

COMPOSITE WATER MANAGEMENT INDEX (CWMI)

A NATIONAL TOOL FOR WATER
MEASUREMENT , MANAGEMENT &
IMPROVEMENT

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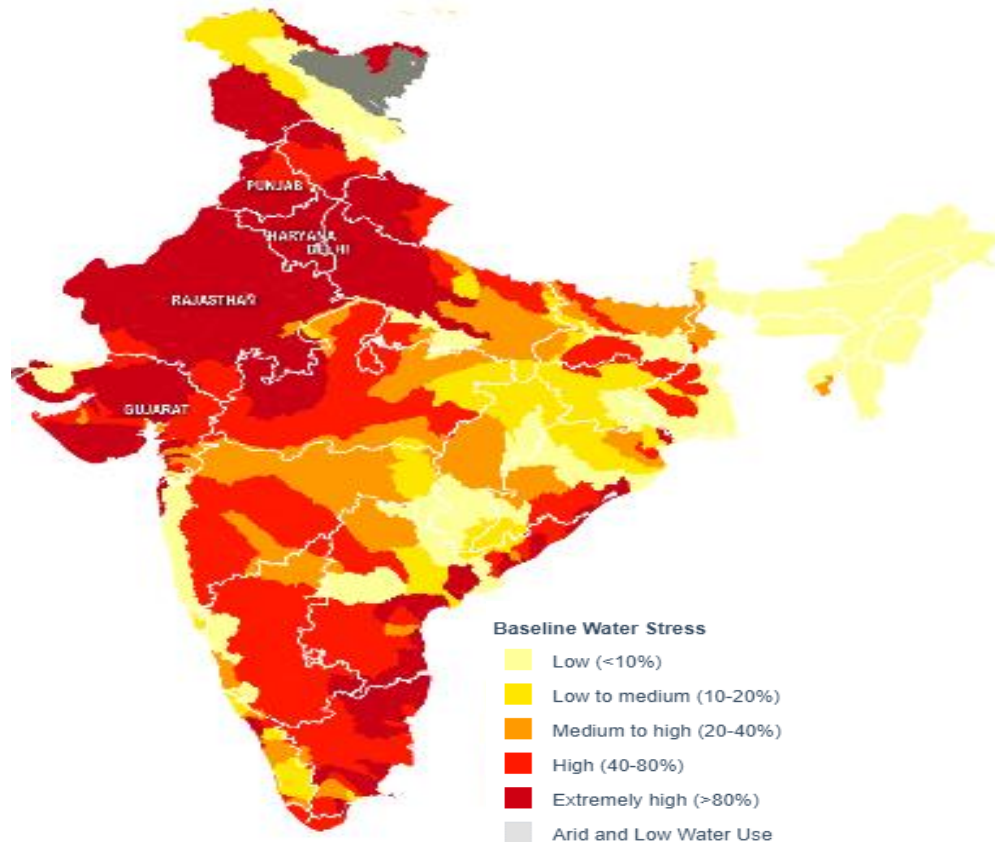
सत्यमेव जयते

14 June 2018

India is currently suffering from the worst water crisis in its history

Baseline water stress in India

Ratio of total withdrawals and total flow (2010)



Facts: Water supply is limited, quality is poor



600 million people face high-to-extreme water stress.



75% of households do not have drinking water on premise. **84%** rural households do not have piped water access.



70% of our water is contaminated; India is currently ranked 120 among 122 countries in the water quality index.

Data-based decision making will be a critical lever for effective water management in India

Note: 1. Baseline water stress measures total annual water withdrawals (municipal, industrial, and agricultural) expressed as a percent of the total annual available flow for 2010; higher values indicate more competition among users
Source: WRI Aqueduct; UNICEF; WaterAID, Forbes India, Census 2011

According to Census 2011: out of total 24 crore households, only 7 crore households are getting treated tap water i.e 70 % households are getting contaminated water

The Water Index seeks to enable data-backed water management in the country and promote 'competitive, cooperative federalism'

Objectives of Index are :

1. **Establish a clear baseline and benchmark for state-level performance on key water indicators**
2. **Uncover and explain how states have progressed on water issues over time, including identifying high-performers and under-performers, thereby inculcating a culture of constructive competition among states**
3. **Identify areas for deeper engagement and investment on the part of the states**

The CWMI is the country's first comprehensive and integrated national dataset for water and is a massive achievement in the context of India's water management. The Index can reinforce the principle of '**competitive & cooperative federalism**' in the country and enable innovation in the water ecosystem.



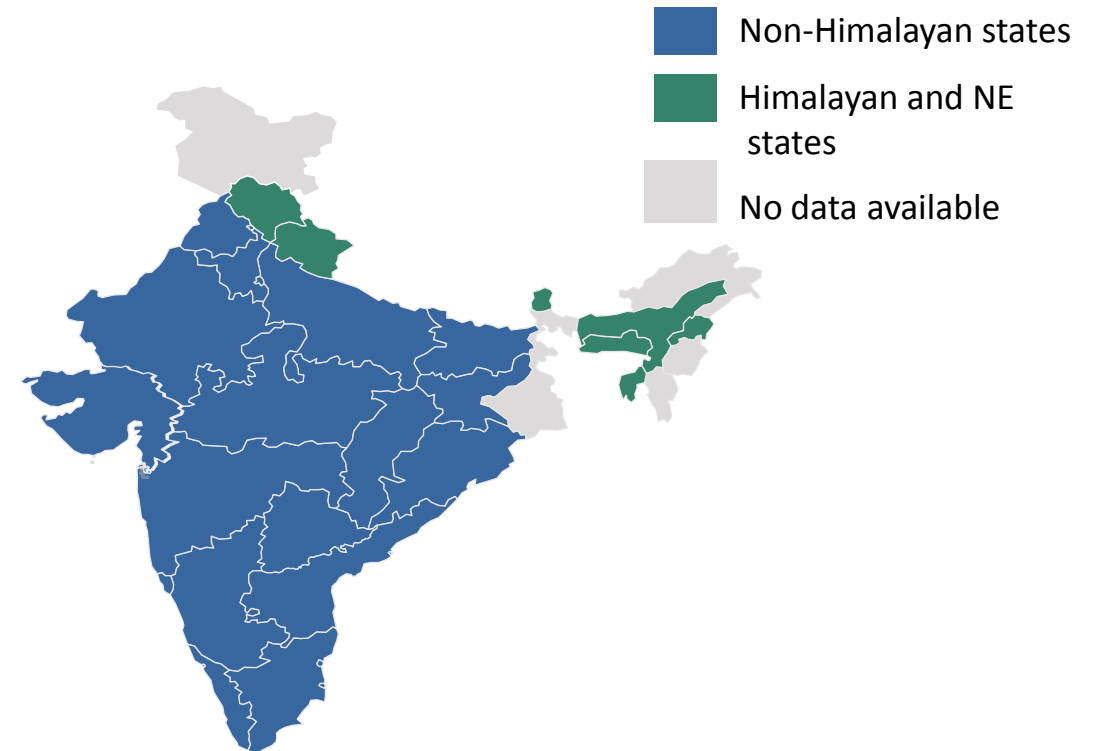
The Index comprises 9 broad sectors covering 28 indicators

Indicator sectors and weights

No.	Sectors	Weights
1	Source augmentation and restoration of waterbodies	5
2	Source augmentation (Groundwater)	15
3	Major and medium irrigation—Supply side management	15
4	Watershed development—Supply side management	10
5	Participatory irrigation practices—Demand side management	10
6	Sustainable on-farm water use practices—Demand side management	10
7	Rural drinking Water	10
8	Urban water supply & sanitation	10
9	Policy and governance	15
	Total	100

- The nine sectors cover **28 indicators**, with the weights equally divided across a sector's indicators
- **Focus on groundwater, irrigation, and policy action**—highlighting the growing groundwater crisis, India's low irrigation utilization, and the importance of effective policy frameworks

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

This Index was created through a first of its kind water data collection exercise in collaboration with states

The data collection process for the CWMI involved close, continuous collaboration of central agencies such as NITI Aayog, MOWR, and MDWS, with state governments and several state and local departments as the data for several of the indicators was being collected and compiled at the state level for the first time.

