Outline on Module of Water resources

- ***Session – 1***
  - *a) Introduction – Water resources*
  - *b) Economic and social dimensions of water as a natural resource*
  - *c) Legal and Policy frame work of water management in India*
- ***Session-2***
  - *d) Institutional structure for water management*
  - *e) Composite Water Index*
  - *f) Conflict management*
- ***Session- 3***
  - *g) Water Sector Project management & Challenges*
  - *h) Water conservation vis-à-vis augmentation*
  - *i) Towards a sustainable solution*

Session-2

d) Institutional structure for water management
e) Composite Water Index
f) Conflict management

Institutional structure for water management

Institutional structure (vertical)

Ministry of Jalshakti (Earlier Ministry of Water Resources, River Development, Ganga Rejuvenation and Drinking water)

At the state level department of water resources/irrigation & Command area development department

Department of Pahcayat Raj and Rural water supply and Urban local bodies for urban areas

Para- statals such Delhi Jalboaod, Mission Bhagirath, Hyderabad Metro water supply & sewerage Board

Institutional structure (Horizontal)

80% of water used for irrigation, Command area development and catchment area treatment are two related issues

Categorization of Major, Medium and Minor irrigation;

Merging various wings and designating a single district irrigation officer.

Conjunctive use of surface and ground water

In view of vast land resources and water bodies excellent potential for solar power generation along with water resources infrastructure

Untapped potential of mini and micro Hydro-power.

Institutional structure (Horizontal) – Classification of Major/Medium & Minor

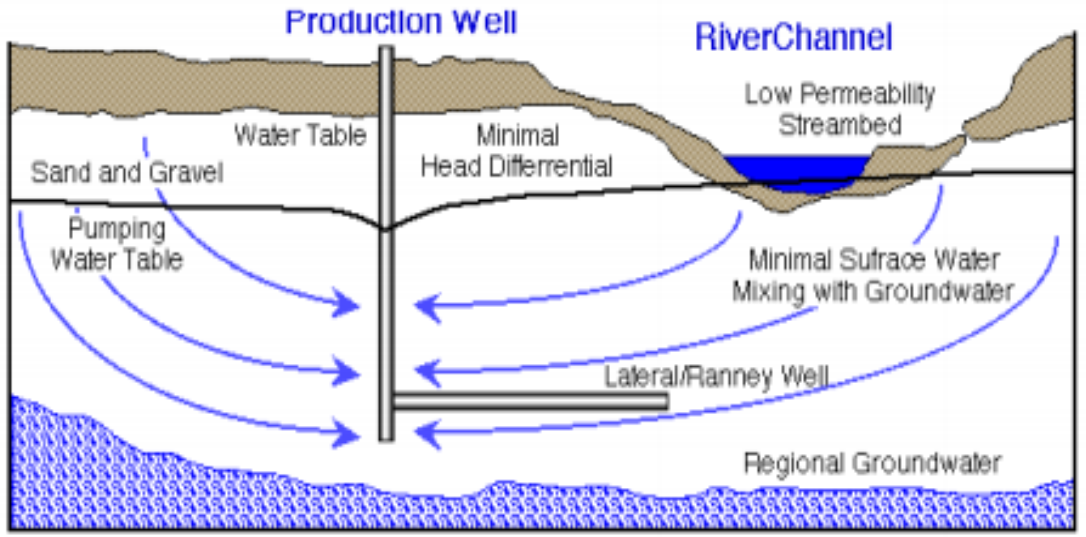
Classification:

- *CCA > 10,000 ha - Major Schemes*
- *CCA between 2,000 ha – 10,000 ha – Medium schemes*
- *CCA < 2,000 ha – Minor schemes*
- *Available irrigation potential was not utilised.*
- *Several deficiencies like absence of efficient distribution and management system, lack of research for optimum use, lack of suitable infrastructure, weakness of old structures, water logging etc.*

