



Making Vadodara a leader in water security

February 8, 2025

Seminar on Sustainable Water Solutions in Vadodara Urban Region

Society for Clean Environment (SOCLEEN)

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With support from Aditi Dwivedi, Dhruv Bhavsar, Gaurav Kushwaha, Dhvani Shah, Saubiya Sareshwala, Karan Patil, CWAS

CWAS CENTER FOR WATER AND SANITATION

CRDF CEPT RESEARCH AND DEVELOPMENT FOUNDATION

CEPT UNIVERSITY

Vadodara – my janambhoomi....



Born here in Sayajiganj, Jaskamal Bunglows

Looking forward to contributing to its activities - making it also my 'karmabhoomi'



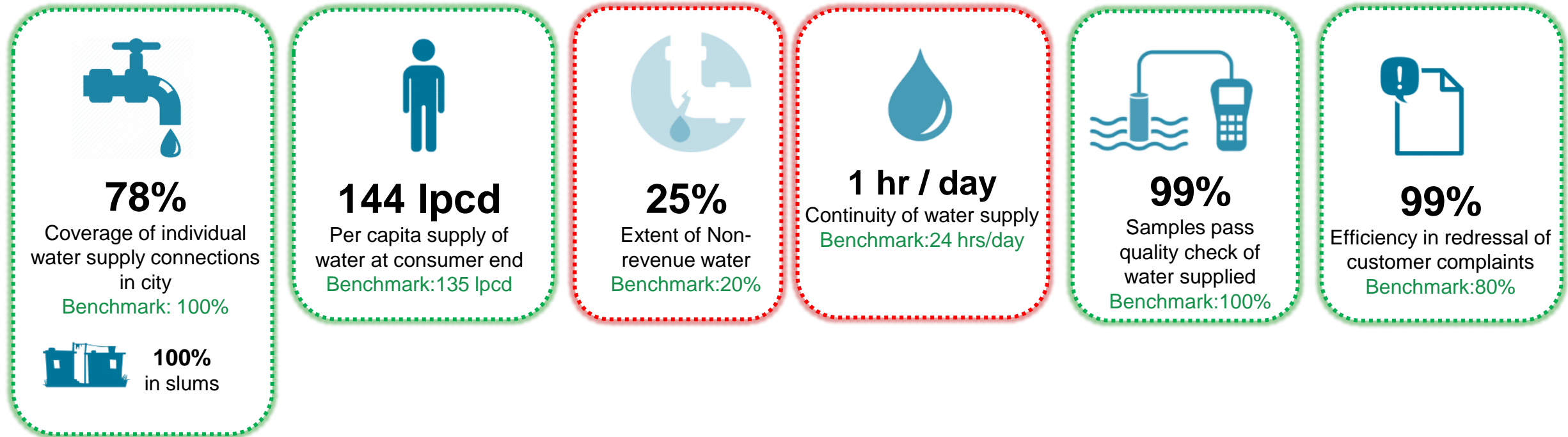
Vadodara is known as the cultural capital of Gujarat



It can also become a leading voice in water services, climate resilience and urban finance



PAS-Service Level Benchmarks suggest that VMC is a top performer in Gujarat for municipal water supply



Source: PAS SLB Data 2022-23

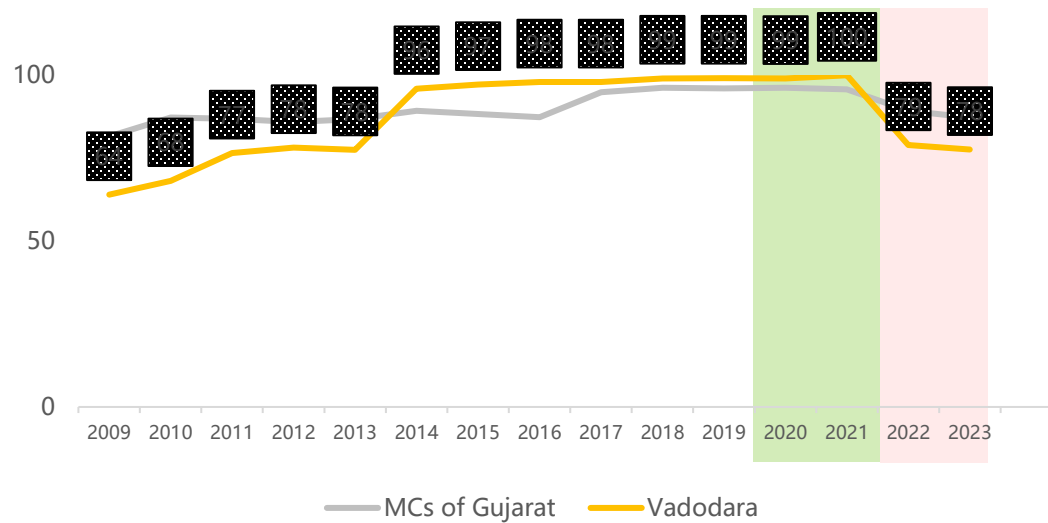
Efforts needed to maintain this position - coverage

