



Central Ground Water Board

TATA TRUSTS

STATE-LEVEL ORIENTATION WORKSHOP

SOURCE SUSTAINABILITY AND GREY WATER MANAGEMENT IN RURAL AREAS OF UTTAR PRADESH

Date: February 19, 2026

Venue: Auditorium, Water and Land Management Institute, Telibagh, Lucknow

PARTICIPATION ONLY BY INVITATION

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State Level Orientation Workshop on “Source Sustainability and Greywater Management in Rural Areas of Uttar Pradesh February 19, 2026

CENTRE FOR SCIENCE AND ENVIRONMENT, NEW DELHI

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Proceedings of the workshop

Background and Purpose of the Workshop – Sushmita Sengupta

The workshop was organized to discuss the sustainability of rural drinking water sources and the management of greywater in rural areas of Rajasthan. It aimed to move the focus beyond the creation of infrastructure under the Jal Jeevan Mission (JJM) toward long-term functionality, source sustainability, and effective operation and maintenance (O&M), with special emphasis on community institutions.

The main objective were to

- Overview of the drinking water situation in Uttar Pradesh and why protecting water sources is important
- Understanding groundwater depletion and its long-term effects on nature and communities
- Technological solutions for groundwater recharge and ensuring safe, reliable water sources across different hydrogeological conditions
- Coordination among departments and agencies to secure sustainable and safe water sources
- Role of private partners in improving water sustainability
- Greywater generation and its management in rural and urban areas
- Best practices and successful case studies from different states

Anchoring the workshop on “Source Sustainability and Greywater Management in Rural Areas of Uttar Pradesh,” Sushmita Sengupta emphasized that at the Centre for Science and Environment (CSE), the focus extends beyond water supply to include source sustainability. She noted that community involvement is the most critical aspect of sustaining drinking water programmes, but at present, it often exists only on paper. Communities, she stressed, must be trained and capacitated. She highlighted the importance of leveraging traditional community knowledge to achieve sustainable water source management. She also discussed the challenges posed by climate change and the over-extraction of groundwater, along with their implications for water security. With these remarks, she announced the formal start of the workshop.

1. Welcome address – Subrata Chakraborty, CSE

Subrata Chakraborty, Director, Water Programme, CSE, inaugurated the workshop with a formal welcome address. He extended his greetings to the keynote speakers and participants and outlined the objectives of the workshop. He expressed his appreciation to the speakers and participants for their presence and valuable contributions, noting that the workshop serves as an important platform for initiating meaningful discussions on the sustainability of drinking water sources, greywater management, and the strengthening of community institutions. He also summaries the study done by CSE in Banda district

2. Setting the Context- Susmita Sengupta, Senior Programme Manager, Water Programme, CSE

Sushmita Sengupta from the Water Programme at the Centre for Science and Environment (CSE) set the context for the workshop. She spoke about the need to ensure that every household receives a safe, regular, and adequate supply of drinking water. She explained that while creating water supply infrastructure is necessary, it is equally important to focus on the long-term sustainability of water sources. Without protecting and strengthening these sources, she noted, water systems may not remain reliable in the future.

She emphasised that sustainability must become a central part of planning and implementation. This includes understanding local water availability, protecting existing sources, and promoting responsible water use. She also highlighted the growing pressures of groundwater depletion and climate variability, which make source protection even more critical. Sushmita stressed the importance of convergence and coordination among line departments. She particularly mentioned programmes such as the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), along with other schemes related to water, sanitation, and natural resource management. Better alignment between these programmes, she said, can significantly improve water security outcomes.

She further underlined the need to map and integrate village water assets such as ponds, wells, and watershed structures into Village Water Security Plans. Proper documentation and use of these assets can help villages plan recharge measures, improve storage, and manage water more effectively. She explained that such integration is possible through joint planning, shared responsibilities, and coordinated implementation across departments.