Index data collection timeline



June 2017

July 2017



Data portal closes

Jan 2018

March 2018

Workshop and online portal launch

NITI Aayog and MOWR organized a workshop to prepare states for the index requirements and launched the online portal where data entered.

Collection and entry of data

The states collected and compiled water data across multiple departments and submitted to online portal

Validation of data

An Independent Validation Agency— IPE Global—validated data submitted by states through cross-checking of public records, requests for evidence, and field visits. The final validation findings were presented to states in a conference organized by NITI Aayog

The key results at the overall/ national and sectoral levels

1 **Overall analysis:** *How has the overall performance of the states on the Index been?*

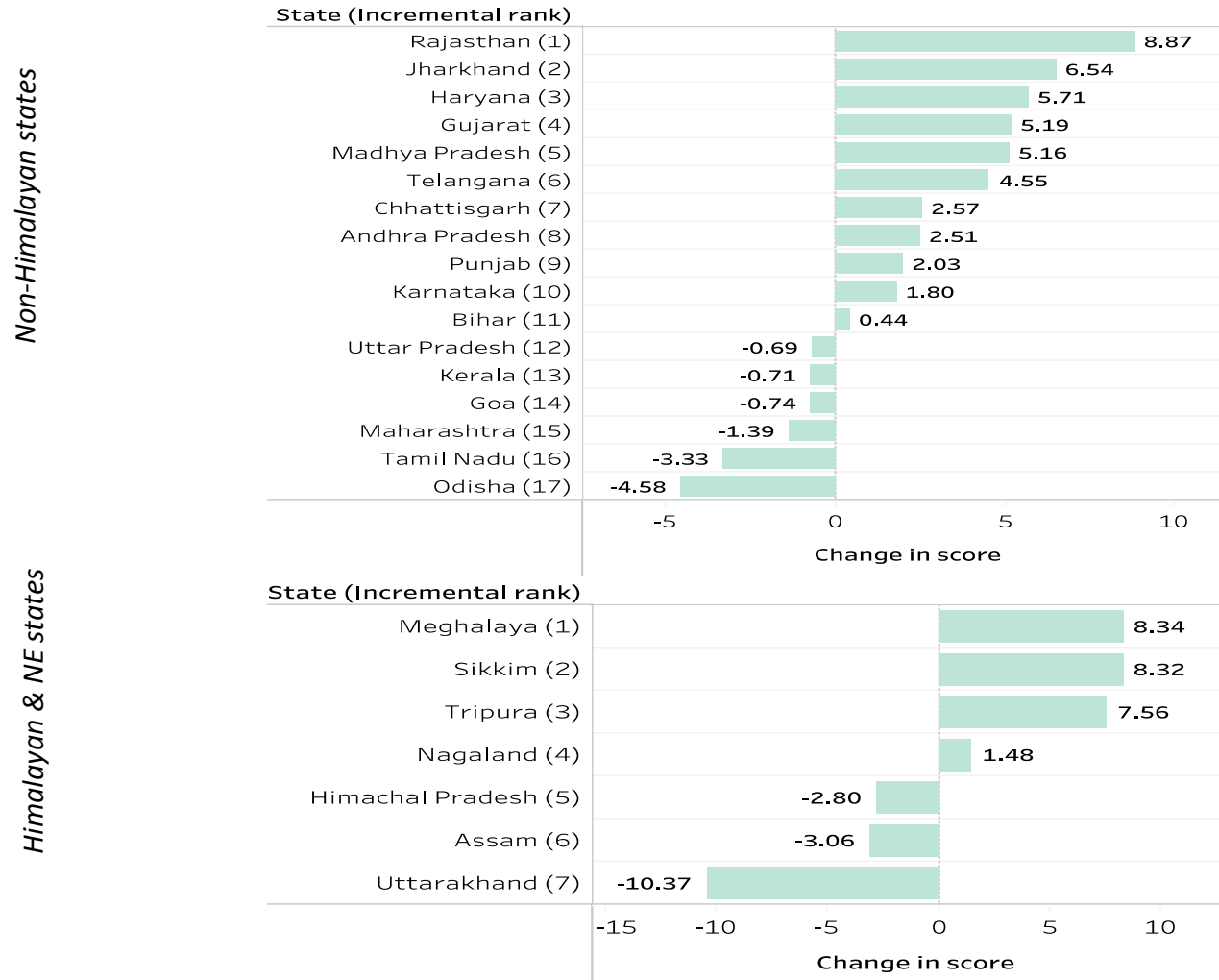
2 **Sectoral analysis:** *How have states performed across selected indicator sectors?*



Overall analysis: 60% of states have modestly improved their scores across the two years

Evolution of state performance over time

Water index composite scores (Base Year (FY 15-16), FY 16-17)



