Workshop on

Water Security for Urban Local Bodies in Maharashtra

महाराष्ट्रातील नागरी स्थानिक स्वराज्य संस्थांसाठी 'जलसुरक्षा' या विषयावर कार्यशाळा

Mazi Vasundhara Abhiyan, Department of Environment and Climate Change, Government of Maharashtra

In collaboration with Center Water and Sanitation (CWAS)
CRDF, CEPT University

22nd April 2026

Agenda for the workshop

1. Welcome and introduction of workshop

2. Understanding Water scenarios in different areas of Maharashtra
   - Key water challenges in cities

3. Policies and programs for water security

4. Measures and approaches to address different water challenges
   - Good Practices & Case Studies

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Earth Day 2026

The Earth Day 2026 theme is **"Our Power, Our Planet,"** emphasizing that individual and community actions—rather than just government policies—are crucial for environmental progress.

The theme focuses on accelerating the shift to renewable energy, strengthening community sustainability, and harnessing collective action for a cleaner, safer, and more sustainable future.

Source: https://www.earthday.org/earth-day-2026/

Majhi Vasundhara Abhiyan and its relevance to water security

Majhi Vasundhara Abhiyan (MVA) was launched by the **Honorable Minister, Environment and Climate Change Department, Government of Maharashtra on 2nd October 2020.**

- The Abhiyan has successfully completed **6 cycles** and now we are in the **7th** phase of the Abhiyan.

It is based on the 3 important pillars of Climate Action:

- **Carbon Sequestration**
- **Reducing Greenhouse Gas Emissions**
- **Promoting Green Lifestyle among citizens**

- Majhi Vasundhara Abhiyan is designed as a **comprehensive, citizen-focused initiative,** implemented across the state in a **mission-driven approach**. It takes the form of a **competition among local bodies**, leading to a substantial and tangible impact on the ground.

- The measures are designed to preserve and restore the natural ecosystem and covers various **existing government initiatives/ programs and schemes** hence does not require dedicated funding for implementation.

Majhi Vasundhara Abhiyan focuses on Five elements of nature /Panchamahabhuta

Indicators in MVA toolkit related to Water security

3. Water (Urban/Rural)

S/N	Action Points	Marks
3.1	**Water Resource Conservation and Rejuvenation**	**300**
3.2	**Rain Water Harvesting**	
3.2.1	Rainwater Harvesting in Public Buildings	**250**
3.2.2	Aquifer Recharge	**200**
3.3	**Measuring Fresh Water Loss and Quality Monitoring**	
3.3.1	Water Audit	**300**
3.3.2	Water Quality Monitoring	**150**
3.3.3	Water Metering in water supply system	**100**
3.4	**Wastewater Treatment and Reuse of Treated Water**	**200**
3.5	**Promotion of Sustainable festivals**	**400**
3.6	**Conservation of Aquatic Ecosystem**	**100**

Source: MVA toolkit

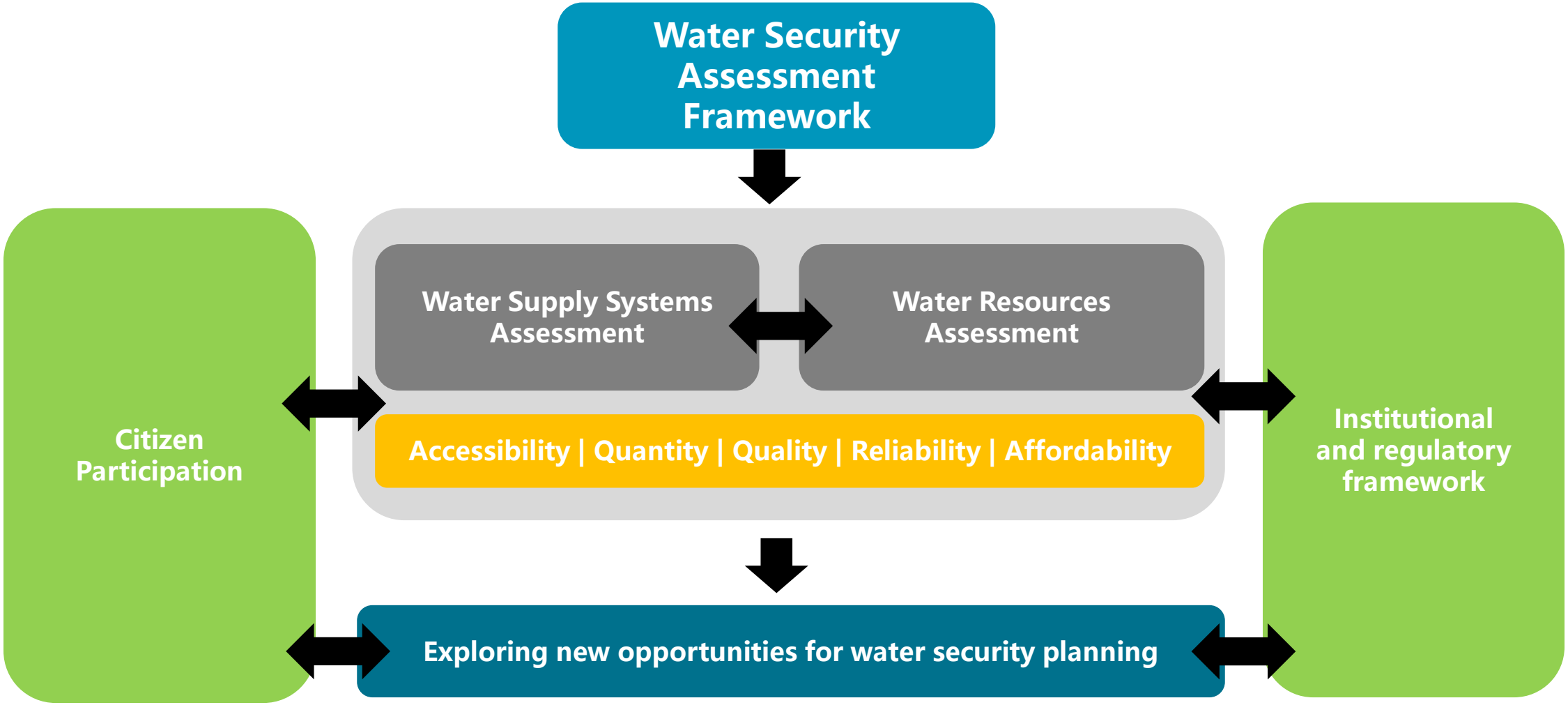
"Water is not merely a commodity—it is a priceless asset. Securing our future depends on how we conserve and manage it today."

"पाणी ही केवळ एक दैनंदिन गरजेची वस्तू नाही - ती एक अमूल्य संपत्ती आहे. आपले भविष्य आज आपण पाण्याचे जतन आणि व्यवस्थापन कसे करतो यावर अवलंबून आहे."

-
Droupadi Murmu
Hon'ble President of India

Source : https://www.presidentofindia.gov.in/press_releases/president-india-graces-jal-mahotsav-2026

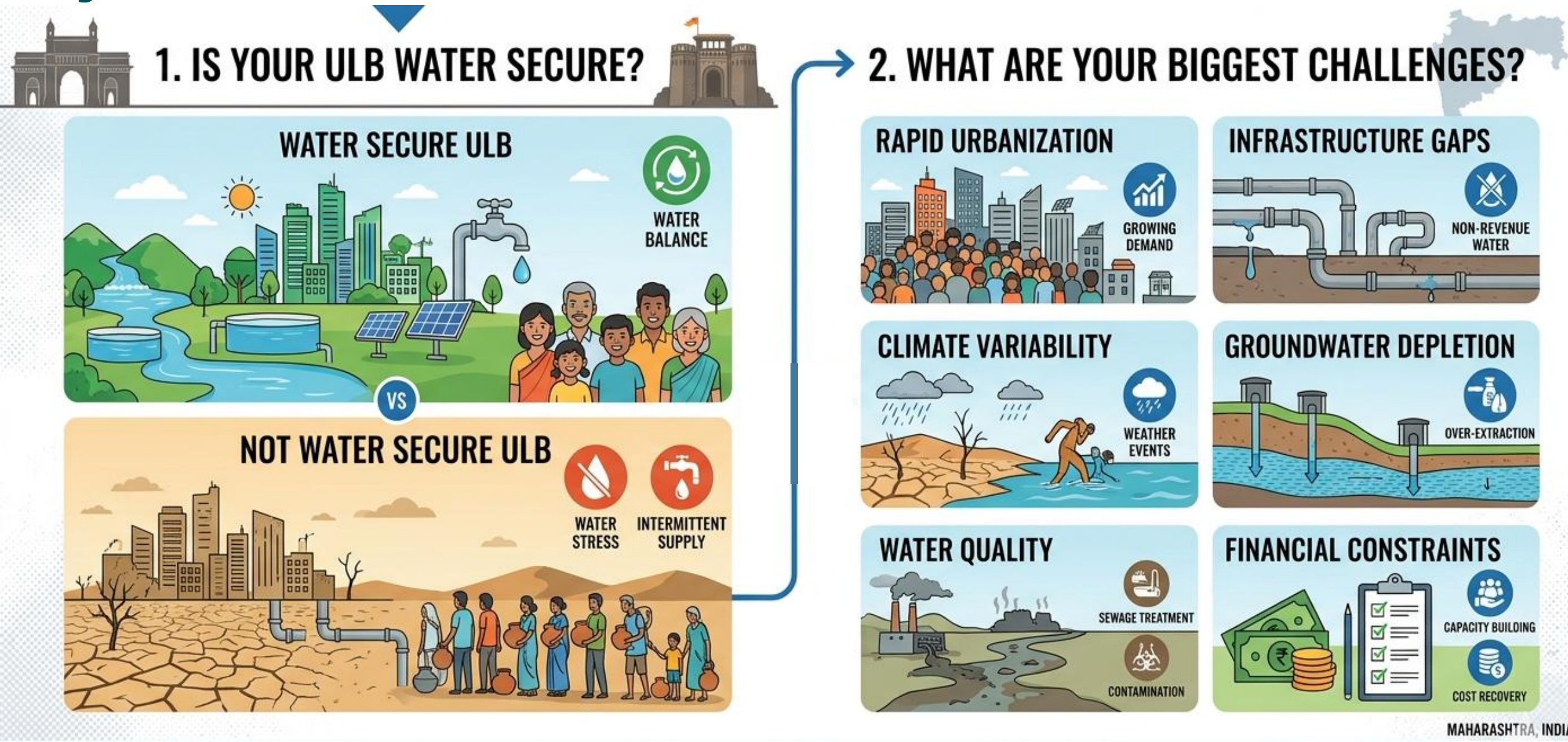
Framework and definition of water security



"Water Security is access of water for basic human needs in adequate quantity and quality, which is reliable and affordable."

Source: Water secure and climate resilient cities Anjar and Gandhidham: Citywide Assessment, CWAS, 2024.

Is your ULB Water Secure?



Source: image created with the help of AI

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Or use QR code

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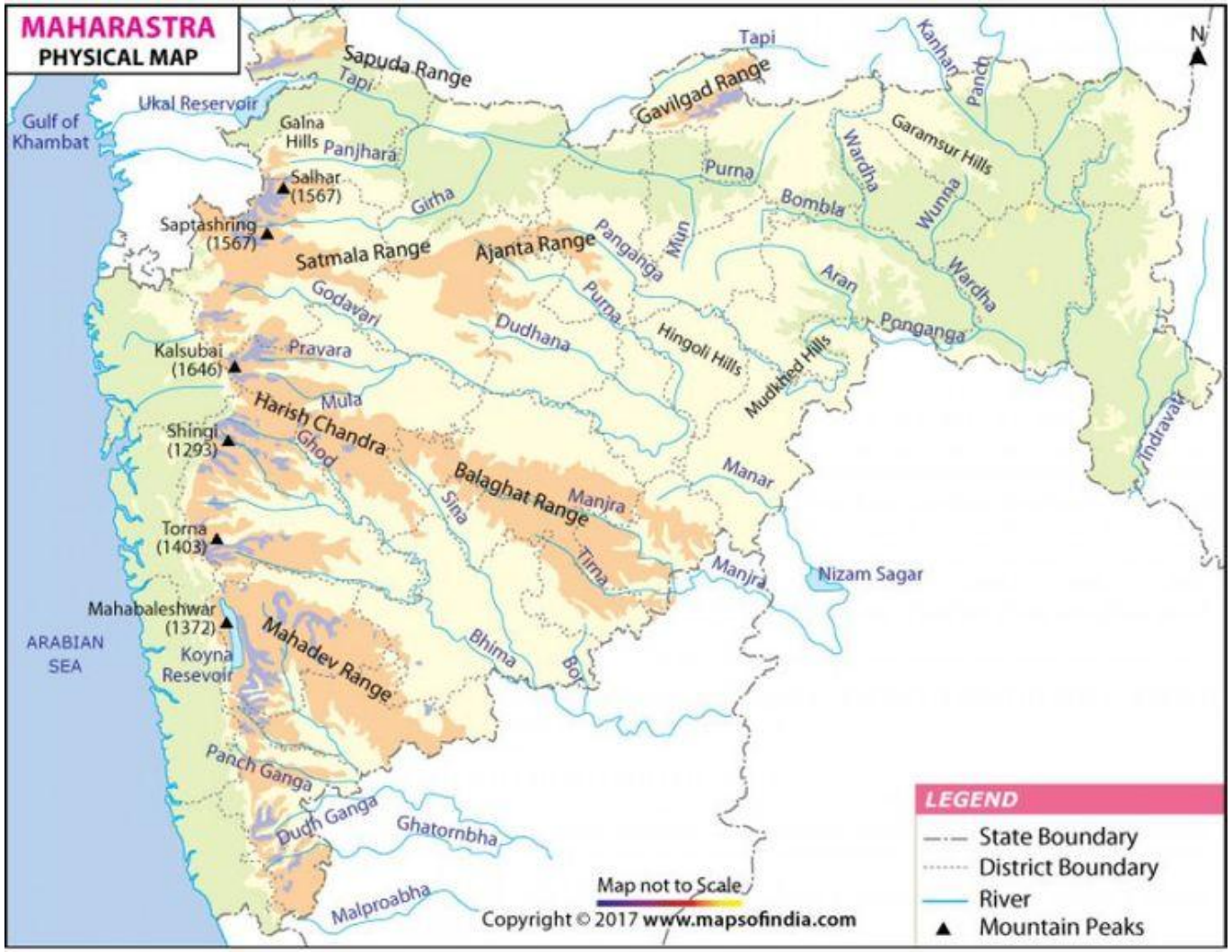
Maharashtra's climate and rainfall is majorly controlled by Western ghats



Maharashtra – Geographic Overview

- **Third-largest state in India** by area -**3.08 lakh sq. km**
- **Fourth-longest coastline** in India - extends **~720 km along the Arabian Sea**