3. Replenishing the water sources in rural areas– Gouri Shanker Priyadarshi, IAS, Commissioner and Secretary, Rural Development Department, Uttar Pradesh

Gouri Shanker Priyadarshi from the Rural Development Department shared the experience of implementing water conservation and recharge works under the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) in Uttar Pradesh. The session highlighted how MGNREGA has evolved beyond its traditional role of employment generation to become a major instrument for strengthening rural water security, restoring natural resources, and creating durable community assets.

He explained that Uttar Pradesh's vast administrative scale — spanning 75 districts, 826 blocks, and over 57,000 Gram Panchayats, provides a strong institutional framework for decentralized planning and implementation of water-related works. Of the 266 permissible works under MGNREGA, 78 are directly linked to water conservation, watershed management, irrigation, and the renovation of traditional water bodies. Key interventions discussed included the construction and rejuvenation of ponds, check dams, rooftop rainwater harvesting structures, recharge pits, trenches, bunding, farm ponds, canal-related works, and the restoration of wells and other traditional assets. These interventions collectively contribute to groundwater recharge, enhanced irrigation access, improved soil moisture conservation, and greater resilience of rural livelihoods.

He also highlighted the achievements over the past five years, noting the substantial number of works completed across categories such as water conservation, watershed management, irrigation, and traditional water bodies. Investments of nearly ₹16,100 crore were also reported, reflecting the prioritization of water-related assets within the programme. Special emphasis was placed on the Amrit Sarovar initiative, under which thousands of ponds have been created or rejuvenated. These assets were described as multipurpose structures supporting rainwater storage, groundwater recharge, livelihood opportunities, and broader ecological benefits. River rejuvenation efforts supported through MGNREGA were also discussed. He explained that activities such as desilting, pond construction along riverbanks, vegetation development, and catchment treatment help revive small and declining rivers, improve environmental flows, and restore local ecosystems.

The impacts shared included:

- Improved groundwater recharge and water availability
- Expansion of irrigation potential
- Restoration of traditional village water bodies
- Strengthening of agricultural productivity
- Employment generation alongside long-term environmental benefits

Lastly, he underscored that sustained investments in water conservation, supported by scientific planning and inter-departmental convergence, are essential for long-term water security. He

emphasised that MGNREGA plays a critical dual role—supporting rural livelihoods while building climate-resilient natural resource assets.

4. Source sustainability of groundwater sources— Dr. Rajneet Kumar Prasad, Scientist D, Hydrometeorologist, Central Ground Water Board, Northern Region, Lucknow

Ranjeet Kumar Prasad from the Central Ground Water Board emphasized the urgency of addressing emerging groundwater challenges. He highlighted the growing pressure on aquifers and discussed the distribution of water-stressed regions across Uttar Pradesh. In particular, he noted that the western part of the state is experiencing comparatively higher levels of water stress due to intensive extraction, agricultural demand, and rapid development. To respond to these concerns, CGWB has prepared comprehensive district recharge plans covering all 75 districts of Uttar Pradesh. These plans aim to promote scientific water management, enhance groundwater recharge, and guide local-level interventions.

He stressed that effective implementation requires strong collaboration with line departments, local authorities, and implementing agencies. Concluding his remarks, he assured participants that CGWB remains committed to providing technical guidance, data support, and expert assistance to strengthen groundwater sustainability and improve long-term water security outcomes.

5. Learnings from the field—Banda’s challenge to sustain its drinking water sources— Pradeep Kumar Mishra, Deputy Programme Manager, Centre for Science and Environment

Pradeep Kumar Mishra, Deputy Programme Manager, Water Programme, CSE, presented key findings from the Banda district study. He focused on assessing the current status, functionality, and sustainability of rural drinking water supply systems in selected villages of Banda district, Uttar Pradesh.

He explained that the study was designed to evaluate whether existing drinking water sources both groundwater and surface water—based are sustainable, and to identify challenges affecting long-term water availability and system performance. The study also examined the role of community-level institutions, particularly Village Water and Sanitation Committees (VWSCs), in the planning, implementation, operation, and maintenance (O&M) of rural water supply schemes.

