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Evaluating Drinking Water Quality Using Water Quality Parameters and Esthetic Attributes: A Statistical Approach

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Abstract

This study presents a comparative analysis of water quality parameters in well , bhayander khadi , juhu beach be conducted in theafternoon. Assessing the quality of the water is essential to knowing the state of aquatic ecosystems and guaranteeing the welfare of human populations that depend on them. Coastal water quality degradation raises serious global environmental and public health problems.

Keyword: Water quality parameters Turbidity, pH Biochemical oxygen demand Total Dissolved Solid Total Solids Total Hardness.

1. INTRODUCTION

Mumbai's coastline areas were home to gorgeous beaches that were important parts of the city's character as well as places to go for relaxation and natural ecosystems. But Mumbai's growing industrialization and urbanization have put a great deal of strain on these coastal ecosystems, prompting worries about the quality of the city's well, khadi, and beach water. It was crucial to comprehend the dynamics of the water quality indicators in these coastal areas in order to guarantee environmental sustainability, protect public health, and encourage responsible behaviors for coastal management.

A well is a deep shaft or hole dug into the ground for the purpose of accessing natural resources. Apart from gas and oil wells, there are also water wells. Around the world, wells have been used for more than 8,000 years in a variety of cultures. The earliest wells were probably dug by hand or with very simple tools. They enabled the ability to access and raise groundwater to the surface. As it falls, rain is absorbed by the soil. Water is collected by numerous plants from here as it descends.

The Indian city of Mumbai is located on Salsette Island, which is home to Bhayander Creek. It is created by the gathering of Bhayandar Industrial firms' tail-water emissions. The Arabian Sea was immediately connected to it. Sewage, oil, trash, and industrial waste all contaminate the Creek.

Geographically, Vasai-Virar and the Mumbai suburban zones (where Bhayander falls) are separated by a large stream. Vasai Creek is located in the north, Sanjay Gandhi National Park is to the east, and the Uttan seashore is to the west. It mostly comprises of swampy and wet areas with Deccan lava topography.

Ecological Degradation: The discharge of materials or energy into the environment that has detrimental effects is referred to as pollution. These contaminants come in different forms and might be either naturally occurring or man-made.

Even in little amounts, they have the ability to upset the ecological balance and reach the human body through the food chain

The purpose of this study article is to perform a thorough examination of the water quality characteristics of Bhayander Khadi, Juhu Beach, and well water. These, which drew large crowds due to their scenic beauty and cultural significance

, were essential to the city's tourism sector and socioeconomic structure. Nevertheless, there was cause for concern regarding the cleanliness of the beach, khadi, and well due to the rapid urban development, population growth, and inadequate waste management procedures.

This study's main goal was to thoroughly assess and compare important water quality metrics, such as turbidity, CO2 levels, total dissolved solids (TDS), and total solids (TS), across the chosen beaches. well water and beach detect areas of concern and provide insightful information on the current state of water quality in Bhayander Khadi. They also educate local communities, environmental agencies, and policymakers about the necessity for focused interventions and management measures. In the end, this research hopes to support public awareness and involvement in maintaining the environmental integrity of Mumbai's beaches, which will support previous sustainable development and improve the wellbeing of current and future generations. It also hopes to contribute to the sustainable management and conservation of coastal ecosystems.

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LIMITATIONS SET BY MAHARASHTRA POLLUTION CONTROL BOARD :

pH	BETWEEN	5.5 TO 9.0
BOD	NOT TO EXCEED	30 mg/L
COD	NOT TO EXCEED	250 mg/L
TDS	NOT TO EXCEED	2100 mg/L

Sample Analysis was carried out using following methods :

Sr.No.	Parameter	Method used
1.	pH	Digital pH meter
2.	Alkalinity	Titration
3.	Dissolved CO2	Titration
4.	Hardness	Titration
5.	Total Dissolved Solids	Heating
6.	Total Suspended Solids	Heating
7.	Total Solids	Heating
8.	Chemical Oxygen Demand	

2 Materials and Methods

2.1. Research Area: Bhayander Khadi, Juhu Beach, and well water were all compared for water quality. Human activities and pollutants cause variations in the quality of the water. Three sampling sites were chosen for this study, and the selection criteria for the sites were mostly based on the features of anthropogenic activity.

