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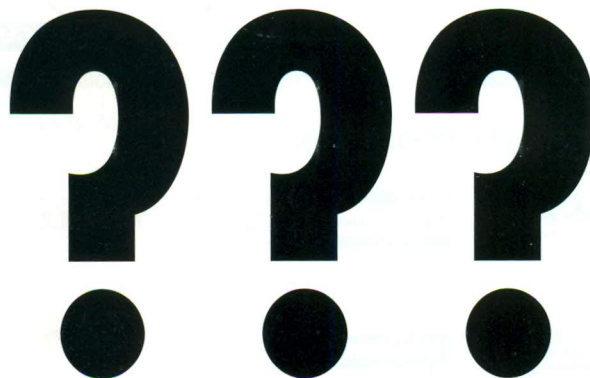
INDIA

WATER STRESSED TO SCARCE

It is expected that by around 2020, India will be a water stressed state with declining per-capita availability



INDIA
**WATER
STRESSED
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ALTHOUGH ENDOWED WITH LARGE FRESHWATER RESERVES, THE INCREASING POPULATION AND EXPLOITATION OF SURFACE AND GROUNDWATER OVER THE YEARS HAVE TRANSFORMED INDIA TO WATER STRESSED NATION, LOVINA KINNY UNEARTH...

Water is critical for sustainable development, including environmental integrity and the alleviation of poverty and hunger, and is indispensable for human health and well-being." The importance of water in today's scenario can be best summed up in these words of the United Nations.

Water, a prime natural resource, a basic human need and a precious asset essential for life and livelihood, has always remained at the centre-stage of developmental activities, and economic growth. However, there has been multi-dimensional challenges that have crept in the water sector worldwide. The ever growing population and urbanization coupled with shrinking water availability on back of fast increasing developmental needs and uneven distribution of water resources across the globe has put tremendous pressure on water availability worldwide.

Water: A critical resource, unevenly distributed

The world's freshwater resources are distributed unevenly around the planet. According to the United Nations World Water Development Report, tropical countries in Asia and Africa with the highest populations have low availability of freshwater.

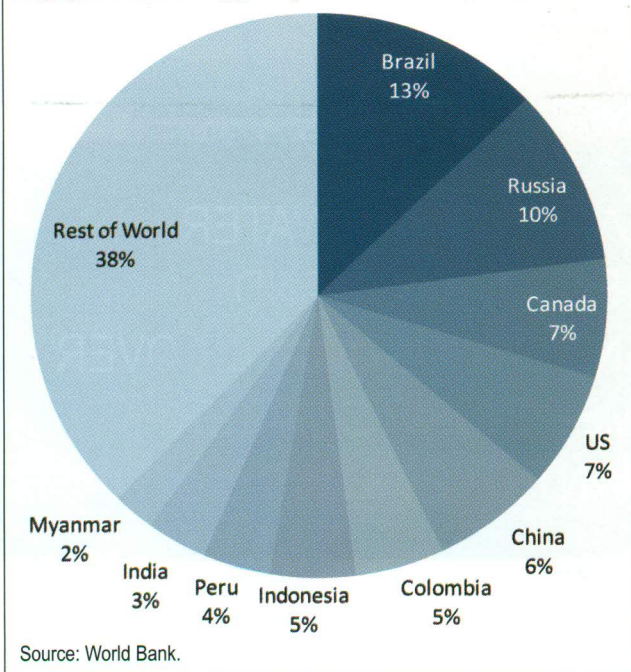
According to The Goldman Sachs Group report, over 60% of the world's freshwater supply is found in 10 countries, notably Brazil (13% of global resources), Russia (10%), Canada (7%) and the United States (7%). North America, for example, has an abundance of freshwater, in sharp contrast to regions at the other end of the spectrum such as the arid Middle East.

The imbalance is further evident on a per-capita basis. For instance, Canada's abundance of freshwater resources and its relatively sparse population mean the country has close to 85,000 cu. m of freshwater per person. In contrast, China, with 20% of the global population, has just roughly 2,000 cu. m of freshwater per capita, less than 3% of Canada's per capita availability.

