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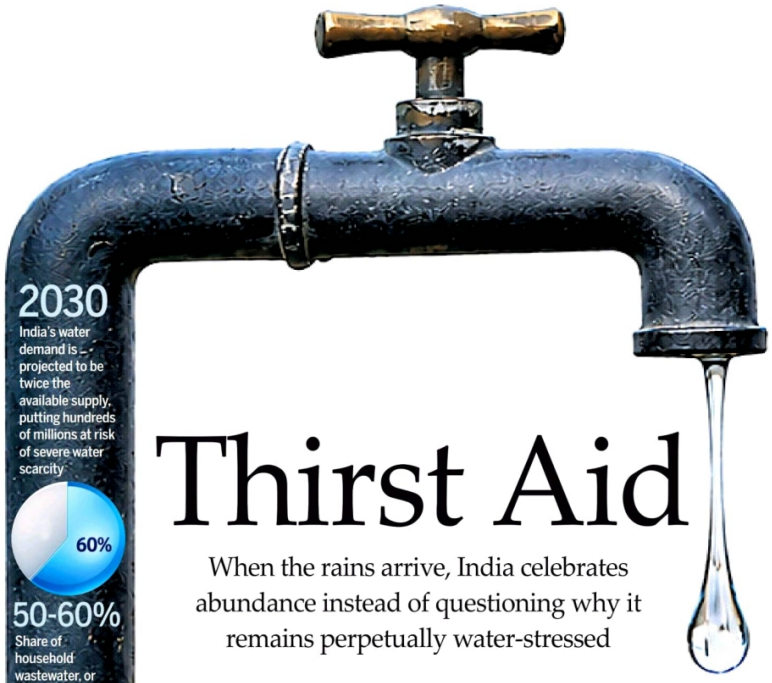

Thirst Aid

When the rains arrive, India celebrates abundance instead of questioning why it remains perpetually water-stressed

By **TEJ PRAKASH BHARDWAJ**

India's water crisis is a paradox of abundance: the country receives roughly 4,000 billion cubic metres of rainfall annually, yet captures barely eight per cent of it. Mumbai can flood in July and face water rationing by October, while Bengaluru gets around 970 mm of rain a year, and yet has a groundwater deficit of nearly 500 million litres a day. The waste extends to greywater, which makes up 50-60 per cent of household wastewater; a family of four generates around 360 litres daily, amounting to more than 31 billion litres nationwide each day. Yet India treats only 28 per cent of its wastewater, leaving 72 per cent to pollute rivers, lakes and groundwater. Major cities face daily shortfalls: 250-300 million litres in Mumbai, 1,300 million litres in Delhi, 680 million litres in Hyderabad, and 200-250 million litres in Chennai. Chennai perhaps best captures the contradiction: after catastrophic floods in 2015, its four main reservoirs—Poondi, Cholavaram, Puzhal and Chembarambakkam—were nearly dry three years later following a deficient monsoon, pushing the city towards "Day Zero". The problem, then, is less a lack of water than more a failure of design. Solutions already exist—proven, practical and often remarkably simple—but many remain forgotten, overlooked or waiting to be scaled.

Women and children wait in a long queue to collect water in a parched region

2030
India's water demand is projected to be twice the available supply, putting hundreds of millions at risk of severe water scarcity

50-60%
Share of household wastewater, or greywater, and can be safely reused after simple treatment

28%
India's wastewater that is treated; the remaining 72% flows untreated into rivers, lakes and land, polluting freshwater sources

billion litres of Greywater generated across India every day

80%
Share of STP-treated water that is still discharged because its reuse is largely restricted to gardening and flushing

360 litres
Greywater generated every day by a four-member household—roughly 90 litres per person

85%
Share of rural drinking water that depends on groundwater, compared with about 45% of urban water supply

While governments flounder, funds are either pilfered or left unused, and politicians make pretty speeches, a massive but largely unnoticed movement in water conservation is already under way. Across the country, individuals, communities, institutions and innovators are quietly demonstrating that the water crisis need not be inevitable. They are harvesting rain, recycling wastewater, restoring lakes, reviving traditional systems and finding ways to make every drop go further.

Pune-based Jalconserve Technologies, for instance, designs compact greywater-recycling systems for homes, apartment complexes, schools and institutions. Its modular units treat wastewater from showers, wash basins and laundry so it can be reused for gardening, toilet flushing and landscaping. This reduces dependence on freshwater supplies while easing the burden on municipal sewage networks.

More than governments and large departments, it is often individuals who find solutions in a crisis. Take Aadya Kanchan, who grew up in a condominium in Bengaluru. Every summer, as the taps ran dry, she watched endless queues of water tankers arrive at her complex. At just 16, she developed NIRI, a compact device that tracks household water consumption in real time and alerts users to overuse and leaks.