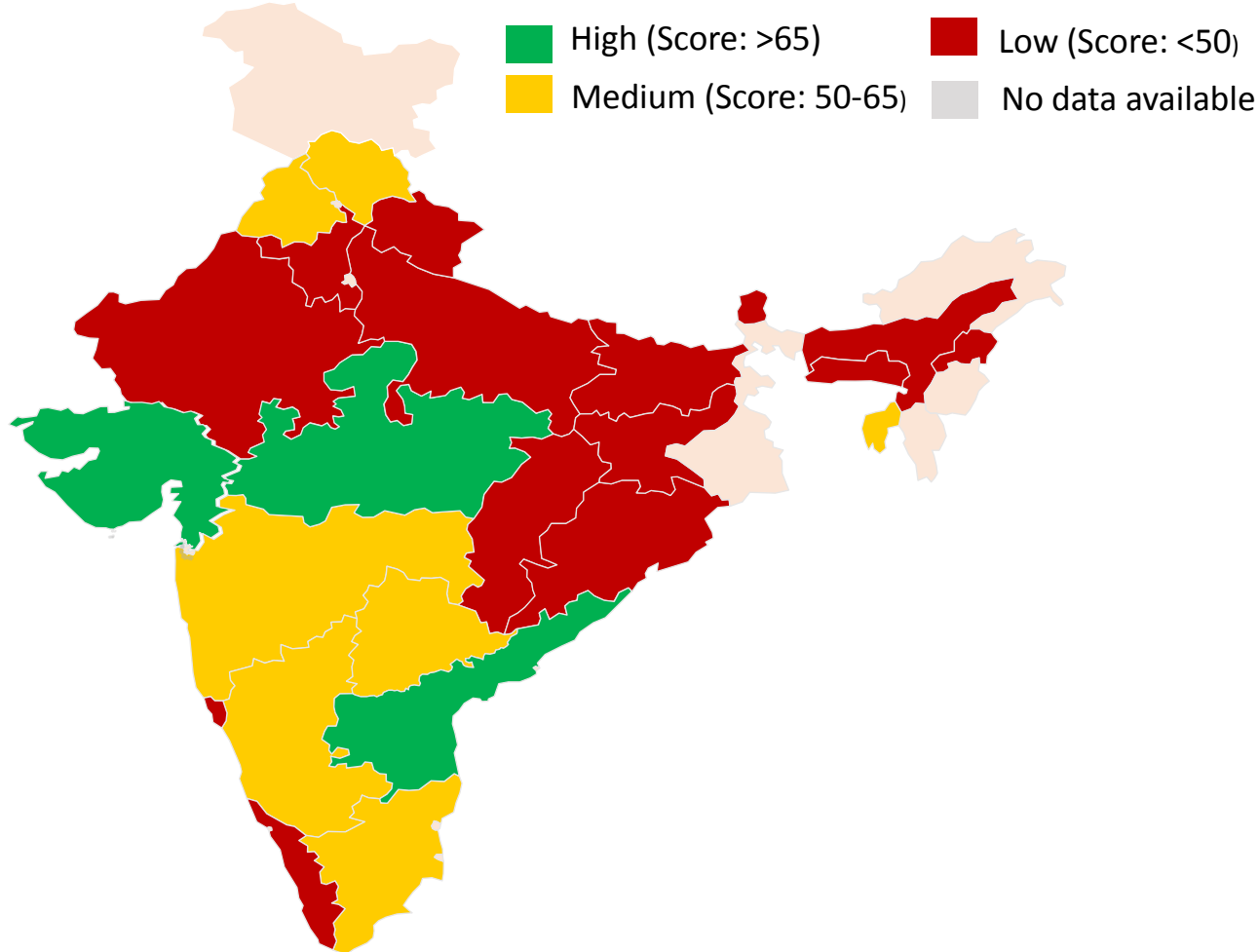
Key findings

- Promisingly, **~60% (15 out of 24) of states have improved their scores in FY 16-17**
- **Eight states achieved impressive gains of five points or more** in a single year—led by improvements in ‘Source augmentation and restoration of water bodies’, ‘Watershed development’, and ‘Rural drinking water’
- **Rajasthan is the most improved state**, gaining ~9 points by strengthening WUA participation and restoring the irrigation potential of ~81% of identified water bodies—these are also expected to be prominent levers in the \$100 million development of the Indira Gandhi canal
- The ‘Himalayan & NE states’ of Meghalaya, Tripura, and Sikkim are the other big improvers, increasing their scores by more than 7.5 points, signaling greater water policy action in this category

Overall analysis: All states need to perform better

High, medium, low-performing states

Water index composite scores (Reference Year)