As a result of the uneven global distribution, nearly 3 billion people currently live in areas under severe water stress. A large portion of the affected population resides in developing countries: close to two-thirds live in the BRICs (Brazil, Russia, India and China). An imbalanced local distribution of resources adds to water strains. For example, some of the major cities in China, including Beijing, are located in drought-prone regions.

Figure 1: Ten countries possess over 60% of the world's freshwater supply

Geographic breakdown of global freshwater resources, 2009 data



With the need for water resources growing rapidly in emerging economies, the global number of those living under severe water stress is projected to increase by an additional one billion people by 2030 to total 3.9 billion, adds the report. Over the past 15 years, water use in developing countries has increased rapidly. Since 1997, water withdrawals have increased by 81% in Vietnam, 52% in India and 43% in Mexico. Today, China and India account for a third of global water demand. In contrast, water withdrawals in developed economies like the United States and Japan have stayed relatively constant.



The volume of water used for irrigation in India is expected to increase by 68.5 trillion liters between 2000 and 2025

In 1975, water scarcity was limited to a small number of countries in North Africa, Europe and the Middle East. By 2000, water scarcity had spread to many large and densely populated countries in Asia and by 2025, water scarcity is expected to further spread; India and China will continue to be the largest countries facing water stress.

According to United Nations report, water use has been growing at more than twice the rate of population increase in the last century. It further projects a substantial rise in population which will add to water woes. "By 2025, 1800 million people will be living in countries or regions with absolute water scarcity, and two-thirds of the world population could be under stress," the report foresees.

India: Water Stressed Nation

India, with around 1.21 billion inhabitants, has access to only 4% of total global utilizable water resources for fulfilling the needs of 18% world inhabitants, in addition to 11% of livestock. The total water available annually in form of precipitation amounts to 4000 billion cubic metre (BCM). Of this only 28% (1123 BCM) is available as utilizable water in form of surface (690 BCM) and groundwater (433 BCM). As per the latest assessment of ground water resources, of the 433 BCM groundwater resources, annual utilizable ground water resource is 396 BCM.

