WATER INFRASTRUCTURE – NEED OF EFFICIENCY

By Subhash Sethi

Introduction

Water is most essential element among all to sustain human, animal and plant life on the planet. Water is needed for everything – to ensure food security, feed livestock, maintain aquatic & organic life, take up industrial production and to conserve the biodiversity and environment along with all other human activities.

Water is also essential for economic development. Recent studies indicate that poor rural families can double their income if they have access to their own water sources and the low–cost irrigation technologies can triple the annual profits of the farmers. Hence, there is no life without water. However, with the uncontrolled use and increasing demand, due to growing population and unsustainable lifestyle, many countries are now facing severe water crisis. Water can no longer be taken for granted as an inexhaustible resource. There is an imminent crisis approaching and we need to be mindful of it. The United Nations estimates that 2.1 billion people, or 28% of the global population currently lacks access to safe drinking water and the number are likely to increase with an exploding population, climate change, global conflicts and drying up of water resources. It is estimated that by the time we reach the year 2050, water scarcity will affect more than 50% of the population or about 5 billion people on earth. In the absence of suitable corrective measures, many developing countries, including India will have to face the crisis of food and water security in the near future.

Traditionally, India has been a water rich country with ample amount of available water. But as the climate becomes increasingly unpredictable combined with a growing population, changing food habits, old agriculture pattern, severe neglect and over–exploitation of resources, water is gradually becoming a scarce commodity. With the world's second largest population at 1.37 billion currently and UN projection is that India will become the most populous by 2024 and continue growing for years to reach 1.8 billion by 2050 and mammoth 2.5 billion by 2100. India will find it very difficult to serve the vast majority of that populace with safe, clean water. India is more vulnerable because of the growing population

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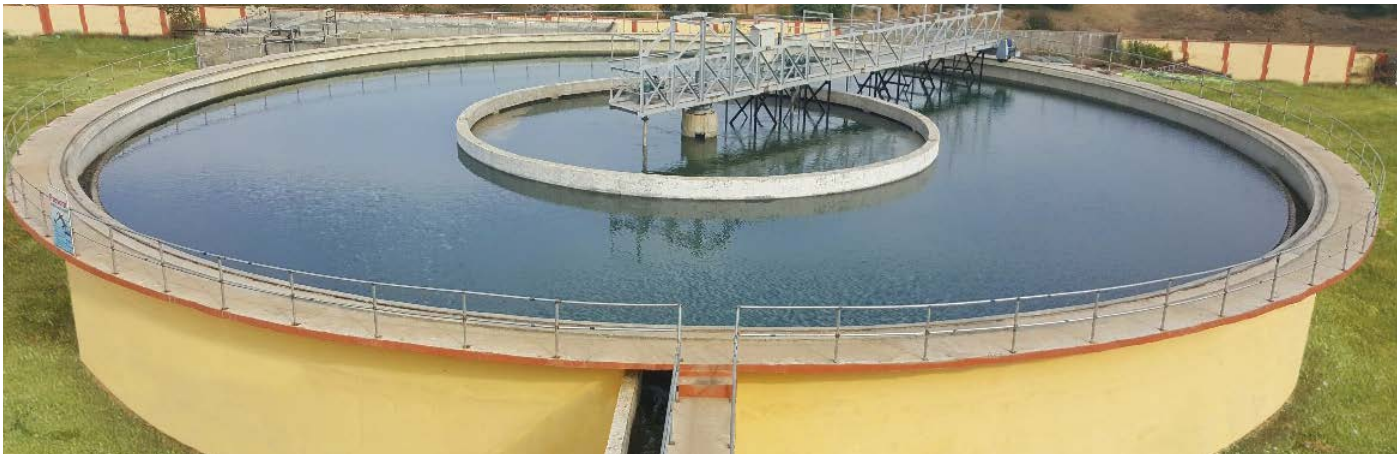
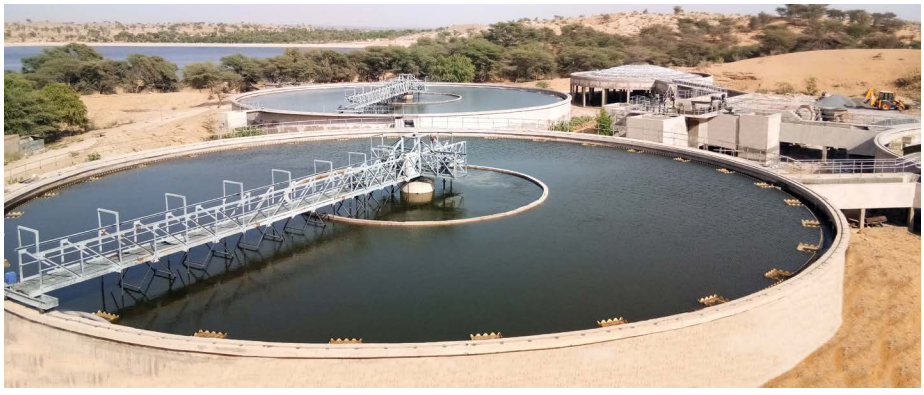


