INDIA SANITATION COALITION
BUILD • USE • MAINTAIN • TREAT

Business of Change Compendium 2026

REIMAGINING SOLID WASTE AND WATER MANAGEMENT FOR CLIMATE ACTION: PATHWAYS, PARTNERSHIPS AND INNOVATIONS

Recycled Wastewater: A Sustainable Solution for Water-Scarce Regions

S M Sehgal Foundation | Pinangwan, Nuh district, Haryana | Initiated in 2024

DESIGN CAPACITY **50,000 litres per day**	STORAGE **28 lakh litres in restored pond**	REPORTED COVERAGE **Approx. 708 households**
IRRIGATION DEMONSTRATED **17.5 acres in Rabi 2025-26**	CAPITAL COST **Approx. INR 31 lakh**	LOCAL INSTITUTION **12-member Village Development Committee**

Case in brief

S M Sehgal Foundation established a decentralised wastewater treatment and reuse system in Pinangwan, Nuh where saline groundwater and unreliable rainfall constrain irrigation. Domestic wastewater that previously accumulated in the village pond is diverted from the sewage drain and passed through a gravity-based wastewater treatment system and returned to the restored pond for agricultural reuse. The model combines passive biological treatment, online and laboratory water-quality monitoring, community-managed operation and farmer uptake. Its circularity proposition is direct: it converts a local pollution load into an irrigation resource while reducing dependence on unsuitable groundwater and the vagaries of monsoon rainfall.

Context and problem

Pinangwan is a rural, water-stressed settlement in Nuh district of Haryana. High groundwater salinity limits its use for irrigation, and without surface water irrigation sources, farming has depended heavily on rainfall. At the same time, household regularly flowed through village drains into a pond, creating stagnant conditions, odour, mosquito breeding and exposure risks. Some farmers reportedly used untreated wastewater, with concerns about sludge accumulation in agricultural fields, odour, and occasionally facing skin irritation and waterborne disease. The intervention sought to address sanitation and create an alternative source of irrigation by treating the continuously available wastewater close to its source and reusing it productively.

Intervention scope and governance

The detailed case concerns Pinangwan village in Nuh district. The Gram Panchayat supported consultation, site selection and implementation and reportedly provided panchayat land near the pond. A 12-member Village Development Committee (VDC), comprising beneficiary farmers, ward representatives and community members, oversees routine management, irrigation coordination and issue resolution. S M Sehgal Foundation designed and implemented this pilot project of village wastewater recycling and reuse of treated water in agriculture, along with beneficiary training, monitoring and documentation for this rural development and climate-resilience intervention.

What the model integrates

1. Treatment: decentralised, nature-based removal of solids, organic load and pathogens.
2. Reuse: treated water stored in the village pond and supplied for crop irrigation.
3. Monitoring: online inlet/outlet indicators plus periodic accredited-laboratory testing.
4. Management: VDC and Gram Panchayat oversight, beneficiary training and locally collected O&M charges.

Technical model: passive treatment and agricultural reuse

1. Screening chamber removes plastics, leaves, cloth and other floating debris.
2. Settler/septic tank settles suspended solids and supports partial anaerobic decomposition.
3. Anaerobic baffled reactor increases contact with anaerobic microorganisms to reduce organic pollutants.
4. Anaerobic filter uses cinder media and microbial biofilms for further solids and organic-load removal.
5. Horizontal planted gravel filter uses gravel to grow biofilm and wetland vegetation roots to infuse oxygen, support aerobic microbes to degrade organics and remove nutrients.
6. Polishing pond provides additional settling of finer solids, UV rays from sunlight exposure help kill pathogens and reduce bacteria. Extended retention ensures disinfection before treated water is used for irrigation.

Operating design: The treatment train is reported to use gravity, natural microorganisms and vegetation without routine pumping or chemical dosing.

Reported treatment performance

Parameter	Reported removal efficiency
Chemical Oxygen Demand (COD)	86.9% removal
Biological Oxygen Demand (BOD)	85.6% removal
Total Suspended Solids (TSS)	92.9% removal
Turbidity	91.9% removal
Oil and grease	96.3% removal
Coliform bacteria / E. coli	98.1% / 96.8% removal

Online and laboratory monitoring

An IoT system reportedly monitors inlet and outlet water quality parameters including pH, electrical conductivity, TSS, BOD, COD and oxidation-reduction potential, helps in monitoring inlet/outlet water quality and timely action in case there is any issue with the treatment, while an ultrasonic flow meter continuously records treated volume. Data are available through a cloud dashboard, and the system had reportedly operated for more than ten months at submission. Periodic NABL-accredited laboratory testing covers physical, organic and microbial assessment of 21 parameters and confirms that the treated water is suitable for reuse in agriculture.