2.2. Sample and Sampling Procedue: On the same day, in the afternoon, between 12:00 and 2:00 pm, all three samples were taken. Samples were labeled correctly and kept in spotless containers. Before being used, distilled deionized water was used to rinse these containers. After

being kept in a refrigerator, each sample was examined within 48 hours.

2.3. Sample Analysis: The pH, turbidity, electrical conductivity (EC), total dissolved solids (TDS), total solids (TS), dissolved carbon dioxide (CO2), biochemical oxygen demand (BOD), and total hardness of the sample were all measured. A pH meter, nephelometer, and conductometer were used to electronically get the best stable results for turbidity, pH, and electrical conductivity (EC), respectively. Using the gravimetric method, total dissolved solids (TDS) and total solids (TS) were calculated. Titrimetric techniques were used to determine the total hardness and CO2 content, and the "Five-Day Biochemical Oxygen Demand" method was used to determine the BOD.

3. Results and Discussions:

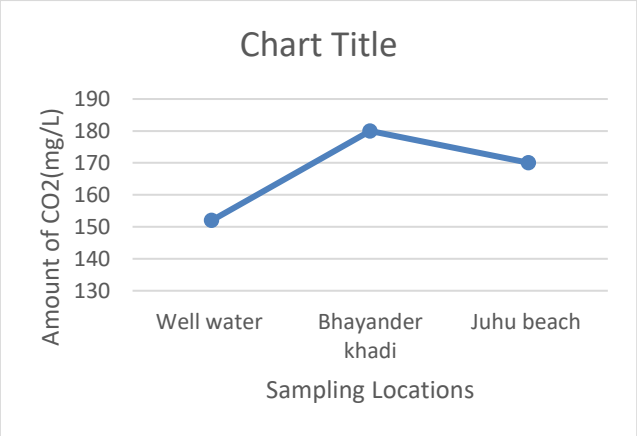
The physical and chemical characteristics of water samples gathered around the coastline were compared in the current study. The results of every parameter for each of the three samples are shown in the following table.

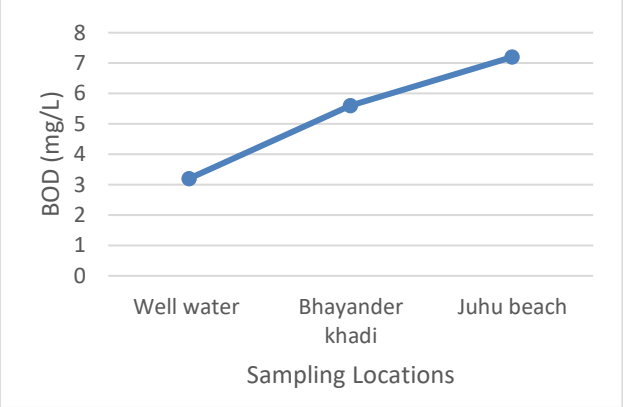
Water Quality Parameters	Well water	Bhayander khadi	Juhu beach
pH			
Turbidity			
Electrical conductance (mS)			
Amount of CO2 (mg/L)			
TDS (mg/L)			
Total solids (mg/L)			
BOD (mg/L)			
Total Hardness (ppm)			

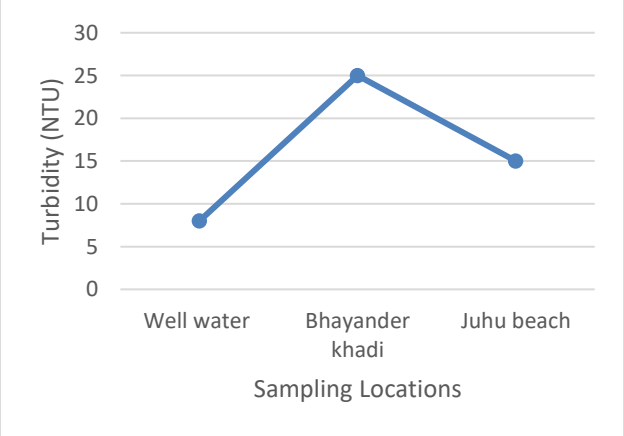
3.1. pH. The well water has a pH of 6.8, Bhayander Khadi's is 8.9, and Juhu Beach's is 7.59. Aquatic life is supported by a pH range of 7 to 9. All three beaches have pH values between 7 and 9, which is within the range needed to support aquatic ecosystems.

