Water Security and Climate Adaptation Conference (WSCA 2023)

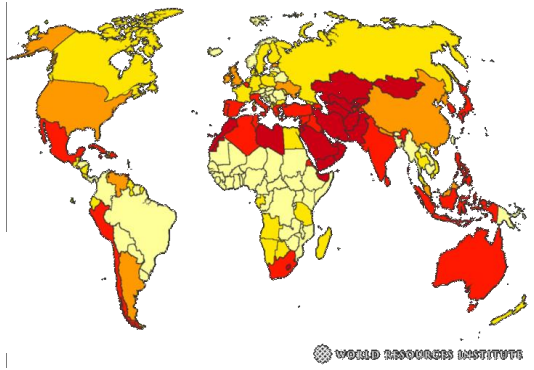
ABS049 - Moving towards water secure and climate resilient cities – Case of two cities in Gujarat

Center for Water and Sanitation (CWAS)

CWAS CENTER FOR WATER AND SANITATION | CRDF CEPT RESEARCH AND DEVELOPMENT FOUNDATION | CEPT UNIVERSITY | ABCD-CENTRE | WSCA

The world is facing the plight of water crisis and hence Water security is emerging as an issue of extreme urgency …

- The **IPCC AR6** analyses that **26 out of 35 Climatic Impact Drivers** (CIDs) are **water-related**
- The **Water & Climate Pavilion at COP27** stressed on **water resilience** to build **climate and socio-economic resilience**
- A recent **UNCCD** report says **75%** of world population will be affected by **droughts by 2050**
- **17 Countries**, home to One-Quarter of the World's Population, **Face Extremely High Water Stress**
- **12%** of India's population is already living the **'Day Zero' scenario, looming 21 cities of India**



Water Security is high on International and National agendas, cities too need to align towards these agendas…

Sustainable Development Goals (SDG 6)

- Target 6.1: Achieve **universal and equitable access** to **safe and affordable** drinking water for all
- Target 6.6: **Protect and restore water-related ecosystems**, including rivers, aquifers and lakes

AMRUT 2.0
Making Cities Water Secure

अमृत
Atal Mission for Rejuvenation and Urban Transformation

Government of India has put a strong emphasis on water security – **The Atal Mission for Rejuvenation and Urban Transformation 2.0** (AMRUT 2.0) has **water security** as the central theme

KET OBJECTIVES

Ensuring **universal access** to drinking water connection at household level

Focus on moving towards **water secure cities**

Conservation of **waterbodies and urban aquifer management**

Source: SDG ; AMRUT

The two study cities – Anjar and Ganhdidham are located in Kachchh region of Gujarat state in India…

ANJAR

17.81
Area (sq. Km)

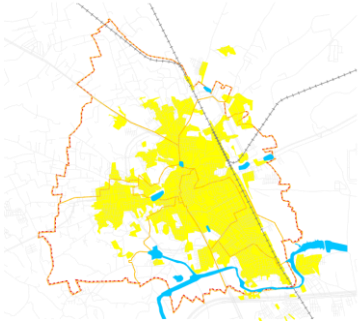
9
Wards

1,09,238
Population (2021)

26,036
Households (2021)

29,214
(25% of total population)
Slum Population (2021)

9,770
Slum HH (2021)



GANDHIDHAM

30.50
Area (sq. Km)

13
Wards (SRC)

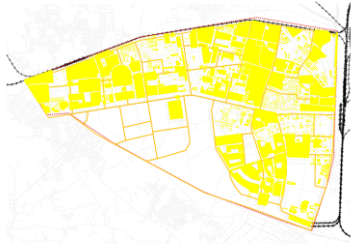
13
Sectors (KPT)

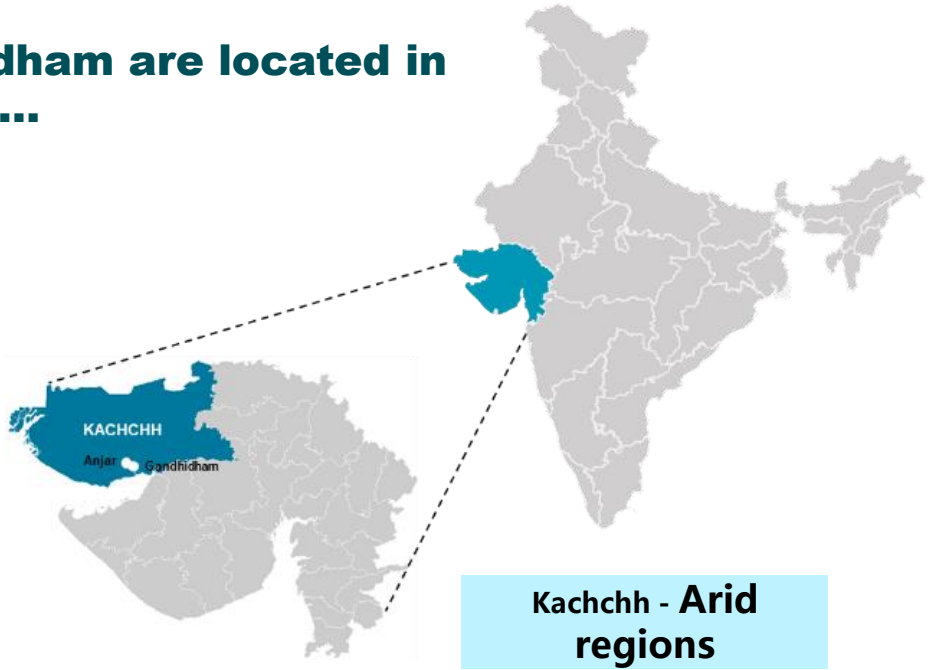
4,10,000
Population (2021)

