






Bottlenecks in transitioning to Daily water supply - The case of Gandhidham

Guide: Upasana Yadav
Co-guide: Omkar Kane

Study by
Vaagdaa Vijayshankar |
PUI23416

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MASTER OF INFRASTRUCTURE PLANNING
FACULTY OF PLANNING
CEPT UNIVERSITY

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The Need for Daily Water Supply in Indian Cities

Growing Urban Population Strains Water Resources

India's urban population is expected to reach **600 million by 2030**

50% of urban households lack piped water connections

Water Scarcity and Inequitable Distribution

21 major cities, including Delhi and Bengaluru, will run out of groundwater by 2030

34% of urban water supply is lost due to leaks and theft

Health and Economic Impacts

37.7 million Indians are affected by waterborne diseases annually

73% of urban households rely on expensive private water tankers

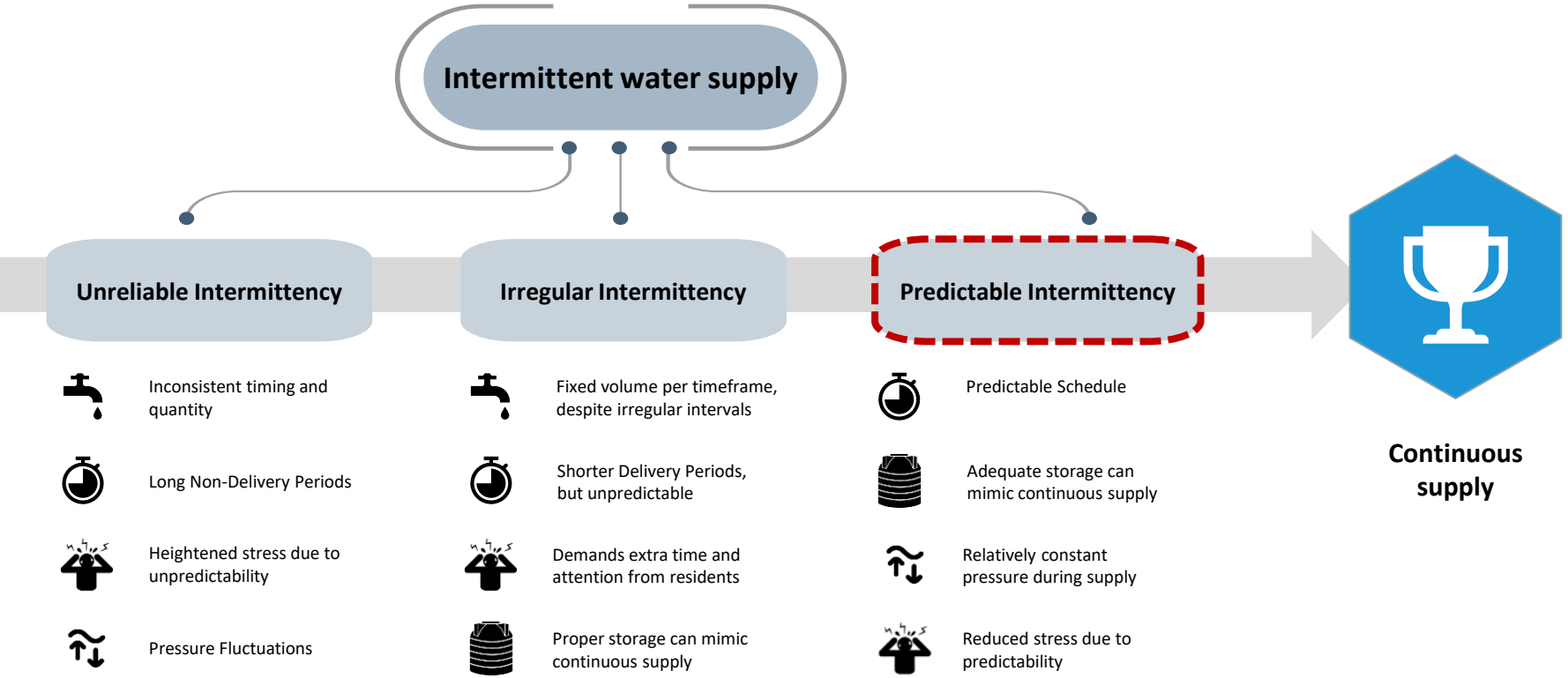
Climate Change Exacerbates Shortages

Erratic monsoons and depleting groundwater worsen urban water stress.

By 2050, water demand will exceed supply by 50% .

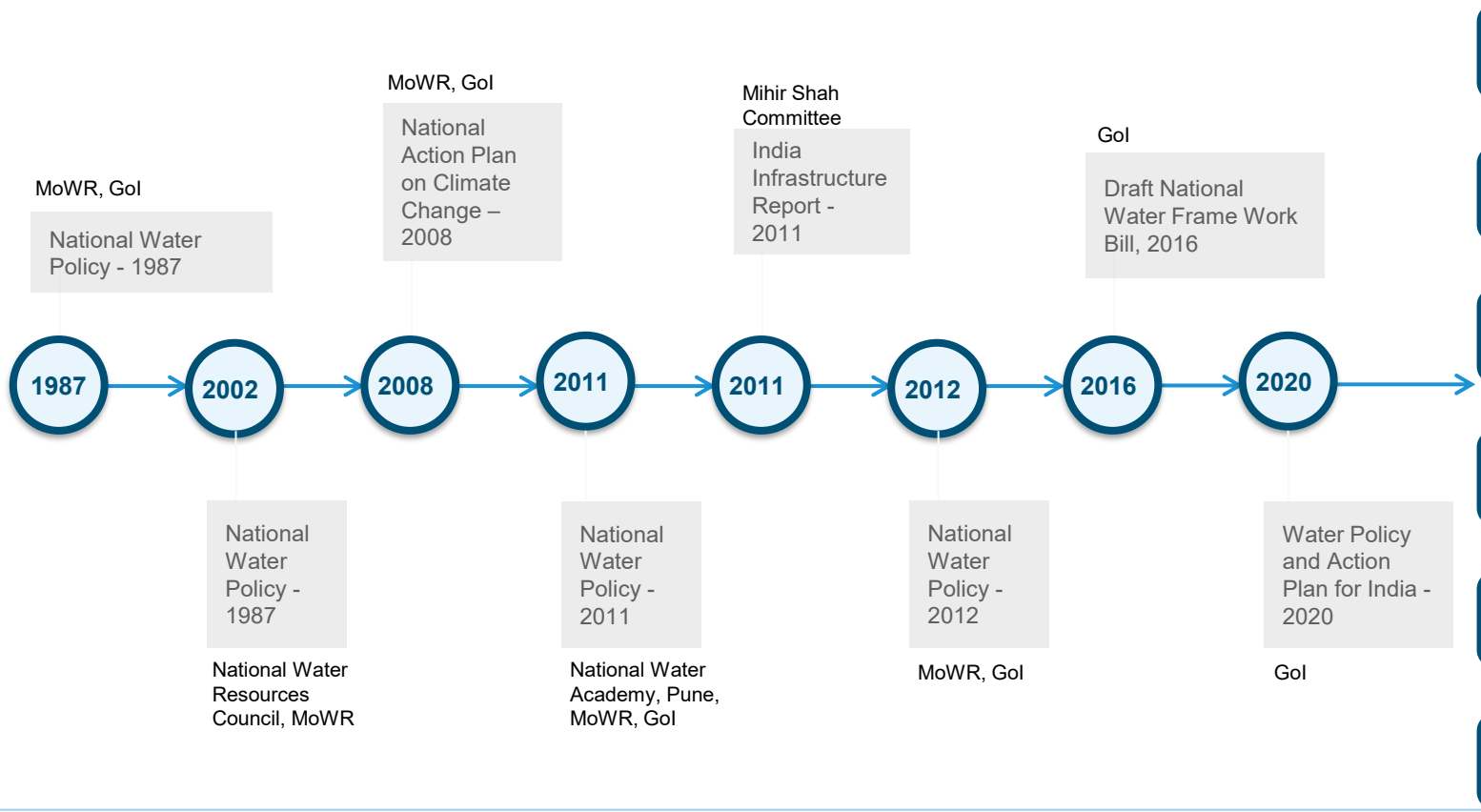
Source : COMPOSITE WATER MANAGEMENT INDEX, NITI Aayog, CPHEEO, URBAN WATER SUSTAINABILITY, CSE

Why focus on daily supply



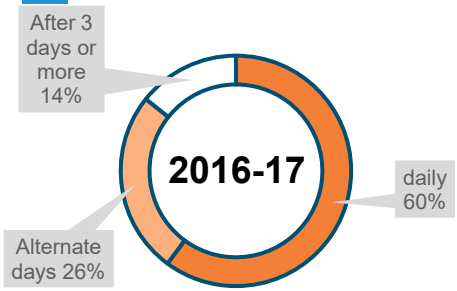
Source : Intermittent Domestic Water Supply: ACritical Review and Analysis of Causal-Consequential Pathways,2016

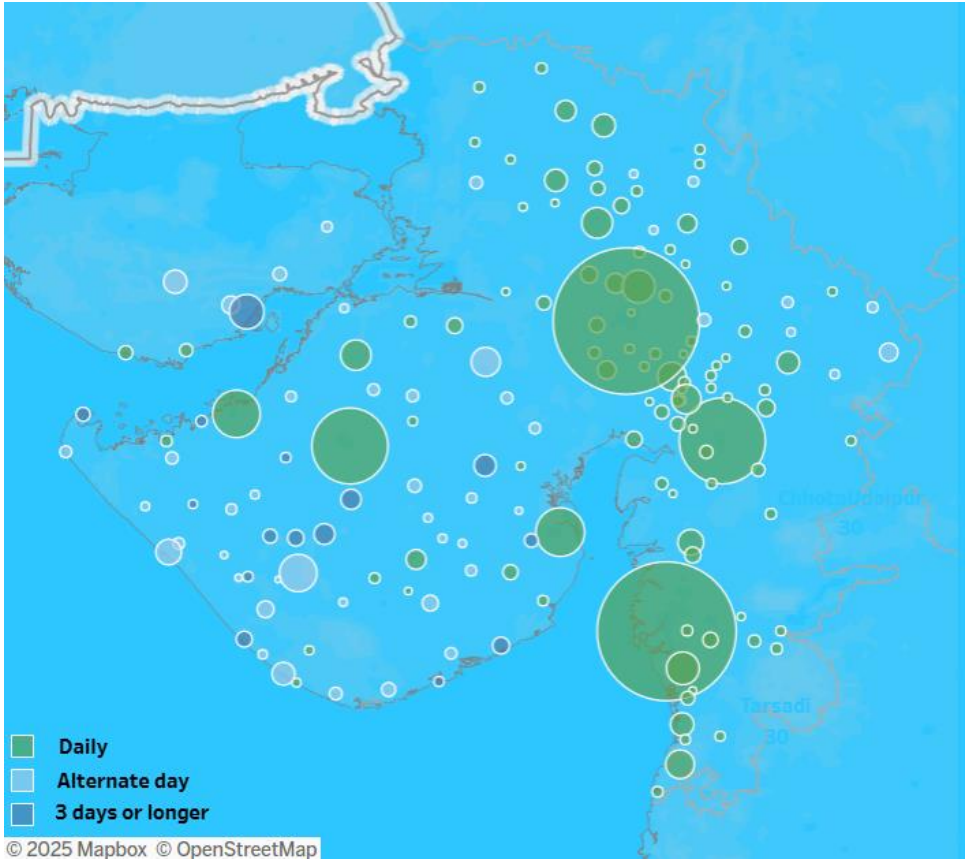
Water related policies in India and their key features



Source : http://timesofindia.indiatimes.com/articleshow/108120955.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst
Ministry of Urban Development, Government of India. (2018). National Urban Sanitation Policy.