Har Ghar NAL – coverage of water supply connections

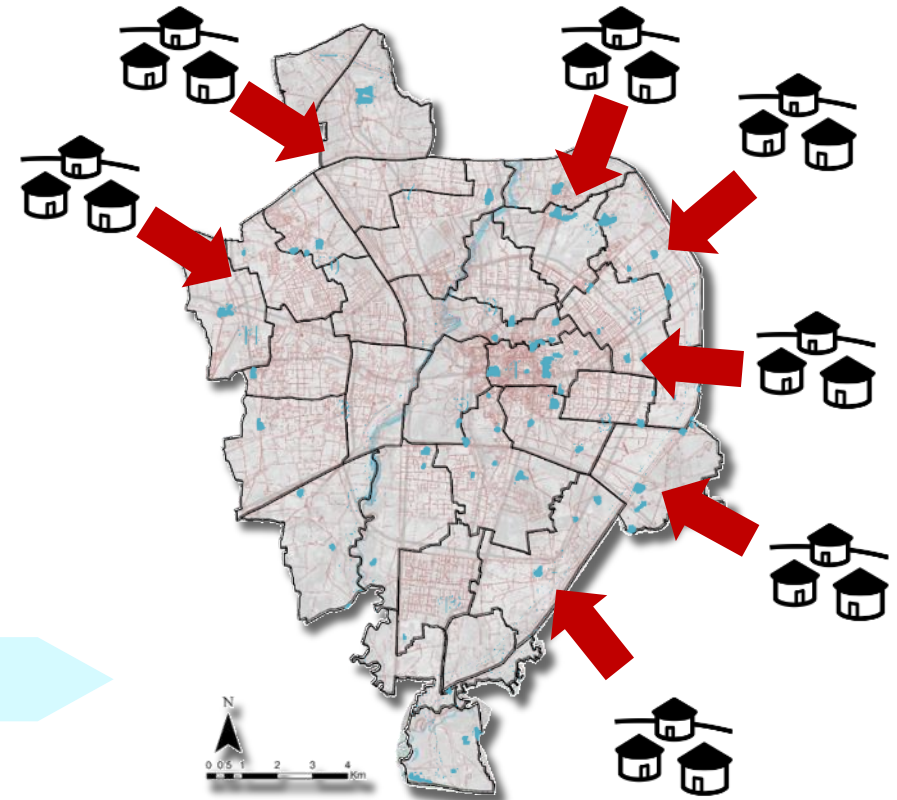
78%
Coverage of individual water supply connections in city
Benchmark: 100%

100%
in slums

- From being lowest performer in 2009 amongst all Gujarat Corporations to achieving 100% coverage in 2021 – results of JNNURM and AMRUT



- In 2022 – city boundaries expanded to add outer villages – coverage reduces to 79%




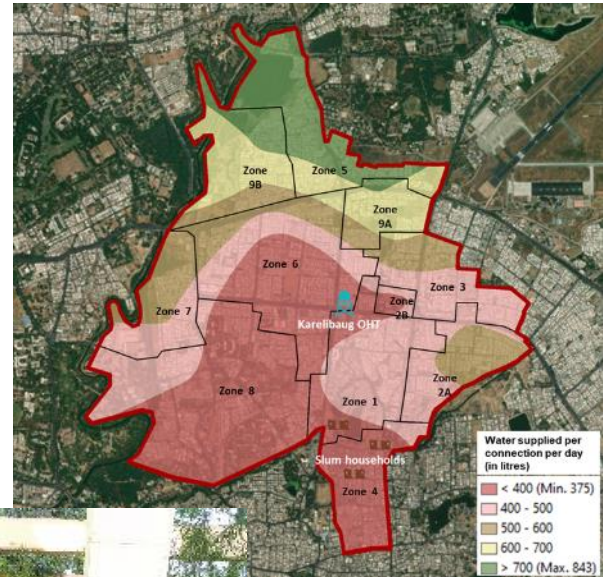
Need to extend services to all !

Source: PAS SLB Data 2022-23

Efforts needed to maintain this position – plug the leaks

Lost or non-billed water


25%
 Extent of Non-revenue water
 Benchmark: 20%



- A preliminary water audit study by CWAS in a pilot area estimated the loss as over 33% in the distribution network.
- The city has access to modern methods like metering and SCADA to monitor this



Need to “plug the leaks”

Repair leakages at the OHT, valves and distribution lines.

Regularize unauthorised connections and reduce “water theft”