87,280
Households (2021)

69,880
(17% of total population)
Slum Population (2021)

13,950
Slum HH (2021)





Kachchh - Arid regions

Drought in 2.5 Years

430mm Annual rainfall

406 kms coast line

Source: GoG - District Profile, : Census 2011, Anjar and Gandhidham Municipalities

The region has historically faced water crisis...

Chronically drought prone region with a **frequency** of once in every **2.5 years**


THE HINDU

Kutch in the grip of worst drought: Desert grit


AL JAZEERA

'We can only watch our animals die': A drought disaster in Kutch

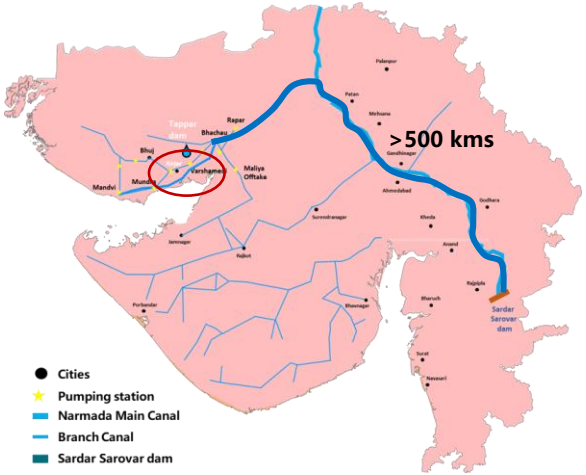
In Kutch, a northern Gujarat district, residents say their livelihoods are at risk as experts warn of a water crisis.


In Kutch, history has a habit of repeating itself

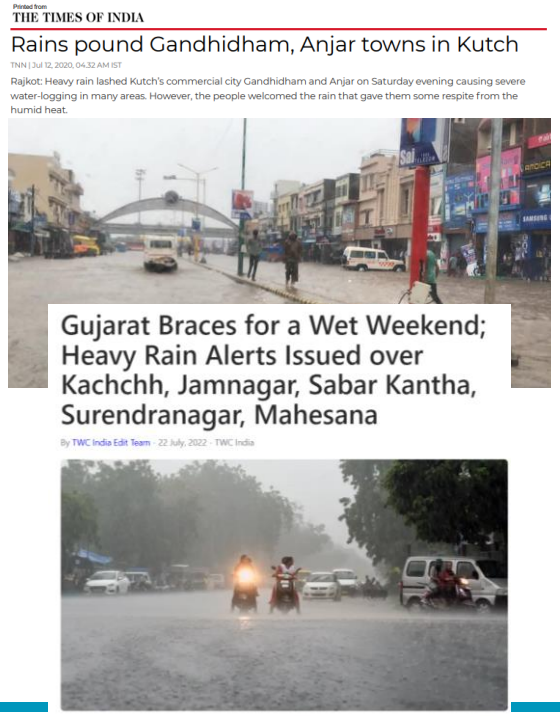
Rutam V Vora | Bhuj, March 28 | Updated On: Mar 28, 2019

The region is witnessing its worst drought in 30 years; 16 of its 20 dams have gone dry; there is drinking water but nothing for cattle; and yet, its people remain resilient

- **Over exploitation of ground water,** which is further aggravated by **salt water intrusion**
- **Dependent on Narmada Water**



Frequent **Urban flooding** scenario in **major parts** of the cities


Printed from THE TIMES OF INDIA

Rains pound Gandhidham, Anjar towns in Kutch

TNN | Jul 12, 2020, 04.32 AM IST

Rajkot: Heavy rain lashed Kutch's commercial city Gandhidham and Anjar on Saturday evening causing severe water-logging in many areas. However, the people welcomed the rain that gave them some respite from the humid heat.

