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Analysis of Water Quality Using Physico-Chemical Parameters of Rangavali Dam, Navapur (Nandurbar District), Maharashtra

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Abstract

Water quality analysis plays a critical role in the stable management of water resources and environmental monitoring. The dam is classified in Nabapur Taluk, in the Nandarbar region of Maharastra and serves as an important water source for agriculture and use. As an artificial structure built on river channels, dams modify the natural abiotic and biological factors of the river, leading to changes that affect the ecosystem compared to rivers rather than wild.The purpose of this study is to assess dam water quality by analyzing key physical and chemical parameters that determine their capabilities for various applications. parameters including the pH, temperature, dissolved oxygen, turbidity, total dissolved solids, free carbon dioxide, transparency, total hardness, chloride, alkalinity, phosphates, and nitrates, etc. are thoroughly measured. These factors affect the dam's ability to provide safe drinking water, support agriculture and maintain water lifespan. Physical characteristics, such as water temperature and transparency, affect the general ecosystem, affecting the growth of aquatic plants and organisms. Meanwhile, chemical parameters, such as pH, dissolved oxygen and nitrates, are necessary to maintain a healthy aquatic environment and provide suitable water for human consumption and irrigation. Including the impact of dams on these parameters, this study provides a complete assessment of water quality and provides valuable information for effective management in queue movements and sustainable use of water resources.

Key words: *Water quality, Water pollution, Physicochemical Parameters, Rangavali dam Navapur, Nandurbar Maharashtra.*

Introduction

Water is one of the most important connections to ecosystems on the surface of the Earth. Several parameters that help essentials display the quality of the water. The quality of groundwater depends primarily on the various chemical constituents and their concentrations derived from geological data or each region. Industrial and local government waste have been proven to be one of the main causes of surface and groundwater contamination. Water quality is extremely important to humans as it is directly linked to human health. It improves water quality as described by physical, chemical and biological properties, including population growth, industrialization, the use of fertilizers in agriculture, and artificial activities such as domesticated wast. Therefore, the quality of drinking water should be checked at normal time intervals. Water chemistry has a lot about ecosystem metabolism and explains thegeneral biological relationship with hydropower, making it difficult to fullyunderstand biological phenomena. Due to the dependence of water physicochemical parameters and all life processes of these factors, it is desirable as an environment. In this study, water quality analysis is included in relation to physicochemical parameters of Rangavari Dam in Navapur (Nandarbar district) in Maharashtra. River water is basically used for homes, agricultural purposes and fishing activities. I performed physicochemical and biological characteristics of the waters of the Rangawali dam.

Materials and Methods:

The Water samples collected from Rangavali dam from four different dam areas. The water samples collected in glass bottle regularly for every month during morning time between 8.00AM to 10.00AM. The water samples were brought laboratory immediately for calculating several physico-chemical characteristics, such as pH, water temperature, and transparency were recorded at the time of sample collection, by using thermometer and pocket digital pH measurement device and pH strips. The transparency was measured using the a Secchi Disc. other parameter such as TDS, DO, Free CO2, Hardness, Alkalinity, Nitrate and Chlorides were estimated in the research laboratory according to standard methods as prescribed by APHA (1985) and APHA (1989)

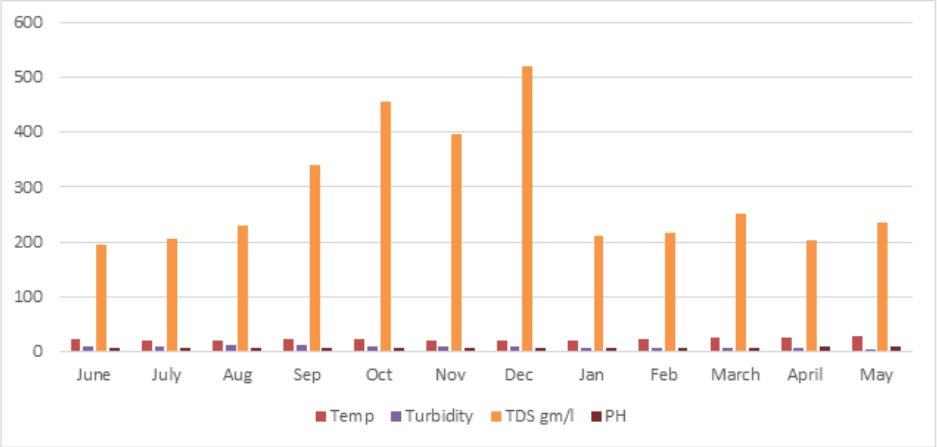
Results and Discussion:

