CHAHAL ACADEMY

# WATER CONSERVATION

## KURUKSHETRA (JUNE 2023)

# 1 FOSTERING WATER MANAGEMENT FOR FOOD SECURITY

The global food system and its sustainability are faced with a number of issues as a result of the growing demand on natural resources, particularly land and water. In the coming years, one of the key elements in ensuring water security and achieving the SDGs will be water management.

### Need for Water Management & Conservation

- Water is a critical component of agricultural output and food security.
- Agriculture is the world's largest water user, accounting for over 70% of all surface and groundwater withdrawals through irrigation.
- Rainfed farming generates 60% of the world's food while using just 80% of the cultivated land. Irrigated farming delivers 40% of global food output on 20% of the land (FAO, 2021).
- In India, agriculture consumes 80-90 percent of overall water consumption, while half of the agricultural land is still rainfed.
- Irrigation improves agricultural yields by 100 to 400% in most cases.
- In India, net irrigated agriculture covers 75456 thousand hectares, while gross irrigated agriculture covers 112229 thousand hectares (DE&S, 2023).
- In India, the yearly precipitation, including snowfall, is the primary supply of water.
- India has around 18% of the world's population yet only 4% of its water resources.
- The availability of water per capita in India is less than 1000 cubic metres, making it one of the world's most water-stressed countries (NITI, 2018).
- With a larger population by 2050, agriculture would need to generate over 50% more food, livestock feed, and biofuel than in 2012 to meet global demand and stay on track to achieve 'zero hunger' (FAO, 2021).
- The Government of India is taking many steps to conserve water and produce optimum yield with minimal water.
- Water conservation initiatives include the **Sahi Fasal campaign, River Development and Ganga Rejuvenation, National Water Mission, Pradhan Mantri Krishi Sinchayee Yojana (PMKSY)-Har Khet Ko Pani (HKKP), Per Drop More Crop, Atal Mission for Rejuvenation and Urban Transformation (AMRUT), Repair, Renovation and Restoration (RRR)** of Water Bodies Scheme, and others.

### Water Conservation Strategies in Agriculture

The Government of India has implemented a number of projects to conserve water and increase production while using less water. Some of them are given below-

### Pradhan Mantri Krishi Sinchayee Yojana (PMKSY)

- It is a centrally sponsored scheme that was launched in 2015 and has a budget of Rs 93,068 cr. for the years 2021-26.
- The scheme uses source generation, distribution, administration, field application, and extension efforts to provide an entire end-to-end solution for irrigation.
- It was formed by amalgamating the following schemes:
- **Accelerated Irrigation Benefit Programme (AIBP)** – Ministry of Jal Shakti, Department of Water Resources, River Development and Ganga Rejuvenation.
  - ➢ Integrated Watershed Management Programme (IWMP) – Department of Land Resources (DoLR), Ministry of Rural Development.
  - ➢ On Farm Water Management (OFWM) – Department of Agriculture and Cooperation (DAC).

### Per Drop More Crop (PDMC)

- In 2015, PDMC was launched as a part of PMKSY. From 2022-23 PDMC is being implemented under Rashtriya Krishi Vikas Yojana (RKVY).
- The micro-irrigation technologies that PDMC specialises in include sprinkler and drip irrigation systems.
- The GoI offers subsidies through this scheme to other farmers and small and marginal farmers at a rate of 45% and 55% of the suggested unit cost, respectively.

### Sahi Fasal Campaign

- The Sahi Fasal campaign is a component of the

National Water Mission, launched in 2019 by the Ministry of Jal Shakti.

- The "Sahi Fasal" programme was launched to motivate farmers in water-stressed regions to cultivate crops that are not only healthy and nutrient-dense but also economically rewarding, compatible with the region's agro-climatic-hydro features, and environmentally responsible.

**Bhartiya Prakratik Krishi Padhati (BPKP)**

- This scheme promotes Natural Farming. It is estimated that Natural Farming requires 50 to 60 percent less water and electricity and reduces methane emissions.
- The BPKP advocates natural farming, a traditional farming-based, diversified farming system devoid of chemicals that combines crops, trees, and cattle with functional biodiversity.
- The objectives of the scheme include reducing agricultural costs, restoring the soil ecosystem, and ensuring environmental sustainability.

Through numerous ongoing programmes, including the **National Food Security Mission (NFSM), Rashtriya Krishi Vikas Yojana (RKVY), Mission for Integrated Development of Horticulture (MIDH), National Mission on Oilseeds and Oil Palm (NMOOP), National Mission for Sustainable Agriculture (NMSA), and Rainfed Area Development,** the Ministry of Agriculture and Farmers' Welfare has made concerted efforts to encourage the diversification of agricultural and horticultural crops in accordance with local needs.