Existing Situation in Gujarat





Source : PAS Data

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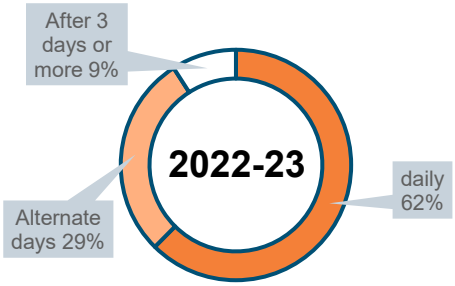


Bagasra
Baravala
Bhavnagar
Gariyadhar
Halol
Lathi
Vadali

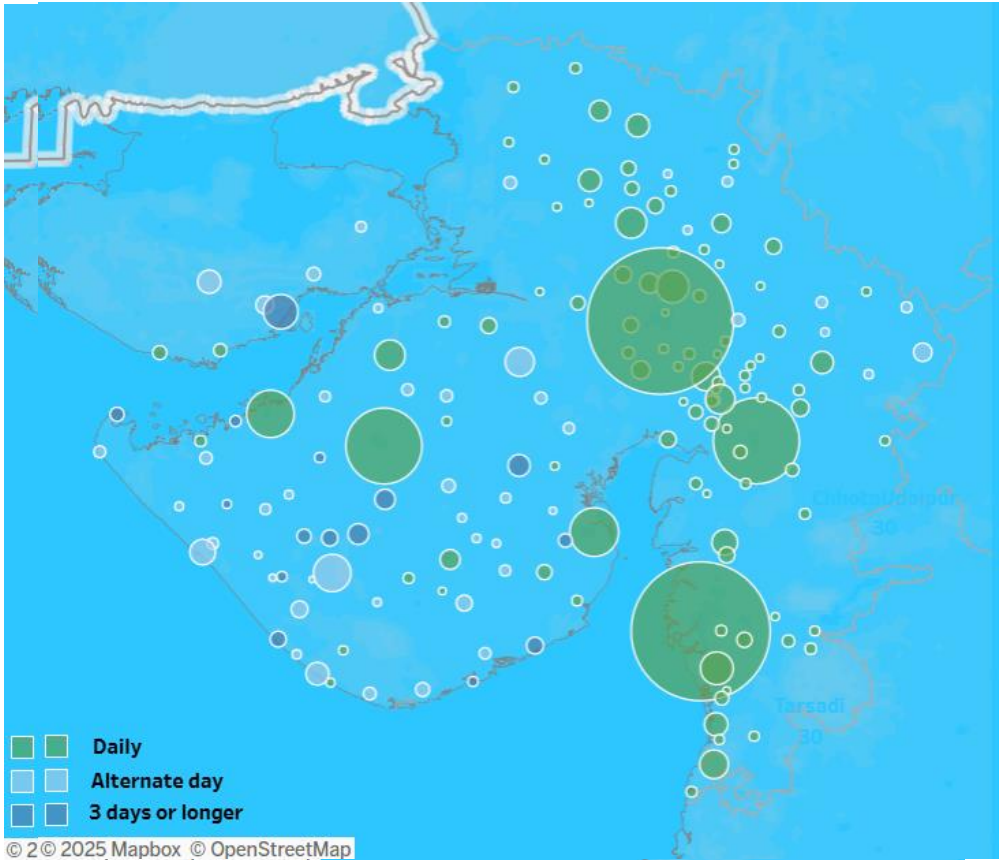
Slight increase in cities supplying water on daily and alternate basis

- Narmada connectivity
- Increasing water storage capacity – deepening lakes
- Increasing water resources
- Desalination

82%
Surface water dependance

18%
Ground water dependance

2.1 hrs
Average Daily Supply

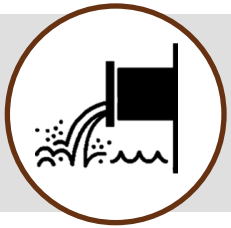


Source : PAS Data

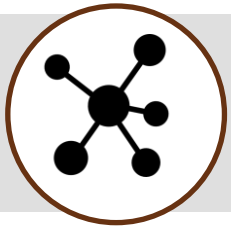
Tier 3 cities

	Bagasra	Baravala (Botad)	Gariyadhar	Lathi	Vadali
	37,900	**23,500**	**39,152**	**24,998**	**26961**
Issues	High groundwater nitrate/salinity	Erratic local sources	Unreliable sources	Limited infrastructure	Groundwater-dependent
Key Interventions	• Narmada pipeline to replace groundwater	• Narmada grid connectivity • Increase network coverage	• Narmada stable supply • Increased coverage • Increased storage	• Narmada stable supply • Increased coverage • Increased storage	• Narmada reduced GW dependance • Increased network coverage and storage

Common measures



Enhanced Narmada connectivity



Network coverage expansion

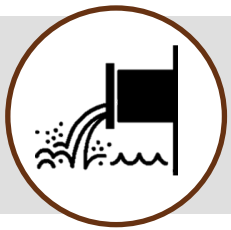
Increased storage capacity

Source : PAS Data, https://saujaldharatrust.com/checkdam-list/, WATER AND SANITATION SERVICES IN URBAN GUJARAT, UMC 2012, https://amrut.mohua.gov.in/approvedProjects/list/c3cwOVlFOG1BckF5cE9mQVVFbWhSdz09/aTJrakVqeTY5amZkazJuNWhJczNYdz09

Tier 1 cities

	Bhavnagar	Halol
	7,97,328	**1,03,210**
Issues	High groundwater nitrate/salinity	Industrial town, rising urban/industrial demand
Key Interventions	• 100 MLD Increased Narmada supply with Shetrunji Dam • Expansion of piped network • Increased storage capacity • Governance (2016-2025): Villagers engagement in O&M of water reservoirs	• Narmada grid connectivity • Increase network coverage, 100% tap connected • Groundwater resource management (aquifer recharge)

Common measures



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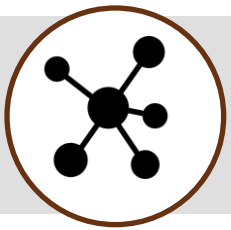


Network coverage expansion

Increased storage capacity

Community engagement and awareness

Source : BMC, https://www.vrtibhavnagar.org/watersector.html, Bhavnagar City Water Supply Scheme, https://jaljeevanmission.gov.in/media/halol-and-jambughoda-talukas-panchmahal-district-become-100-tap-water-connected , District Irrigation Plan (2016-2020):PANCHMAHAL, GUJARAT, GoG

Research Overview

Aim: To assess bottlenecks in the transition towards daily water supply in Gandhidham and propose implementable interventions

Objectives

Objective 1

Identify bottlenecks to achieving daily water supply and how they have been addressed through case studies and literature reviews

Objective 2

Identify specific bottlenecks hindering daily supply in Gandhidham

Objective 3

Propose implementable short term (3-6 months), mid term (6-18) months and long term(+1.5 years) solutions to enable this transition

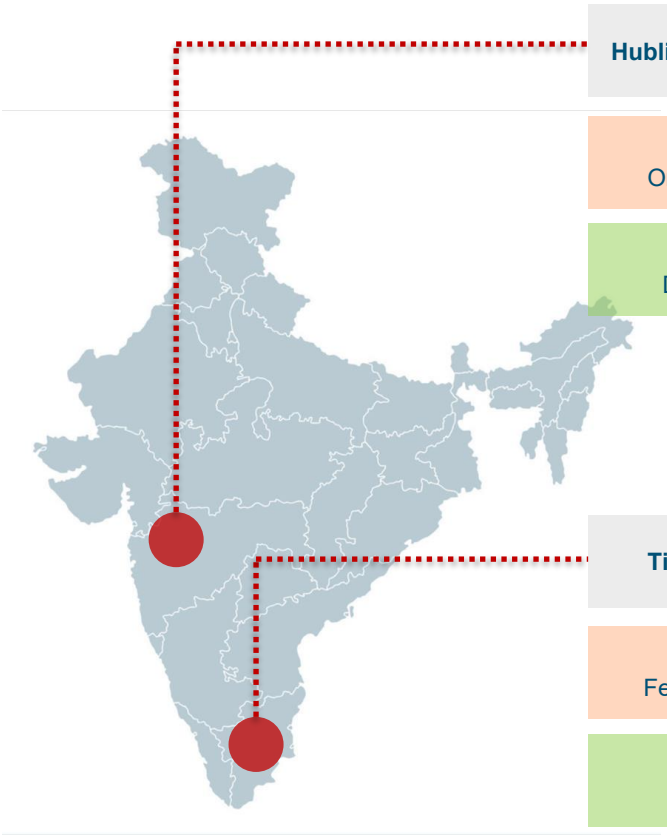
Methodology

Desk Review → Stakeholder consultation and primary data collection → Data analysis & gap identification → Providing Suitable Recommendations

Identifying Bottlenecks

Case studies and Literature reviews

Case studies



Hubli-Dharwad, Karnataka

Before
Once every 3–7 days

Now
Daily supply +24/7

Tirupur, Tamil Nadu

Before
Few hours on alt days

Now
Daily supply

Source : Environmental and Social Assessment (ESA) for continuous water supply in Hubballi-Dharwad, World Bank https://timesofindia.indiatimes.com/city/hubballi/hubballi-dharwad-247-water-supply-project-delays-spark-resident-concerns/articleshow/115498207.cms, https://www.deccanherald.com/india/karnataka/24x7-water-supply-a-hitch-in-hubballi-dharwad-project-2940052, TIRUPUR WATER SUPPLY AND SANITATION PROJECT, IELRC, Water Supply System for Corporation Areas of Tiruppur City Municipal Corporation, ADB

Hubli-Dharwad, Karnataka

Before Once every 3–7 days	**46 wards** 3-7 days	**25 wards** Daily supply	**11 wards** 24x7 supply
Now Daily supply +24/7	**2021** Initial completion	**2025** Revised completion	**40%** Progress

Key Issues:

- High non-revenue water (NRW) (~40%).
- Poor pressure management leading to leaks and contamination.
- Heavy reliance on groundwater due to unreliable piped supply.

