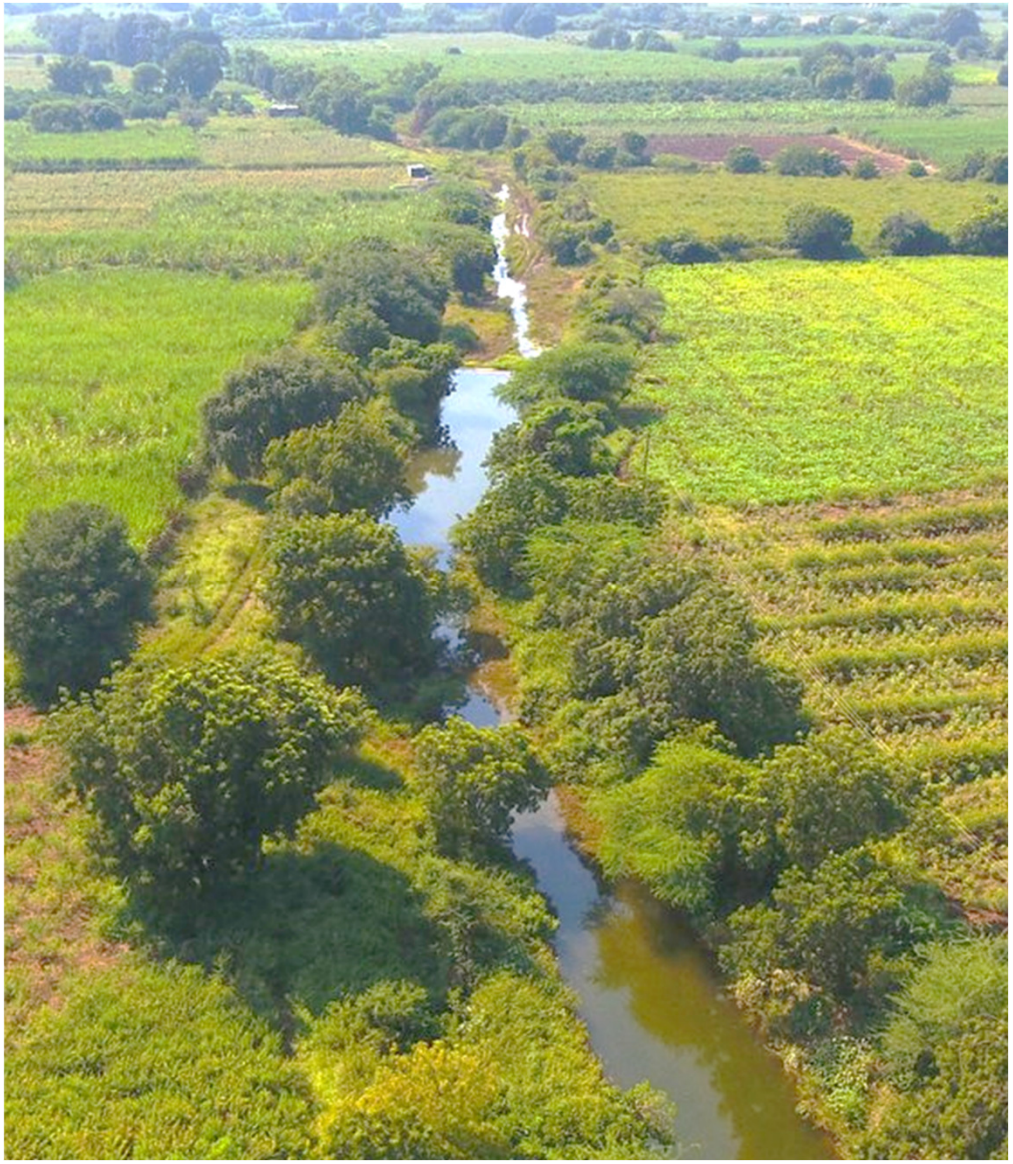
Wahegaon Water Security

Long-Term Outcomes and Lessons from Community-Based Water Resource Management

Sustainable Water Resource Development and Management (SWRDM) Initiative

Paithan Taluka, Chhatrapati Sambhajinagar, Maharashtra

Infrastructure initiates change. Institutions sustain it. Evidence makes it scalable.