Conjunctive use – Surface & Ground Water

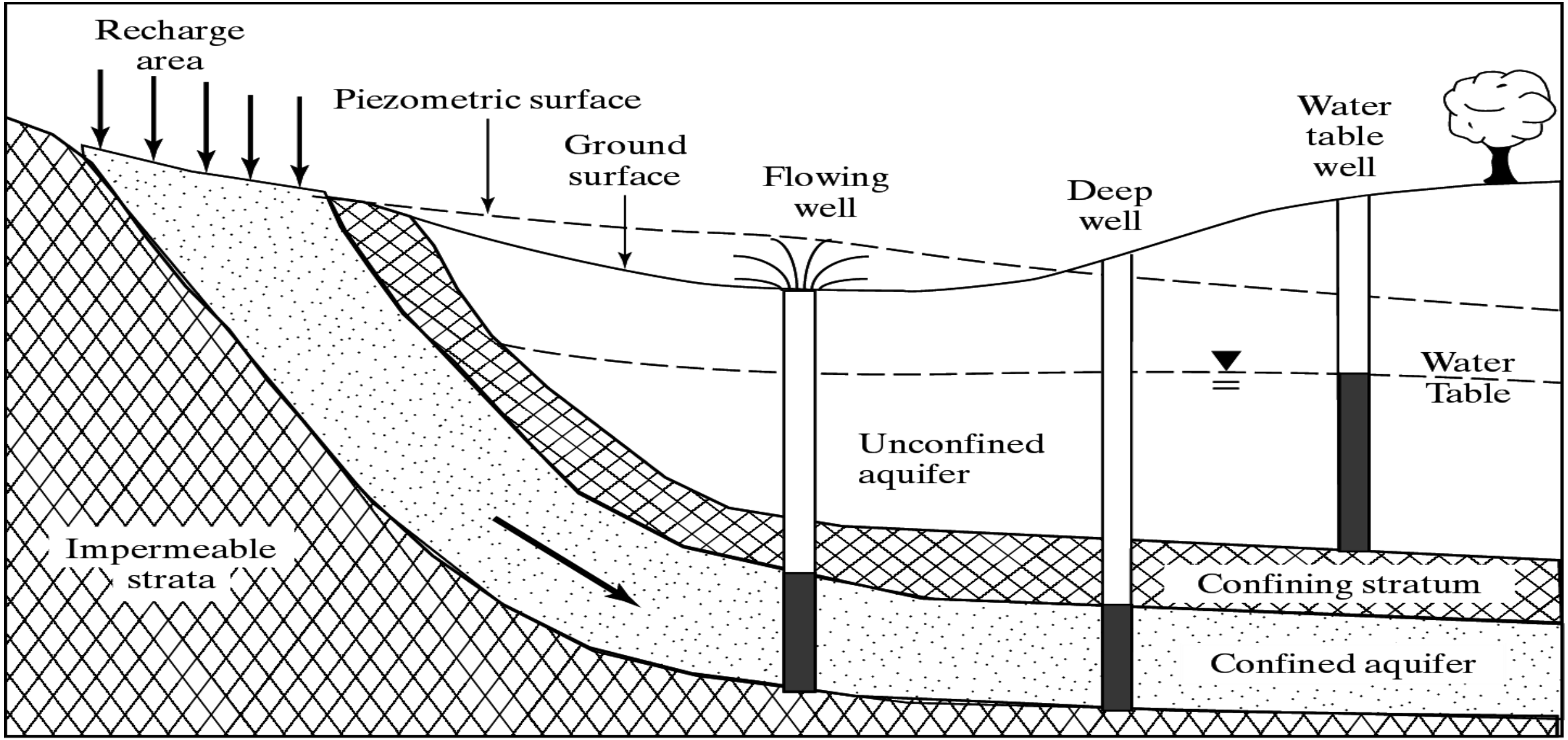
Conjunctive use

- *The choice of an irrigation scheme depends on several factors such as topography, rainfall, type of source available, sub-soil profile.*
- *If surface and ground waters are used together to derive maximum benefits. such use is termed as conjunctive use of surface and ground waters.*