Source : Environmental and Social Assessment (ESA) for continuous water supply in Hubballi-Dharwad, World Bank https://timesofindia.indiatimes.com/city/hubballi/hubballi-dharwad-247-water-supply-project-delays-spark-resident-concerns/articleshow/115498207.cms, https://www.deccanherald.com/india/karnataka/24x7-water-supply-a-hitch-in-hubballi-dharwad-project-2940052,

Hubli-Dharwad, Karnataka - Interventions

Interventions	Why?	How?	Impact
Zonal Segregation (DMA Approach)	The city's water network was interconnected, making it hard to isolate leaks or theft.	Divided into 19 isolated zones with boundary valves and flow meters.	Leaks in one zone didn't disrupt the entire city. Allowed targeted repairs (NRW dropped from 40% to 15% in pilot zones).
Pressure Management (PRVs)	High pressure caused frequent pipe bursts.	Installed Pressure Reducing Valves (PRVs) to maintain optimal pressure (3–4 bar).	Reduced pipe breaks by 60%. Saved energy (lower pumping needed).
Household Metering	Unmetered connections led to overuse and theft.	Installed mechanical meters (later smart meters for industries).	Billing efficiency improved from 50% to 85%. Consumers reduced wastage (volumetric pricing).
Leak Detection (Acoustic Sensors)	Underground leaks were hard to detect.	Used ground microphones to listen for leaks.	500+ leaks fixed in the first year.
Water User Associations (WUAs)	Lack of community trust in utility.	Local committees monitored supply and reported issues.	Faster grievance resolution. Reduced illegal connections.

Project could not be scaled up due to Financial constraints

Source : Environmental and Social Assessment (ESA) for continuous water supply in Hubballi-Dharwad, World Bank https://timesofindia.indiatimes.com/city/hubballi/hubballi-dharwad-247-water-supply-project-delays-spark-resident-concerns/articleshow/115498207.cms, https://www.deccanherald.com/india/karnataka/24x7-water-supply-a-hitch-in-hubballi-dharwad-project-2940052,

Lessons

High Operational costs in pilot zones

- The 24x7 continuous supply model required maintaining constant pressure, 24/7 pumping, and frequent leak repairs.

Energy costs surged by ~40% due to continuous operation.

Source : Environmental and Social Assessment (ESA) for continuous water supply in Hubballi-Dharwad, World Bank https://timesofindia.indiatimes.com/city/hubballi/hubballi-dharwad-247-water-supply-project-delays-spark-resident-concerns/articleshow/115498207.cms, https://www.deccanherald.com/india/karnataka/24x7-water-supply-a-hitch-in-hubballi-dharwad-project-2940052,

Lessons

Consumers need sufficient time to

(i) gain **confidence about the reliability** of supply,

(ii) get an idea of their **monthly water charges**

(iii) **control consumption** and **undertake any repairs** in their internal plumbing to **reduce leakage.**

Low Willingness-to-Pay

Households questioned why they should pay more when groundwater was still available as a backup.

Only 65% of bills were paid on time in pilot zones.

High number of complaints regarding bills

Volumetric tariffs had to be reduced to curb agitation

Low cost recovery; multiple contractors leading to project delays

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Tirupur, Tamil Nadu

Before Alternate days, few hours	**Heavy reliance** on water tankers	**Heavy pollution** by textile industry	**Fast depleting** groundwater
Proposed Daily supply	**Slums** Still face gaps (2022)	**NRW** Dropped in upgraded zones	**Leaks/theft** Persist in older areas

Key Issues:

- High contamination due to textile industry
- Heavy reliance on groundwater
- Fast depleting groundwater levels
- High NRW levels

Source : TIRUPUR WATER SUPPLY AND SANITATION PROJECT, IELRC, Water Supply System for Corporation Areas of Tiruppur City Municipal Corporation, ADB, Tirupur water supply and sanitation project - an impediment to sustainable water management?, IELRC,

Barriers to Universal Daily Supply

Funding Shortfalls

PPP Model Limitations:
Private sector (Suez) focused on high-revenue zones (industries), leaving residential areas underfunded.

- **Unequal Service Delivery**
- **Delayed Expansions**
- **Dependence on Cross-Subsidies**

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Infrastructure Gaps

Incomplete Pipeline Upgrades (38% completion in 2023): Older networks in slums/peripheral areas were not fully replaced.

- **Unequal Service Delivery**
- **Delayed Expansions**
- **Dependence on Cross-Subsidies**

- **Persistent Leakage**
- **Pressure Inequity**
- **Tanker Dependence**

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Political & Administrative Challenges

Industry vs. Household Priorities: Textile lobby influenced water allocation, delaying equitable distribution.

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- **Lobbying Bias**
- **Slow Reforms**
- **Accountability Gaps**

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- **Slow Reforms**
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Groundwater Depletion

Despite reduced dependence, falling water tables (~2m/year decline post-2015) exacerbated dry-season shortages.

- **Source Instability**
- **Long-Term Risks**
- **Higher Costs**

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Key Obstacles to daily water supply

20+
Case studies

Study parameters

- Design and Analysis
- Operation and Maintenance
- Consumer satisfaction
- Revenue
- Institutional capacity

Source : Drivers for Intermittent Water Supply in India: Critical Review and Perspectives, IITB, Intermittent water supply systems: causal factors, problems and solution options, 2018, Intermittent Domestic Water Supply: ACritical Review and Analysis of Causal-Consequential Pathways, 2016

Design and Analysis

Centralized Planning Issues

- Ideal ESR (Elevated Storage Reservoir) location fails due to **land constraints**, leading to hydraulic failures.
- **Population forecast uncertainties** result in faulty demand projections.

Gap Between Design Standards & Actual Operation

- **Design norms** (e.g., pipe diameter, peak factor) conflict with **intermittent supply (IWS)** realities.
- **Per capita demand norms** outdated—lifestyle changes (e.g., rural tech penetration) increase water demand.

Flaws in Network Analysis Methods

- Unaccounted pressure variations.
- Unaccounted **service connection pipes**.
- Ignored **household storage** (critical in IWS).

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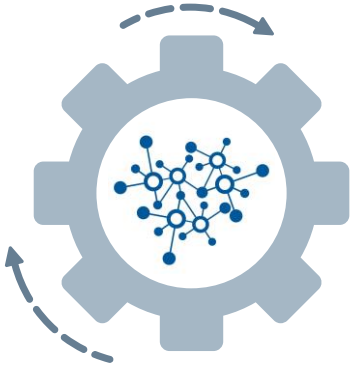
Operation and Maintenance

Failed DMA Implementation

- Maintenance becomes challenging
- Conducting water audit is tedious



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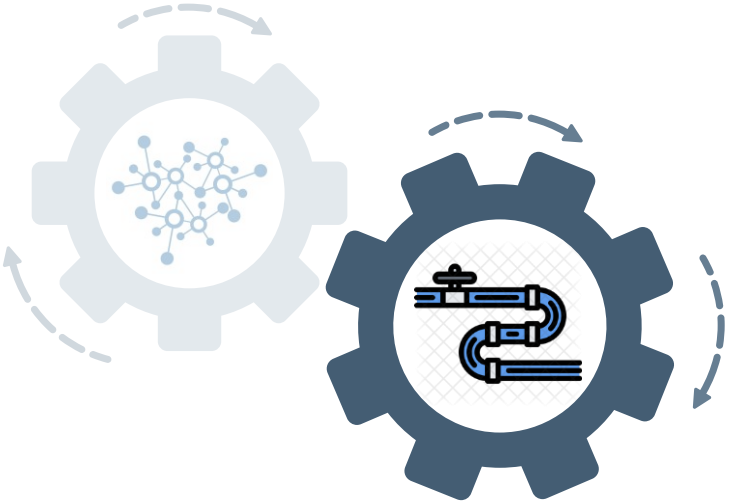
Failed DMA Implementation

- DMAs not functional in practice → difficult maintenance & water audits.
- Transmission networks often bypass ESRs, connecting directly to distribution lines.



Operational inefficiencies

- Partial flow conditions leave ESRs incompletely filled.
- Frequent pipeline refilling increases losses

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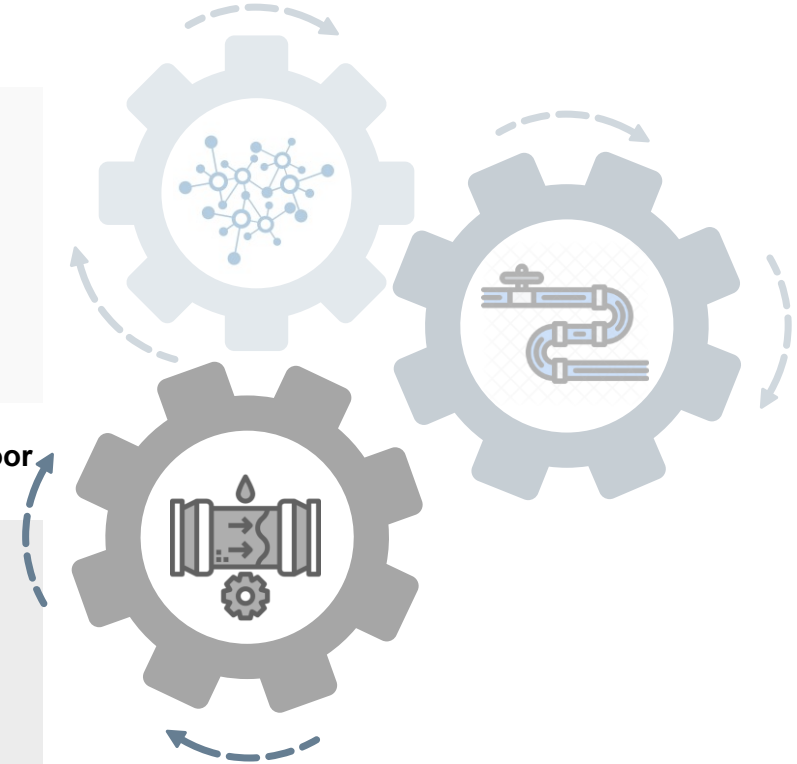
Aging Infrastructure & Poor Data Management

- The lack of a proper database regarding the pipe age and rehabilitation activity
- GIS underutilized for asset tracking.



Operational inefficiencies

- Partial flow conditions leave ESRs incompletely filled.
- Frequent pipeline refilling wastes water and increases losses.
- HGL drops below Low Supply Level (LSL) due to uncontrolled withdrawals → reduced network pressure.

