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Analysis of physicochemical parameters of water sample Around the Pravara River from Akole and Sangmner Tahsil Maharashtra

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Abstract
The Pravara river is the tributaries of Godavari river in Maharashtra. Pravara river water used as drinking and irrigation purposed. During the months of December 2024 to March 2025, water samples were collected from different site and analysed monthly. As soon as possible, the water samples were brought into the laboratory to estimate a number of physico-chemical parameters, such as water temperature and pH, which were measured using a thermometer and a digital pH meter. A digital conductivity meter was used to measure particular conductivities. Other parameters, like Alkanity, Dissolve Oxygen, Acidity, Free carbon dioxide are measured using Volumetric methods and estimated in the lab. The pH and temperature range of water samples is varies from site to site. pH plays a important role in water quality, affect the solubility and availability of chemicals and heavy metals, impacting aquatic life, and affecting water treatment processes. The fluctuation of temperature affect the metabolic rates, growth, reproduction, and species dispersal. The other parameter also affect on growth, respiration, metabolic rates, survivals due to changes in range. dissolved oxygen (DO) in water is essential to aquatic life's survival and serves as a critical water quality indicator.

Keywords: Pravra river, Physico-chemical analysis

Introduction

The current study focuses on a survey of the Pravara, a tributary of the Godavari River in India. It starts in Ratangad, which is located along Maharashtra's Western Ghats, and flows 200 kilometers east before emptying into the Godavari. The upstream portion of the river travels through the extremely mountainous Western Ghats. High-speed water flows from this location. Eleven million cubic feet of water are impounded in the upstream region by the Wilson Dam (Bhandardara Dam), which was constructed over the Pravara River. Two hydroelectric power projects are based on Wilson Dam water.

The primary uses of water are domestic, industrial, drinking, and irrigation. Beginning in 1873, irrigation on the Pravara River has been regarded as the district of Ahmednagar's lifeline. Since the river absorbs a variety of residential, agricultural, and industrial effluents as it passes through rural and urban areas, its quality is evaluated together with the effects of various cultural and human activities on its physico-chemical and biological properties.

The seven the 97% water present on earth which is salinity water and 3% are freshwater out of these three percent 0.09% water used for drinking purpose. Pollution of water is measured by assessing the physiochemical parameters of water [1]. Physico-chemical analysis is the prime consideration to assess the quality of water for its best utilization like drinking, irrigation, fi sheries, and industrial purpose and helpful in understanding the complex processes, interaction between the climatic and biological processes in the water [2]. When rain water flows over the surface of soil, the soil consists of mineral, salt etc. which are dissolved by water. So water consists minerals, salts etc. which affect on physic-chemical properties of water. Due to the same, the entire eco-system gets disturbed.

The quality ofdrinking water is essential for life. Contaminants such as bacteria, viruses, heavy metals, nitratesand salt have polluted water supplies as a result of inadequate treatment and disposal of waste fromhumans, livestock, industrial discharges, domestic discharge and extensive use of limited water resources [3]. There are a number of reported cases of typhoid, diarrhoea and other water borne diseases arising from the consumption of contaminated water. Different works have been reported by many researchers on water quality assessment. Today, contaminated water kills more people than cancer, AIDS, wars, terrorism or accidents [4].

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 (Kocaoba and Akain, 2005). Water is being polluted due to various human activities including water from chemical fertilizers and pesticides from farms and water for domestic use and industrial [5, 6, 7, 8]. The best solvent for life is water. There is no pure water on the surface of the earth. The closest thing to chemically pure water is rainwater. Life cannot be imagined without water. On the earth's surface, water can be found in lakes, rivers, wells, glaciers, and the ocean. Water makes up 71% of the earth's surface, while land makes up 29%. Seventy-nine percent of the 1% fresh water utilized for irrigation, thirteen percent for industry, and eight percent for drinking. Rainwater dissolves minerals, salt, and other substances found in soil when it falls on the soil's surface.

Thus, minerals, salts, and other substances found in water have an impact on its physicochemical characteristics. Based on a number of water quality factors, the water quality index gives a single figure that represents the general state of the water at a specific place and time. Transforming complicated water quality data into information that the

general public can use and comprehend is the aim of the water quality index. By evaluating different physicochemical characteristics such as pH, temperature, total alkalinity, and dissolved oxygen, the current study aimed to evaluate the Pravara River's environment.