Physiographic Divisions

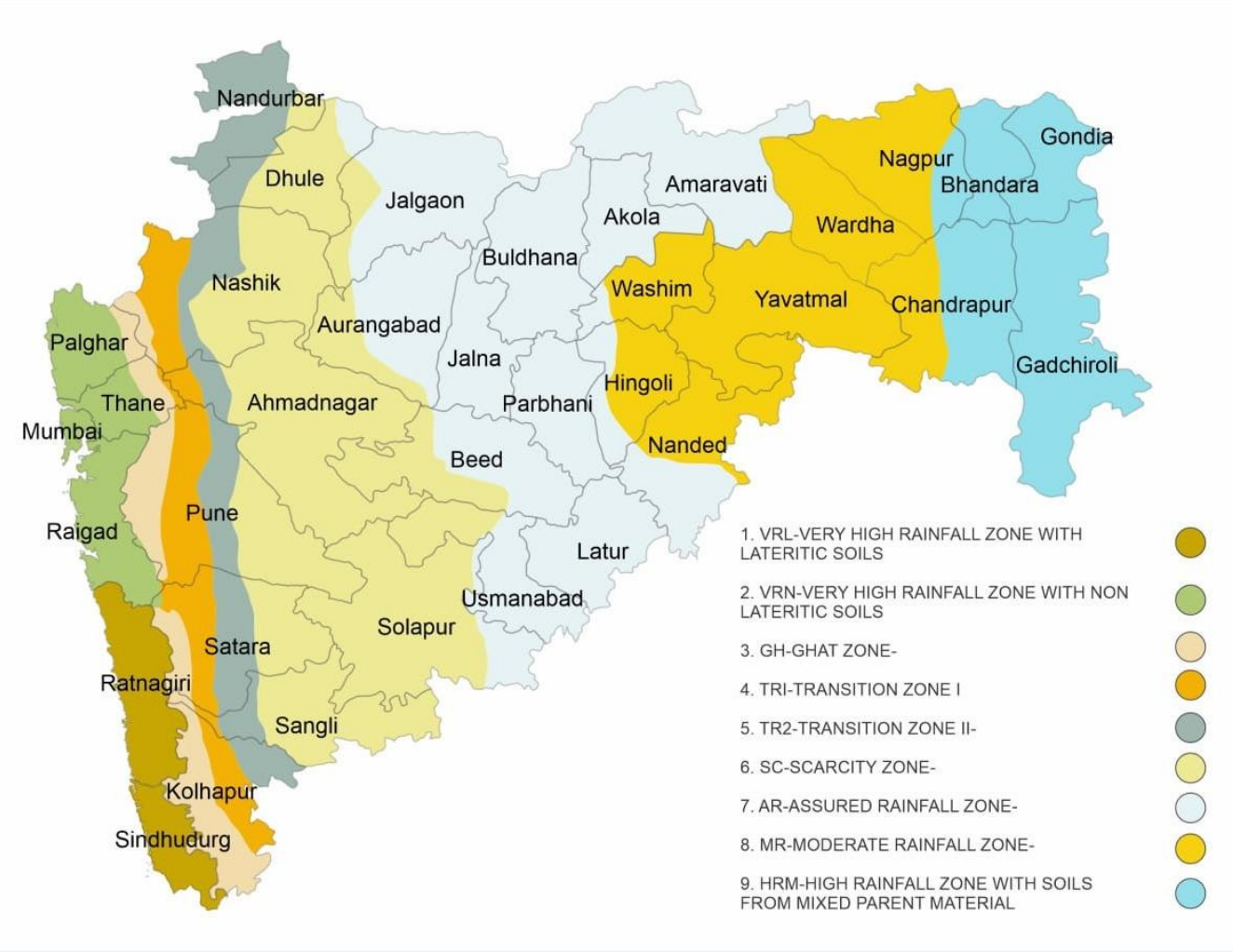
Maharashtra is naturally divided into three distinct regions:

1. **Deccan Plateau**
2. **Sahyadri Range (Western Ghats)**
3. **Konkan Coastal Strip**

The Western Ghats (avg height 1,200 m) act as an important climatic border for the region, controlling rainfall, drainage, and groundwater recharge in Maharashtra.

Source: https://www.mapsofindia.com/maps/maharashtra/maharashtraphysical.htm

East and West of Maharashtra has good amount of rainfall v/s central Maharashtra (1/2)

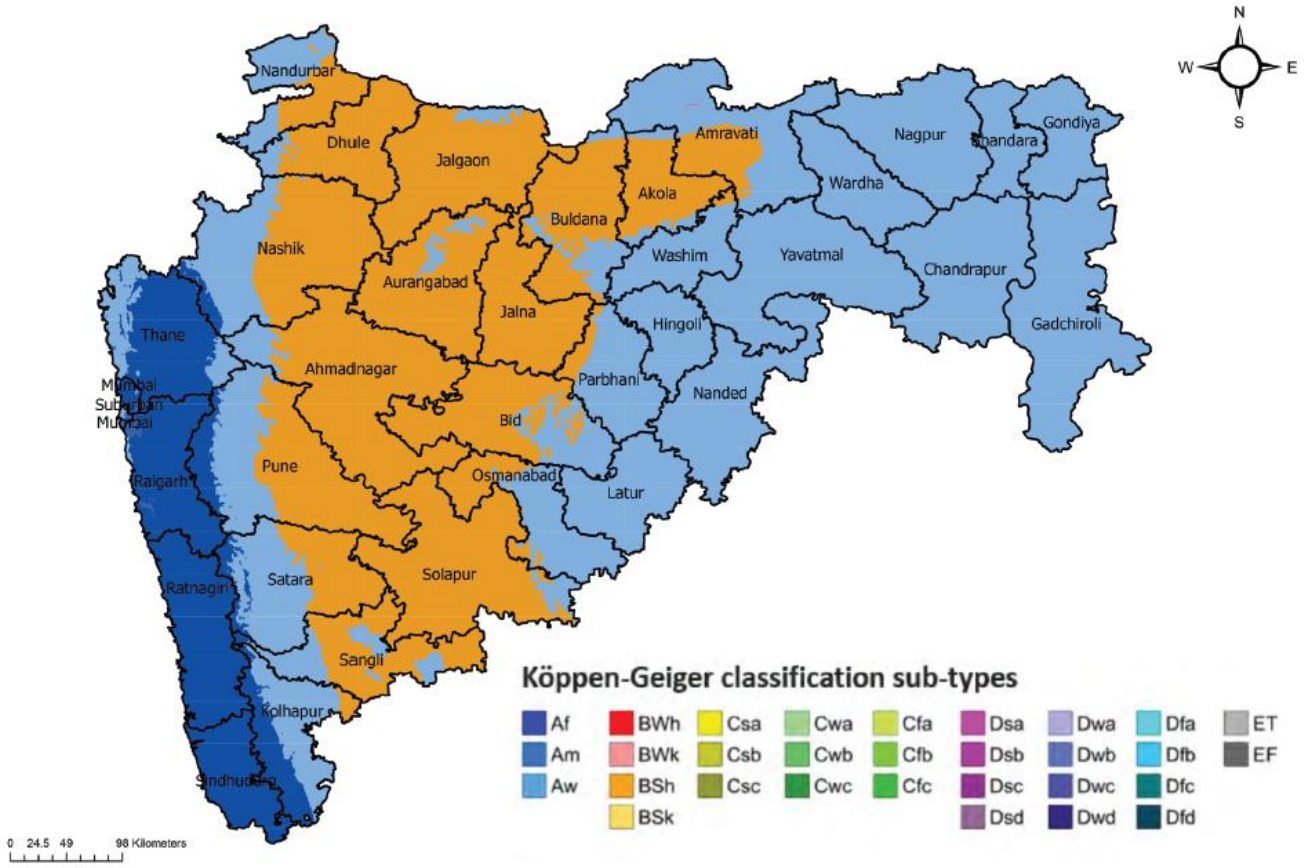


Rainfall pattern

- **Coastal Konkan** - high rainfall (2,000–3,000 mm),
- **Central Maharashtra and Marathwada** - low rainfall (~500 mm), leading to limited surface water and groundwater recharge
- **Vidarbha-** moderate rainfall (~1,000 mm) with comparatively better hydrological conditions.

Source: https://www.mahascac.in/uploads/reports/Revised_Maharashtra_State_Climate_Action_Plan_(2021-2030)_compressed_(1).pdf
https://www.ijarsct.co.in/Paper26803.pdf

East and West of Maharashtra has good amount of rainfall v/s central Maharashtra (2/2)



Source: Authors' adaption from Beck et al. 2019

Climate

- **Tropical rainy monsoon (Am)** - short dry season
- **Tropical (Bsh)** - dry, semi-arid, hot climate
- **Tropical savannah (Aw)** - hot, seasonally dry weather, usually in winter

Source: https://www.mahascac.in/uploads/reports/Revised_Maharashtra_State_Climate_Action_Plan_(2021-2030)_compressed_(1).pdf
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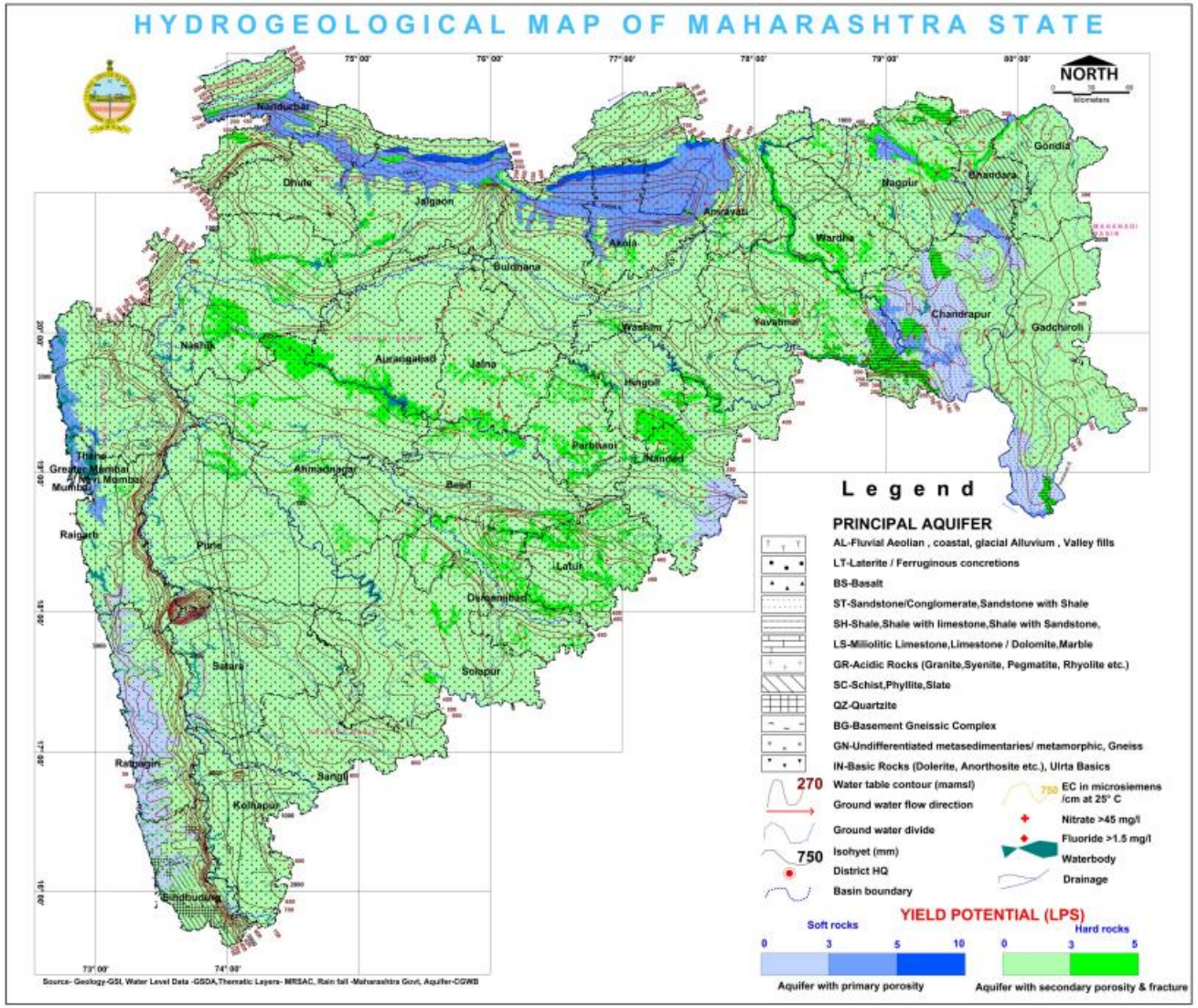
Maharashtra has predominantly hard rock aquifers with limited storage and low yield potential



- Maharashtra's subsurface (sub strata) is **predominantly hard rock aquifers (~93%), which limited storage and low-yield potential land high surface runoff**
- Rainfall is the dominant contributor for replenishing ground water annually, which is **highly variable.**
- Groundwater in Maharashtra shows a **recurring cycle of pre-monsoon depletion and post-monsoon recharge**.
- While monsoon recharge improves short-term availability, **long-term groundwater levels are declining**, posing risks to water security.
- This highlights the need for **sustainable management, recharge, and demand regulation**.