Way Forward

- Since water is a state subject, cooperation is necessary to implement measures for resource augmentation, conservation, and effective management among states.
- Ecosystem services and incentives should be considered to promote the optimal use of water resources.

# 2 WATER CONSERVATION THROUGH COMMUNITY PLANNING

The comprehensive development of fundamental infrastructure is necessary to realise the goals of inclusive growth with fairness and social justice. To ensure a healthy and economically productive society and become a water-secure country, it is crucial to arrange an appropriate, timely, and inexpensive water supply. Only 6% of the nation's annual 1,200 mm of rainfall is stored, therefore saving and conserving water is crucial to supplying the nation's water needs.

**Community Participation in Water Conservation**

According to the Indian Constitution, "water" is a state subject. Therefore, the primary duty for actions to increase, conserve, and manage water resources has remained with the respective states.

- The different central government schemes support state initiatives to save water by providing the necessary technical and financial support.
- Better results come from civic involvement in public development endeavour management procedures.

| Initiative | Implementing State | Details |
|---|---|---|
| Neeru-Chettu | Andhra Pradesh | ➢ It aims to increase awareness and group engagement in order to make the state more drought resistant through better water conservation.<br>➢ Through the desilting of tanks and feeder channels, among other methods, the activity entails revitalising and reinvigorating water supplies. |
| Jal Jeevan Hariyali | Bihar | ➢ It aims to persuade farmers to take part in government water conservation initiatives and educate them about the use of alternative crops, organic farming, drip irrigation, and other irrigation-less technology.<br>➢ It entails locating, repairing, and renovating all public storage facilities, including canals, |
| Sujalam Sufalam Jal Sanchay Abhiyan | Gujarat | ➢ The government is contributing 60% of the cost of the work in this Public Private Partnership (PPP) venture.<br>➢ Before the monsoon arrives, the endeavour involves deepening the water bodies to improve storage. |
| Jal Hi Jeevan Hai | Haryana | ➢ It motivates farmers to plant crops that use less water, such as maize, arhar, etc. |
| Pani Panchayat | Odisha | ➢ It seeks to ensure the best possible use of water while enhancing agricultural output. |
| Jalyukht Shivar Abhiyan | Maharashtra | ➢ By removing water scarcity from 5000 villages per year, the goal is to eradicate drought in Maharashtra.<br>➢ Water streams must be widened and deepened, stop dams must be built out of cement and dirt, etc. |
| Mukhya Mantri Jal Swawalamban Abhiyan | Rajasthan | ➢ By inspiring beneficiaries and locals to participate, projects are carried out through the fusion of plans from multiple departments.<br>➢ Management of rainfall, runoff, groundwater, and in-situ soil moisture are all part of the conservation efforts. |
| Mission Kakatiya | Telangana | ➢ The plan intends to expand small-scale irrigation throughout the state with community involvement for long-term water security. |

**Water Conservation Initiatives of the Union Government**

- India has a net-sown area of around 141 million hectares, of which 65 million hectares (or 45 percent) are currently submerged in irrigation of any source.

India depends heavily on rainfall, therefore farming in unirrigated areas is risky, less lucrative, and less effective. Assured irrigation enables farmers to spend more on farming equipment and inputs, increasing their output and income.

- Through effective water resource management and the promotion of the slogan "Per Drop More Crop," the Pradhan Mantri Krishi Sinchayee Yojana seeks to guarantee sustainable access to some kind of irrigation to all agricultural farms in the nation.

The following PMKSY components require sufficient community planning and involvement throughout the implementation phase:

- **Har Khet Ko Pani.**
- **Watershed Development.**
- **Per Drop More Crop**
- **MGNREGA** - The Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) places a strong emphasis on the building of water harvesting and conservation projects.
  - ➢ The MGNREGA allows watershed development activities, and the PRI (Panchayat Raj Institutions) are responsible for planning, implementing, and overseeing National Resource Management Works, which include irrigated area command area development, afforestation, plantation, and horticulture, as well as watershed development for rain-fed areas.
- **Jal Shakti Abhiyan** – This is a mission to enhance groundwater conditions and water availability in the water-stressed blocks of 256 districts in India.
- **Atal Bhujal Yojana** – With community involvement, the Atal Bhujal Yojana intends to manage groundwater sustainably in areas of Gujarat, Rajasthan, Haryana, Uttar Pradesh, Madhya Pradesh, Maharashtra, and Karnataka that have been identified as being overexploited and experiencing water stress.
- The **Ministry of Jal Shakti** has also taken other important measures for water conservation through active community participation – **National Aquifer Mapping and Management (NAQUIM)** Programme, Rain Area Development Programme (RADP), National Perspective Plan, Catch the Rain and Sahi Fasal campaigns.