Build capacity of waterworks dept. for using SCADA data

Improve and use metering in the distribution network

Today, it is not enough to provide good water services

There is a need to also build climate resilience



**Infrastructure
provision**

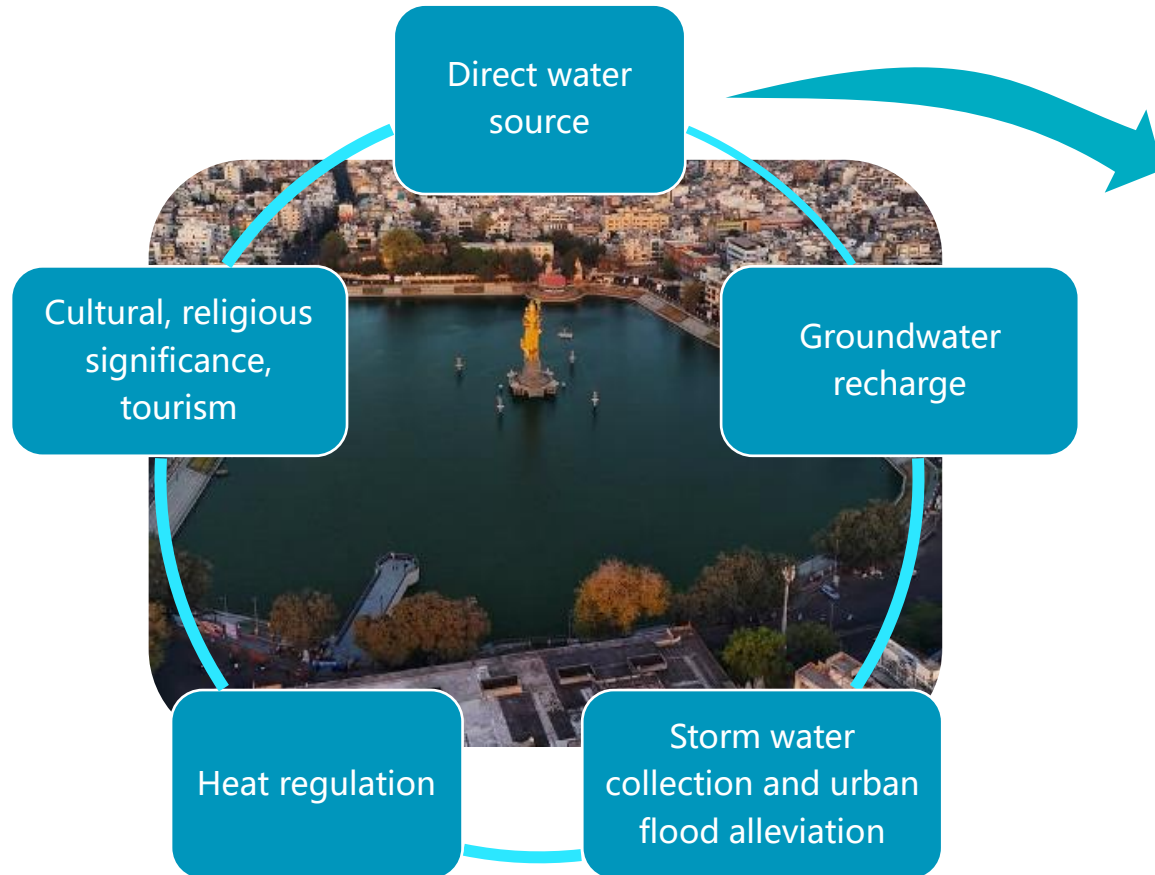


Ensuring Services



**Ensuring climate
resilience**

Lakes have been an important part of the city both as cultural and ecological spaces

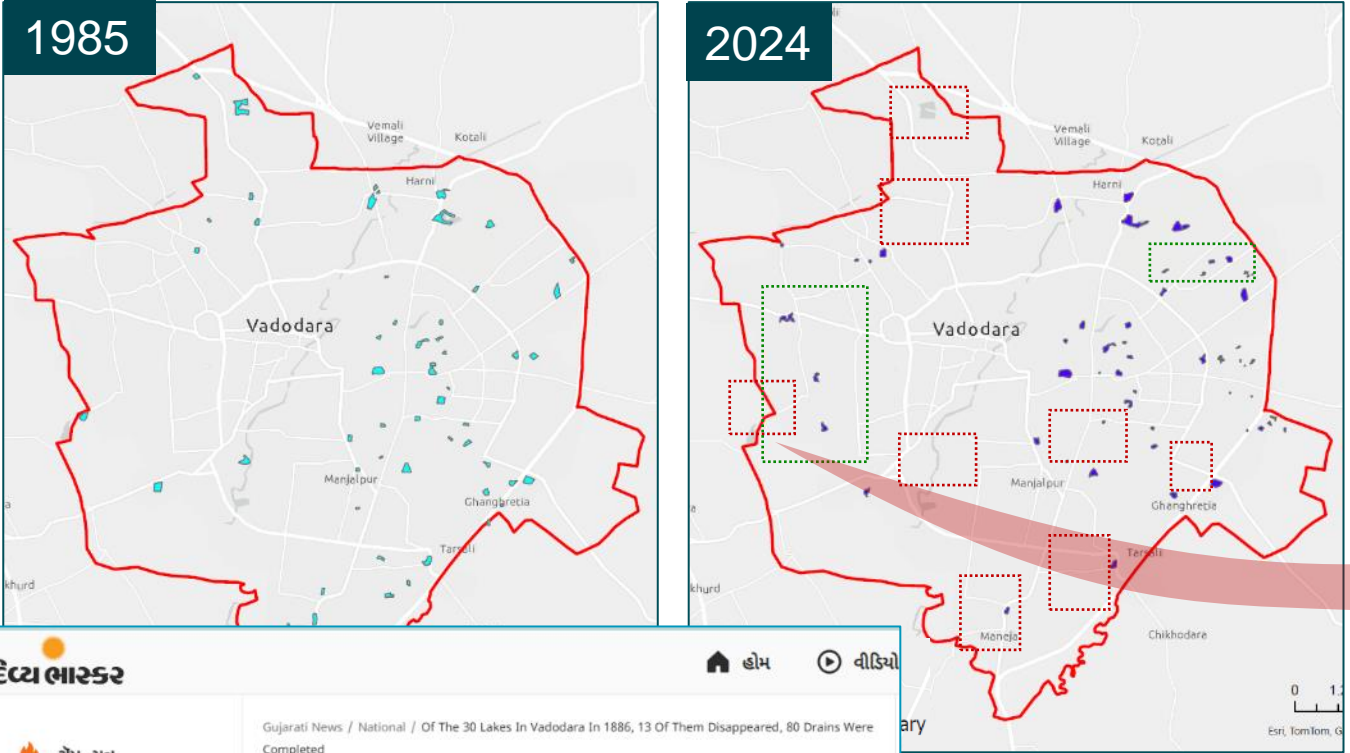


Historical importance of lakes in urban planning Need to revisit and restore ancestral wisdom !!

- Sursagar Talav, in the old walled city
- Source of drinking water - During reign of Malharrao Gaekwad, construction of retaining walls, ghats, overflow to Vishwamitri
- A focal point for urban renewal efforts during the reign of Maharaja Sayajirao Gaekwad III



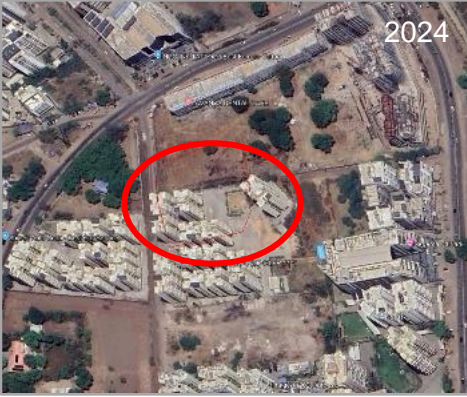
Actions needed to ensure continued presence and lake development



Remote sensing techniques reveal that between 1985 and 2024 some lakes have completely disappeared.

A case of a Vanished Lake...

The Lake in the Bhayli area was converted into a residential project.