19 MLD Water Treatment Plant, Gagreen, Rajasthan

> With ever reducing water sources and increasing demands, it is essential that we rework on our policies to better address key challenges in the water space.



160 MLD Water Treatment Plant, Dhannaser, Rajasthan

and in–disciplined use of water sources. This calls for urgent and immediate attention by all stakeholders to adopt supportable practices to make available water resources sustainable. Supporting 16% of the global population is a daunting task considering that India possesses only 4% of the world's fresh water. Imagine the crisis that out of the very limited water availability, almost 80% of our surface water is contaminated. Nearly 60% of India's ground water reserves are already contaminated with biological, organic, and inorganic pollutants. The Central Pollution Control Board (CPCB) has found that 18 major rivers in India are unfit for any domestic and industrial water usage.

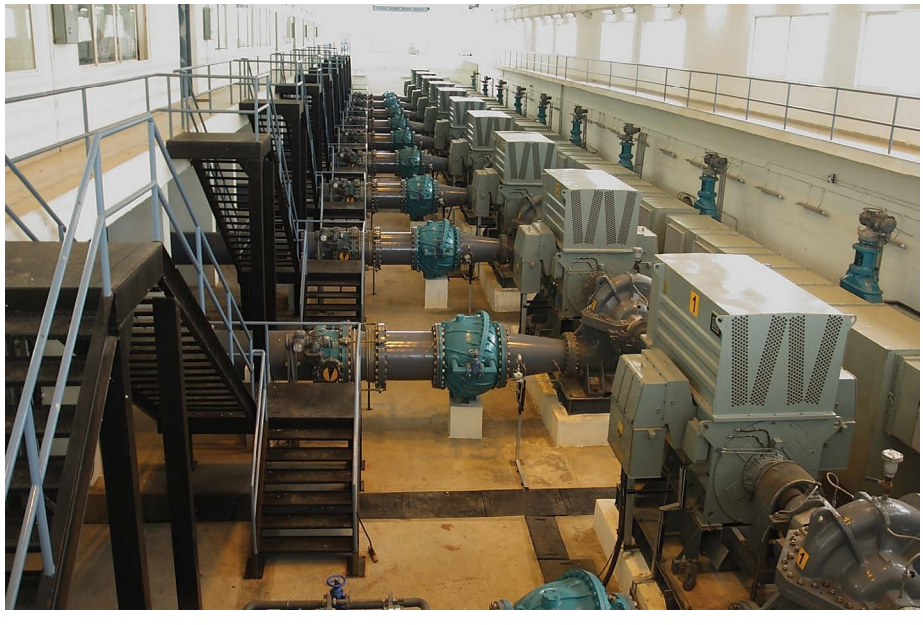
Limited Water Resource

Water resources are divided into two distinct categories—the surface water and the groundwater. Both of these are part of the earth's water circulation system and derived from precipitation–rainfall and snow. India has a highly variable climate and vastly seasonal pattern of rainfall. On an average, India receives about 118 cm of rainfall. Estimated 50% of rainfall happens in just 15 days and 90% of river flows during three to four months of monsoon period only. A large proportion of the water resources in India are located in those regions which has limited annual rainfall, the major source for recharging of underground aquifers.