3.2.Turbidity . Suspended particles affect water turbidity by increasing density and decreasing water clarity. Dredging, animal activity, animal runoff, and sewer outflow are other key factors that affect turbidity. Values for turbidity ranged from 8 to 45 NTU. In comparison to well water and Juhu Beach, Bhayander Khadi has higher turbidity. Well water, with a turbidity of 8 NTU, has the lowest. Juhu Beach's turbidity measures 15 NTU.

3.3. Electricity Conductivity (EC). Salt, temperature, and the amount of dissolved ions are some of the factors that affect beach water's electrical conductivity, which in turn affects the water's capacity to conduct electricity. The presence of dissolved materials, chemicals, and minerals may be indicated by higher electrical conductivity in beach water, which could have an adverse effect on the quality of the water.







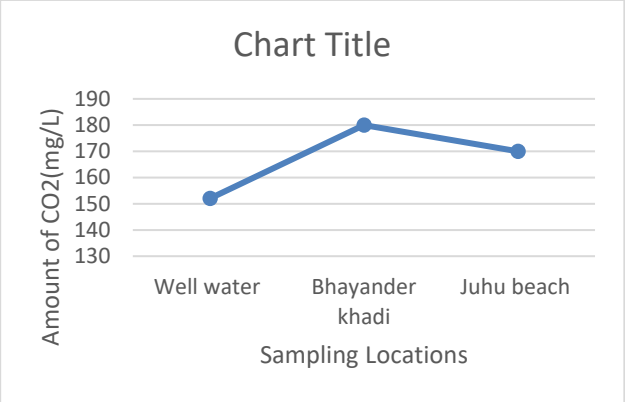
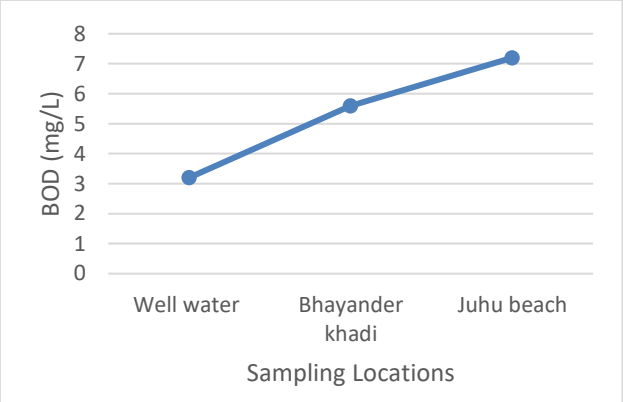
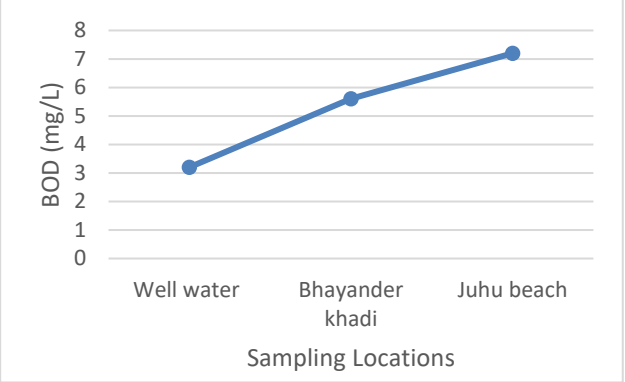
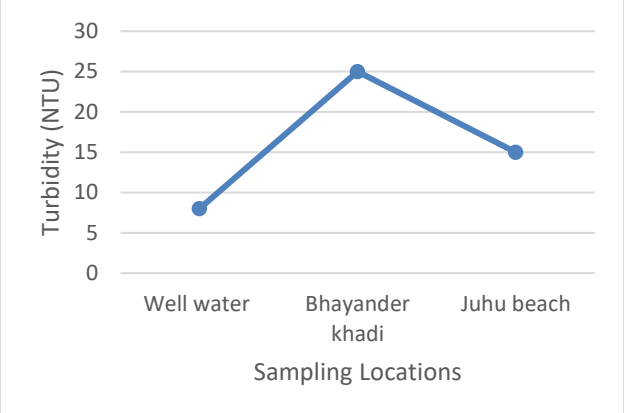
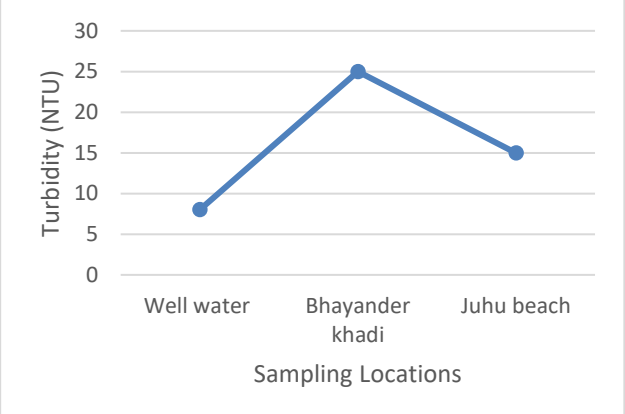


