



# “Innovations and Technologies for Water Saving”

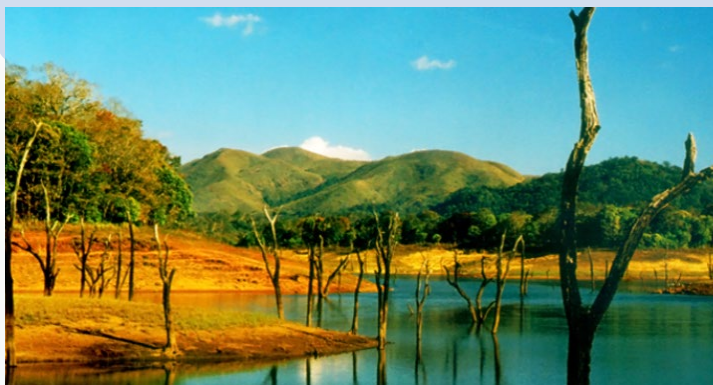
**Isly Issac**

Deputy Director  
Central Water Commission  
Department of Water Resources  
River Development & Ganga Rejuvenation  
Ministry of Jal Shakti  
INDIA

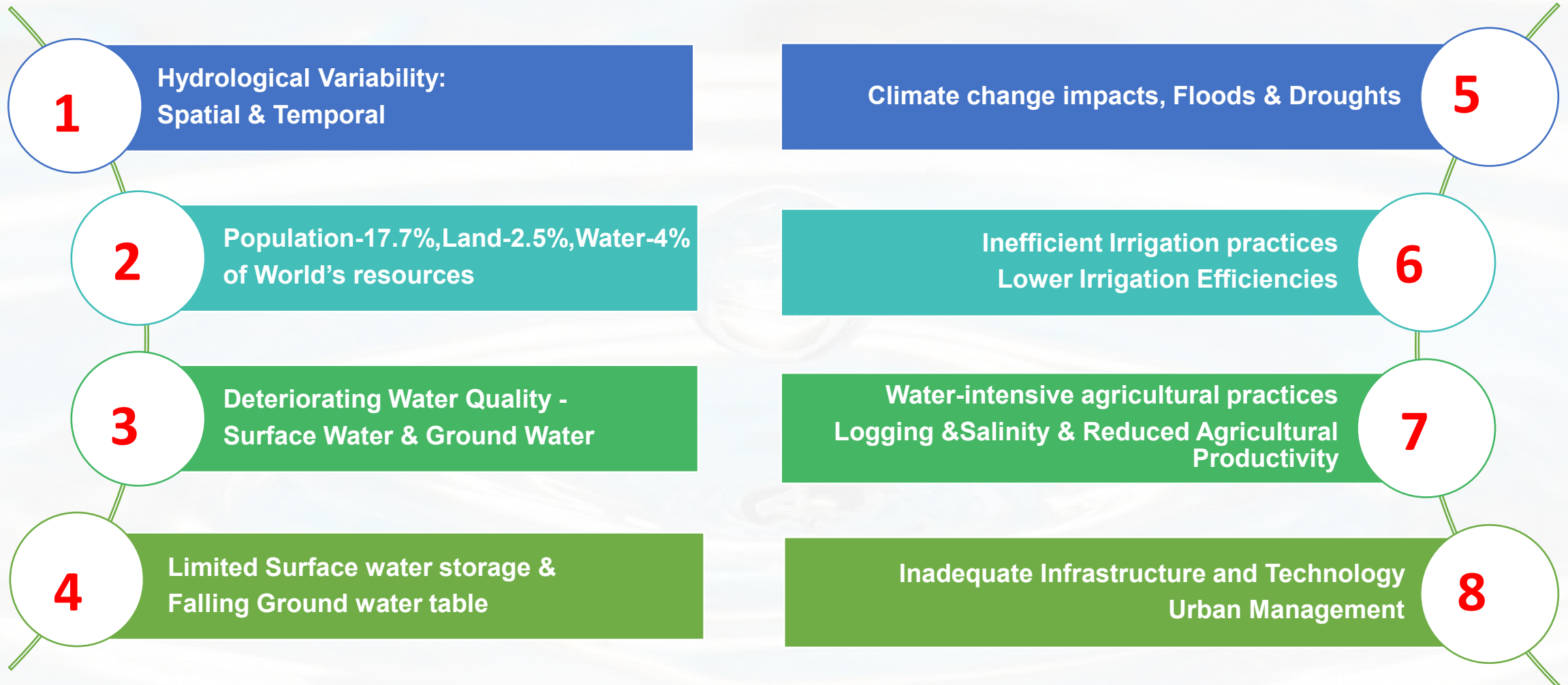


“Even as life on earth cannot sustain without water, virtue too depends ultimately on rain”