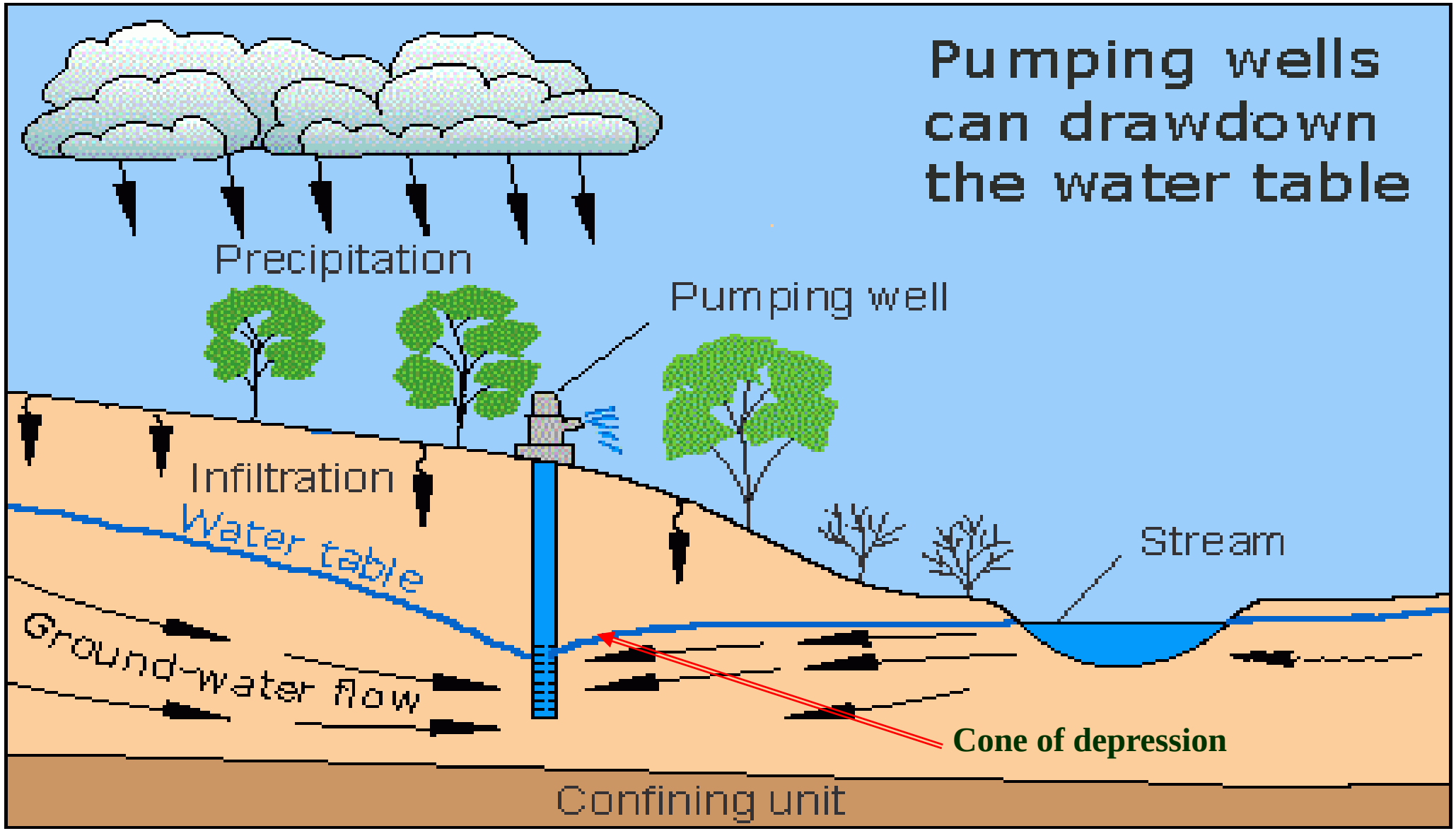


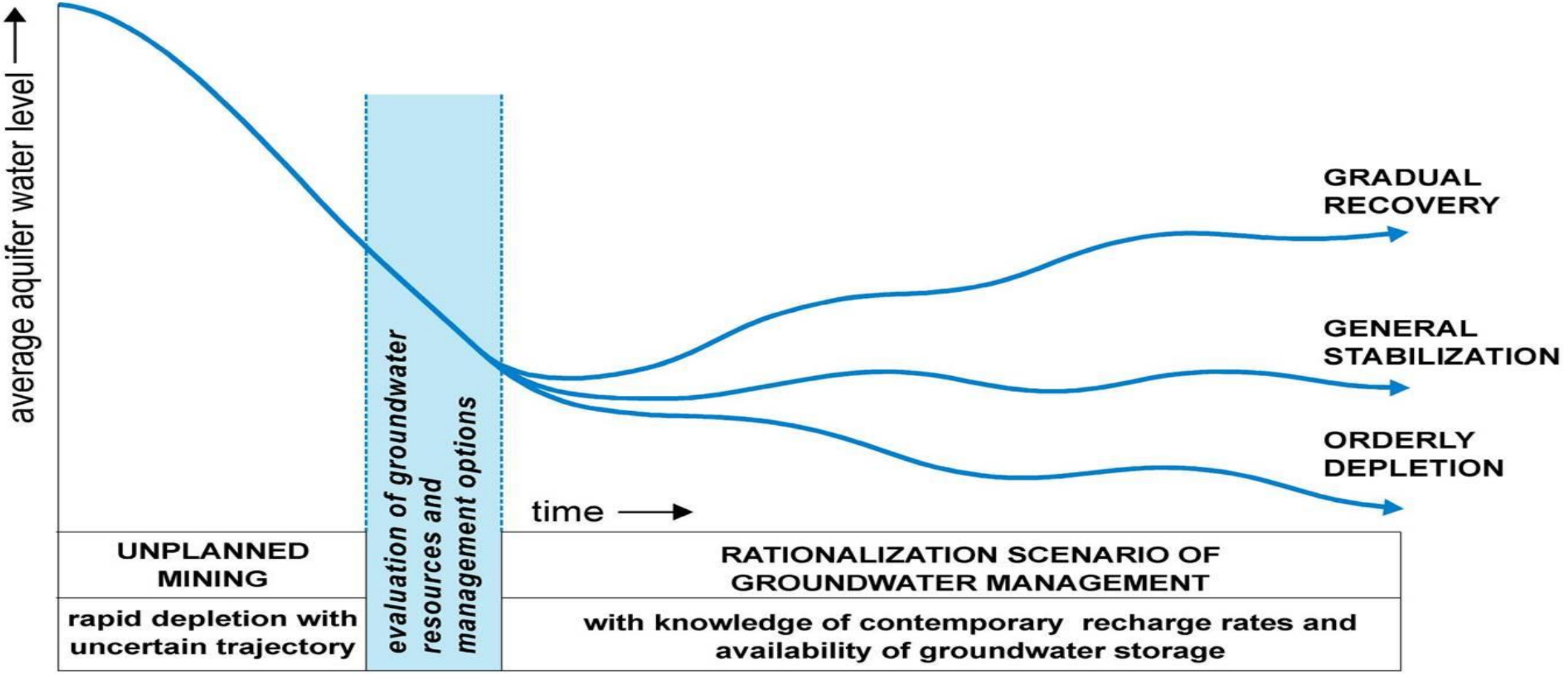
Ground Water

- *Essentially used as a natural resource for domestic purposes.*
- *Also discharges into surface water systems and account for river runoff (low flow/base flow.*
- *Importance of GW system is often underestimated, partly due to the fact that it is not immediately visible.*
- *Occurs when water recharges the subsurface strata (aquifers) through cracks and pores in soil and rock.*
- *Aquifers are geological units, which can store and supply significant quantities of water*.



