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GROUND WATER QUALITY ANALYSIS OF JALGAON AND JAMNER MUNICIPAL CORPORATION AREA

Prof. Jyoti Mali[1], Anmol Agrawal[2], Vivek Gaikwad[3], Hardik Jagtap[4], Purva Patil[5], Sejal Sonar[6]

Department of Civil Engineering, SSBT College of Engineering and Technology, Jalgaon, MH, India[1]

Civil Engineering Student, SSBT College of Engineering and Technology, Jalgaon, MH, India[2]

Civil Engineering Student, SSBT College of Engineering and Technology, Jalgaon, MH, India[3]

Civil Engineering Student, SSBT College of Engineering and Technology, Jalgaon, MH, India[4]

Civil Engineering Student, SSBT College of Engineering and Technology, Jalgaon, MH, India[5]

Civil Engineering Student, SSBT College of Engineering and Technology, Jalgaon, MH, India[6]

Abstract: Groundwater is one of the most essential natural resources for drinking, agriculture, and industrial purposes. However, rapid urbanization, industrialization, and agricultural activities have significantly affected its quality. This study focuses on the analysis of groundwater quality in Jalgaon and Jamner municipal corporation areas. Various physicochemical parameters and Water Quality Index (WQI) methods are used to assess the suitability of groundwater for drinking and other uses. The study also evaluates seasonal variations and identifies contamination sources. The results highlight the need for proper groundwater management and pollution control strategies to ensure sustainable usage.

1.0 INTRODUCTION

Water is a vital natural resource covering about 71% of the Earth's surface. Among all water sources, groundwater plays a crucial role in providing drinking water, irrigation, and industrial supply. It is stored in underground aquifers and is recharged through precipitation and surface water infiltration.However, groundwater quality is deteriorating due to excessive extraction, industrial waste, agricultural runoff, and climate change. Contamination by heavy metals and chemicals makes groundwater unsafe for consumption. Therefore, it is essential to assess groundwater quality using scientific methods such as Water Quality Index (WQI).This study aims to evaluate groundwater quality in Jalgaon and Jamner areas and analyze its suitability for various uses. In semi-arid regions, groundwater serves as the primary lifeblood for domestic and agricultural needs. However, rapid urbanization and expanding industrial footprints have put significant pressure on these aquifers. Systematic assessment is not just a technical requirement but a necessity for sustainable water resource management. This paper focuses on the comparative analysis of two key municipal areas in the Jalgaon district to monitor seasonal quality fluctuations.

2.0 LITERATURE SURVEY

Several researchers have studied groundwater quality using different methods:

1.P. Ravi Kumar, (2023) Groundwater quality evaluation using water quality index. The main aim of this research is to evaluate the quality of groundwater in parts of Anantapur district, Andhra Pradesh, for drinking and irrigation purposes. Groundwater samples were collected from various locations in the study area during the post-monsoon season. 2. Sutapa Chakrabarty & Hari Prasad Sarma (2010) Heavy metal contamination of drinking water in Kamrup district, Assam, India. This study was undertaken to assess the heavy metal concentration of the drinking water with respect to zinc, copper, cadmium, manganese, lead and arsenic in Kamrup district of Assam, India. 3. Allahbakhh Javid1, Kamyar Yaghmaeian2 (2014) An Evaluation of Water Quality From Mojen River Water quality index (WQI) is valuable and unique rating to depict the overall water quality status in a single term that is helpful for the selection of appropriate treatment technique to meet the concerned issues. 4. Bouslah S., Djemili L., (2017). Water quality index assessment of Koudiat Medouar Reservoir, northeast Algeria using weighted arithmetic index method. Water quality index (WQI) is a mathematical tool used to transform large quantities of water quality data into a single number which present water quality level. 5. Shahjad

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Alia, Ali Akbar Mohammadib, (2021) Groundwater is the world's considerable resource for providing drinking water to millions of people worldwide. It is essential to assess groundwater quality for drinking water purposes due to the increasing trend of contaminants in this water. Therefore, this research has been carried out to study groundwater quality for 22 different village's well locations. 6. Sagar R. Chavhan, Monika Khaladka (2022) A Review on Water Quality Analysis Water is essential for ecosystem and has been termed as "Elixir of life". Ever since the civilization, man has used water for his economic gains and substances. For over thousands of years, human settlements and civilizations have originated, concentrated and thrived around different types of water bodies. It is known that water bodies have played a crucial role in growth and development of human society. 7. Biyoloji Bilimleri Araştırma Dergisi (2019) Water Quality Assessment of Yazır Pond: An Application of Water Quality Index. In this research, water quality of Yazır Pond was evaluated by using Weighted Arithmetic Water Quality Index (WAWQI). Samples were taken from three selected stations on the artificial pond in summer season of 2019.

3.0 EXPERIMENTAL WORK

The research followed a structured sampling and testing protocol:

Sampling: Samples were gathered from diverse zones (Residential, Commercial, Industrial) in Jalgaon and Jamner during the monsoon.

Testing: Parameters analyzed include pH, Total Hardness, Alkalinity, and Chloride using standard laboratory methods. Standards: All experimental data were compared with IS 10500:2012 drinking water specifications.

WQI Calculation: The Weighted Arithmetic Index method was applied to determine the overall potability.

Table 01: Tests on Jalgaon Sample.

Zone	pH	Hardness (mg/L)	Alkaliniy (mg/L)	Chloride (mg/L)
Residential	7.4	108 ppm (100 to 150 ppm can be used for drinking)	180	159.75 ppm (100 to 200 ppm contain in water can be used for drink)
Commercial	7.2	87.3 ppm (50 to 100 ppm fit for drink)	165	171.58 ppm (100 to 200 ppm contain in water can be used for drink
Industrial	7.8	81.7 ppm (50 to 100 ppm fit for drinking)	210	163.3 ppm (100 to 200 ppm contain in water can be used for drink)

Table 02: Tests on Jamner Sample.

Zone	pH	Hardness (mg/L)	Alkalinity (mg/L)	Chloride (mg/L)
Residential	7.3	95 ppm (100 to 150 ppm can be used for drinking)	150	75 ppm (100 to 200 ppm contain in water can be used for drink)
Commercial	7.1	82 ppm (50 to 100 ppm fit for drink)	140	68 ppm (100 to 200 ppm contain in water can be used for drink
Industrial	7.6	140 ppm (50 to 100 ppm fit for drinking)	190	150 ppm (100 to 200 ppm contain in water can be used for drink)

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Figure 01: Collection of Groundwater.

Figure 02: Hardness Test

Figure 03: Chloride Test

Figure 04: Alkalinity Test

4.0 CONCLUSIONS

- Groundwater quality in Jalgaon and Jamner municipal areas is generally suitable for domestic use, but some locations show contamination beyond permissible limits.
- The deterioration of groundwater quality is mainly due to sewage disposal, agricultural fertilizers, and improper waste management practices. Rapid urbanization and population growth.
- Regular water quality testing and implementation of proper sanitation systems are essential to protect groundwater resources. Public awareness programs should be conducted to promote safe waste disposal and controlled use of fertilizers.

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