Source: Google earth imagery retrieved on 20 January 2025

દિવ્ય ભાસ્કર

હોમ વીડિયો

Gujarati News / National / Of The 30 Lakes In Vadodara In 1886, 13 Of Them Disappeared, 80 Drains Were Completed

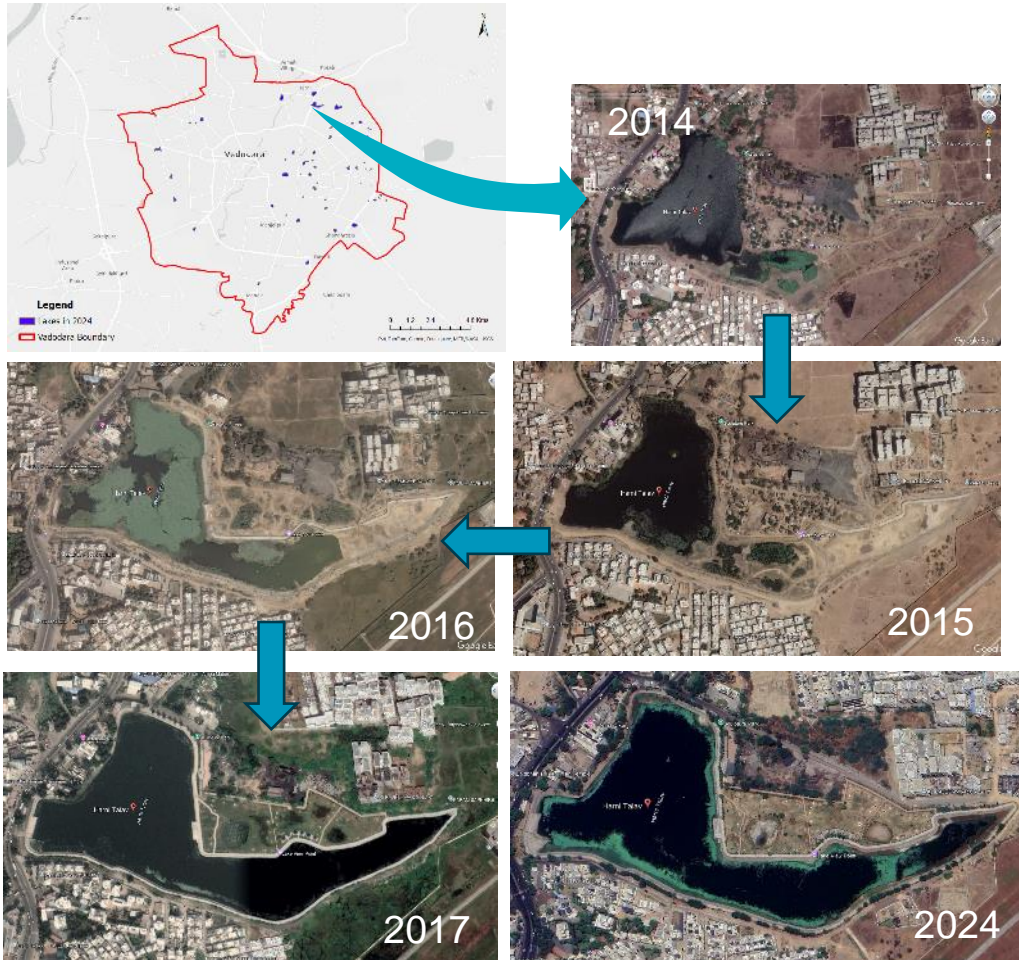
વડોદરામાં 1886માં 30 તળાવ હતા તેમાંથી 13 ગાયબ થઈ ગયા, 80 નાળા પૂરાઈ ગયા

6 વર્ષ પહેલા

ફ ટ્વિટર લિંક

Efforts towards lake conservation and rejuvenation

How lake rejuvenation can help in water supply and tourism: A case study of Harni Lake's Rs 10 Cr rejuvenation project



Rejuvenation through community engagement



New budget provides for 'creative redevelopment of city spaces'



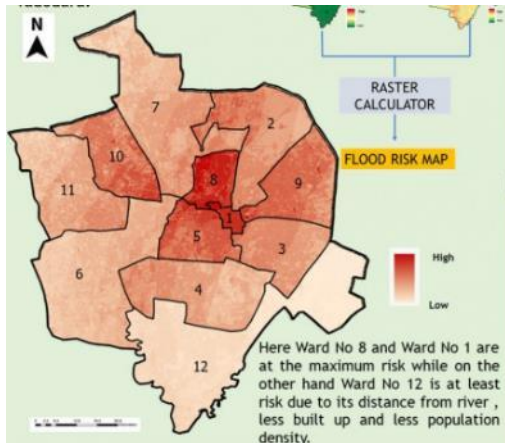
Source. A Report on Environmental Monitoring for major lakes of Gujarat , page 39
Images: Google earth imagery retrieved on 20 January 2025

Lakes can also be linked to groundwater recharge and flood mitigation

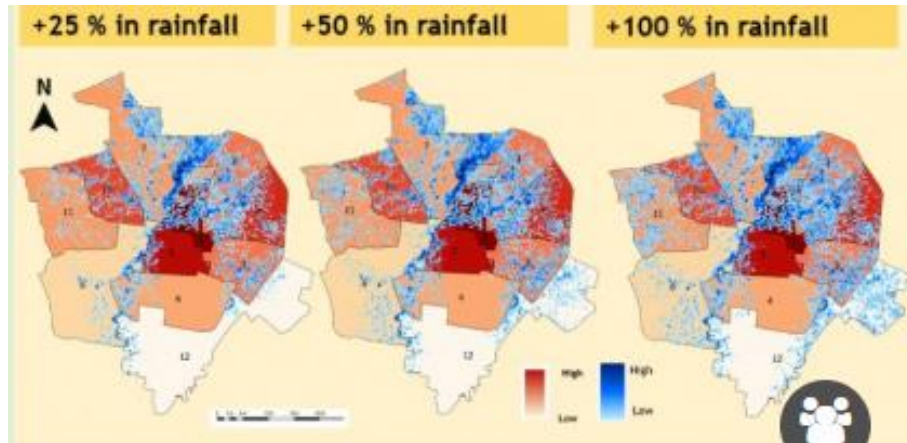
With disappearing lakes, seasonal urban flooding happens! Vadodara has been prone to frequent floods: floods in 1994, 1996, 2005, 2007, 2014, 2019, 2024.