Groundwater System


Pumping wells can drawdown the water table
Precipitation
Pumping well
Infiltration
Water table
Stream
Ground-water flow
Cone of depression
Confining unit



Groundwater Management

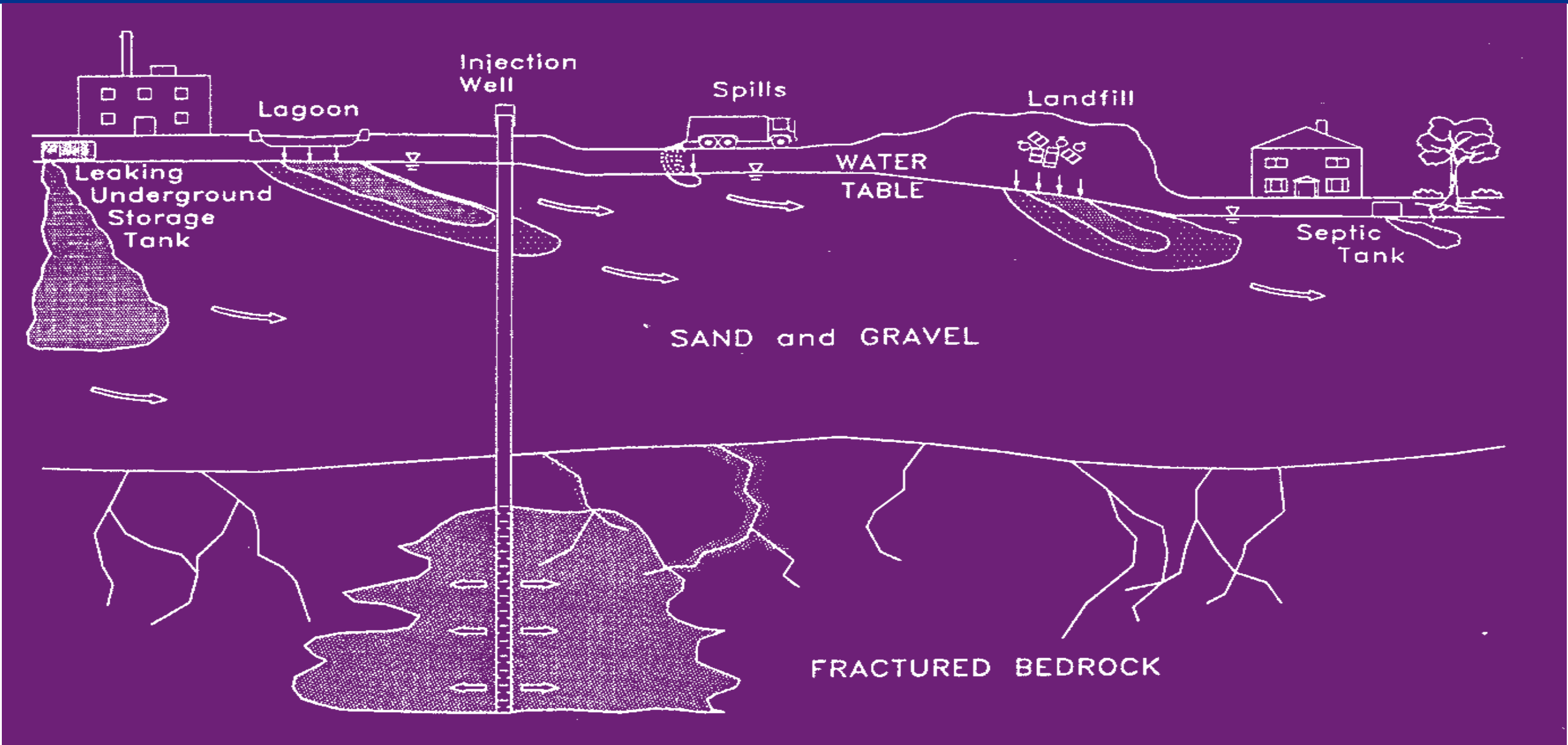
Ground Water – Potential

- *Total annual GW recharge has been estimated as 432 bcm.*
- *The annual extractable ground water resource is 393bcm.*
- *The total current annual ground water extraction (as in March, 2017) is 249bcm.*
- *Assessment shows that 1186 units in the country in various States (17%) have been categorized as 'Over-Exploited' indicating ground water extraction exceeding the annually replenishable ground water recharge.*
- *313 units (5%) are 'Critical', where the stage of ground water extraction is between 90-100 %.*
- *972 semi-critical units (14%), where the stage of ground water extraction is between 70% and 90% and*
- *4310 assessment units (63%) have been categorized as 'Safe' where the stage of Ground water extraction is less than 70 %.*

Ground Water – Challenges

- *Increasing population, growing urbanization and rapid industrialization combined with the need for raising agricultural production generates competing demands for water.*
- *Overexploitation of groundwater and intensive irrigation in major canal commands.*
- *Depletion of water tables, drying of aquifers, groundwater pollution, water logging salinity, agriculture toxins, industrial effluents etc.*
- *Unplanned ground water extraction*
- *Urban infrastructure*
- *Landfills and dumps*
- *Discharges from abandoned mines and*
- *Deliberate or accidental pollution incidents*

