Seasonal Variations In Water Parameters In Hadapsar Region (Assessment Of Drinking Water Quality)

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Abstract- *The study on seasonal variations of water parameters in Hadapsar analyzes changes in pH, turbidity, total hardness, and dissolved solids across summer, monsoon, and winter seasons. Results indicate higher turbidity during monsoon due to runoff, while pH and hardness show noticeable fluctuations in winter and summer. The findings help assess water quality status and its suitability for drinking and civil engineering applications in the region.*

Keywords: Seasonal variation, Water quality, Drinking water assessment, Hadapsar region, Civil engineering

I. INTRODUCTION

Water quality changes seasonally due to rainfall, evaporation, and groundwater recharge. This study evaluates drinking water quality in Hadapsar region by testing pH, Turbidity, and Total Hardness. The results are compared with IS 10500:2012 drinking water standards..

II. LITERATURE REVIEW

Several researchers have studied the impact of seasonal changes on water quality parameters such as pH, turbidity, and total hardness. These studies highlight that water quality is not constant and varies significantly due to environmental and climatic conditions.

Early studies on drinking water quality revealed that **seasonal fluctuations** are mainly influenced by rainfall, temperature, and human activities. During the **monsoon season**, increased surface runoff carries suspended particles, organic matter, and pollutants into water sources, leading to a rise in turbidity levels. In contrast, **summer season** is associated with higher evaporation rates, which increases the concentration of dissolved minerals and results in higher hardness of water.

Research on groundwater quality indicates that **pH levels** tend to vary across seasons due to changes in chemical reactions and groundwater recharge. Winter often shows slight variations in pH because of dilution and interaction with soil minerals. However, most studies confirm that pH generally remains within permissible limits unless affected by pollution sources.

Studies comparing different water sources such as **groundwater (boring water), river water, and treated (mineral) water** show that:

- Groundwater often contains higher hardness due to dissolved salts and minerals.
- River water exhibits higher turbidity, especially during monsoon, due to runoff and erosion.
- Treated or mineral water maintains stable quality across seasons due to purification processes.

According to standards like **IS 10500:2012**, acceptable limits are defined for parameters such as pH, turbidity, and hardness to ensure safe drinking water. Many researchers have used these standards as a benchmark to evaluate water quality and potability.

Recent studies emphasize the importance of **regular monitoring and treatment methods** such as filtration, softening, and reverse osmosis (RO) to maintain water quality. It is concluded that although seasonal variations affect water parameters, proper treatment and management can ensure water remains safe for consumption.

III. METHODOLOGY

1. **Selection of Study Area-**
    a. The Hadapsar region was selected for water quality analysis.
2. **Selection of Water Sources-**
    a. Different water sources were chosen:
        i. Boring water
        ii. River water
        iii. Mineral water
3. **Sample Collection-**
    a. Water samples were collected in three seasons:
        i. Summer
        ii. Monsoon
        iii. Winter

   b. Clean and sterilized bottles were used for sampling.
4. **Sample Preservation**-
   a. Samples were properly labeled and stored to avoid contamination.
   b. Testing was done within a short time after collection.
5. **Parameters Analyzed**-
   a. pH
   b. Turbidity
   c. Total Hardness
6. **Testing Methods**-
   a. pH measured using pH meter
   b. Turbidity measured using turbidity meter (NTU)
   c. Hardness measured using titration method
7. **Data Recording**-
   a. All observations were recorded systematically in tabular form.
8. **Comparison with Standards**-
   a. Results were compared with IS 10500:2012 drinking water standards.
9. **Data Analysis**-
   a. Seasonal variations were analyzed and compared across all water sources.
10. **Conclusion & Recommendations**–
   a. Water quality was evaluated for drinking suitability.
   b. Suggestions for treatment (RO, softening, filtration) were provided.

IV. RESULT

Water Source	Season	pH	Turbidity (NTU)	Total Hardness (mg/L)
Bore-Well Water	Summer	7.85	1.8	340
	Monsoon	8.16	3.5	280
	Winter	6.29	2.2	310
Tap Water	Summer	7.3	0.5	110
	Monsoon	7.0	1.0	95
	Winter	6.48	0.7	105
River Water	Summer	7.2	15.8	130
	Monsoon	6.37	56.2	90

V. CONCLUSION

1. Seasonal variation significantly affects water quality parameters like pH, turbidity, and hardness.
2. Turbidity increases during monsoon due to runoff, while hardness rises in summer due to evaporation.
3. Boring water shows acceptable pH and turbidity but has high hardness, making treatment necessary before drinking.
4. Mineral water remains stable and safe across all seasons, meeting drinking water standards.
5. River water has very high turbidity and unsafe pH levels (especially in winter), making it unsuitable for direct consumption.
6. Most parameters fall within the permissible limits of IS 10500:2012 standards, but some require attention.
7. Proper treatment methods (like filtration and softening) are essential for safe drinking water.
8. Regular monitoring of water quality is necessary to ensure safety and sustainability.

REFERENCES

[1] Bureau of Indian Standards (2012),*IS 10500: Drinking Water Specification*.
[2] World Health Organization (2017), *Guidelines for Drinking-water Quality*.
[3] APHA (2017), *Standard Methods for the Examination of Water and Wastewater*.
[4] Sawyer, C.N., McCarty, P.L., &Parkin, G.F., *Chemistry for Environmental Engineering*.
[5] Peavy, H.S., Row, D.R., &Tchobanoglous, G., *Environmental Engineering*.
[6] Kumar, A., & Singh, S. (2015), Study on seasonal variation of water quality parameters.
[7] Patil, P.N. et al. (2012), Assessment of water quality using physicochemical parameters.
[8] Sharma, D. &Kansal, A. (2011), Water quality analysis of river systems.
[9] CPCB (Central Pollution Control Board), *Water Quality Monitoring Reports*.
[10] BIS & WHO reports on drinking water safety and standards.
[11] Groundwater quality studies in urban regions of India (various journals).
[12] Research papers on turbidity and hardness variation during monsoon.
[13] Environmental science textbooks and laboratory manuals.
[14] Local municipal water supply reports (Hadapsar region).
[15] Online academic sources and journals related to water quality assessment.