



FROM 'DAY ZERO' TO DATA-DRIVEN: RETHINKING INDIA'S WATER FUTURE IN A CLIMATE-STRESSED WORLD

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In 2018, the Government of India's think tank, Niti Aayog, warned that 21 Indian cities, including Delhi, Chennai, Bengaluru and Hyderabad, could run out of groundwater. A grave situation which would impact nearly 100 million people. As the climate-stressed world would have it, what appeared as alarmist now seems prescient. From Chennai's nearabout 'Day Zero' crises in 2019 to the water supply disruption that keeps being reported in the country's capital, India's urban water challenge is no longer episodic, but a structural issue.

However, India is not the sole country facing such a threatening issue. According to the UNESCO World Water Development Report 2023, 2-3 billion people globally experience water scarcity for at least one month each year, and the situation is expected to intensify significantly by 2050. To further worsen matters, the World Resources Institute's Aqueduct Water Risk Atlas identifies cities like Delhi, Chennai, and Hyderabad among the most water-stressed globally.

Is Digital the Solution for Water Management?

To be able to address this imbalance requires more than just capacity expansion; it demands intelligence. With time, cities and industries are turning to digital solutions to transform water management.

IoT-enabled sensors, smart meters and real-time monitoring systems help utilities track flow rates, detect leaks, and improve consumption patterns. Predictive algorithms can help in forecasting demand, allowing utilities to allocate resources dynamically & efficiently. Such a shift towards data-driven models will transform the water infrastructure into responsive ecosystems. More than improving efficiency & productivity, this shift will introduce transparency & accountability, which are two crucial

components of good governance in urban utilities.

Rise of Circular Water Systems

At this point, perhaps the most significant transition in progress is the shift from a linear to a circular water economy. India's traditional "extract-use-discharge" model is increasingly untenable in a resource-constrained future. A report mentioned that India supports 18% of the world's population with just 4% of global freshwater resources. It is this kind of an imbalance in the system that makes the reuse of water not only desirable but of great importance.

Decentralized wastewater treatment plants have now become more common in residential areas, commercial sites, and industries. MBR and RO can achieve very good quality water that can be used for cooling purposes and landscape irrigation.

As has been brought to light several times prior to these in many studies, India is already the fifth-largest wastewater treatment market globally, presenting a significant opportunity to scale circular water solutions. The shift is evident; wastewater is no longer being treated as a liability, but is now an asset.

Integrated Systems for Complex Urban Ecosystems

Modern infrastructure in modern cities, whether it be metros, airports or even data centers, requires integrated water solutions. This kind of system refers to an integrated and holistic approach for managing water resources, where surface water, groundwater, stormwater, and wastewater are considered together as one system rather than separate components. This is a very doable factor, considering implementation through separate vendors leads to multiple problems.

The future is reliant on end-to-end water

management systems that integrate treatment, distribution, wastewater recovery, and long-term operations and maintenance (O&M). Integrated approaches such as these not only improve lifecycle efficiency but also enable the seamless adoption of digital tools.

This is important as urban infrastructure is becoming more complex and interdependent and requires a more solidified approach and coordination across water, energy and built environments.

Electronics, Semiconductors and Data Centres: The Next Water-Energy Nexus

As electronics manufacturing, semiconductor fabs and data centres scale up across India, industrial water demand is rising sharply. It is further intensifying pressure on already stressed urban ecosystems. These facilities also require uninterrupted power and advanced cooling, making integrated infrastructure critical.

UMPEL brings a unified MEP, Water and Power capability to address this complexity. By engineering water, energy and mechanical systems as one ecosystem, UMPEL delivers reliable, efficient and sustainable infrastructure for mission-critical environments, from advanced water treatment and reuse to robust power and cooling systems, across the full lifecycle.

Crisis to Capability

With urban water demand projected to double by 2030 the need for smarter systems, integrated infrastructure, and circular solutions is greater. The transition from "Day Zero" scenarios to data-driven resilience will define how effectively cities respond to this shift. In a climate-stressed world, the future of urban India will depend how intelligently water is managed.