PepsiCo India Region | Alternative Development Initiatives (ADI)

Understanding Wahegaon’s Water Context

A semi-arid, hard-rock landscape where seasonal groundwater is central to agriculture and rural water security



Wahegaon lies in the Deccan basalt region, where groundwater occurs mainly within localized weathered and fractured rock zones. Water availability therefore varies considerably across short distances and through the seasons.

Before the SWRDM intervention, agriculture was largely rainfed, assured irrigation was limited, several wells experienced summer stress, and dry-season drinking-water availability was uncertain.

The Wahegaon initiative addressed these challenges through an integrated approach combining runoff retention, localized groundwater recharge, community institutions and long-term monitoring.

Village setting

A semi-arid agrarian landscape where water reliability shapes agriculture and livelihoods

4,217	889	856 ha	3	713–730 mm
population	households	cultivated area	main drainage lines	normal annual rainfall







Baseline conditions were characterized by rainfed agriculture, limited assured irrigation, summer stress in several wells and uncertain dry-season drinking-water availability.

An Integrated Water Security Approach

Linking runoff retention, groundwater recharge, community institutions and long-term management

Runoff Retention
Check dams and drainage-line treatment

→

Localized Groundwater Recharge
Open-well recharge structures

→

Community Institutions
Water User Groups, SHGs and Gram Panchayat participation

→

Monitoring & Maintenance
Water-level monitoring, well-performance assessment and seasonal O&M









The initiative combined physical water-resource interventions with community participation, monitoring and maintenance rather than treating the structures as standalone civil works.

Water-Resource and Community Interventions

A combination of physical assets, local institutions and monitoring



Check dams



Open-well recharge



Community process

13
Cement check dams across three drainage lines

1
Earthen water-retention structure rejuvenated

100
open-well recharge structures in the command area

13
Water User Groups with training and stewardship roles

How the Impact Was Assessed

Multiple evidence streams were used to understand long-term change

Groundwater Monitoring
Pre- and post-monsoon static water levels

GIS & Agriculture Records
LULC change, cultivated and irrigated area

Triangulated evidence

Well Functionality
Pumping drawdown and recovery

Community & Institutional Evidence
WUGs, SHGs, consultations and field verification

Measured indicators form the technical evidence base, while field and community information helps interpret how those changes are experienced locally.

Groundwater response

Comparison of the same 27 monitored wells between 2009–15 and 2020–24

Pre-monsoon static water level

13.43 m bgl → **8.75 m bgl**

4.7 m shallower

Post-monsoon static water level

5.77 m bgl → **2.51 m bgl**

3.26 m shallower



Why it matters

Improvement in both pre- and post-monsoon conditions indicates better seasonal groundwater behavior across the monitored wells.

Groundwater response reflects the combined influence of rainfall, runoff retention, aquifer conditions, pumping practices and later canal support.

Well functionality

Drawdown and recovery provide functional evidence beyond static groundwater levels





