International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Groundwater Resources and Management in Poladpur Taluka

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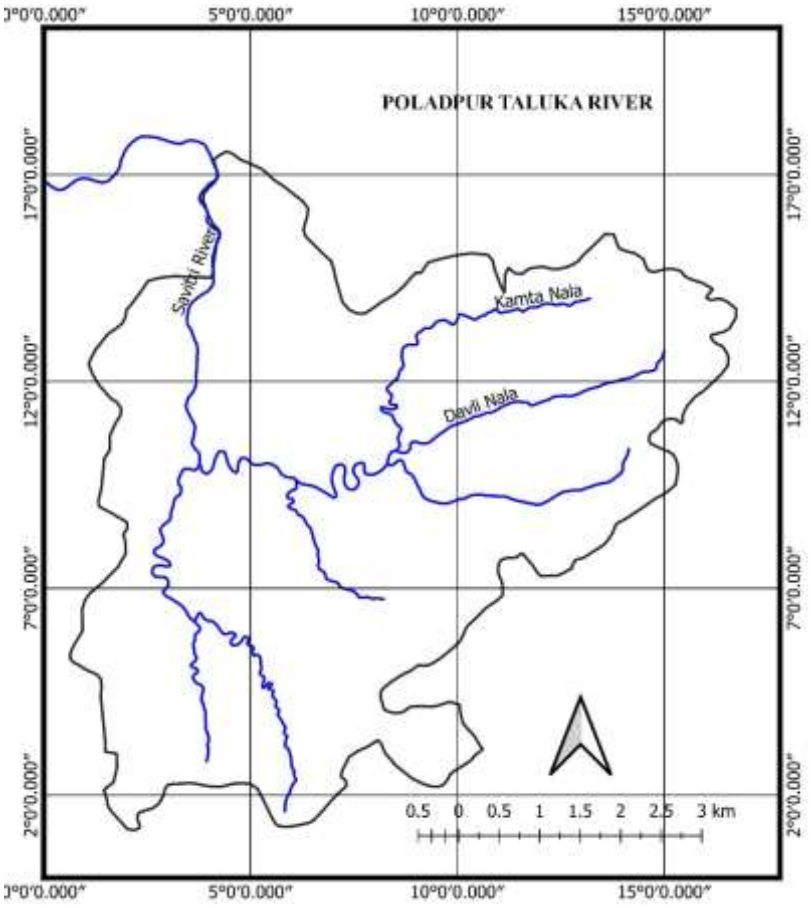
Abstract

Poladpur Taluka is a hilly and high rainfall area located in the Raigad district. Despite receiving an average annual rainfall of 7598.66 mm, groundwater recharge is limited due to the steep slopes that cause rainwater to flow away quickly. The groundwater storage in the taluka is 1922.00 MCM, and the groundwater development level is only 7.71%, placing it in the "safe" category for groundwater use.

Groundwater in the region is mainly found in fractured and vesicular basalt formations. During the pre-monsoon season, the groundwater level ranges from 4.50 to 9.00 meters below ground level (bgl), and improves to 1.10 to 4.05 meters bgl after the monsoon. The groundwater quality is suitable for both drinking and irrigation purposes, as total hardness, nitrate (NO_3), and fluoride (F) levels are within acceptable limits.



In summer, the groundwater level drops significantly, causing many wells to dry up and leading to water shortages. To address this issue, it is essential to adopt artificial recharge and water conservation techniques. Measures like check dams, percolation tanks, and contour trenching can help increase groundwater recharge. For agriculture, using drip and sprinkler irrigation systems is important to ensure efficient water use.

An integrated and sustainable policy is needed for groundwater management in Poladpur Taluka to increase recharge and protect water sources. Active participation from local authorities, farmers, and the community is essential to tackle future water scarcity.

Aims and Objectives

1. Aims of the Study:

- To analyse the current status and availability of groundwater resources in Poladpur Taluka.
- To assess the quality and quantity of groundwater to understand its usability and limitations.
- To study the processes of groundwater recharge and identify effective water conservation methods.
- To evaluate changes in groundwater levels, development stages, and future possibilities.
- To suggest necessary actions for groundwater conservation and sustainable management.