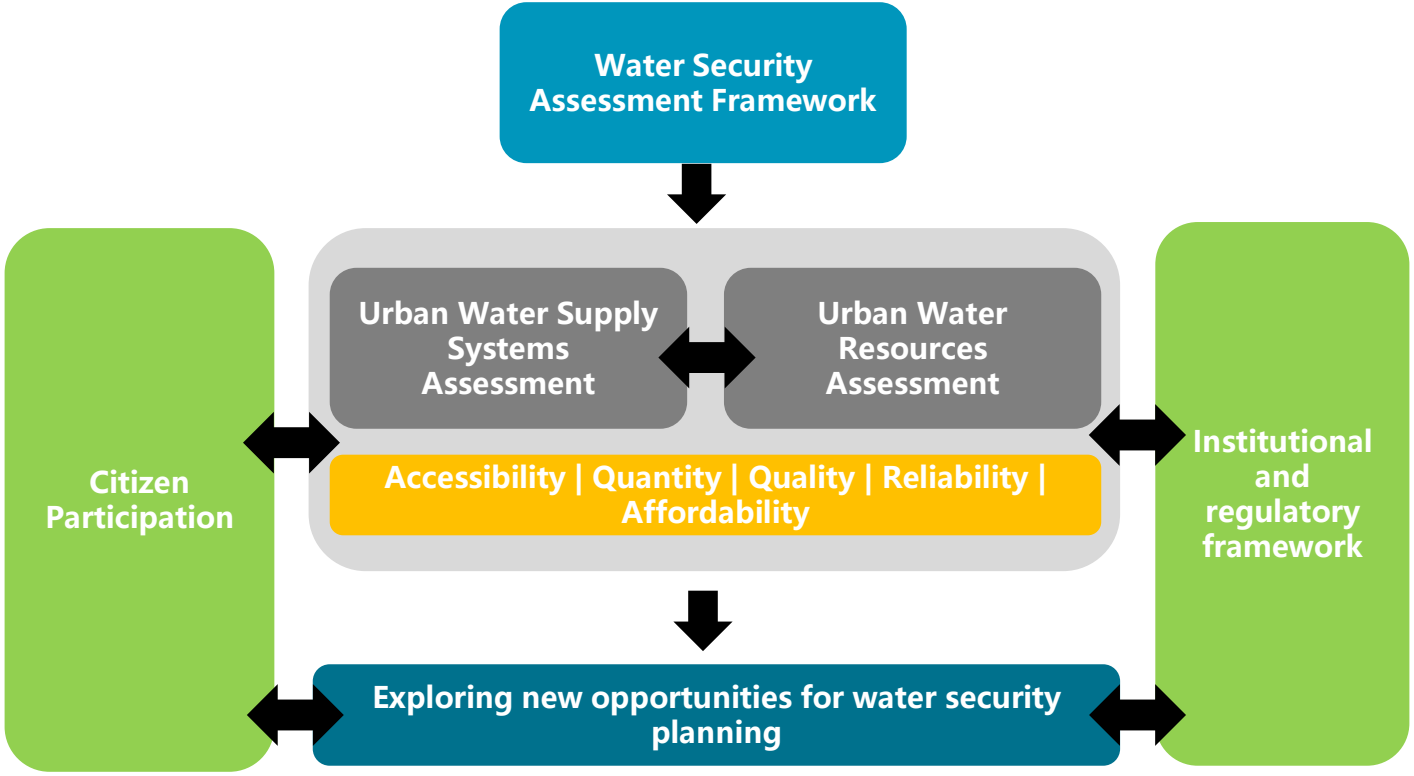
Gujarat Braces for a Wet Weekend; Heavy Rain Alerts Issued over Kachchh, Jamnagar, Sabar Kantha, Surendranagar, Mahesana

By TWC India Edit Team · 22 July, 2022 · TWC India

Key Highlights of the study....

- Development of Water security assessment framework
- Use of innovative tools/ applications to monitor ground water level
- Geohydrological study for understanding aquifer and watershed of cities
- Pilot demonstrations for water security
- Composite water vulnerability index for urban poor
- Scaling up of the initiatives from city to state level

Urban Water Security Assessment Framework...



Source: Adapted from CWAS Urban water security Planning toolkit

City assessment based on - Urban Water Security Assessment Framework...

Quantity

Water Source (MLD)

Anjar has **50%** and Gandhidham has **75%** dependency Narmada (distant) water

Anjar has **50%** dependency on **ground water**, which is **depleting**

Gandhidham has **Saline GW** depend up on Anjar's aquifer

Cities are further planning to shift to 100% Narmada (distant) water under "Nal se Jal" project in next 5 years

City authorities has **no plans** to **augment own water sources**

Accessibility

Coverage

Anjar has **75%** and Gandhidham has **64%** individual water supply connections

The cities will achieve **100%** individual **WS connections** post implementation of **"Nal se Jal" Project under AMRUT 2.0**

The per capita supply in Anjar has increased from 68 to 91 LPCD and decreased for Gandhidham from 128 to 89 LPCD over the period of 5 years

City authorities has **plans** to provide **140 LPCD** on daily basis

Quality

Water Treatment Plant

Anjar has **4.5 MLD** Treatment capacity; Gandhidham has **40 MLD** treatment capacity

The cities are augmenting their treatment capacities by **15 MLD** (Anjar) and **27 MLD** (Gandhidham)

Gandhidham WTP is **non-functional** from more than an year

GWSSB conducts regular water **quality testing** in Gandhidham, no testing in Anjar