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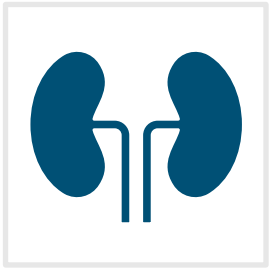
Consumer Satisfaction

Service Quality Depends On:

Infrastructure Condition (plagued by planning/design flaws)

System Reliability (disrupted by):

- Power cuts → pump failures
- Unplanned urban growth → unmet demand
- Droughts/surges (e.g., festivals) → shortages



Hidden Costs to Consumers

Coping Strategies (due to unreliable supply):

- Storage tanks/pumps (for low pressure)
- Water filters (for poor quality)
- Tankers/bottled water (for shortages)

Coping Costs:

- Extra money (15–25% of income in some cases)
- Lost wages (waiting for supply hours)

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Revenue

1. Tariff & Cost Reality

- **Public Expectation**: Water should be free/cheap (basic right perception)
- **Actual Cost**:
  - Mumbai example:
    - Treatment cost: ₹20/1,000L
    - Consumer charge: ₹5/1,000L (25% of cost)

2. Flawed Billing Systems

- **Tariff Types**:
  - Flat rates (unmetered)
  - Block tariffs (metered, but meters fail in IWS)
- **Meter Issues**:
  - Mechanical meters → inaccurate readings
  - Electronic meters → high O&M costs

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Institutional capacity

Skill Gaps:

- Lack of technical/managerial expertise
- Outsourcing of planning/design leading to poor ownership

Training Programs focus on generic topics, not actual solutions

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Tariffs Below operating costs leading to revenue shortfalls

Database Gaps: Limited GIS use for revenue/asset tracking

Coordination Issues: Civil servants vs. engineers → Poor decision-making

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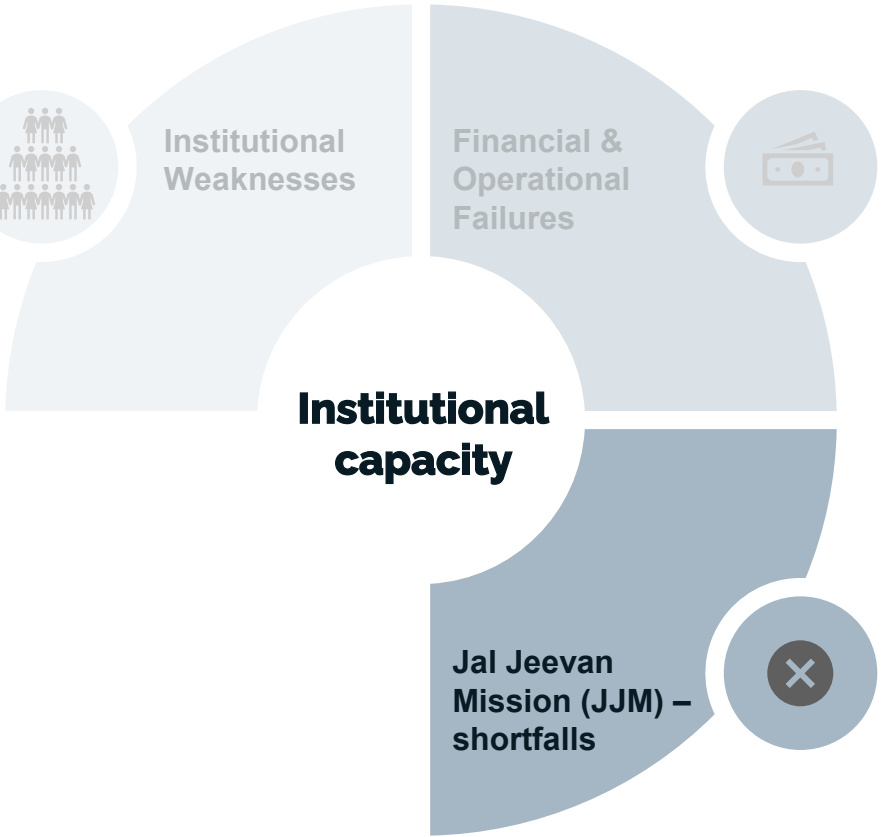

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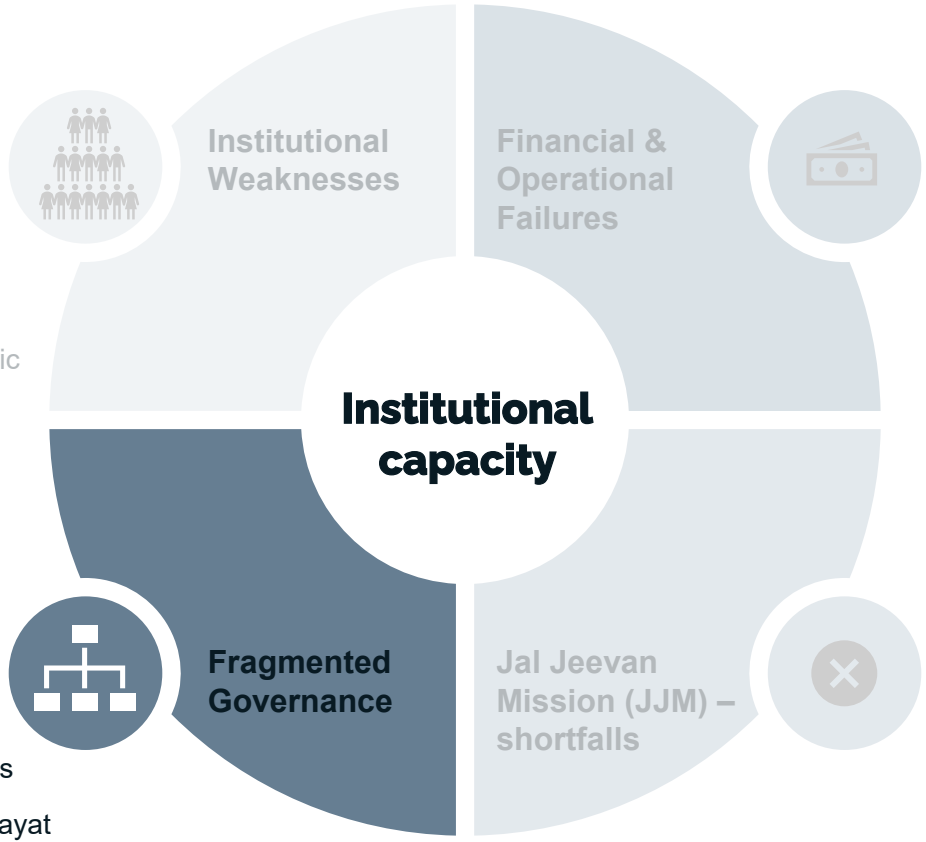

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Responsibility: States/ULBs (73rd Amendment)

Varied Models:

- Urban: ULBs **or** Centralized Boards
- Rural: Zilha Parishad/Gram Panchayat

Weakness:

- **PMU loophole**: Consultants may push unsuitable, high-cost solutions

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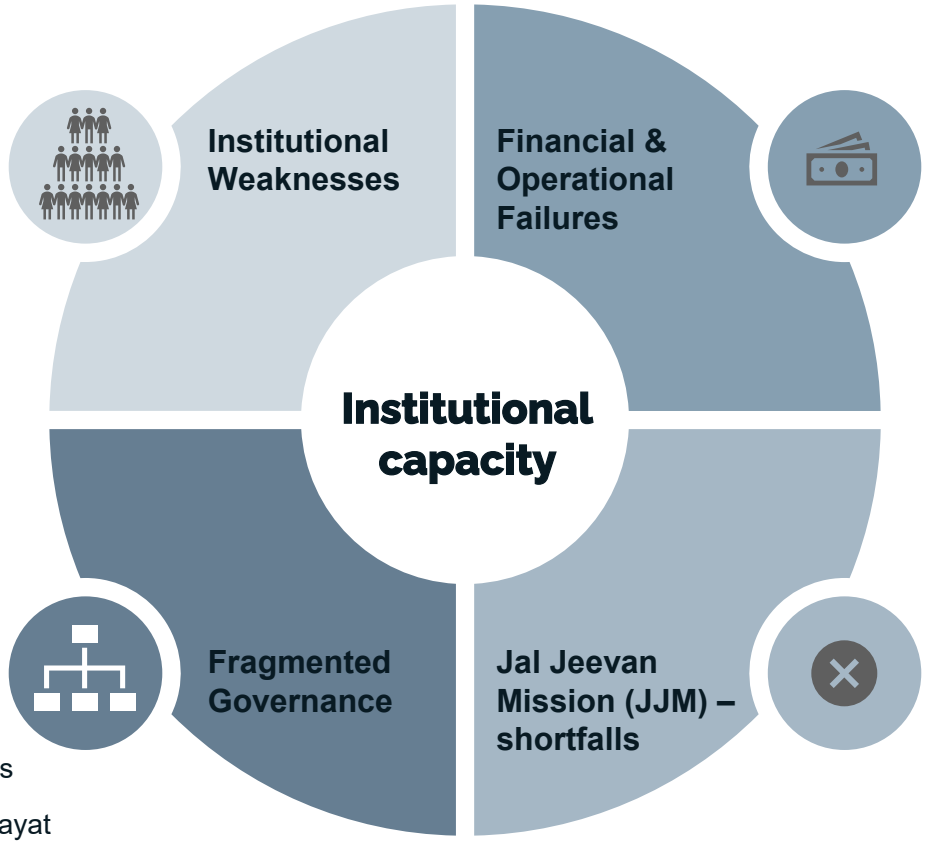
Training Programs: Focus on generic topics, not actual solutions



Tariffs Below operating costs leading to revenue shortfalls

Database Gaps: Limited GIS use for revenue/asset tracking

Coordination Issues: Civil servants vs. engineers → Poor decision-making

Responsibility: States/ULBs (73rd Amendment)

Varied Models:

- Urban: ULBs **or** Centralized Boards
- Rural: Zilha Parishad/Gram Panchayat

Weakness:

- **PMU loophole**: Consultants may push unsuitable, high-cost solutions

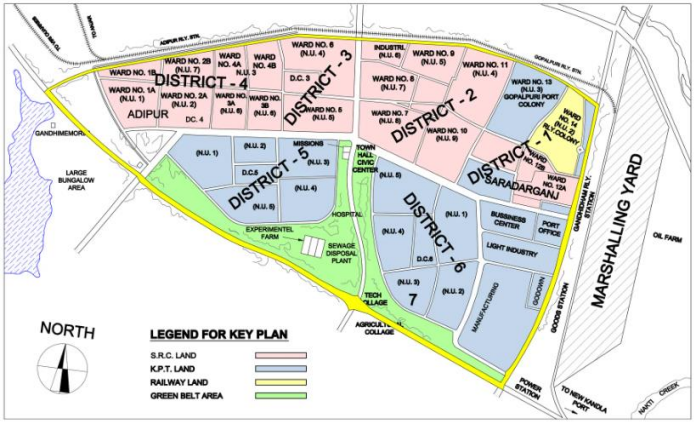
Source : Drivers for Intermittent Water Supply in India: Critical Review and Perspectives, IITB, Intermittent water supply systems: causal factors, problems and solution options, 2018, Intermittent Domestic Water Supply: ACritical Review and Analysis of Causal-Consequential Pathways, 2016