The Monthly Variablity in Physico-chemical parameters is represented in below table No.1:

Table 1: Physical parameters of Rangavali District, Maharashtra:

Month	pH	Turbidity NTU	Temperature	TDS mg/lit
Jun	7.64	8	22.4	195
Jul	7.60	10	20.1	205.5
Aug	7.55	12.5	20.4	231
Sep	7.51	11	23.2	340
Oct	7.51	10	21.3	455.5
Nov	7.45	8.5	21.1	395.5
Dec	7.40	8	20.0	521.
Jan	7.50	7.5	20.4	210
Feb	7.60	6.5	22.2	215
Mar	7..65	6	23.9	250
Apr	7.7	5.5	26.3	202
May	8.10	5	27.1	235

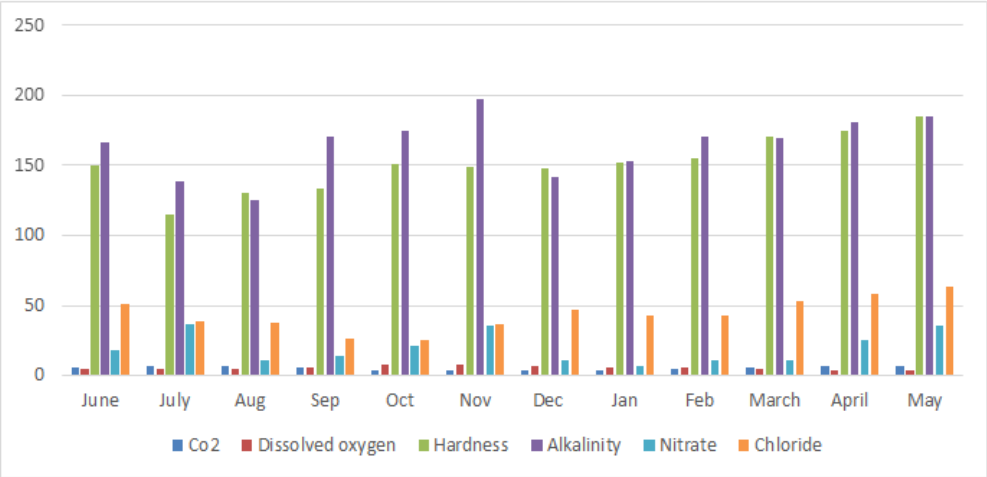
Graph 1. Rangavali Dam's physical characteristics at Navapur, Nandurbar District, Maharashtra, were statistically analyzed.



Biostatistical evaluation of Rangavali Dam's chemical and physiological characteristics in Navapur, Nandurbar District (MH):

Months	Co_2	Dissolved Oxygen	Hardness	Alkalinity	Nitrate	Chloride
Jun	5.9	5.05	150	166	18.2	51.55
Jul	6.5	5.1	115	139	36.82	39.15
Aug	6.4	5.15	130	125	11.01	37.5
Sep	6.2	5.6	133	170	13.97	26.4
Oct	3.2	8.05	151	175	20.8	25
Nov	3.4	7.5	149	197	35.8	36.5
Dec	3.5	7	148	142	11.4	46.5
Jan	3.4	5.7	152	153	7.25	42.5
Feb	4.4	5.4	155	170	10.84	43
Mar	5.9	4.6	170	169.5	10.8	53
Apr	6.6	4.1	175	181	25.8	58
May	7.2	3.8	185	184.5	35.8	63

Graph 2. Rangavali Dam's chemical characteristics at Navapur, Nandurbar District, Maharashtra, were statistically analyzed.



Water Temperature: At Rangavali Dam, the summer months of May and December saw the highest and lowest recorded temperatures, respectively, at 27.1°C and 20°C. It demonstrated that summer temperatures were greater and winter temperatures were comparatively lower. According to a similar study by Jayabhaye et al. and Salve and Hiware, the low water level, high temperature, and clear atmosphere caused the water's temperature to rise over the summer. The temperature of the water has a significant impact on the chemical, biological, and biochemical properties of a body of water.

