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Water Quality Analysis of Different Sources: A Case Study of Pisavli Village, Kalyan–Shirdhon Region

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Abstract: *This study evaluates the water quality of different sources in Pisavli Village, Kalyan-Shirdhon region to determine their suitability for domestic and drinking purposes. Water samples were collected from four sources: tap water, river water, lake water, and tanker water. The collected samples were analyzed for physicochemical parameters such as pH, turbidity, dissolved oxygen, total solids (TS), total dissolved solids (TDS), and total suspended solids (TSS). A jar test was also conducted to study the effectiveness of coagulation in water treatment. The results were compared with drinking water standards provided by the Bureau of Indian Standards (IS 10500:2012). The study helps to identify variations in water quality among different sources and provides recommendations for safe water use.*

Keywords: Water Quality Analysis, Physicochemical Parameters, pH, Turbidity, Dissolved Oxygen, Total Dissolved Solids (TDS), Jar Test, Drinking Water Standards

I. INTRODUCTION

Water is one of the most essential natural resources required for human survival and environmental sustainability. It plays a vital role in domestic activities, agriculture, industrial processes, and ecological balance. However, rapid urbanization, population growth, and industrial development have increased the demand for safe and reliable water sources. These factors have also contributed to the deterioration of water quality in many regions due to pollution from domestic waste, industrial discharge, and surface runoff. As a result, monitoring and assessment of water quality have become important for ensuring public health and sustainable water resource management.

Different communities depend on various water sources such as municipal tap water, tanker-supplied water, and natural surface water sources including rivers and lakes. The quality of water from these sources may vary depending on environmental conditions, treatment methods, and distribution systems. Even water that appears clean may contain suspended particles, dissolved substances, or organic contaminants that affect its suitability for domestic and drinking purposes. Therefore, regular analysis of physicochemical parameters is necessary to evaluate water quality and identify potential contamination. The BIS IS 10500:2012 Drinking Water Standard provides acceptable limits for several water quality parameters used to determine the safety of drinking water. In the present study, water samples were collected from four different sources—tap water, river water, lake water, and tanker water—from the Pisavli village region near Kalyan and Shirdhon. The collected samples were analyzed for important parameters such as pH, turbidity, dissolved oxygen, total solids (TS), total dissolved solids (TDS), and total suspended solids (TSS). A jar test was also performed to evaluate the effectiveness of coagulation in reducing turbidity. The results obtained from laboratory analysis were compared with standard limits to assess the suitability of these water sources for domestic use and to identify the need for treatment where required.

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II. LITERATURE REVIEW

2.1 Gupta et al. (2015)

Gupta et al. (2015) studied groundwater quality in urban areas of Maharashtra and found that hardness and chloride levels were higher in densely populated regions. The study showed that population density and geological conditions can influence groundwater composition. These findings highlight the importance of regular water quality monitoring in urban areas.

2.2 Kumar and Sahu (2018)

Kumar and Sahu (2018) investigated the effect of industrial activities on water quality in Gujarat. Their results indicated increased turbidity and changes in pH levels due to industrial effluents. The study emphasized the need for proper wastewater treatment and strict pollution control to protect water resources.

2.3 Patil et al. (2020)

Patil et al. (2020) examined wells and ponds in agricultural areas and observed that hardness and chloride levels often exceeded permissible limits. The contamination was mainly caused by fertilizers, pesticides, and agricultural runoff. The study recommended regular monitoring and appropriate treatment methods to maintain safe water quality.

2.4 Bharambe (2022)

Bharambe (2022) analyzed pond water quality in semiurban areas and reported contamination due to sewage discharge and poor waste management. High turbidity and microbial presence were observed in several samples. The study suggested regular cleaning, chlorination, and community awareness to maintain safe pondwater.

2.5 Singh and Sharma (2023)

Singh and Sharma (2023) compared mineral water, tap water, and tanker water samples. The study found that mineral water generally met drinking water standards, while tap and tanker water quality varied depending on storage conditions and pipeline maintenance. The research highlighted the importance of proper storage and regular inspection of water supply systems.

