Frank Notes

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Sustainable Water Conservation and Management – Need of the Hour

Water is the essential natural resource for sustenance of life on Earth. Three-fourth of the Earth's surface is covered with water. Of the total global water resource, 96.5% is brackish water distributed in the oceans and seas, 2.5% is fresh water locked mostly in the glaciers and 1% is liquid fresh water. With 4% of the global fresh water resources at its disposal, India faces a daunting task of supporting about 18% of human and 15% of the animal population of the world.

According to some estimates, two-third of the world's population will be living in countries with deficiency or excessive deficiency of water by the year 2025. With per capita availability of water below benchmark figure of 1700 m^3 $year^{-1}$, India was tagged as the water-stressed nation way back in 2007. Projections indicate that 40% of the country's population will not have access to drinking water by 2030. Twenty-one cities with 100 million population including Delhi, Chennai, Bengaluru and Hyderabad may run out of ground water as early as next year.

Data on sector-wise water consumption in 2010 showed that agriculture is the largest consumer of freshwater resource (78%) in the country followed by domestic (6%), industry (5%) and power (3%). Industrialization and urbanization along with increasing population will put higher demand on water resources. By 2050, share of agriculture, domestic, industry and power sectors in water consumption will be 68, 9, 7 and 6%, respectively. But agriculture will continue to be the major consumer of water in foreseeable future.

Post-independent India made impressive strides in development and utilization of water resources for agriculture. Out of 143 Mha net cultivated area, 63 Mha (some reports put it at 68 Mha) is irrigated. Tube-well accounts about 63% of this area followed by 24% area irrigated by canals. Canal water is available for almost free. Power subsidy (amounting to Rs. 90,000 crore) given to agriculture triggered the colossal water wastage and over-exploitation of ground water in agriculturally-intensive states. Water table has been reportedly going down @ 1m $year^{-1}$ for nearly two decades in Punjab. Presently, out of 6607 assessment areas (block/talukas/mandals) 30% of groundwater blocks have been marked as 'overexploited'. By 2025, this figure will double to 60%.

Rainfed area of 80 Mha suffers from the deluge of both frequent droughts or erratic distribution of rainfall in the normal monsoon years. The absence of proper rainwater management leads to floods causing huge loss to the people and property during rainy season and water shortage during the rest of the year. There is, therefore, an urgent need to evolve permanent solution to the problem by conservation and management of available water resources.

Groundwater is a national resource and public property and its unauthorized exploitation for commercial benefits should be treated as an offence. To stem the fall in ground water levels, stress should be laid in recharging ground water through rain water harvesting in the rainy season. Simple steps like conserving the water of field in the same field and stopping the village water in the village itself should become a public movement.

In agriculture sector, the water management related challenges are low water use efficiency, water-energy nexus, water intensive crops in water-deficient areas, poor quality waters characterized by the excessive toxic elements and salts, and poor rainwater management. Agricultural productivity is now dependent on judicious use of each drop of water. Water smart technologies like proper scheduling of canals (matching supply with demand), laser leveling of the fields, scientifically designed check basins/border strips, zero tillage, pressurized irrigation systems, proper land configuration (ridge/furrow or raised/sunken beds)

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have a potential of water savings ranging from 10 to 60%.

Synergy between water and fertilizer nutrients in high yielding rice and wheat varieties led to the Green Revolution in the Indo-Gangetic alluvial plains. Together these pulled the country out of ship to mouth condition of 1960s to the current overflowing granaries with food grain and horticultural production touching 284.8 and 311.7 Mt in 2017-18, respectively. Maximization of water and fertilizer use efficiency is a solution for sustaining agricultural productivity, soil health and water quality. Area under micro-irrigation comprising of drip and sprinkler systems, a water saving technology, increased from mere 0.23 Mha in 1985-86 to 10.3 Mha last year, thanks to the National Horticultural Mission.

Fertigation, a method of fertilizer application in which fertilizer is incorporated within the irrigation water by the drip system, offers a possibility of getting 25-50 per cent higher crop yields and achieving 80-90% fertilizer use efficiency resulting in saving of around 25% on nutrients. Expansion of area under fertigation driven by growth in micro-irrigation has triggered the growth of water soluble and specialty fertilizers. Growth in use of water soluble fertilizers sector has been remarkable during last two decades. However, growth of water soluble fertilizers is constrained due to the fact that these have to compete with highly subsidized bulk fertilizers. Policies for fertilizer sector should address this anomaly. Farmers should be provided specialty fertilizers particularly designed to suit the pressurized irrigation systems. This may be possible when fertilizer subsidy is transferred to the farmers' accounts which will remove inter-product distortion on prices of fertilizers due to faulty subsidy policy.

Recognizing fresh water as critical natural resource for all walks of life, policy initiatives have been taken by the Government of India from time to time. National Water Policy (2012) advocates rain water harvesting and conservation of water and highlights the need for augmenting the availability of water through direct use of rainfall. With the vision of extending the coverage of irrigation 'Har Khet ko Pani' and improving water use efficiency 'More Crop per Drop' in a focused manner, Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) was formulated in 2015. Creation of a new Ministry of Jal Shakti for dealing with all the matters relating to water at one place in an integrated manner is a very timely and laudable step.

Sustenance of water resource for future generations requires multi-pronged strategies. The National River Interlinking Scheme is seen as solution to India's water challenges. Adoption and development of cropping/farming systems should be guided by the potential water availability. Regulatory mechanisms have to be in place in each state for ground water resource development and utilization.

United Nations has set 2030 as a target year to achieve universal and equitable access to safe and affordable drinking water for all under Special Development Goal 6. Honorable Prime Minister has committed his government to deliver tap water to every household by 2024 under the "Nal se Jal" programme. He has also given a clarion call to the nation to save every drop of water and make water conservation a mass movement on the lines of the Swachh Bharat Abhiyan.

Education of the society at large on necessity of 'judicious use of water', 'Har Khet ko Pani' and 'More crop per drop' is the first and foremost step to save water. Since, agriculture continues to be the major water using sector, it is necessary that focus is directed on this sector. The important programmes and technologies which need propagation in agriculture sector include integrated and conjunctive use of rain, surface and ground waters; development of demand-driven irrigation systems; planned waste water reuse with emphasis on peri-urban water use; conjunctive use of poor and good quality irrigation waters; development of low cost pressurized irrigation/fertigation systems; and fine-tuning of furrow based irrigation systems (raised bed) for different crops and soils.

In conclusion, water is a precious commodity and we owe it ourselves and future generation that its proper utilization becomes a way of life. ■