What makes the innovation remarkable is that it puts sophisticated water-management technology—something typically associated with engineers and large utilities—within the reach of an ordinary household. Its concept is almost disarmingly simple: make water visible. Kanchan reasoned that what cannot be measured is rarely valued, and that real-time information about consumption could nudge people to change their behaviour. It did.

By turning invisible consumption into measurable data, NIRI allows households to identify waste and act before scarcity becomes a crisis.

WeGoT Utility Solutions in Chennai is replicating that idea on a much larger scale. The company installs ultrasonic sensors in apartment complexes, office parks and industrial campuses, enabling residents and facility managers to monitor water consumption in real time, detect leaks and identify unusual usage patterns before they result in significant losses.

"Once you have data, you can understand where water is being used, where it is being wasted and where intervention is needed," says Sirisha Sumanth, co-founder of WeGoT Utility Solutions.

Communities using the software typically reduce their water consumption by 20-30 per cent, while commercial and industrial campuses report savings of up to 30-40 per cent. Much of this comes from plugging leaks and changing consumption behaviour rather than restricting use.

"Think of electricity. Everybody pays for what they consume. Water is traditionally not treated the same way. Once people can see how much they are using and paying for what they use, their behaviour begins to change," she adds.

Boson Whitewater, co-founded by Vikas Brahmavar and Gowthaman Desingh, treats sewage-treatment-plant (STP) wastewater to potable standards using advanced filtration, disinfection and AI-powered monitoring. The water is recovered from apartment complexes, IT parks and commercial campuses, where it would otherwise be used for flushing or gardening. "The biggest hurdle is public perception," says Desingh. "Apartments don't use treated water for drinking because of perception, not safety."

That logic extends to the way buildings themselves are designed. Architect Sanjay Jain, renowned for climate-adapted architectural design, puts it plainly: "Water conservation isn't a bolt-on solution. It requires planning the entire infrastructure at the design stage." Dikshu Kukreja of CP Kukreja Architects echoes the harder truth: "Sustainability is still treated as an add-on rather than a design requirement from the beginning."

Former marine chief engineer Anjan Mukherjee takes the principle of working with existing infrastructure even further. His Maji Reactor, a palm-sized device that fits into standard hand pumps, purifies groundwater at its source using cavitation—millions of microscopic bubbles that collapse with enough force to destroy disease-causing microbes. Requiring no electricity, chemicals or consumables, the technology has eliminated more than 99 per cent of harmful microbes across several states. "It is not a filter," Mukherjee explains, "but a technology that puts science to good use."

The elegance of the Maji Reactor lies in its modesty: rather than replacing existing infrastructure, it makes it work better. That philosophy of integration, rather than replacement, distinguishes much of the current wave of water innovation. The most effective solutions are not necessarily those that demand entirely new systems, but those that can slip into the ones already in place—and make them smarter, more efficient and more resilient.

If technology solves half the problem, culture and design can solve the other. Urban designer Manushi Ashok Jain, co-founder of Sponge Collaborative, traces the crisis to the way cities are engineered. "We have engineered cities to expel rainwater as quickly as possible. What if we designed them to hold and absorb water instead?"

Chennai's first sponge park puts this idea into practice. Inspired by China's Sponge City programme, they function as artificial wetlands, slowing, storing and filtering stormwater instead of channelling it into drains. At the MS Swaminathan Eco Park, an asphalt lot has been transformed into wetlands, shallow ponds and permeable landscapes designed to manage 90 per cent of incoming stormwater while storing millions of litres underground. "Cities don't have to choose between flooding and running out of water," says Jain.

In Bengaluru, scientist AR Shivakumar has not paid a municipal water bill since 1995. His house runs on rainwater collected and stored in 45,000-litre tanks. His calculation is simple: every millimetre of rain falling on a square metre produces roughly a litre of water. A two-by-three-metre balcony can therefore collect about 120 litres during a 20 mm shower. With a food-grade drum, mesh, tap and stand, a basic system costs just ₹1,200-2,000.

Individually, such interventions may seem modest, but multiplied across thousands of homes, they could reshape the city's water equation.

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THE REVIVALIST Rajendra Singh—the "Waterman of India"—revived the *johad*, a simple earthen check dam, in Rajasthan's Alwar district in the mid-1980s

RAIN CATCHER Scientist AR Shivakumar's house runs on rainwater collected and stored in 45,000-litre tanks

AIR HARVESTER Swapnil Shrivastava's Uravu Labs extracts drinking water directly from the atmosphere