Reliability

Intermittent supply

Anjar
Supply days – **Alternate Days**
Supply Hours – **1 to 1:45 hours**

Gandhidham
Supply days – **Once in 3-4 Days**
Supply Hours – **1 to 6 hours**

Distribution is **not uniform** in terms of supply **across the city**

Presence of **private water** suppliers can be observed in **Gandhidham**

Affordability

Cost Recovery 2021-22

ANJAR – 100%
GANDHIDHAM – 41 %

Collection Efficiency 2021-22

ANJAR – 50%
GANDHIDHAM – 71 %

Water Connection Charges

ANJAR – Rs. 350/-
GANDHIDHAM – Rs. 4000/-

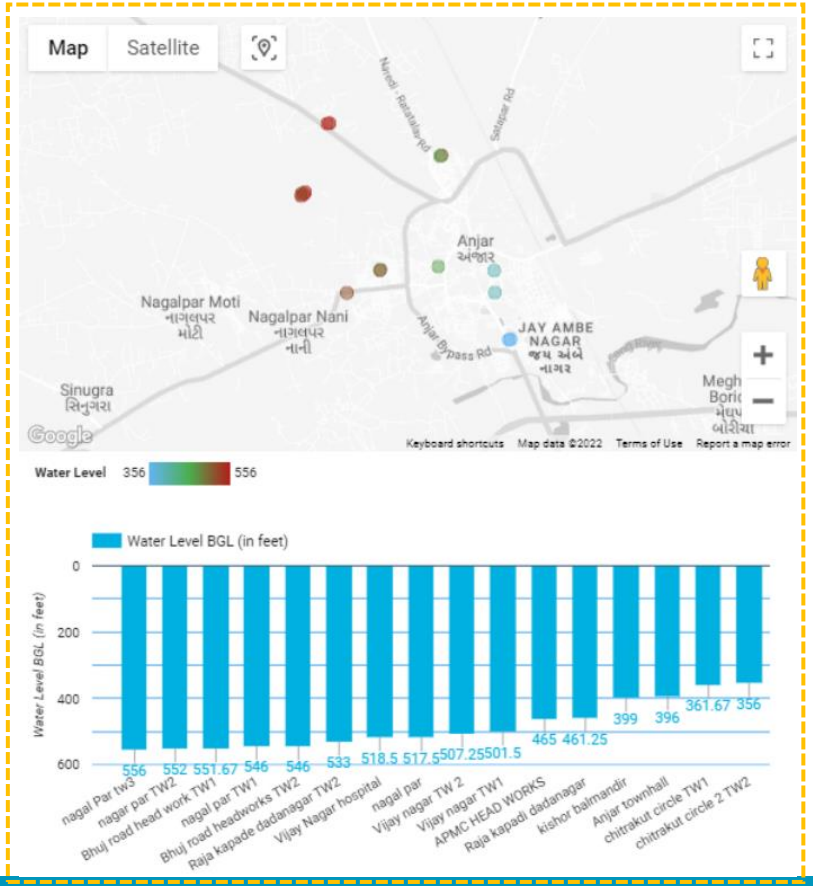
Water Tariff

ANJAR – Rs. 900/-
GANDHIDHAM – Rs. 900/-

Connection charges and **tariff are same** for **city area and slum** pockets

In **Gandhidham** people incur monthly **additional expenditure** on procuring water from private supplier

Use of innovative tools/ applications to monitor ground water level...



- Use of **Bhujal App** – for Ground Water Monitoring
- The app is **empaneled** under **AMRUT 2.0** by MoHUA **as a Technology and Implementation partner**
- **22 locations Pilot testing** -16 borewells @ Anjar and 6 borewells @ Gandhidham
- The **test results** were **similar** to the **data provided by the ULBs**

Benefits of such tools/applications

- ✓ Assess the **water demand**
- ✓ Measurements are **available in minutes**
- ✓ **Ease less** testing process
- ✓ **Community participation** in GW management
- ✓ Early identification of **drying borewells**

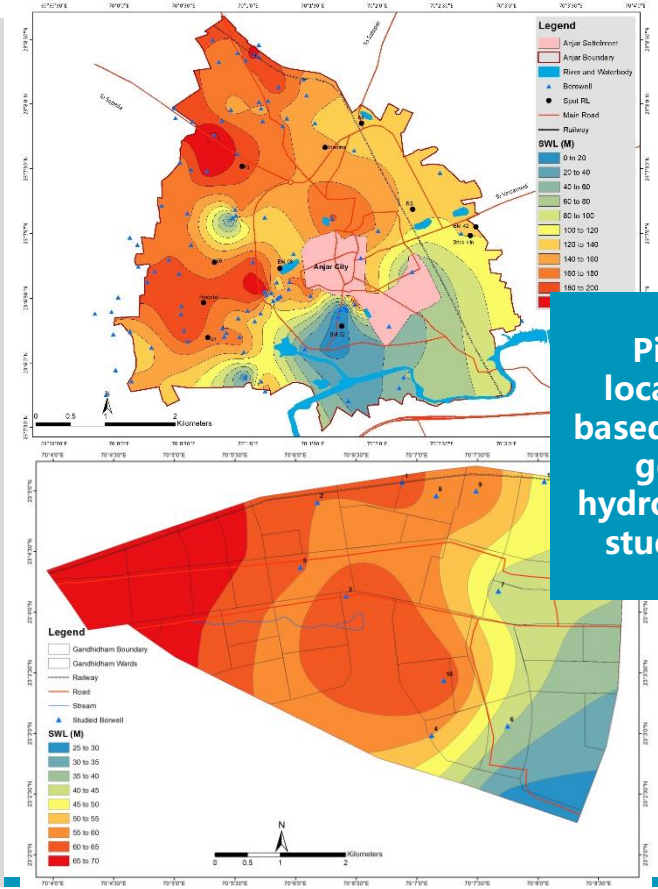
Source: Developed by Waterlabs for CWAS study; Waterlabs

Geohydrological study for understanding aquifer and watershed of cities...