**Measures for the Success of Water Conservation Efforts**

Gram Panchayats are given the authority to design and oversee rural water supply and sanitation systems by the 73rd Constitutional Amendment. Water conservation-related initiatives require significant community involvement through PRIs (Panchayati Raj Institutions), Self Help Groups (SHGs), Farmer's Groups, and Cooperatives in order to be planned and implemented effectively. The community should assume the role of being Programme Implementing Agencies (PIAs) through PRIs.

For initiatives to save water in rural regions to be successful, the community should make sure that:

- The formulation of a village action plan, an irrigation plan, and a water security plan.
- Discuss and consider the viability of water plans, and look at new sources of funding for water conservation initiatives.
- To ensure recharging, storage, and availability of water as well as to address issues connected to water quality utilisation, preparation of a water reserve audit and a water safety plan is required.
- encouraging the efficient use of finances and the timely completion of projects.
- Set up training and capacity-building initiatives on gathering, storing, and using water, etc., for grassroots workers.

**Conclusion**

The Water conservation programmes will only be successful if the community and end users are involved at various levels of programme implementation.

# 3 EDUCATING PEOPLE TO SAVE EVERY DROP OF WATER

The United Nations has set a goal under its 2030 Agenda for Sustainable Development to guarantee that everyone has access to clean water and sanitation (SDG 6), in response to the worldwide water crisis. However, the 2019 United Nations World Water Development Report shows that at least one month out of every year, nearly two-thirds of the world's population experiences severe water scarcity.

- India receives plenty of rainfall, but because of poor water management practises and rising urbanisation, it frequently experiences droughts, floods, and water shortages.
- A united effort from many stakeholders, including the government, civic organisations, management, educational institutions, NGOs, media, and society as a whole, is needed to address the water situation.
- Structured, long-term programmes are required to raise people's awareness, educate them, and motivate and reward them for conserving every drop of water.

**National Water Mission (NWM)**

The National Water Mission is one of the eight missions under the National Action Plan on Climate Change (NAPCC).

- Through integrated water resources management and development, NWM's primary goal is to conserve water, reduce wastage, and ensure that it is distributed more fairly between and within states.
- Promoting state and citizen initiatives for water conservation, augmentation, and preservation is one of the National Water Mission's five objectives.
- Awarding groups or businesses for water conservation and resource efficiency is one of NWM's techniques for achieving Goal IV. The biennial NWM Water Awards honour outstanding water management, efficient water usage, and conservation efforts.
- **Water Talk** – The NWM hosts a lecture series called "Water Talk" with the goal of promoting information sharing about water-related subjects. Every third Friday of the month, talks by industry professionals and experts are held as part of the Water Talk series.

**'Catch the Rain' campaign**

- The "Catch the Rain" campaign is being run by the NWM.
- World Water Day was celebrated on March 22, 2021, when this campaign was officially launched.
- The campaign's slogan, "Catch the rain, where it falls, when it falls," aims to inspire states and other stakeholders to build and maintain adequate rainwater harvesting systems (RWHS), adapted to the local soil strata and climatic circumstances.
- The local community is encouraged to actively participate in the campaign by helping to enact policies that will increase water bodies' capacity for storage.

**Strategies to Educate People**

- Individuals can be empowered to take control of their water consumption and guarantee that every drop of this priceless resource is protected through education and awareness-raising efforts.
- The necessity for water conservation has already been the subject of numerous mass awareness initiatives, including media campaigns, puppet performances, street theatre, jal yatras, etc.
- The following actions could also be taken to mobilise the public around water conservation:
  - Social Media – can be used to proactively interact with individuals in real-time communication.
  - Conventional Media – which includes outlets like TV, newspapers, and radio since they have significant national reach.
  - Educational Institutions.
  - Engaging Communities – organising community programmes like seminars, workshops etc.
  - Incentives and Rewards – Incentives like tax breaks and discounts can be provided to entice individuals to save water. With financial assistance from the federal or state governments, this can be done at the local level.

- Involving Private Sector – There are already some private organisations which are running campaigns for the conservation of water.
- Engaging with eminent personalities Celebrity support might be sought to raise awareness of water conservation efforts and get the public's attention.

Amplifying the wonderful work being done to conserve water and educating people about it could be an effective approach to spread the message.

# 4 MAKING VILLAGES WATER SUFFICIENT

India is home to 18 percent of the global human population and 15 percent of the global livestock population. However, it has only 2 per cent land mass and 4 percent of global freshwater resources.

- Over the years, our demand for water resources has increased manifold. Towards this goal, various efforts are being undertaken, including rejuvenation of inactive water bodies, construction of water recharge pits, promotion of rainwater harvesting, treatment of wastewater and so on.
- Under national flagship schemes, such as the Mahatma Gandhi-NREGA, and Jal Jeevan Mission (JJM) many activities are taken up for sustainable and efficient water resource management.

A strategy for accomplishing the Sustainable Development Goals (SDGs) is the localization of the Sustainable Development Goals (LSDGs) through PRIs (Panchayati Raj Institutions).

