

Every Drop Matters: Soil and Water Conservation Technologies and Rehabilitation of Saline and Waterlogged Soils in Vidarbha

Dr. Rajesh Patode

Senior Scientist and Head (SWCE), AICRP for Dryland Agriculture and Deptt. of SWCE, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola

Introduction

The age-old saying “Water is Life” has acquired greater significance in the present era. Rapid population growth, climate variability, declining groundwater levels, erratic rainfall and increasing demand for water are placing tremendous pressure on available water resources. Water conservation is therefore no longer merely an environmental concern; it has become closely linked with food security, rural livelihoods, economic development and ecological sustainability. Vidarbha is an important agricultural region of Maharashtra, where a large proportion of agriculture is dependent on rainfall. Although the region receives substantial annual rainfall, its distribution is highly uneven. Heavy rainfall may occur within a few intense events, followed by prolonged dry spells. This creates a paradox: excess water during one period and water scarcity during another. Recent research from the Vidarbha region has also highlighted waterlogging as an important constraint in some agricultural areas, particularly where inadequate drainage interacts with erratic weather and heavy clay soils. Under these circumstances, soil and water conservation technologies have an important role in conserving rainwater, reducing soil erosion, improving soil moisture availability, supporting groundwater recharge and strengthening the resilience of rainfed agriculture.

Vidarbha: The Need for Efficient Water Management

A major portion of Vidarbha is characterized by deep and medium-deep black soils. These soils generally have good water-holding capacity, which is advantageous for rainfed agriculture. However, their high clay content can also create drainage-related problems under excessive rainfall or poor surface drainage. During intense rainfall, runoff may develop rapidly when rainfall intensity exceeds the infiltration capacity of the soil. The resulting runoff can carry away valuable topsoil and nutrients. On the other hand, during prolonged dry periods, the soil loses moisture and deep cracks may develop in black soils. Thus, the challenge in Vidarbha is not simply “more water” or “less water”. The real challenge is to manage rainfall in space and time. The basic philosophy should therefore be: “Capture rainfall where it falls, conserve it in the soil, store surplus water safely and use the stored water efficiently.”

In-situ Moisture Conservation: The First Priority: Before transporting water from one location to another, the first

objective should be to conserve rainfall within the agricultural landscape. Practices such as:

- Conservation furrows
- Compartment bunding
- BBF
- Mulching
- Residue management
- Appropriate tillage
- Contour-based field practices

can increase the opportunity for rainfall to infiltrate into the soil. This is particularly important in rainfed agriculture, where soil moisture itself acts as an important on-farm water reservoir.

Groundwater Recharge

Rainwater that is conserved within the watershed can contribute to groundwater recharge, provided the geological and hydrogeological conditions are suitable. Recharge measures may include:

- Recharge pits
- Recharge trenches
- Percolation tanks
- Check dams
- Nala bunds
- Farm ponds and suitable recharge structures

However, groundwater recharge structures should always be planned after understanding geology, soil profile, drainage characteristics and groundwater conditions. Simply constructing more structures does not automatically guarantee groundwater recharge.

The Emerging Challenge: Saline and Waterlogged Soils

While drought and water scarcity are major concerns in Vidarbha and other parts of Maharashtra, another important problem deserves equal attention—land degradation caused by salinity, sodicity and waterlogging. These problems may occur in irrigated command areas, poorly drained agricultural landscapes and locations where groundwater levels rise close to the root zone. Waterlogging reduces soil aeration and restricts root development. Under high evaporation, salts may accumulate near the soil surface. In sodic soils, excess exchangeable sodium adversely affects soil structure and infiltration. The result is a gradual decline in soil productivity and crop performance.

Why Do Salinity and Waterlogging Develop?

Major contributing factors include:

- Excessive or poorly managed irrigation
- Inadequate surface drainage
- Absence of subsurface drainage
- Use of poor-quality irrigation water
- Rising groundwater table
- High evaporation
- Impermeable or slowly permeable soil layers
- Poor field levelling and inadequate disposal of excess water

Therefore, reclamation of degraded land requires an integrated approach rather than relying on a single treatment.