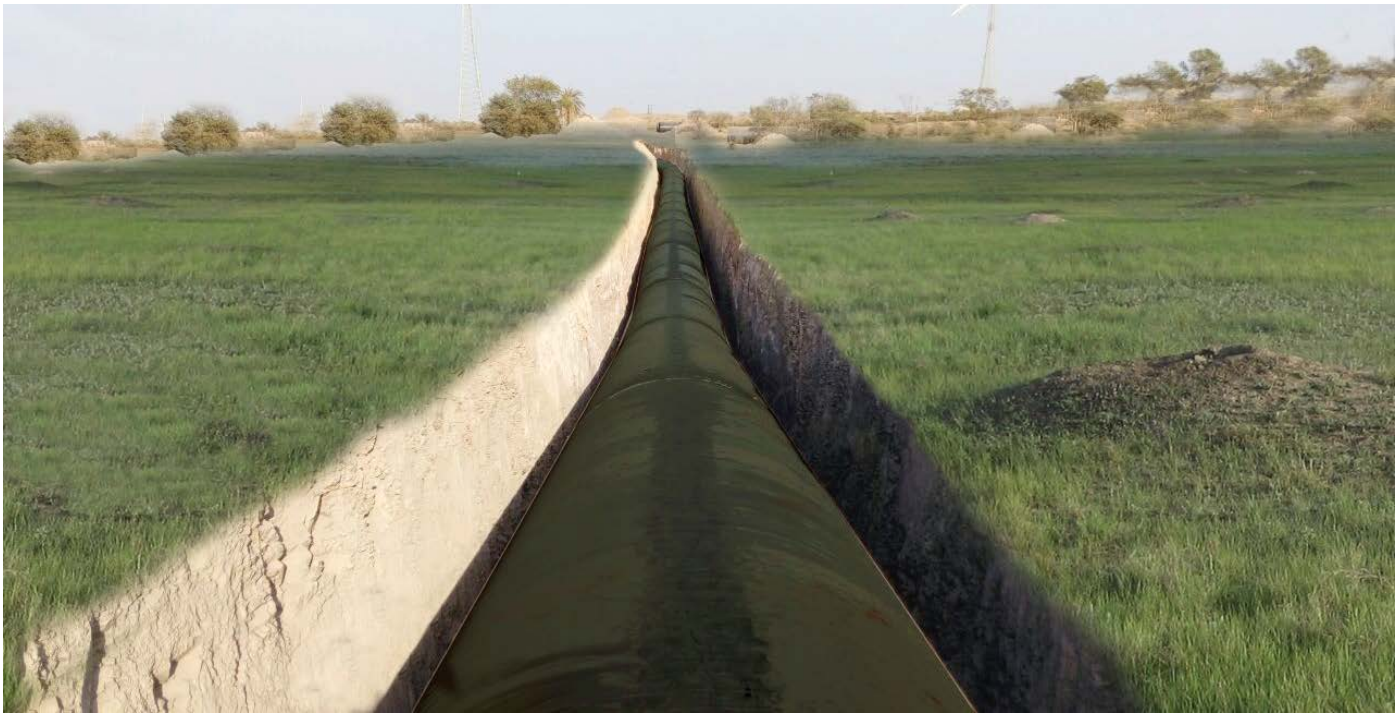
India's water harvesting and storage capacity from the rainfall is extremely inadequate due to investments in large–scale water infrastructure development in India have been very limited. By all international comparisons the country remains extremely short with such infrastructure as compared to other arid countries such as the United States and Australia, where they have built over 5,000 cubic meters of water storage per capita; China can store about 1,000 cubic meters per capita, India's dams can store only 200 cubic meters per person. Moreover, India can store only about 30 days of rainfall, compared to 90 days in major river basins in developed countries. We need to recognize water as a stimulus for growth by combining major water infrastructure with modern management approach. India needs to grow the capacity of its water storage from the existing levels, which is more critical because of global climate change is going to have a major impact on India and there is likely to be rapid glacial melting in coming decades in the western Himalayas and increased variability of rainfall in large parts of the country.

Water Infrastructure

The rapidly increasing urban population and fast industrial growth has driven up the water demand substantially over the past two decades. Conventional water security measures, drawing on reserves, increases in supply systems, regulation of network pressures, and tariff incentives were insufficient to mitigate the effects. Among all the challenges being faced by water utilities in India, ageing infrastructure is the most important of



500 MLD Water Pumping station, Bangalore



3000 MM Dia MS Sauni Pipeline, Gujarat

them all. In particular, urbanization and population growth contribute to water scarcity and intensify the strain caused by ageing infrastructure. Water utilities in India are faced with the need to address these challenges and revamping of infrastructure on priority for social, economic and environmental implications.