*Tiruvalluvar says in the Tamil Veda Tirukkural (verse 20),*



# Major Water Challenges in India





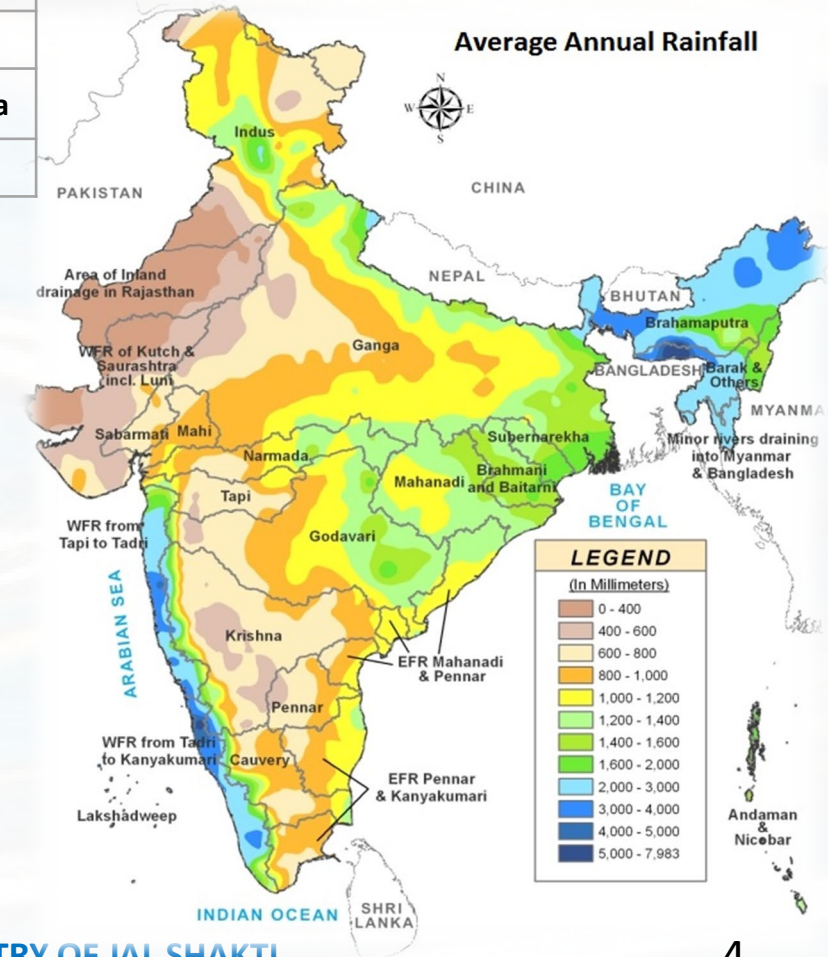
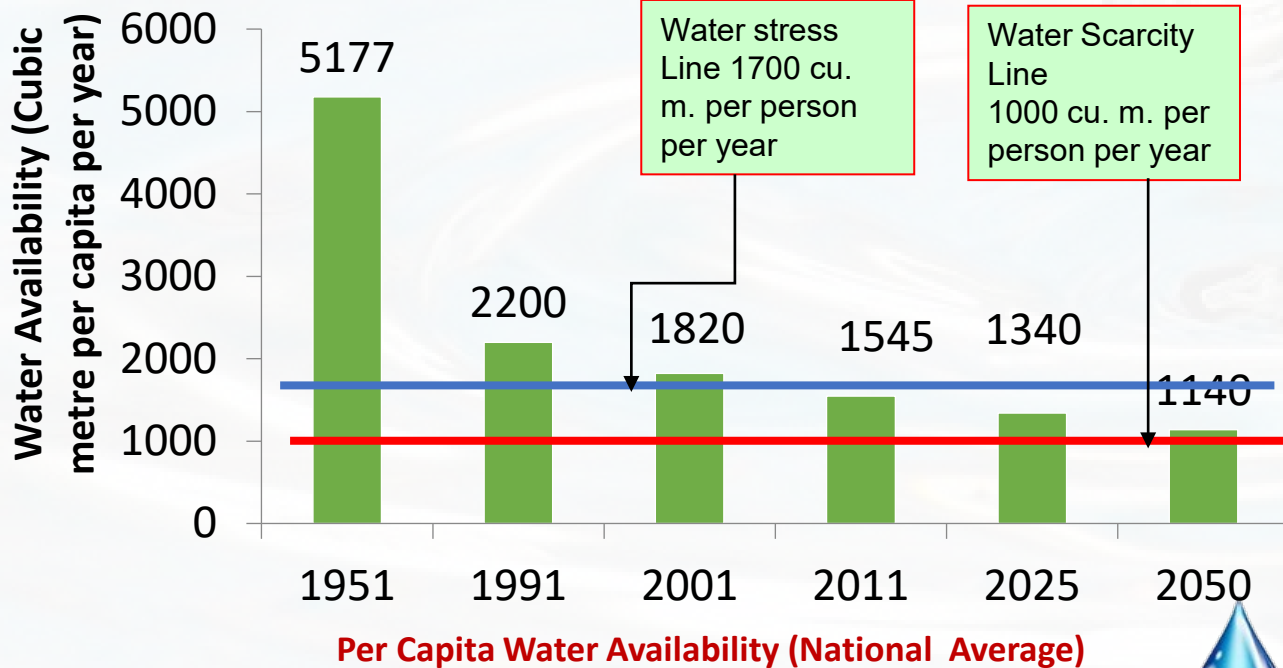
# Spatial & Temporal Variation of Precipitation