Rehabilitation of Saline and Sodic Soils

1. Soil Testing: The First Step
2. Gypsum Application
3. Leaching of Soluble Salts
4. Organic Amendments

Rehabilitation of Waterlogged Soils

The most important requirement for reclaiming waterlogged land is effective drainage.

Surface Drainage: Open field drains and properly designed surface channels can remove excess water from the root zone. Surface drainage is particularly useful where water accumulates because of heavy rainfall, field topography or inadequate disposal pathways. The drainage network should be designed with adequate capacity and safe disposal arrangements.

Subsurface Drainage: Where the water table remains persistently high, surface drainage alone may not be sufficient. Subsurface drainage uses perforated pipes installed below the soil surface to remove excess water and maintain the groundwater level at a desirable depth. Although subsurface drainage involves greater initial investment, it can be highly effective in severely waterlogged areas when properly designed and maintained.

Raised-Bed Cultivation: Raised beds provide an elevated root zone and can be particularly useful for crops sensitive to excess moisture. Raised-bed systems can be especially useful for vegetables, horticultural crops and nurseries.

From Individual Structures to a Landscape Approach

One of the important lessons emerging from watershed development is that isolated interventions have limited effectiveness. A farm pond alone cannot solve a watershed's water problem. A check dam alone cannot solve

soil erosion. A drainage channel alone cannot rehabilitate a saline soil. The future lies in a landscape approach, where upstream and downstream areas are planned together.

Such an approach may integrate:

Rainfall → Runoff management → Soil conservation → Water harvesting → Groundwater recharge → Protective irrigation → Drainage → Crop planning → Water budgeting

This integrated system can improve both water security and agricultural resilience.

Towards Water-Secure Villages

Every village should gradually move towards developing its own Village Water Security Plan.

A water-secure village should aim for:

- Conservation of every possible drop of rainwater
- Scientific groundwater recharge
- Properly planned farm ponds and water-harvesting structures
- Efficient irrigation systems
- Water budgeting
- Protection of soil resources
- Increased vegetation cover
- Effective drainage where required
- Community participation
- Regular monitoring of groundwater and water use

The ultimate objective should not be merely to construct water-harvesting structures, but to create a self-reliant and climate-resilient water management system.

Water Conservation Week: From Awareness to Action

The Government of Maharashtra's Soil and Water Conservation Department observed Water Conservation Week from 15 to 21 August 2026. The emphasis was on public awareness, youth participation and transforming soil and water conservation into a people's movement. The important message is that water conservation cannot remain confined to government programmes or departmental activities. Farmers, students, local institutions, industries, voluntary organizations and citizens all have a role to play. Activities such as:

- Water-awareness programmes
- Soil and water conservation demonstrations
- Shramdaan
- Water-source cleaning
- Tree plantation
- Farmer training
- Soil testing
- Water budgeting

- Awareness campaigns in schools and colleges can help transform technical knowledge into community action.

The Way Forward

Vidarbha has considerable potential to become a model region for climate-resilient rainfed agriculture if soil and water resources are managed scientifically. The future strategy should focus on five major principles:

1. **Conserve water where it falls:** Promote in-situ moisture conservation and watershed-based runoff management.
2. **Store surplus water safely:** Use farm ponds, check dams and other suitable structures based on scientific design.
3. **Use water efficiently:** Promote micro-irrigation, proper irrigation scheduling and water budgeting.
4. **Manage excess water:** In areas affected by waterlogging, drainage must receive the same importance as irrigation.
5. **Restore degraded soils:** Use soil testing, appropriate amendments, leaching, organic matter management and drainage for reclamation of salt-affected soils.

Conclusion

Every drop of rain should be viewed as a resource. Every hectare of soil should be protected as a productive asset. Every surplus drop should either be safely stored or allowed to contribute to recharge where conditions permit. At the same time, excess water must be efficiently drained from areas vulnerable to waterlogging.

Suggested References

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