A total of 15 villages across four blocks — Baberu, Jaspura, Badokhar Khurd, and Naraini — were selected based on hydrogeology, topography, population, and Jal Jeevan Mission (JJM) coverage. The findings showed that although most villages reported high household tap connection coverage under JJM, the functionality and reliability of water supply remained major concerns.

He highlighted groundwater conditions in the selected blocks, noting that most fall under the semi-critical category in terms of extraction, indicating increasing stress on groundwater resources.

The field survey revealed several gaps and challenges:

- Although 83 percent of surveyed households had tap connections, only 67 percent were functional
- 32 percent of households did not receive regular water supply
- Water supply duration was highly irregular, ranging from less than 30 minutes per day to once every few days
- Many households reported insufficient water to meet daily needs
- Absence of mechanisms to measure or monitor water supplied at the household level
- Significant abandonment of traditional water sources
- Weak community participation and limited awareness of VWSC roles

Pradeep Kumar Mishra emphasized that these challenges reflect a clear gap between infrastructure creation and the long-term sustainability of services.

The Way Forward suggested included:

- Identifying and bridging gaps in Functional Household Tap Connection (FHTC) coverage
- Establishing mechanisms to quantify water supplied at the household level
- Prioritizing source sustainability through mapping and scientific planning, including the use of GIS tools
- Strengthening community institutions such as VWSCs, Gram Panchayats, and SHGs
- Building capacities of communities for O&M, monitoring, and participation
- Enhancing awareness and capacity of officials on source sustainability, convergence, and fund utilization

He concluded by stressing that ensuring reliable rural drinking water supply requires moving beyond infrastructure targets toward sustained functionality, source protection, and institutional strengthening.

6. Identifying the need for water conservation measures to strengthen the water security in the Ganga basin of Uttar Pradesh– Amrish Pal Singh, Director (M&A), Upper Ganga Basin Organization, Central Water Commission, Lucknow

Amrish Pal Singh, Director (Monitoring & Appraisal), Upper Ganga Basin Organisation (UGBO), Central Water Commission (CWC), Lucknow, delivered a technical presentation on “Identifying the Need for Water Conservation Measures to Strengthen Water Security in the Ganga Basin of Uttar Pradesh.”

He highlighted that Ganga Basin states, particularly Uttar Pradesh, are facing increasing water stress due to overexploitation of groundwater, pollution of rivers and tributaries such as the Gomti, declining base flows, and the growing impacts of climate variability. He emphasized that these challenges demand a strategic shift from infrastructure-centric approaches to conservation-first planning and efficient water management.

The speaker outlined national priorities for the 2026–2031 period, noting that key programmes including Namami Gange, Jal Shakti Abhiyan, and the National Water Mission are increasingly focusing on sustainability, efficiency, and resilience. He explained that the Central Water Commission (CWC) has introduced a strategic shift in the appraisal and approval of major and medium irrigation projects. New proposals are now expected to incorporate mandatory water-saving provisions such as piped irrigation networks (PIN), micro-irrigation systems (drip and sprinkler), and SCADA-based monitoring systems. These technologies aim to reduce conveyance losses, improve water-use efficiency, and ensure equitable distribution.

He further stressed the importance of diversifying water sources through the reuse of treated sewage effluent (TSE) and localized greywater management. Such circular economy approaches help reduce dependence on freshwater withdrawals. The role of the Bureau of Water Use Efficiency (BWUE) was also discussed, particularly its efforts in promoting water-efficient fixtures, standards, and farmer awareness initiatives.

Amrish Pal Singh underscored the need for Integrated Water Resource Management (IWRM), advocating conjunctive use of surface water and groundwater, recharge interventions, and floodplain protection through River Regulation Zones (RRZ). Special reference was made to Lucknow and the Gomti River, where rainwater harvesting, river rejuvenation, and desilting efforts are being implemented. He concluded by emphasizing the Reduce, Reuse, Recycle (RRR) philosophy as central to achieving long-term water security and ecological sustainability in the Ganga Basin.