Need to find strategies to maintain ecological role of lakes

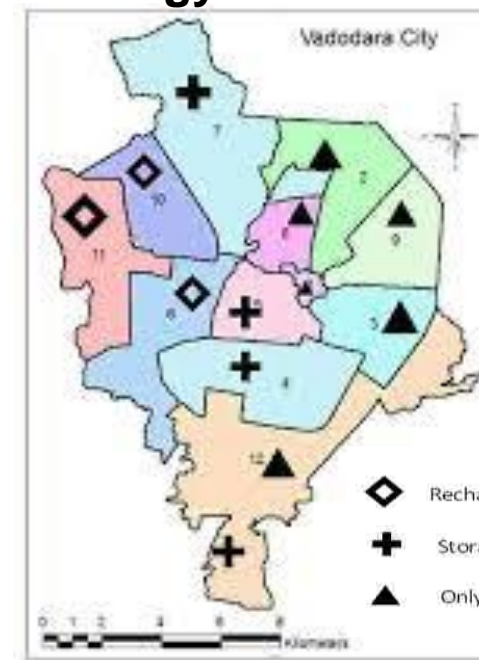
Flood risk Map



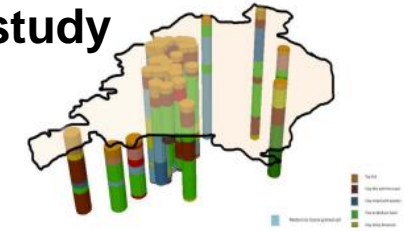
Modelling scenario and flood risk map



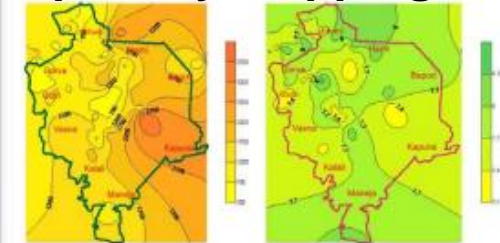
Zone-wise Groundwater recharge structure strategy



Geohydrological study



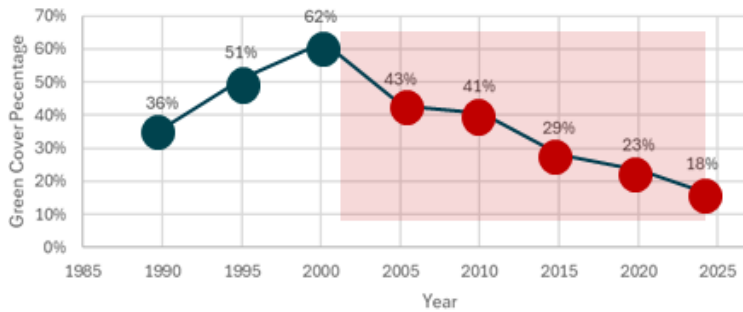
GW quality and quantity mapping



Source: Flood Inundation Modelling and Flood Risk analysis, Vadodara, CEPT Portfolio by Saraswat Aditya Sanjay [link](#); Paper on Groundwater Recharge – Solution To The Water Woes Of Vadodara by Sanskriti Majumdar, MSU [link](#)

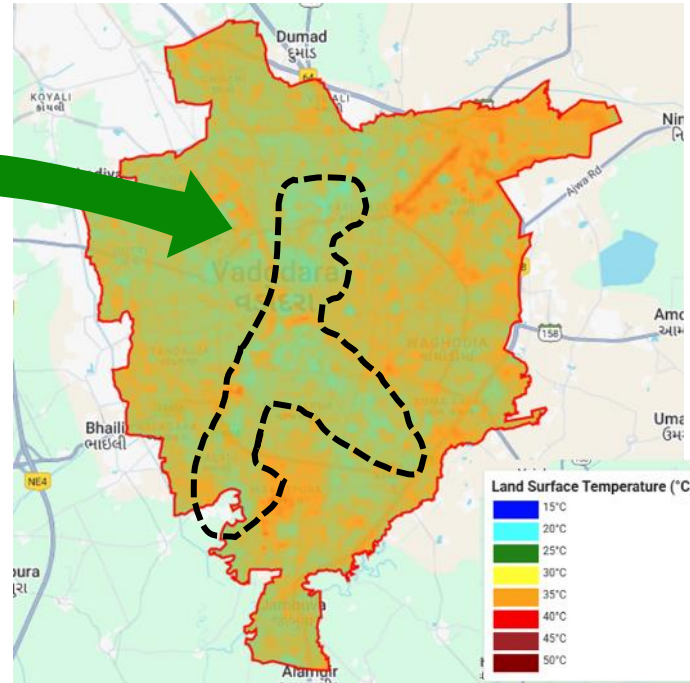
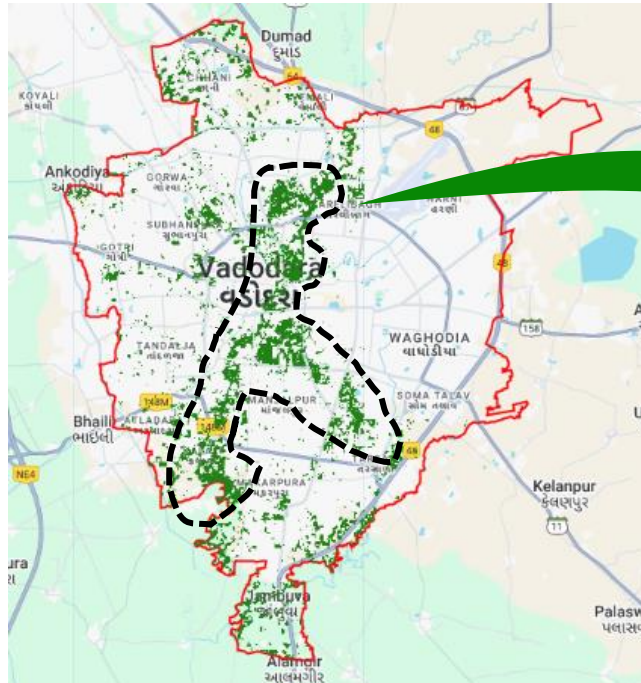
Increasing urban green coverage can combat rising temperature and heat waves – reuse of treated waste water

Green cover temporal variation in VMC limit (1985 - 2024)



← Reducing green cover in Vadodara over the years. Over the last decade, average temperature increased by 0.8°C

Remote sensing techniques show a relation between green cover and surface temperature



Building circularity – an opportunity to reuse wastewater?