Turbidity: Water turbidity ranges from 5 NTU to 12.5 NTU. The highest reading (12.5 NTU) was noted during the hot months of February. Human activity, a drop-in water level, suspended particulate matter, and the July minimum value of 5 NTU could all be to blame.

Total Dissolved Solids: The total dissolved solids fluctuate from 195 mg/l to 521 mg/l. The maximum value (521 mg/l) was recorded in December due to heavy rainfall, and the minimum value (195g/l) was recorded in June.
CO2 was at a high level in May.

Turbidity: Water turbidity ranges from 5 NTU to 12.5 NTU. The highest reading (12.5 NTU) was noted during the hot months of February. Human activity, a drop in water level, the presence of suspended particulate matter, and a minimum value of 5 NTU in July could all be contributing factors.
Total Dissolved solids: The range of the total dissolved solids is 195 mg/l to 521 mg/l. The month of December saw the highest figure (521 mg/l). Heavy rains and the lowest value (195g/l) in June are to blame.

pH: The alkaline pH values were between 7.40 and 8.10. The summer months of May and December had the highest and lowest pH values, respectively, at 8.10 and 7.40. Water's pH varies depending on variables like air temperature. The pH affects the majority of chemical and biochemical reactions. According to Masood Ahmed and Krishnamurthy R. (1990), Bandella, N.N., D. P. Vaidya, and V. S. Lomte (1998), low oxygen levels coincided with high summer temperatures because the decreased rate of photosynthetic activity reduces the assimilation of carbon dioxide and bicarbonates, which is ultimately responsible for the increase in ph.
Free Carbon dioxide: Free CO2 levels vary from 3.2 mg/l to 6.50 mg/l. The months of May and October saw the highest and lowest values, respectively, at 7.20 mg/l and 3.2 mg/l. The water body's hardness and alkalinity may have an impact on this. CO2 was at a high level in May.
This might have something to do with the greater rate of decomposition during the warmer months. D. V. Muley, S. A. Manjare, and S. A. Vhanalakar also reported similar findings (2010).

Dissolved Oxygen: The range of dissolved oxygen concentrations is 3.8–8.05 mg/l. The month of October had the highest levels (8.05 mg/l), while the month of May recorded the lowest values (3.8 mg/l).

Hardness: The hardness value varies between 70 and 185 mg/l. The summer month of May recorded the highest figure (180 mg/l), while the month of December recorded the lowest value (148 mg/l). According to Hujare (2008), summertime total hardness was higher than monsoon and wintertime total hardness. Summertime high hardness values are caused by a decrease in water volume and an increase in the rate at which water evaporates. The current investigation produced similar findings.

Alkalinity: The range of total alkalinity is 125 mg/l to 184.5 mg/l. The summer month of May had the highest value (184.5 mg/l), while the month of August had the lowest value (125 mg/l). Because to the rise in bicarbonates in the water, the alkalinity reached its highest value in May (summer). Similar findings were also reported by Hujare (2008), who stated that the high photosynthetic rate recorded by Wetzel (1963) and Shreenivasan (1964) caused it to peak in the summer and fall in the winter.

Nitrates: The growth of plants depends on the nitrates. Nitrate levels range from 7.25 mg/l to 36.82 mg/l. The monsoon month of July had the highest value (36.82 mg/l), while the winter month of January had the lowest (3.40 mg/l). According to Umavathi et al. (2007), drinking water with high nitrate concentrations is harmful.

Chlorides: Chloride concentrations vary between 25 and 63 mg/l. The summer month of May recorded the highest value (63 mg/l), while the month of October recorded the lowest value (25 mg/l). According to the current study, summertime is when the chloride value is at its highest. Swarnalatha and Narsing Rao (1998) and M. John Mohammad, P.V. Krishna, O.A. Lamma, and Shabbar Khan (2015) both found similar findings.

Conclusion:

The analysis of water samples from the Rangavali dam in Navapur, Maharashtra's Nandurbar District, over several months. It indicates that the physico-chemical parameter values were below the World Health Organization's (WHO) acceptable limit. As a result, the water from the Rangavali dam is unfit for human consumption.

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Conflicts of Interest
The authors declare that there are no conflicts of interest regarding the publication of this paper.

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