

Water Infrastructure: Challenges and Remedies for a Sustainable Future



Urban areas worldwide are grappling with a pressing issue: the sustainable management of their water supply. Over the past 20 years, more than 80 major metropolitan areas have faced severe drought and water scarcity, with some of the largest cities experiencing reduced water availability. Unfortunately, this trend is expected to continue, with urban water crises becoming increasingly common. Alarming projections suggest that more than one billion urban residents may soon be facing acute water shortages, highlighting the urgent need for sustainable solutions to this critical challenge.

In India, Niti Aayog's studies emphasize the severity of the issue, revealing that over 600 million people face severe to extreme water scarcity. This scarcity stems from various factors, including population growth, increasing water demand, unsustainable management practices, and climate change impacts. Additionally, 21 major Indian cities including Delhi, Chennai, Ahmedabad, and Hyderabad, are expected to experience extreme water shortages due to rapid urbanization, inadequate infrastructure, and limited water resources.

To combat the challenges posed by water scarcity and resource depletion, India must take immediate and comprehensive action. The government has initiated a series of measures aimed at mitigating water shortages and promoting sustainable water management. These actions include encouraging water conservation practices, regulating groundwater extraction and promoting recharge, enacting and enforcing water-related policies and regulations, strengthening water governance mechanisms, conducting public awareness



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campaigns, upgrading water supply infrastructure, improving distribution networks, and investing in efficient water management systems.

Infrastructure Conundrum

While significant efforts have been made to develop rural water supply infrastructure through initiatives like the Jal Jeevan Mission, addressing urban water challenges necessitates focussed attention and collective action. By implementing sustainable water management practices and investing in water infrastructure, India can effectively alleviate water shortages and ensure access to clean and reliable water for its population.

Water being the harbinger of human, social and economic growth, India's aging water infrastructure poses significant challenges. Major cities in the country are grappling with out-dated and deteriorating water infrastructure systems, which have adverse effects on water supply, sanitation, and overall public health. Aging water infrastructure in India presents significant challenges as many of the existing water supply systems have surpassed their intended lifespan. Mostly build decades ago for limited load keeping capacities, they are functioning on the borrowed time.

Some of the key challenges associated with aging water infrastructure:

- **Deterioration and Breakdown:** The aging water infrastructure is more prone to deterioration, leaks, and system failures. Pipes, pumps, treatment plants, and storage facilities are suffering from corrosion, wear and tear, and structural weaknesses, leading to reduced

system efficiency and increased maintenance cost.

- **Leakage and Water Loss:** India finds itself facing a grave issue as substantial water losses occur due to leaks and pipe failures. In a disheartening revelation by Global Water Intelligence, India ranks at the bottom among the world's top 40 water markets, with a staggering 50 percent of water losses. Surprisingly, this figure surpasses that of certain African nations, despite their limited resources. These losses not only waste a precious resource but also strain water supply systems, leading to inadequate supply, reduced system reliability, and increased operational costs. Addressing this critical issue is of utmost importance to ensure the efficient management and conservation of water resources in India.

- **Service Disruptions and Outages:** Aging infrastructure is prone to frequent breakdowns and supply disruptions, severely impacting daily activities, businesses, and public health.

- **Inadequate Capacity and Growing Demand:** Population growth and urbanization have increased water demand, surpassing the capacity of aging infrastructure to meet the growing needs. Water utilities are struggling to cope with the escalating demand, resulting in a growing disparity between supply and the needs of expanding service network in cities.

- **Financial and Maintenance Challenges:** Upgrading and maintaining aging infrastructure require substantial investments. However, many water utilities in India face financial constraints, making it difficult to allocate sufficient resources for upgrades, maintenance, and repairs. This perpetuates the vicious cycle of deteriorating infrastructure and further exacerbates the existing challenges.

- **Health and Environmental Risks:** Aging infrastructure compromises water quality due to leaks and rusted pipes, potentially leading to the presence of harmful substances in drinking water. Inadequate wastewater management also results in increasing pollution of water bodies and environmental degradation. As per estimates, only 30 percent of the generated urban sewage is treated before disposing it while remaining 70 percent sewage is discharged into water bodies without any treatment.

India, along with several other developing countries, faces the issue of legacy water supply systems that were initially designed during the British rule or after independence to serve smaller populations or less urbanized areas. With rapid urban expansion and accelerated population growth, these systems are struggling to cope with the heightened demand for water, resulting in insufficient capacity and frequent service disruptions.



Measures to Address Infrastructure Challenges

India must prioritize investments in upgrading and modernizing water infrastructure to address these challenges effectively. Key measures that can be taken include:

- **Conducting comprehensive assessments:** Carry out thorough evaluations of existing infrastructure to identify areas that require immediate attention. Prioritize upgrades based on the assessment results to address critical needs.
- **Implementing regular inspection and maintenance programs:** Establish routine inspection and maintenance protocols to address issues such as leaks, corrosion, and equipment failures promptly. Timely maintenance helps ensure optimal system performance and prolongs the lifespan of infrastructure.
- **Embracing Innovation:** Revolutionizing water management through smart solutions and cutting-edge technologies encourage the adoption of advanced technologies for smart water management like advanced metering systems, real-time monitoring, IoT and data analytics, pump optimization to improve operations and system performance. Implementing leak detection technologies can help minimize water loss and enhance efficiency. By adopting innovative technologies and smart solutions, India can revolutionize its approach to water conservation and supply.
- **Integrated Water Management:** Adopt an integrated approach to water management that encompasses the entire water cycle. This includes water supply, distribution, conservation, wastewater treatment and reuse. By considering the holistic picture, water resources can be utilized efficiently, and risks associated with water can be minimized.
- **Enhancing financial planning and investment mechanisms:** Develop robust financial planning strategies and sustainable funding mechanisms to ensure adequate resources are available for infrastructure upgrades and on-going maintenance. This may include exploring options such as public-private partnerships, loans, grants, and revenue generation through tariffs or user fees.

- **Strengthening institutional capacity and coordination:** Enhance the capabilities of government agencies, water utilities, and other stakeholders involved in water infrastructure management. Improve coordination and cooperation among these entities to streamline decision-making processes, share resources, and exchange knowledge.
- **Public-Private Partnerships:** Collaborate with the private sector to leverage their expertise, resources, and innovative solutions in developing and maintaining water infrastructure. Public-private partnerships can expedite infrastructure development, ensure efficient operations, and allocate risks and responsibilities effectively.

Way Forward

By implementing these measures, India can work towards upgrading and modernizing its water infrastructure, ensuring access to clean and reliable water for its population. This not only addresses immediate challenges but also contributes to long-term sustainable development, stimulates economic activity, and creates employment opportunities. Investing in resilient and technologically advanced water infrastructure is crucial for India's journey towards becoming a \$5 trillion economy while safeguarding its economic growth and providing equitable access to water for its citizens.

Author profile: With a distinguished background in media, he is a seasoned professional who has dedicated a significant portion of his career to the water sector. His expertise has been sought after by prominent water companies in India, where he provides valuable advice and guidance.

As the Chief Strategist at TS Advisory Services, he has played a pivotal role in developing, evaluating, and defining marketing and communication strategies across various industries. His extensive knowledge and strategic acumen have proven instrumental in driving growth and success in the ever-evolving landscape of the water sector.