Precipitation during June to September 3000 BCM(75%)

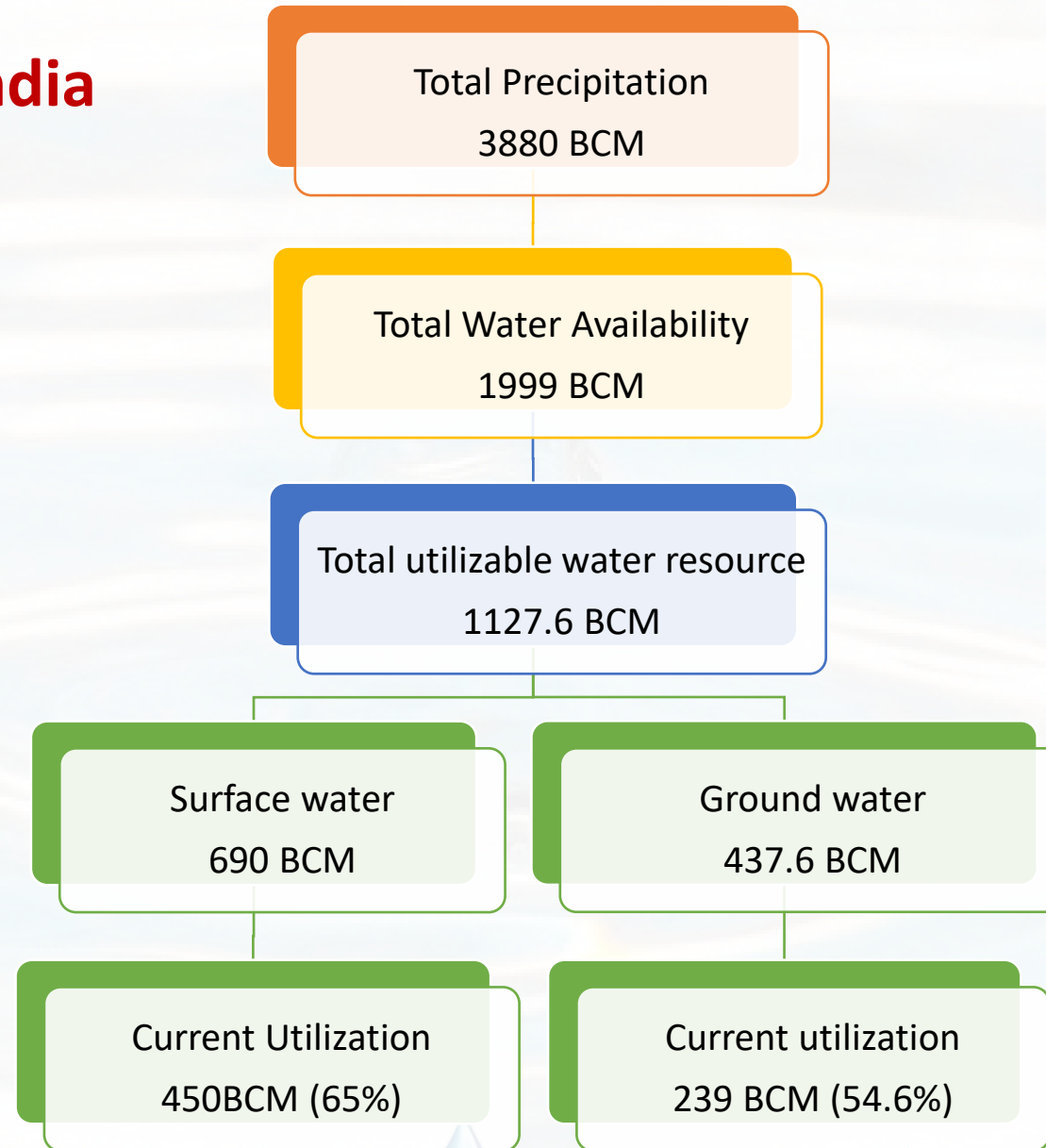


Monsoon based Climate		
Enhanced Spatial & Temporal Variations		
Rainfall (mm)		
Annual	1180	
Monsoon	890	
Max.	11,000	Mawsynram, Meghalaya
Min.	100	Western Rajasthan

Even in monsoon season, the rainy days are limited. On an average there are about 20-30 rainy days for 120 days (June-Sep) resulting in rains for just 100-150 hours of the year.



# Water Availability- India



# Technological Innovations for Water Saving



## Smart Irrigation Systems

Soil moisture sensors are integrated into farming systems.

Enable real-time monitoring and provide actionable insights for efficient irrigation management



## Examples

- Rajasthan - IoT-based Smart Irrigation:
