



India can learn from other nations where they are recycling and reusing most of the generated wastewater.

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What is the current demand-supply scenario of water in India?

Water is a fundamental requirement of life, commerce and eco system. The current demand-supply trend is tilting towards stressful scenario as major cities in India struggling to handle water crisis. Per capita water availability has reduced by almost 70% in a span of seven decades, from 5,177 cubic meters in 1951 to 1,486 cubic meters in 2021. It is estimated to further decline to 1,191 cubic meters by 2050. With growing population and increased agriculture and commercial activities, the water demand is constantly increasing from 710 billion cubic metres (BCM) in 2010 to predicted 843 BCM by 2025 and 1,180 BCM by 2050. There is serious thinking about exploring technologies to harness fresh water and reuse wastewater by reclamation. The current water demand-supply is under challenge with over 600 million people suffering with acute water shortage in the country.

What are the steps needed to minimise wastage in water distribution and usage?

A considerable amount of water is wasted in distribution system because of leakage pipes,

joints, fittings, water mains etc. India has about 50% distribution losses, roughly estimated to be \$600 million per year in economic terms. Unsustainable use of water by farmers, industries and even the consumers especially in an unmetered water supply, theft through unauthorised connections and other reasons put tremendous pressure on already declining resources.

There are advance technologies to detect water leaks in water pipes. Smart sensors with artificial intelligence (AI) system can easily detect leaks with more than 90% accuracy. Advanced metering infrastructure (AMI) can be a fundamental component to reduce losses in supply network. Technology, smart sensors, valve controls etc. can effectively detect leaks for effective control and preventive maintenance. Best practices from across the globe can be applied to reduce the consumption of fresh water whether it is for irrigation, industries or municipal supply.

What are the major government policies that help in better water infrastructure?

The best thing Government of India has done is integrating various ministries dealing in water and wastewater sectors into one Ministry of Jal Shakti. It has helped in making informed decisions by single authority. Apart from the flagship drinking water supply scheme – Jal Jeevan Mission, government has also initiated a number of water resource and wastewater management programs like smart irrigation, interlinking of rivers, national aquifer mapping, integrated watershed management and rain water harvesting programs with dedicated budgets to address the water scarcity issues by developing better water infrastructure and making clean drinking water available for every households.



What are the steps needed for maximising sewage water recycling for reuse?

Wastewater treatment and reuse approach is being considered as only way to address fresh water challenges in India as the resources vanishing. India can learn from other nations where they are recycling and reusing most of the generated wastewater. United States Environmental Protection Agency (US-EPA) has issued comprehensive guidelines for treatment processes for specific uses, reclaimed water quality limits, monitoring frequencies, and other controls for various water reuse applications. These guidelines could be a valuable resource for Indian water utilities planning for water reclamation and reuse projects.

Traditionally, it is uncommon for drinking water reservoirs to be augmented with reclaimed water. However, this practice has increased in popularity over the last decade and has been successfully implemented in a number of countries including Singapore where 40% of drinking water supply is reclaimed water. India can start with non-potable uses, especially for irrigation purposes that consume over 80% of total fresh water withdrawals. Industries in India have to follow a zero-liquid-discharge policy for circular water recovery and reuse to reduce their consumption of fresh water. There should be clear policy and guidelines for recovery of water from wastewater for all non-potable purposes and gradually increasing the scope of reuse.

What is the trend in seawater desalination in the country?

Advances in seawater desalination globally have sparked interest in India as a potential solution to freshwater shortage. With saline water comprising over 97% of the earth's surface, seawater desalination can be the answer to freshwater scarcity. Tamil Nadu has established the first desalination plant in India in Minjur followed by another one at Nemmeli, both in Chennai. Although seawater desalination offers a potential solution to water shortage in India, but due to high energy cost and other challenges, it has not been a popular choice. Smaller desalination plants are functioning at several places for limited consumption, but broadly it has not been considered for producing bulk water.

Most seawater desalination plants rely on fossil fuel for energy. But as renewable energy technology becomes smarter and cheaper, there is a good chance that we will see more such plants running on wind, solar, or hydropower in the near future.



How feasible is production of potable water by seawater desalination in India? What are the trending technologies?

India is currently experiencing a big water crisis, which is affecting the economy, people's wellbeing, and the ecological state of the country. Seawater desalination being an alternative solution, India can explore the opportunities for having an extensive coastline in several states.

Reverse osmosis is the most effective way to desalinate water and remove excess salts and minerals. Other technology that is in use for desalination includes multi-stage flash distillation where seawater is heated in a vessel and steam is converted into fresh water. The multi effect distillation (MED) process has been used for industrial distillation. The vapour compression (VC) distillation process is generally used for small and medium scale desalting, usually built to produce 20 to 2,000 cubic meter clean water per day. There are other technologies also in use like membrane processes, electrodialysis, electrodialysis reversal process (EDR), and concentrate disposal etc.

What is your outlook on water sustainability in India?

India is facing a difficult freshwater crisis and there is a call for exploring and finding sustainable ways to use water. With several remedial programs launched by the government, it is expected that the situation may not get worse in coming years as there will be latest technology to support the initiatives of groundwater recharge, surface water augmentation, wastewater treatment and reuse and smart water supply and distribution management with other focussed efforts that will yield better results. With advancing technology, we at Aquality Water Solutions Pvt. Ltd. are hopeful for a better water future with increased sustainability.

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