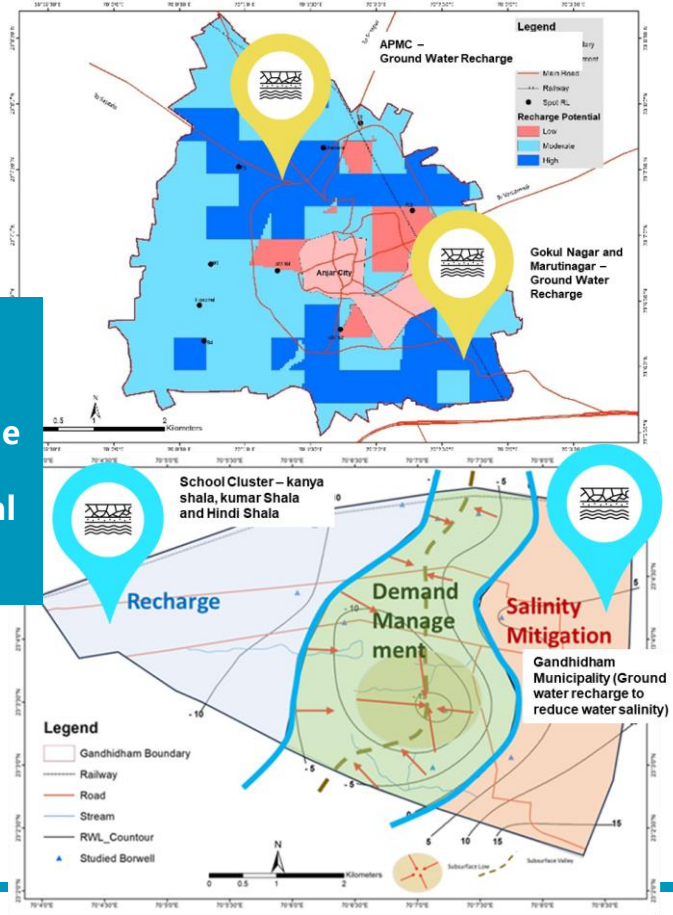
APPROACH FOR GEOHYDROLOGICAL STUDY

- **WATER SOURCE STUDY**
- **LITHOLOG AND AQUIFER STUDY WITH THEMATIC MAPS**
- **IDENTIFICATION OF POTENTIAL RECHARGE ZONES**