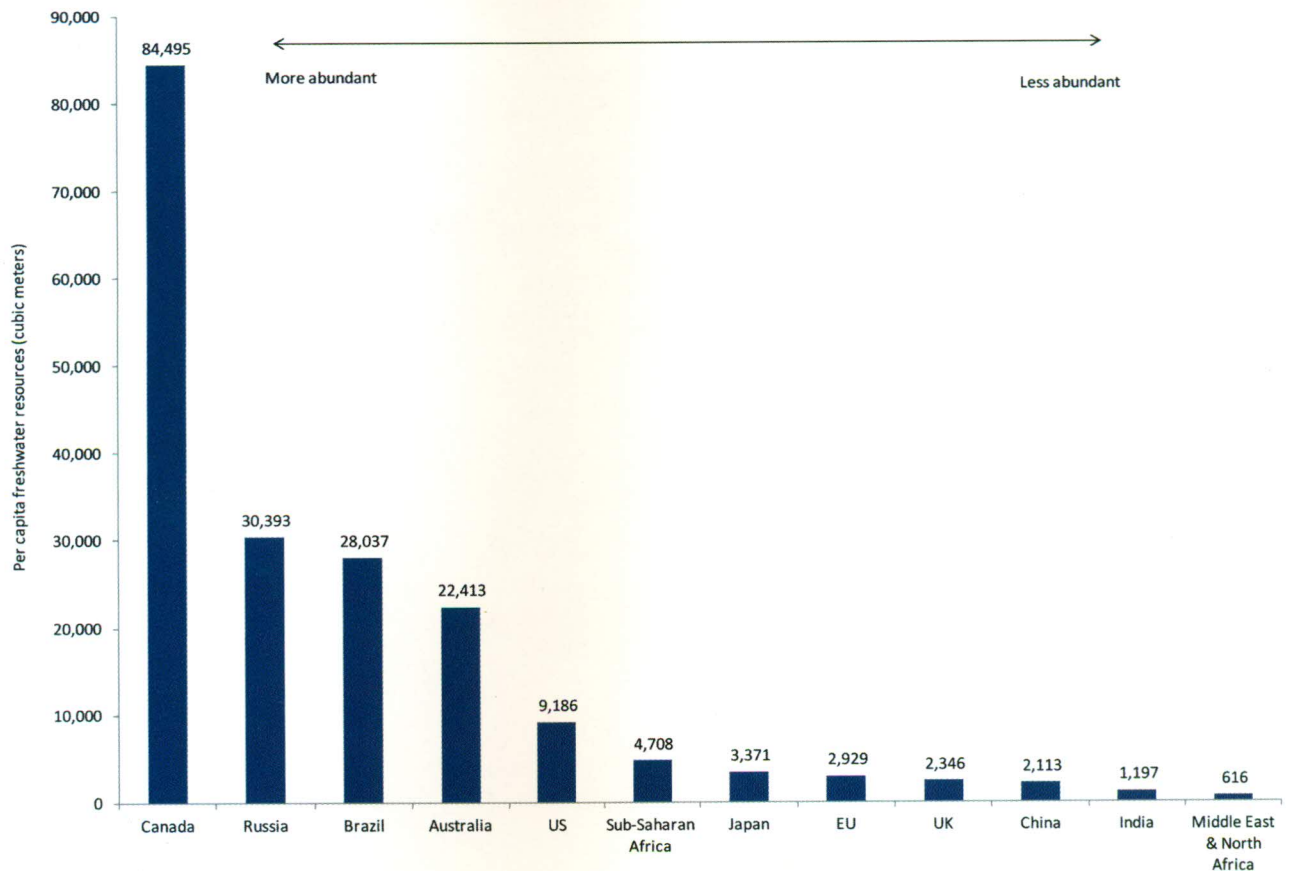
Groundwater is the major source of water in our country with 85% of the population dependent on it. However, growth in the Indian economy is driving water usage across all sectors. Groundwater is continuously being exploited for drinking, irrigation and various other purposes due to which groundwater levels in various parts of the country are declining. "Continuous depletion of groundwater is another challenge before us. We have about 802 over exploited talukas, 169 critical talukas, and 523 semi-critical talukas, as far as ground water situation is concerned," informs Shri Harish Rawat, Hon'ble Minister of Water Resources, Government of India during India Water Week 2013 conference held recently.

As per the data of CGWB for the month of May 2013, about 41% of the wells analyzed have shown ground water level in the range of 5 to 10 meters below ground level (mbgl).

"Traditionally, India has been endowed with large freshwater reserves but the increasing population and exploitation of surface and groundwater over the years has resulted in water scarcity in many regions," states MA Patil, Director – Resource Conservation & Management, FICCI.

Due to increasing population and all round development in the country the per capita average annual freshwater availability has been reducing since 1951 from 5177 cu.m to 1869 cu.m in 2001 and 1588 cu.m in 2010, according to Water Technology

Figure 2: A wide disparity in per capita distribution *Per capita freshwater resources, 2009 data*



Centre, Indian Agriculture Research Institute.

There are wide variations in the availability of water across the country with the drier regions having greater fluctuations in rainfall, thus increasing the vulnerability of people to water scarcity. Urban centers like Ahmedabad and Mumbai are facing high density as well as drastic declining water levels. Jaipur and Kolkata comparatively have average adjustment of water supply due to projects, but Kolkata has witnessed declining water levels. Chennai on the other hand has developed a network from out sources and fulfilled demands. Lucknow, Jaipur, Bhopal, Patna and Bengaluru, though have less declined water levels, still have limited capacity of water and total water content would remain the same. Bhopal recently faced the drying of its Upper Lake in 2009 to 4% of its surface area thus leaving people without water.