Source: https://cgwb.gov.in/cgwbpnm/public/uploads/documents/17056462878667638 83file.pdf

With low rainfall and limited water storage in the aquifers, central Maharashtra at high climate and water risk

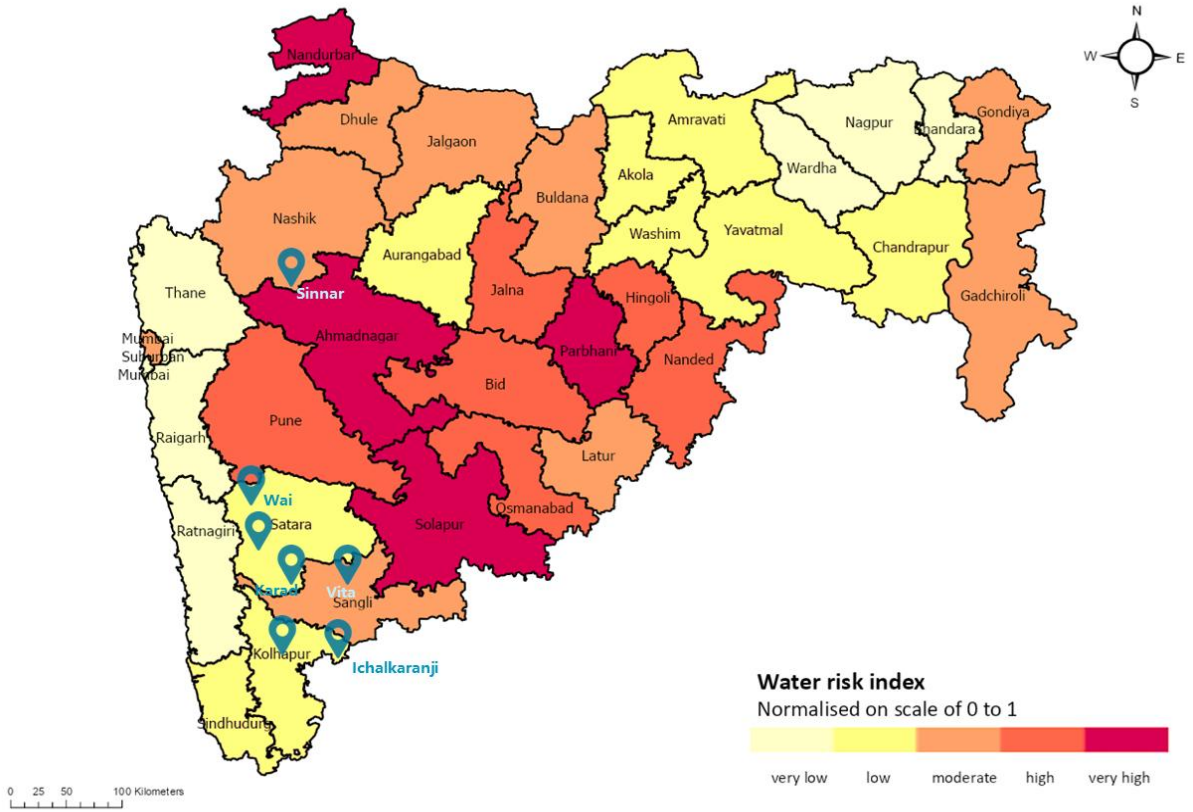


Table 4.6 Vulnerable districts of Maharashtra

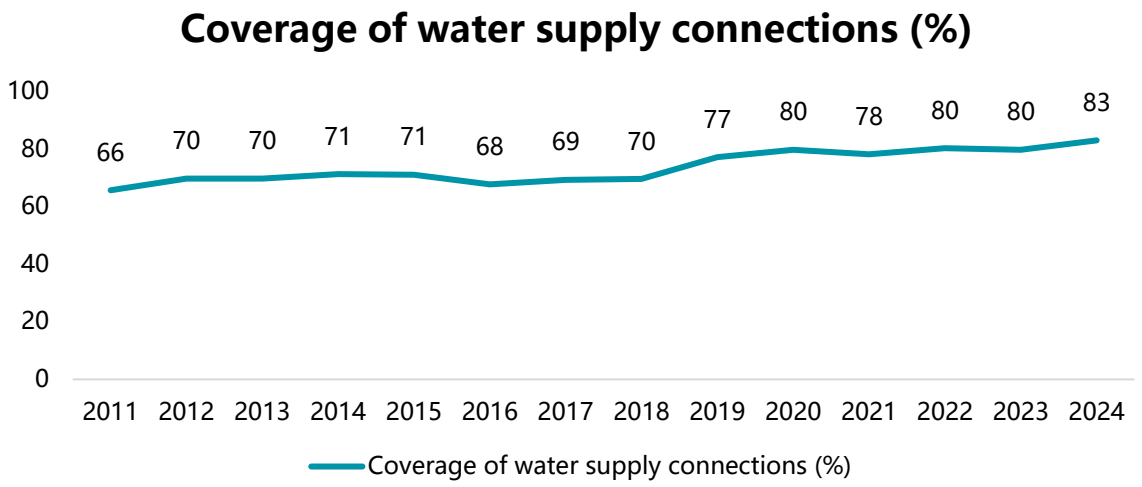
District	Event	Vulnerability
Sangli	Drought	Very high
Ahmednagar	Drought	Very high
Solapur	Drought	Very high
Dhule	Drought	Very high
Mumbai City	Flood & cyclone	Very high
Mumbai Suburban	Flood & cyclone	Very high
Buldhana	Drought	Very high
Hingoli	Drought	Very high
Jalgaon	Flood & drought	Very high
Osmanabad	Drought	High
Parbhani	Drought	High
Nandurbar	Drought	High
Nagpur	Drought	High
Satara	Drought	High
Akola	Drought	High
Nanded	Drought	High
Beed	Drought	High
Aurangabad	Flood & drought	High
Latur	Drought	Moderate
Pune	Flood & drought	Moderate
Amravati	Flood & drought	Moderate
Nashik	Flood & drought	Moderate
Jalna	Drought	Moderate
Gadchiroli	Drought	Moderate
Ratnagiri	Flood & cyclone	Moderate
Sindhudurg	Flood & cyclone	Moderate
Washim	Drought	Moderate
Raigad	Drought	Moderate
Chandrapur	Drought	Moderate
Gondia	Drought	Moderate
Wardha	Flood & drought	Low
Yavatmal	Drought	Low
Thane	Flood & cyclone	Low
Bhandara	Drought	Very low
Kolhapur	Drought	Very low

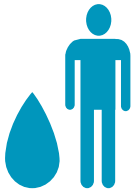
Source: Authors' analysis

- In the state's 36 districts, **11 are water-stressed** (less than 1,700 cubic meters per capita per year), and **18 are water-scarce** (less than 1,000 cubic meters per capita per annum).
- The overall **climate water risk is highest for districts in central Maharashtra and Marathwada**, particularly **Ahilyanagar** (**Ahmednagar), Nandurbar, Parbhani, and Solapur.**
- Seasonal groundwater scarcity is prevalent in Vidarbha and Marathwada regions, mainly due to the hard rock aquifers which have **limited storage and low-yield potential.**

Source: https://www.mahascac.in/uploads/reports/Revised_Maharashtra_State_Climate_Action_Plan_(2021-2030)_compressed_(1).pdf

Maharashtra's Urban Water Scenario: Improving Access, Persistent Gaps





Per Capita Water Availability in 2011 — **118.7 Lpcd**

Per Capita Water Availability in 2024 — **125.9 Lpcd**

Duration of Supply in Hrs in 2011 — **2.9 Hrs**

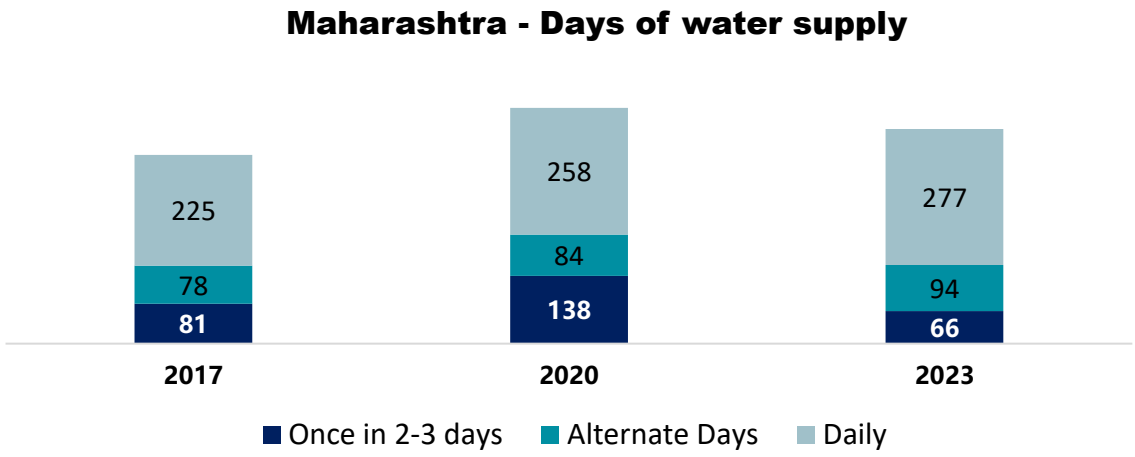
Duration of supply in 2024 — **3.7**

Water Coverage Status in State 2024 — **83.0%**

Water Coverage Status in SLUM 2024 — **75.8%**

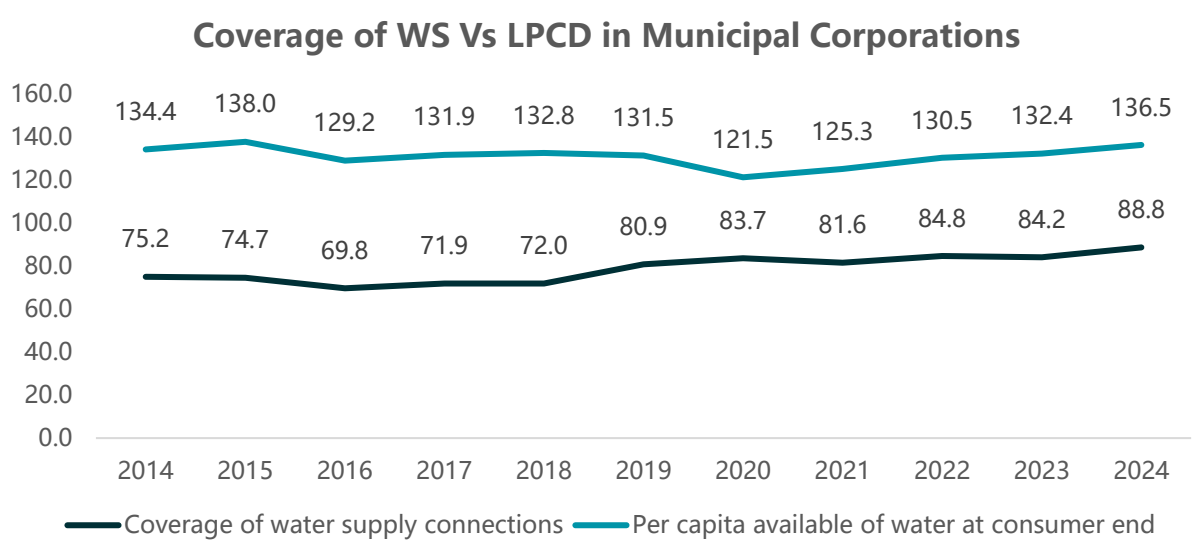
Extent of NRW in 2011 — **28%**

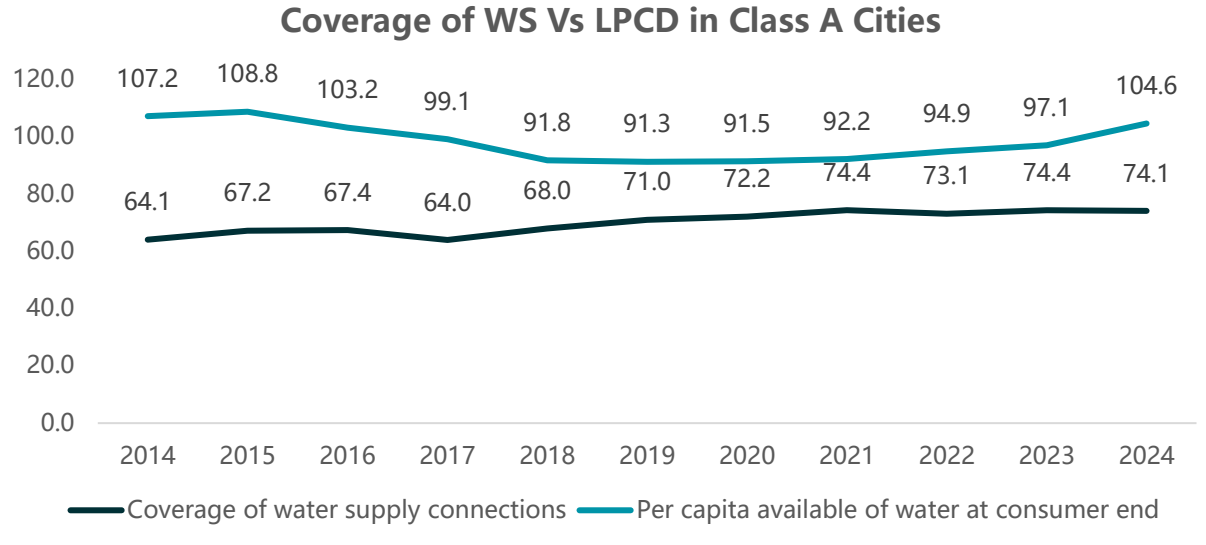
Extent of NRW in 2024 — **27%**

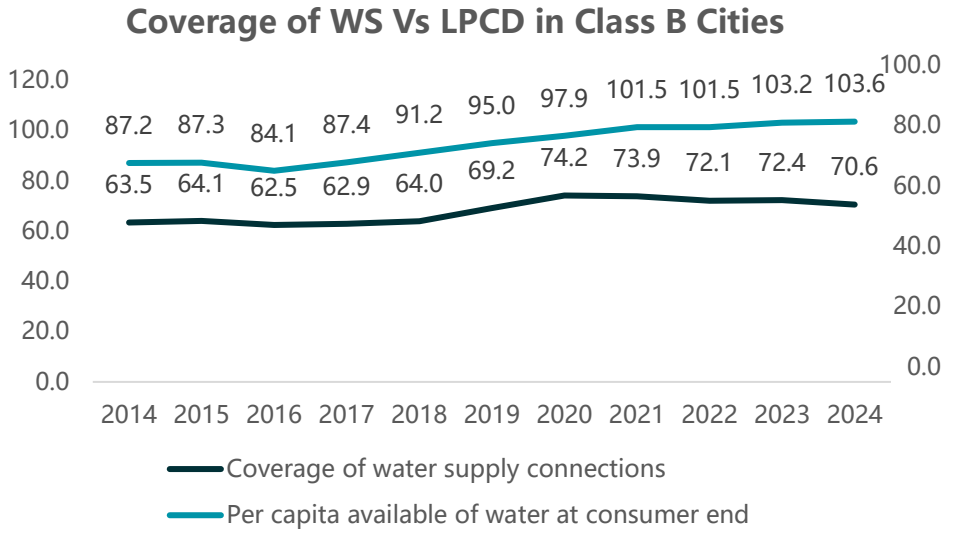


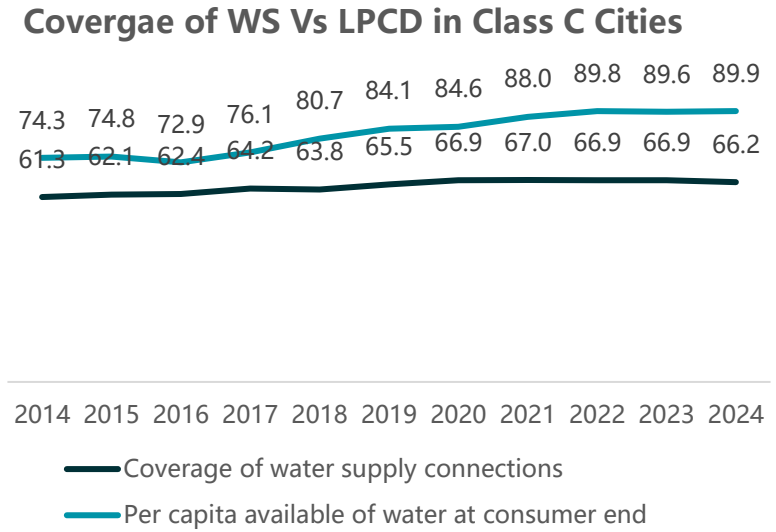
Source: SLB-PAS 2011, SLB-PAS 2024, GoM

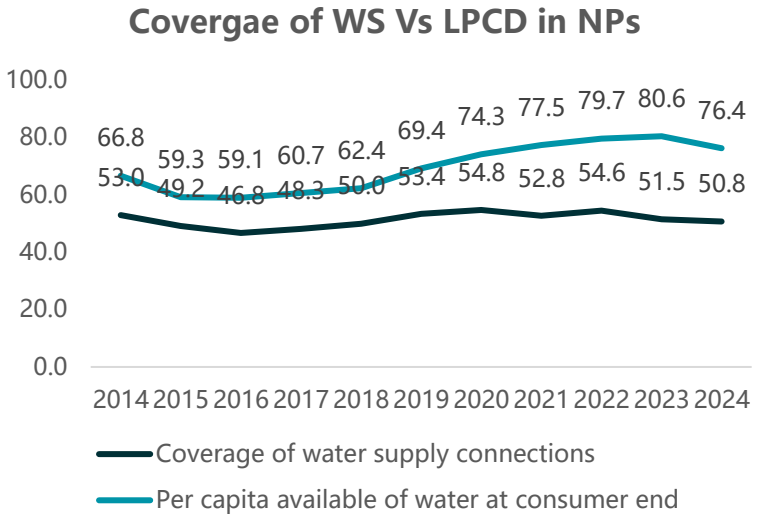
In Maharashtra Water access has improved, but availability per household is still a concern in small and medium towns