Materials and Methods

During the months of December 2024 to March 2025, water samples were collected from different site and analyzed monthly. For the investigation, five sampling locations were chosen from along the Pravara River: Nanduri (Site I), Sangamner (Site II), Chikhali (Site III), Dhandarfal BK (Site IV), and Kalas (Site V).Water samples were taken in polythene bottles from five different locations between 9 and 11 a.m. As soon as possible, the water samples were brought into the laboratory to estimate a number of physico-chemical parameters, such as water temperature and pH, which were measured using a thermometer and a digital pH meter (Systronics). A digital conductivity meter was used to measure particular conductivities. Other parameters, like Alkanity, Dissolve Oxygen, Acidity, Free carbon dioxide are measured using volumetric methods and estimated in the lab. Present Study involves the Analysis of Water Quality in Terms of Physico-chemical methods. (Trivedy and Goel, 1986, APHA 1985) [9].

Table 1: Parameter observed methods

Sr.No.	Parameter	Methods
1	pH	pH meter
2	Temperature	Thermometer
3	Alkanity	Volumetric method
4	Dissolved O2	Volumetric method
5	Acidity	Volumetric method
6	Free CO2	Volumetric method

Results and Discussion

PH: The normal pH of drinking water is 7. pH plays a important role in water quality, affect the solubility and availability of chemicals and heavy metals, impacting aquatic life, and affecting water treatment processes. pH is the negative logarithm of base 10 hydrogen ion concentration (pH=-log [H+]). Since most plant and animal species can survive in a narrow pH range from slightly acidic to slightly alkaline conditions, the pH of water is critical for biotic communities, according to the data. The majority of water's chemical and biological processes are impacted by pH. It is among the most significant environmental elements that restrict the range of organisms in aquatic environments. The ideal pH range for the majority of aquatic creatures is between 6.5-8, although some species thrive in different pH ranges. The pH range of water samples is varies from site to site during December 2024 to march 2025, The lowest pH observed during February is 6.8 and The highest pH observed during December 2024 is 7.9.

Temperature: The pure water boil at 100^{o}c temperature and frozen at 0^{o}C temperature. By changing metabolic rates, growth, reproduction, and species dispersal, water temperature has a substantial impact on biotic life. Warmer temperatures tend to promote activity, but they can also decrease dissolved oxygen and alter chemical processes. The temperature range of water samples is varies from site to site between December 2024 to march 2025, The lowest temperature observed during December is 18 ^{o}C and The highest temperature observed during march is 27^{o}C.

Alkanity: The ability of water to neutralize acids or withstand pH shifts that cause acidity while maintaining a relatively constant pH in organism body is known as alkalinity. This capability is commonly known as the "buffering capacity" of water. The alkalinity of water is influenced by the presence of specific compounds, such as hydroxides, carbonates, and bicarbonates. To put it simply, if high alkalinity water is contaminated by acidic water, such acid rain, it is less likely to become more acidic. Bicarbonate and carbonate, which dissolve in soil water, are the cause of alkalinity. The alkanity range of water samples is varies from site to site between December 2024 to march 2025, The lowest alkanity observed during march is 40 mg|L and The highest alkanity observed during December is 283 mg|L. WHO, BIS, ISI, and ICMR proposed a desirable range of Alkalinity of drinking water.

Acidity: When carbon dioxide (CO2) gas dissolves in water, it turns acidic. Both human actions, such as burning fossil fuels, and natural processes, such as respiration and photosynthesis, can contribute to this. Biological life is greatly impacted by water acidity, which affects physiological functions, species distribution, and ecosystem health. The Acidity range of water samples is varies from site to site between December 2024 to march 2025, The lowest Acidity observed during december is 5 mg|L and The highest Acidity observed during February and march is 22 mg|L. WHO, BIS, ISI, and ICMR proposed a desirable range of Alkalinity of drinking water.

Dissolve Oxygen: The water sample collected from pravara river during December 2024 to march 2025 during winter and mansoon at 5 different sites the dissolve oxygen is varies from site to site. The Dissolve Oxygen range of water samples is varies from site to site between December 2024 to march 2025, The lowest Dissolve Oxygen observed during december is
0.26 mg|L and The highest Dissolve Oxygen observed during December is 18 mg|L. A necessary "breath" for fish, invertebrates, and microbes, dissolved oxygen (DO) in water is essential to aquatic life's survival and serves as a critical water quality indicator.

Free CO2: The Free CO2 range of water samples is varies from site to site between December 2024 to march 2025, The lowest Free CO2 observed during december is 0.99 mg|L and The highest Free CO2 observed during march is 4.20mg|L. The free carbon dioxide value was ranged from 0.98-4.34 mg/L. Lendhe and Yergi, 2004 [10].

