

Synopsis of Webinar on

Environmental Challenges and Opportunities of Vadodara Urban Region jointly hosted by INHAF- Habitat Forum and SOCLEEN on 9 May 2025



Context of the Webinar Series:

Shri Kirtee Shah, President, **INHAF- Habitat Forum** gave context of the webinar series called, ***Rethinking Cities***. He said that reasons for organising these webinar series are that despite cities being centres of economy, culture, technology and innovations, our cities are saddled with major challenges and are not able to meet challenges of unprecedented urban growth which is going to double in next two decades. Government efforts alone are not adequate for providing healthy and sustainable cities. The time is running out for us to resolve urban issues and achieve our economic and environmental targets. Human capital outside the Government has knowledge and skills to solve cities problems and this knowledge and skill can contribute in addressing the challenges effectively if involved. This is the context of our webinar series which is expected to bring new perspectives and voices on cities.

This was the 124th webinar organised as part of the series. More than 500 professionals, experts, community leaders, etc. have expressed their views during various webinars on 30 to 40 various topics relating to city planning, mobility, infrastructure, governance and finance. INHAF plan to organise six webinars on the Odisha slum improvement programme showing slum solutions are possible. This will be followed up by another six webinars on climate change in Asian cities.

This webinar on **Environmental Challenges and Opportunities of Vadodara Urban Region** is co-hosted with **SOCLEEN (Society for Clean Environment)**. SOCLEEN is a voluntary and non-profit organization. He was thankful to Rajmata Shubhanginiraje Gaekwad, President of SOCLEEN to be present and guide in these discussions. He was also thankful to all panel members and particularly moderator of the webinar Prof. Chetan Vaidya for extensive support in organising the event.

Welcome Address by the President SOCLEEN

Rajmata Shubhanginiraje Gaekwad, President of SOCLEEN, welcomed the participants to the Webinar. She said that SOCLEEN is committed to creating cleaner, greener and pollution free environment in and around Vadodara for over 40 years. Vadodara, the cultural and education capital of Gujarat is facing number of environmental issues such as fluvial floods, water logging, air pollution, extreme heat, inadequate water supply and sanitation and rapid loss of green spaces. In future, environmental issues will be most crucial aspect for any development strategy for the urban area.

In view of various environmental challenges faced by the Vadodara urban region, INHAF and SOCLEEN have planned to organize this webinar together. Focus of the event was to propose possible solutions to the challenges and way forward for effective implementation of the proposals and not on identifying problems alone. She thanked the Habitat Forum INHAF for inviting SOCLEEN to co-host the webinar together. She added that the deliberations of the webinar will be useful to the citizens as well as experts working on various issues of the urban region.

Moderator's Remarks

Prof. Chetan Vaidya former Director of School of Planning and Architecture (SPA) New Delhi and NIUA moderated the webinar. He said that INHAF and SOCLEEN have brought together a diversified group of experts who have experience and knowledge of working on environmental issues in Vadodara region as well as at national and international levels. The panel members presented their analysis on topics covering Environment issues and solutions, Urban green financing, Best practices in urban environmental management, Urban Air Quality and Environmental initiatives of a Housing Society. He added that the deliberations of the webinar would be useful to the citizens as well as experts working on various issues of the urban region.

Expert's Presentations:

1. Environmental Issues and Solutions

Dr. Sanskriti S. Mujumdar, Director, Institute of Climate Change Research, M.S. University of Baroda made this presentation. She said Vadodara is third largest city in Gujarat state. It has semi -arid climate with major rainfall contributed due to South-west monsoon. Major environmental issues of the of region are: Rising temperatures, Higher energy demands, Floods, Urban floods, Water availability, Waste management and Air pollution.

Maximum temperature in the urban areas is rising but the minimum daily temperature is rising at a much faster rate thus reducing difference between maximum and minimum temperature in a day. When natural vegetation is replaced by buildings and paved streets, the landscape is transformed into a solar sponge, storing heat and increasing evaporation rates. These significant changes alter meteorological conditions, such as wind patterns and surface temperatures. The urban surface temperature can be 7 to 8 degree centigrade higher than the rural areas. This is causing higher consumption of electricity for cooling, which in turn increasing the atmospheric heat and thus adding to climate change problems. There is need

to reduce consumption of fossil fuels and increase the use of alternate source of energy such as solar and wind power and increasing use of electric vehicles. Moreover, areas under green cover and water bodies could also be increased in the region.