7. Ground water resource estimation and implementation of NAQUIM management plans in Uttar Pradesh– Ebadur Rahman, Scientist-C, Hydrogeologist, Central Groundwater Board, Northern Region, Lucknow

Ebadur Rehman, Central Groundwater Board (CGWB), Northern Region, Lucknow, delivered a technical presentation on “Groundwater Resource Assessment and Implementation of the National Aquifer Mapping and Management Programme (NAQUIM) in Uttar Pradesh.”

He provided an overview of the evolution of hydrogeological studies and groundwater assessments in India, highlighting aquifer mapping from small-scale national maps to detailed, high-resolution aquifer characterization. He explained that NAQUIM represents a major advancement, focusing on aquifer-specific understanding of groundwater levels, quality, geometry, and hydraulic characteristics.

He emphasized that the primary objective of NAQUIM is to establish a scientific and systematic framework for groundwater management. This includes delineating aquifer geometry in three dimensions, assessing groundwater availability, evaluating water quality, and formulating aquifer-specific management plans.

He outlined the multi-disciplinary approach adopted under NAQUIM, which integrates hydrogeological surveys, groundwater quality analysis, geophysical studies, and exploratory drilling. Advanced techniques such as Vertical Electrical Sounding (VES), Transient Electromagnetic Surveys (TEM), geophysical logging, and 2D/3D imaging were highlighted as critical tools for understanding aquifer systems. Approximately 2,000 exploratory and observation wells have been constructed to support aquifer delineation and parameter estimation. The outcomes presented revealed that Uttar Pradesh is characterized by multi-layered aquifer systems. In alluvial regions, three-tier aquifer structures were identified, while in Bundelkhand, weathered and fractured aquifers within granites and Vindhyan sandstones were mapped. Aquifer-wise groundwater resources were estimated using scientific parameters derived from exploration data.

Ebadur Rehman detailed area-specific management strategies, addressing over-exploited, critical, and semi-critical (OCS) areas, Bundelkhand regions, arsenic-affected zones, fluoride-affected areas, shallow water level regions, and waterlogged/flood-prone zones. Proposed interventions included artificial recharge structures, rooftop rainwater harvesting, demand-side water-use efficiency measures, conjunctive use strategies, and specialized technologies such as cement sealing for accessing safe deeper aquifers.

He concluded by emphasizing that aquifer-based planning and scientific groundwater management are essential for ensuring long-term sustainability, water quality protection, and climate resilience in Uttar Pradesh.

8. Review of the impact of JJM projects on the socio-economic conditions of the communities in selected districts of Uttar Pradesh– Prof. Ajay Kumar Garg, Indian Institute of Management (IIM), Lucknow

Professor from Indian Institute of Management Lucknow (IIM) Ajay Kumar Garg shared key findings from a study conducted across six districts of Uttar Pradesh. The research revealed that while Village Water and Sanitation Committees (VWSCs) have been formally constituted, most remain ineffective due to limited authority, inadequate orientation, and lack of dedicated funding. He emphasized that many committees exist only on paper, with minimal involvement in planning, monitoring, or decision-making. Highlighting the gap between institutional design and ground realities, he argued that VWSCs must be empowered within Gram Panchayats. Granting them clear functional powers, financial resources, and capacity-building support is essential for improving accountability and ensuring sustainable rural water governance.

9. Success stories at village level to recharge groundwater sources for secured and safe water supply and securing funds for O & M—Shivani Singh, Senior Programme Manager, Parmarth Samaj Sevi Sansthan, Uttar Pradesh

Shivani Singh from Parmarth Samaj Sevi Sansthan, presented the session on “Success Stories of Groundwater Recharge for Secured and Safe Water Supply.” She highlighted Parmarth’s work across Uttar Pradesh and other states, emphasizing its women-led Jal Saheli initiative designed to address water scarcity, strengthen rural drinking water systems, and promote source sustainability.

She explained that the Jal Saheli model uniquely integrates operation and maintenance (O&M) support with water conservation and groundwater recharge efforts. Jal Sahelis play a crucial role in supporting Jal Jeevan Mission (JJM) schemes by assisting communities in system upkeep, promoting water-use efficiency, and addressing local water challenges.