- Tamil Nadu - Automated Micro-Irrigation Systems
- Punjab - ICT-based Smart Irrigation
- Maharashtra - Solar-Powered Precision Irrigation
- Andhra Pradesh - Smart Water Grid Project



## Rainwater Harvesting Systems

Conserve rainwater by collecting, storing, conveying and purifying it

Temporary structures, to recharge the aquifer

Leads to crop diversification

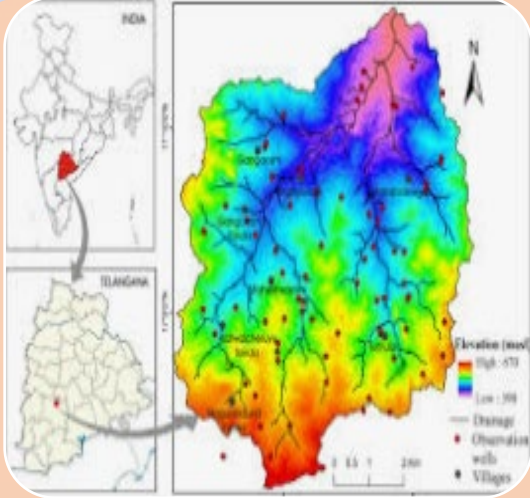


## Examples

- Rajasthan's Traditional Tankas
- Auroville, Puducherry
- Delhi's Rainwater Harvesting Program
- Jal Shakti Abhiyan- Rainwater Harvesting Structures



# Technological Innovations for Water Saving



## GIS and modeling tools

A complete Water bodies inventory is prepared by GIS mapping and remote sensing.