Municipal corporation	% collected wastewater treated	% treated wastewater reused
Ahmedabad	100%	47%
Surat	100%	33%
Vadodara	93%	0.9%



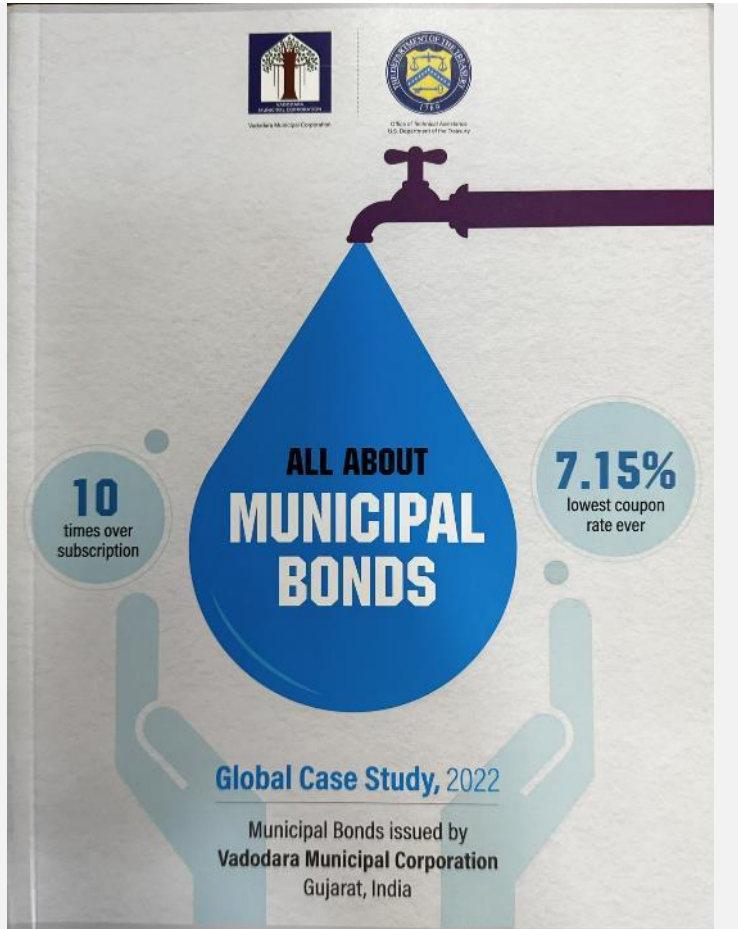
Gujarat reuse policy – 100% Reuse of treated WW by 2030



Onsite reuse of treated wastewater for landscaping at Ahmedabad STP

Addressing these measures will require additional financing

Vadodara Municipal Corporation has India and Asia's First Certified Green Muni Bond



- Vadodara Municipal Corporation (VMC) has issued one municipal bond and one green bond of **Rs. 100 crores (USD 12 million eqv.)** each.

Municipal Bond of INR 100 crore (FY 2023)

- Deployment of funds for **Sindhrot water supply project** to cater drinking water needs of the city and liquid waste management project.
- Bid subscribed for **36 times**
- Bond has **AA rating**.
- VMC's '**successful listing**' of municipal bond now case study for US Treasury.

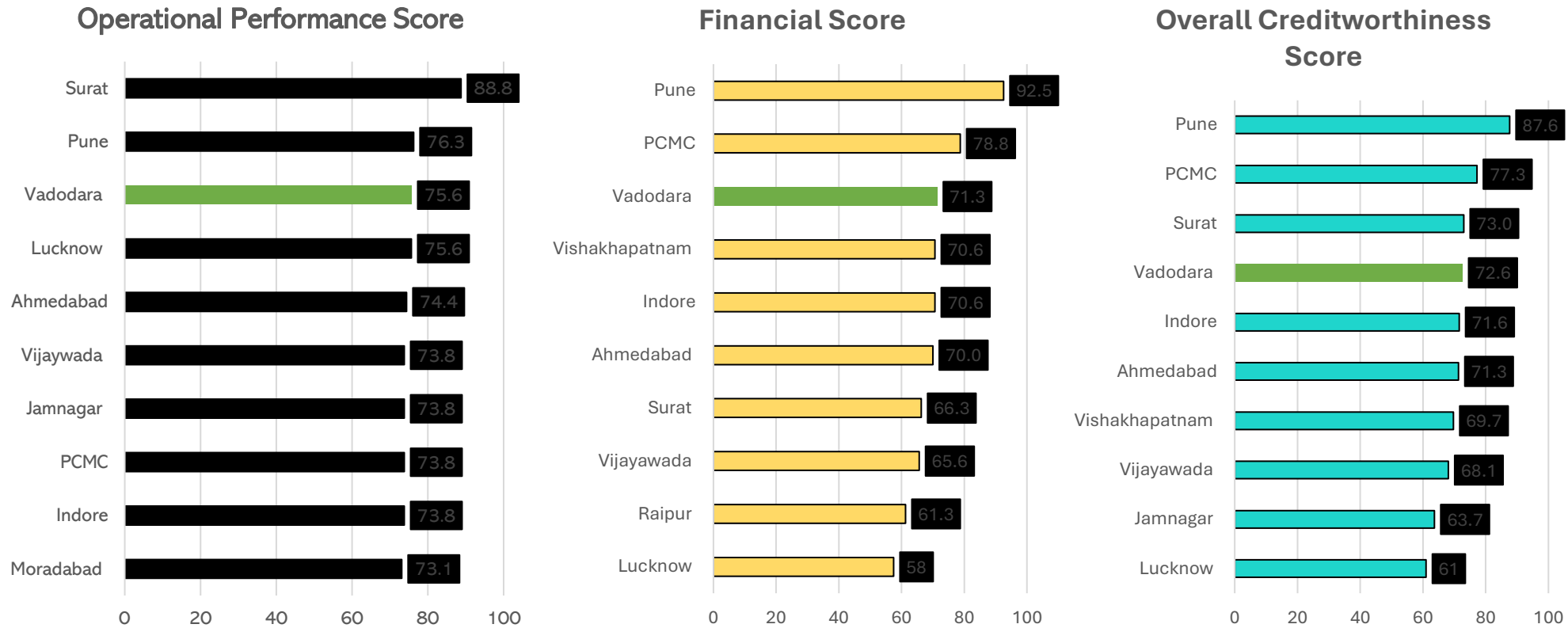
Green Bond of INR 100 crore (FY 2024)

- Enhancing **liquid wastewater management** infrastructure across Vadodara for developing 2 STPS of 121 MLD and 1 APS with drainage network.
- Bid subscribed for **44 times**
- Bond has **AA+ Stable rating**.
- Recorded as the **first certified green municipal bond** for sustainable WASH infrastructure.