Source: SLB-PAS 2011, SLB-PAS 2024, GoM

Key challenges faced by our cities, today …

Ironical situation- floods vs. water scarcity

On the one end there is **acute water scarcity** and on the other, the **streets are often flooded** during the monsoons

Depletion of local water resources

Depletion of groundwater levels

Distant water sources

Deteriorating Quality of Water Sources

Solid waste and untreated sewage dumping

Industrial pollution

Key challenges faced by our cities, today …

Widening demand and supply gap

India's water demand will by 74 percent by 2050

Urbanization leading to surge in
- Domestic water demand
- Industrial water demand

High Water losses

Water losses and leakages in pipes as high as 40-50% of total water supply

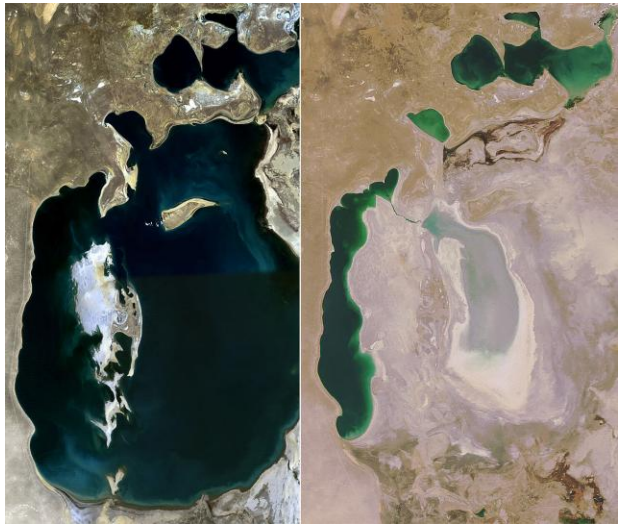
Inequity in water supply

Key challenges faced by our cities, today ...

Lack of rainwater harvesting and groundwater recharge

Non-maintenance of traditional harvesting structures

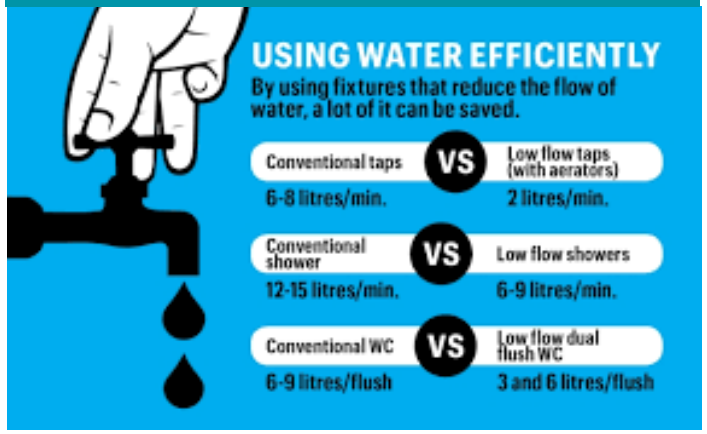
Vanishing lakes and waterbodies



Lack of demand management

Water wastage

Lack of water saving fixtures



Droughts and water crises in the last few years affecting different regions of Maharashtra (1/2)

India 'water train' brings relief to drought affected state

11 April 2016

The 10 tankers were steam cleaned before they were filled with water

A train carrying half a million litres of water has been dispatched to the worst-affected areas of India's drought-hit western Maharashtra state.

The "water train" is pulling 10 tankers filled with water to Latur district.

Railway Minister Suresh Prabhu said the tankers, which usually carry oil products, had been steam cleaned.

Finally, 50-wagon water train heads for parched Latur

In the past few days, the same train has already made nine trips to Latur with 10 wagons, carrying 5 lakh litres of water each time.

Written by: Manoj Dattatrye More 3 min read Latur Updated: Apr 21, 2016 08:37 AM IST

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The train has already made nine trial trips to Latur with 10 wagons, carrying 5 lakh litres of water each time. Express photo

Droughts and water crises in the last few years affecting different regions of Maharashtra (2/2)

SCARCITY ALERTS IN MAHARASHTRA

170 of 355 talukas have reported trigger-1 level of drought assessment

- Rainfall in the state between June and Sept was 77% of normal
- Water storage in dams have declined by almost 10% compared to last year
- Water storage in Marathwada is just 27% of capacity compared to 65% at this time last year
- Thrice the number of water tankers deployed in the state compared to this time last year
- First advance estimates of kharif crop show 12% decline in cereal production and 6% decline in pulse production

RAINFALL REPORT
June to September

Solapur 38% of normal

Beed 53% of normal

Aurangabad 56.5% of normal

Marathwada, Pune face Maha water crisis as reservoir levels plummet

SUDHIR SURYAWANSHI @Mumbai

MAHARASHTRA is facing an acute drinking water shortage with Marathwada, Pune, and North Maharashtra regions facing a difficult situation.

According to the state's water resource department, there is 8% less drinking water in the state reservoirs this year [The de-

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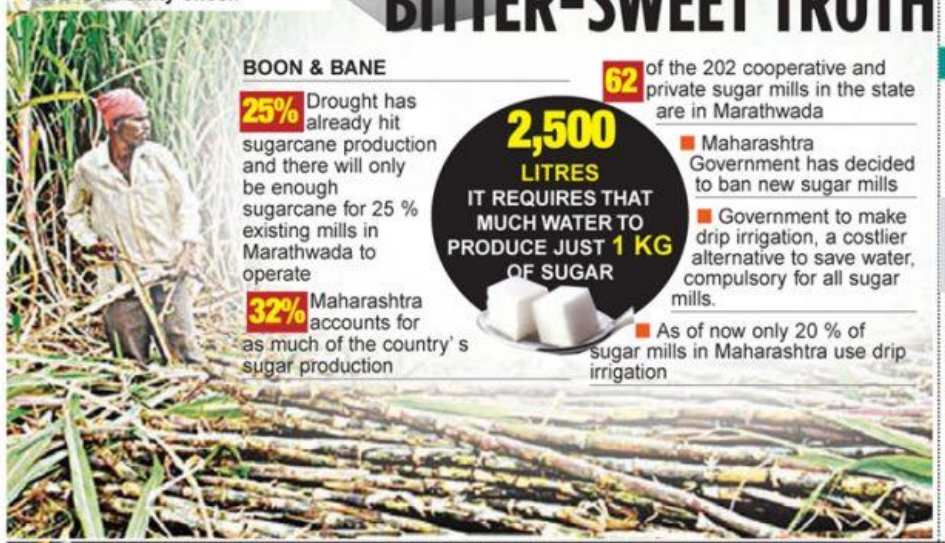
drinking water. But this year, the water level is depleting speedily in the summer. This year, the Nagpur division reservoirs have got satisfactory water storage that is 46% against 21% storage last year while Amarawati division of Vidarbha has also got 43% water in its reservoirs this year against the same percentage of water last year as well.

But badly affected regions are North Maharashtra and Marathwada regi people go far in sear ing water. In Marat year only 19% stora ing water against last year while in year, 33% water stor 44% last year and i harashtra, there is storage against 53 and in the Konkan year there is 42% w against 46% last ye

The Jayakwadi r the major source c water supply in the da region and the area of Sambhaji this year, it has go water left against 52 In North Mahara Bhawali and Chan ervoirs have only 1 of drinking water tively against 46% a previous year. In S ma Ujani has ze drinking water lef to 22% last year.

MARATHWADA'S BITTER-SWEET TRUTH

The severe drought plaguing Maharashtra, particularly the Marathwada region, has trained the spotlight on the region's water-guzzling sugar industry. Here is a reality check



BOON & BANE

25% Drought has already hit sugarcane production and there will only be enough sugarcane for 25 % existing mills in Marathwada to operate

32% Maharashtra accounts for as much of the country' s sugar production

2,500 LITRES IT REQUIRES THAT MUCH WATER TO PRODUCE JUST 1 KG OF SUGAR

62 of the 202 cooperative and private sugar mills in the state are in Marathwada

- Maharashtra Government has decided to ban new sugar mills
- Government to make drip irrigation, a costlier alternative to save water, compulsory for all sugar mills.
- As of now only 20 % of sugar mills in Maharashtra use drip irrigation

WATERSHED MANAGEMENT

- Maharashtra government is making urgent watershed management plans to tide over the drought. They include:
- Law to make use of recycled water mandatory in industries being brought.
- Studies to check feasibility of raising height of dams
- Desilting & deepening of lakes and water canals

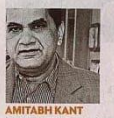
WE ARE MULLING TO INITIATE LONG-TERM MEASURES LIKE INCREASING THE HEIGHT OF MIDC DAMS AND MAKING RECYCLED WATER MANDATORY FOR INDUSTRIES BY AMENDING THE MIDC ACT, 1961 — SUBHASH DESAI, Maharashtra Industries minister

mint LIVEMINT.COM VIEWS

THEIR VIEW

Catch the rain and save our soil: Let's solve the rural water crisis

The rejuvenation of silted water bodies is an affordable and effective way to tackle a problem in need of urgent attention



AMITABH KANT
is India's G20 Sherpa and former CEO, NITI Aayog.

Precipitated by climate change and widespread practices, India's water crisis is rapidly reaching a flashpoint. Water is essential for life, and history teaches us that civilizations have had to adapt or face dire consequences when water grew scarce. Lack of water has led to mass migrations of people and even wars over resources.

Over the past 25 years, India's drought-prone regions have increased by more than 50%, with increasing drought frequency on account of climate change. In the last 10 years, every third Indian district has experienced more than four droughts. This situation poses a significant threat to a nation where nearly half the population relies on agriculture, with most farming being rain-fed. This reliance on rain means that farmers are vulnerable to changes in weather patterns, which can threaten food security, economic stability and the livelihoods of millions.

Finding solutions to the water crisis is crucial for rural development and food security. One important point of intervention is to improve water storage and focus on replenishing groundwater. The proposal to 'catch the rain—where it falls, when it falls' has resulted in projects like the Amrit Sarovar initiative, which aims to build or revive 75 ponds per district, totalling 50,000 water bodies across the country. In tandem, it encourages communities to get involved in managing their water resources.

Historically, civilizations have always settled near water sources. In rural India, farmers traditionally depended on local water bodies for both agricultural and personal use. These bodies would fill during the monsoon months and provide water throughout the year. Many of these were percolation tanks, which helped recharge the groundwater table, acting like a bank does for our savings, to be used when we need to draw upon them in times of need. However, many of these sources have been affected by silt build-up and over-extraction of water, leading to a decline in groundwater levels.

Silt build-up occurs when fertile topsoil washes away into nearby water bodies during heavy rains, reducing both soil quality and the amount of water these bodies can hold. This has worsened water scarcity in many parts of India.

Rejuvenating silted water bodies can be a cost-effective solution. The first-ever Water Body Census by the ministry of jal shakti found over 2.3 million rural water bodies in India. By focusing on larger water bodies owned by the government or communities in drought-stricken areas, we could revive over 200,000 water bodies. This could potentially provide water security to over 300 million citizens at a very low cost, funded through existing government schemes. Restoring these water bodies can have a wide-reaching impact, giving entire communities a reliable water source.

The community-centric model: A successful example of community involvement is an initiative by Niti Aayog under its Aspirational District Programme in six states. The government funded the excavation of silt in water bodies, while farmers covered the cost of transporting it to their fields. A foundation dedicated to water security supported the process, including building an open technology platform to monitor progress, funding local NGOs to create community demand for the silt.

Farmers found such an arrangement beneficial, as silt enhances soil fertility and reduces the need for chemical fertilizers. Using natural silt instead of artificial fertilizers can lead to healthier soil and better crop yields in the long-term. In regions where silt is not fertile (Sirohi district of Rajasthan, for example), it was used for other community projects like levelling roads or building playgrounds. This model exemplifies the power of collaboration between government, local communities and civil society to solve critical issues.

Chhatarpur, located in the drought-prone Bundelkhand region of Madhya Pradesh, offers a compelling case study of this approach. This district has long struggled with erratic rainfall and low water retention capacity of the soil, severely affecting agricultural output. Its terrain and extensive deforestation exacerbate drought conditions, resulting in high soil runoff and reduced groundwater recharge. In 2022, Niti Aayog began reviving water bodies in Chhatarpur, creating additional storage for 1.5 million litres of water across 164 water bodies—which helped 182 villages and around 270,000 people.

Farmers in Chhatarpur have noticed major improvements in their water levels and crop yields, thanks to these efforts. For instance, Pramod Chaurasia, who used 90 loads of silt from a cleaned pond on his one-acre farm, saw his income double with better harvests of tomatoes and chilies.

The government spends about ₹5 lakh to clean a water body, which greatly increases water storage and helps replenish groundwater. Farmers benefit from better crop yields and the reduced need for fertilizers that using silt assures them.

Many similar success stories across India show how community-driven water body rejuvenation can change lives.

According to a Deloitte study, the Niti Aayog initiative, which started in 2022, rejuvenated 351 water bodies, impacting over 2.2 million people in 379 villages across three states, at a cost of ₹9.3 crores. This created 3.13 billion litres of new water storage.

Other initiatives, like Gal Mukt Dharan in Maharashtra and Sujalam Sufalam Jal Abhiyan in Gujarat, also demonstrate success. These projects show that even small steps can lead to significant improvements in water availability.