## Leak Detection and Water Management Systems

Regular monitoring and maintenance can help identify leaks and fix them minimizing water losses



## Examples

- Automated Meter Reading (AMR) System, Maharashtra
- Real-Time Water Monitoring System, Karnataka
- Automated Water Distribution and Monitoring System, Tamil Nadu
- Intelligent Water Management System, Telangana



## Revival of Water Bodies

**Amrit Sarovars**-to capture and store water from streams, rainfall, or canals during abundance

**Loose Boulder Structures** -to arrest excess erosion and water loss during the rainy season.

**Porcupine Studs** –River training and protection of Riverbanks



## Examples

- Jalyukt Shivar Abhiya Maharashtra
- Krishna Bhagya Jala Nigam Limited (KBJNL) Projects (Karnataka)
- Neeru-Chettu Program (Andhra Pradesh)
- Jal Swavlamban Abhiyan(Rajasthan)
- Mission Kakatiya (Telengana)

# Technological Innovations for Water Saving



## Soak Pits

A soak pit is a covered, porous-walled chamber that allows water to slowly soak into the ground.

Soak pits have helped in treating the wastewater and in recharging the ground water.



## De-silting of Check Dams

Increased water storage capacity of the check dams

Provided protective irrigation to crops in kharif and in Rabi in areas which are predominantly rain fed earlier



## Recharge shafts & Removal of Encroachments and Illegal Infringements

Surplus water is now recharged to ground water. Tough measures were taken against illegal mining

- Demolition of Encroachments on Lakes, Karnataka
- Eviction of Encroachments on Backwaters, Kerala
- Removal of Riverbank Encroachments, UP



## Role of Mass media

Awareness and Education  
Dissemination of Information  
Behaviour Change  
Policy Advocacy  
Knowledge Sharing and Expertise:



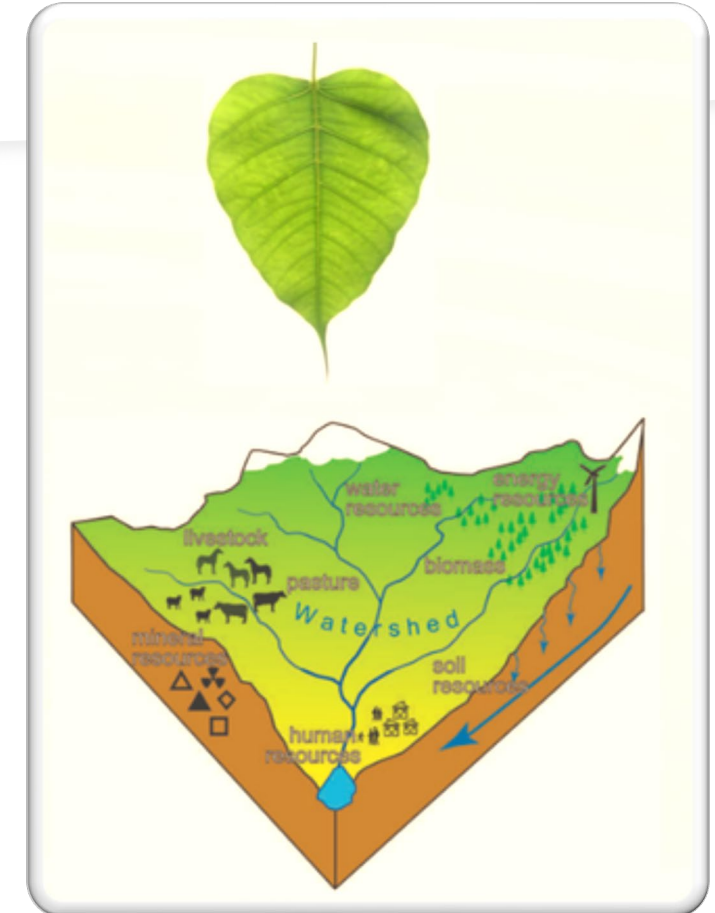


# Watershed Development

- It is a holistic approach of managing natural resources including soil, water, vegetation, and biodiversity.
- Increases the availability and quality of water resources within the watershed, which in turn can have a positive impact on agriculture, livelihoods, and the environment.
- The implementation by:
  - ✓ Integrated Watershed Management
  - ✓ Soil and Water Conservation Measures
  - ✓ Afforestation and Agroforestry
  - ✓ Rainwater Harvesting
  - ✓ Participatory Approach and Capacity Building
  - ✓ Sustainable Agricultural Practices
  - ✓ Livelihood Diversification