Table 2: Analysis of Water Sample during December 2024

Sr. No	Site	PH	Temparture oC	Alkanity mg/l	Dissolve Oxygen mg/l	Acidity mg/l	Free CO_2 mg/l
Sample 1	Nanduri	7.9 mg/dl	21	73 mg/dl	14.49	6.65	0.99
Sample 2	Sangmner	7.5mg/dl	20	226mg/dl	18.52	5	2.03
Sample 4	Dhandhrfl	7.8mg/dl	18	176mg/dl	6.44	10	2.40
Sample 5	Kalas	7.5mg/dl	20	190mg/dl	0.26	10	3.30

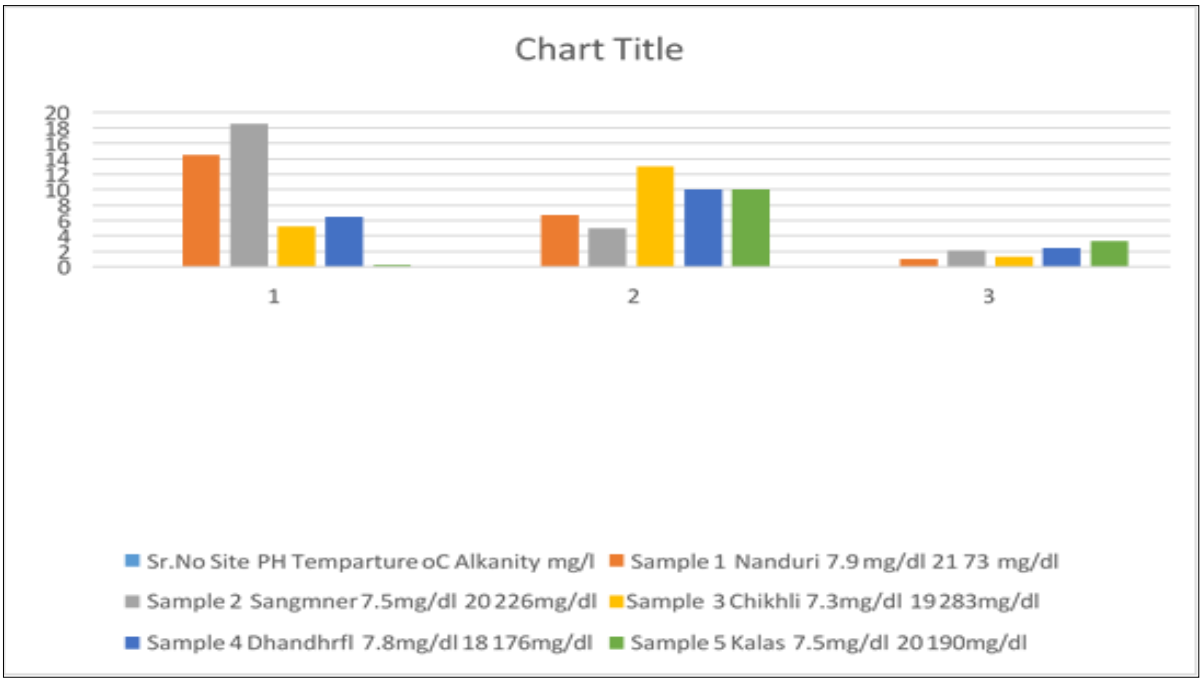


Table 3: Analysis of Water Sample during January 2025

Sr.No	Site	PH	Temparture oC	Alkanity mg/l	Dissolve Oxygen mg/l	Acidity mg/l	Free CO_2 mg/l
Sample 1	Nanduri	7.2 mg/dl	21	75mg/dl	12.14	7.3	1.10
Sample 2	Sangmner	7.3mg/dl	22	202mg/dl	15.23	8	2.33
Sample 3	Chikhli	7.6mg/dl	20	154mg/dl	6.33	14	1.00
Sample 4	Dhandhrfl	7.3mg/dl	22	180mg/dl	5.22	12	1.80
Sample 5	Kalas	7.0mg/dl	21	80mg/dl	1.34	10	4.20