Expanding these community-focused projects could significantly improve water availability for rural areas. It is estimated that spending around ₹1,500 crore each year for five years could help cover 260,000 villages in water-stressed regions, easing the water crisis for 300 million people and boosting the income of 5 million farmers.

Rejuvenating silted water bodies is an affordable and effective way to tackle this urgent problem. India's political will is moving in the right direction, as demonstrated by the commitment to sustainable water management practices. It is Prime Minister Narendra Modi's phrase, 'Catch the rain—where it falls, when it falls,' that underpins this vision and emphasises the importance of collective action in addressing the water crisis. It's vital for everyone, across sectors and demographics, to work together to create a sustainable and thriving rural India.

These are the author's personal views.

In summary, urban water systems face critical gaps in supply, infrastructure, and governance

SUPPLY & SOURCE STRESS

1 Seasonal Dependence

80% of annual rainfall in just 3-4 monsoon months

2 Declining Groundwater

Aquifer depletion in Marathwada, Vidarbha & Deccan Plateau

3 Distant Sources

Cities drawing from reservoirs 50-100 km away

INFRASTRUCTURE & ACCESS

1 Inequitable Access

Slum areas get 2-4 hrs of water vs. planned city supply

2 High NRW

30-50% water lost in distribution before reaching homes

3 Aging Infrastructure

Old pipelines, leaking networks, no pressure management

CLIMATE & GOVERNANCE

1 Flood + Scarcity Paradox

Same city floods in July, faces acute shortage in May

2 Urban Concretisation

Paved surfaces reducing groundwater recharge in cities

3 Weak O&M Systems

ULBs lack technical capacity for modern water management

Agenda for the workshop

1. Welcome and introduction of workshop

2. Understanding Water scenarios in different areas of Maharashtra
   - Key water challenges in cities

3. **Policies and programs for water security**

4. Measures and approaches to address different water challenges
   - Good Practices & Case Studies

Government's initiatives in urban Maharashtra to scale up water conservation measures

Central government's programs and initiatives

Schemes and Programs	Implementing department	Urban RWH / GWR Relevance
AMRUT 2.0	Urban Development Department	Rejuvenation of water bodies, urban aquifer mapping and management, promote recycle & reuse and rainwater harvesting to augment freshwater resources.
Jal Shakti Abhiyan: Catch the Rain	Urban Development Department	Harvest rainfall through creation of artificial recharge structures, watershed management, recharge and reuse structures, intensive afforestation and awareness generation.

State government's programs and initiatives

	Schemes and Programs	Implementing department	Urban RWH / GWR Relevance
1	Maharashtra State Water Policy, 2019	Water Resource Department	RWH mandatory in urban areas, aquifer mapping and recharge projects on priority, ULBs to treat all the wastewater and reuse at least 30%, strengthen community engagement.
2	DCPR-2034 (BMC) and UDCPR	UDD	Detailed provision of RWH and GWR. Ensures open spaces allows natural percolation
3	Urban RWH By-laws and Incentives (Municipal Initiatives)	UDD and ULBs at local level	ULBs mandate RWH in new constructions on plots of a certain size and offer property tax rebates for adoption

Maharashtra State Budget – 2026-27

To make water available by 2047 as prescribed standards in rural and urban areas, flowing activities are proposed under the State's budget for FY 2026-27

	Theme	Key Initiatives / Provisions	Details
1	**State Water Information Centre**	Establishment of centralized digital water data system	• Proposed in Nashik; • ~₹71.20 crore allocation; will provide digital, certified, and online water resource information
2	**River Linking Projects**	Multiple inter-basin transfer projects	• Includes Wainganga–Nalganga (~₹94,968 crore), • Damanganga–Vaitarna–Godavari (~₹13,497 crore), • Nar–Par Girna (~₹7,465 crore), • Damanganga–Ekdare–Godavari (~₹2,213 crore); • 54 TMC diversion from Vaitarna & Ulhas to Godavari; • Neera–Kanha river linking project for Baramati & Purandar
3	**Maharashtra State Responsive Development Programme (MRDP)**	Flood and disaster mitigation programme	• ₹2,240 crore programme supported by World Bank; • Focuses on Kolhapur & Sangli; • Includes floodwater diversion from Krishna basin to drought-prone Bhima basin regions
4	**Potential El Niño**	Drought preparedness measures	• Anticipated drought risk in 2026; • Focus on water reservation, planning, Jalyukt Shivar Abhiyan, conservation schemes, and fodder development
5	**Urban Water Supply, Sewage Management and Recycling Projects**	Large-scale urban water infrastructure programme	• ₹5,860 crore project with World Bank support; • Aims for 100% sewage treatment & reuse; • Strengthening financial capacity of urban local bodies

Source: https://beams.mahakosh.gov.in/Beams5/BudgetMVC/BudgetBooksPDF1/2026-2027/Speech/Part-I%20(Speech)%20(English).pdf

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   - **Good Practices & Case Studies**

Emerging approaches to move towards water security…

Water sensitive urban design

Integrated planning approach that manages the entire water cycle—stormwater, wastewater, and water supply—to minimize environmental degradation and improve amenity

Blue Green Infrastructure

Integrating natural water elements ("blue"—rivers, wetlands, ponds) with green spaces ("green"—parks, forests, green roofs) to create more sustainable, resilient, and livable cities

Innovative Technologies

Advanced, science- and engineering-driven systems, tools, and processes that enhance the efficiency, reliability, sustainability, and resilience of water resource management

Nature Based Solutions (NbS)

ecosystem-based approaches that protect, restore, or sustainably manage natural systems to enhance the availability, quality, and resilience of water resources

Knowledge based approach

systematic use of scientific studies, data analysis, and evidence-driven insights to understand water systems and inform the development of effective, context-specific management strategies

Emerging approaches of urban development

Water sensitive urban design

Rainwater Falls on	Water Sensitive Urban Design Elements
Green Areas (Parks, Forest, etc.)	Retention Ponds, Detention Ponds
Roads / Green Streets	Bio Swales, Vegetated Filters, Gravel Filters along the Roads, Pervious Paving on Footpaths, Underground Storage Tanks (for RW and TWW storage) to use it for roadside Landscaping and Horticulture, Rain Gardens
Open Parking Lots	Bio Swales, Vegetated Filters, Gravel Filters, Pervious Paving
Open Land	Retention Ponds, Detention Ponds, Dry Swales
Water Bodies / Drains	Constructed Wetlands (to rejuvenate water bodies / lakes)

Blue green infrastructure

Rainwater Harvesting (RWH)

Rainwater harvesting is the process of collecting and storing rainwater that falls on our rooftops and open grounds for later use. This can be stored for direct use or can be recharged into the ground water.

Where can be install ?

These Rainwater harvesting structures can be installed at anywhere including;

Aanganwadi


Gov. Buildings


Community level


Flooding Area


Farms

Schools/ colleges

Catch the rain

Where it fall, When it falls

For Water Security!

Do's and Don'ts for RWH

Proper rainwater harvesting ensures efficient water conservation and long-term sustainability.

Here are some key dos and don’ts to follow for effective implementation.

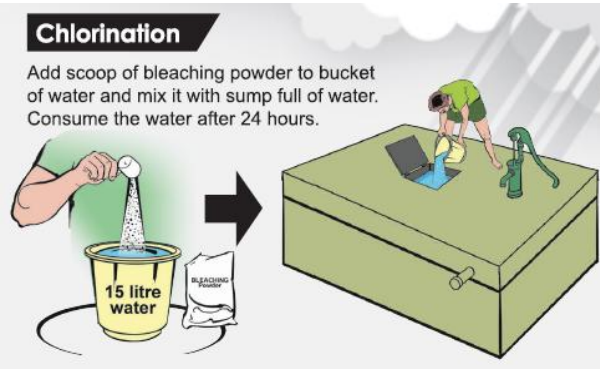
Do’s of RWH

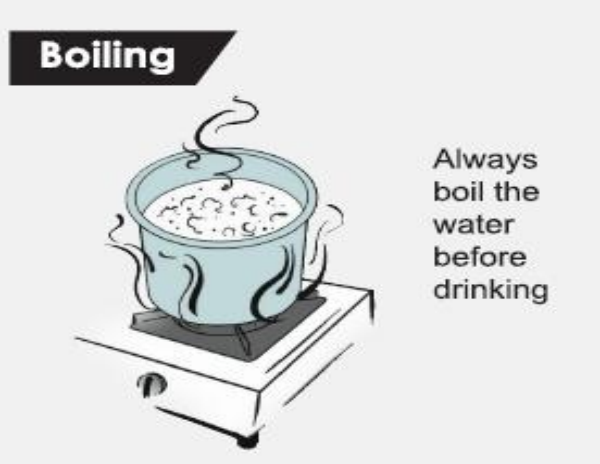
- Divert initial rainwater before collecting it in the storage tank
- Clean roof and gutters before every monsoon
- Make sure the pipes are well maintained
- Ensure the rainwater tank has a tight lid to block sunlight and prevent algae growth.

Don’ts of RWH

- Do not store rainwater in tanks without proper covers.
- Don’t use paints, chemicals or hazardous substances on the roof
- Don’t leave the first rain separator valve open! Remember to close it

Methods to disinfect water

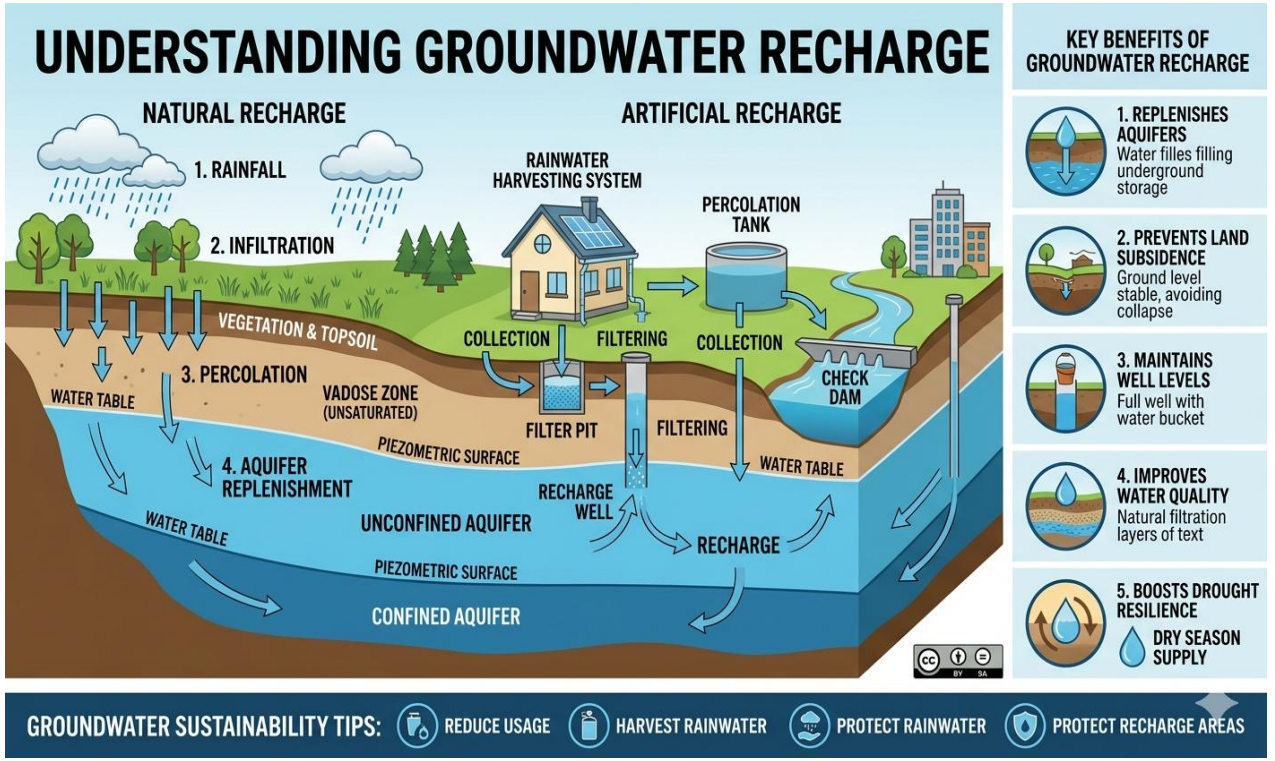




Ground Water Recharge (GWR)

1. What is Groundwater Recharge?
Groundwater recharge is the process of **allowing rainwater and surface runoff to seep into the ground**, helping to restore depleted aquifers and improve long-term water availability.

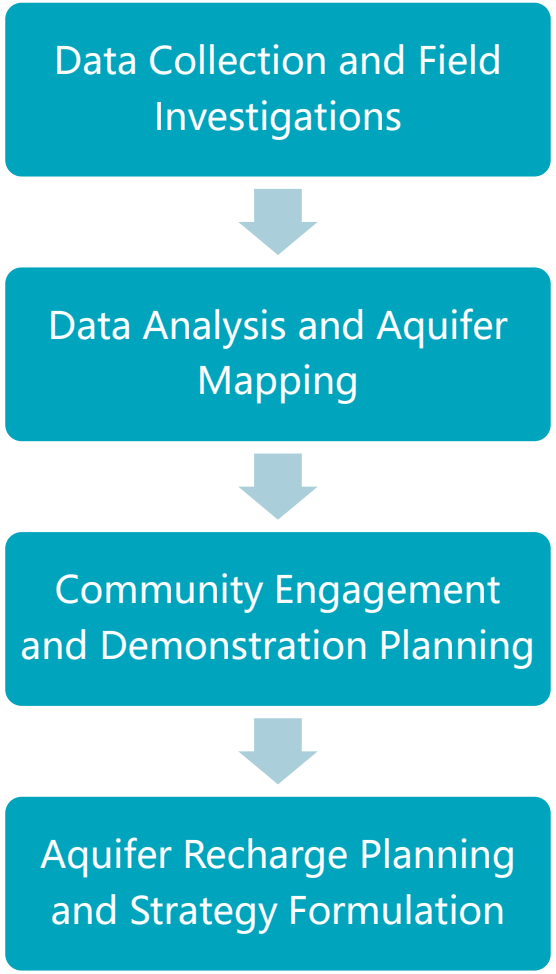
2. Why is it Important for Cities?
Recharge helps **increase groundwater levels, reduce tanker dependence, and ensure water availability during dry periods**, making cities more resilient to droughts and climate variability.



3. How Can ULBs Implement It?
ULBs can promote recharge at **Urban flooding spots through GWR systems and also explore recharge pits, recharge wells, rainwater harvesting systems, and revival of water bodies** in public spaces, making it a **low-cost and scalable solution** for urban water security.

Aquifer mapping turns invisible groundwater into visible data for better planning and sustainable use

Approach and Methodology to be adopted



1. **Understanding Aquifers through Mapping:** Geohydrological studies combined with **aquifer mapping** help identify **types of aquifers (shallow/deep), recharge zones, and groundwater flow**. In Maharashtra's hard rock regions (like Marathwada), this is critical as aquifers are **limited and unevenly distributed**.