The **17 UN- SDGs** have been remapped into 9 broad themes –

- Theme 1 – Poverty free and enhanced livelihood villages.
- Theme 2 – Healthy village.
- Theme 3 – Child-friendly village.
- Theme 4 – Water sufficient village.
- Theme 5 – Clean and green village.
- Theme 6 – Self-sufficient infrastructure in the village.
- Theme 7 – Socially secured village.
- Theme 8 – Village with good governance.
- Theme 9 – Engendered Development in village.

Localisation of SDGs (LSDGs) have been included in PRIs (Panchayati Raj Institutions) by the Ministry of Panchayati Raj (MoPR). The revised Rashtriya Gram Swaraj Yojana (RGSY), which aims to empower 2,78,000 PRIs or elected rural local governments to carry out a set of social goals that the United Nations has deemed important for sustainable development, has received approval from the GoI for a budget of Rs 5911 crore.

**Envisioning Water Sufficient Village**

Many other SDGs are connected to LSDG Theme 4: Water Sufficient Village. For instance, insufficient water for irrigation causes marginal farmers and landless labourers to earn low wages and makes it likely that their standard of living will fall below the poverty line (SDG 1-Zero Poverty), while sufficient water for irrigation will increase agricultural productivity (SDG 2-Zero Hunger), and so on.

- Theme 4 – "Water Sufficient Village," is multifaceted and directly relates to issues such as gender equality, health, education, and the sustainable and effective use of natural resources.
- Nine sub-goals have been established under Theme 4 with 25 Modified GP (Gram Panchayat) Level Indicators to evaluate, examine, and track the progress.

**Goals proposed under Theme 4 - Water Sufficient village**

| Sl No. | Goals |
|---|---|
| 1 | Providing access to clean Water to all households and public buildings in the villages by 2024 |
| 2 | Provide access to Sanitation in the villages |
| 3 | Achieve ODF Sustainability |
| 4 | Grey Water management |
| 5 | Per capita availability of water in villages |
| 6 | Construction of rainwater harvesting and recharge works |
| 7 | Safeguarding of water bodies |
| 8 | Constitution of Village Water and Sanitation Committees (VWSCs) in each Gram Panchayats |
| 9 | Water efficient Agricultural practices |

- To ensure that resources (people, knowledge, financial, and administrative) go to the endpoint (village, farmer, or family), a solid plan is required. All current schemes must be familiar to PRIs, and they must be able to create detailed action plans.
- The GP must investigate resources from a variety of programmes, including the 15th Finance Commission Funds, the Jal Jeevan Mission (JJM), MGNREGA, Swachh Bharat Mission Gramin (SBM-G), the National Rural Drinking Water Programme (NRDWP), the Pradhan

Mantri Krishi Sinchayee Yojana (PMKSY), etc. to establish water sufficiency in the village.

- The GP must collaborate closely with other rural stakeholders like SHGs, ASHA, Swachhata Doots, Water User Associations (WUAs), NGOs, and officials in charge of drinking water and sanitation, among others.

**Learning from the Good Initiatives and Practices**

- In various regions of the nation, there are numerous programmes that are producing results for the restoration, conservation, and sustainable use of water resources. Such initiatives must be documented, and attempts at replication with any appropriate customization should be performed.
  - ➢ The Mission Bhagiratha initiative is used in Telangana state's villages to provide all households with clean, sustainable drinking water. Additionally, the Mission Kakatiya scheme was put into place to restore the irrigation tanks to their full capacity, and the MGNREGA programme is responsible for a number of water conservation projects such building check demand structures, other harvesting structures, desilting feeder and field channels, etc.
  - ➢ By estimating water availability and use, Kerala is the first state in the nation to create a water budget based on local self-government bodies. The water budget attempts to educate the general population about the importance of water conservation while also presenting scientific methods for the preservation of water resources.
  - ➢ In order to ensure water security in Sikkim, attempts were undertaken under the Jal Dhara Vikas initiative (using Mahatma Gandhi-NREGA resources) to improve spring water flow in the state.

**Conclusion**

Local institutions like Panchayats play an important role in acquiring Water Sufficient Village status. In addition, all water-related issues must be addressed in the Gramme Panchayat Development Plan (GPDP). People's participation, community-led management, training and capacity building of public relations functionaries and officials from various line departments would produce the required results in terms of water-sufficient villages.

# 5 WATER USE EFFICIENCY ENSURING WATER SUSTAINABILITY

- 'Water' is at the heart of the 2030 Agenda for Sustainable Development.
- Goal 6.4 of the Sustainable Development Goals tackles water usage efficiency and water stress.
- SDG objective 6.2 states, "By 2030, substantially increase water use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity."

**Water Use Efficiency**

Water Use Efficiency is defined as the ratio of effective water use to actual water extraction.