Ground water level and contour maps

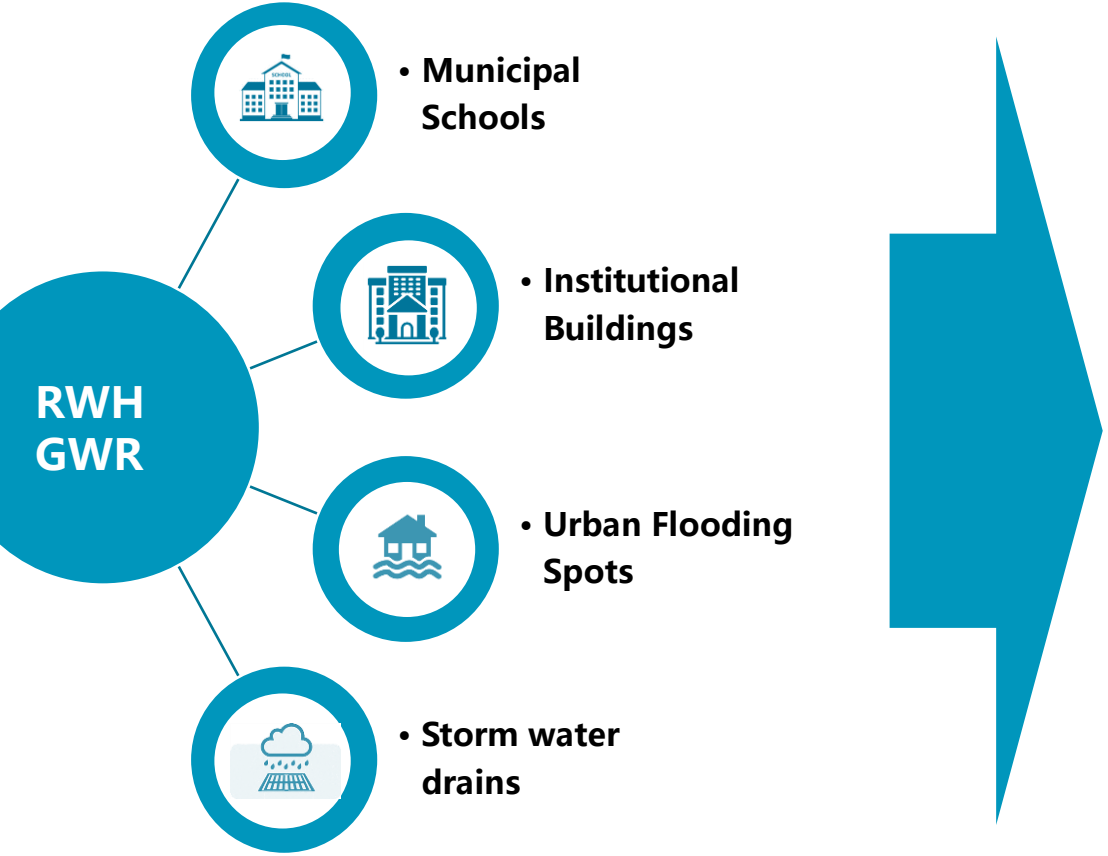


Pilots locations based on the geo - hydrological study . . .



Source: Developed by ACT for CWAS study

CWAS initiatives through Pilot Demonstrations for water security...

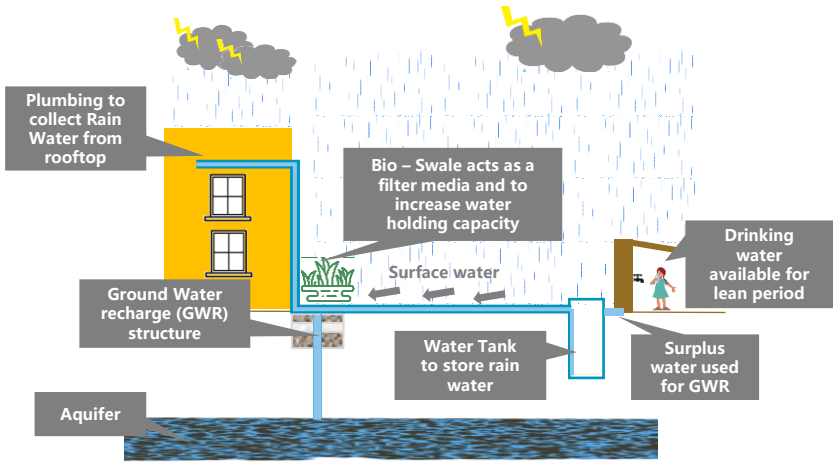


Impact

88 thousand liters of Rainwater available for **3000+ students** during lean period

35 Million liters of ground water recharged during monsoon

Pilot Demonstrations – Municipal schools and Institutional buildings…



Salient features of the project

- Water conservation
- Water holding capacity
- Water – lean period
- Surplus Water - GWR
- No water logging