Chart Title
Amount of CO2(mg/L)
190
180
170
160
150
140
130
Well water
Bhayander khadi
Juhu beach
Sampling Locations


BOD (mg/L)
8
7
6
5
4
3
2
1
0
Well water
Bhayander khadi
Juhu beach
Sampling Locations


BOD (mg/L)
8
7
6
5
4
3
2
1
0
Well water
Bhayander khadi
Juhu beach
Sampling Locations


Turbidity (NTU)
30
25
20
15
10
5
0
Well water
Bhayander khadi
Juhu beach
Sampling Locations


Turbidity (NTU)
30
25
20
15
10
5
0
Well water
Bhayander khadi
Juhu beach
Sampling Locations

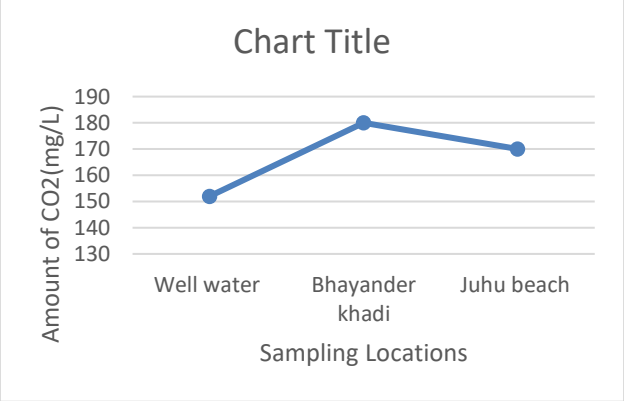


Chart Title
Amount of CO2(mg/L)
190
180
170
160
150
140
130
Well water
Bhayander khadi
Juhu beach
Sampling Locations