Ground Water contamination



Ground Water – Strategies

- *Implementation of water pollution prevention strategies and restoration of ecological systems are integral components of all development plans.*
- *To preserve our water resources and environment, we need to make systematic changes in the way we grow our food, manufacture the goods and dispose off the waste.*

Farmers Organizations

Farmers associations – Participatory Irrigation Management (PIM) in India

Issues in Irrigation Projects:

- *Command area development is low priority*
- *Hierarchy in Canals – Main canal, distributories (majors), Minor and Field channels.*
- *Head reaches get abundant supplies – farmers cultivate high duty crops like paddy, irrespective of the designed cropping pattern*
- *Inadequate supply at the tail end outlets.*
- *Lack of measuring devices and control structures.*
- *Inadequate allocation of funds for O & M.*
- *Inequitable distribution of water & poor drainage.*

Farmers associations – Farmers Management and Irrigation systems Act, 1997

What is PIM:

- *Participation of irrigation users in the management of irrigation system at all levels, and in all aspects of management.*

Main Objective:

- *To ensure equitable and reliable water supplies*
- *To bridge the gap between irrigation potential created and utilised.*
- *Crop intensification and diversification*
- *Better and adequate maintenance of irrigation systems.*
- *Water budgeting and implementation of operational plan.*

Farmers Management of Irrigation Systems Act, 1997

- *Establishing Water User Associations (WUAs)*
- *Elections held in 1997 for 10,000 WUAs.*
- *provided a forum for expression of the collective problems, demands and concerns*
- *a channel of communication with the Government in a systematic manner.*

Works takenup by WUAs:

- *Silt removal and jungle clearance of Distributaries, Minors and field channels.*
- *Strengthening of Canal embankments.*
- *Repairs to pipe outlets and CM & CD works*
- *Plugging of breaches and Fixing of shutters for gated structures.*

Composite Water Index
(A tool to track performance in water management)

composite Water Management Index

- *Things which can not be measured, can not be improved;*
- *To establish a clear baseline and benchmark for state-level performance on key water indicators;*
- *Instills a sense of recognisation and introduces healthy competition among various states;*

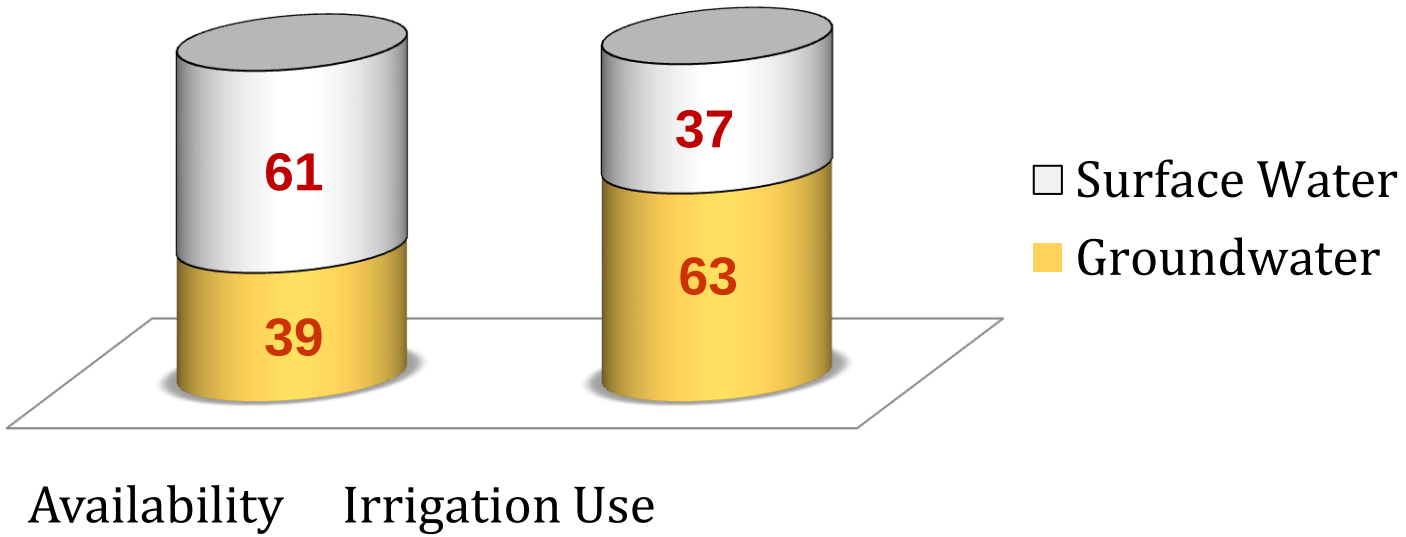
Need for Interventions

Resource Augmentation	
• Storage Capacity	303 BCM (44%)
• Per Capita storage	225 m^3
• Water Bodies, not in use	1,14,410 (20 %)
• Ground Water Development	0.08 – 172%

Irrigation Sector	
Coverage	46 %
IPC-IPU Gap	21 %
Water Use efficiency	30-40 %

Pipped water supply (Drinking water)	
Rural households	30.8 %
Urban households	70.6 %