Plumbing Work



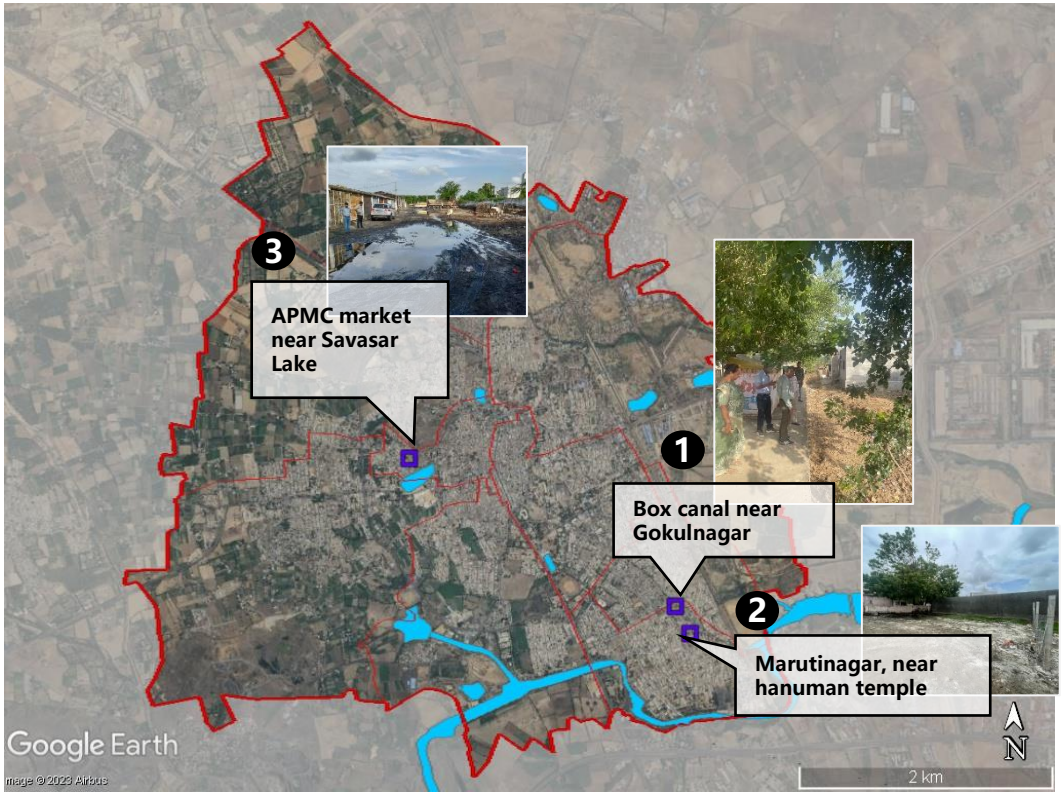
Bio-swale/ borewell



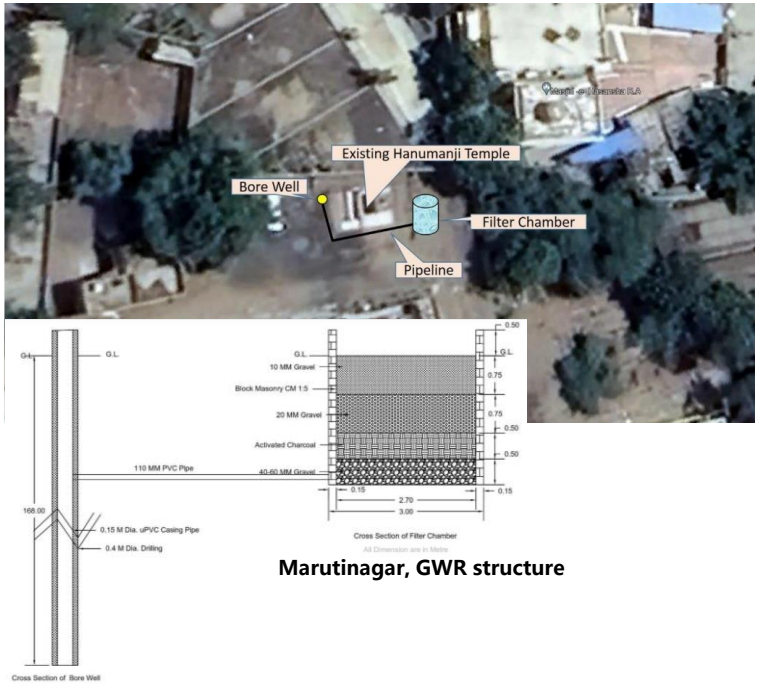


VJT – Mineralized tanks


Pilot Demonstrations – Ground water recharge…



Locations of Pilot on use of storm water for GWR and urban flood control in Anjar



Marutinagar, GWR structure

Mitigating urban flood scenario, while **exploring** the concept of **Sponge cities** through ground water recharge structures

Composite water vulnerability index for urban poor...

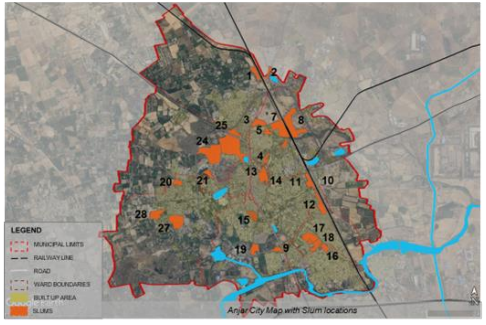
1. Collecting **Notified Slum** lists from Municipalities
2. Marking all **slum locations on city map**
3. **Data analysis** from **WASH** perspective

Preparing questionnaire to carry out Survey

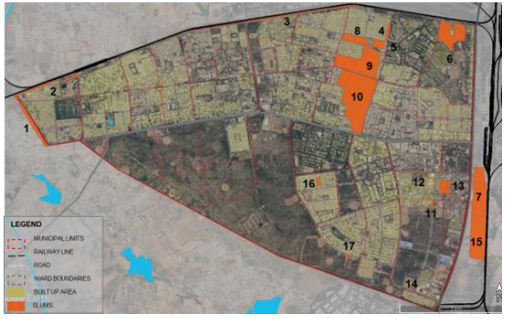
Carrying out **slum surveys** by visiting individual slums

Developing **Spatial maps** and **Index**

Anjar Slum locations



Gandhidham Slum locations

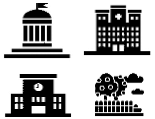


Parameters of the composite water vulnerability index

- **Availability**
- **Reliability**
- **Accessibility**
- **Quality**
- **Awareness and Affordability**

Scale up plan...

Where to implement?



Identifying potential location/ stakeholders

Through which media?

Awareness programme – Jal Samvad

Where is the fund?

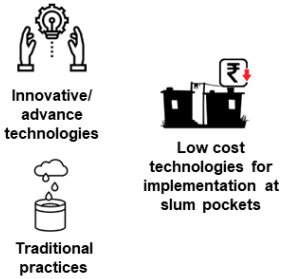
Identifying potential financing mechanism

What are the norms?

Development authority, ULBs, State /Central government, Good practices etc.

Identifying Innovative tools – subsidizing, incentivizing etc.

Which technology and who will build ?