2. **Supporting Better Water Planning:** Cities can use aquifer maps to **locate suitable sites for borewells and recharge structures**, avoid over-extraction, and plan **ward-level water budgeting**. Maharashtra's **GSDA aquifer mapping (NAQUIM programme)** supports such scientific planning. Reference: https://cgwb.gov.in (NAQUIM Programme)

3. **Practical Use in Cities:** Many cities have used aquifer understanding to **design recharge interventions and manage groundwater more sustainably**, linking it with **rainwater harvesting and watershed planning** for improved water security.

Ichakaranji

Ichalkaranji is located on the east of Kolhapur district. This city has historical importance. This city is known as the **Little Manchester of Maharashtra**.

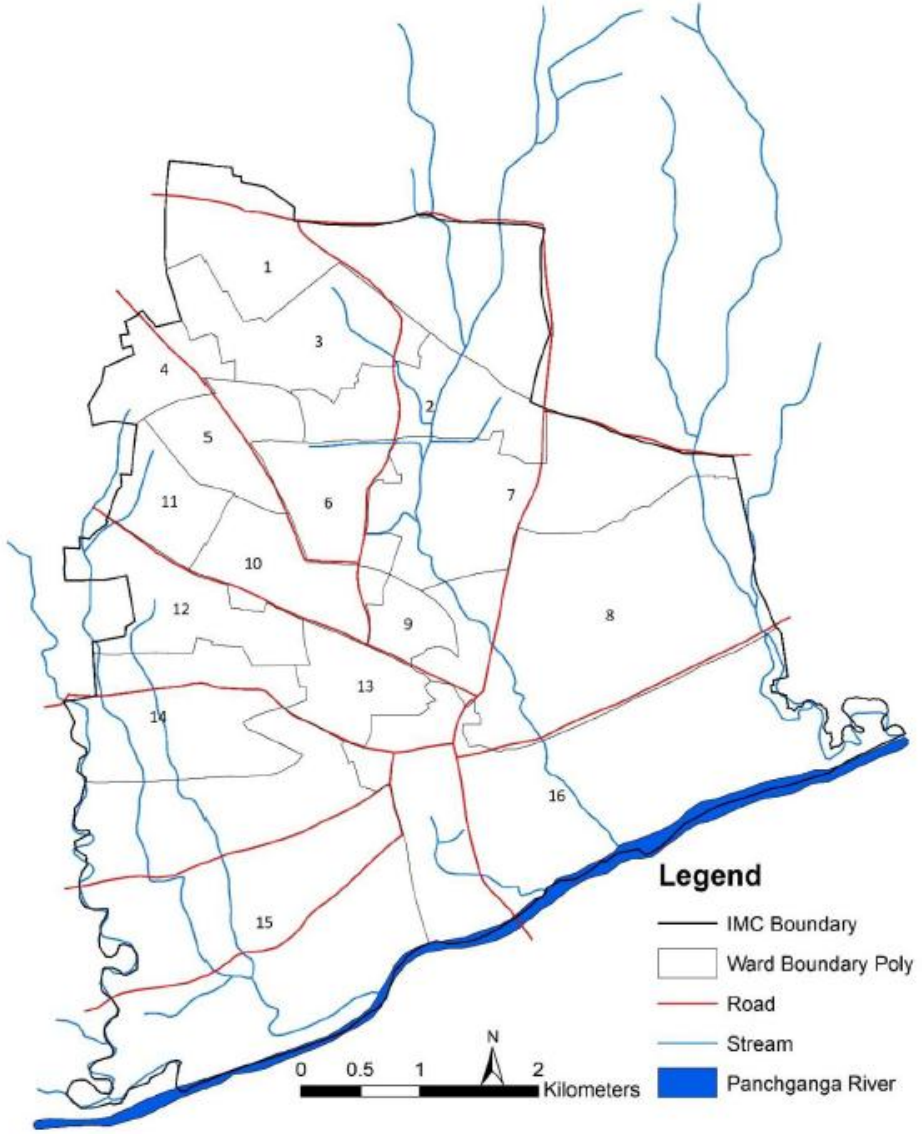
Ichalkaranji: The Urban Water Crisis & Strategic Objectives

Why Cities Must Act Now-

- **The Urban Imbalance:** Rapid industrialization and urbanization have led to excessive groundwater pumping while reducing natural recharge areas due to concrete cover.
- **Declining Resources:** Increasing water demand versus decreasing groundwater availability is creating a permanent water crisis for urban populations.
- **The Strategic Fix:** To solve this, we must identify **Aquifer Characteristics** through geo-hydrological studies to locate specific **"Recharge Potential Zones".**

Core Objectives of the Setup:

- Map geological/tectonic traits and delineate city watershed areas.
- Identify aquifer boundaries and their specific recharge potential.
- Monitor groundwater quality, water levels, and flow directions.



Base map for Study Area - Ichalkaranji

Site Selection & Implementation Framework

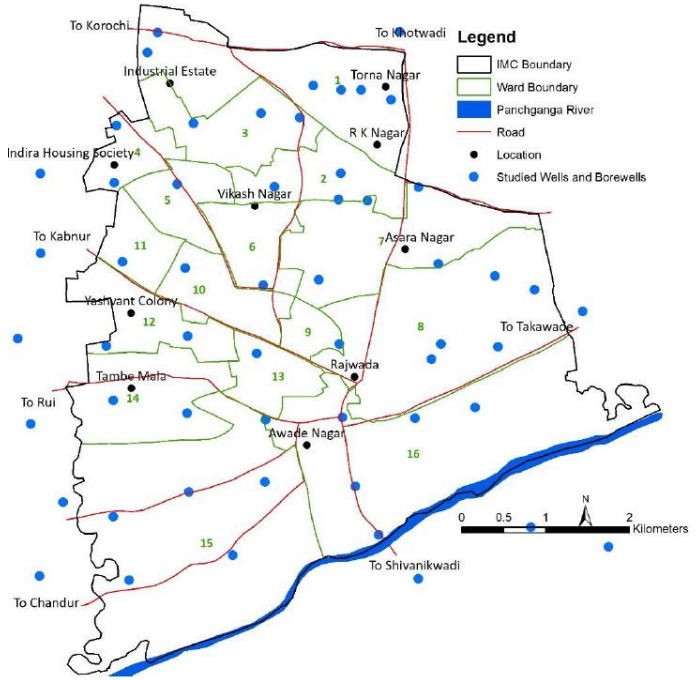
Technical Steps for System Setup:

1. **Holistic Site Analysis:** Recommendations are based on studying local Topography, Climate/Rainfall, Geomorphology, and Hydrology.

2. **Well Inventory (The Field Foundation):**
   - **Direct Measurement:** Tracking water level depth, well dimensions, and lifting capacities.
   - **Observation:** Assessing landforms, aquifer composition, and geological structures (e.g., dykes or fractures).
   - **Community Input:** Interviewing locals regarding historical water table behavior and seasonal quality changes.

3. **Scientific Testing:**
   - **Electrical Resistivity Tests:** Conducted to map the lithological setup and identify aquifer types at varying depths.
   - **Laboratory Analysis:** Testing water samples for dissolved chemical content to ensure recharge water won't contaminate the aquifer.

4. **System Design:**
   - **Shallow/Unconfined Aquifers:** Ideal for recharge pits and trenches in residential zones.
   - **Deep/Confined Aquifers:** Require injection wells or recharge shafts to bypass impermeable layers.



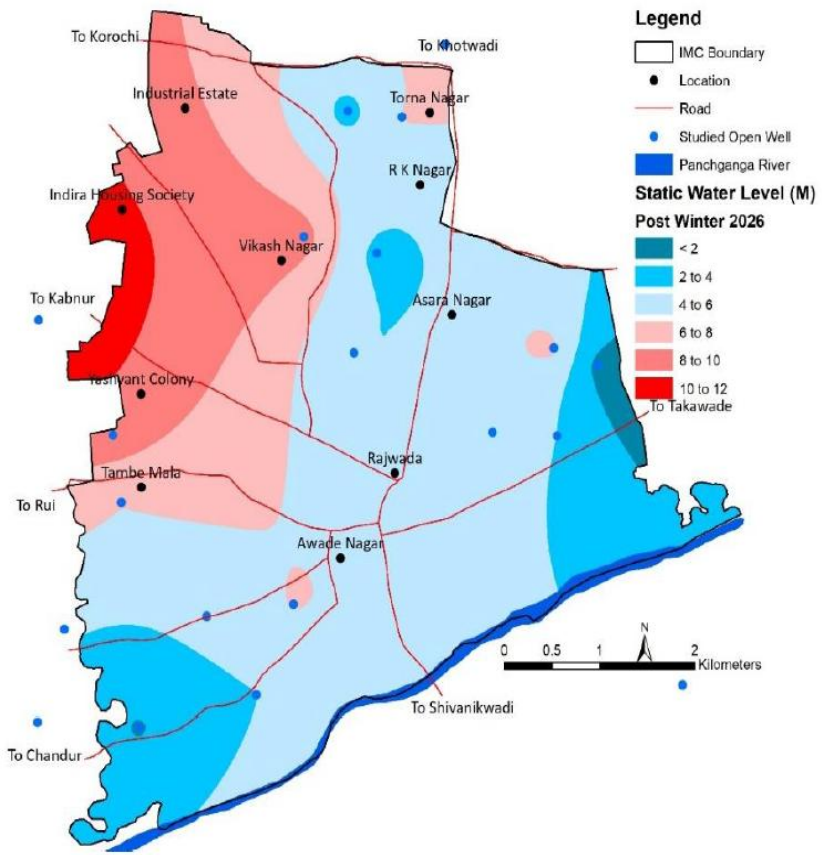
Location of Studied Wells, Ichalkaranji City, Maharashtra

Well Inventory Survey

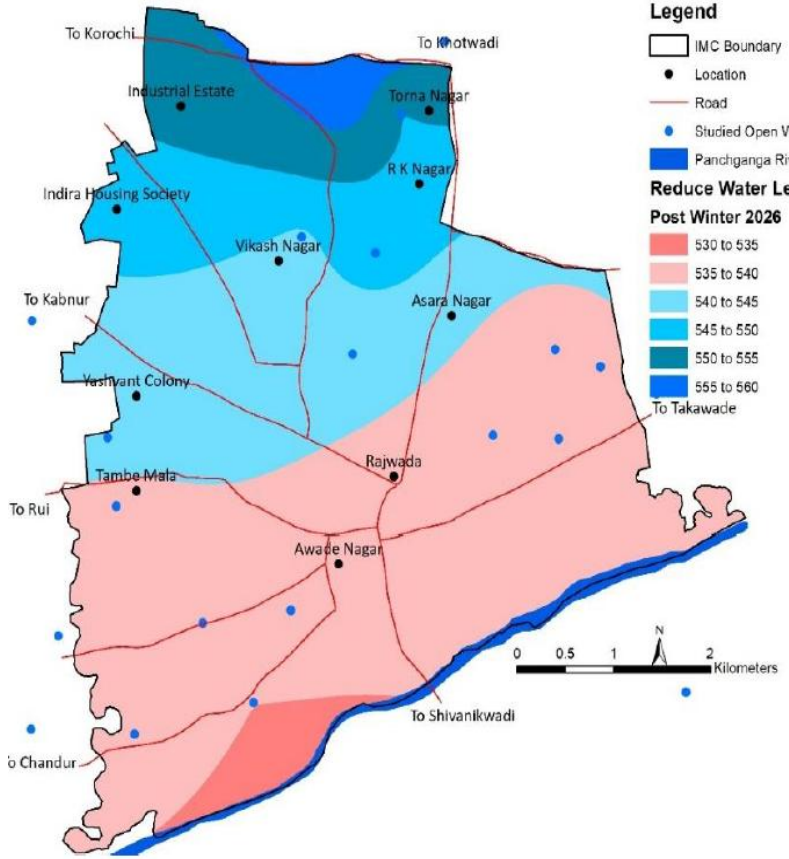
Electrical Resistivity Test

Spatial Distribution of Groundwater (1/2)