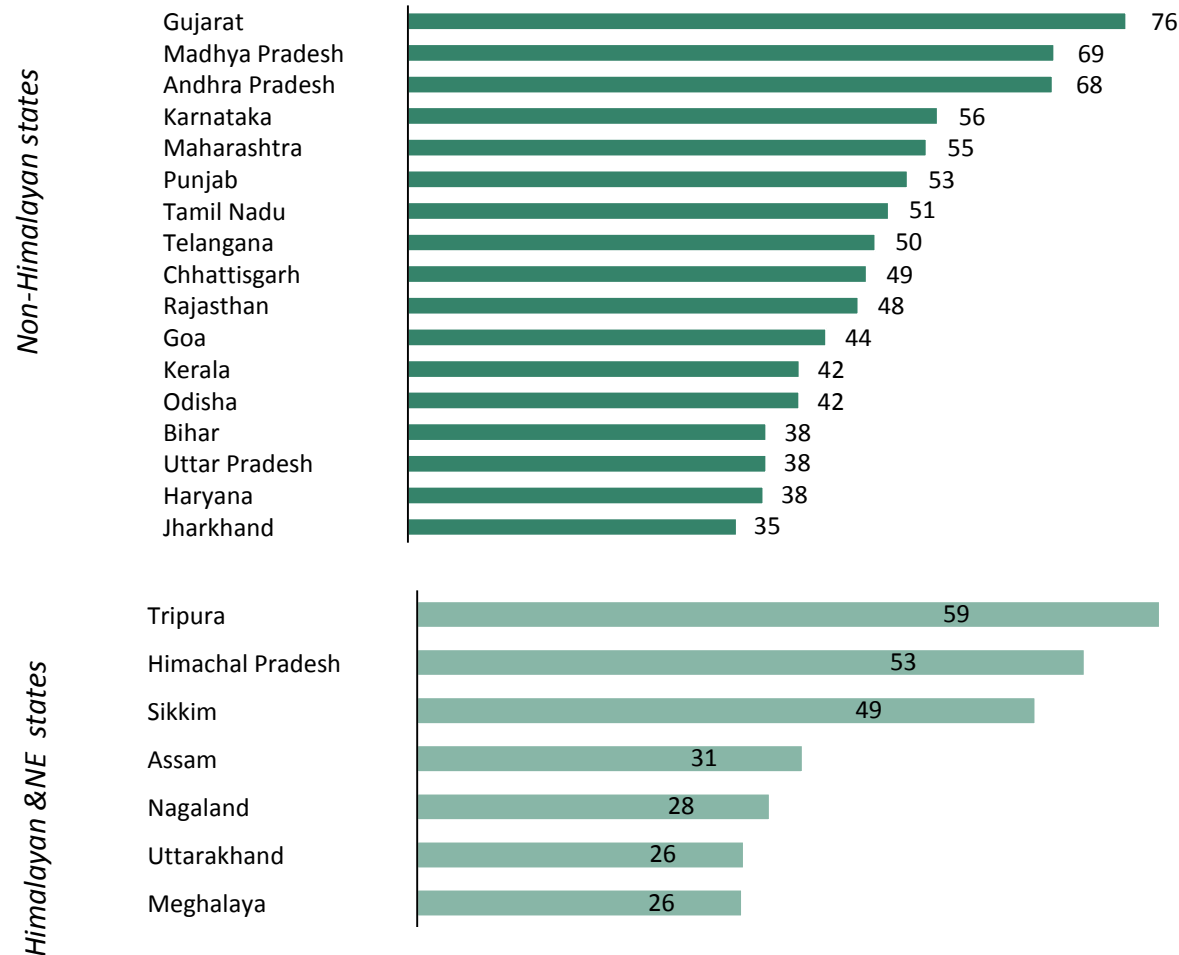
Key findings

- 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

Overall analysis: There is wide variation in state scores—from 26 to 76

Performance of Big states and Hilly states on water index

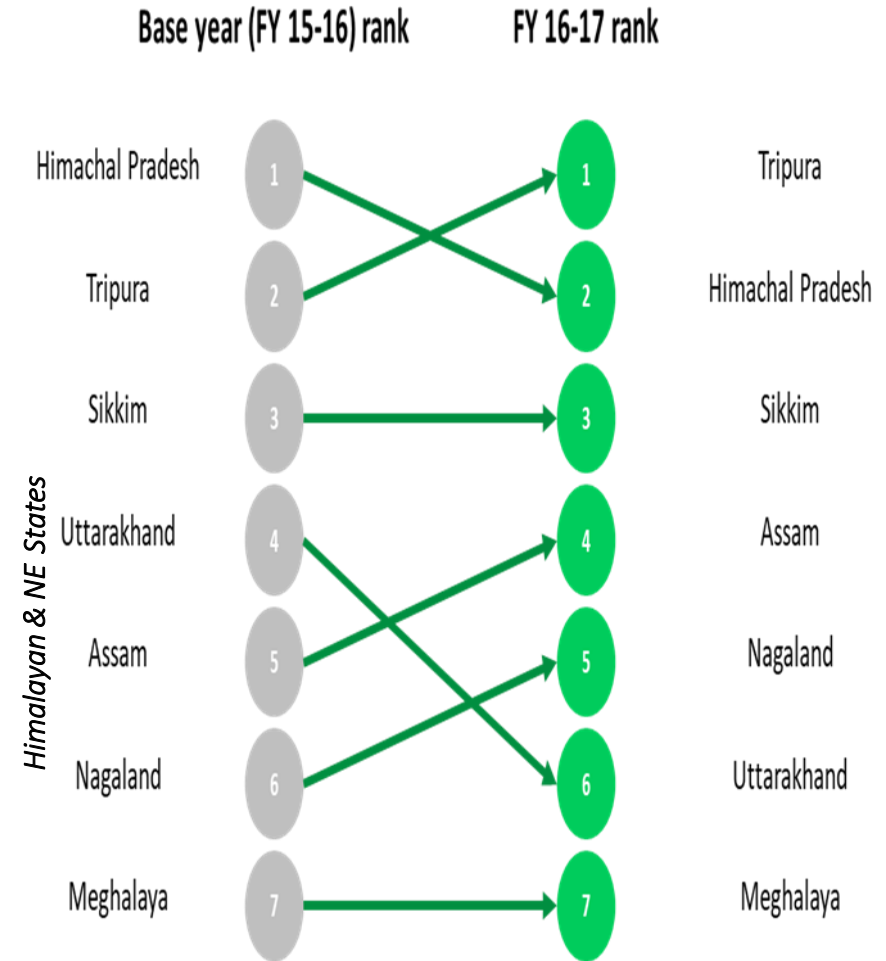
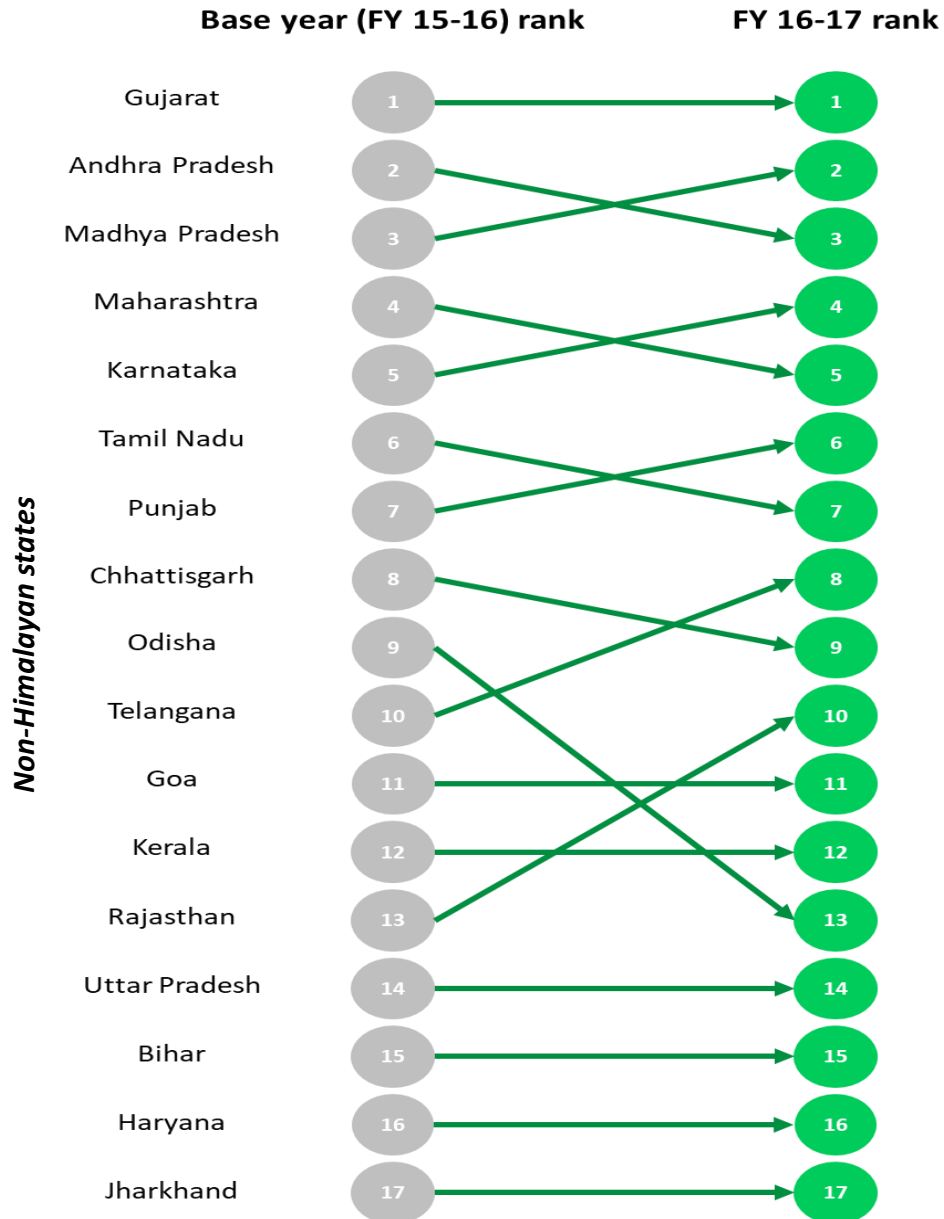
Ranking of states with composite scores (Reference Year)



Key findings

- Overall, there is large inter-state variation in Water Index scores, but **most states have achieved a score below 50 (out of 100) and need to significantly improve their water resource management practices**
- The scores for FY 16-17 vary from 26 (Meghalaya) to 76 (Gujarat), with the **median score being ~49 for 'Non-Himalayan states' and ~30 for 'Himalayan & NE states'**
- Most 'Himalayan & NE states' are the lowest performers on the Index, possibly due to a combination of high water availability, which reduces the imminence for water management and policy action
- But, a few 'Himalayan & NE states', such as Tripura and Himachal Pradesh, have high scores, **signaling increasing policy focus on water management in this category of historically water-abundant states**

Overall analysis: There has not been any significant accompanying movement in state rankings