III. STUDY AREAS

The present study was conducted in Shirdhon Village near Pisavli along the Kalyan–Murbad Road in Thane District. The area lies at approximately 19.22° N latitude and 73.13° E longitude and falls within the Mumbai Metropolitan Region. The region is characterized as a semi-urban settlement where residential areas, agricultural activities, and small commercial establishments coexist. Due to this mixed land-use pattern, the area provides suitable conditions for assessing water quality from different domestic water sources.

The climate of the region is tropical monsoon with heavy rainfall during June to September and relatively dry conditions during the rest of the year. The average annual rainfall is around 2500 mm, and temperatures range from 20°C to 35°C. The geological formation of the area is mainly Deccan basalt, which influences the mineral composition and hardness of water sources. For the present study, water samples were collected from four commonly used sources, namely tap water, tanker water, river water, and lake water in the Pisavli– Shirdhon region. These sources represent treated water supply as well as surface water bodies used by the local population for domestic activities. The selected sampling locations help in evaluating the physicochemical characteristics of water and comparing them with BIS IS 10500:2012 Drinking Water Standards.

IV. METHODOLOGY

4.1 Study Area and Sample Collection

Water samples were collected from Pisavli Village in the Kalyan–Shirdhon region. Four sources—tap water, lake water, river water, and tanker water—were selected to represent commonly used supplies. Samples were collected in clean one-litre polyethylene bottles, rinsed with the respective water before collection. Tap water was collected after flushing for 5 minutes, while surface water samples were taken below the water surface. All samples were labeled and transported to the laboratory for analysis.

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4.2 Parameters Analyzed

The collected samples were analyzed for key physicochemical parameters including pH, turbidity, dissolved oxygen (DO), total solids (TS), total dissolved solids (TDS), and total suspended solids (TSS).

4.3 Laboratory Analysis

pH was measured using a digital pH meter after calibration with buffer solutions. Turbidity was determined using a turbidity meter, and dissolved oxygen was measured using a DO meter. TS and TDS were determined by oven drying a known volume of sample at 103–105°C and calculating the weight difference. TSS was obtained using the relation:

$$\mathbf{TSS = TS - TDS}$$

4.4 Jar Test for Coagulation

A jar test was conducted to determine the optimum alum dosage for turbidity removal. One-litre samples were subjected to rapid mixing for 1–2 minutes followed by slow mixing for 15 minutes. After settling for 30 minutes, turbidity was measured, and the dosage giving the lowest turbidity was considered optimum.

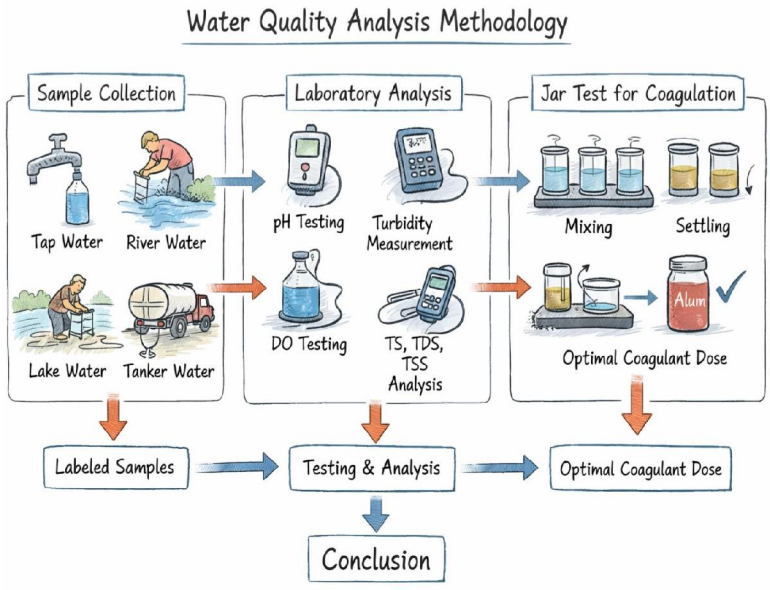

Fig 1:Water Quality Analysis Methodology

V. RESULT AND CALCULATION

Table 1:pH Test

Sr.No.	Water Sources	pH Value
1.	Tap Water	7.15
2.	River Water	7.16
3.	Lake Water	6.9
4.	Tanker Water	6.39