Agricultural reuse and reported outcomes

The restored pond reportedly stores about 28 lakh litres of treated water. During the Rabi 2025-26 season, wheat and mustard across 17.5 acres received treated-water irrigation. Farmers using treated water reported that their crop yield has increased by 44% in wheat and 55% in mustard. Expansion to approximately 40 acres is planned, alongside promotion of drip and sprinkler irrigation.

Community adoption and safe reuse

Regular village meetings, demonstrations, exposure visits, wall paintings and training were used to promote treated water reuse and address concerns about water quality and crop safety. VDC members, farmers and sanitation workers were trained in system upkeep and safe reuse.

Reported scale, cost and evidence gaps

Indicator	Reported value / issue
System	50 KLD design capacity; restored pond storage of 28 lakh litres
Households	708 Households
People	4,502 people
Agricultural reach	17.5 acres irrigated in Rabi 2025-26. Plan to cover upto 40 acres using micro-irrigation practices
Capital cost	Approximately INR 31 lakh
Indicative household cost	INR 4,378/-

Financial and O&M model

1. Capital financing: Institutional or philanthropic grants by Sehgal Foundation for pilot. Replication possible through CSR projects and convergence with government programs/schemes.
2. Local O&M: the VDC/WMC is reportedly to collect membership and treated water reuse charges per acre from this season and deposit them into a community-operated bank account for maintenance with support from the Gram Panchayat.
3. Recurring costs: screen cleaning, vegetation upkeep, desludging, laboratory tests, sensors, repairs and irrigation distribution should be costed even though the core treatment train avoids routine energy and chemicals.

Challenges and safeguards

The submission ranks land or infrastructure constraints first, lack of O&M funding second and policy or regulatory gaps third. It also describes farmer hesitation, shortage of trained construction personnel and the need to integrate the system with existing drains while maintaining gravity flow. Reported responses included consultation, demonstrations, exposure visits, engineering

assessment, construction supervision and VDC training. Replication also requires a non-flood-prone site, adequate land, safe sludge management, reliable monitoring and an agreed irrigation-allocation mechanism.

Sustainability and replication

The combination of passive treatment, local governance and agricultural demand offers replication potential in rural settlements, especially with saline groundwater, water-scarce areas and sufficient domestic wastewater availability. Adoption depends on actual inflow, land and elevation, effluent quality, seasonal irrigation demand, farmer acceptance, panchayat support and a local community-managed or funded O&M plan. The submission suggests the system's suitability for villages or hamlets having sufficient population. City- or village-level feasibility should therefore precede replication.

CLIMATE LINK	**Wastewater reuse can improve drought resilience and reduce pressure on exploitation of freshwater. A passive treatment train use no operational energy or chemicals than conventional systems**

Transferable lessons

1. Design treatment and reuse together; a compliant outlet needs a dependable user and delivery arrangement.
2. Combine online indicators with accredited laboratory verification and transparent operating thresholds.
3. Define community charges, responsibilities and sludge-management procedures before handover.
4. Report actual daily flow, water quality, farm uptake, yields and net financial benefit by season.

Contact person	Email	Website
Salahuddin Saiphy	s.saiphy@smsfoundation.org	https://www.smsfoundation.org/

India Sanitation Coalition (ISC), launched in June 2015, at Federation of Indian Chamber Commerce and Industry (FICCI), enables and supports safe and sustainable sanitation by bringing multiple organizations on a common platform through a range of catalytic actions. These include supporting the unlocking of WASH financing with focus on the private sector, forging partnerships with allied organizations for leading the discourse on sustainable sanitation; convening, curating and disseminating best practices in the sanitation advocacy — space and providing inputs into the policy aspects of sanitation through participation at allied forums.

https://www.indiasanitationcoalition.org/

CONTACT INFO

India Sanitation Coalition
FICCI Federation House Tansen Marg New Delhi-110001
Landline: 011-23487270
E-mail: indiasanitationcoalition@ficci.com

Social Link