Shivani Singh shared key achievements of the initiative, including the revival of over 136 traditional tanks, construction and repair of more than 2,000 water structures, and the saving of an estimated 17+ billion litres of water annually. The interventions also contributed to increased irrigation capacity and rejuvenation of small rivers in Bundelkhand.

She emphasized the role of Jal Sahelis in repairing and maintaining hand pumps and wells, strengthening Village Water and Sanitation Committees (VWSCs), supporting tariff collection, conducting water quality testing, and promoting hygiene awareness through community dialogues. The presentation underscored that empowering women as local water leaders significantly improves system functionality, community ownership, and long-term sustainability of rural water supply programmes.

10. Learnings from the ground—challenges of managing greywater in rural areas of Banda and way forward— Swati Bhatia, Deputy Programme Manager, Centre for Science and Environment

Swati Bhatia, Deputy Programme Manager, Water Programme at the Centre for Science and Environment, presented an in-depth analysis on “Challenges on Greywater in Uttar Pradesh and the Way Forward.” She highlighted that rural areas generate significant quantities of greywater estimated to be enough to fill Kathautia Jheel more than three times daily—yet lack structured systems for its collection, treatment, and reuse.

Currently, greywater is often disposed of indiscriminately into open drains and surface channels, leading to polluted ponds, waterlogged fields, mosquito breeding, and contamination of drinking water sources. The unseen but serious consequence is groundwater pollution. Field assessments conducted by CSE in districts such as Rae Bareilly, Banda, Rampur, and Jhansi revealed widespread issues including poorly designed drains, wrongly tagged or unmaintained soak pits, inadequate operation and maintenance, and limited technical know-how. Increasing

use of detergents, pesticides, pharmaceuticals, cosmetics, and plastics further deteriorates water quality.

She emphasized that with the expansion of the Jal Jeevan Mission, rural water consumption is rising, which will proportionally increase greywater generation. Therefore, solutions must consider soil type, groundwater conditions, cost, climate resilience, and community acceptance. The way forward includes developing village action plans with mapped drainage networks, building capacity of local workers, promoting community ownership and audits, and planning for safe reuse of treated greywater to ensure long-term source sustainability and improved rural health.

11. Identifying the solutions for greywater management in the different geographic terrain of Uttar Pradesh– Dr. Ritu Gulati, Professor and Head, Faculty of Architecture and Planning, Dr. A P J Abdul Kalam Technical University

Ritu Gulati from A.P.J. Abdul Kalam Technical University presented on “Identifying Solutions for Greywater Management in the Diverse Geographic Terrains of Uttar Pradesh,” emphasizing that greywater is a reusable resource if managed properly. She explained that greywater from bathrooms, kitchens, and laundry can be treated and reused for non-potable purposes, reducing pressure on freshwater sources.

She highlighted the importance of terrain-specific solutions across Uttar Pradesh’s varied landscapes. In the Gangetic alluvial plains, where poor drainage and high water tables prevail, constructed wetlands and reed bed systems are recommended. In the Terai region, characterized by waterlogging, raised reed beds and subsurface flow wetlands are more suitable. For the water-scarce Bundelkhand plateau, evapotranspiration beds and greywater reuse for kitchen gardens are effective low-cost options. In rapidly urbanizing cities like Lucknow and Kanpur, decentralized systems, dual plumbing, and building-level recycling units are essential.

She emphasized community participation, policy integration with the Jal Jeevan Mission and Swachh Bharat Mission, financial incentives, and capacity building as key enablers. The session concluded that greywater management must be decentralized, climate-sensitive, and aligned with local geography to ensure long-term water security.

12. Success stories on nature based solutions for managing greywater in the rural areas of Uttar Pradesh– Dr. Smriti Singh, State Programme Director, WaterAid

Smriti Singh, State Programme Director at WaterAid India, presented success stories on nature-based solutions (NBS) for managing greywater in rural Uttar Pradesh. She highlighted the restoration of community ponds in Bheekhapurwa and Rudahi, under Nagar Panchayat Bakshi Ka Talab in Lucknow, where 717 households generate nearly 334 KLD of wastewater daily.

