

Water Management for Sustainable Rural Livelihood

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The Government of India is committed towards the rational and efficient water management in the country. To this effect many schemes and programmes have been launched to ensure adequate water facilities in every nook and corner of the country. Water needs to be used and managed judiciously by maintaining a proper balance between availability and utilisation for its long-term sustainability. In this direction proper water resource management through rainwater harvesting, natural farming and crop diversification with the active participation of local communities and NGOs is imperative. Public awareness regarding the judicious and rational use of water also needs to be promoted through education, information and communication.

Water is crucial for the existence of life on earth. It is an essential component to achieve inclusive and sustainable growth in an economy. It is vital to ensure food security, health and hygiene in rural areas. In fact, easy access to adequate water is both, a direct component of economic well-being as well as an input for enhancing productive capabilities. Judicious use of water resources assumes utmost importance, particularly when changing environment, increasing population, urbanisation, and related developmental activities create additional pressure on available water resources. Sustainable water management along with adequate water infrastructure are the key factors in maintaining a healthy and productive workforce, expanding agriculture and allied activities, creating gainful employment opportunities, and improving rural livelihood.

Water Resources of India

The average annual water availability of a country/region is largely dependent upon the hydro-meteorological and geological factors which generally remain constant. India accounts for nearly 4 percent of fresh water resources of the World as against 17.7 percent of total population and 2.4 percent of the land area. The main water resources of India consist of the precipitation on its territory which is estimated to be around 4000 Billion Cubic Meters (BCM) per annum and trans-

boundary flows received in its rivers and aquifers from the upper riparian countries (Table 1). On an average out of total precipitation, 1869 BCM (46.7 percent) water remains available as natural runoff. However, due to geological and other factors, the utilisable water availability is limited only to 1137 BCM (28 percent of total precipitation) per annum; comprising of 690 BCM of surface and 447 BCM of replenishable groundwater.

Table 1: Water Resources of India

S. No.	Source	Water (km ³)
1	Annual precipitation	4000
2	Run-off received from upper riparian countries	500
3	Estimated utilisable water	1869
4	Average annual natural flow in rivers and aquifers	1137
	(i) Surface	690
	(ii) Ground	447
5	Water demand	634
	(i) Agriculture	541
	(ii) Domestic	42
	(iii) Industry, Energy & Others	51

Sources: (i) *National Water Mission under National Action Plan on Climate Change, 2008, GOI.*

(ii) *Dynamic Groundwater Resources of India, 2020, Ministry of Jal Shakti, GOI*

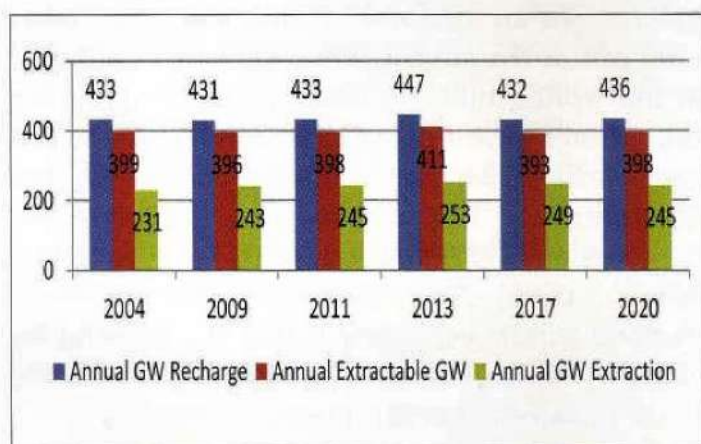


The surface water account for nearly 61.44 percent of total usable water sources in the country. The major sources of surface water are; rivers, lakes, ponds and tanks. Most of the surface water resources in India are also getting polluted with industrial, agricultural and domestic effluents, which in turn limits the availability of usable water resources.

Owing to its universal availability, easy access, and low cost of extraction, groundwater has become the most preferred source of fresh water for various uses in India. It acts as a buffer stock during the times of drought and a resilient resource for mitigating the adverse effects of climate change on agriculture. The main source of groundwater recharge is rainfall, which contributes nearly 64 percent of the total annual recharge. Variability in the onset, withdrawal and quantum of rainfall during the monsoon season has profound impacts on water resources, power generation, agriculture, economics, and ecosystems in the country.