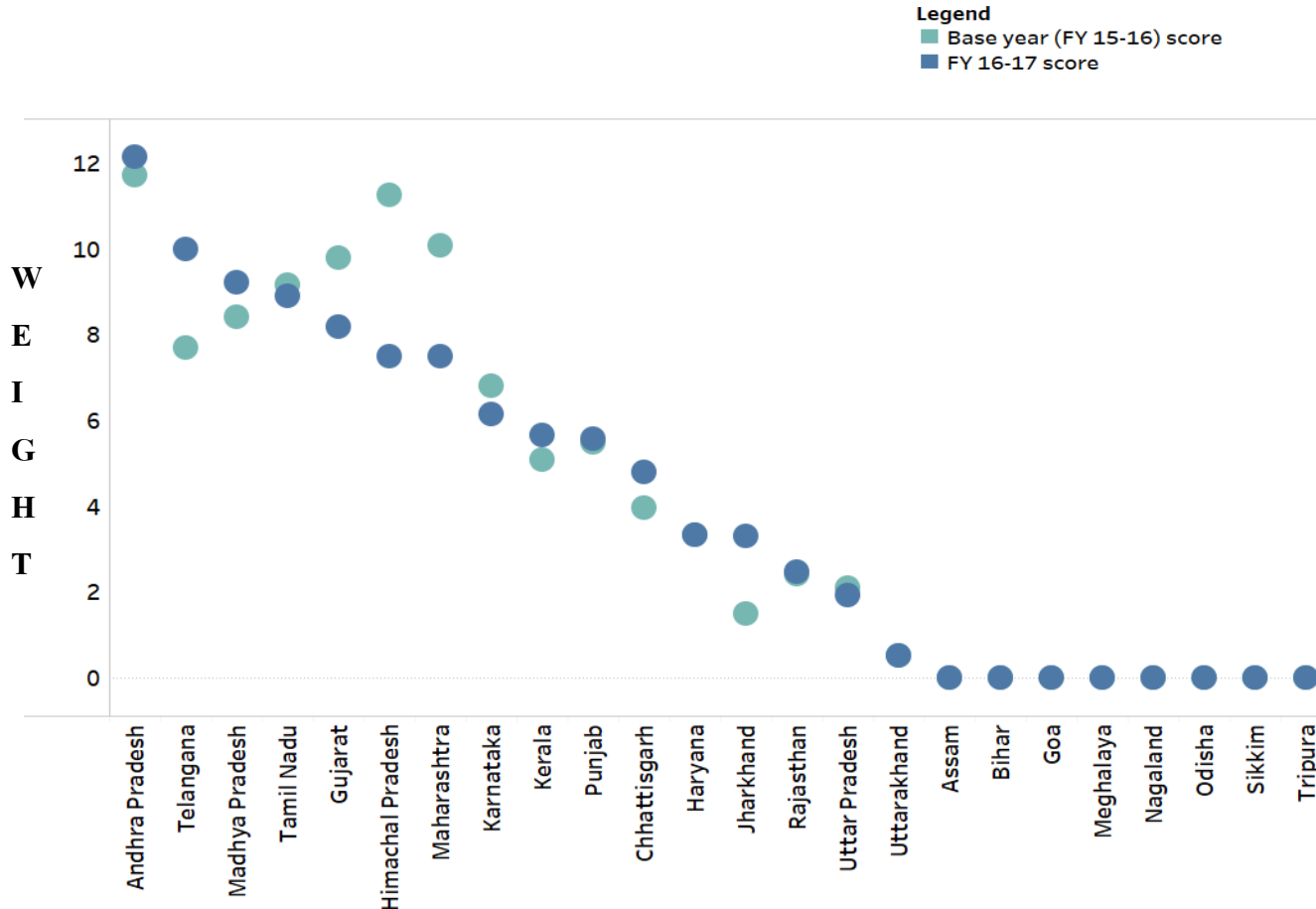
Key findings

- **In terms of state rankings, there have been only a few major shifts from the base year (FY 15-16) to FY 16-17, with the average change being about two places**
- **Most states have moved up or down by one or two places**, in line with the slow-moving nature of several indicators—irrigation projects, area under rainfed agriculture, etc.
- **Biggest Gainer:**
- **Rajasthan has gained** the most places—3—by improving participatory irrigation and source restoration
- **Tripura has moved to the top of the ‘Himalayan & NE state’ category by boosting rural water quality and geo-tagging of IWMP conservation assets**
- **Need Improvement:**
- **Odisha and Uttarakhand** have fallen by 4 and 2 places respectively, largely **due to a decline (relative to other states) in the reach and quality of rural and urban drinking water**

Sector- Source augmentation (Groundwater): Most states have scored below 50%, highlighting a growing national groundwater crisis

Performance of states on Sector – Source augmentation (Groundwater)

Index scores for sector (Base Year (FY 15-16), FY 16-17)



Key findings

- ~60% of the reporting states (10 out of 16)¹ achieved a score **below 7.5—the 50% score mark**—in FY 16-17 in the sector of groundwater restoration
- Further, only 50% of states have enacted a regulatory framework for the management of groundwater
- This highlights the **growing national groundwater crisis, with 54% of wells declining** in level due to unsustainable withdrawals for irrigation

Going forward



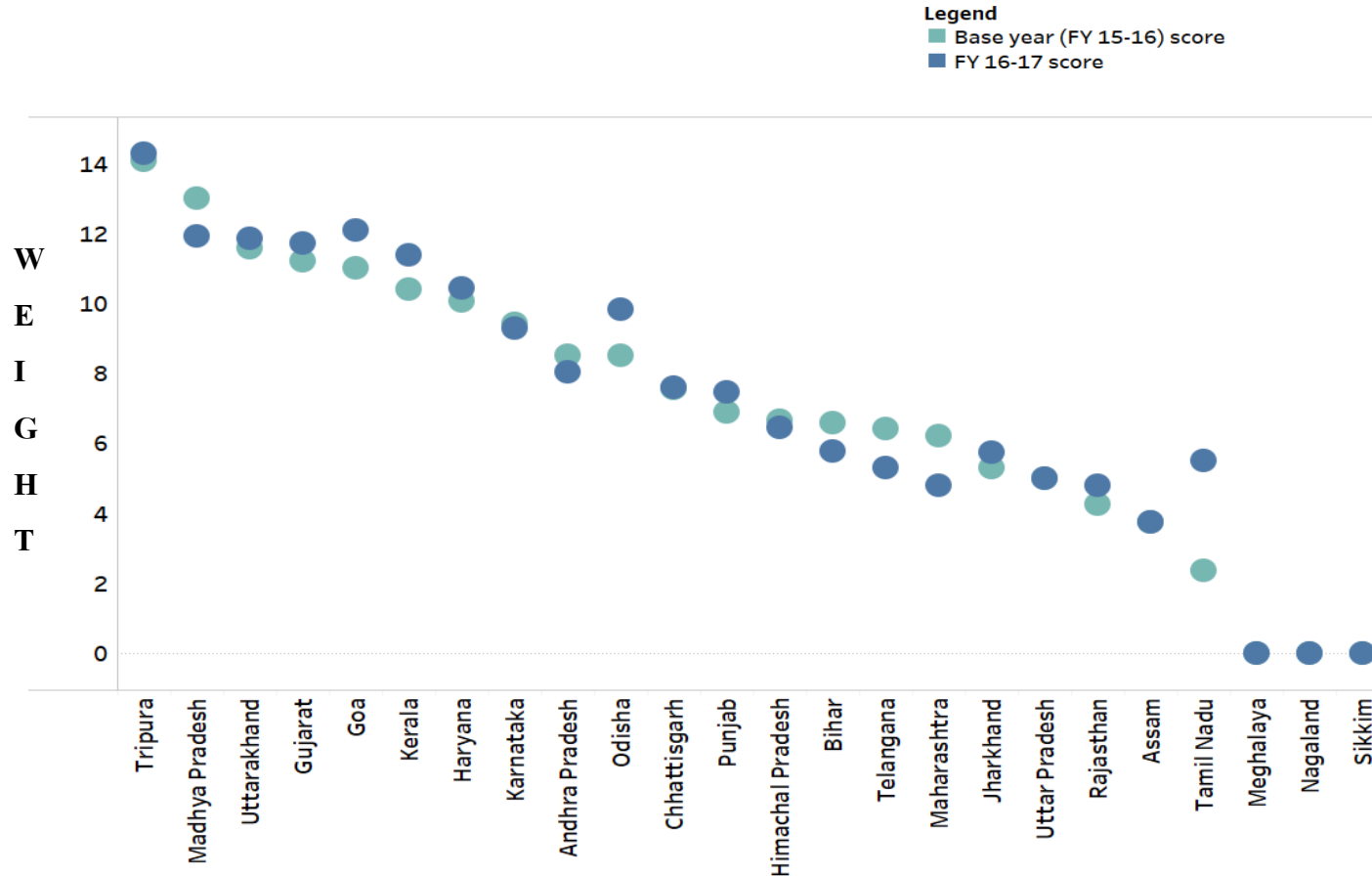
- States need to establish strong regulatory frameworks for managing and using groundwater
- **Market-based interventions, such as impact bonds²**, can also be explored to incentivize community institutions and users to recharge groundwater

Note: 1. Eight states reported having no over-exploited or critical groundwater units and thus have been excluded from this sector 2. An impact bond involves initial private/ community funding and efforts to recharge groundwater, with the govt. or donors paying investors on the basis of recharge targets achieved

Sector- Major and medium irrigation: A majority of states have performed well in irrigation management, scoring more than 50%

Performance of states on Sector – Major and medium irrigation— Supply side management

Index scores for sector (Base Year (FY 15-16), FY 16-17)



Key findings

- **11 out of 21 reporting states** achieved a score **above 7.5—the 50% score mark**—in FY 16-17 in major and medium irrigation.
- Most states perform well on the sub-component of Irrigation Potential Utilized (IPU)—the **median state utilizes 70% of its irrigation potential**
- However, **maintenance of assets is poor**, with several states having more than 100 major and medium irrigation (MMI) projects spending below the specified threshold for adequate maintenance¹

