

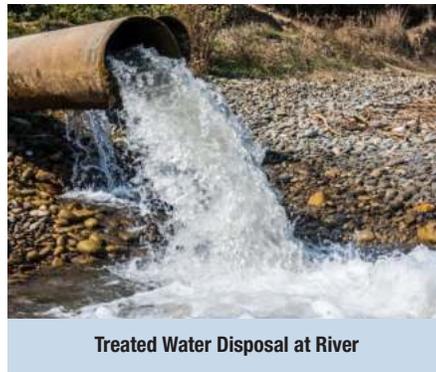
# REDEFINING WASTE: NEW ERA OF WATER REUSE

The freshwater supply on Earth is extremely limited, constituting only about 1% of the total water resources. In India, which holds approximately 4% of the world's freshwater resources, this scarcity is further exacerbated by the fact that the country supports about 18% of the global population. As a result, many regions in India experience significant water stress. If we see the consumption pattern, the agriculture sector is the primary consumer of water, utilizing nearly 85% of extracted surface and groundwater. Domestic use accounts for 7%, while industrial and commercial activities consume the remaining 8%.

Despite progress, there are still challenges in providing universal access to clean drinking water. Currently, around 75% of rural households have access to drinking water facilities due to mission mode efforts put forward under the JJM projects. But a substantial number still lack tap water connections in rural India. Urban areas, too, face challenges in ensuring continuous, high-quality water supply with equitable distribution.

Rapid urbanization and industrialization have significantly increased the generation of wastewater. Indian cities now produce over 72 billion litres of sewage daily, in addition to the effluents discharged by industries. Unfortunately, only less than 40% of municipal wastewater is treated before being released into the environment, with industrial wastewater treatment rates also falling short.

To address this critical issue, the government has launched several initiatives, including the National Mission for Clean Ganga and the Atal Mission for Rejuvenation and Urban Transformation (AMRUT). These programs, supported by private sector investments, aim to develop and expand wastewater treatment infrastructure and sewerage networks across the country. By accelerating the implementation of these projects, India seeks to significantly enhance its wastewater collection and treatment capacity over the coming decade, thereby contributing to sustainable water management and



Treated Water Disposal at River

improved public health outcomes.

## MUNICIPAL INITIATIVES FOR SUSTAINABILITY

The increasing demand for water in urban areas has placed significant pressure on water utilities and urban local bodies. With ever increasing demands and declining supply, these bodies are adopting more sustainable methods for long-term water management. In November 2022, the Ministry of Jal Shakti, in collaboration with the European Union, formulated the National Framework on Safe Reuse of Treated Water. This framework sets ambitious targets for all states:

- 100% collection of used water
- 100% treatment of collected water
- 50% safe reuse of treated water by 2025
- 100% safe reuse of treated water by 2030 (where STPs are operational and collection and treatment capacity exists)

Several Indian cities faced with daunting task of making water provision for the residents are implementing remedial initiatives to augment their water resources. Some of the example could be found in Chennai, which is developing projects to ensure an optimal supply of recycled drinking water designed to bridge the gap in the city's water requirements. In Delhi, the Delhi Jal Board (DJB) is focusing on water reuse, developing a plant with 2 million gallons per day recycling capacity at its Bawana water treatment

plant. This project, aims to meet the city's future water demands and ease the stress people face especially during summers.

The Aurangabad Municipal Corporation in Maharashtra has prepared a detailed project report for reusing treated water from their three STPs at Kanchanwadi (161 MLD), JhaltaPhata (35 MLD), and Padegaon (10 MLD) to augment city's water supply. The Aurangabad Smart City Development Corporation Limited is also promoting the reuse of 90% of water from STPs.

The state government in Goa has developed a plan to reuse treated water from STPs to reduce the burden on existing water sources. The necessary infrastructure and facilities are expected to be developed at the Vasco STP to provide 2 to 3 MLD of treated water to the Mormugao Port Authority and Zuari Industrial Estate, in addition to the domestic use.

These initiatives demonstrate a growing commitment across various municipal bodies to implement sustainable water management practices. By focusing on the collection, treatment, and reuse of wastewater, cities are working towards reducing their reliance on freshwater sources and improving overall water security.

Water reuse projects have the potential to significantly alleviate the stress on existing resources. By treating and recycling wastewater for various non-potable uses, such as irrigation, industrial processes, and even groundwater recharge, these projects can reduce the demand for fresh water

The success of water reuse projects depends on various critical factors:

- Effective implementation and maintenance of treatment facilities
- Public awareness and acceptance of treated water reuse

- Continuous monitoring and rigorous quality control measures
- Integration of these initiatives with broader urban water management strategies
- Regulatory support and clear guidelines for water reuse applications
- Financial viability and cost-effectiveness of treatment technologies
- Adequate infrastructure for distribution of reclaimed water
- Ongoing research and development to improve treatment processes
- Skilled workforce in water treatment and reuse technologies
- Collaboration between government agencies, utilities, and stakeholders
- Environmental impact assessments and mitigation strategies
- Energy efficiency in treatment processes to ensure sustainability
- Risk management protocols for potential system failures
- Public-private partnerships to facilitate project implementation
- Long-term planning to accommodate future water demand and climate change impacts

As more cities adopt similar approaches, there is potential for significant improvements in urban water sustainability across India.