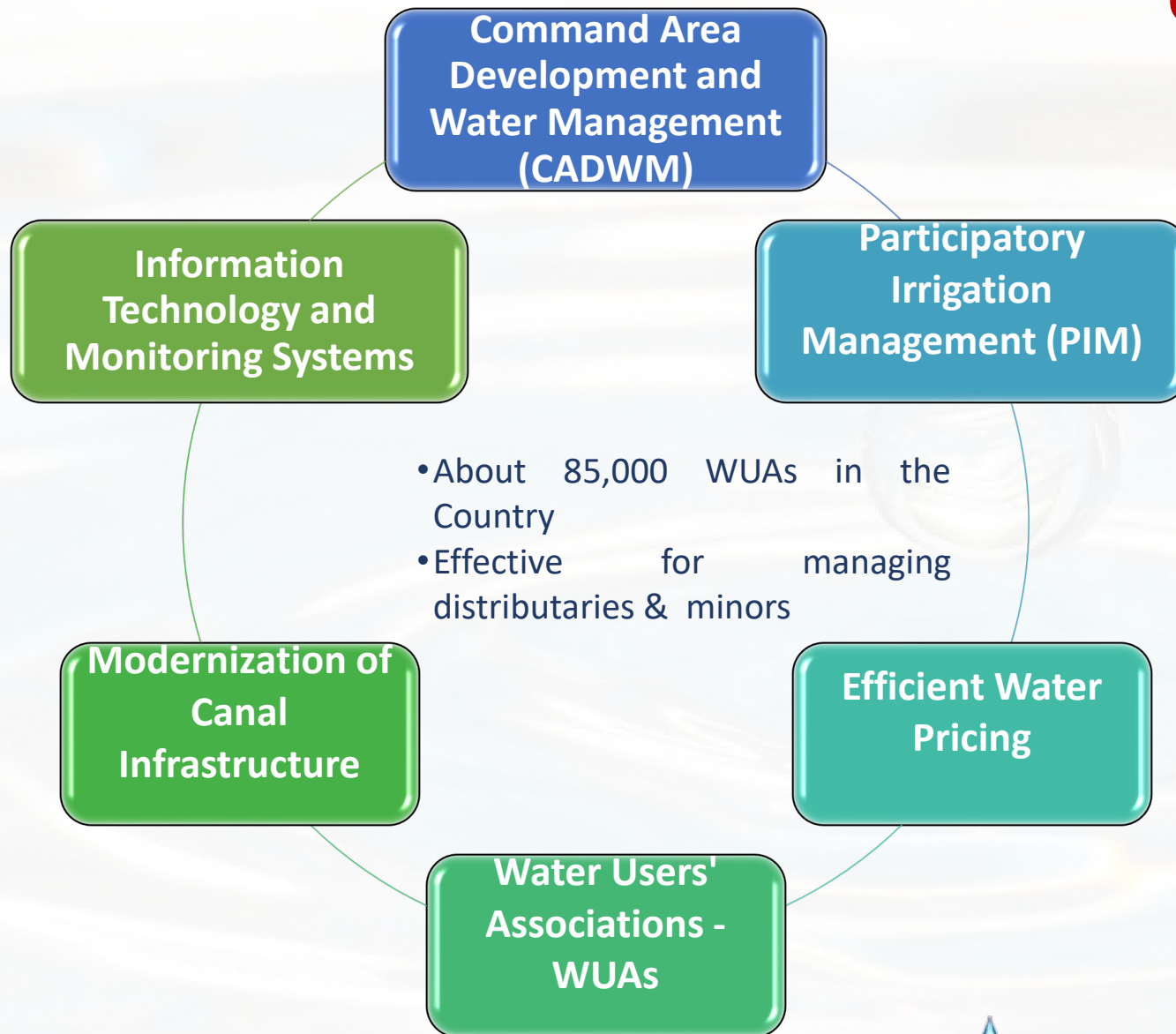
The typical shape of a **WATERSHED** has a striking similarity with that of a **Banyan Leaf** – the most sacred tree in Indian mythology considered as God's abode.