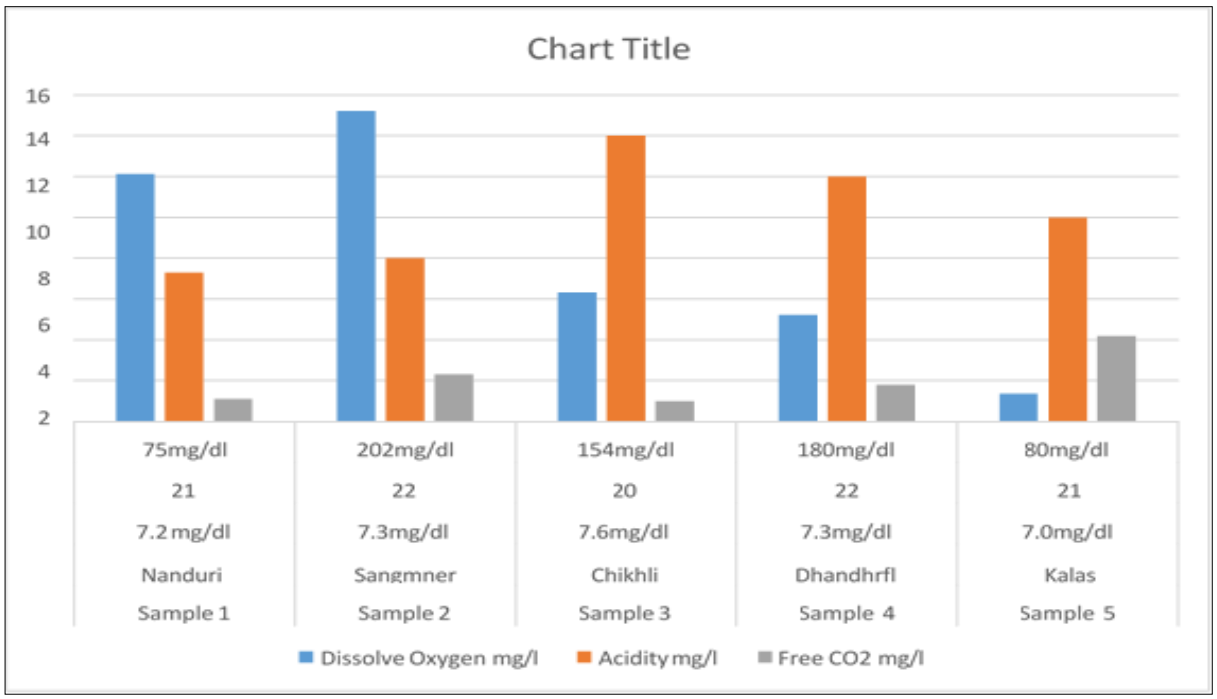


Table 4: Analysis of Water Sample during February 2025

Sr. No	Site	PH	Temparture oC	Alkanity mg/l	Dissolve Oxygen mg/l	Acidity mg/l	Free CO_2 mg/l
Sample 1	Nanduri	6.8 mg/dl	23	60mg/dl	11.0	6.7	1.00
Sample 2	Sangmner	7.2mg/dl	24	123mg/dl	14.7	9	2.20
Sample 3	Chikhli	7.6mg/dl	23	150mg/dl	5.11	14	1.20
Sample 4	Dhandhrfl	7.4mg/dl	22	90mg/dl	7.10	22	3.10
Sample 5	Kalas	7.3mg/dl	23	77mg/l	0.44	7.0	4.10