There is substantial increase in one day maximum rainfall and average monthly rainfall during June to September months in last few decades. This is making drainage network inadequate. There are frequent floods and the most severe floods were experienced in 1994, 1996, 2005, 2007, 2014, 2019 and 2024 in the recent past. There can be no direct control on rainfall but efforts to control atmospheric temperature increase should be attempted. Next issue is Urban flooding that is a result of urbanization leading to encroachment of natural water catchment areas, which increases the flood peaks from 1.8 to 8 times and flood volumes by up to 6 times. Consequently, flooding occurs very quickly due to faster flow times. Many times, it is also associated with inadequate discharge carrying capacity of stormwater drain, clogging of drains, poor stormwater management and negligible ground infiltration possibility. Solution of urban flooding lies in modification of discharge carrying capacity of stormwater drains wherever possible, design of new drains with increased intensities, inter-linking of ponds and stormwater management.

There is inadequate water supply availability and wastewater management in the region. For solid waste management, segregation is most crucial and necessary aspect. Moreover, the region has to shift to circular economy considering product use and manufacturing process, extend life of products and use of proper materials for the application. Finally, there is need to make people aware of environmental problems and promote good practices.

2. Urban Green Financing

Shri Santosh Tiwari Chief Accountant, Vadodara Municipal Corporation (VMC) spoke about his experience of accounting reforms, issue of green municipal bonds and financing green projects. VMC introduced financial reforms since mid- 1990s. In 2007, it introduced double entry accrual- based accounting system. In 2023-24, VMC prepared a balance sheet with Rs, 12,000 crores asset valuation. Present budget size of VMC is Rs. 6,200 crores with capital investment of Rs. 1800 crores. The Corporation has received AA+ credit rating from two agencies, is the highest for municipal body and is same as major Municipal Corporation like Ahmedabad, Surat and Mumbai. VMC has issued two municipal bonds. The first bond, Rs. 100 crores, was issued in March 2021, which was subscribed by over 10 times. Its annual interest was 7.15% and VMC received an incentive of Rs. 13 crores from the Government of India. So effective annual interest worked out to be 4.55%. A case study of this bond has been prepared and shared with many municipal corporations and state government in India and outside India.

VMC issued its second bond as a green bond in March 2024. It was a Rs. 100 crores issue with 7.90% annual interest rate and corresponding rate with the subsidy is below 6%. This was oversubscribed by 15 times. This bond amount is being invested in green projects and is certified by independent consultants under green finance framework. One of major project to be funded from this fund is reuse of waste water.

This financial year, VMC introduced public participation in the annual budget preparation. It invited suggestions from citizens and received over 2,000 suggestions. About half of these were included in the budget. In future, VMC will issue a blue bond where public could invest as individuals. VMC balance sheet is regularly prepared and certified by Independent Chartered Accountants. With additional resource mobilisation, the Corporation has taken up many green projects like footpaths, parks, urban forests and Vishwamitri river rejuvenation project.

3. Best Practices in Urban Environment Management

This presentation was made by Prof. Saswat Bandyopadhyay, Professor of Urban Planning, CEPT University, Ahmedabad. Gujarat state is forefront of urbanisation. The state is anticipated to turn two-third urban habitat within next two decades. The state will be adding a city, equal of current Vadodara every third year. Moreover, settlement boundaries are expanding beyond administrative boundaries. One key challenge is changing landscape of main city and surrounding rural areas. This has profound impact on climate related issues leading to increasing emissions levels. One major challenge is heat exposure on labour resulting in dropped productivity in cities. Except for Gandhinagar urban area, most urban areas are having inadequate green cover. In Singapore, despite very high land prices, green cover is around 60%. This has positive impact on micro climate.

Another challenge in urban sector is floods which are of three types, namely, fluvial, ravine and coastal. Flood management is important for safety and security. It is no more an engineering solution. Cities have to move from concrete drains to green and blue engineering solutions. Rain water has to be managed within a building complex and excess water should be managed by sponge open spaces. There is also need to adopt cloud burst street guidelines similar to Copenhagen. There is need to de-concretise river beds and water bodies. They require soft treatment including green grass and organic material like jute.

Chennai city has faced floods as well as water scarcity. It has developed a 16-acre, M. S. Swaminathan wet land park on waste land. This is designed by inter-disciplinary team of engineers, architects, urban designers, hydrologists, botanist and environment scientists. It features a board walk, a garden, basketball court, seating areas and a lake. This has become a very popular place in the city.

