WATER INFRASTRUCTURE: REVITALIZE FOR SUSTAINABILITY

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Mr. Subhash Sethi is the Chairman of SPML Infra Limited, a listed infrastructure development company in India. In the past four decades, he worked with a mission to create sustainable water infrastructure for providing drinking water facilities to people of the country. Under his dynamic leadership, his company established itself as a leading water management company and executed more than 650 projects making provision for clean drinking water facility for 50 million people. His nation building initiatives has been recognized with several prestigious awards.

India, a nation with its rich historical and cultural heritage has been witnessing rapid economic growth in the last few decades. With a population of over 1435 million and growing urbanization, it is facing an increasingly critical challenge – managing its water resources effectively. The demand for clean water is surging, while challenges of water pollution are on the rise.

With its vast and diverse geographical landscape, India is facing significant challenges of depletion of water resources that further intensified by the impacts of climate change. These factors collectively strain India's water infrastructure. In recent years, there has been an increasing acknowledgment of the need for extensive water infrastructure development. This is crucial not only to secure the nation's water resources but also to foster economic growth and enhance the overall well–being of its citizens.

Water Infrastructure Challenges

India's current water infrastructure faces numerous challenges, including aging and obsolete systems, inefficient water distribution, unequal access to water sources, and insufficient storage facilities. The country's diverse and unpredictable climate conditions present hidden challenges, leading to weather–related disasters such as severe floods and droughts that induce hydrological shocks. The varied geographical spread of India adds extra complexity to effective water resource management.

The issue further aggravates by unequal access to clean water, especially in rural areas. As the demand for water rises in agriculture, industry, and households, there is an urgent and growing need for modern, sustainable water infrastructure.

Groundwater Depletion: Groundwater is vital to human welfare and development, and in many countries it is the principal source of water for drinking, irrigation and industries. With the world's largest population and extensive agricultural practices, India is the foremost consumer of freshwater globally and the largest user of groundwater. The country utilizes an estimated 230 cubic kilometers of groundwater annually, constituting over 25% of the world's total withdrawal. In India, more than 60% of irrigated agriculture and 85% of drinking water supplies depend on groundwater.

Approximately 65% of India's overall water demand is satisfied through groundwater sources, crucial in shaping the nation's economic and social progress. As the demand for water continues to rise and existing resources face depletion, ensuring a reliable supply of quality water has emerged as a pressing concern in the country. Excessive reliance on groundwater for domestic, agricultural, and industrial needs has also led to the depletion of aquifers. The over–extraction of groundwater in India also raises the long–term sustainability concerns.

Losses in Water Distribution: Water produced, treated, pumped, but lost in the water distribution system is a major challenge. This means the water produced by spending substantial resources are not used for the purpose and paid back, affecting economies of water utilities as well as putting pressure on fresh water resources. The problem is universal, but India, with such a large water network is losing almost 50% of produced water across cities distribution networks. In terms of quantity, this translates to a loss of 3.4 trillion litres of treated water annually. Outdated water distribution systems and leakages in pipelines results in significant water losses

Public awareness campaigns are essential to educate and engage citizens about the importance of water conservation and empowering them to take ownership and responsibility for their water resources.

Gagreen Water Supply Scheme, Rajasthan

The JJM was launched in 2019, envisages providing tap water connections to every household by 2024.

across Indian cities with varying quantities. Improving the efficiency of water supply network is essential to conserve this precious resource.

SPML Infra strongly focuses on strengthening the existing system with innovation and technology while dealing with water loss management. It has demonstrated the efficacy of strategic techniques and targeted efforts by successfully implementing a water loss project in Bengaluru. This initiative has resulted in a significant conservation of precious resources, saving a minimum of 55 million liters of potable water daily. Moreover, the water loss in the selected 43 DMAs has seen a substantial reduction from 53% to 18%, underscoring the positive impact of SPML Infra's approach.

Urbanization Strain: Rapid urbanization has led to increased water demand in urban areas, putting severe stress on existing water infrastructure and supply systems. The past few decades, there has been a significant trend as people progressively migrated from rural to urban areas in pursuit of an enhanced standard of living and improved quality of life. Currently, more than 34% of the population resides in urban settlements, and this figure is projected to rise to 60% by 2050.