The International Water Management Institute projects India to need 1,447 cu. km of water by 2050. Of this, around 74% is identified for irrigation, while the rest is for drinking water (7%), industry (4%) energy (9%) and others (6%). However, with rapid urban growth in its 498 Class-I cities and 410 Class-II towns, the demand for drinking water is also rising and has a high priority, competing with rural water needs, including irrigation. The current water supply to these cities is estimated at about

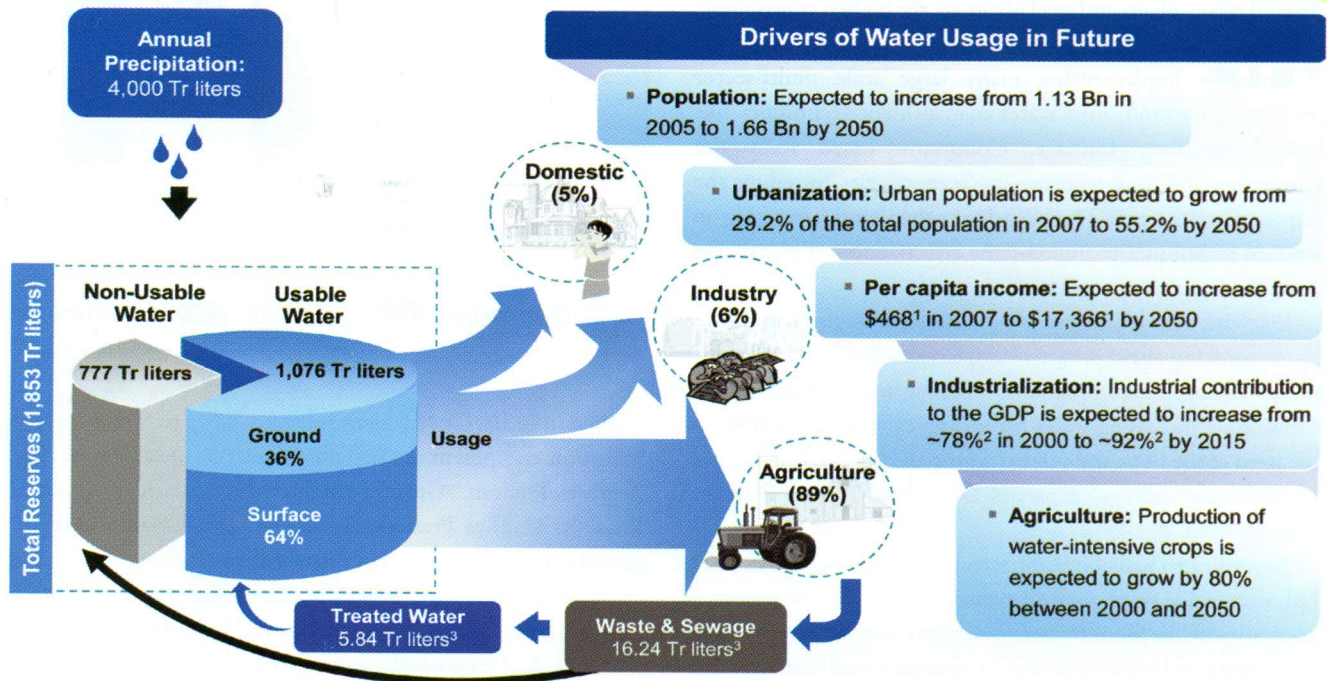
48,000 million liters per day (mld) and is projected to increase further as the sectoral demands for water are reaching new heights.

To meet these requirements, India needs storage capacity of 450 BCM by 2050, compared to present available capacity of 253 BCM. However, if per capacity availability is scrutinized basin-wise, a significant number of basins in the country are even today either in the 'water scarcity zone' or worse. The statistics related to the per capita storage or the days of average flows are equally disturbing. The data available indicates that the per capita storage in India at 220 cu. m in one fifth that of China (1110 cu. m). The scenario in terms of 'days of average flow' at the National level is around 20 days compared to Colorado in USA which is 850-900 days.

It is expected that by around 2020, India will be a water stressed state with per capita availability declining to 1600 cu.m/person/year. The capacity is further expected to decrease to 1,140 cu.m/person/year by 2050. A country is said to be water stressed when the per capita availability of water drops below 1700 cu.m/person/year.