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Sr.No.	Water Source	Turbidy(NTU)
1.	Tap	01
2.	River	17
3.	Lake	07
4.	Tanker	5

Table 2: Turbidity Test

Table 3- jar Test

Sources	Selected Jar No.	Sample f Water on Selected Jar	Amount of Coagulation added on Selected Jar	Observe d Floc
Tap	5.	1.0	1	Very Good
River	4.	1.0	0.75	Very Good
Lake	2.	1.0	0.25	Excellent
Tanker	4.	1.0	0.75	Good

Sample Calculation for Tap Water

Calculation Strength of alum Preparation=7.14g/500ml =14.28mg/mL

Optimum dose of Coagulation=14.28mg/mL×1.0mL/L

=14.28mg/m

Table 4: **TS,TDS,TSS**

Sr.No.	Sources	TS	TDS	TSS
1.	Tap Water	420 mg/L	360 mg/L	60 mg/L
2.	Lake Water	540 mg/L	480 Mg/L	60 Mg/L
3.	River Water	480 mg/L	440 mg/L	40 mg/L
4.	Tanker Water	440 mg/L	340 mg/L	100 mg/L

Sample Calculation (For Tap Water):

TS = (W2 − W1) × 1000 / V

Where:

W1 = Initial weight of empty dish = 0.070 g

W2 = Final weight of dish + residue = 0.112 g

V = Volume of sample = 100 mL

TS = (0.112 − 0.070) × 1000 / 100

= 420 mg/L

TDS = (W2 – W1) × 1000 / V

Where:

W1 = Initial weight of empty dish = 0.070 g

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W2 = Final weight of dish + residue (filtered sample) = 0.106 g
V = Volume of sample = 100 mL
TDS = (0.106 – 0.070) × 1000 / 100
= 360 mg/L

Test 5:Dissolved Oxygen

Sr.No.	Sources	Dissolved Oxygen(mg/L)
1.	Tap Water	6.7
2.	Lake Water	10.1
3.	Tanker Wate	12.2
4.	River Water	9.8