Raw Water Reservoir, Dhannasar, Rajasthan

The rapid growth of urban population, coupled with the expanding middle class has led to an increased demand for water. However, the inadequate and aging water infrastructure has exacerbated the strain on water supply systems.

Apart from the above, there are other challenges including agricultural water management, water pollution, inadequate wastewater treatment and lack of integrated water management practices. But ageing and dilapidated water infrastructure is at the root of them all.

Water sector in India is facing the dire need to address these challenges and revamping of infrastructure on priority for social, economic and environmental implications. It requires a comprehensive and multifaceted approach with following key strategies that can be employed to address water infrastructure conundrum.

Modernizing Water Supply Systems: Upgrade and modernize water supply infrastructure in urban and rural areas to effectively take the load of increasing demand, reduce water loss, and ensure a continuous, reliable water supply.

Capacity Building: Developing skills and knowledge through regular training of water infrastructure professionals to enable them to design, build, and maintain water systems effectively.

Harnessing Technology: Implementing smart water management technologies for efficient monitoring, data collection and distribution of resources that has the potential for enhanced operational resiliency.

Investment in Modern Infrastructure: Innovative financing mechanisms, such as public–private partnerships and bilateral funding can help mobilize resources to fund water infrastructure projects. It is essential to improve and upgrade water supply and distribution systems along with wastewater treatment and storm water management facilities and infrastructure. Investing in state–of–the–art technologies and modern infrastructure is pivotal for enhancing efficiency and minimizing losses for better water sustainability.

Climate–Resilient Infrastructure: Considering the impact of climate change, it is essential for India to design and build infrastructure that can withstand extreme weather events, such as floods, hurricanes and droughts. Climate–resilient infrastructure ensures long–term functionality and adaptability.

Policy Reforms: It is vital to establish and enforce policies that promote sustainable water management. Governments should enact and enforce policies that include regulations on groundwater extraction, water quality standards, and strict norms for water pollution as well as pricing guidelines. Clear and transparent policies and regulatory framework is essential for the development of water infrastructure.

Promoting Water Conservation: Public awareness campaigns are essential to educate and engage citizens about the importance of water

Water Treatment Plant, Rajasthan

conservation and empowering them to take ownership and responsibility for their water resources.

These strategies, if implemented with sincerity can work towards creating resilient, sustainable, and equitable water infrastructure systems in India that will be able to meet the current and future growing water needs for drinking and industrial production.

Government Initiatives:

In view of the challenges water sector is facing, Government of India has acknowledged the crucial role of water infrastructure and has undertaken various initiatives to tackle these challenges. In the past, water–related matters were handled by nearly nine different ministries. The present government has integrated the work of these various ministries and brought them under one Ministry of Jal Shakti. Hon'ble Prime Minister has also set a revolutionary goal of providing piped drinking water to all households both in urban and rural India under the ambitious Jal Jeevan Mission (JJM) with a huge outlay of Rs. 6.47 lakh crore. The JJM was launched in 2019, envisages providing tap water connections to every household by 2024. This ambitious project focuses on decentralized, demand–driven, and community–managed water supply systems. SPML Infra has emerged as a reliable partner for the Jal Jeevan Mission, actively undertaking various water supply projects across several states in India. Through these initiatives, the company is contributing to the accessibility of clean drinking water facilities for rural households.

Urban areas have also seen a push for improved water infrastructure through initiatives like the Atal Mission for Rejuvenation and Urban Transformation (AMRUT) and the Smart Cities Mission. These programs aim to enhance water supply, sewage management, and storm water drainage in urban centres.

During the period of 2019 to 2025, a total capital investment of Rs. 4 lac crore has been planned for the water sector under the National Infrastructure Pipeline. The government has also been laying emphasis on capacity building and infrastructure development through program such as Namami Gange and Swachh Bharat apart from AMRUT and Smart Cities. Along with water supply schemes, the government has also initiated a number of water resource management, wastewater treatment, irrigation and rain water harvesting programs with dedicated budgets to address water scarcity challenges and making water resilient and sustainable for our future. These initiatives will play a big role in economic and social development and realise the target of making India a 5 trillion–dollar economy.