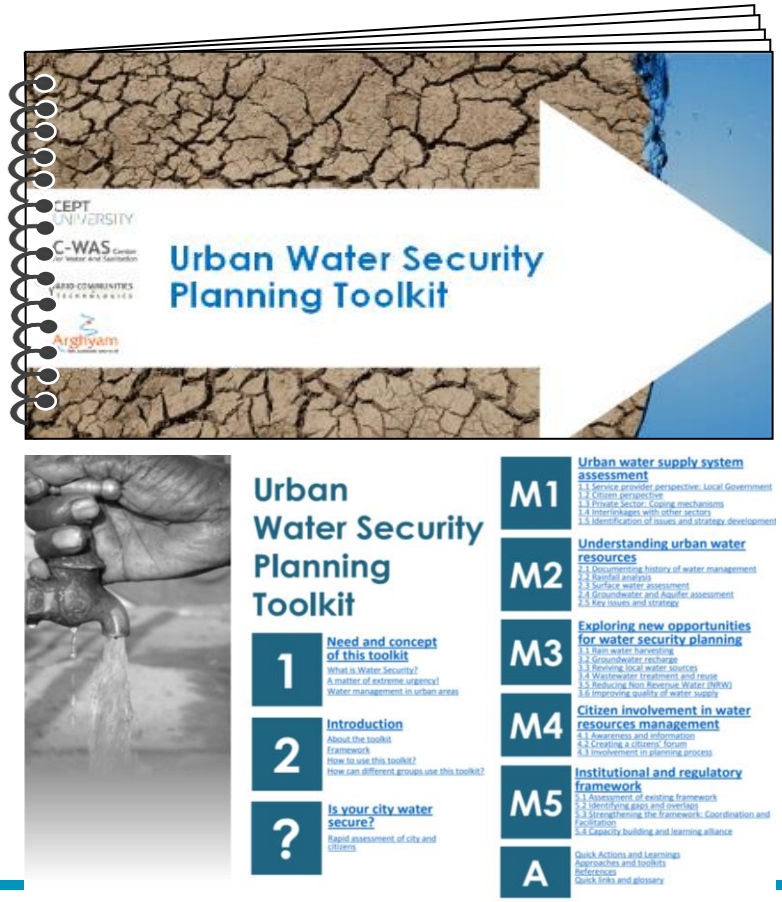
Identifying various technologies for RWH/ GWR

Phase I - Engaging

Phase II - Strategizing

Phase III - Implementing

Key features of CWAS's Urban Water Security Planning toolkit...



- The approach of toolkit is to prevent crisis and move the cities towards a secure future by becoming 'self-reliant' for water
- Begin with the conservation of local water resource rather than depending on distant sources
- This toolkit has been developed to pave the way for other cities to become water secure
- It can be adapted and tailored according to the context and needs of each city

Urban water security planning toolkit available at: https://cwas.org.in/resources/file_manager/urban_water_security_planning_toolkit_compressed.pdf

Outcomes of the project...

Source sustainability

The cities will be able to augment their own water resources through rain water harvesting and ground water recharge

Policy level initiatives

The cities will be able to strengthen their policy frameworks, which in turn will help in successful implementation of projects at ground level

Capacity building

The cities will be empowered through capacity building and training workshops for actual implement and monitoring of the system

Community participation

Involving citizens to the system will further bring in the sense of ownership and will ensure sustainability of the systems, beyond project period

Scaling up

The action oriented pilot projects developed in the study cities, will help to scale up such initiatives from city to state level

Climate Resilient

The cities will be able to cope with the impacts of changing climate in terms of water scarcity due variation in precipitation pattern or urban flooding situation through GWR structures

Water is the primary vehicle through which we feel the impacts of climate change

- World Meteorological Organization

Thank you

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About us

The Center for Water and Sanitation (CWAS) is a part of CEPT Research and Development Foundation (CRDF) at CEPT University. CWAS undertakes action-research, implementation support, capacity building and advocacy in the field of urban water and sanitation. Acting as a thought catalyst and facilitator, CWAS works closely with all levels of governments - national, state and local to support them in delivering water and sanitation services in an efficient, effective and equitable manner.

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Annex 1 : Elements of Water security framework …

1. Urban Water Supply System Assessment
- Service Provider Perspective – ULBs, State Government etc.
- Citizen Perspective
- Private Player Perspective – Coping Mechanism
- Identification of issues and strategy development

2. Urban Water Resources Assessment
- Water dependency assessment
- Rainfall Analysis
- Surface Water and Ground water Assessment
- Aquifer Mapping
- Identification of issues and strategy

3. Exploring New Opportunities
- Rainwater harvesting
- Ground Water recharge
- Use of Storm water to Recharge GW
- Revival of dysfunctional wells/ borewell
- Concept of sponge street/ sponge campus
- Improving water quality
- Improving water services

4. Citizen Participation
- Citizen Awareness and information
- Citizen involvement in Water systems management
- Citizen participation on developing strategies

5. Institutional and regulatory framework
- Assessment of existing framework
- Identifying Gaps and Overlaps
- Strengthening the framework
- Building capacity

Multiple climatic impact-drivers are projected to change in all regions of the world
(Source: IPCC AR6 The Physical Science Basis Summary for Policymakers)