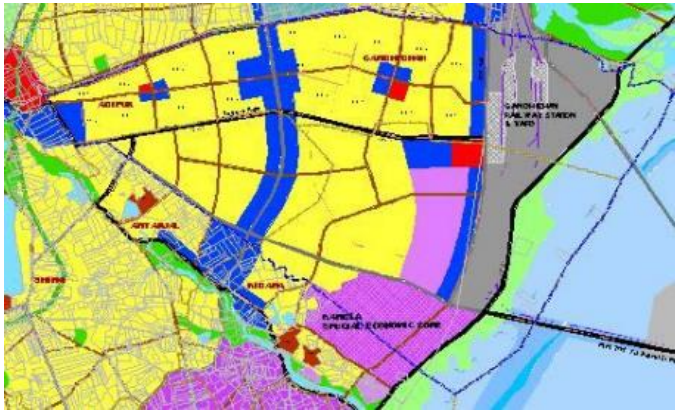
Gandhidham Bottlenecks

Primary and Secondary data

Contents

City Profile





Area

30.5 SQKM

Wards (SRC)

13

Wards (KPT)

13

Arid-semi arid zone average annual rainfall of 250-500 mm)

Planned township in 1947

Population (2021)

4,10,000

Total Households

87,280

Slum Population

69,880

Slum Households

13,950

No. of slums

17

Source : Moving towards water secure and climate resilient cities: Gandhidham, CWAS

Overview of Water Supply in Gandhidham

Groundwater
12MLD

Surface water
40 MLD

Existing Treatment capacity
40 MLD

Proposed Treatment capacity
27 MLD

Existing Storage capacity
14.5 MLD sump
7.6 MLD ESR

Existing Storage capacity
21.9 MLD sump
11 MLD ESR

NRW – 30%
15 MLD

Current Demand
55.3 MLD

Current Supply
36 MLD

Coverage
60-100%

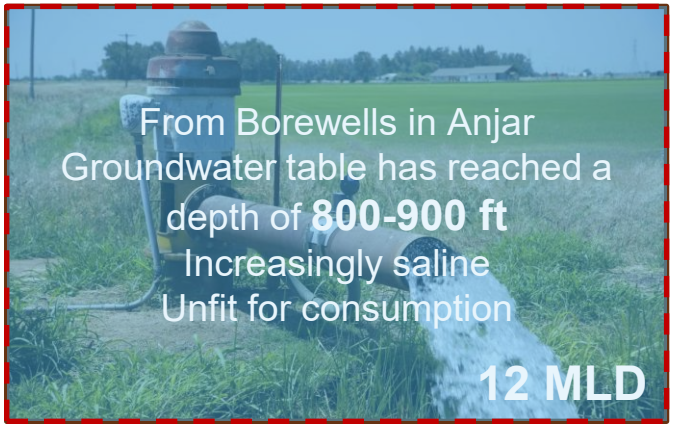
How often
Once in 3 days

For how long?
1-6 hrs

Source : Field visits,GMC, Moving towards water secure and climate resilient cities: Gandhidham, CWAS, Assessment of water situation across the water service chain in Kachchh region– A Case study of Anjar and Gandhidham City

Design and Analysis

Source availability- Heavy reliance on distant sources



Current Demand
55.3 MLD

= 52 MLD

Source	Capacity (MLD)	% of Supply	Reliability Issues
Narmada Canal	40	75%	Seasonal fluctuations (30% summer drop)
GWSSB Borewells	12	25%	High salinity
Local RWH	unknown	unknown	No systematic harvesting

There is a need to augment own sources. Opportunity for rainwater harvesting

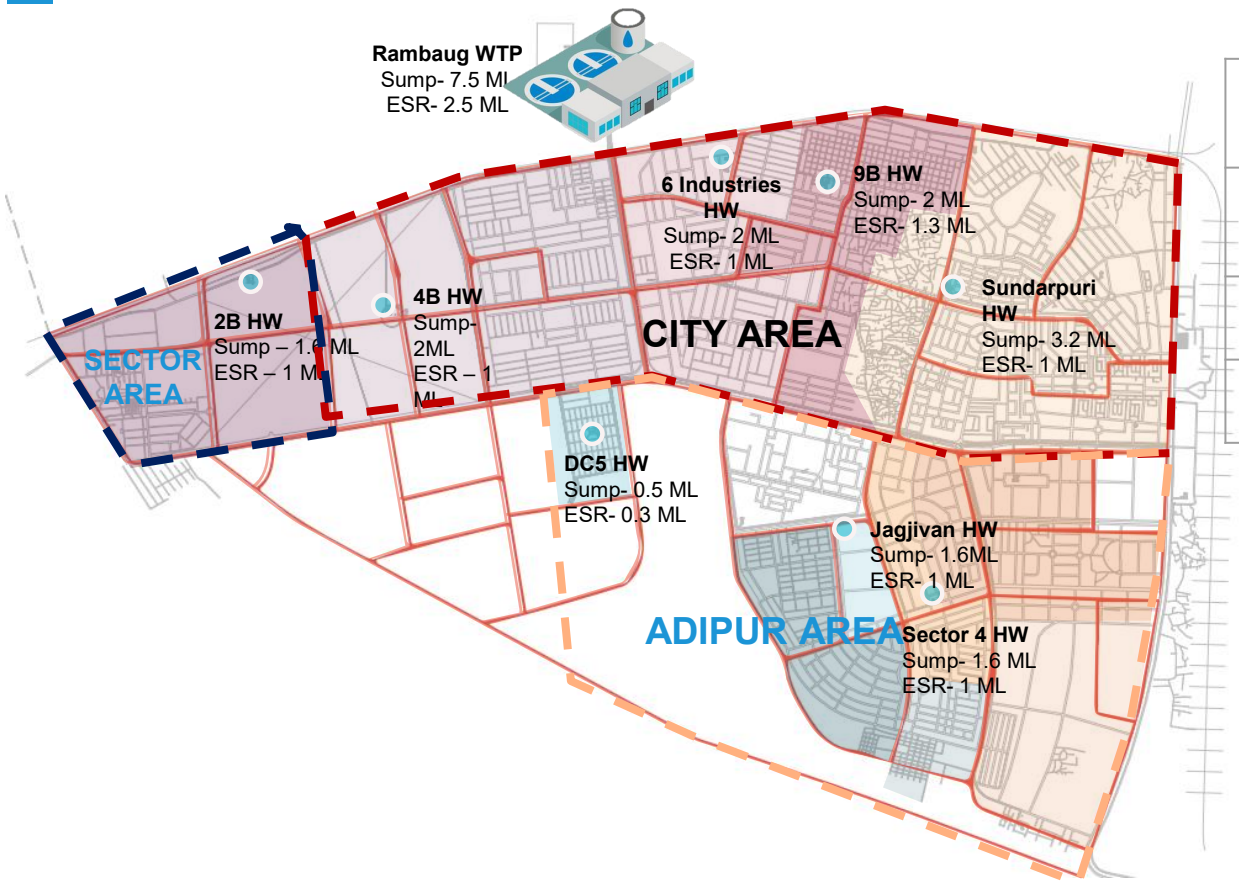
Source : Field visits,GMC, Moving towards water secure and climate resilient cities: Gandhidham, CWAS, Assessment of water situation across the water service chain in Kachchh region– A Case study of Anjar and Gandhidham City

Treatment capacity

If existing plant is not repaired and brought into use, effective treatment capacity available is **27 MLD**

Source : Field visits,GMC, Moving towards water secure and climate resilient cities: Gandhidham, CWAS, Assessment of water situation across the water service chain in Kachchh region– A Case study of Anjar and Gandhidham City

Storage infrastructure gaps



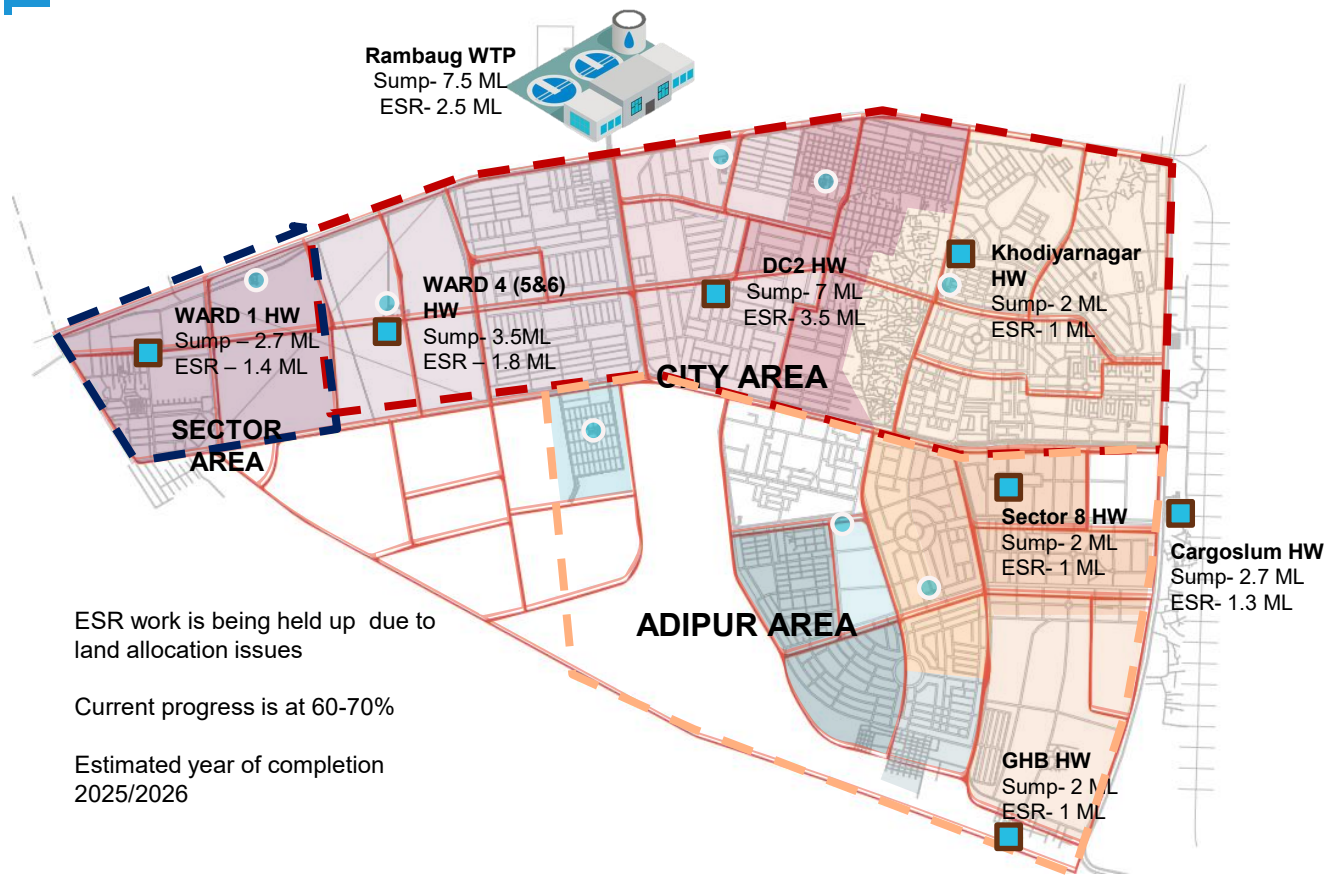
Facility Type	Existing Capacity (ML)	Required (ML)	Deficit	Critical Issues
ESRs	7	18	61%	Lack altitude for gravity flow
Underground Sumps	11.2	18	38%	No SCADA monitoring
Service Reservoirs	2.4	6	60%	Concrete degradation