- Improving water usage efficiency in all sectors of water use (agricultural, drinking, domestic, etc.) is critical for sustaining life in the face of climate change issues in the water sector.

**Water Use Efficiency in Agriculture**

India is an agrarian country, with agriculture providing a living for approximately 58% of the people.

- Water Use Efficiency (WUE) in irrigation is the ratio of irrigation water consumed by a crop on an irrigated farm, field or project to the amount of water given from the source. Some water is lost in the field due to conveyance, distribution, and application.
- Because agriculture is the major consumer of water resources in India, even a modest percentage savings in this sector will have a significant influence on the availability of water for drinking and residential needs.

**Methods for Improving Water Use Efficiency in Agriculture**

**1. Micro Irrigation -**

- Water Use Efficiency (WUE) with micro-irrigation, including drip irrigation, can reach 80-95%, compared to 30-50% in conventional flood irrigation.
- Micro-irrigation techniques also aid in lowering water logging, fertiliser usage, labour costs, and other input costs, as well as increasing agricultural output and farmers' revenue while preserving soil health.

**2. Fertigation Studies -**

- Different fruit and vegetable crops demonstrated a 25% reduction in fertiliser use with this method.
- For 24 crops and agriculture systems, the ICAR has standardised drip irrigation and fertigation regimens.

**3. Mulching**

- Mulching helps to increase Water Use Efficiency by reducing water loss through evaporation from the plant root zone.
- Mulch is a material that is laid on top of the soil, such as plastic sheets or organic material.
- The usage of mulch materials in agriculture saves roughly 10% of the water.

**4. Drought- Tolerant Crops**

- Growing crops that are suited to the region's environment also aids in yielding more crops each drop.
- For prudent water use, the ICAR has produced many drought-tolerant short-duration crop varieties that suit distinct agro-climatic zones of the country.

**Initiatives to increase Water Use Efficiency in the Agriculture**

- Reduce transportation losses by lining channels or, preferably, utilising closed conduits.
- Avoiding mid-day sprinkling reduces evaporation.
- Reduce run-off and percolation losses due to over-irrigation.
- Select the most suitable and marketable crops for the region.
- Use appropriate insect, disease and parasite control.
- Apply manures and green manures where possible and fertilise effectively.
- Apply weed control measures.
- Practice soil conservation for long-term sustainability.
- Irrigate in the exact amounts to prevent water deficits, taking into account weather conditions and crop growth stages.

**Initiatives to increase Water Use Efficiency in the Agriculture Sector**

The Government of India, through several ministries and departments, has taken numerous initiatives to improve WUE in agriculture -

- **Pradhan Mantri Krishi Sinchayee Yojana (PMKSY)** (Refer to Chapter 1)
- **Accelerated Irrigation Benefit Programme (AIBP)** – The GoI established AIBP in 1996-97 to give Central Loan Assistance (CLA) to major and medium irrigation projects that were nearing completion in order to realise the desired potential, resulting in water savings and efficiency improvements.
  - ➢ AIBP was amalgamated with PMKSY in 2015-16.
- **Command Area Development and Water Management (CADWM)–** In 1974-75, the GoI established CADWM to bridge the gap between IPC (Irrigation Potential Created) and IPU (Irrigation Potential Utilised).
  - ➢ With the launch of PMKSY, CADWM was included under the Har Khet Ko Pani component of the PMKSY.
- **Har Khet Ko Pani (HKKP) –** HKKP is a component under PMKSY and aims at ensuring water to every farm through assured irrigation.
- **Per Drop More Crop** – assures increased production through micro-irrigation (also a PMKSY component).
- **National Water Mission (NWM) –** In June 2008, the National Water Mission was launched with five goals. One of NWM's most important goals is to reduce the WUE by at least 20%. One significant strategy for achieving this goal is to conduct research on raising WUE in agriculture, industry, and residential usage.
- **Bureau of Water Use Efficiency (BWUE)** - The BWUE was founded in October 2022 as part of the National Water Mission to accomplish the aim of 20% improvement in WUE.
  - ➢ BWUE serves as a catalyst for the advancement of WUE in a variety of industries, including agriculture, industry, and power generation.
- **Sahi Fasal Campaign**
  - ➢ The National Water Mission launched a campaign called 'Sahi Fasal' to nudge farmers in water-stressed areas to grow crops that are not water intensive, but use water very efficiently, are economically remunerative, are healthy and nutritious, and are suited to the agro-climatic-hydro characteristics of the area, weaning them away from water-intensive crops like paddy, sugarcane, and so on.

**Water Use Efficiency (WUE) in Industrial Sector**

According to recent assessments, industrial water use would quadruple between 2005 and 2030, putting additional strain on the country's already over-allocated water resources.