However, according to Dr A K Singh, Secretary, Indian Society of Water Management, if the international yardstick of 1700 cu. m per capita availability of water is taken as a criterion, then the whole country became "Water Stressed" in the year

Water in India – Overview



2007 with per capita water availability declining to 1656 cu.m from 5200 cu.m in 1951.

“It is estimated that the per capita availability of water is likely to reach a level of around 1100 cu.m in 2050 but in reality we may reach this threshold much earlier considering the wasteful ways of water usage,” opines Dr Singh.

Echoing the same Rawat states, “We are now already a water stressed nation, and with further reduction in per capita availability of water, we will soon be a water scarce nation.”

Hence there is an urgent need for efficient water resource management through demand side management, enhancing water use efficiency and wastewater recycling.

Demand-side management

Population growth and overall economic developments are expected to lead to an increase in water usage across sectors. India is one of the world's leading crop producers. Over the years, this has led to an increase in water consumption in the agricultural sector. The volume of water used for irrigation in India is expected to increase by 68.5 tr liters between 2000 and 2025.

Groundwater depletion has started affecting most of the river basins which support agriculture states like Uttar Pradesh, Maharashtra, Karnataka, Tamil Nadu and Andhra Pradesh. By 2050,

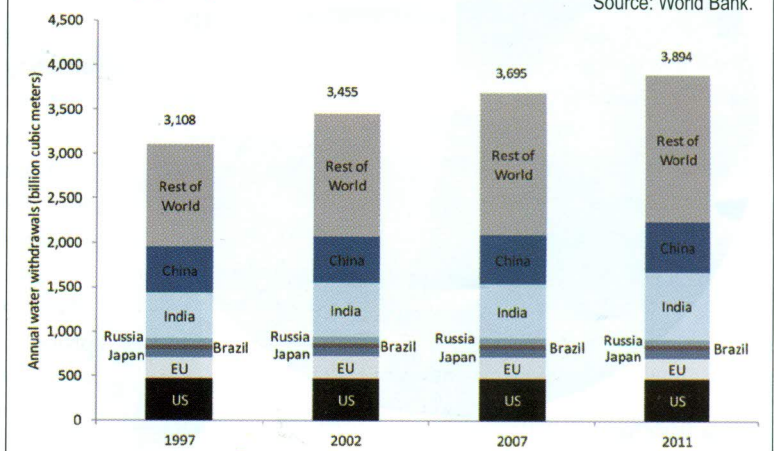
groundwater level in the Ganges basin (which provides water to UP) is projected to deplete by 50-75% while that in the Krishna, Kaveri and Godavari basins (which provide water to Maharashtra, Tamil Nadu, Karnataka and AP) are projected to deplete by 50%, estimates Water – The India Story report.

Further, industrial water consumption is expected to quadruple between 2000 and 2050; by 2050 industrial water consumption will reach 18% of total annual water consumption, up from just 6% in 2000. Industrial wastewater discharge causes pollution and reduces available freshwater reserves. Around 6.2 billion liters of

Figure 3: Developing economies have been major drivers of global water demand

Breakdown of global freshwater withdrawals

Source: World Bank.



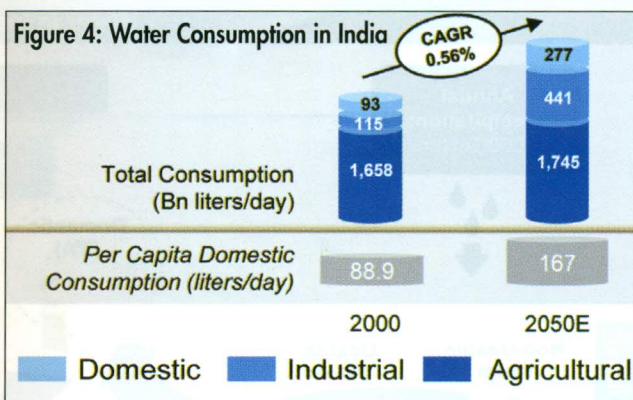
untreated industrial wastewater is generated every day of which thermal power plants and steel plants are the highest contributors to annual industrial wastewater discharge.