6. GRAPHICALY COMPARISON OF WATER QUALITY PARAMETERS

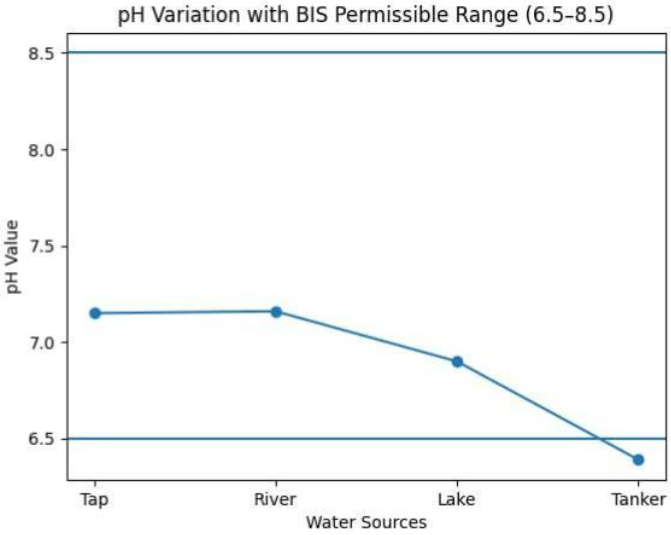

Fig 1:pH Variation with BIS Range

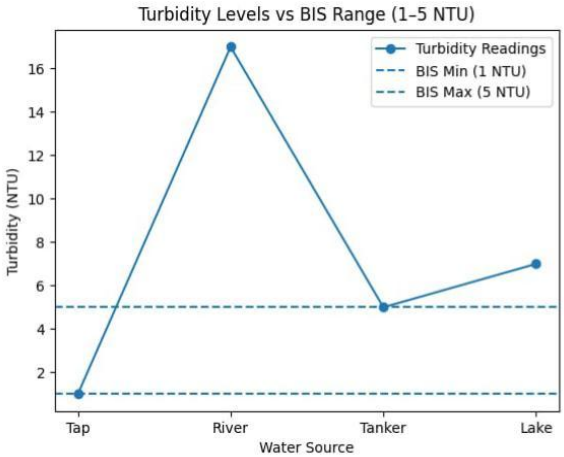

Fig 2: Comparison of Turbidity Level of Different Water Source with BIS Standards Units

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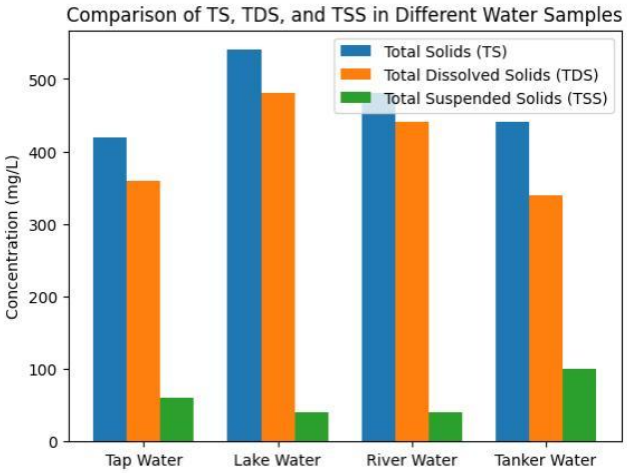

Fig 3: Comparison of TS,TDS,TSS

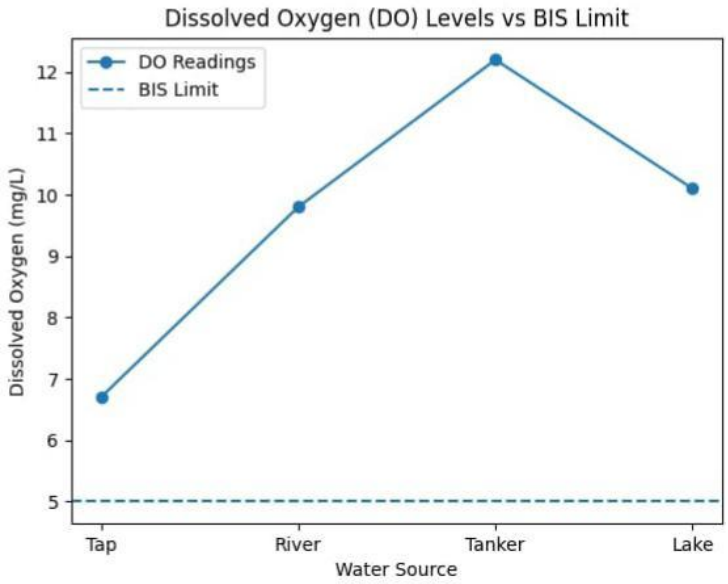

Fig 4: Dissolved Oxygen Level in Different Water Samples

VII. CONCLUSION

The present study analyzed the water quality of different sources including tap water, river water, lake water, and tanker water by evaluating parameters such as pH, turbidity, dissolved oxygen, total solids, total dissolved solids, and total suspended solids. The results showed that water quality varies depending on the source. Tap water showed comparatively better quality, while river and lake water exhibited higher turbidity and solid content due to natural and human activities. Tanker water also showed variations in quality due to storage and handling conditions. The study highlights the importance of regular monitoring and appropriate treatment methods such as filtration and chlorination to ensure safe water for domestic use and to protect public health.

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