Ground Water - Status



More than 50% of the total assessed units reported over-exploited/critical in Delhi, Haryana, Punjab, Rajasthan and Daman & Diu;

Water use efficiency (Irrigation Sector)

	Present level of efficiency	Full achievable efficiency	Efficiency to be achieved by	
			2025	2050
Surface Water	**30**	**60**	**50**	**60**
Ground Water	**55**	**75**	**72**	**75**

- Surface - 30 to 35 %
- Sprinkler - 50 to 60 %
- Drip - 80 to 90 %

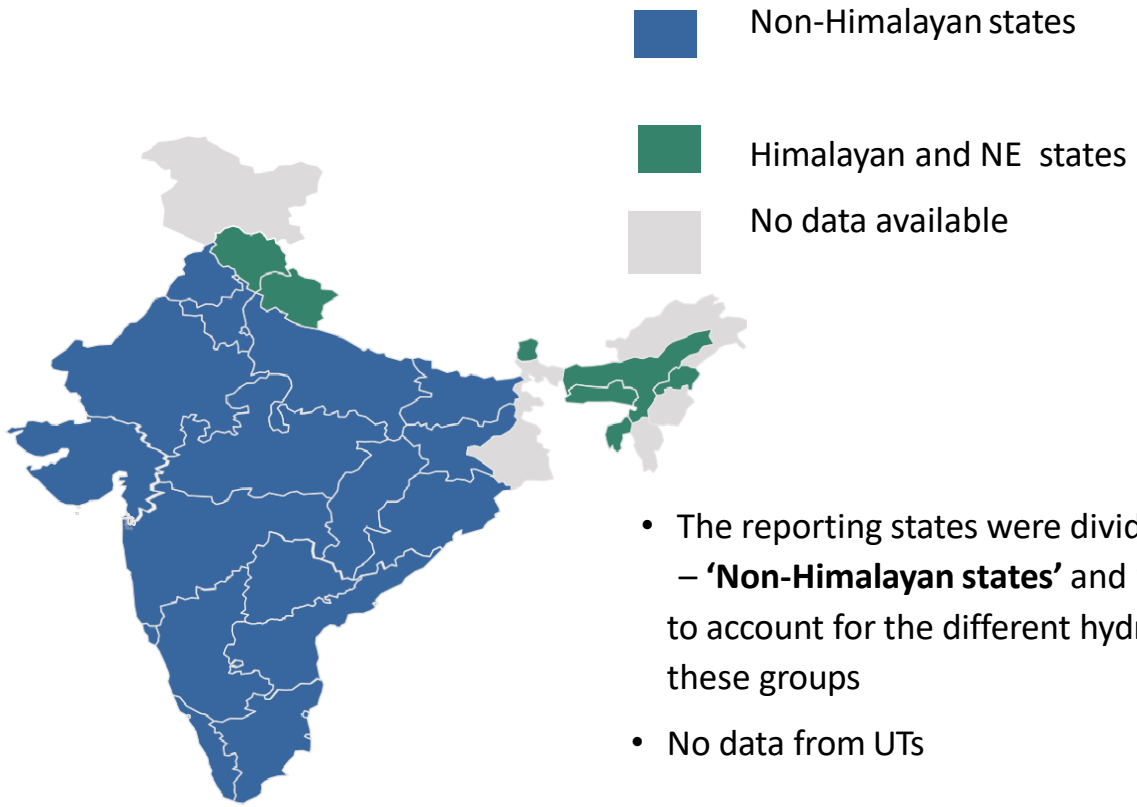
Water Index

WMI - Tracking the Management Initiatives

- *To assess and improve the performance in efficient management of water resources*
- *Ranking of States on 28 KPIs*
- *9 Sectors covered*

The Index comprises 9 broad sectors covering 28 indicators

Classification of states into Non-Himalayan and Himalayan



- The reporting states were divided into two special groups – **'Non-Himalayan states'** and **'Himalayan and NE states'**, to account for the different hydrological conditions across these groups
- No data from UTs