Pumping drawdown after 8 hours

2.22 m → **1.49 m**

Lower pumping stress

Recovery time to static level

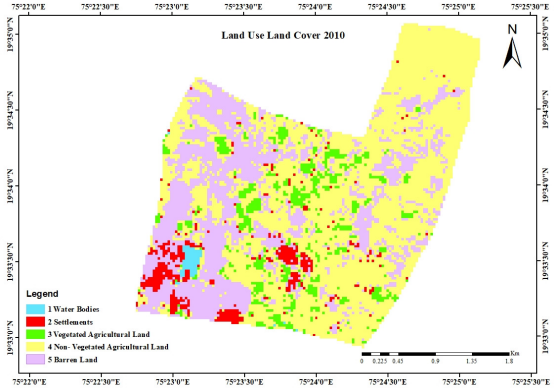
11.62 hr → **6.35 hr**

Faster well recovery

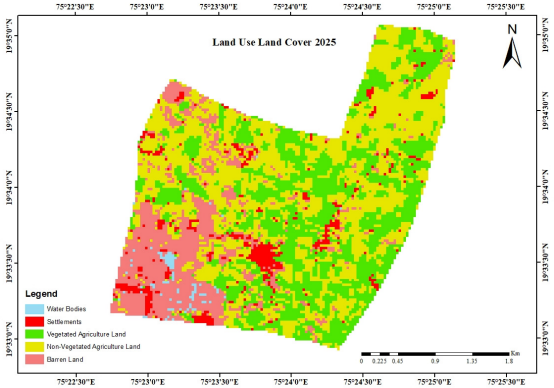
Lower drawdown and faster recovery indicate improved well functionality under irrigation-use conditions.

LULC / landscape evidence

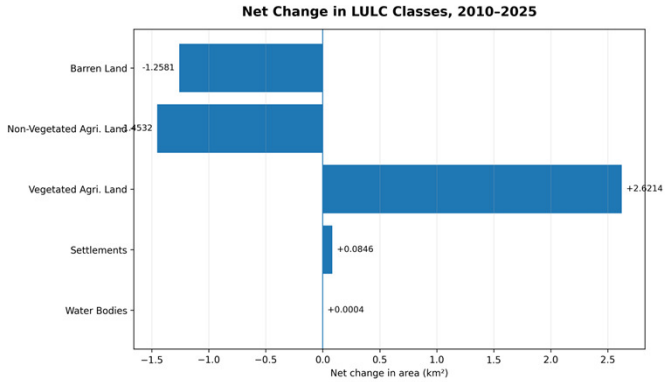
Satellite-based LULC analysis shows a substantial increase in active agricultural vegetation



2010



2025



Net change

0.68 → 3.31 sq km

vegetated agricultural land

3.03 km^2 → 1.77 km^2

barren land reduction

Landsat images were compared from similar May acquisition periods. LULC is used as supporting spatial evidence and does not by itself establish causality.

Satellite-classified vegetated agricultural land is not directly equivalent to the irrigated-area figure reported in village planning records.

Agriculture, livelihood and drinking water

Improved water conditions were accompanied by broader changes in agriculture and rural livelihoods







513 ha

Irrigated area in recent planning records

₹2.03 lakh → ₹5.20 lakh

Mean annual farm income, Nominal values; not inflation-adjusted

No tanker supply

household tap-water access functional during field verification

Reduced distress migration

Reported through field consultations, alongside greater local agricultural employment

Community institutions

Local stewardship helps connect infrastructure with maintenance, responsible water use and livelihoods







Water User Groups

Supported monitoring, maintenance awareness and local water-management discussions.

SHGs and women's groups

Linked water security with household resilience, skills and livelihoods.

Gram Panchayat

Provided local governance support and continuity.

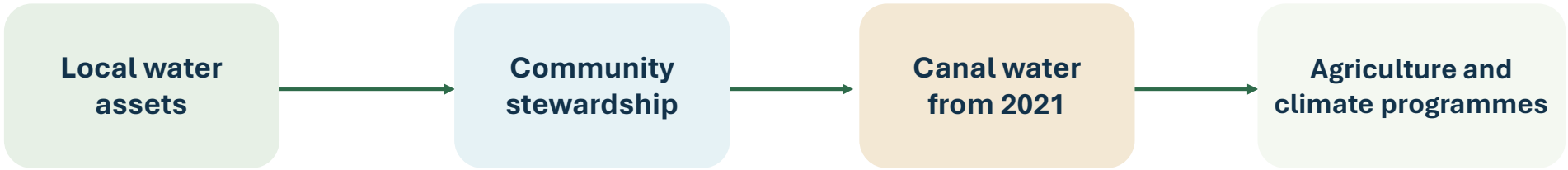
O&M

Routine inspection, vegetation removal, desilting and monitoring remain essential.

Long-term water security depends on both functioning infrastructure and local capacity to maintain, monitor and manage water resources.