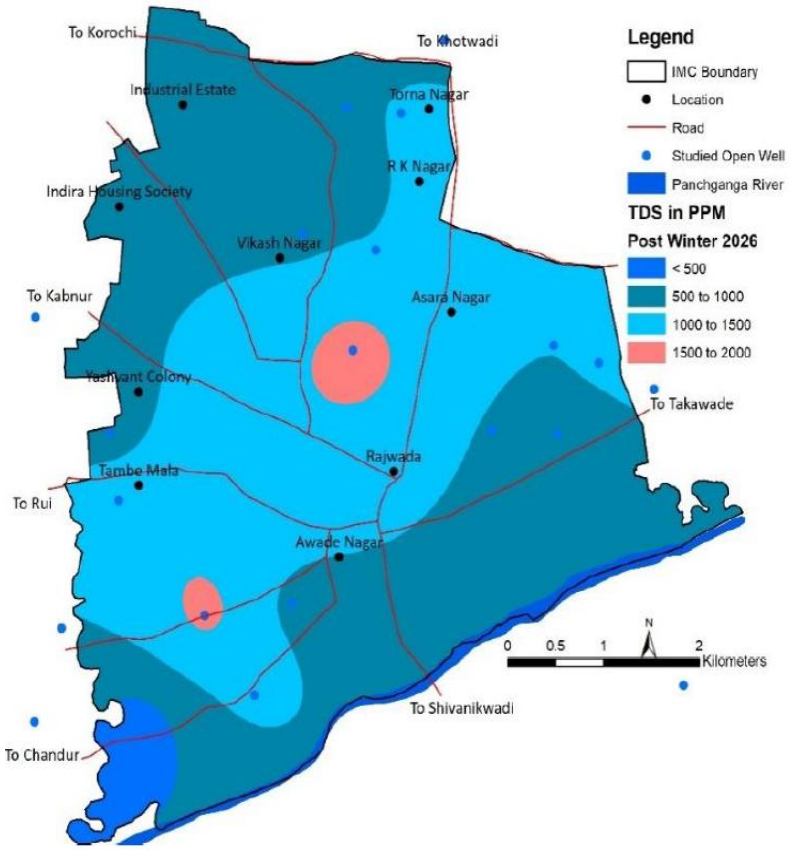
Shallow / Unconfined Aquifer Systems



Shallow Aquifer Static Water Level Map



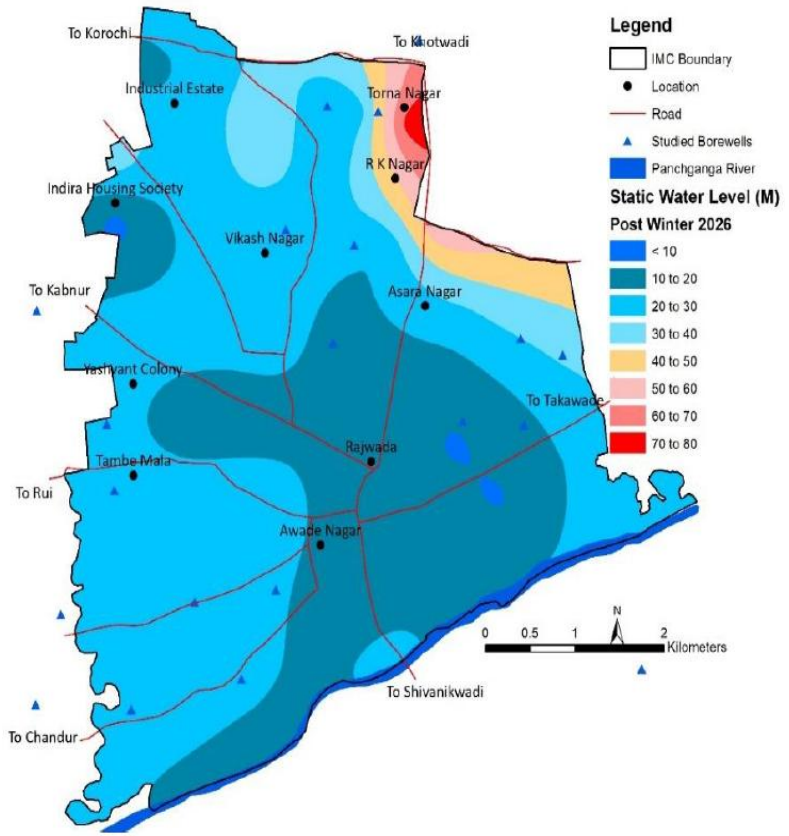
Shallow Aquifer Reduced Water Level Map



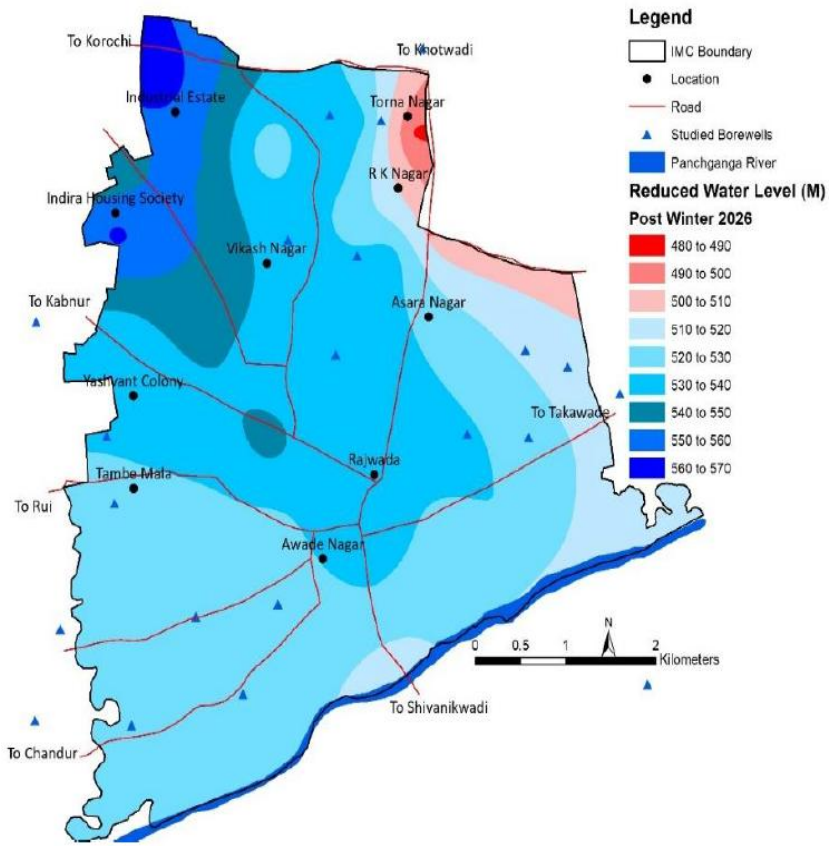
Shallow Aquifer Water Quality (TDS in PPM) Map

Spatial Distribution of Groundwater (2/2)

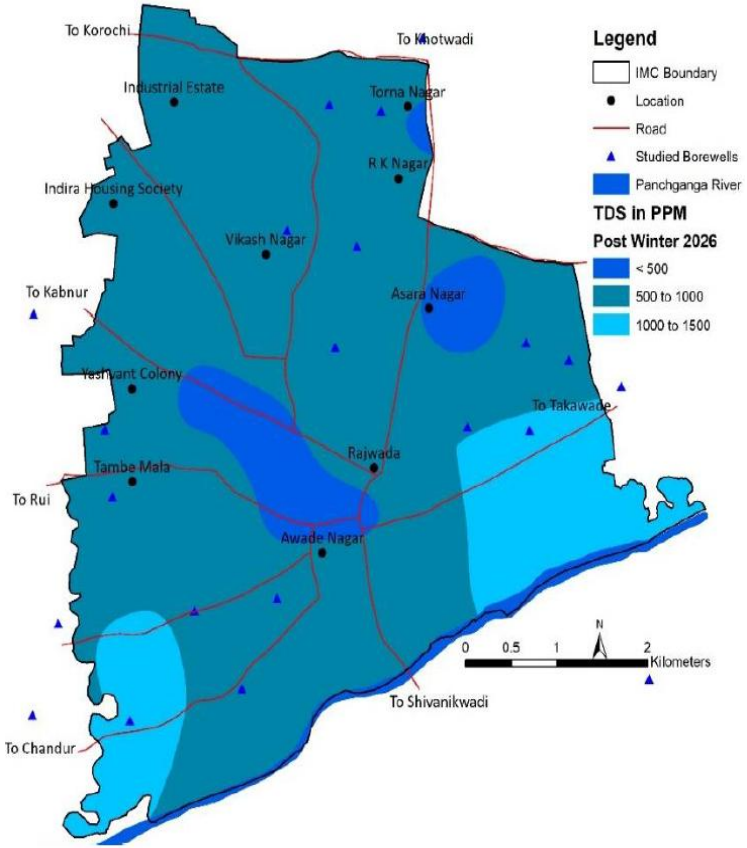
Deep / Confined Aquifer Systems



Deep Aquifer Static Water Level Map



Deep Aquifer Reduced Water Level Map



Deep Aquifer Water Quality (TDS in PPM) Map

Nagpur

Nagpur exemplifies how a holistic approach to water security—integrating sustainable planning, reuse strategies, and innovative systems—can enable a transition toward a circular water economy.

Nagpur's Transition to Daily Water Supply (1/2)

Background / Why the Project was Needed

Before the Reform: Intermittent System /Old System Issue

Intermittent supply, Few hours daily (**2 to 24 hours depending on area**)

Unequal distribution across zones

High water losses; Leakages (**Total water losses were estimated at 291 MLD & Equivalent to 54% of total water supplied**)

Aging pipeline network, poor pressure

Increasing demand From urban growth

Inconvience,Storage dependence

What Nagpur Did

The Reform: City-Wide 24x7 Water Supply Project through PPP

Major Interventions

Partnership: NMC & Orange City Water

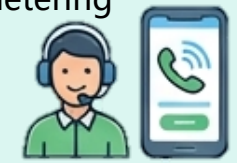
Rehabilitation, pipeline replacement

Creation of District Metered Areas (DMAs)

Universal household metering

SCADA & Smart Monitoring

Leak detection, NRW reduction



Improved billing, Customer service,

Objective : To provide safe, pressurized, 24x7 water supply with better operational efficiency

Source : OCW (2024), Times of India (2023, 2024, 2026, https://www.ocwindia.com/)

Outcomes of Nagpur 24x7 Water Supply Project (2/2)

Positive Outcomes

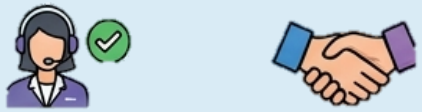
1 Improved Service Levels

Several areas received significantly longer supply duration

Better pressure And more reliable distribution

2 Better System Management

Meter-based billing introduced



Faster complaint Resolution systems

Real time-network monitoring

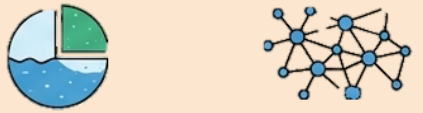
3 Reduced Dependence on Storage

Continuous/ long-duration supply reduced need for rooftop tanks and pumps

4 National Benchmark Project

Became a major case study for urban water reforms in India

Challenges Observed



Full 24x7 supply not achieved uniformly in all zones

NRW reduction remained a long-term challenge

Consumer complaints regarding billing/meters

Need for stronger public communication and trust building

Key Lesson for Other Cities

Continuous water supply requires not only infrastructure, but also:

Continuous water supply requires not only infrastructure, but also: modern water more norms (strong governance), of NRW controls, involvement of citizen engagement

Source : OCW (2024), Times of India (2023, 2024, 2026, https://www.ocwindia.com/)

Nagpur generates ₹55 crore in revenue through the sale of treated wastewater

- Total STP Capacity - 403.5 MLD
- Total WW generation = 520 MLD
- Total treated water Generated at STP site

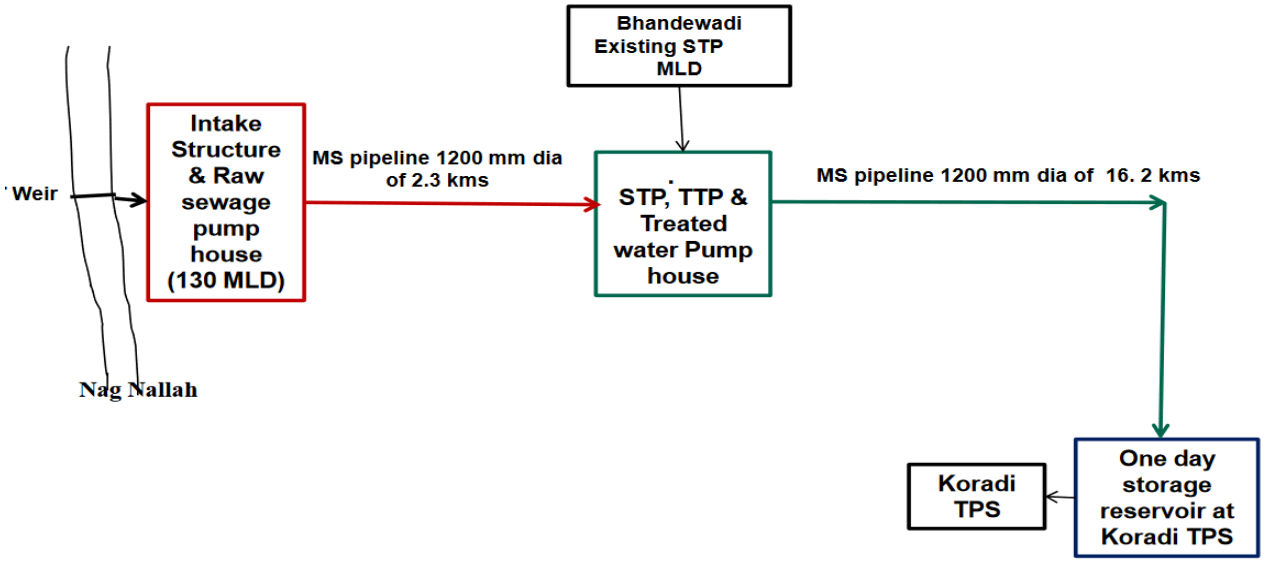
= **403.5 MLD**

- **Total WW reused = 320 MLD**

- MOU signed with Maharashtra state power generation company (MAHAGENCO)
- MOU signed for to use of treated water at khaparkheda thermal power plant and Koradi thermal power plant *(Dated -29 December 2017)*
  - Khaparkheda Thermal power plant = **230 MLD**
  - Koradi Thermal power plant = **90 MLD**

Revenue generated 55-60 Cr

PROJECT LAYOUT



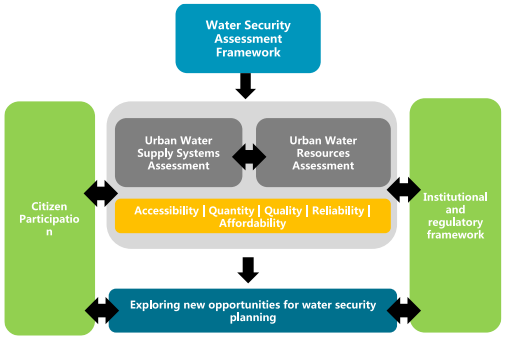
Source – MOU signed by ULB with Mahagenco

Gandhidham

Gandhidham showcases a comprehensive, knowledge-driven approach adopted to move towards water security, integrating scientific assessments, pilot demonstrations, and community engagement

Assessment of water service chain using Urban planning toolkit developed by CWAS...