**INDUSTRIAL INITIATIVES FOR SUSTAINABILITY**

The volume of water used in industrial processes varies significantly across different sectors and plant operations due to several factors, including input raw materials, manufacturing processes, equipment and technology variations, and the age of the facility. In India, major water-intensive industries include thermal power plants, heavy engineering, textile, pulp and paper, steel, sugar, and fertilizer production. Although water consumption in these industries varies based on their individual processes and water use practices, it is notably higher in thermal power plants, which account for over 80% of industrial water usage, far exceeding other industrial sectors.

The demand for water in industrial use and power generation is increasing rapidly, with the World Bank reporting a growth rate of 42% per annum. With water stress continue to inflict the production facilities, industries such as thermal power, steel, mining, and cement are increasingly turning to recycled water.

Zero-liquid discharge (ZLD) has become a focal point for organizations aiming to reuse water in their

manufacturing processes or within their premises. Industries are installing ZLD plants that employ advanced wastewater treatment methods; including ultrafiltration, reverse osmosis, crystallization, and fractional electro-deionization.



**Wastewater Treatment Facility**

Among the pioneering project utilizing ZLD technology is the Sipat Super Thermal Power Station of the National Thermal Power Corporation (NTPC) in Chhattisgarh. This large-scale, coal-fired power project, with a capacity of 2,980 MW, has implemented ash water recirculation systems that typically recover 70% of ash pond water for reuse. The installation of sewage treatment plants (STPs) and effluent treatment plants (ETPs) has further enhanced the power station's water management capabilities.

Adani Power has also made significant strides in reducing water consumption and achieving ZLD across its plants. By establishing ETPs, implementing water demineralization processes, and harvesting rainwater, the company has achieved noteworthy results. Water consumption at Adani Power's plants in Maithon, Haldia, and Jojobera decreased from 3.5 m<sup>3</sup>/MWh to 2.5 m<sup>3</sup>/MWh.

In urban India, where rapid growth and industrialization have strained water supplies, water reuse projects can contribute to more sustainable urban development by ensuring that water resources are used more efficiently and responsibly.

The steel industry has also embraced ZLD initiatives. The Steel Authority of India's (SAIL) has implemented ZLD at its Bhilai plant using recycled wastewater to clean the plant's filters. Similarly, Tata Steel Mining Limited has developed a 108 million litre per day

(MLD) common effluent treatment plant (CETP) at the Sukinda Chromite Mine, which treats 100% of generated effluent and allows for 90-95% reclamation of recycled treated water.

As these initiatives gain momentum across industries, there is a growing need for robust operations and maintenance (O&M) contractual frameworks to ensure long-term viability and quality assurance. These efforts collectively represent a significant shift towards more sustainable water use in industrial sectors, addressing the pressing issue of water scarcity while promoting environmental responsibility.

**WAY FORWARD**

Urban water management faces significant challenges due to depleting and degrading water sources. The adoption of a circular economy model promoting high-quality treated water reuse is becoming essential. Initiatives like the National Mission for Clean Ganga aim to monetize treated water by selling it to industries.

The government's Water Vision 2047 is expected to contribute significantly to efficient wastewater recycling and reuse. Decentralized wastewater treatment systems offer high potential for accelerating water reuse. For instance, the DJB aims to reach a sewage treatment capacity of 922 MGD by December 2024 and 964.5 MGD by March 2025, according to the latest monthly progress report submitted to the Jal Shakti Ministry.

A modular STP decentralized treatment project, estimated at Rs. 410 crore is sanctioned under the Namami Gange Programme. The partnership with Japan introduces the Johkasou technology, a decentralized wastewater treatment system that treats human waste from flush toilets and domestic wastewater from kitchens, baths, and others, for efficient domestic wastewater management and reuse.



**Wastewater Treatment Plant**

The Government of India, through its National Water Mission (NWM), is committed to conserving water, minimizing wastage, and ensuring more equitable distribution both across and within states. The mission emphasizes integrated water resources development and management as a key strategy for achieving these goals. A central objective of the NWM is to enhance water use efficiency by 20%, a target that requires the active participation of various sectors, including the industrial sector.

Achieving this ambitious goal necessitates a concerted effort from industries to optimize and improve their water use efficiency. By adopting advanced technologies, implementing best practices in water management, and investing in wastewater treatment and recycling, industries can significantly contribute to reducing water consumption. Moreover, public-private partnerships and regulatory frameworks encouraging sustainable water practices are essential for driving the necessary changes across all sectors.

The success of these initiatives will not only help in addressing India's water scarcity challenges but also promote sustainable development, ensuring that the country's water resources are managed responsibly for future generations.

**ABOUT THE AUTHOR**



With a doctorate in media and over 28 years of professional experience, he has been deeply involved in the water sector, advising several leading water companies across India. As the Chief Strategist at TS Advisory Services, he plays a pivotal role in developing, evaluating, and defining business strategies and implementation plans for various industries.

**Tariq Siddiqui**  
Chief Strategist, TS Advisory Services



*Customized Webinar With B2B Meetings*

**LET'S CONNECT DIGITALLY VIA WEBINAR**

**REGISTER NOW**

More Information  
**+91 85889 11033**

For case study submission, write us at  
[enquiry@eawater.com](mailto:enquiry@eawater.com)

Visit Now:  
[www.eawater.com](http://www.eawater.com)