China is implementing many large scale multi-sector projects using innovative water management techniques like Inter-Basin River Linkage, Community-based Rainwater Harvesting and Water Treatment Technologies to reduce the impact of water stress. The US on the other hand is focusing on modern techniques to improve the effectiveness of its existing water management programs.

Likewise, in India, industry bodies are encouraging companies by recognizing their proactive implementation of sustainable water management programs. "Management programmes, focusing on increasing water use efficiency across all sectors, is the need of the hour and is crucial for reducing the dependence on freshwater sources," expresses Dr Arbind Prasad, Director General, FICCI.

According to Rishabh Sethi, Executive Director, SPML Infra Ltd, sustainable water management in India is fast becoming a necessity with the looming crisis over water resources threatening the security and livelihood of the population and environment. "SPML has been promoting sustainable water management – a task that is increasingly becoming essential and complex as the natural supplies deplete and demand rises."

Subsidized micro-irrigation, mandatory rainwater harvesting, community based watershed management and system of rice intensification are some of the water techniques



applied in India. Government subsidies of up to 50% on micro irrigation equipment are being utilized, but only by states like Andhra Pradesh, Gujarat, Maharashtra, Karnataka, Uttar Pradesh, Madhya Pradesh, Rajasthan, Tamil Nadu. Only 10 states in the country have laws enacted for rain-water harvesting on the roofs of all new buildings. These states include Kerala, New Delhi, Madhya Pradesh, Uttar Pradesh, Andhra Pradesh, Tamil Nadu, Haryana, Rajasthan, Maharashtra, Gujarat.

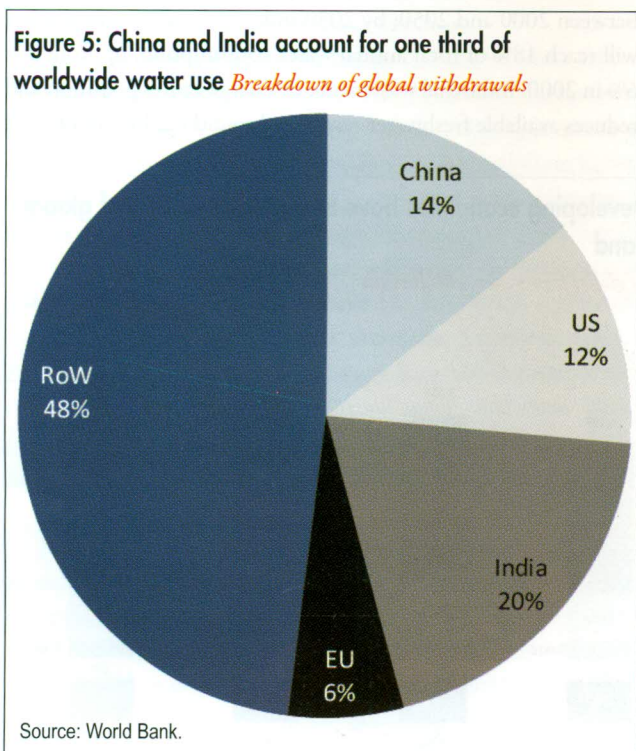
Local communities are also implementing several techniques of watershed development, to increase water levels and enhance productivity of crops across Maharashtra, Karnataka, Andhra Pradesh, Madhya Pradesh, Punjab. Between 1997 and 2007, innovative cultivation programs (e.g. spacing between plants, transplanting younger seedlings) were implemented to reduce the need for flood irrigation in water-intensive crops, but only across Andhra Pradesh, Tamil Nadu, Karnataka, Kerala, Orissa and West Bengal.

However, with only a few states implementing water management techniques, India still lacks a national initiative to tackle the impending water crisis, opines Water – The India Story report.