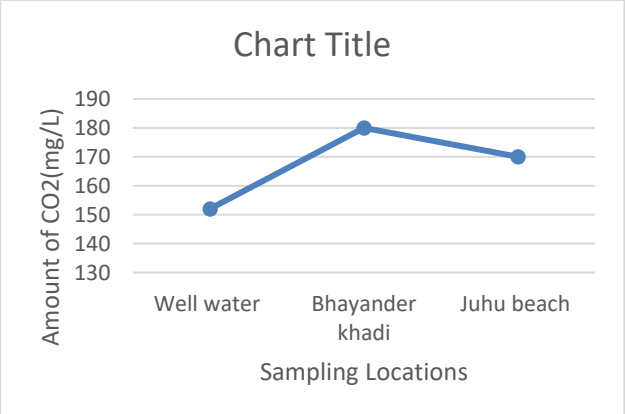
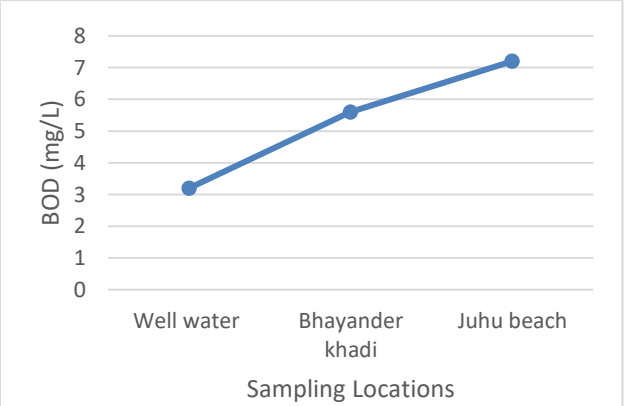
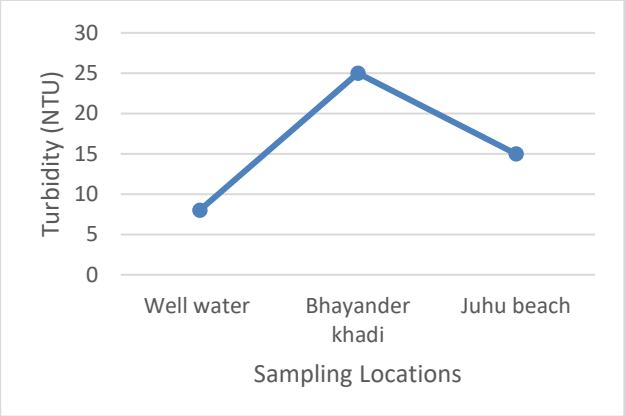
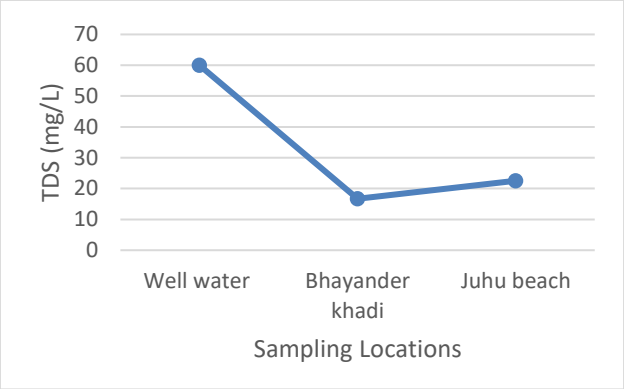


Chart Title
Amount of CO2(mg/L)
190
180
170
160
150
140
130
Well water
Bhayander khadi
Juhu beach
Sampling Locations


BOD (mg/L)
8
7
6
5
4
3
2
1
0
Well water
Bhayander khadi
Juhu beach
Sampling Locations


Turbidity (NTU)
30
25
20
15
10
5
0
Well water
Bhayander khadi
Juhu beach
Sampling Locations


TDS (mg/L)
70
60
50
40
30
20
10
0
Well water
Bhayander khadi
Juhu beach
Sampling Locations