Urban India needs strong partnerships among public, private and community groups to resolve environmental issues. There is often a disconnect between the citizens groups and real estate developers. Citizens groups blame real estate developers for various urban problems whereas real estate developers claim to be their projects as green and environment friendly. All have to come together to find solutions.

4. Urban Air Quality

Mrs. Kavitha B. V., Additional Director of the Central Pollution Control Board (Regional Directorate, Vadodara), presented on urban air quality challenges and solutions. She highlighted key pollution sources such as vehicular emissions, industrial activity, construction, poor waste management etc.

Policy interventions at the state and local Government levels can help by enforcing stricter parking rules in congested areas, enhancing public transport infrastructure, incentivizing electric vehicles (EVs), and supporting non-motorized transport such as cycling and walking. Urban planning should integrate environmental considerations, including green infrastructure like urban forests and parks.

Urban planning and infrastructure also play a key role. Enhancing public transport (buses, metro), pedestrian walkways and cycling lanes can reduce private vehicle use. Expanding urban green cover, parks and tree plantation absorbs pollutants. Green building codes encouraging vertical gardens and rooftop plantations can further improve air quality.

Operational measures like mechanized sweeping with sprinklers, effective construction and demolition (C&D) waste management, proper municipal solid waste segregation, upgrading old vehicles and industrial units with advanced emission controls, ban on open waste burning, identifying air pollution hotspots and managing traffic etc. can aid air quality management.

Public engagement is vital. Awareness campaigns can educate citizens on pollution sources and protective measures. Community-led initiatives such as tree plantation drives, waste segregation, and sustainable living can foster shared responsibility.

Vadodara, a non-attainment city under the National Clean Air Program (NCAP), has a targeted PM₁₀ reduction of up to 40% by FY 2025–26, using 2017–18 as the baseline. Funded through 15th Finance Commission's Million Plus Cities Challenge Fund, Vadodara's City Action Plan addresses its specific pollution sources. Success in achieving the targeted PM₁₀ reduction depends on timely implementation, resource utilization, and collaboration among government bodies, communities, and the private sector.

5. Environmental Initiatives in a Housing Society

A case study on Environment Friendly Living in Urban Residential Community of the Shangri-La Luxury Cooperative Housing Society was made by Shri N. K. Kabra, former President of the Society. Shangri-La is a gated housing society in Gorwa, Vadodara. It has 11 residential towers comprising of 369 flats. Around 1400 people are residing in the society. It has all amenities like swimming pool, club house, children play area, games, gym, lawns etc. The residents believed in sustainable living, hence various water, waste and energy management aspects are being followed as per the best practices and are implemented successfully. Shangri-La society has its own Sewage Treatment Plant (STP) for treatment of domestic wastewater, consisting of various treatment units like rotating media bio-reactor, alum dosing and hypo dosing tanks, settling tank and sand and carbon filters. To achieve reduction in fresh water consumption and thus saving precious fresh water, the society has a system of reuse of treated wastewater for toilet flushing as well as gardening within the society. 2 crores litres of treated water per year reused resulting in annual saving of Rs. 4.5 lacs. Eco-waste warriors, a women group is formed in the society to promote environment friendly waste disposal in a sustainable way. Regular dry waste and kitchen wastes are segregated and stored separately at household level. The waste collection staff collects daily the dry waste and wet / kitchen waste separately. These are then disposed as per the Solid Waste

Management Rules 2016. Recyclable plastic waste is collected from households once a week. It is handed over to M/s Ecovision Environmental Resources LLP, a registered recycler company and they send it to their plastic waste processing facility in Surat. There are separate bins for e-waste as well. For sustainable energy management, the society has installed solar panels on rooftops at the cost of Rs. 46 lakhs. This cost was recovered in four years. The solar energy is used for common facilities and about 50% of this requirement is met from this alternate and renewable source. The society has constructed six recharge wells with filtration systems. Unlike most other housing societies, recharge wells in Shangri-La work properly. Thus, this society has undertaken up a number of environment friendly initiatives.

Concluding Remarks

Dr. Sanjay Pandit – Vice President, SOCLEEN gave the concluding remarks. He praised the efforts of panel members in analysing the environmental issues of the urban areas and summarized solutions provided by them. He said that the hosts would share proceedings of the webinar with all stakeholders. He thanked all the panel members for their excellent inputs and **INHAF** for giving **SOCLEEN** an opportunity to co-host the webinar.