Enhancing water use efficiency

Recognizing the water risk, large Indian companies are investing in multiple water management initiatives across their operations. For instance, General Motors has committed to reducing water consumption in its manufacturing facilities. By implementing water conservation strategies at every plant, water use was reduced by 32% on a per-vehicle-produced basis between 2005 and 2010. One example is a new assembly plant in Mexico, which was designed with a zero discharge concept (90% of wastewater is treated and reused in the manufacturing process). This design is estimated to reduce the amount of water used by 20 million gallons annually.

DuPont, on the other hand, aims to reduce water consumption at sites located in water-scarce or water-stressed





Recognizing the water risk, large Indian companies are investing in multiple water management initiatives

regions by at least 30%. In 2011, absolute water consumption in these areas declined by 9.2%, compared to 2004 levels. Yet another leading giant, General Electric (GE) reduced its freshwater consumption by 35% in 2011, from 2006 levels. In addition to addressing water in its operations, the company is also working to develop products that minimize water consumption, such as the GE 'ecomagination' brand that offers operationally and environmentally efficient products.

Besides, corporates like Visakhapatnam Steel Plant, Hindalco, ACC Ltd, ITC Ltd, Wipro Ltd have embraced water management techniques like rainwater harvesting, wastewater management and recycling, watershed management etc.

Wastewater recycling

Rapid industrialization and unplanned urban growth is resulting in the generation and discharge of large quantities of wastewater into existing water bodies. Only 26.8% of domestic and 60% of industrial wastewater is treated in India. Moreover, with wastewater management plants in cities having capacity of approximately 6,000 MM liters per day, 423 Class I cities treat just 29.2% of their wastewater while 499 Class II towns are able to treat just 3.7% of wastewater due to poor treatment infrastructure.

Small and medium plants do not invest in effluents e.g., over 3,000 units in Ankleshwar, Gujarat discharge 270 MM liters of effluents each day. "Discharge of untreated wastewater is leading to increased pollution and depletion of clean water resources," opine industry experts.

Moreover, use of untreated wastewater for irrigation has led to reduction in agricultural production. E.g. in Hyderabad, wastewater drawn from the river Musi for irrigation has reduced rice output by 40-50%.

Government Initiatives

Globally, governments have realized that the supply of clean water and effective treatment of wastewater are crucial for sustainable development. In an attempt to conserve water, increase water use efficiency and planned development and management of water resources, the government of India has launched National Water Mission under National Action on Climate Change. "One of the identified goals, of the National Water Mission, is increasing water use efficiency by 20%," states Rawat.

Further, The National Water Policy (2002) of our country, accords highest priority to drinking water, while planning and implementing the water resources schemes. "We are committed to provide safe drinking water to all sections in urban and rural areas. Our Government, therefore, attaches highest priority to the development and expansion of physical infrastructure, including water supply, sewage treatment and sanitation in rural as well as urban areas," opines Rawat.

The National Water Policy drafted last year looks at water as an economic good and focus at numerous macro and micro initiatives in water management, expresses Sethi.

However, in India, multiple government agencies have responsibility for water management, which hinders effective policy development and implementation. State governments and local bodies in urban areas are mainly responsible for offering drinking water and sanitation facilities while the Central Water Commission (CWC) is responsible for regulating the use of surface water for irrigation, industry, drinking, and for mediating inter-state water allocation disputes.

There are multiple government bodies that manage water resources in India. However, there is a lack of coordination between them. E.g. the CPCB (which monitors pollution) and CWC conduct separate, uncoordinated water quality monitoring exercises in 507 and 300 locations respectively.

According to industry experts, management and supply of water resources is perceived to be a public sector monopoly. Therefore, in the absence of an independent regulator, the very few pockets of water privatization have resulted in government sanctioned monopolies.

"India has launched numerous programs, but lacks regulatory network to control and coordinate implementation efforts," opines Sethi. Moreover, as the water supply and sanitation services in India are managed by the state or local municipal bodies, the biggest hurdle in demand management have been financial.

However, industry experts believe that with stringent regulations and legislations in place, the existing scenario can change in coming years.

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