The main vein in the leaf signifies the main river and the smaller veins signify tributaries and the very tiny ones signify small rivulets, all contributing to the main river, likewise a watershed is like a living entity encompassing all forms of life human resources, flora and fauna



**BANYAN LEAF vs WATERSHED**

# Canal Irrigation Reforms in India



# Underground Pipelines for Irrigation -Advantages

Increased irrigation water productivity

Reduced Water Loss

Improved Crop Health and Yield

Flexibility in Water Delivery

Reduced Energy Consumption

Minimized Land and Soil Disturbance

Reduced Weed Growth and Erosion

Longevity and Durability

## EXAMPLES:

*Gujarat: Saurashtra Narmada Avtaran Irrigation Yojana*

*Maharashtra: Krishna Valley Development Corporation*

*AP: Handri-Neeva Sujala Sravanthi*

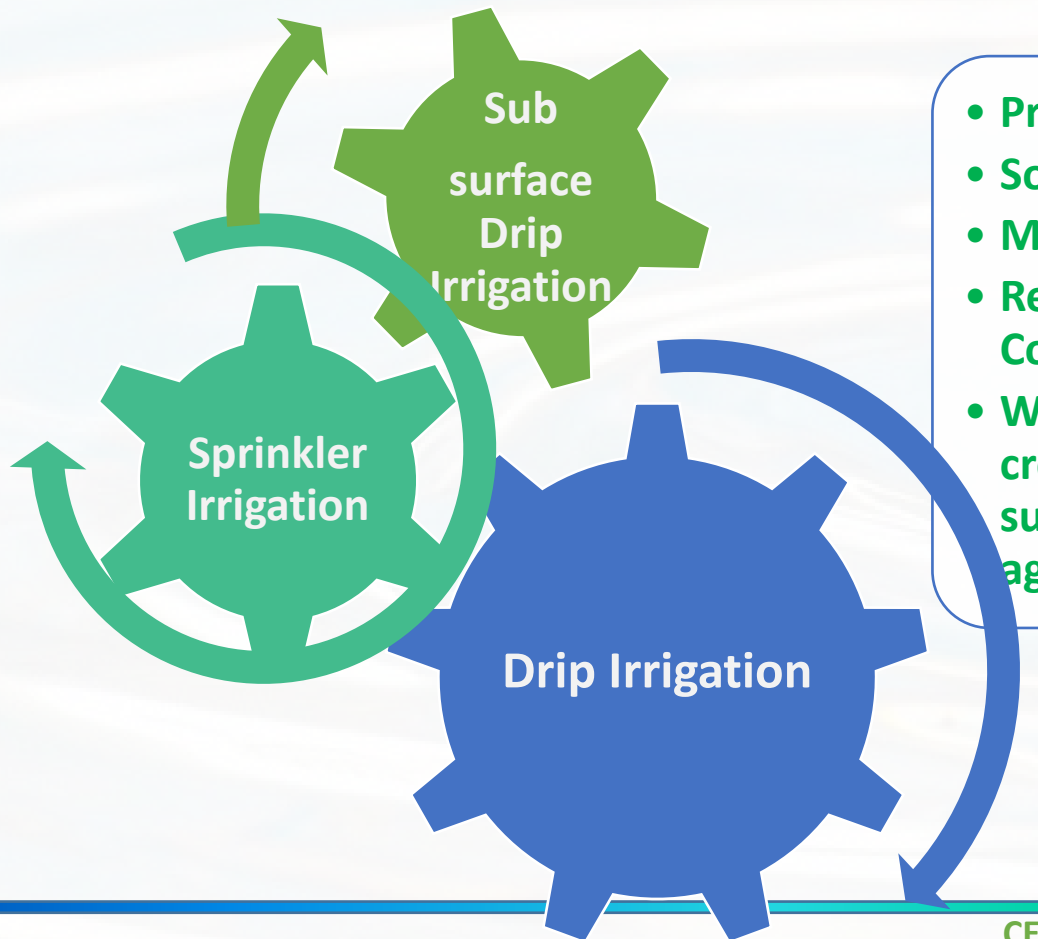
*Karnataka: Krishna Bhagya Jala Nigam Limited*





# Micro Irrigation in India

Micro-irrigation technologies deliver water directly to the root zone of plants in a controlled manner, reducing water wastage and optimizing water use.