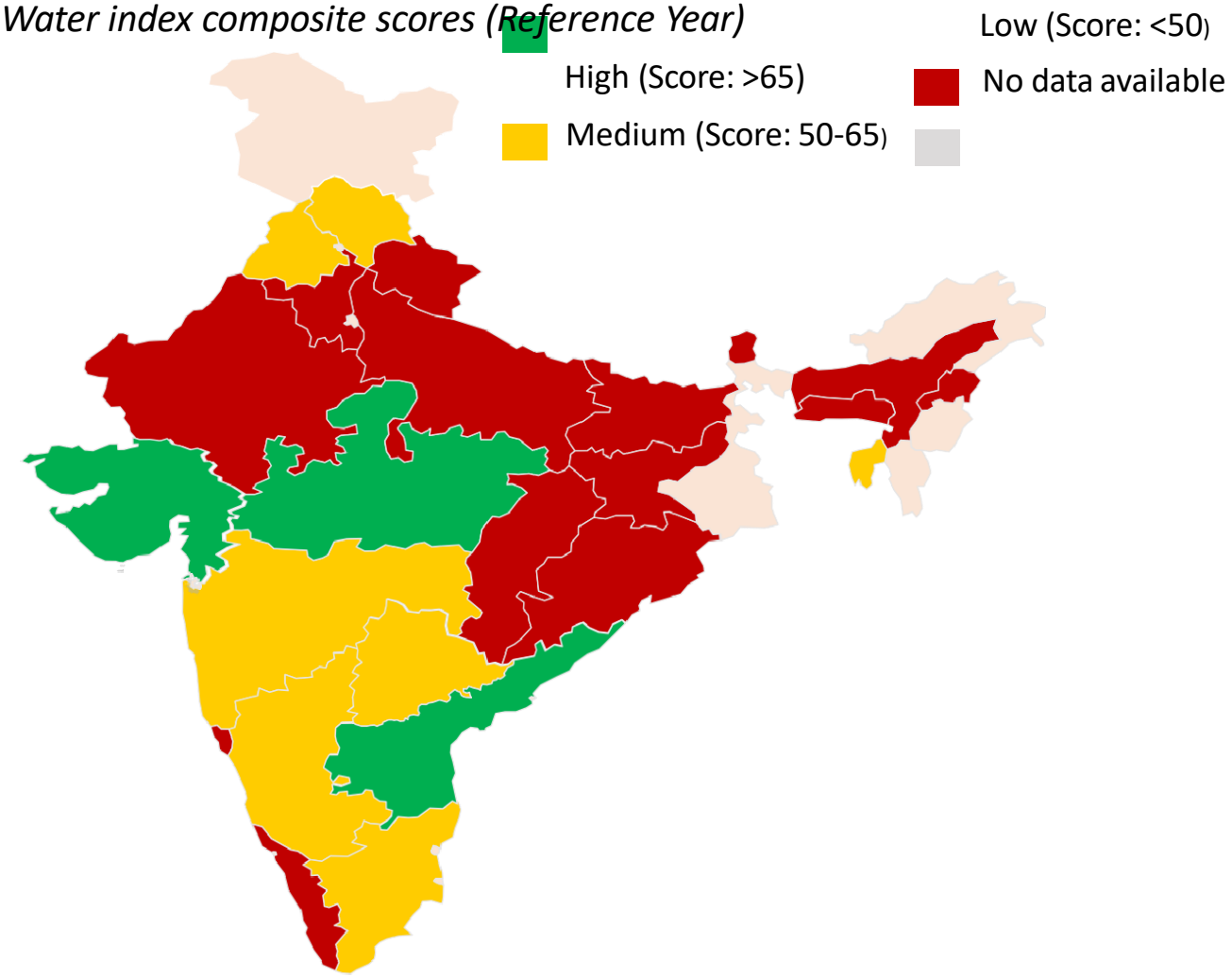
WMI – Sectors Covered

Sector	Weightage
Source Augmentation (Restoration of Water Bodies)	5
Source Augmentation (Groundwater)	15
Major and Medium Irrigation	15
Watershed Development	10
Participatory Irrigation Practices	10
Sustainable on-farm water-use practices	10
Rural Drinking Water	10
Urban Water Supply and Sanitation	10
Policy and Governance	15
Total	100

Overall analysis: All states need to perform better

High, medium, low-performing states

Water index composite scores (Reference Year)