- Between 2013 and 2016, water constraint forced the closure of at least 20 of India's top thermal utilities, costing a total of USD 1.4 billion. Companies must consequently put water resource management above the domain of corporate social obligations.

**Initiatives to increase WUE in Industrial Sector**

TERI has been awarded a benchmarking study on 'Benchmarking Industrial Water Use to Assist Policy for Enhancing Industrial WUE in India' by the National Water Mission.

- In phase 1, the study would focus on two industrial sectors – thermal power plants and textile industries.
- In phase 2, water audit in pulp and paper, and steel industries would be taken up.

**Initiatives to boost WUE in the domestic sector**

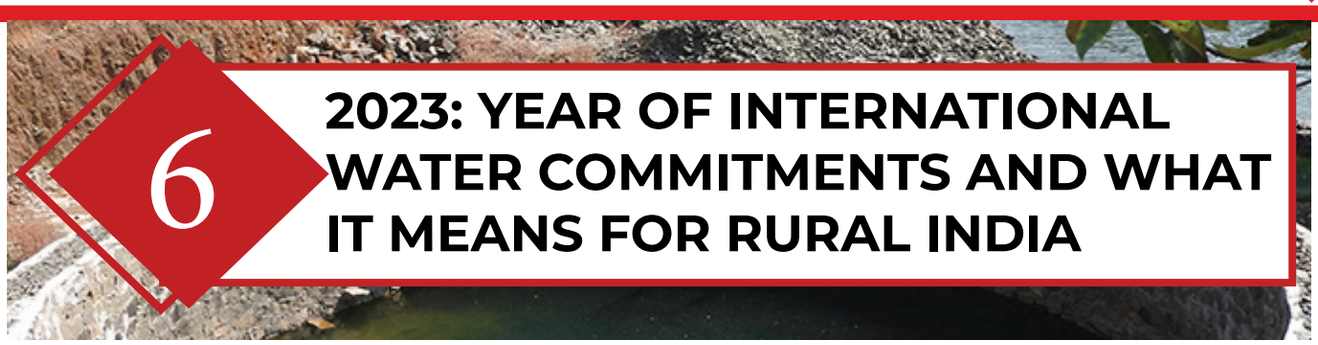
- The National Water Mission has advised BIS to develop standards for water-efficient plumbing items.

**AMRUT Mission**

The mission of AMRUT is to promote sustainable water management in urban areas.

**Conclusion**

- Enhanced water use efficiency will go a long way towards effectively coping with the challenges posed by climate change and an ever-increasing population on available water resources, and will result in optimum and efficient use of precious water, contributing to increased productivity, prosperity, and sustenance.



# 6 2023: YEAR OF INTERNATIONAL WATER COMMITMENTS AND WHAT IT MEANS FOR RURAL INDIA

The year 2023 is significant both nationally and internationally for the world's water-related goals.

- The United Nations declared 2018-2028 the International Decade for Action on Water for Sustainable Development in 2017. The year 2023 marks the midpoint of the decade for both water action and SDGs.
- The IPCC Sixth Assessment Report, IPCC Report 2021, emphasises that the water cycle is increasingly susceptible to global warming, with a one-degree temperature rise triggering an increase in droughts, floods, and cyclones. These problems affect almost 40% of the world's population.
- According to projections from the United Nations Office for Disaster Risk Reduction in 2019, India has experienced losses of Rs 5.61 lakh crore owing to catastrophic climate events over the last two decades.
- According to a 2021 assessment by the Council on Energy, Environment, and Water (CEEW), more than 75% of India's districts are severe event hotspots, and more than 80% of India's population lives in districts that are highly vulnerable to catastrophic hydromet catastrophes such as droughts, floods, and cyclones.

Climate change has resulted in water scarcity, water quality degradation, infrastructure damage, and the rise of waterborne diseases.

**Water Matters for Rural India**

According to the 2011 Census, 53% of districts in India are rural, with 37% exposed to the effects of extreme hydromet catastrophes. As a result, it is critical to provide water security in rural regions in order to lessen the effects of droughts, floods, and cyclones.

- Agriculture and WASH (water, sanitation, and hygiene) are the two sectors with the biggest water demand. Agriculture accounts for the majority of water consumption (almost 80%), but WASH is equally vital for public health.
- Groundwater is becoming increasingly important in addressing water demands. According to the Central Ground Water Board (CGWB) Analysis 2022, around 30% of the country's assessment units are semi-critical, critical, or over-exploited. Given that more than 80% of rural water delivery schemes rely on groundwater sources, non-regulation of groundwater may be a cause for concern in the future.