Going forward



- To ensure last-mile utilization and adequate maintenance of irrigation assets, states need to implement **robust participatory irrigation management measures** that allow motivated and knowledgeable local users to control fee collection, use monitoring, and O&M

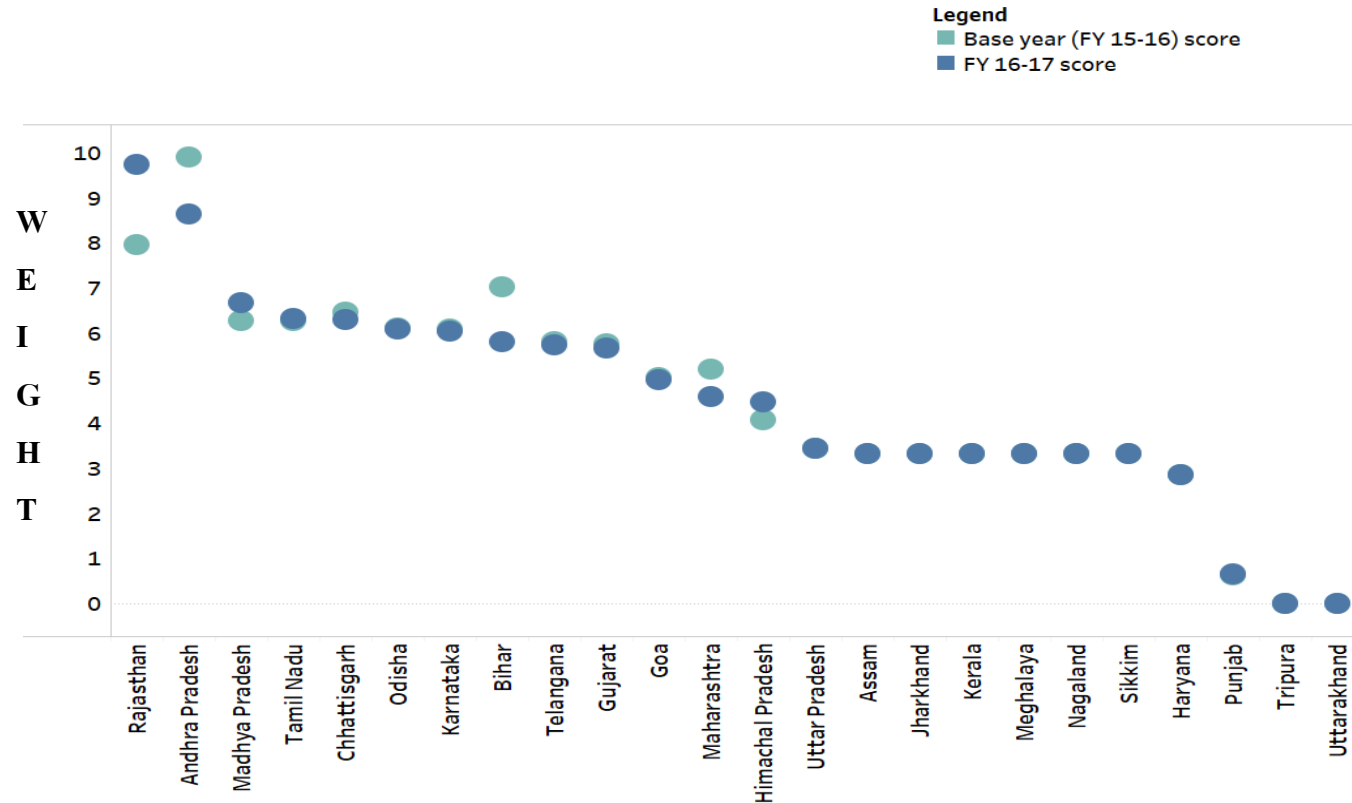
Note: 1. The threshold has been defined in govt. discussion on CWMI as INR 1,655 per hectare

Source: CWMI data

Sector- Participatory irrigation practices: Despite widespread existence of participatory irrigation frameworks, on-ground actualization is poor

Performance of states on Sector – Participatory irrigation practices—Demand side management

Index scores for sector (Base Year (FY 15-16), FY 16-17)



Key findings

- More than 80% of states (20 out of 24) have established a legal and regulatory framework for Participatory Irrigation Management (PIM) through Water User Associations (WUAs)¹
- However, progress on the ground is inadequate with 10 states having WUAs involved in maintenance activities in less than 20% of the irrigation command area
- Further, the percentage of irrigation service fees (ISF) retained by WUAs, a proxy for the level of decentralization of irrigation O&M remains low, with WUAs in only seven states retaining any fees at all

Going forward



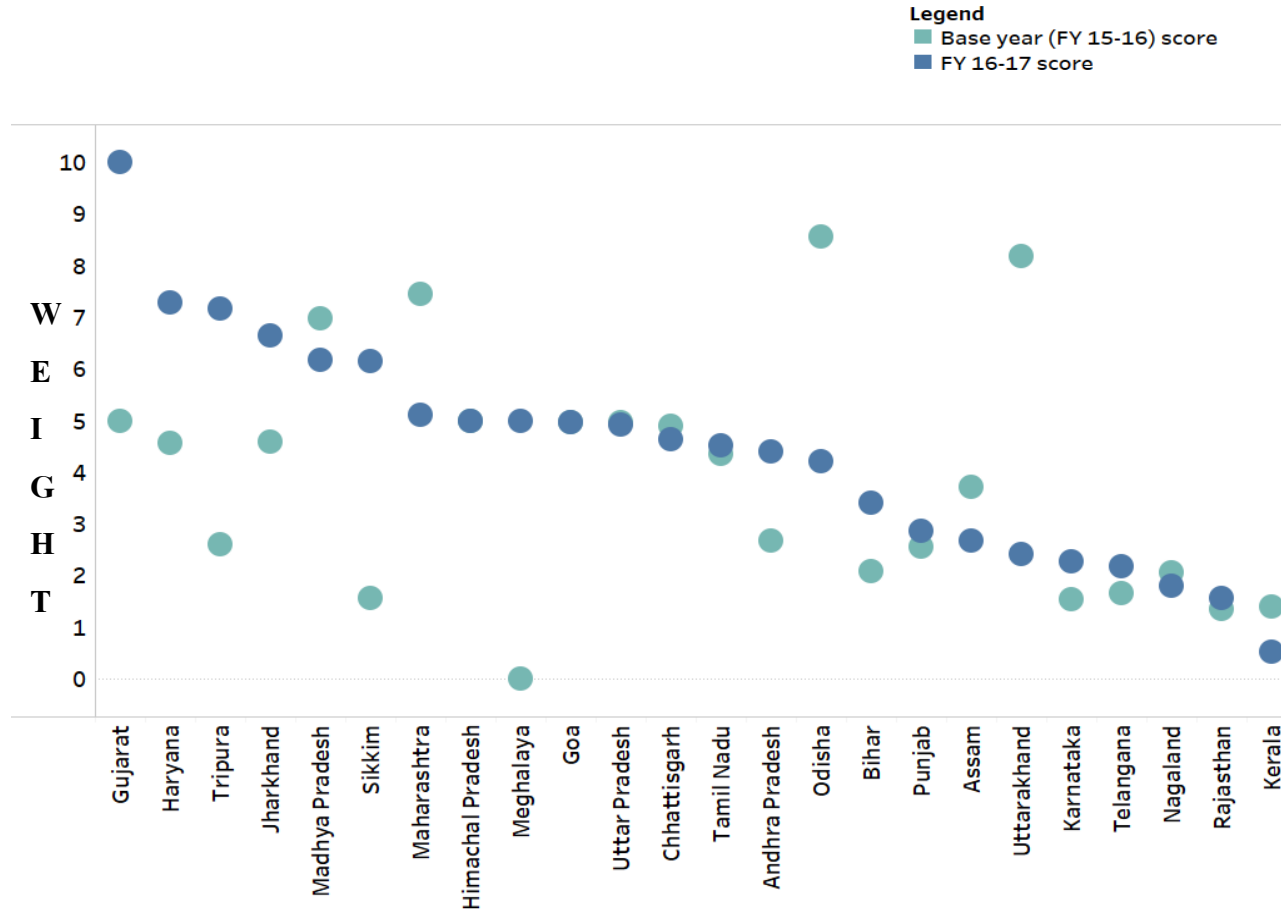
- To leverage the competitive advantages of WUAs in fee collection, O&M, and gaining local buy-in, states need to support the establishment of WUAs across the majority of irrigated areas
- Further, states need to ensure that WUAs are allowed to retain a significant portion of irrigation fees and are thus empowered to govern local irrigation systems