- Precision Irrigation
- Solar-powered Systems
- Mulching
- Remote Monitoring & Control
- Water-use efficiency, crop productivity, and sustainability in Indian agriculture



# Participatory Irrigation Management(PIM)

- In India, at present, 20 states have enacted new acts or amended the existing irrigation acts to make provision for participatory irrigation management through WUAs
- Ministry circulated Model PIM Act
- Most of the States formulated their PIM Act
- Moving towards Member-Centric Water Users Associations
- It is a major shift in the approach of irrigation system management.
- PIM leading to Water Users Associations
- The WUAs play a key role in improving the efficiency of an irrigation system and ensuring equitable distribution of water by creating a sense of ownership among farmers and facilitating their participation in the operation and maintenance (O&M) of the canal network.





# Reduce-Reuse-Recycle

## Reduce



Use water-efficient fixtures  
Fix leaks promptly and regularly check for any water wastage.  
Practice mindful water use habits, such as turning off taps when not in use and reducing water-intensive activities

## Re-use



Implement RWH systems to collect and store rainwater for various purposes.  
Treat and reuse grey-water from sources like sinks, showers, and laundry for non-potable purposes like irrigation, toilet flushing, or industrial processes.

## Recycle



Implement advanced water treatment technologies in Industries and Business to recycle and purify wastewater for potable reuse  
Recycle industrial process water by treating and reusing it within the same or different production process .





# Smart Farming Initiatives

## IoT (Internet of Things)-based Irrigation System

- Sensor Deployment
- Data Collection and Transmission
- Data Analytics and Decision Making
- Automated Control and Actuation
  - **Benefits :**
    - Improved Water Efficiency
    - Enhanced Crop Health and Yield
    - Cost Savings
    - Remote Monitoring and Control
    - Data-Driven Decision Making
    - Soil moisture sensors are integrated
    - Enable real-time monitoring

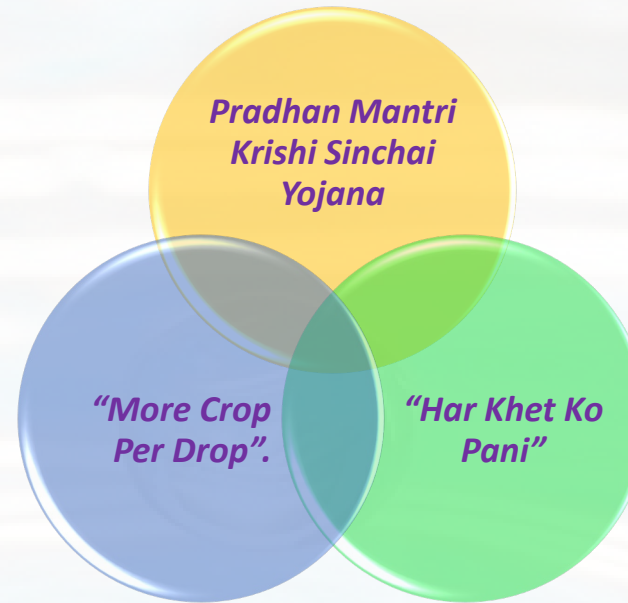
- *Telangana - Mission Bhagiratha*

- *Karnataka - Smart Water Management in Bengaluru*

- *Maharashtra - Jal Yukta Shivar Abhiyan*

- *Tamil Nadu - IoT-based Smart Irrigation in Coimbatore*

- *Rajasthan - IoT-based Water Management in Udaipur*



# GIS based Irrigation in India

GIS integrates spatial data, such as soil types, land topography, crop patterns, water sources, and weather information, with advanced analytical tools.

- ✓ Irrigation Planning and Design
- ✓ Water Resource Mapping
- ✓ Water Distribution Network Management
- ✓ Crop Water Requirement Analysis
- ✓ Water Use Efficiency Assessment
- ✓ Decision Support Systems
- ✓ Water Conservation and Waterlogging Management

- Implemented widely in India in the States of Punjab, Andhra Pradesh, Gujarat, Karnataka, Tamil Nadu etc.
- Identifies water-stressed regions, monitor groundwater levels & plan irrigation activities to make informed decisions about irrigation scheduling and water usage





# Strategies for Water Saving



**Efficient Irrigation Techniques**



**Rainwater Harvesting**



**Water-efficient Fixtures**



**Wastewater Treatment and Reuse**



**Integrated Water Resource Management**



**Micro Irrigation**



**IoT based Irrigation System**



**Water Users Association**



*"The rivers and oceans are the arteries of the Earth, carrying the life-giving waters that sustain all creatures. Let us honor and protect these sacred lifelines." - Atharva Veda*