The total annual groundwater recharge in the country hovered between 431 to 447 BCM during 2004 to 2020 (Fig. 1). The annual extractable groundwater resources have been 91 to 92 percent of total recharge during the period under context. The annual groundwater extraction for irrigation, domestic and industrial use was 231 BCM in 2004, but it up surged to 245 BCM in 2020. The overall annual groundwater extraction has been in the range of 58-63 percent of extractable water during the period under context.

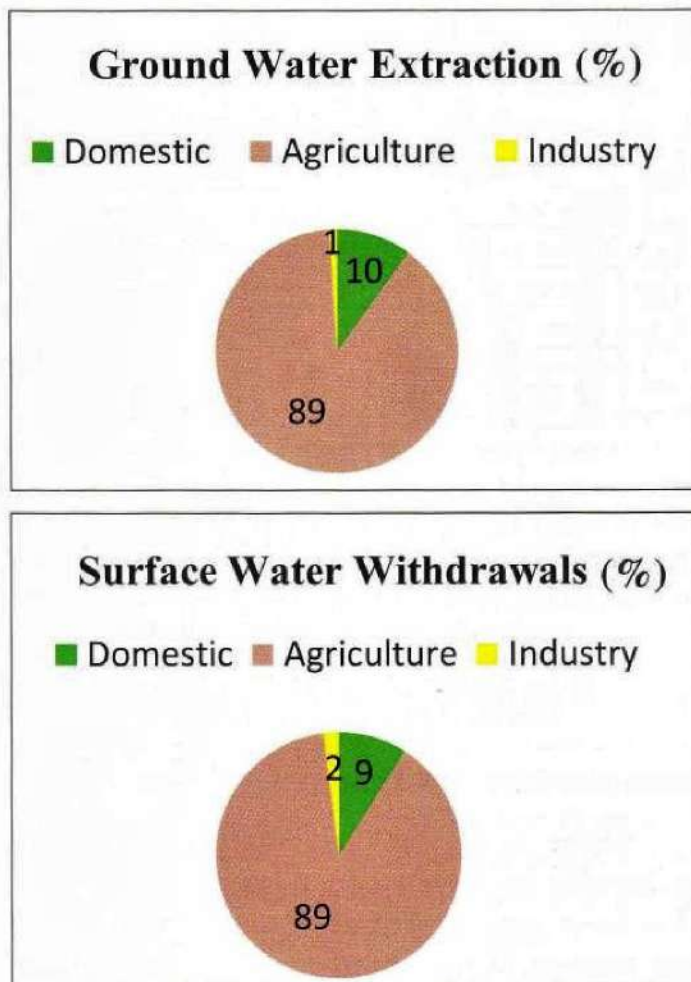
Figure 1: Ground Water Resource Assessments of India (BCM)



Source: *Dynamic Groundwater Resources of India, 2020, Ministry of Jal Shakti, GOI.*

The largest user of ground and surface water in the country is irrigation sector which accounted for about 89 percent of total ground as well as surface water extraction in 2020. (Fig.2).

Figure 2: Ground and Surface Water Extraction for Different Uses in India (2020)



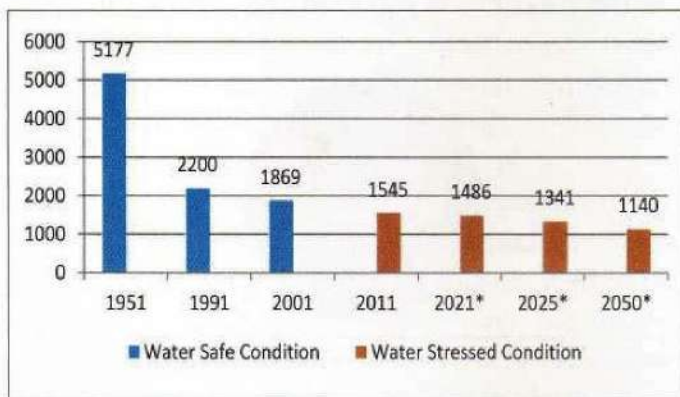
Source: *Dynamic Groundwater Resources of India, 2020, Ministry of Jal Shakti, GOI.*

Per Capita Availability of Water

Per capita availability of water in the country has been falling progressively due to rapid population growth and environmental factors. The average annual per capita water availability in India was as high as 5,177 cubic meters in the year 1951 (Fig. 3). It sharply slid down to 1,869 cubic meters in the year 2001 and to 1,545 cubic meters in 2011. As per the report released by the Ministry of Jal Shakti on dated 25 March 2021, per capita annual availability of water in the country is estimated to be at 1,486 cubic meters in the year 2021. It is expected to fall to 1,341 cubic meters in 2025 and further to 1,140 cubic meters by the years 2050. The per capita

annual water availability of less than 1,700 cubic meters is considered as water-stressed condition, whereas below 1,000 cubic meters it is considered as water scarcity condition. Due to wide temporal and spatial variations of precipitation, the water availability of many regions in the country is much below the national average and can be considered as water stressed/ scarce state.