Major International Commitments and Outcomes

**1. Group of Twenty (G20)**

- As part of the Environment and Climate Sustainability Working Group (ECSWG), a special global water debate is being held as part of India's G20 Presidency. It aims to achieve sustainable water resource management in accordance with SDG-6 by 2030.
- During the second G20 ECSWG meeting, the Ministry of Jal Shakti stressed the need of climate-sensitive development in maintaining water security, highlighting India's two flagship projects, Jal Jeevan Mission and Swachh Bharat Mission.
- The following are the desired outcomes of these dialogues:
  - ➢ Access to safe drinking water and sanitary services for everybody.
  - ➢ Local stakeholders are involved in groundwater recharging and effective use as part of groundwater management.
  - ➢ Climate resilient water infrastructure that reduces disaster risk.

**2. United Nations Water Conference (UNWC)**

- Tajikistan and the Netherlands co-hosted the United Nations World Conference on Women in March 2023 at the United Nations Headquarters in New York.
- The conference's principal conclusion is a document including voluntary and non-binding commitments to accelerate progress towards meeting global water and sanitation-related goals and targets in the second part of the Water Action Decade and the 2030 Agenda. Around 700 pledges were made in support of a water-

secure world.

- India has earmarked USD 50 billion under the action agenda to deliver clean and adequate drinking water to all rural families by 2024, far before 2030.

**3. Conference of Parties (COP)**

The COP is an annual assembly of countries organised by the UNFCCC (United Nations Framework Convention on Climate Change) to discuss and address climate change issues.

- ➢ At COP25 in 2019, the Water Action Track was formed to boost action on climate change adaptation and mitigation, with a specific focus on SDG 6.
- ➢ The Water Pavilion was established at COP26 to provide a forum for stakeholders to share knowledge and experiences on water management in the context of climate change.
- ➢ Water and sanitation were also included in agendas for the first time in 2022.

Way Forward

For India to accomplish SDG 6 ambitions, it should synergize and leverage its existing activities and commitments. India may use the collective knowledge and experiences gathered at international forums such as COP, UN Summits, G20, and so on to reinforce existing climate change initiatives and increase resilience in the water sector.

# 7 RAINWATER HARVESTING FOR SUSTAINABLE AGRICULTURE

- According to the Food and Agriculture Organisation (FAO), worldwide water withdrawal rose 1.7 times faster than population during the last century, raising concerns about the sustainability of water consumption.
- The world's water supply is estimated to be 1,400 million cubic kilometres. However, only 0.003% of this large amount, or around 45 000 cubic kilometres, are 'freshwater resources' that might be utilised for drinking, hygiene, agriculture, and industry.
- The yearly rainfall on land is 1,10,000 square kilometres, but 70,000 square kilometres evaporate before reaching the sea. The remaining 40,000 square kilometres are potentially viable for human usage, but they are spread unevenly, with two-thirds of them being washed away in floods.
- Global freshwater use is currently roughly 4,000 square kilometres, accounting for only 10% of the yearly renewable supply. As a result, rainwater collecting is the only option for closing this gap.
- Rainfed agriculture accounts for approximately 80% of global land use and 60% of food output.
- The remaining 20% of irrigated agricultural land sustains around 40% of the food supply and helps to food self-sufficiency in a number of emerging countries.
- Rain-fed agriculture accounts for 127 million ha of cultivated area in India, accounting for over 70% of total cultivated land. Agriculture is the largest water consumer, accounting for 70% of global freshwater withdrawals.

## Need for Rainwater Harvesting

- The Central Ground Water Board (CGWB) has classified 16.2 per cent of the total assessment units like blocks, mandals or talukas as 'over-exploited'; extra 14 per cent as either at 'critical' or 'semi-critical' stage.
- The annual rainfall in India is approximately 1183 mm, with the majority of this falling in a four-month period during the monsoon. Even if only 5% of annual rainfall was effectively gathered, it would yield a significant amount of water, amounting to 900 million litres. As a result, rainwater harvesting becomes critical.
- The majority of the overexploited blocks are located in the country's northwest.
- Monsoon rainfall is a major source of groundwater recharge, accounting for approximately 55% of total annual groundwater recharge.
- Monsoon rains generate more than 70% of annual ground water recharge in states such as Goa, Gujarat, Jharkhand, Kerala, Madhya Pradesh, Manipur, Meghalaya, Mizoram, Rajasthan, and Daman & Diu.
- The general depth to water level in the country ranges from 5 to 10 mbgl (metres below ground level), with very shallow water levels of less than 2 mbgl observed in a few states, including Assam, Andhra Pradesh, Meghalaya, Karnataka, Kerala, Jharkhand, and Tamil Nadu, in small patches.
- The annual groundwater recharge, also known as dynamic groundwater resources, for the entire country has been estimated to be 437.60 billion cubic metres, with natural outflows totaling 36.85 billion cubic metres.

## Potential of Rainwater Harvesting

- Summer monsoons account for 70 to 80 percent of annual rainfall in most of South Asia.
- It is predicted that approximately 24 million hectares of rainwater can be captured by tiny water harvesting devices in India's various rainfall zones.
- Rainwater collecting is an excellent technique for halting the downward trend of water levels. The surface runoff that normally goes to storm drains is used. It aids in reducing floods on roadways and roundabouts. The structures necessary for rainwater harvesting are simple, cost-effective, and environmentally benign.

