

UNLOCKING THE POTENTIAL OF WATER REUSE

Mohammed Naser Azeez,
Managing Director, Aquality Intelligent Solutions



Nothing is more essential to human existence than water. Beyond being a fundamental necessity, adequate and safe water is essential for a nation's wellbeing, economic prosperity, food security, and ecological health. India, once blessed with plentiful water resources, now confronts an unprecedented drinking water crisis. This situation continues to deteriorate as the gap between supply and demand widens and interstate water disputes regularly make news headlines.

The United Nations consistently emphasizes that "access to safe water is a fundamental human need and, therefore, a basic human right." The Sustainable Development Goal 6 (SDG-6) focuses on ensuring the availability and sustainable management of water and sanitation for all by 2030 across nations.

Our planet's population has surpassed 8.2 billion people. Can Earth produce sufficient water to satisfy the thirst of over eight billion individuals! As our population continues to grow, meeting this challenge appears increasingly difficult, with water scarcity emerging as a primary

constraint on future food production. This precious resource faces intense and unsustainable pressure from various sectors, forcing agricultural users to compete with urban supplies and industries for access.

Globally, water demand significantly outweighs supply, and farmers face difficult challenges in meeting their needs. The lack of focused attention from policymakers on sustainable water management including policy formulation, investment prioritization, and infrastructure development poses a serious risk of escalating into a full-blown water crisis. This, in turn, could have far-reaching consequences, including widespread food shortages due to the deep interconnection between water availability and agricultural productivity.

To mitigate these risks, a comprehensive and forward-thinking strategy is urgently needed. This must include robust governance frameworks, long-term planning, and sustained financial investments aimed at building climate-resilient water infrastructure and water reuse practices at different levels. Equally important is the integration of technology, adoption of best practices, community participation, and inter-agency coordination to ensure water security. Only through such dedicated and strategic approach to sustainable water management, we can safeguard water and food security, ensuring equitable access and resilience for current and future generations.

India's Growing Water Crisis

India is facing a serious water crisis, even though it has big river systems like the Ganges, Brahmaputra, and Indus. The problem is that while India has 18% of the world's people, it



only has 4% of the world's freshwater resources. Water availability per person has dropped sharply; from 5,177 cubic meters in 1951, is projected to decrease to around 1341 cubic meters in 2025, putting India in the water-stressed category.

This crisis is uneven; some areas face heavy floods, while others suffer from droughts. In many farming regions, groundwater levels are falling by more than one meter each year. Over 600 million people deal with high to extreme water stress, and cities like Delhi, Chennai, Bengaluru, and Hyderabad regularly face water shortages.

As India's population grows and cities and industries expand, water demand keeps rising. At the same time, pollution is making many water sources unusable. Climate change is making things worse, bringing unpredictable rains, higher evaporation, and more extreme weather.

Only about 30% of the country's wastewater is treated, which means a lot of reusable water is being wasted. Though the government has started programs like the Jal Shakti Abhiyan, National Water Mission, and Atal Bhujal Yojana, there are still challenges in achieving the desired goals. Without comprehensive action, over 40% of India's population is projected to have no access to clean drinking water by 2030. Solving this water crisis is critical for India's future growth and stability. Against this backdrop, water reuse presents not merely an option but an imperative for India's sustainable development trajectory.

Addressing water scarcity requires a strategic, future-ready approach, one that includes strong policies, long-term planning, and steady investment in climate-resilient infrastructure and water reuse systems.

Water Reuse in India

While the concept of water reuse is not new to India, its systematic implementation at scale remains limited. It is estimated that urban centres in India generates approximately 72,368 million litres per day (MLD) of municipal wastewater and approximately 83,000 million litres of industrial effluent; but a large quantity of it is disposed in the environment

without treatment. This leaves a substantial volume of potentially reusable water untreated and unutilized.

The existing water reuse landscape in India is characterized by fragmented approaches and significant regional variations:

Industrial Reuse

Industries, particularly water-intensive sectors like thermal power plants, textiles, paper, pharmaceuticals and steel have been early adopters of water reuse technologies driven by regulatory requirements and economic considerations. For instance, zero liquid discharge (ZLD) policies are not mandated for all industries in India. It is strongly encouraged and becoming increasingly important, especially for water-intensive sectors.

Municipal Reuse

Several urban centres have initiated municipal wastewater reuse projects. Surat in Gujarat treats approximately 57



MLD of municipal wastewater for industrial use. Nagpur's Orange City Water project supplies 190 MLD of treated wastewater to a nearby thermal power plant. Chennai Metro Water has established tertiary treatment plants that provide recycled water for industrial purposes. Wastewater reuse is often concentrated in urban areas, with cities like Gurugram, Bengaluru, and Chennai leading the way. In Gujarat, thermal power plants situated within 50 km. of sewage treated plants (STPs) or city limits are mandated to use treated wastewater. In Karnataka, industrial estates within 30 km. of STPs are mandated to prioritise treated water.

While not all states have reuse policies, several have adopted them, including Gujarat, Madhya Pradesh, Punjab, Rajasthan, Jharkhand, and others. Many states are focusing on using treated wastewater for agricultural purposes.

Agricultural Reuse

While informal reuse of untreated or partially treated wastewater for agriculture is widespread, structured systems for safe agricultural water reuse remain underdeveloped. A notable exception is Karnataka's Vrishabhavathi Valley project, where treated wastewater irrigates approximately 16,000 hectares of agricultural land.