Operational Impacts:
Insufficient supply during summers; heavy reliance on private tankers

The current infrastructure caters to approx. 50% of the city's needs

Source : Field visits,GMC, Moving towards water secure and climate resilient cities: Gandhidham, CWAS, Assessment of water situation across the water service chain in Kachchh region– A Case study of Anjar and Gandhidham City

Proposed storage



ESR work is being held up due to land allocation issues

Current progress is at 60-70%

Estimated year of completion 2025/2026

New ESR being constructed in the same compound in Sundarpuri ward

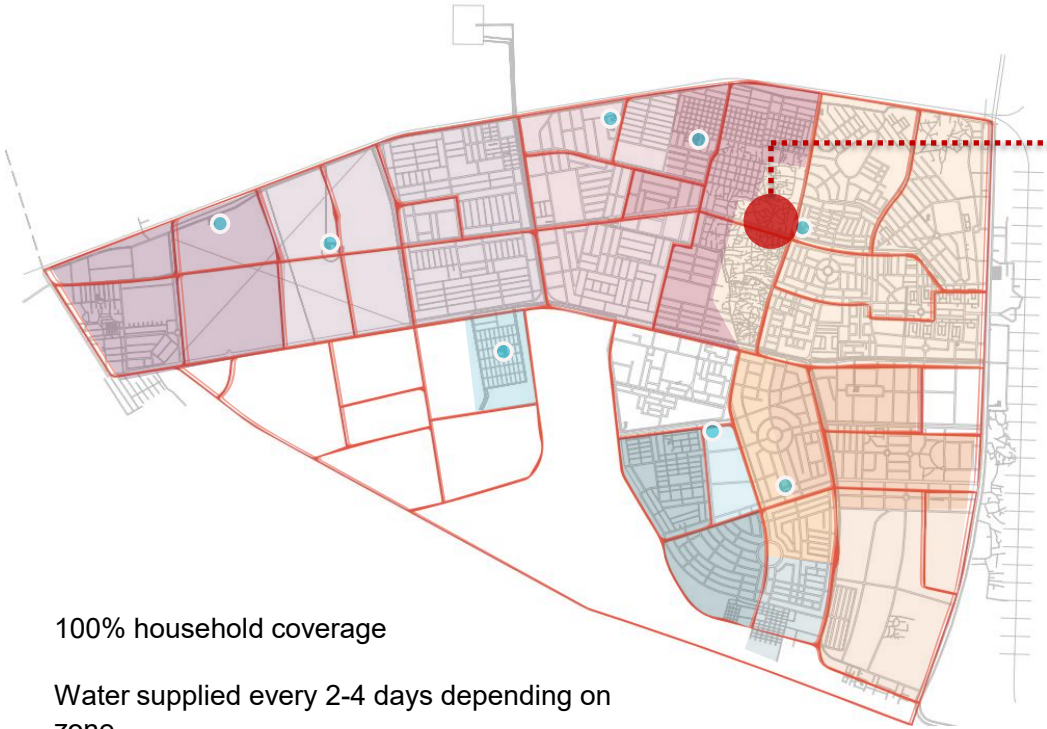
Existing ESRs are expected to go out of use in 5-10 years

Unclear if new ESRs will supplement or replace old ESRs

The augmented system under Nal se Jal would cater to approx. 90% of the city's current needs

Source : Field visits,GMC, Moving towards water secure and climate resilient cities: Gandhidham, CWAS, Assessment of water situation across the water service chain in Kachchh region– A Case study of Anjar and Gandhidham City

Network Design Deficiencies



Sundarpuri
Low pressure and leakages

100% household coverage

Water supplied every 2-4 days depending on zone

Water supply window 1hr- 6 hrs

Parameter	Current Status	Ideal Standard
Pipeline Age	60% >50 years old	<20 years

Pipe sizes can support transition to daily supply

Source : Field visits,GMC, Moving towards water secure and climate resilient cities: Gandhidham, CWAS, Assessment of water situation across the water service chain in Kachchh region– A Case study of Anjar and Gandhidham City

Stormwater Drainage network

Stormwater drain near Sundarpuri ward

Gandhidham is a planned city. This includes stormwater drains across the city

These are littered with solid waste.

Slum areas release greywater into them in some cases

Better solid waste management is required
Awareness is required about the benefits and need for daily water supply

Source : Field visits,GMC, Moving towards water secure and climate resilient cities: Gandhidham, CWAS, Assessment of water situation across the water service chain in Kachchh region– A Case study of Anjar and Gandhidham City

Recommendations to Strengthen Design and Analysis

Bottleneck	Solution	Implementation Steps	Expected Outcome
Single-source dependency	Develop **multi-source water security plan**	1. Augment local sources (revive defunct borewells) 2. Build 5 MLD RWH infrastructure 3. Pilot wastewater reuse (1 MLD for non-potable use)	Reduce Narmada dependency
Outdated network	**Hydraulic modeling & DMA redesign**	1. Zone city into DMAs with flow meters 2. Replace aging pipes (Priority: Ward 5,7) 3. Optimize pump schedules using EPANET software	Reduce NRW
Storage gaps	**Augment storage infrastructure**	1. Construct new ESRs 2. Convert sumps to smart reservoirs with IoT monitoring 3. Implement **rooftop storage incentives** for industries	Achieve 24x7 supply in pilot zones

Operation and Maintenance

Operation and Maintenance

Faulty intake meter (Gandhidham municipality scope)

Annual contract – private agency takes care of mechanical and electrical scope

Non operational for atleast 5 years

Pump failure due to power outage is common

High complaints of leakages and contamination

Faulty pipelines are upgraded on a reactive basis as and when required. No structured upgradation system in place

Source : Field visits,GMC, Moving towards water secure and climate resilient cities: Gandhidham, CWAS, Assessment of water situation across the water service chain in Kachchh region– A Case study of Anjar and Gandhidham City

High NRW. Reduction of Transmission losses is required

<table>
<tr><td rowspan="6">Gandhidham System input volume

52 MLD</td><td rowspan="3">Authorised Consumption

36.9 MLD

70%</td><td>Billed authorised Consumption

36 MLD
70%</td><td>Billed metered consumption
NA</td><td rowspan="3">Revenue water

36 MLD
70%</td></tr>
<tr><td>Billed unmetered consumption
36 MLD (70%)</td></tr>
<tr><td rowspan="4">Unbilled authorised Consumption

0.9 MLD
1.73%</td><td>Unbilled metered consumption
NA</td><td rowspan="4">Non - revenue water

15.1 MLD
30%</td></tr>
<tr><td>Unbilled unmetered consumption
0.9MLD (1.73%)</td></tr>
<tr><td rowspan="2">Water losses

15.1 MLD

30%</td><td rowspan="2">Apparent losses

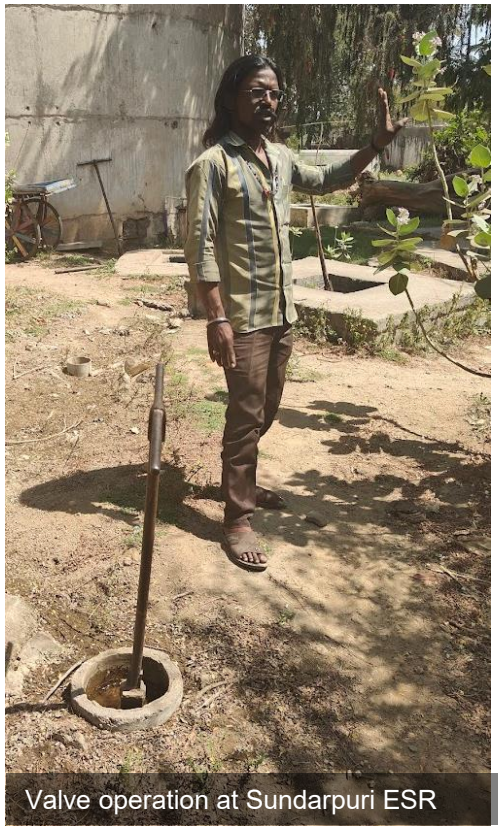
0%</td><td>Unauthorised consumption
0%</td></tr>
<tr><td>Metering Inaccuracies
NA</td></tr>
<tr><td colspan="2">Real losses
15.1 MLD (30%)</td><td>Leakage on Transmission and/or distribution mains
15.1 MLD (30%)</td></tr>
</table>

Pipeline stretches are repaired on a reactive basis as and when complaints are registered

No spatial record of upgradations made

Source : Field visits,GMC, Moving towards water secure and climate resilient cities: Gandhidham, CWAS, Assessment of water situation across the water service chain in Kachchh region– A Case study of Anjar and Gandhidham City

Distribution Network Operation



Valve operation at Sundarpuri ESR

Twice a day. Sumps refilled	22.4 MLD received by sumps	Mismatch between ground reality and govt claims
1 hr 3.2 ml sump	9 hrs Supply from WTP	Scope to increase supply hours from WTP
2.5hrs 1 ML ESR	Significant time consumed in refilling ESRs	Scope to optimize valve operation

Source : Field visits,GMC, Moving towards water secure and climate resilient cities: Gandhidham, CWAS, Assessment of water situation across the water service chain in Kachchh region– A Case study of Anjar and Gandhidham City