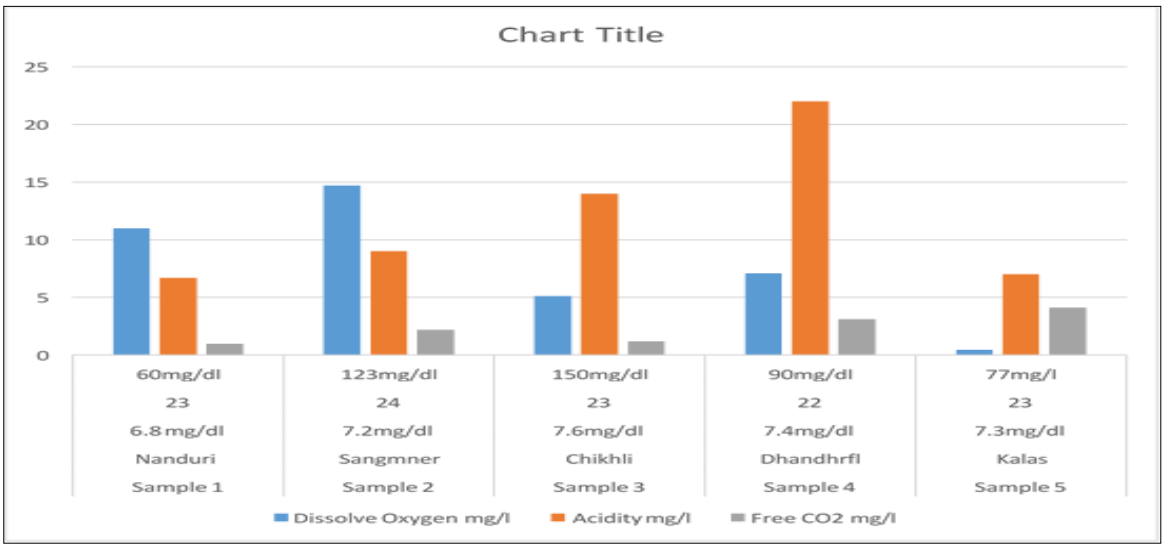
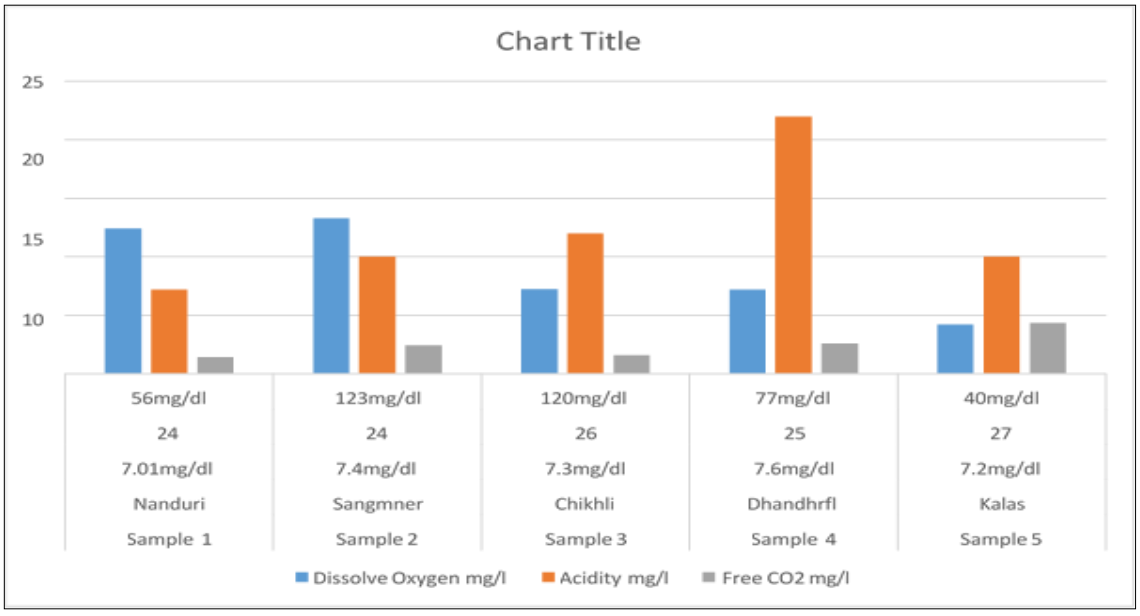


Table 5: Analysis of Water Sample during March 2025

Sr. No	Site	PH	Temparture oC	Alkanity mg/l	Dissolve Oxygen mg/l	Acidity mg/l	Free CO_2 mg/l
Sample 1	Nanduri	7.01mg/dl	24	56mg/dl	12.4	7.2	1.44
Sample 2	Sangmner	7.4mg/dl	24	123mg/dl	13.3	10	2.42
Sample 3	Chikhli	7.3mg/dl	26	120mg/dl	7.22	12	1.60
Sample 4	Dhandhrfl	7.6mg/dl	25	77mg/dl	7.2	22	2.60
Sample 5	Kalas	7.2mg/dl	27	40mg/dl	4.20	10	4.34



Conclusion

The physico-chemical analysis of pravara river water is necessary because this water is used for the purpose of drinking and irrigation. The pH of pravara river water is to be slightly change as compare to pH of normal water. The Temperature is change during the season because December and January comes under the winter season and February and march comes under the summer season so there is difference in temperature. By changing metabolic rates, growth, reproduction, and species dispersal, water temperature has a substantial impact on biotic life. The alkanity, Acidity, Dissolved oxygen and Free carbon dioxide has also variation because farmers used different fertilizer for the development of crop,when the irrigated water runs towards river during rainy season and affect the metabolic activity of organisms and fluctuates parameter of water. Biological life is greatly impacted by water acidity, which affects physiological functions, species distribution, and ecosystem health.

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