Key findings

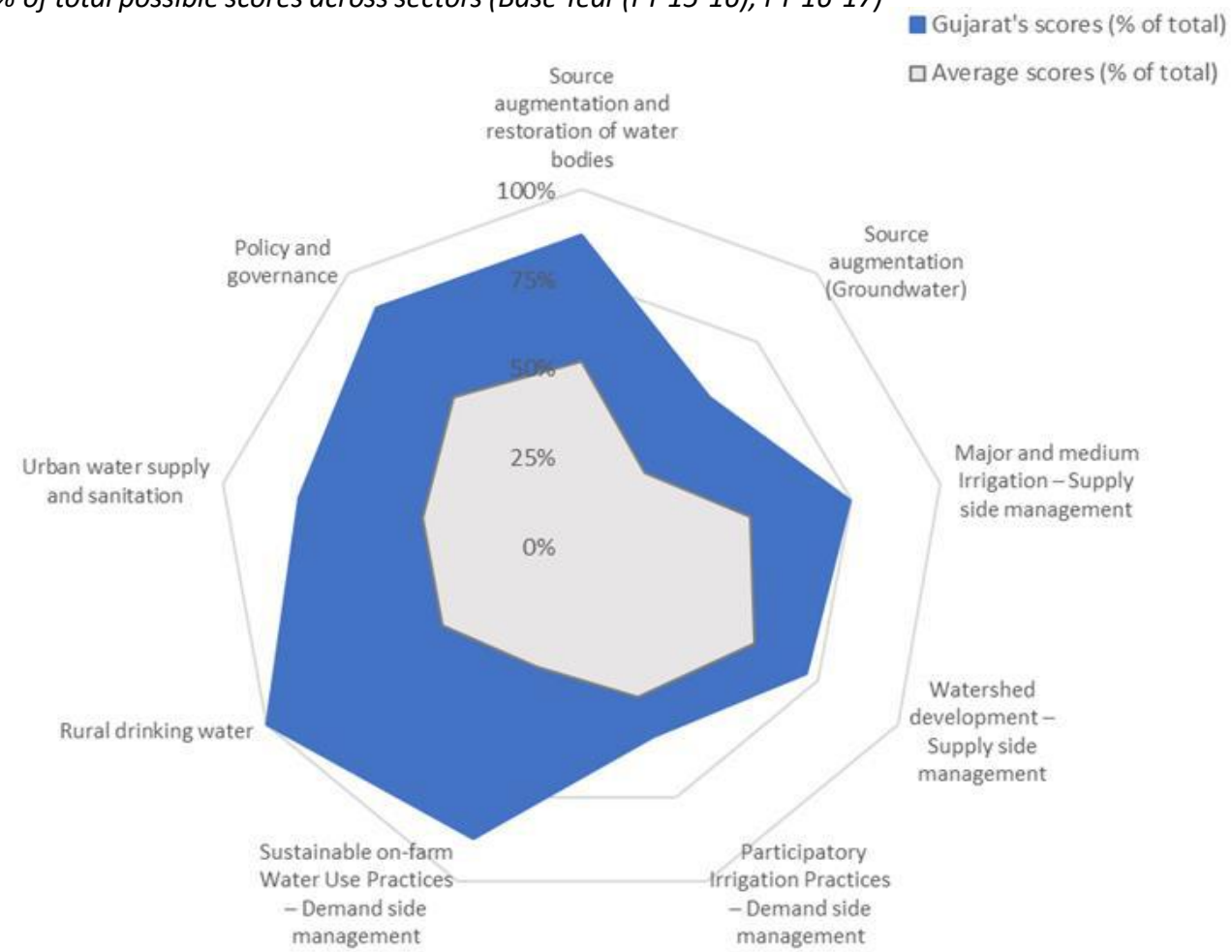
- Three **states—Gujarat, Madhya Pradesh, and Andhra Pradesh**—are '**High' performers** with scores >65 (out of 100)
- Seven states have scores between **50-65 and have been classified as 'Medium' performers**
- However, ~60% of states (15 out of 24) have achieved scores below 50 and have been classified as 'Low' performers
- **Encouragingly, several water-scarce states are the leaders in Index performance.** Several high and medium performers have suffered from severe droughts in recent years, indicating that corrective action is starting in at least some of the areas that need it the most
- More worryingly, **the low performers on the Water Index are home to ~50% of the country's population**, thereby highlighting the significant water risk faced by the country
- The low performing northern states also account for ~20-30% of the country's agricultural output, indicating the associated **food security risk for India**

Source: CWMI data; Census of India 2011; Planning Commission Databook, 2014; https://economictimes.indiatimes.com/news/economy/policy/8-states-declared-drought-affected-centre-allows-them-to-offer-50-days-of-extra-work-under-nregs/articleshow/58037760.cms

Gujarat has emerged as the best water manager, achieving ~75% or higher scores across most themes

Highest performing state – Gujarat

% of total possible scores across sectors (Base Year (FY 15-16), FY 16-17)



Key findings

- **Gujarat has performed higher than the average across all sectors,** displaying exceptional performance across on-farm management, rural supply, and policy indicators
- Gujarat was **the highest ranked state across both FY 16-16 and FY 15-16**, boosting its score from ~71 to ~76 across the two years
- The state has achieved more than 50% of the score across all sectors
- Gujarat has achieved **88% of the total possible score in 'Sustainable on-farm water use practices'**, which is a significant milestone in water management given that 88% of the state's water is used for irrigation
- On '**Rural drinking water'**, the state has achieved a **100%** score, which means that it is able to provide clean water to its ~35 million inhabitants living in rural areas
- Gujarat's success has been built upon comprehensive **state water policy** that has set up a strong institutional structure for water governance and pushed through key reforms in participatory irrigation and data collection

Source: CWMI data; Govt. of Gujarat, *'State Water Policy-2015'*

Strategies – 3 Js

- *Jal Sanchay*
- *Jal Sinchan*
- *Jal Sanrakshan*

Policy Interventions

- *RRR of Water Bodies*
- *Good quality drinking water*
- *Reduce, Recycle, Reuse*

Conflict Management

Conflict Management

- *Guidelines and norms for water allocation among various political and administrative entities.*
- *Enforcement [Krishna River Management Board (KRMB)/ Godavari River Management Board (GRMB)]*
- *Mechanism for consultation and arbitration (with or without mediation)*
- *Adversarial position results into seeking Legal remedies*
- *Efficacies of River Water Disputes Tribunals.*
- *Ultimate arbiter is the Supreme Court (concept of time and urgency)*
- *All eyes on the ISWR Bill*

Dispute Resolution/Conflict Management

- *Execution of the project of such a magnitude like Kaleshwaram may have lingered in the river water disputes with the coriparian States.*
- *The issues with the Maharashtra on the submerge of its territory were resolved by entering into a land mark agreement on 8th March 2016*
- *The finest example of inter State co-operation in the recent past in India and would be a guiding principle in the dispute/conflict resolution mechanism between the States.*
- *This was possible with continuous dialogue, interactions and intervention at various levels with a give and take approach.*

Collaborative Spirit: The Landmark Maha-TS Agreement

A Memorandum of Understanding was signed on 8th March, 2016, in the presence of the Chief Ministers of Telangana and Maharashtra. The agreement settled the modalities for water and benefit sharing arrangements between the two states.

A three-tiered institutional mechanism, at the technical, administrative and political level, was also constituted.