Before the intervention, untreated grey and black water flowed directly into ponds through open drains, causing high BOD and COD levels, foul odor, mosquito breeding, and groundwater contamination risks. The project introduced phytoremediation, a 100% nature-based solution involving daily dosing of a natural solution to improve dissolved oxygen and water quality. The approach is low-cost, chemical-free, and environmentally sustainable.

Strong government collaboration ensured long-term operation and maintenance through an MoU with the Nagar Panchayat, along with monitoring and enforcement measures. Community ownership played a crucial role, with residents forming O&M committees and voluntarily modifying sanitation connections. The intervention significantly reduced pollution levels, eliminated odor, improved nearby handpump water quality, and demonstrated a replicable, scalable model for sustainable water security across Uttar Pradesh.

13. Snapshot of the challenges and way forward for securing safe and secured water supply in the rural areas of Uttar Pradesh– J.V.R. Murty, Senior Advisor, WASH, Tata Trust

Murty Jonnalagadda, Senior Consultant at Tata Trusts, in the concluding session, presented a snapshot of the challenges and the way forward for securing safe and sustainable rural water supply under the Jal Jeevan Mission in Uttar Pradesh. Drawing on recent functionality assessment reports and groundwater data, he highlighted growing concerns around groundwater depletion and long-term source sustainability.

The presentation emphasised that agriculture remains a major driver of groundwater extraction, contributing to declining water tables in several districts. While tap connections have expanded significantly under JJM, ensuring functionality and sustainability depends on reliable water sources and robust operation and maintenance systems. Strengthening village-level institutions such as Village Water and Sanitation Committees (VWSCs) was highlighted as critical for monitoring groundwater levels and implementing source protection measures.

He recommended promoting water budgeting and water balance estimation, particularly in water-stressed blocks, to guide both supply-side and demand-side interventions. Convergence with initiatives like the UP Micro Irrigation Project can further reduce pressure on groundwater. The session underscored that source sustainability is fundamental to achieving long-term rural water security.

Conclusion and Way Forward

The workshop concluded with closing remarks by Sushmita Sengupta from the Water Programme at the Centre for Science and Environment (CSE). She summarized the key insights emerging from the presentations and discussions, emphasizing the urgent need to shift from an infrastructure-focused approach to one centered on sustainability, functionality, and resilience.

Key Takeaways:

- Groundwater in Uttar Pradesh is facing serious quantitative and qualitative stress, making source sustainability a critical priority rather than a choice.
- Aquifer-based planning, and scientific selection of recharge sites using GIS and remote sensing can significantly improve the effectiveness and impact of investments.
- Local water sources — including wells, hand pumps, ponds, remain essential for ensuring resilience, particularly where piped water supply is irregular or inadequate. These assets must be systematically mapped, protected, and rejuvenated.
- Greywater management is closely linked to water security and environmental health and requires scalable, context-specific solutions at household, community, and village levels.
- Community institutions, especially Village Water and Sanitation Committees (VWSCs), require continuous capacity building, clearer roles, and sustained financial and technical support to transition from nominal structures to effective managers of rural water systems.

Table: Details of Participants attended the workshop

SN	Participating department/ Organization	No. of participants
	Government departments	
1	Rural Development	26
2	Central Ground Water Board (CGWB)	18
3	State Water and Sanitation Mission (SWSM)	12
4	MGNREGA	7
5	Groundwater Department	11
6	Jal Nigam (Rural)	7
7	Minor Irrigation (MI)	6
8	Central Water Commission(CWC)	5
9	Panchayati Raj Department	8
	Academic Institutions	
10	Indian Institute of Management (IIM), Lucknow	3
11	Dr. A P J Abdul Kalam Technical University	5
	Non-Governmental Organizations	
12	Tata Trusts	2
13	Aga Khan Foundation	3
14	WaterAid	6
15	Vigyan Foundation	1
16	Sociovital Network Foundation	2
17	Centre for Science and Environment	7
	Total	129