Source: The Indian Express (2022). VMC's 'successful listing' of municipal bond now case study for US Treasury. Retrieved from <https://indianexpress.com/article/cities/baroda/us-treasury-department-book-vadodara-municipal-bond-listing-bse-8247788/>; The Climate Bonds Initiative (2024). Retrieved from <https://www.climatebonds.net/resources/press-releases/2024/02/vadodara-municipal-corporation-initiates-india-and-asias-first>

Municipal borrowing requires creditworthiness

VMC shows good performance



Creditworthiness Assessment

An Approach for in Indian Cities

Creditworthiness Score

City: Vadodara Municipal Corporation
State: Gujarat

Financial Year : 2018-22 [Best Performing Year:2019-20]

	Benchmark	Creditworthiness Score
Total Score	100	72.8
Financial Score	100	71.3
Operational Score	100	75.6

Rating	PAS AA	High level of creditworthiness
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Borrowing capacity **1576 INR crores**

- VMC indicates **High Level of Creditworthiness** with a **PAS AA assessment grade**.
- VMC scores the **highest operational performance** among the group of one-four million plus Indian cities.
- VMC is a leader in creditworthiness assessment grade, can be a learning experience for other cities.

Suggestions for municipal finance in Vadodara

**Budget Brief for VMC
and participatory budget
consultations**

Resident welfare
Associations
Societies and Citizens



**Municipal Bond
subscriptions can be
opened to retail investors
for the citizens of
Vadodara**



**Access the newly
announced "Urban
Challenge Fund" through
PPPs and blended finance**



In this era of GREEN Bonds, need more than financial creditworthiness

GREEN BONDS



Ear-marked for financing projects with environmental / climate benefits



Investors are looking to invest in “sustainability” and “responsible business”

ESG – More and more popular in the corporate world...

Municipal Credit Ratings are not enough - A Case of Seattle

Credit Rating – **AAA**

as per Moody's, S&P and Fitch - three of the top credit rating agencies

But

Financial indicators do not reflect ESG -

- Homeless/1,000 residents increased from 4.81 to 5.42
- Median rental rates increased by 56%
- Reportedly the worst traffic & commute times in the US.
- Increased Carbon Emissions

ESG Rating – **B** – as per ACRE ESG Rating

Good ESG rating



= judicious use of funds & low payment risk

= Easier borrowing from banks, capital market, bi/multi lateral funds



ESG for cities – already in practice!

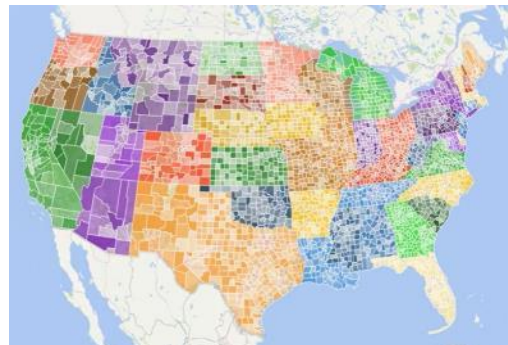
Toronto's Debt Issuance Program linked to ESG outcomes

Capital Projects –Corporate Strategic Plan	Green	Social	Conventional
 Maintain and create housing that's affordable • Capital projects that reduce GHG emissions e.g. energy retrofits	✓	✓	✓
 Keep Toronto Moving • Capital projects that reduce GHG emissions e.g. subway	✓	✓	✓
 Invest in people and neighbourhoods • Capital projects that reduce GHG emissions e.g. green roofs	✓	✓	✓
 Tackle climate change and build resilience	✓		✓
 Maintain a well-run City	✓	✓	✓

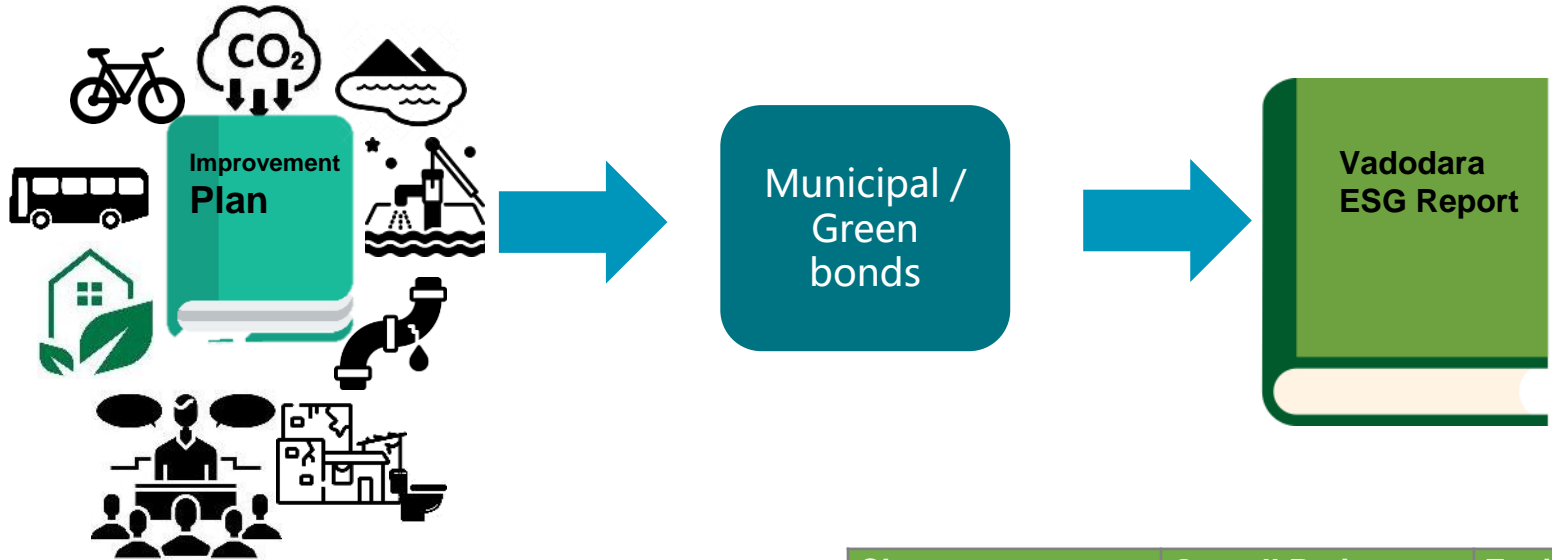
Since 2018, Toronto has issued Green Bonds and Social Bonds to fund its development strategy