Promoting Safe Reuse of Treated Wastewater

To encourage states and stakeholders to treat and reuse wastewater, the central government introduced the National Framework on Safe Reuse of Treated Water in November 2022. The goal is to help states set clear targets for wastewater treatment and reuse in both cities and villages. The National Water Policy (2012) explicitly recognizes recycling and reuse of water as priority strategies. The Atal Mission for Rejuvenation and Urban Transformation (AMRUT) and Smart Cities Mission incorporate components for wastewater recycling

infrastructure. The Jal Shakti Ministry's guidelines on water reuse aim to ensure that by 2025, 20% of water used by industries should be recycled water.

The framework suggests creating a technical support cell, drafting local reuse policies (with regular reviews), and planning how treated water will be transported using pipelines, tankers, or aqueducts. It also highlights common challenges in urban and rural areas and offers business model options for different end-uses. The framework recommends using treated wastewater for city services like watering parks, flushing toilets, and fire fighting. For groundwater recharge, it suggests strict quality control, monitoring, and safety standards.

Secondary treated wastewater is often used in spray guns to control dust in polluted areas in Delhi. There's also a need to raise awareness that this water is not for drinking, as people are often hesitant about reusing wastewater. Overall, the framework is a positive move towards increasing wastewater reuse, which can boost water security, restore water bodies, and support the economy.

Challenges in Scaling Water Reuse in India

Even though water reuse is important and getting policy support, several challenges are slowing its progress in India. On the technical side, issues like unreliable electricity supply affect how well treatment plants work. It is also hard to deal with changes in wastewater quality and quantity depending on the season. There is not enough water testing labs to regularly test treated water quality.

Economically, the cost of setting up advanced treatment systems is high. Freshwater is often cheaper, making recycled water less attractive. Urban local bodies also lack

Aquality Intelligent Solutions is significantly contributing to the promotion of water reuse by embedding advanced, eco-friendly treatment technologies into its systems. These solutions are designed for energy efficiency and long-term sustainability, making them ideal for deployment even in the remote and off-grid areas. The company not only supports water reuse and environmental conservation but also empowers communities and industries with reliable access to treated water.

the funds to invest in water reuse, and there are not enough public-private partnerships to share the risks and costs.

Socially and culturally, people often have negative perceptions about using treated water. There's limited awareness about how safe and useful it can be when properly treated. Cultural beliefs and preferences about water sources, along with low community involvement in water-related decisions, also slow down acceptance.

From a governance perspective, responsibilities are scattered across different departments, and there is not appropriate coordination between water supply, sanitation, and reuse planning. Existing laws are not always enforced, and a lack of data makes it harder to design effective reuse systems. Together, these issues show the need for a more integrated and well-supported approach to scale up water reuse in India.

AQUALITY Intelligent Solutions: Enabling Water Reuse with Smart and Sustainable Technologies

AQUALITY Intelligent Solutions is playing a vital role in advancing water reuse by integrating innovative used water treatment technologies into its solar-powered water filtration systems. These systems are designed to be energy-efficient and sustainable, making them especially suitable for remote and off-grid areas. By using solar energy to power water treatment units, AQUALITY helps communities and institutions treat and reuse wastewater in an eco-friendly way, reducing dependence on freshwater sources.

For industries, AQUALITY offers compact and modular wastewater treatment and reuse systems that can be easily installed even in space-constrained environments. These systems help industries treat their effluents on-site and reuse the treated water for non-potable purposes like cooling, cleaning, and industrial processing thereby minimizing discharge and promoting circular water use.

Through these efforts, AQUALITY is contributing to a future where water reuse becomes an integral part of India's water management strategy, supporting both environmental sustainability and resource efficiency.

Final Reflection

As India navigates the complex challenges of water security in the 21st century, water reuse must transition from being viewed as an alternative option to becoming the "new normal" in water resource management. Taking inspiration from countries like Singapore, which successfully treats and reuses over 40% of its wastewater

for both potable and non-potable purposes, India has the opportunity to adopt a similar forward-looking approach.

With the country's rapidly growing urban population, expanding industrial activity, and increasingly climate-vulnerable agriculture, continued dependence on traditional freshwater sources is no longer sustainable. To address this, India must prioritize investments in wastewater treatment infrastructure, promote decentralized and localized reuse systems, and establish strict quality standards to ensure safe reuse.

By integrating treated wastewater into municipal, industrial, and agricultural supply chains, India can ease pressure on freshwater resources, enhance climate resilience, and create a more circular and sustainable water economy. For this to succeed, strong political will, public awareness campaigns, private sector participation, and clear regulatory frameworks will be essential.

India's water future depends significantly on its ability to close the water loop through effective reuse strategies. By doing so, the country can turn the challenge of water scarcity into an opportunity for innovation, sustainability, and resilience. As India works toward becoming a developed nation by 2047, integrated water reuse must feature as a cornerstone of its sustainable development pathway. 

ABOUT THE AUTHOR



MOHAMMED NASER AZEEZ
Managing Director,
AQUALITY Intelligent Solutions

He established AQUALITY Intelligent Solutions with a clear vision to deliver cutting-edge water treatment and air purification solutions tailored to domestic, institutional, and industrial needs. Motivated by a deep commitment to improving access to clean drinking water and purified air, he has played a pivotal role in transforming lives. Through relentless dedication, innovative technology, and an unyielding focus on quality, he has consistently driven the company's mission to promote healthier, more sustainable living environments.