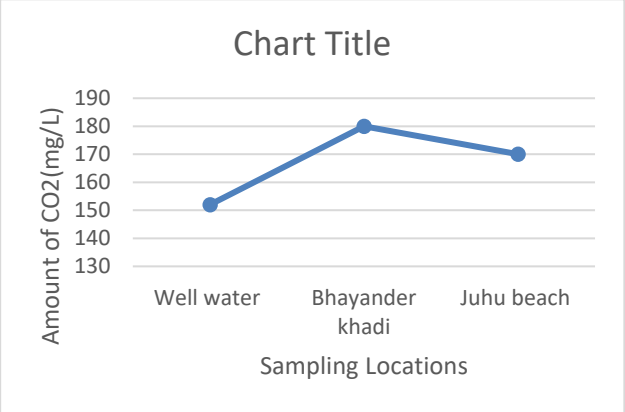
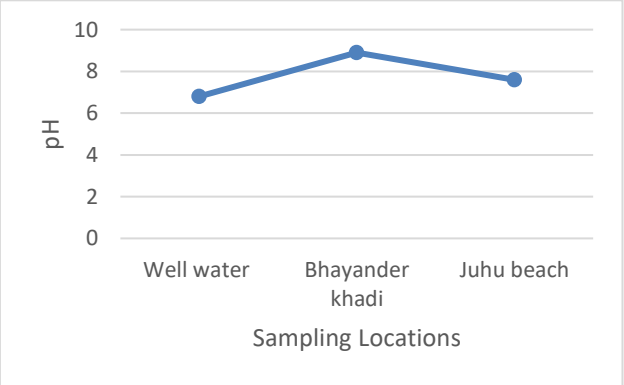
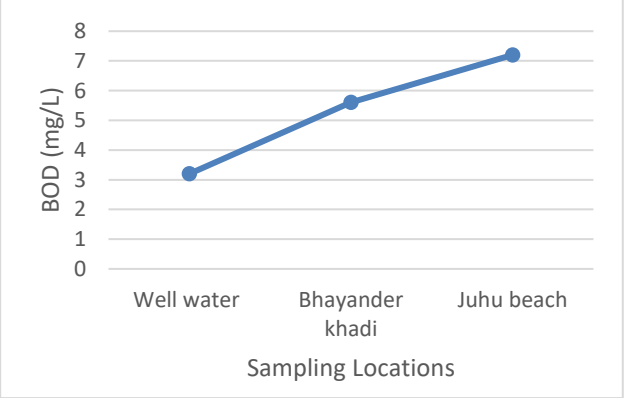
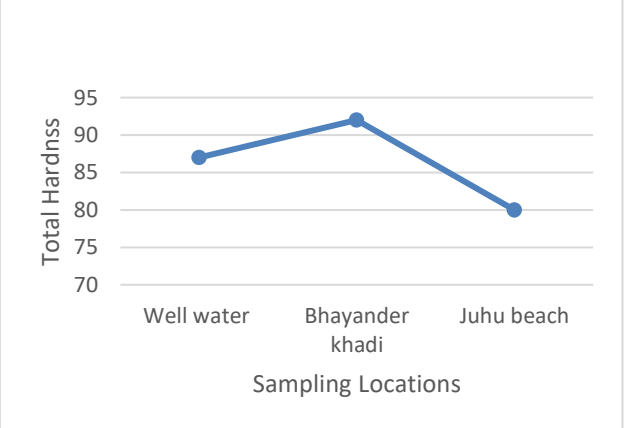


Chart Title
Amount of CO2(mg/L)
190
180
170
160
150
140
130
Well water
Bhayander khadi
Juhu beach
Sampling Locations


pH
10
8
6
4
2
0
Well water
Bhayander khadi
Juhu beach
Sampling Locations


BOD (mg/L)
8
7
6
5
4
3
2
1
0
Well water
Bhayander khadi
Juhu beach
Sampling Locations


Total Hardnss
95
90
85
80
75
70
Well water
Bhayander khadi
Juhu beach
Sampling Locations

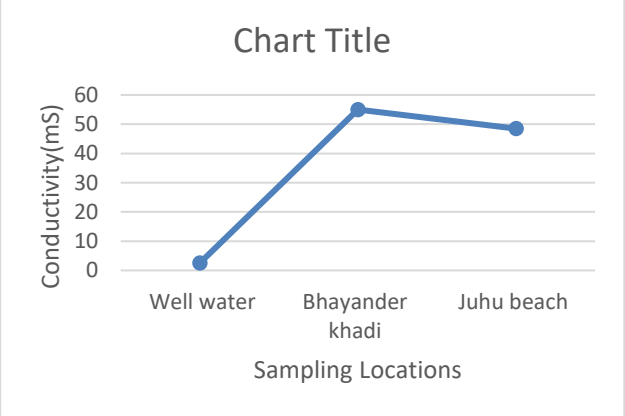


Chart Title
Conductivity(mS)
60
50
40
30
20
10
0
Well water
Bhayander khadi
Juhu beach
Sampling Locations

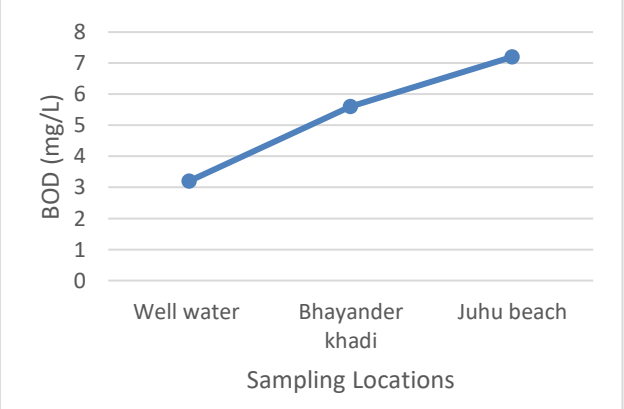

BOD (mg/L)
8
7
6
5
4
3
2
1
0
Well water
Bhayander khadi
Juhu beach
Sampling Locations

Figure 2: Distribution of values for (a) pH, (b) turbidity, (c) conductivity, (d) amount of CO2, (e) TDS, (f) Total solids, (g) BOD, (h) Total hardness

3.4. Amount of CO2. When carbon dioxide (CO2) is present in water, it converts to carbonic acid, which lowers pH levels. Using sodium hydroxide (NaOH) titration, the amount of CO2 was measured. The CO2 content in well water is 153 mg/L, however it is much higher at Bhayander Khadi (mg/L) and Juhu Beach (mg/L).