Water security assessment framework help identify key issues and opportunities

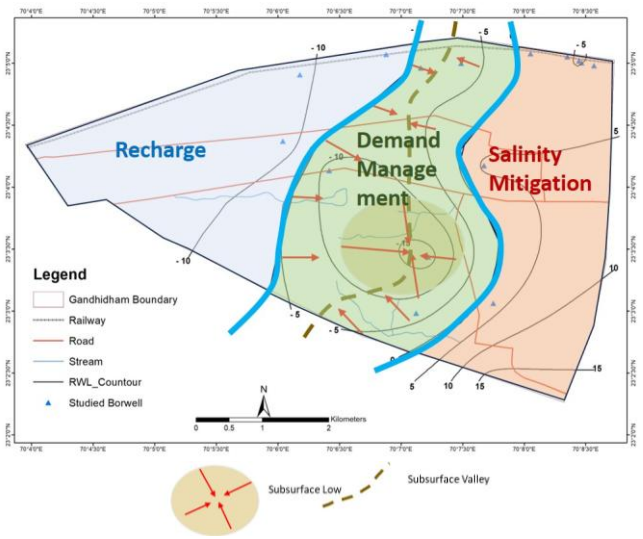


Water Security action plan providing key initiatives

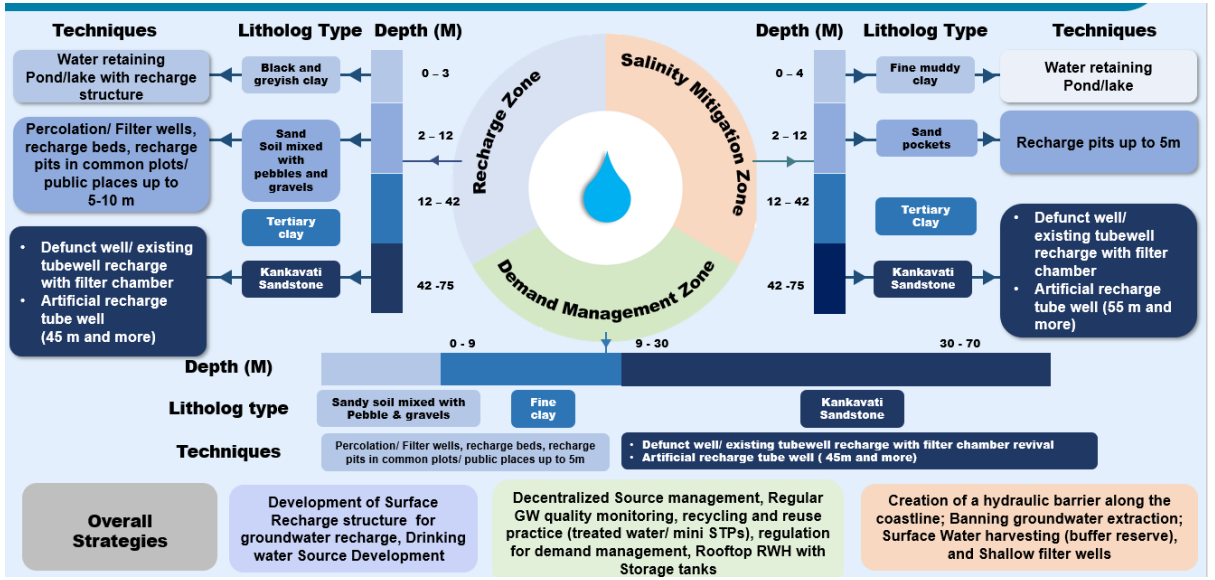
Key Challenge	Key Action	Key Initiatives
Water Source	**AUGMENTATION WATER SOURCES**	• **Lake rejuvenation** and **Surface water source strengthening** • **Rainwater Harvesting** and **Groundwater recharge** at major **institutional** and **educational** buildings • **Groundwater recharge structures** along City **Storm Water Drainage**
Municipal Services	**IMPROVING MUNICIPAL SERVICES**	• **Intermittent to daily supply** - **District Meter Area (DMA)** • **Water Audit** – **NRW**, identify **illegal connections** etc. • **Water Quality Testing Regime** • **Slum improvement** - **Community level ESR**
Institutional & Financial Initiatives	**STRENGTHENING EXISTING SYSTEMS**	• Institutional – **strengthening the Water Department** • **Financial** – **Amnesty Scheme** to improve Tax collection efficiency + **rebate or incentives**
Awareness & Engagement	**GENERATING AWARENESS AND ENGAGEMENT**	• **IEC and BCC** – Jal Sanrakshan Mela for RWH/GWR awareness • **Partnerships and Collaborations** – Industries + NGOs + Academia etc. for generating awareness among various stakeholders

Scientific studies, conducted to develop and demonstrate RWH/ GWR techniques across the city……

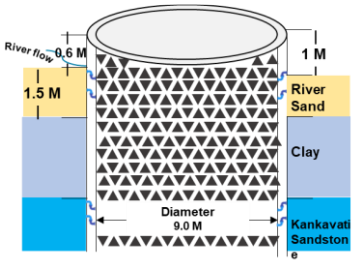
Geohydrological study for understanding aquifer and watershed of cities



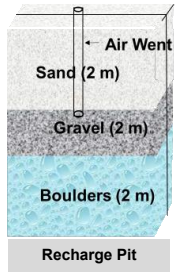
Zone-wise Groundwater recharge strategy



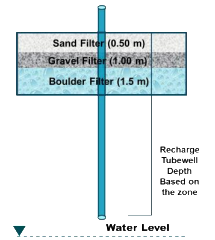
Identification of potential water recharge Techniques



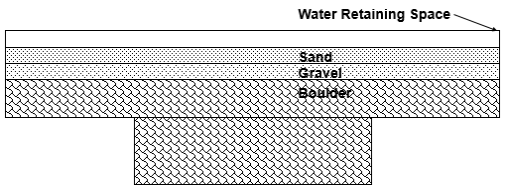
Filter Well



Recharge Pit



Artificial Recharge Tubewell



Percolation Bed

Rainwater Harvesting and Groundwater recharge @ Gandhidham

Anganwadi no-85

3 school cluster- Kanya Shala, Kumar shala and Hindi Shala

Gandhidham Municipal Council

Implemented 16 rainwater harvesting and groundwater recharge structures

JAL SANRAKSHAN MELA: 20th – 21st July
Gandhidham, Kachchh (Gujarat)

1200+ *visitors from various walks of life visited the Mela*

Visitors included – MP, MLA, Government Officials, Development Authority, Armed forces, citizens

12+ *vendors Participated*

500+ *school students*

35+ *villagers from nearby villagers visited the Mela*

"Nukkad Natak" on water conservation

Community engagement, awareness and capacity building

Capacity building for - 200+ professionals

Anjar Area Development Authority (AADA)- Builders, developers Workshop

Teachers Training for RWH in schools

Plumbers Training

Valve operators training – Transitioning from non daily to daily water supply

Sensitization workshop for Architechts, builders, developers by GdMC, Gandhidham Development Authority and CWAS

Awareness program– 30,000+ people

Viksit Bharat, Government program

Ramnavmi Mela

Sstudents and teachers awareness program

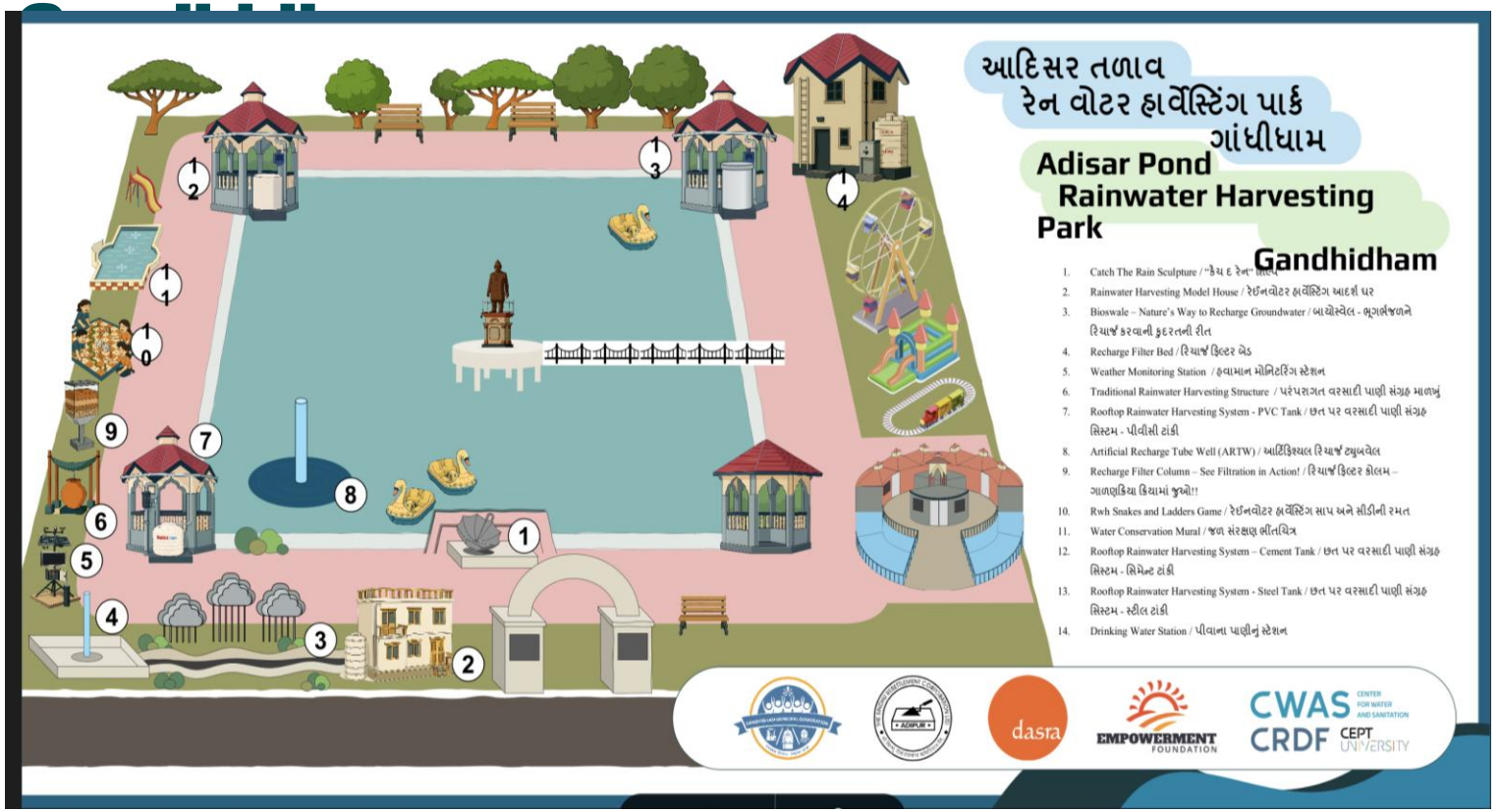
Multiple Stakeholder consultations

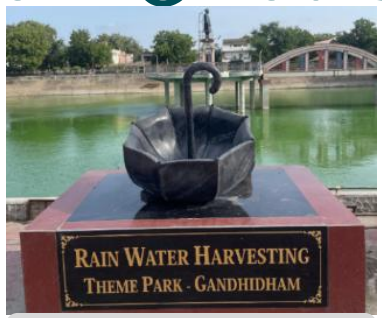
Focus group discussions with citizens and local residents

Multiple Stakeholder consultations with govt officals

Field visit to capture good practices in and around kachchh

Gujarat's first Rainwater Harvesting Theme Park @ Aadisar Pond, [illegible]





RWH theme park- umbrella sculpture


Weather Monitoring station


RWH systems


Household RWH, Bio swales and GWR structure


Traditional method


Rainwater drinking station


Mural depicting water conservation practice &city fabric

Educational and awareness platform promoting sustainable water conservation practices

Various training sessions


Inauguration event


School Students


City Officials


GdMC – MC


Regional NGOs

Steps taken by various Indian cities for implementation of RWH/ GWR...

	Chennai	Bangalore	Indore	Hyderabad
Policy framework	• **Phase I:** RWH mandatory for all buildings • **Phase II:** RWH was expanded from buildings to **roads, ponds, streets**, National and State **Highways, road margins** and **open areas**	• Mandatory for all **existing properties** built on area of **2400 sq ft or more** • For **upcoming buildings** on area of **1,200 sq ft or more**	• **Mandatory** for all buildings with an area of **250 sqm or more and G+3 structures** • RWH - as a **separate head** under the **Municipal budget**	• **Mandatory** for all buildings with an area of **300 sqm or more**
Implementation	• Implemented RWH at **29 flyovers**, **242** RWH **open areas**, **945 road margins**, **1698** RWH **streets/temples** • **3.29 lakh** residential/ commercial/ institutional buildings	• **1.5 lakh/2.1 lakh HHs,** has adopted RWH system (2021) • **BBMP** planned to install **5,000** RWH pits in parks and roadside drains to control urban flooding	• Implemented over **3,000 RWH** projects in **residential buildings** • **150 in public buildings** and **gardens** • **Pilot project** on RWH at all **Government buildings/ gardens**	• Constructed nearly **14,000 RWH** structures • **All existing Municipal building** were made to **undertake RWH** within **1 year**
Institutional Setup	• **TWAD and CMWSSB** provides technical guidance RWH	• Karnataka State Council for Science and Technology in collaboration with **BWSSB** has setup a **RWH Cell**	• **Rain water harvesting and Recharging Department** @ corporation • **Technical Committee** (representatives from NGOs, Institutes and IMC)	• **Hyderabad Metropolitan Water Supply and Sewerage Board** (HMWS&SB) has special Cells - information regarding RWH
Monitoring	• **State Government -** Department for the maintenance of RWH structures	• **BWSSB' s RWH cell -** monitoring the proper installation of RWH • Check on **storage tanks** and take **water-meter readings**		
Subsidy/ incentive/ penalty	• If the building **fails to provide RWH** structure - **Water supply** can be **disconnected** under legislation • **No water connection/ sewer connection** – if RWH not provided	• **BWSSB** levy a **penalty of 50%** of the **water bill** for first **6 months** and subsequently **100%** • Currently collecting **Rs. 1.5 Cr** a month as penalty	• **Initial incentive** of a **one year** complete **property tax waiver** • **Building Department** of IMC gives a **rebate of 6%** in **property tax**	• **50% subsidy** announced on **RWH structures**, however the same was **lifted due to poor response**

Awareness/citizen participation	• TWAD - **dedicated RWH** website
	  • All information (technical/financial)
	  • English and Tamil
	  • Workshops/ capacity building/ trainings
	  • SHGs involved
		• **BWSSB' s rainwater harvesting theme park -** The park showcases 26 types of live models of RWH structures
		• **Capacity building** programs
		• **Awareness** campaigns
			• **Information Centre** to divulge data on technical aspects of RWH
			• **RWH cell** undertakes activities related to **awareness generation**, conducts **exhibitions**, distributes **pamphlets** and **coordinates with NGOs**	

Source: https://www.cseindia.org/legislation-on-rainwater-harvesting-1111; https://bengaluru.citizenmatters.in/rainwater-harvesting-in-bengaluru-webinar-64351; https://www.thehindu.com/news/cities/bangalore/only-155-lakh-properties-in-bengaluru-have-rainwater-harvesting-structures-installed/article37276664.ece

Towards water-secure ULBs: Defining actionable goals for 5th June (World Environment Day)..

1. **What is one concrete action your ULB will take by 5th June to improve water security in your city?** *(e.g., fixing leaks, starting rainwater harvesting, groundwater recharge structures, awareness drive)*

2. How much **reduction in water losses (leakages/NRW)** can your ULB aim to achieve in the next 6 weeks?

3. How many public buildings (schools, offices) can your ULB equip **with rainwater harvesting systems by 5th June?**

4. **What steps will you take to improve water availability during summer (e.g., tanker management, source strengthening)?**

5. Can your ULB commit to increasing **groundwater recharge? If yes, how many recharge structures can be created or revived till 5th June?**

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Contributors for the presentation

Dhruv Bhavsar

Center Head

Center for Water and Sanitation (C-WAS)

CRDF, CEPT University

Aasim Mansuri

Center Head - Strategy

Center for Water and Sanitation (C-WAS)

CRDF, CEPT University

Kasturi Joshi

Program Lead

Center for Water and Sanitation (C-WAS)

CRDF, CEPT University

Priyadarshini Choudhary

Lead Research Associate

Center for Water and Sanitation (C-WAS)

CRDF, CEPT University

Omkar Kane

Senior Research Associate

Center for Water and Sanitation (C-WAS)

CRDF, CEPT University

Chirag Patel

Senior Research Associate

Center for Water and Sanitation (C-WAS)

CRDF, CEPT University

Apoorva Bhate

Research Associate

Center for Water and Sanitation (C-WAS)

CRDF, CEPT University