Note: 1. A water user association (WUA) is a grouping of local water users, largely farmers, that pool together financial and operational resources for the maintenance of irrigation systems, and in some cases, negotiate water prices with the service providers and collect user fees

Sector- Rural drinking water: Rural water access is improving, but quality remains a major challenge

Performance of states on Sector – Rural drinking water

Index scores for sector (Base Year (FY 15-16), FY 16-17)



Key findings

- **Overall performance in provision of rural drinking water has improved** from the base year (FY 15-16) with 13-15% increases in the average and median scores
- Most of the **‘Non-Himalayan states’** report **70-90% of rural habitations having drinking water** supplies
- These figures are lower for ‘Himalayan & NE states’, but steadily improving, with Himachal Pradesh registering a 21% increase in access in a single year
- **Water quality remains a major issue, with several populous states reporting no reduction in quality incidents**

Going forward

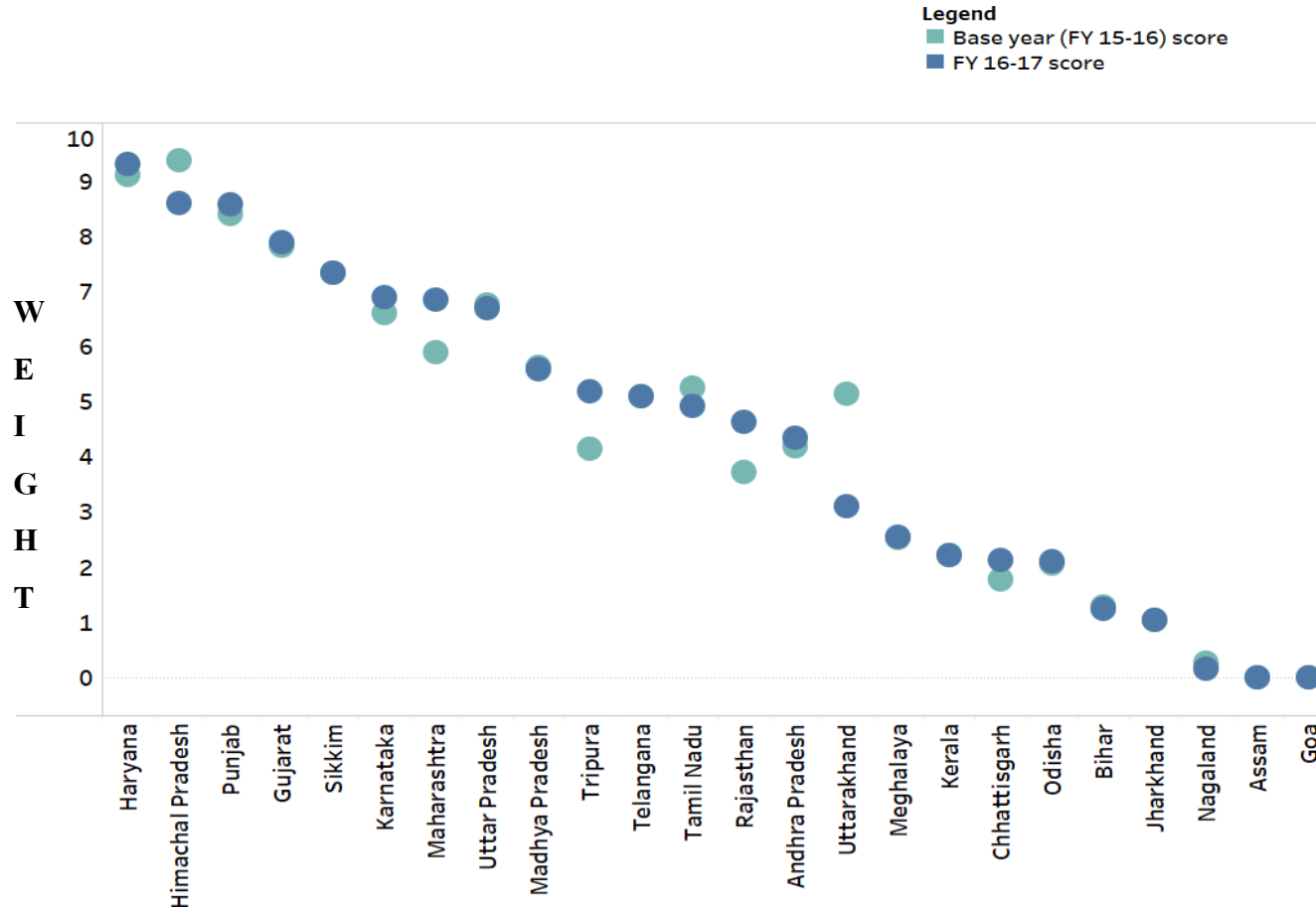


- **State govts. can support entrepreneurs in piloting and scaling promising decentralized technologies for measuring and improving water quality**

Sector- Urban water supply & sanitation: Urban access also suffers from significant gaps, and India's water treatment capacity is only ~33%

Performance of states on Sector – Urban water supply and sanitation

Index scores for sector (Base Year (FY 15-16), FY 16-17)



Key findings

- Most states report a high percentage of urban population having access to drinking water, except for the North-Eastern and Eastern regions, which report less than half of the urban population having access
- Though, some states with large urban areas—Maharashtra, Tamil Nadu, and Kerala—are also only able to provide drinking water to 53-72% of urban populations
- Waste water treatment capacity and actual treatment vary widely, but ~70% of states treat less than half of their waste water and the median state treated ~33% of its water in FY 16-17, indicating room for improvement