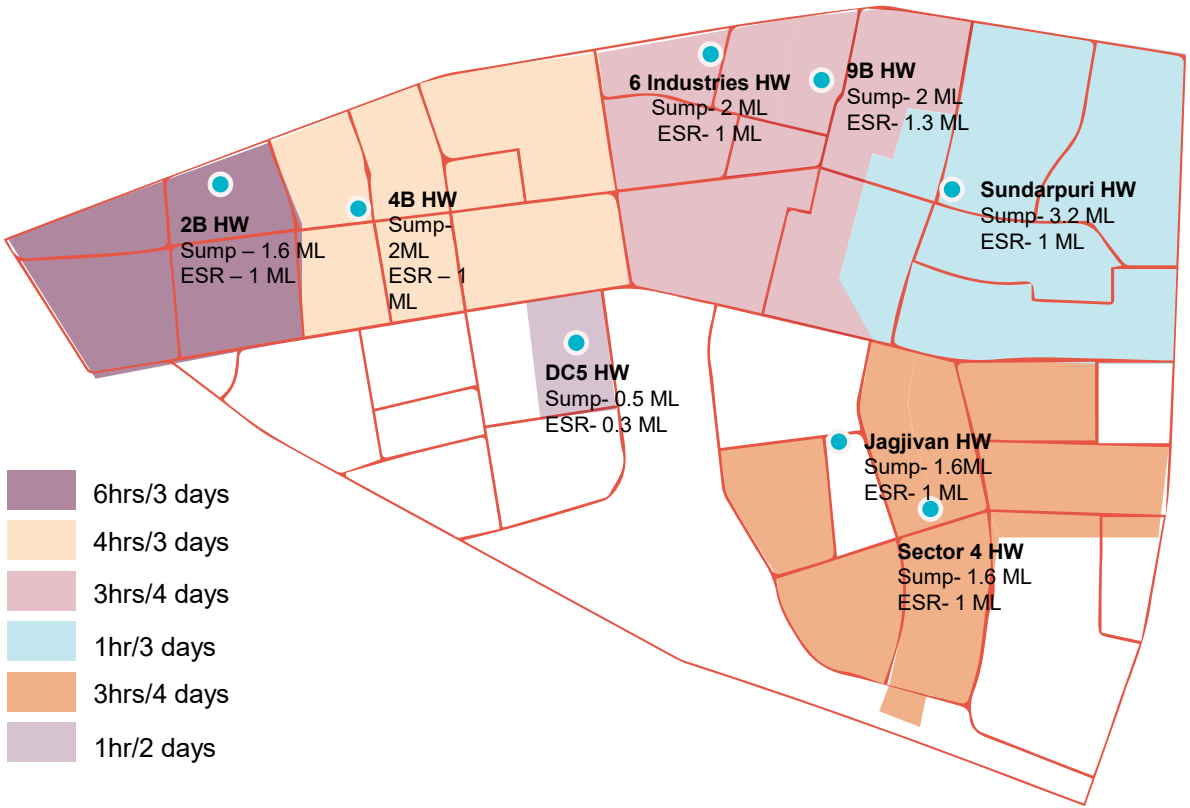
Recommendations to Strengthen Operation and Maintenance

Bottleneck	Solution	Implementation Steps	Expected Outcome
High NRW	**Establish NRW Reduction Cell**	1. Deploy leak detection teams with acoustic sensors 2. Implement **DMA-based water audits** quarterly 3. Penalize illegal connections	Reduce NRW
WTP failures	**Modernize Rambagh WTP**	1. Replace intake meters with ultrasonic sensors 2. Enforce contractor SLAs	Ensure 100% WTP functionality
Poor maintenance	**Predictive maintenance system**	1. GIS-based asset registry for pipes/valves 2. Train staff in SCADA monitoring 3. Annual O&M budget increase	Reduce repair time from 5 days to 24 hrs

Consumer Satisfaction

Based on FGDs with 30 slum households

Inequitable Service Delivery

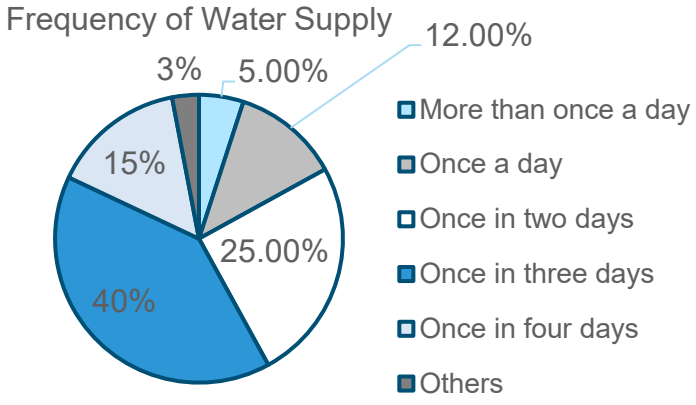


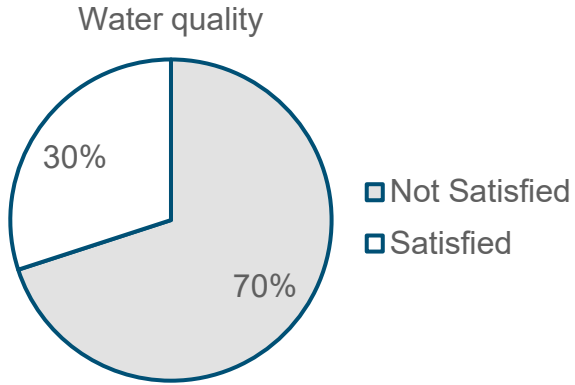
Area Type	Supply Frequency	Duration
CBD	3 days/week	6 hrs
Suburbs	2 days/week	2 hrs
Slums	1 day/week	1 hr

- Women spend 3.5 hrs/day collecting water
- 68% households invest in storage tanks
- 42% children miss school during water crises

Source : Field visits,GMC, Moving towards water secure and climate resilient cities: Gandhidham, CWAS, Assessment of water situation across the water service chain in Kachchh region– A Case study of Anjar and Gandhidham City

High Dissatisfaction with Water Supply Frequency





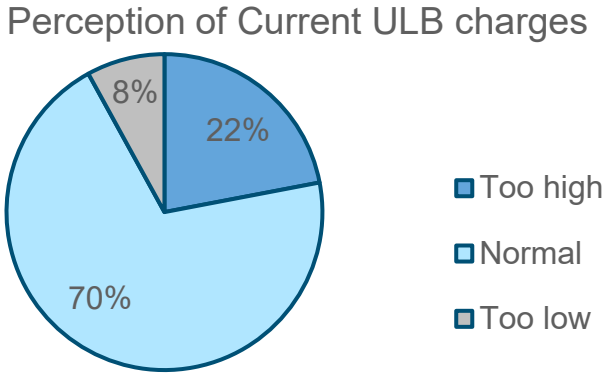
- Inconvenience in daily water usage.
- Dependence on costly alternatives (tankers, private wells).
- Distrust in the municipal water system.


Bottled drinking water supply

Unreliable supply is the top frustration, forcing households to seek unreliable or expensive alternatives.

Source : Field visits,GMC,

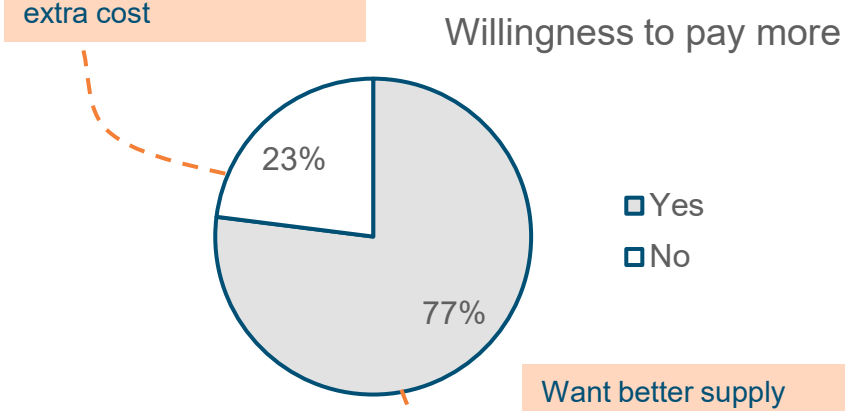
Willingness to Pay More – But Only if Services Improve



Currently a flat tariff of 900rs per household.

Low-income constraints.

Belief that current service does not justify extra cost



Want better supply regularity (daily instead of erratic).

Want improved water quality

Revenue potential exists, but consumers expect service upgrades first.

Source : Field visits,GMC,

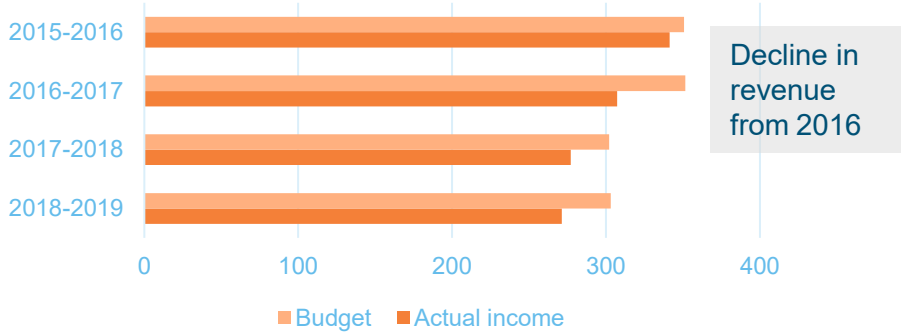
Recommendations for Consumer Satisfaction

Bottleneck	Solution	Implementable Steps	Expected Outcome
Irregular Water Supply	Improve supply predictability	1. Implement fixed supply schedules with public announcements. 2. Deploy water tankers to critical shortage areas.	Reduced daily inconvenience; increased trust in supply reliability.
Poor Water Quality	Enhance water safety & transparency	1. Distribute free chlorine tablets in high-risk zones. 2. Conduct monthly water quality tests and publish results.	Fewer health risks; higher consumer confidence in water safety.
Lack of Consumer Feedback	Strengthen grievance redressal	1. Launch a mobile app for complaints with tracking. 2. Assign nodal officers per ward for follow-ups.	Faster issue resolution; improved accountability.
Aging Infrastructure	Reduce leakage & improve distribution	1. Prioritize pipe repairs in high-loss areas. 2. Install smart meters in pilot zones.	More efficient water use; equitable supply distribution.