## Indigenous Knowledge of Rain Water Harvesting

### 1. Khadin, Rela, Tal, Kundi and Tankas (Rajasthan)

- **Khadin**
  - ➢ Khadin is a system whereby rocky catchment areas are used to collect run-off water in a valley by constructing a bund across the flow.

- ➢ The soils of Khadin are extremely fertile because of the frequent deposition of fine sediments.

- **Rela**
  - ➢ It is a water conservation practice that aims to channel water from streams in hills to terraced farms on the edge of adjacent plains.
- **Tal**
  - ➢ Tal farming is found where runoff rainwater flows into low-lying valleys, forming stagnant pools. During the monsoon, water is lifted and used in adjacent fields.
- **Kundi**
  - ➢ It is an artificial well, which stores runoff from an artificially prepared catchment surrounding it so that rainwater that falls on the catchment rapidly runs into the well and gets stored.
- **Tankas**
  - ➢ It is dugout lined circular holes of 3-4 metres in diameter.

**2. Virda system (Gujarat)**

- The Virda system in Gujarat is like a well in a tank. The system is for procuring potable sweet water in an area where rainwater is scarce and groundwater is saline.
- Maldharis who have invented the technique, locate low-lying areas that accumulate a great quantity of rainwater from very large catchment basins.

**3. Bandharas (Gujarat)**

- In Gujarat, people are motivated to collectively harvest rainwater through bandharas (check dams) by using stone and sand filled gunny bags right after the monsoon, which has increased water availability.

**4. Haveli system (Madhya Pradesh)**

- In the Haveli system of Madhya Pradesh, farmers store rainwater in the agricultural fields itself.
- The fields are embanked, and farmers work out an arrangement amongst themselves to allow rainwater to flow from one field to another.
- The Collected water seeps into the soil and gives it enough moisture to grow a good crop in the following dry period.

**5. Jalkund (Maharashtra and Assam)**

- The Jalkund (lined small ponds) technique of water harvesting is popular in Maharashtra and Assam . Series of tanks connected through field channels isa common feature of water harvesting in Tamil Nadu and western Odisha.

**6. Niru Oni (Karnataka)**

- A structure called Niru Oni (an outlet for each field) is used to control runoff in Karnataka.
- The type of outlet depends on the type, size, and location of a certain field. Surface runoff is controlled according to a timetable that coincides with the growth of a crop and various cultural operations.

**7. Khuls and Ghuls (North West Himalayas)**

- In the North West Himalayas, Khuls and Ghuls are used to divert the water from the source to agricultural fields.

**8. Khatri or Diggi and Kul (Himachal pradesh)**

- It is an innovative structure to harvest rainwater, and is found in the sub-Himalayan regions of Himachal Pradesh.
- It is a horizontally dug tunnel with steps going down towards the basin.
- The length is between three to four metres and the entrance is rectangular in shape with a capacity varying between 30,000 and 50,000 litres.

**9. Zabo (Nagaland)**

- It is a water harvesting system in Nagaland, where ponds are constructed in such a manner that surplus water from one pond flows down to another.
- Water is released from a pond through an opening at its lower end, which is otherwise blocked by a piece of wood.

**10. Bamboo rainwater harvesting (Meghalaya)**

**11. Rooftop harvesting (Mizoram)**

- Water is harvested as it falls from the rooftop. Though average rainfall is high, the geological formation does not encourage water retention.

**12. Apatani (Arunachal Pradesh)**

- This system consists of terraced plots connected by inlet and
- outlet channels.

**Government Initiatives**

Some key initiatives taken by Government of India to assess and manage the country's groundwater resources based on resource assessments include:

- **Formulation of a Master Plan** for Artificial

Recharge to Groundwater in India, with the goal of implementing around 11 million rainwater harvesting and Artificial Recharge structures to supplement India's groundwater resources.

- **Circulation of a Model Bill** to all States/UTs to enable them implement appropriate groundwater regulatory laws, including provisions for rainwater collecting.
- **Implementation of the National Aquifer Mapping and Management Programme (NAQUIM)** to map, characterise, and prepare Aquifer Management Plans to ensure the sustainability of India's groundwater supplies.

**Future Initiatives**

- A community-based water management approach is required to help generate social capital, promote equity and social inclusion, and assure the sustainability of water management operations.
- Rainwater collecting should be made mandatory in metropolitan areas so that the stored water can be used for purposes other than drinking.
- Water reuse and recycling technologies, which are new approaches to manage water resources sustainably, should also be prioritised.
- Smart water management systems that optimise water consumption with real-time data and analytics can reduce losses and improve water quality.

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