Convergence

Community-owned water systems can make public programmes more effective

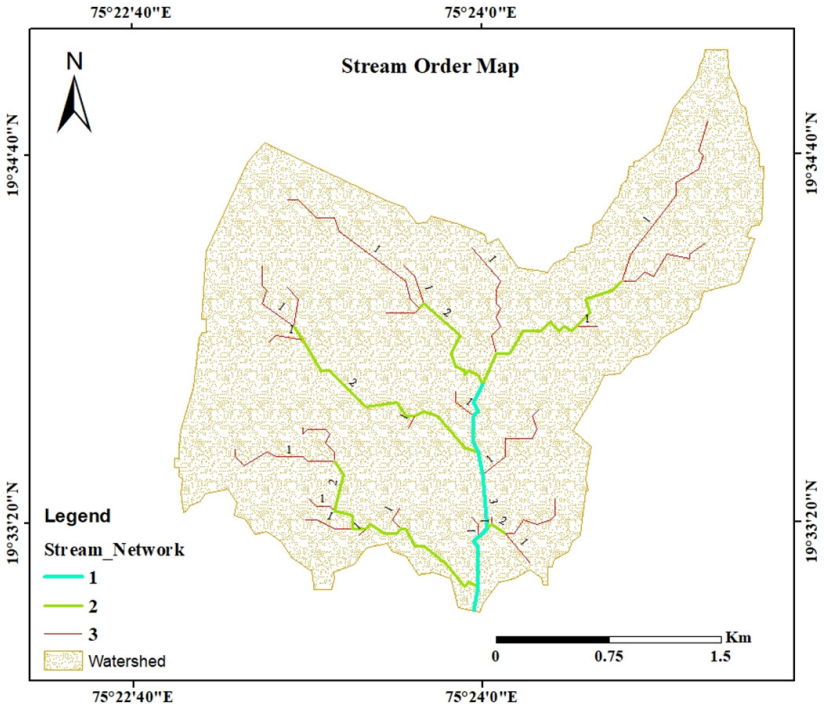


Wahegaon demonstrates a sequencing logic that is useful for government departments: community-owned infrastructure and institutions first, public infrastructure and schemes layered on top.

The later canal and public-sector programs added value to the village water system but are treated separately from the original SWRDM intervention.

Replication

The model should be adapted through screening rather than copied mechanically



Replication should focus on villages where hydrology, drainage potential and institutions are ready to work together.

1. Hard-rock aquifer conditions
Comparable hydrogeological setting

2. Drainage-line runoff potential
Clear opportunities for runoff retention

3. Farmer participation
Willingness to engage in water management

4. Local institutions
Gram Panchayat, WUG and SHG involvement

5. Monitoring & O&M capacity
Ability to maintain structures and track outcomes

6. Convergence opportunities
Potential alignment with appropriate public programs

Hydrogeology, drainage conditions, community readiness and monitoring capacity should guide site selection and intervention design.

Downstream villages

Hydrological connectivity is evident, but downstream benefits require additional field monitoring



Mudhalwadi, Narayangaon, Pachal Gaon and Wadala are connected to the Wahegaon drainage system. The current assessment identifies a plausible downstream influence, but does not quantify groundwater, irrigation or livelihood impacts in these villages.

Follow-up actions

Selected downstream wells

Seasonal groundwater-level monitoring

Representative fields

Irrigation and crop-condition observations

Farmer consultations

Changes in water reliability and cropping

Additional monitoring would help establish the extent and nature of downstream benefits within the connected watershed.

Way forward

Sustaining the gains while strengthening monitoring, water-use management and evidence







- Annual pre-monsoon inspection, vegetation management and desilting where required.
- Maintain pre-monsoon, post-monsoon and late dry-season records.
- Align canal turns, pumping and irrigation decisions.
- Promote crop planning and efficient irrigation based on seasonal water availability.
- Continue the roles of WUGs, Gram Panchayat and SHGs in monitoring, O&M and livelihoods.
- Periodic GIS updates and selected downstream monitoring.

Wahegaon provides a practical example of how water-resource infrastructure, groundwater understanding, community institutions and convergence can work together to strengthen water security in a semi-arid hard-rock setting.