Financial Health

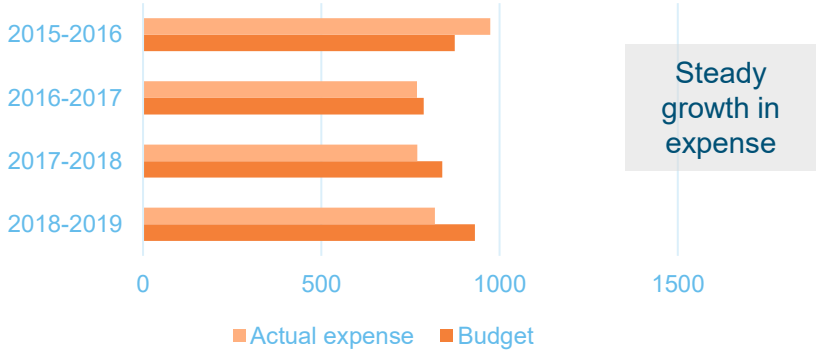
Cost Recovery

Water supply income (in lakhs)



Decline in revenue from 2016

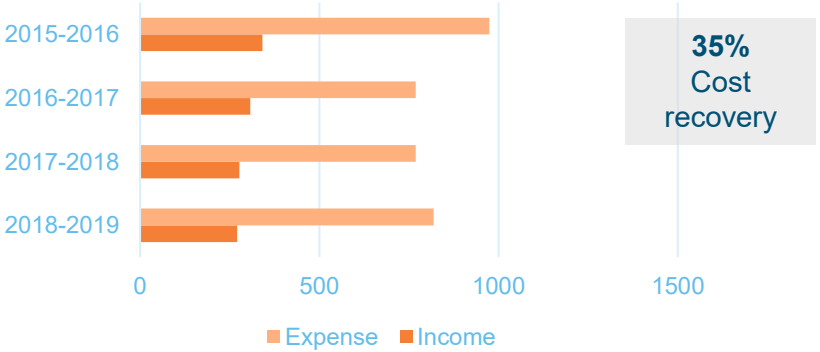
Water supply expense (in lakhs)



Steady growth in expense

35% Cost recovery

Cost recovery (in lakhs)



35% Cost recovery

Source : Gandhidham Nagarpalika

Consumer borne costs

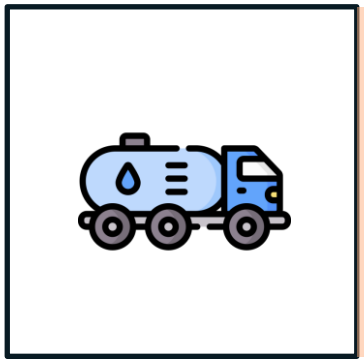
Household storage capacity of 5-7 days

Slum households also need to invest in additional storage

Added maintenance costs at a household level

RO purified water at a household level is expensive and inconvenient

RO purified bottled water is preferred.
Consumer bears additional cost for treatment, cooling, bottling and transportation.



Cost varies based on quality of water required.
Since water is from Anjar, additional cost for transportation.
Added inconvenience of making arrangements

Source : Field visits,GMC, Moving towards water secure and climate resilient cities: Gandhidham, CWAS, Assessment of water situation across the water service chain in Kachchh region– A Case study of Anjar and Gandhidham City

Recommendations for Financial Health

Bottleneck	Solution	Implementable Steps	Expected Outcome
Low Bill Collection Rates	Improve billing efficiency & compliance	1. Implement **automated meter reading (AMR)** in high-revenue zones. 2. Introduce **online payment portals** with discounts for timely payments.	Increased collection rates; reduced revenue leakage.
High Non-Revenue Water (NRW)	Reduce water losses & unauthorized use	1. Conduct **water audits** to identify leakage points. 2. Install **bulk flow meters** to track distribution losses.	Improved water accountability; cost savings from reduced losses.
Outdated Tariff Structure	Rationalize pricing to reflect costs	1. **Revise tariffs** based on consumption slabs (subsidized for low-income groups). 2. **Pilot a pay-per-use model** in select areas.	Fairer pricing; improved cost recovery.
Poor Payment Compliance	Strengthen enforcement & incentives	1. **Penalize defaulters** with late fees; reward prompt payers with rebates. 2. **Publicize compliance campaigns** via local media.	Higher payment discipline; increased revenue.

Institutional Capacity

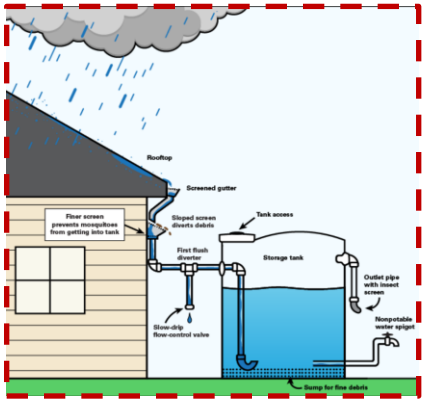
Multiple Agencies with clearly defined Responsibilities

Gujarat Water Infrastructure Limited (GWIL)	Bulk water supplier (Narmada Canal).
Gujarat Water Supply & Sewerage Board (GWSSB)	Bulk water supplier (Narmada Canal).
Gandhidham Municipal Council (GMC)	Day-to-day O&M, billing, and grievance redressal.
Gandhidham Development Authority (GDA)	Urban planning (e.g., RWH policies).

No clear RWH enforcer

Source : Field visits,GMC, Moving towards water secure and climate resilient cities: Gandhidham, CWAS, Assessment of water situation across the water service chain in Kachchh region– A Case study of Anjar and Gandhidham City

Weak Policy Enforcement



Rainwater Harvesting (RWH) Mandate

< 30%

GDA mandates RWH for buildings >80 sq.m

- No penalties for non-compliance.
- No verification during building approvals.
- No nodal agency to guide citizens on RWH installation.

Groundwater Regulation

No regulation on private tankers

No regulation on borewell extraction

Aquifer depletion & Revenue loss

Source : Field visits,GMC, Moving towards water secure and climate resilient cities: Gandhidham, CWAS, Assessment of water situation across the water service chain in Kachchh region– A Case study of Anjar and Gandhidham City

Recommendations to Strengthen Institutional Capacity

Bottleneck	Solution	Expected Outcome
Fragmented Governance	Create a **"Gandhidham Water Authority"** to consolidate GWIL, GWSSB, and GMC functions.	Unified decision-making.
Weak Enforcement	Establish an **RWH Enforcement Cell** under GMC with penalty powers (e.g., property tax liens).	Boost compliance to >70%.
Poor Complaint Systems	Deploy a **digital grievance portal** (integrated with Gujarat's E-Nagar platform).	Resolve complaints in <72 hours.
Revenue Leakage	Install **smart meters** (prioritize commercial users) and adopt **AI-based theft detection**.	Reduce NRW to 15%.
Staff Shortages	Hire 10+ technical staff and train them in **DMA zoning and SCADA systems**.	Faster leak repairs.

Gandhidham Recommendations

Overall Recommendations

Priority	Intervention	Key Actions	Expected Impact
Immediate (0-6 months)	Leak Detection & Repair	- Manual leak surveys using acoustic sticks - Priority repair of major leaks	8-12% NRW reduction
	Illegal Connection Audit	- Monthly physical verification of 10% connections - Penalty enforcement	10-15% revenue increase
	Emergency Storage Repairs	- Clean and repair 2-3 critical reservoirs - Mobile water tanks for deficit areas	15% supply stabilization
Short-Term (6-18 months)	Critical Pipe Replacement	- Replace 5% worst pipes (asbestos/rusted) - Use HDPE in high-loss zones	20-25% leakage reduction
	Smart Meter Pilot	- Install 500 smart meters for commercial users - Staff training	Improved billing accuracy
	WTP Basic Upgrades	- Replace critical pumps/filters - Basic automation for dosing	10-15% efficiency gain
	Rainwater Harvesting	- Mandate for govt buildings - 50% subsidy for first 100 private adopters	5-8% groundwater relief
Long-Term (18-36 months)	New Water Source	- Negotiate additional Narmada allocation - Small desalination pilot (if coastal)	20% supply boost
	Smart Monitoring	- IoT sensors for 50% distribution network - Central dashboard	30% operational efficiency
	Wastewater Reuse	- 10 MLD treatment plant for non-potable use	15% freshwater savings

Costing

Short term interventions	Realistic Cost Estimate	Phasing	Impact
Leak Detection	₹15-25 lakh	Months 1-3	8-12% NRW reduction
Illegal Connection Audit	₹5-10 lakh	Continuous	10-15% revenue boost
Storage Repairs	₹25-40 lakh	Months 2-5	15% supply buffer

Mid term interventions	Realistic Cost Estimate	Phasing	Impact
Critical Pipe Replacement	₹3-5 crore	Phased by zone	20-25% leakage reduction
Smart Meter Pilot (500 connections)	₹50-75 lakh	Months 7-12	Better billing accuracy
WTP Basic Upgrades	₹1-1.5 crore	Months 8-14	10-15% efficiency gain

Long term interventions	Realistic Cost Estimate	Phasing	Impact
New Water Source Development	₹15-25 crore	Years 2-3	20% supply increase
Smart Water Monitoring	₹5-8 crore	Phased rollout	30% efficiency gain
Wastewater Reuse Plant	₹10-15 crore	Years 2-3	15% demand reduction

Short term

75
Lakh

Mid term

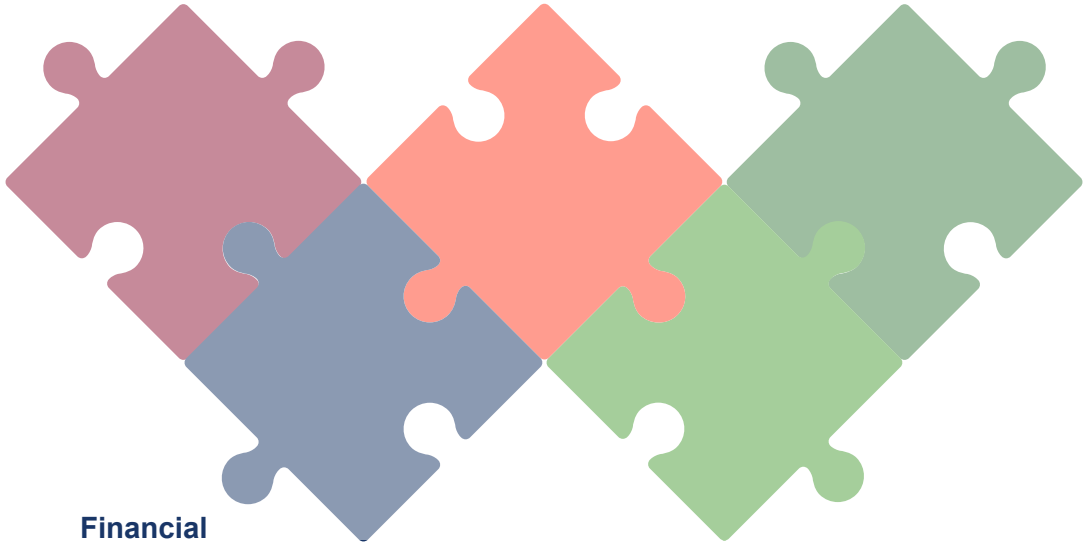
7.5
Crore

Long term

48
Crore

Source : CPHEEO Manual, Pune MC (2022) - Commercial smart meter procurement , Chennai Metro Water (2021) - 20 MLD plant upgrade work, Bengaluru Water Board (2020) - 100-building RWH project

Impact



Social equity

Universal Access
Gender Empowerment
Slum Upliftment

Economic impacts

GDP Boost
Job Creation
Tourism/Investment

Climate resilient

Drought-Proofing
Flood Mitigation

Financial sustainability

Revenue Recovery
Cost Savings
Creditworthiness

Health & environment

Disease Reduction
Groundwater Revival
Wastewater Reuse

Thankyou