



Beyond the Tap

Confronting the Water Crisis with Smart Solutions

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Smart water technologies offer a critical pathway forward. Tools such as IoT-based monitoring, artificial intelligence, smart metering, leak detection, and solar-powered treatment systems enable efficient water use, reduce losses, and improve reliability and resilience. Wider adoption of such data-driven and sustainable solutions, supported by strong policy and infrastructure investment, is essential to securing long-term, equitable water security.

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The United Nations Water statistics paint a sobering picture; nearly half of the global population already experiences severe water scarcity, while approximately 2.2 billion people lack access to safely managed drinking water. Four out of five people lack basic drinking water services in rural areas. Agriculture sector consumes roughly 70% of global freshwater, whereas in India, it is even over 80%, industrial activities account for another significant portion and domestic use continue to rise as urban population expand.

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The Growing Crisis

According to UNESCO, nearly half of the world's population faces severe water shortages for at least a part of the year. UN-Water reports that about 10% of the global population were living in countries under high to critical water stress. The impact is especially severe in agrarian regions, where 3.2 billion people live in areas experiencing high to very high water shortages, including 1.2 billion people in facing extreme water constraints.

Adding to the concern, renewable water availability per person has fallen by 7% over the past decade, highlighting the increasing pressure on limited freshwater resources.

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This growing water crisis affects different regions in different ways. In parts of the Middle East, North Africa, and South Asia, groundwater is being pumped out much faster than they can naturally recharge. In India, several large rivers are close to drying up due to excessive water extraction. More than 40% of India's population faces severe to extreme water stress, with limited access to safe and reliable water. Rapid urbanisation, rising industrial demand, and climate change are further worsening the situation, making water scarcity one of the most urgent challenges for sustainable development and human well-being.

At the same time, pollution is making the water crisis even worse by turning available water sources unsafe for drinking, irrigation, and industrial use. India generates about ~72,000 million litres of municipal wastewater every day, but treatment facilities exist for only a little over 30% of this volume. As a result, a large amount of untreated sewage flows back into rivers, lakes, and other water bodies, further contaminating water sources and reducing the availability of clean and usable water.

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The implications extend beyond immediate water availability. Water stress triggers food insecurity, economic disruption, health crises, and even tensions as nations and regions compete for shrinking resources. Inter-state river disputes in India, such as those over the Cauvery, Krishna, Ravi, and Beas rivers, are largely driven by uneven water distribution and rising demand. These pressures have led to political tensions between states, resulting in the formation of tribunals to resolve conflicts, allocate water fairly, and ensure long - term water security.

Adoption of Smart Water Technology

As the global attention shifts toward rising water stress, climate change impacts, and ageing infrastructure, the adoption of smart infrastructure and advanced technologies is becoming increasingly essential. Smart water solutions use IoT - enabled sensors, intelligent meters, data analytics, and automated remote-control systems to improve performance and real-time decision making. By delivering real-time data and actionable insights, these technologies enable efficient water use, bolster conservation efforts, reduced losses, and greater resilience against climate - related risks and emergencies.

The global water technology market is a growing at a healthy pace, projected to reach about \$600 billion by 2030, from the current size of \$350 billion. According to GWI Water Data, there are about 20,000 water technology

companies worldwide. Only a small number are large players, with around 2,000 earning over \$10 million, about 300 crossing \$100 million, and just 44 companies generating more than \$1 billion in annual revenue. In India, the \$10 - 11 billion current water technology market is poised to exceed \$18 billion by 2030, driven by scarcity, urbanisation, government initiatives like Jal Jeevan Mission and AMRUT 2.0, and industrial needs for treatment & reuse.

Artificial intelligence is changing the water technology sector in many ways. It helps water companies create smarter and more efficient solutions, while also supporting the growth of new industries like battery metals, silicon wafer manufacturing, and data centres, all of which need advanced water treatment. The influence of AI is so significant that the water sector has not experienced a change of this scale since ages. Advanced data analytics, supported by artificial intelligence, analyse large amounts of data to provide insights. These tools help forecast water demand, predict equipment failures, improve treatment efficiency, and plan maintenance in advance.

IoT - enabled sensors allow real-time monitoring of water systems, identify leaks early, reduce water losses, improve billing accuracy, and ensure a reliable water supply while using energy more efficiently. Smart water meters continuously measure flow, pressure, consumption, and water quality across the network.



Digital twins simulate real - life conditions of assets such as treatment plants and distribution networks, allowing utilities to test different scenarios, improve designs, and evaluate changes before implementing them on the ground. SCADA systems enable centralised monitoring and remote control of treatment plants, pumping stations, and networks, helping operators respond quickly to faults, reduce downtime, and improve safety and reliability.

Smart leak detection systems use sensors, acoustic tools, and analytics to quickly find leaks and pipe bursts. When combined with pressure management, they help cut water losses, protect pipelines, and extend the life of infrastructure. Smart water quality systems continuously monitor key parameters such as pH, turbidity, chlorine levels, and contaminants to ensure safe and compliant water supply.

Integrating solar energy into water treatment systems is emerging as a sustainable and cost-effective solution to address rising energy costs, reducing carbon emission, supporting with clean water availability especially in remote and water - stressed regions. Solar-powered water treatment plants use photovoltaic systems to run pumps, filtration units, and disinfection processes, reducing dependence on grid electricity and fossil fuels and ensures reliable water supply even in areas with unstable or no power access.

Aquality Intelligent Solutions is actively supporting the integration of solar energy into water treatment systems by designing and deploying solar - powered water purification and filtration solutions tailored for both rural

and remote locations. The company focuses on energy - efficient systems that combine advanced treatment technologies with solar power to deliver safe drinking water with minimal operating costs. By integrating smart monitoring, low - maintenance designs, and renewable energy, Aquality Intelligent Solutions is helping communities, industries, and security forces achieve sustainable, reliable, and climate-resilient clean water solutions at scale.

Way Forward

Without coordinated action through better water management, wider adoption of conservation technologies, infrastructure investment, and supportive policies, the growing risks of water scarcity will continue to intensify. At the same time, promising advances in smart agriculture, artificial intelligence, real-time monitoring, and predictive water management offer practical solutions. Every drop of water matters, especially in agriculture, where the challenge is to use less water while maintaining the same level of productivity. With the smart use of data and AI - driven tools, it is possible to improve efficiency, conserve water, and secure a more sustainable and equitable water future.

About the Author



Mohammed Naser Azeez, Managing Director of Aquality Intelligent Solutions is a leader in innovative water management, guiding the ISO 9001:2015 certified company to the forefront of advanced water treatment solutions. His vision goes beyond conventional approaches, combining technology and renewable energy with a strong commitment to social responsibility to deliver clean and safe drinking water. By focusing on community well - being and sustainable impact, he is redefining water treatment as a powerful tool for improving quality of life and addressing critical water challenges.