2. Objectives of the Study:

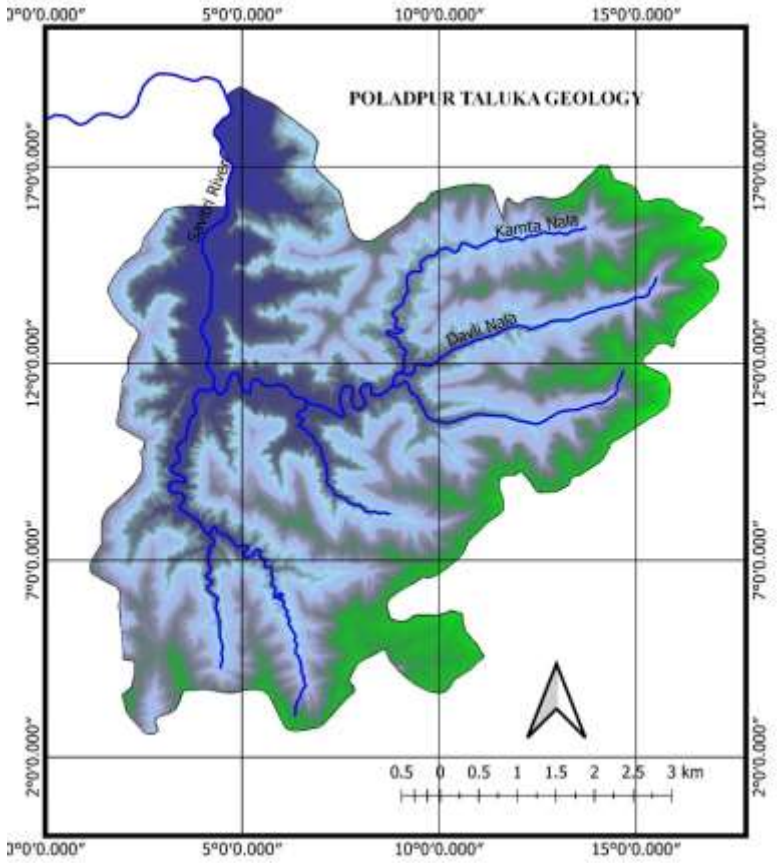
- To study groundwater resources.
- To examine groundwater quality.
- To study groundwater management and conservation.
- To evaluate social and agricultural impacts.

Groundwater in Poladpur Taluka

Poladpur Taluka is located in the southern part of Raigad district, within the hilly and naturally beautiful region of the Western Ghats. The area receives an average annual rainfall of 7598.66 mm, which means there is heavy rainfall. Despite this, groundwater recharge is limited because rainwater flows away due to the sloping and hilly terrain. The main water source in this region is the Savitri River, which plays an important role in agriculture and groundwater recharge. Additionally, small streams and rivulets also serve as seasonal water sources.

Geology:

Geologically, Poladpur Taluka is mostly made up of Deccan Trap basalt rocks. These rocks, formed from lava flows, have limited capacity to store and carry water. Fractured and vesicular basalt in the area helps store groundwater. Some areas also have alluvium (soil with sand and silt), which is more suitable for groundwater recharge. For conserving groundwater and ensuring its sustainable use, it is necessary to adopt water conservation and artificial recharge methods.