3.5: Total DissolvedS Solids. The total amount of solids dissolved in the water, including non-volatile solids, carbonates, chlorides, sulfates, and calcium, magnesium, and sodium, is known as TDS. There was a range of 18 to 62.18 mg/L for TDS. At Bhayander Khadi, the lowest value recorded was 18 mg/L, and the highest value recorded was 62.18 mg/L for well water. The reason behind Bhayander Khadi's low TDS value is probably. The taste of water is impacted by a high TDS level, which increases the quantity of contaminants that are dangerous for human ingestion.

3.6. Total Solids . Together with total dissolved solids, total suspended solids, and volatile suspended solids, these represent the total amount of solids in a water sample. The range of the TS is 29.9 to 55 mg/L. At Juhu Bhayander Khadi, the lowest value reported was 29.9 mg/L, while the maximum value was 55 mg/L from well water. 3.7.2 mg/L is the figure in Juhu Beach. Higher solids concentrations produce muddy looks.

3.7. BOD, or biological oxygen demand. The quantity of dissolved oxygen needed by bacteria during the aerobic decomposition of organic materials is known as biochemical oxygen demand. The potential of water to support biological life is indicated by the presence of free oxygen in that water. The mixing of untreated industrial effluents and the disposal of municipal solid waste into waterways could be the cause of this. Municipal wastewater's organic load is indicated by the BOD. The range of BOD levels is 3.2–7.1 mg/L. At Juhu Beach, BOD levels range from 3.2 mg/L to 7.1 mg/L, the highest figure. The difference in pollution levels and the amount of organic matter in the water are the causes of this value discrepancy. A greater BOD is the result of increased pollution in the water at Juhu Beach from a variety of sources, including sewage, industrial waste, and urban runoff. The amount of dissolved oxygen in the water is higher the lower the BOD.

This suggests that there is less organic stuff contaminating the water.

3.8.Total Hardness . The EDTA titration method was used to determine the calcium and magnesium concentrations in water samples from Well water, Juhu Beach, and Bhayander Khadi. This method is frequently used to assess the concentration of calcium and magnesium ions in water, which is known as the total hardness of the water. The analysis's findings demonstrated that there were large variations in the water samples' overall hardness. The overall hardness of well water was 150 ppm, whereas Juhu beach had the lowest total hardness of 80 ppm. The overall hardness of the Bhayander Khadi was 105 ppm. These findings imply that the high concentrations of calcium and magnesium ions present at these locations may have an impact on the water quality, which can have detrimental effects on human health and aquatic life.

4. Conclusion

The study's findings highlight the need of regular observation and calculated measures to combat pollution and maintain the quality of the water in wells, Bhayander Khadi, and Juhu Beach. Three Mumbai beaches' worth of water quality metrics were studied, and the results provide a thorough evaluation of several variables to gauge environmental health. Three categories were created for comparison and classification based on the statistical analysis of the water quality parameters: low, moderate, and high. Of the three, well water had the lowest contamination level and Bhayander khadi the highest. The pollution on Juhu Beach is caused by industrial discharges, human activities, and inadequate waste management. Runoff bringing contaminants from surrounding industries and urban areas contributes to pollution. This study's main goal was to highlight how crucial it is to regularly measure water quality metrics because doing so can assist locate pollution sources and monitor changes in the quality of the water over time. The development of focused interventions to address certain sources of pollution and enhance water quality can then be done using the information provided.

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Jesudoss4 and Boomi Pandi5, 2016 Volume 5, pp. 4556-4567 STUDY OF WATER QUALITY PARAMETERS OF CAUVERY RIVER WATER IN ERODE REGION

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