Global non–revenue water estimates ranges from 30 to 40% of water produced, whereas it is as high as 50 to 60% in several cities in India mainly due to aging and debilitated water infrastructure. Water supply and sewer systems have a service life of roughly 60 to 80 years and in many cities of India, our water infrastructure has reached the end of their useful life cycle. In addition, the water mains are not being adequately maintained. Therefore, huge investments are needed not only to develop the new and robust but also to repair and maintain the aging water infrastructure.

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Financing of Infrastructure

The large investments required in water infrastructure will help in augment the economic and social development of India. The assured supplies of water meant that crop yields on irrigated land were consistently much higher than yields from rain–fed agriculture, allowing India to achieve national food security and associated affordability of food. Hydropower from many of the large dams will provide the reinforcements for Indian industrial growth and groundwater irrigation. It is not just huge water storage infrastructure that is needed everywhere; in many parts of the country, there are also substantial returns from investments in smaller–scale, community–level water storage infrastructure such as tanks, check dams, ground reservoirs, water harvesting and local water recharge systems. And there are massive needs for investment in water supply systems for growing cities and for undeserved semi–urban and rural populations. India's cities and industries also need to use water more effectively and there have to be massive investments in sewer networks and wastewater treatment plants as well.

This need arises because much of India's existing water infrastructure is crumbling and so there is an enormous backlog of deferred maintenance. The end result is the familiar sight of crumbling, rusting, leaking pipes, dams, canals and other vital water infrastructure.

The financing of water infrastructure is getting difficult for the government, whereas the need for investment is becoming more critical and urgent. Although there is some investment being done by the government with new schemes and grants made available under AMRUT, Clean Ganga Mission, Water Supply and Irrigation Funds, Smart City Mission etc. The international funding for water infrastructure development has also increased from development agencies such as ADB, World Bank and JICA in the past few years. However, overall investment required in the sector is estimated to be INR 620,000 crore

(USD 129 billion). India currently spends about 6 percent of its GDP on infrastructure, less than several countries in Asia, and nearly half of the 11 percent invested by China. Both central and state government are finding themselves increasingly constrained to fund large infra development projects for augmenting water supply and wastewater management. The financial needs of water sector are growing exponentially with major gaps to meet the costs of rehabilitating the existing infrastructure and to build new facilities.
The budgetary allocations to the water sector is not sufficient as per the current requirement of infrastructure development and there is a large and growing financial gap, which can only be met by greater allocations of budgetary resources, more efficient use of resources, and greater contributions from water users.

Energy Efficiency in Water System

The price of delivering drinking water is largely driven by the capital costs of maintaining aging infrastructure; energy bills for water have been rising dramatically and are expected to continue that trend. Water supply networks are the major consumers of energy which is required at every stage of water production and distribution. Water is pumped from the sources; rivers, dams, aquifers, reservoirs to the treatment plants which uses lots of energy to treat the large volume of water and then it is pumped back to storage units and from there distributing it through the city networks. Energy efficiency in water management system is paramount as utilities are facing higher costs to treat and deliver water, with stricter regulations and increasing energy prices. Energy efficiency can be achieved by improving pump design, system design, installation of variable speed drives to pumps and operating it efficiently with automated control system. One of the major causes of excess usage of energy is due to water leaks in supply system or inefficient use of water at the consumer level owing to metering issues. Leakage reduction in supply network will result in significant savings in power consumption.

Final Words

The return on investment for utilities and municipal water systems would be calculated by measuring savings in water efficiency by reducing water loss, adopting energy efficient pumping system and extending lifespan of infrastructure assets along with lowering operational costs. The improved consumer relations, automation of network, smart meter upgrades to provide real–time usages of the consumer will greatly improve the ability to create demand based solutions and increase the functionality of water utilities with good financial returns.

About the Author

Mr. Subhash Sethi is Chairman of SPML Infra Limited,
A leading Engineering and Infrastructure Development organization in India with over 600 completed projects in the domains of Water, Power, Sanitation, Environment, and Civil Infrastructure. Under his leadership, SPML Infra went on to establish itself as the leader in water domain and developed sustainable infrastructure to help water utilities to deliver safe and clean drinking water to over 40 million people in India. He has been bestowed with several prestigious awards including Economic Times Global Asian Business Leader of the year for his valuable contributions.

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