Figure 3: Per Capita Availability of Water in India (Cubic Meters)



Sources: (1) *Master Plan for Artificial Recharge to Groundwater in India (2020)*, Ministry of Jal Shakti, GOI.

(2) *Per Capita Availability of Water*, Press release by Ministry of Jal Shakti, GOI on March 25, 2021.

Water for Rural Livelihood

Water is a core component to ensure sustainable rural livelihood. It is an essential input to achieve growth with equity along with health and hygiene of rural masses. All the agricultural and allied activities like livestock, horticulture, floriculture, fisheries, etc. cannot grow and sustain without the adequate supply of water. Many other job oriented activities in rural areas like food processing also require a considerable amount of water. In order to improve rural livelihood, expand local economies, create decent jobs, and maintain a healthy and productive workforce in rural areas, it is essential to provide improved access to irrigation and drinking water through efficient water management.

Challenges in Water Management

India is facing a number of challenges in water management such as high inter-temporal and spatial variations in the availability of water resources due to varied hydro-meteorological conditions, declining per-capita water availability

due to ever increasing population, inadequate water storage for meeting future demands, over-exploitation of groundwater resources, poor quality of water, low water use efficiency, and so on.

Over-Exploitation of Water Resources

The blatant, indiscriminate and irrational use of groundwater has led to its extraction in excess of annual replenishment in several parts of the country, particularly in the river basins lying in north-western region and parts of south India. The overall stage of groundwater extraction (ratio of annual withdrawal to annual availability) in the country was at nearly 62 percent in 2020. This ratio stood very high (more than 100 percent) in the states of Punjab, Haryana, Rajasthan and Delhi. Over extraction of groundwater has resulted in adverse environmental impacts including declining groundwater levels and deterioration in quality. The climate change also poses challenges to water security as more extreme rates of rainfall and evapotranspiration intensify the impacts of floods and droughts. The groundwater needs to be used and managed judiciously by maintaining a proper balance between availability and utilisation for its long-term sustainability. In this context, rainwater harvesting is one of the most important initiatives which can help in a long way in sustaining the water supply in rural areas.

Stressed Water Demand

Water use has been increasing worldwide by about 1 percent per year since the 1980s due to population growth, socio-economic development, and changing consumption patterns. Unfortunately, India is not an exception to this trend, as it has emerged as the largest consumer of groundwater in the world. India is placed at 13th rank among the world's seventeen extremely water-stressed countries. As per the report submitted by the Committee on Restructuring the Central Water Commission (CWC) and the Central Ground Water Board (CGWB) 2016, if the current pattern of demand continues, nearly half of the demand for water will remain unmet by 2030, which can cause social upheaval and disruptions.

Government Initiatives

Steps for conservation, augmentation and

efficient management of water resources are primarily taken by the State Governments, as water is a State subject. In order to support and supplement the efforts of the State Governments, Central Government provides technical and financial assistance to the States through various schemes and programmes. At the central level, the Ministry of Jal Shakti is the nodal agency responsible for policy formulation, planning, funding and coordination of programmes for sustainable water management.

Government of India is committed towards the rational and efficient water management to ensure sustainable rural livelihood in the country. To this effect, Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) was launched on 1 July 2015 with the motto of *Har Khet Ko Paani*. The scheme is being implemented to expand cultivated area with assured irrigation, reduce wastage of water and improve water use efficiency. The scheme also focuses on creating protective irrigation by harnessing rainwater at micro level through *Jal Sanchay and Jal Sinchan*. Micro-irrigation is also incentivised through subsidy to ensure water use efficiency in the agriculture sector by promoting appropriate technological interventions like drip and sprinkler irrigation technologies and encourage the farmers to use water saving and conservation practices. Focusing on water conservation, capacity building and minimising wastages, the National Water Mission (NWM) was launched in the year 2009. It also aims at ensuring equitable distribution of water both within and across States through integrated water resource development and management.