Going forward

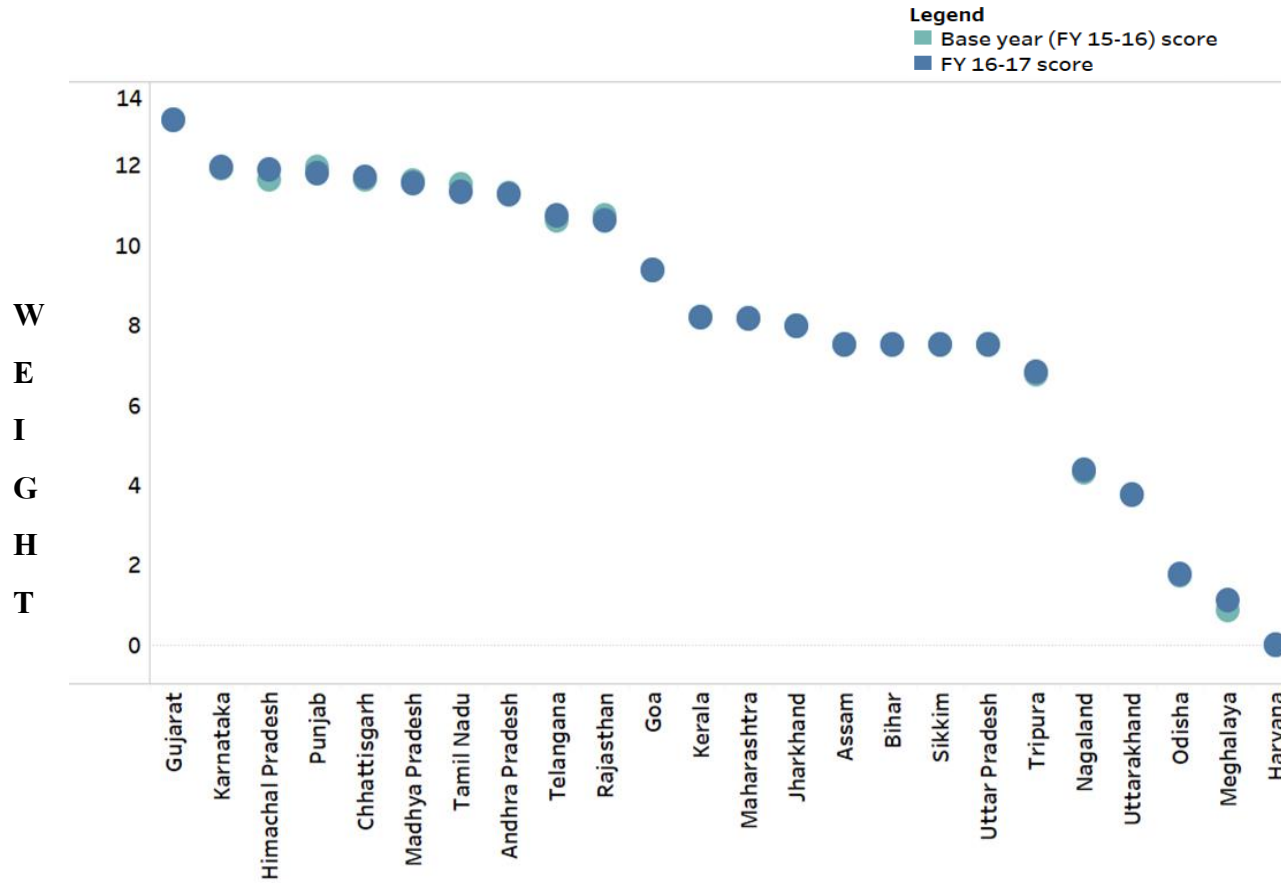


- Urban access can be improved by reducing the ~40% of water lost due to leakages in urban areas through smart technologies such as sensors
- Further, building treatment capacity can enable reuse of water, thereby increasing the utility gained out of every drop

Sector- Policy and governance: In a more encouraging trend, most states have conservation legislations and 50% have set up data centres

Performance of states on Sector – Policy and governance

Index scores for sector (Base Year (FY 15-16), FY 16-17)



Key findings

- Overall, most states have scored more than 50% on the sector--18 states have scored above 7.5 (out of 15) with a cluster of high performers between 10-12 points and median performers located around 7.5 points
- 70-80% of states have passed legislation for protecting water bodies and mandating rain water harvesting
- Promisingly, 11 states (50%) report having an integrated data centre for water resources, which is a crucial enabler for targeted policymaking and broader research and innovation in the sector

Going forward

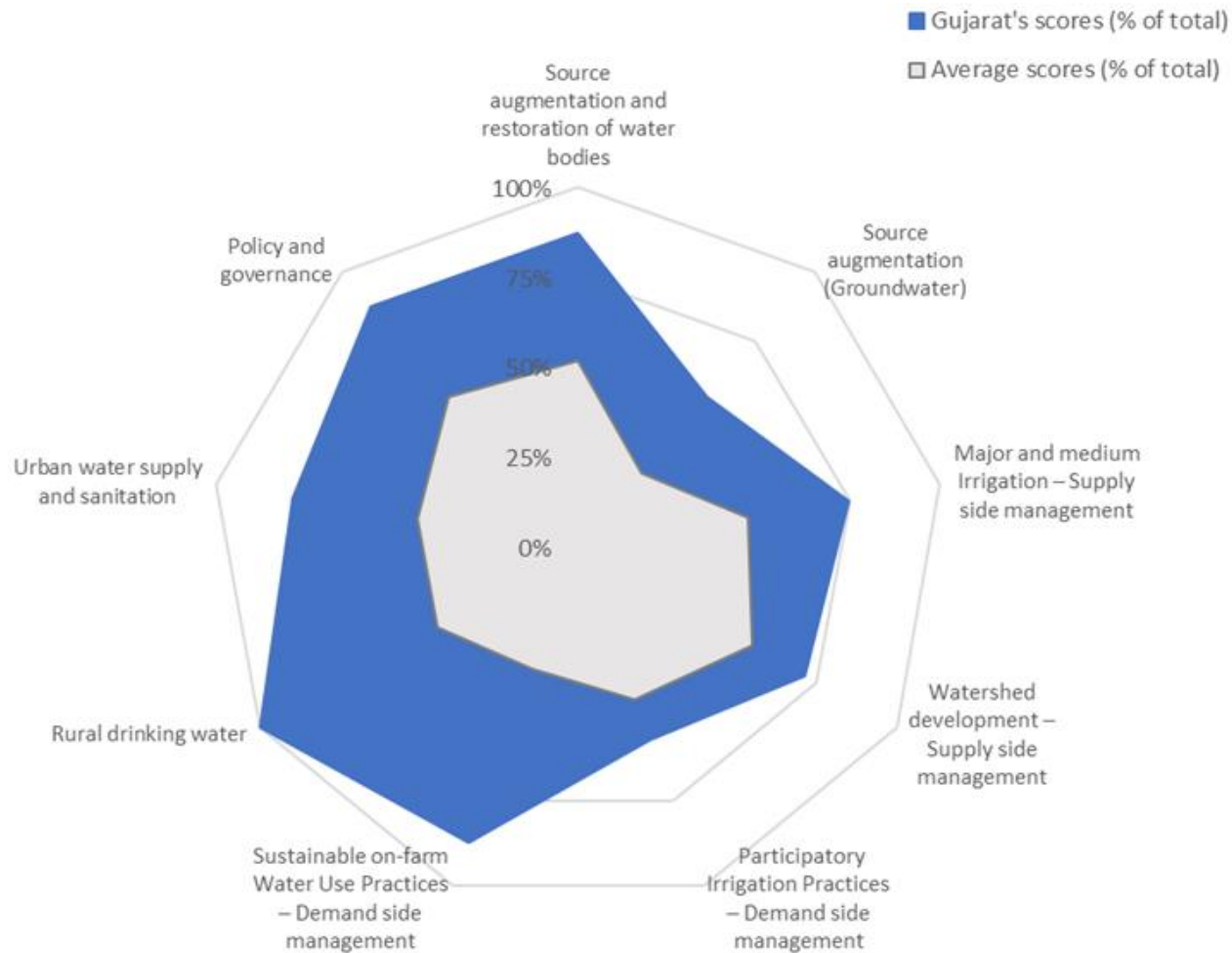


- States need to focus on pricing urban water to encourage efficient use, while ensuring equity through consumption slabs
- The consolidation of state data centres into a **central data platform** with open APIs can allow entrepreneurs and researchers to lead innovation in the sector

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

NITI Aayog will continue engagement with states to refine the Index and boost the spirit of *'competitive & cooperative federalism'*



Next steps

1 State action on water

NITI Aayog can facilitate the targeted dissemination of findings to states and support the states in improving their water management policies and plans through workshops and discussions.

2 Data-enabled water interventions by Centre

The central government can explore interventions that build on the Water Index, such as performance-linked irrigation funding, impact bonds for groundwater recharge, and a national water data platform, to boost national management of water.

3 Iteration of Index for the following year

NITI Aayog can improve/ expand the Index in collaboration with states and water experts to capture an even larger share of water performance and thus ensure the actualization of *'competitive, cooperative federalism'* to its fullest extent.

Thank you