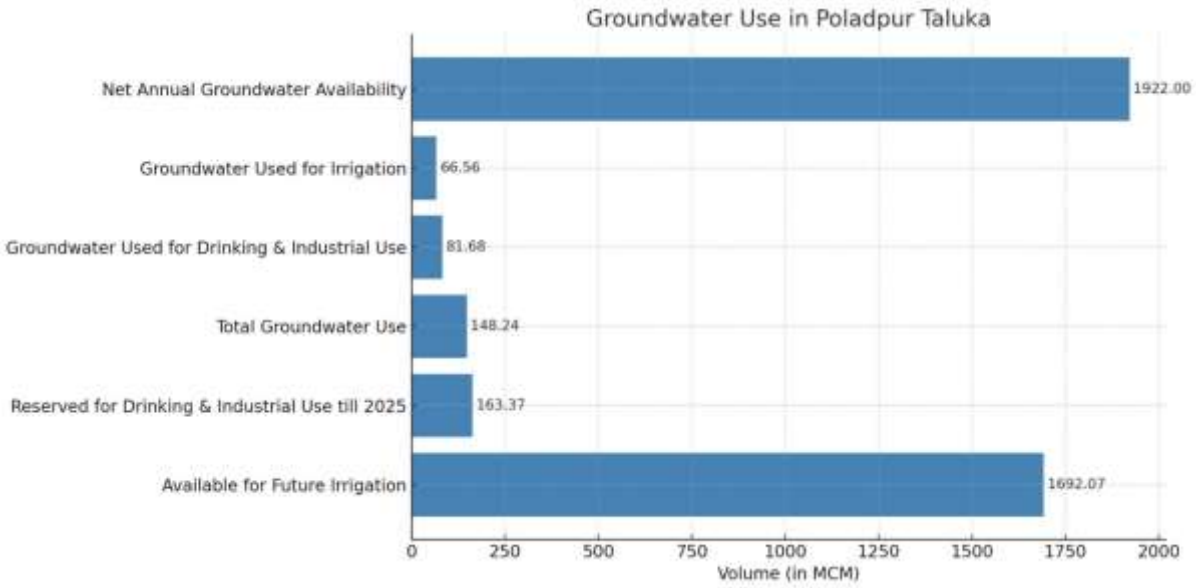


Groundwater Sources and Levels

The groundwater in Poladpur Taluka is mainly found in fractured and vesicular basalt, which limits its storage and flow. Groundwater levels change with the seasons. In the pre-monsoon season, the depth is between 4.50 to 9.00 meters below ground level (m bgl), and after the monsoon, it improves to between 1.10 to 4.05 m bgl. Between 2001 and 2010, groundwater levels increased annually by 0.27 m during the pre-monsoon period and by 0.13 m during the post-monsoon period.

Groundwater Use in Poladpur Taluka

Component	Measurement
Net Annual Groundwater Availability	1922.00 MCM
Groundwater Used for Irrigation	66.56 MCM
Groundwater Used for Drinking & Industrial Use	81.68 MCM
Total Groundwater Use	148.24 MCM
Reserved Groundwater for Drinking & Industrial Use till 2025	163.37 MCM
Groundwater Available for Future Irrigation	1692.07 MCM
Stage of Groundwater Development	7.71% (Safe Category)



Groundwater Exploration in Poladpur Taluka

A total of four wells were drilled in Poladpur Taluka for groundwater exploration—two exploratory wells (EW) and two observation wells (OW). The depth of these wells ranges from 150.00 to 200.00 meters. Based on groundwater flow and availability, the discharge rate was found to be between 3.77 to 12.18 liters per second. The aquifer zone ranges from 16.00 to 137.00 m bgl. This study shows that even though groundwater is available to some extent, proper planning and conservation techniques are needed for its sustainable management.

Groundwater Resources and Availability

Groundwater in Poladpur Taluka is mainly found in fractured and vesicular basalt. These are mostly unconfined to semi-confined aquifers, which means their storage capacity is limited. As a result, groundwater recharge is low, especially in the summer, when sources dry up and water scarcity becomes a serious issue.

Groundwater Quality

Groundwater Test Results:

Important components like pH, electrical conductivity (EC), total alkalinity, nitrate (NO_3), and fluoride (F) were tested.

- Total Hardness (TH) is below 300 mg/L, making the water suitable for drinking.
- Nitrate levels are below 45 mg/L, which is safe for drinking.
- Fluoride levels are within 1.0 mg/L, which is safe for health.
- The groundwater is mainly of Ca-HCO_3 type.
- About 80% of groundwater falls in the medium salinity group (EC: 250 - 750 µS/cm), so proper management is needed.

Groundwater Development and Management Strategies

Due to the hilly geography of Poladpur Taluka, groundwater recharge is negatively affected. A large portion of rainwater flows away on slopes and does not seep into the ground. Currently, groundwater

development for irrigation is limited, but it may increase in the future. Therefore, effective watershed management and artificial recharge projects must be implemented. River and stream recharge activities can help protect natural water sources. In agriculture, drip and sprinkler irrigation systems should be used more to ensure efficient water use. This can help deal with water scarcity and achieve sustainable water management.

Summary

The research paper focuses on the groundwater scenario in **Poladpur Taluka**, a hilly region in Raigad district, Maharashtra, that receives high annual rainfall (approx. 7598.66 mm). Despite the abundant rainfall, groundwater recharge remains limited due to steep terrain that leads to quick runoff.

Groundwater in the region is mainly stored in fractured and vesicular basalt formations, with depth varying seasonally—deeper in pre-monsoon and shallower in post-monsoon periods. Groundwater availability is estimated at **1922.00 MCM**, with only **7.71%** being developed, placing it in the **"safe" category**.

The quality of groundwater is generally suitable for both drinking and irrigation, with key chemical parameters like Total Hardness, Nitrate, and Fluoride within permissible limits.

To address seasonal water scarcity—especially in summer—this paper emphasizes the need for **artificial recharge** and **conservation methods** such as **check dams, percolation tanks, and contour trenching**. Efficient irrigation methods like **drip and sprinkler systems** are recommended for agriculture.

Furthermore, the paper advocates for an **integrated and sustainable groundwater management policy**, highlighting the role of local authorities and community participation to ensure long-term water security.

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