The Government of India has accorded high priority not only to improve irrigation facilities in rural areas but also on providing clean and safe drinking water to every rural household. As a part of this endeavour, Prime Minister announced Jal Jeevan Mission-*Har Ghar Jal* (JJM) on 15 August 2019. The JJM aims to provide adequate and safe drinking water to every rural household through a functional tap connection by the year 2024. For the implementation of this pan India movement on water, there is provision of an outlay of Rs 3.60 lakh crore in partnership with States. With the objective to improve water availability conditions in the country, a campaign for water security and

conservation under *Jal Shakti Abhiyan* (JSA) was launched in the year 2019 in 256 water-stressed districts. Realising the utmost importance of rainwater conservation and recharge, a campaign under Jal Shakti Abhiyan, "Catch The Rain 2022" was launched by Hon'ble President of India Shri Ram Nath Kovind on March 29, 2022. The Ministry of Jal Shakti has proposed the implementation of this campaign with the theme *catch the rain where it falls, when it falls* from April to November 2022. The recommendations for the implementation of the campaign are (i) water conservation and rain water harvesting (ii) renovation of traditional and other water bodies (iii) re-use of bore well recharge structures and (iv) watershed development. Central Government has formulated a National Perspective Plan (NPP) for Water Resources Development which envisages transfer of water from water surplus basins to water deficit basins through inter-linking of rivers. Under the NPP, the National Water Development Agency has identified 30 links (16 Peninsular and 14 under Himalayan Component) to be pursued in a consultative way.

It has been observed that the regions where the crops like paddy, wheat and sugarcane are grown have higher groundwater stress levels. In view of this, Crops Diversification Programme (CDP) is being implemented in the original green revolution states viz. Punjab, Haryana and Western UP since 2013-14, to shift towards less water requiring crops such as oilseeds, pulses, coarse cereals, nutri cereals, cotton, etc. An amount of Rs 120 crore as Central share was earmarked for implementation of the programme during 2021-22. The crop diversification in the country has also been promoted through the MSP policy. In recognition of river Ganga's significant economic, environmental, cultural and religious value, the Government of India has declared river Ganga as the national river in 2008. Further, the Government of India launched the Namami Gange Mission in 2014 as an integrated and multi-sectoral mission for conservation of Ganga and its tributaries. The Mission aims to protect, conserve and rejuvenate the basin of river Ganga.

Future Initiatives

The total population of India is estimated to be around 1,388 million in 2021. Due to

stagnant water resources on the one hand and ever increasing population on the other hand, per capita annual water availability in the country has come down sharply during the last 70 years. It is estimated to decline to 1,341 cubic meters by 2025. If the current trends in the demand and supply of water continue, then soon India is likely to become a water-scarce country. This will have serious implications for the sustainability of agriculture, food security, livelihoods, rural sanitation, and sustainable growth. For making India a water secure nation, especially the rural regions of the country, a lot of challenges are needed to be addressed from both, the demand as well as the supply side of water. From the demand side; population pressures, changing cropping pattern, high rate of urbanisation, rapid industrialisation, and issues relating to climate change need to be urgently addressed. On the supply side; proper conservation, storage, and distribution of water need to be prioritised. To meet the increasing demand of water for irrigation and drinking purposes increased public investment for the creation of water infrastructure is also the need of the hour.

Over exploitation of groundwater is also a cause of concern. Groundwater is not only the main source of irrigation for about 60 percent of the net irrigated area but also fulfills more than 85 percent demand for potable water in rural areas. The problem with the groundwater is that it is not only depleting at a rapid rate, but in some parts of the country it is highly contaminated with the presence of arsenic and fluoride. In this context, necessary technological interventions are needed for the treatment and removal of contaminants and promotion of the re-use of water. Rainwater harvesting and artificial recharge of groundwater by utilising surplus rainfall runoff is also the best supply side water management option for the sustainability of groundwater sources.

The existing cropping pattern is skewed towards cultivation of sugarcane, paddy and wheat which has led to depletion of fresh groundwater resources at an alarming rate in many parts of our country. Crop diversification can be used as a useful tool to promote sustainable agriculture. Natural farming can also be promoted to sustain agricultural production with eco-friendly processes

in harmony with nature. In order to widen the access and availability of water in rural areas, there is the need to take steps to preserve and use the water judiciously with the active community participation. Emphasis should be on addressing critical gaps in the value chain through technology infusion, optimal water management to achieve 'Per Drop, More Crop'.

Proper water resource management, revival of aquifers, and traditional rainwater harvesting structures with the active participation of local communities and NGOs also need to be promoted. The groundwater resources should be managed carefully, through improving the recharge of water resources and plugging over-exploitation to prevent the critical and semi-critical assessment units from further worsening. Last but not least, public awareness regarding the rational use of water needs to be promoted through education, information and communication.

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