during the year 2023 ranges between 7.2 to 8. The minimum value was recorded in the month of December and the maximum in the month of May. During the year 2023 it ranges between 7.1 to 8.4. The minimum value of pH was observed in the month of September and maximum in the month of May. The annual average of the year 2023 was observed to be 7.2 ± 03.

D.O. (Dissolved Oxygen): The dissolved oxygen of the year 2023 ranges between 5.1 to 7.2 mg/l, minimum value was recorded in the month of February and maximum in the month of June. The annual average of year 2023 was observed 6 ±0.3.

Free (CO_2): The free CO_2 during the year 2023 ranges between 4.5 mg/l to 6.3 mg/l. The minimum value was recorded in the month of April & maximum in the month of July. Seasonal variation in the maximum value was recorded 5.2 ± 03 mg/l in the monsoon season of the year 2023. The average of year 2023 was recorded to be 4.9 ± 1.6 mg/l and in the year 2023.

Total Hardness: The total hardness during the year 2023 ranges between 145 mg/l to 290 mg/l. The minimum value was recorded in the month of June & maximum in the July. The annual average of the year 2023 was observed to be 180±80 mg/l.

Transparency: The transparency during the year 2018 ranges from 21.5 to 70.7 cm. The minimum Transparency was recorded in the month of May & Maximum in the month of November in the year of 2023. The average transparency was observed to the extent of 41.31 ± 2.0 cm in the year 2023.

Turbidity: The Turbidity during the year 2023 ranges from 0.8 to 10.5 NTU. Turbidity observed minimum in the month of November and maximum in the month of May during the year 2023.

VI. CONCLUSION

After comparing the results with the previous studies it can be conclude that all the physical and chemical properties of Fagne lake water were within desirable limits. The results obtained from the present investigation shall be useful in future management of the reservoir. The physico-chemical characteristics of reservoir water suggested that there was no harmful to pisciculture, irrigation and drinking water but it is advised to do treatment on water before using for drinking purpose. Determination of water quality index (WQI) would be useful in assessing the overall quality of water seasonally.

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