Annual ESG reports to report outcomes to investors and citizens

ESG Scores and Rankings for all States, Cities, Counties, and School Districts - 29,500 Cities and Towns across America



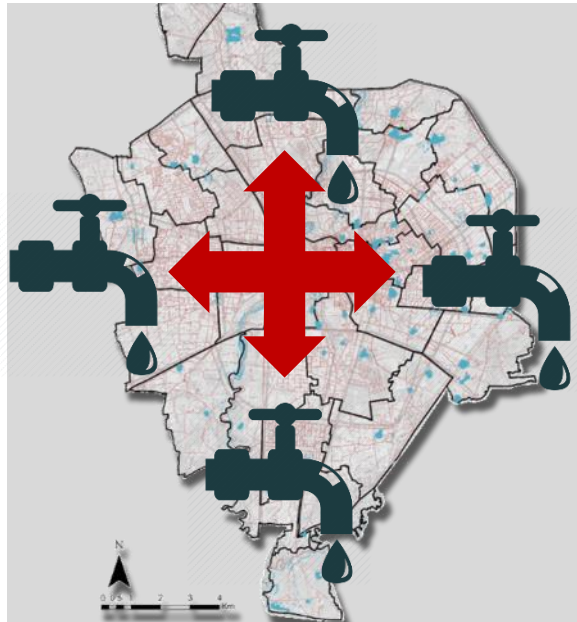
Vadodara can do a regular ESG report to report to investors, citizens?



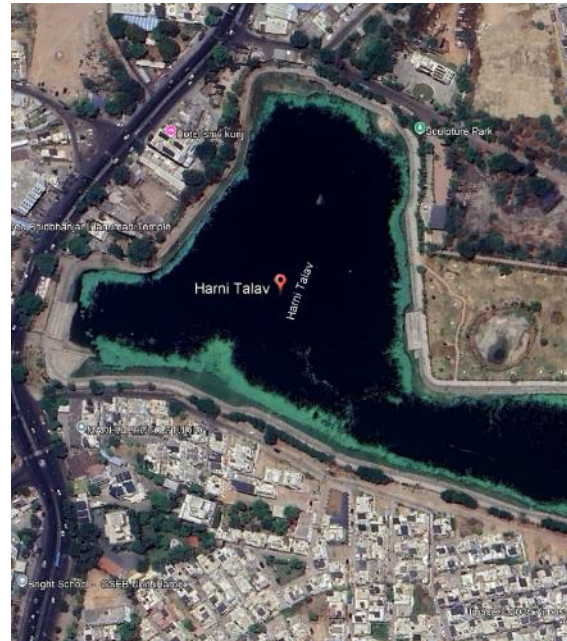
Vadodara already performs well in our initial ESG assessments using secondary data

City	Overall Rating	Environment Rating	Social Rating	Governance Rating
Surat	Achiever	Achiever	Achiever	Achiever
Pune	Achiever	Performer	Achiever	Achiever
Vadodara	Achiever	Performer	Leader	Performer
Pimpri Chinchwad	Achiever	Performer	Achiever	Achiever
Thane	Performer	Performer	Achiever	Performer
Indore	Performer	Achiever	Achiever	Aspirant
Nagpur	Performer	Performer	Achiever	Performer
Nashik	Performer	Performer	Achiever	Performer
Navi Mumbai	Performer	Achiever	Achiever	Aspirant
Ahmedabad	Performer	Aspirant	Achiever	Aspirant
Solapur	Performer	Initiator	Achiever	Achiever
Bangur	Performer	Performer	Performer	Performer

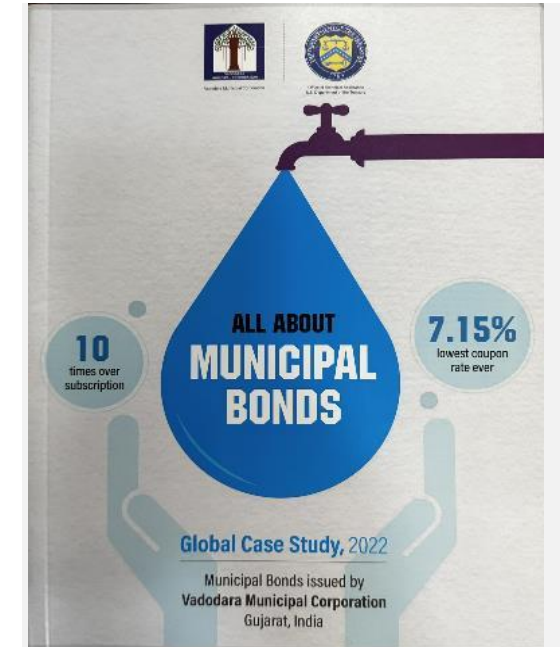
Moving Vadodara towards a water secure future



**Har Ghar Jal and
water efficiency**



**Develop lakes and
green areas for
climate resilience**



**Build on success of
budgets, bonds,
ESG reporting**

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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