THEMATIC BRIEF

My Waste, My responsibility

Solid Waste Management in the CapaCITIES Project

National Institute of Urban Affairs

CapaCITIES

Solid Waste Management (SWM) contributes 3% to India's greenhouse gas (GHG) emissions, and rising GHG emissions from solid waste further aggravates climate change, impacting the urban environment by choking drains during excessive rains, spreading illness, etc. This further adds to the existing water and land pollution. Urban Local Bodies (ULBs) are responsible for the collection and disposal of wastes in the cities. However, improper disposal and treatment results in contamination, polluting the air and water sources. To combat such impacts, the current focus of the Government of India (GoI) is to expand and modernize sanitation facilities and waste management infrastructure across the nation. To facilitate these changes and action upon GoI's mandate, cities need ample technical support and capacity building activities. The city administration and the citizenry require integrated development and interventions that are climate resilient and lead to the growth of a green city.

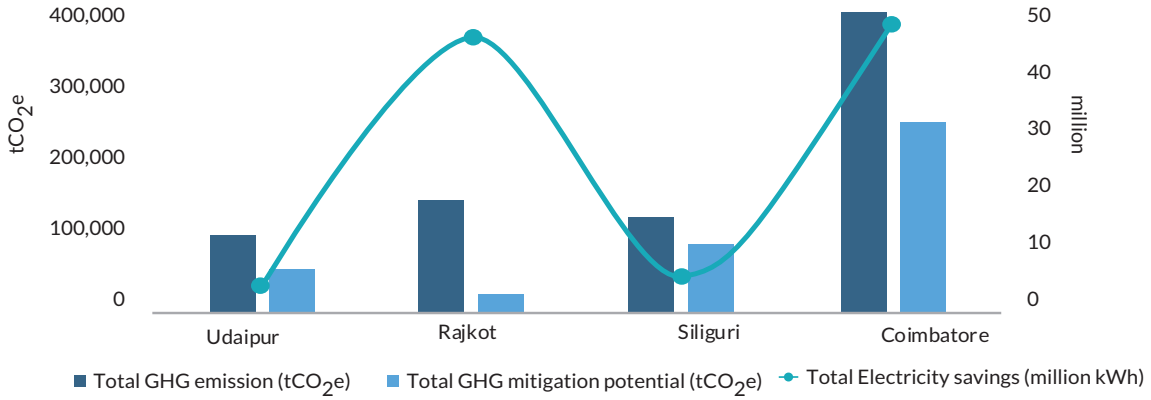
CapaCITIES Project in Solid Waste Management

In 2016, the Swiss Agency for Development and Cooperation's (SDC) Global Programme Climate Change and Environment (GPCCE) funded the **Capacity Building for Low Carbon and Climate Resilient City Development in India (CapaCITIES) Project**. This project with a consortium of implementation partners from India and Switzerland, including ICLEI South Asia, eConcept and the South Pole Group among others, have been working over the past 3 years, with the aim to bridge the lacunae in cities by providing necessary technical and non-technical support to four cities across the country - Coimbatore (Tamil Nadu), Rajkot (Gujarat), Siliguri (West Bengal) and Udaipur (Rajasthan), in adapting and mitigating to climate change. SWM has been identified as a priority along with water and wastewater management, air quality and transportation sectors across the project cities.

The ClimateResilientCITIES Action Plans (CRCAP) process

CapaCITIES has been working on the ground with city authorities to develop **ClimateResilientCITIES** Action Plans (CRCAP). The CRCAPs have been developed to identify climate change adaptation and mitigation measures in an integrated manner that are specific to each project city with an aim to reduce GHG emissions. The interventions identified in the CRCAP are based on the **ClimateResilientCITIES** methodology, which allows Urban Local Bodies (ULBs) to identify their priority areas. These activities were conducted by a Core Team -officials from the local government, and a Stakeholder Group -individuals from

GHG emission, GHG mitigation potential and Electricity Saving through CapaCITIES



Source: Udaipur, Rajkot, Siliguri and Coimbatore Climate Resilient City Action Plans (CRCAPs)

The ClimateResilientCITIES Process

The CapaCITIES project supported the city municipal corporations to identify baseline data from various departments in order to develop a profile for the city. These activities were conducted by a Core Team- officials from the local government, and a Stakeholder Group -individuals from different parastatal bodies in the city / NGOs / institutions / local stakeholders

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different parastatal bodies in the city / NGOs / institutions / local stakeholders.

- A city level GHG inventory is generated for the ULBs and community level activities using the HEAT+ tool.
- Through the GHG inventory, possible mitigation measures were identified to reduce the cities' emissions.
- The Shared Learning Dialogues (SLDs) contributed to determining fragile urban systems in the city and the climate risks to these systems.
- The vulnerability assessments helped in identifying the affected areas and populations within the city by these climate risks.
- A second SLD helped to identify resilience interventions for each fragile system and prioritise them to form a CRCAP.
- The interventions detailed in the CRCAPs also help identify timelines, size of projects-cost, financing models and potential linkages to financing.
- This leads to an overarching climate strategy for the city that addresses projects in each thematic area not just technically, but in a holistic manner

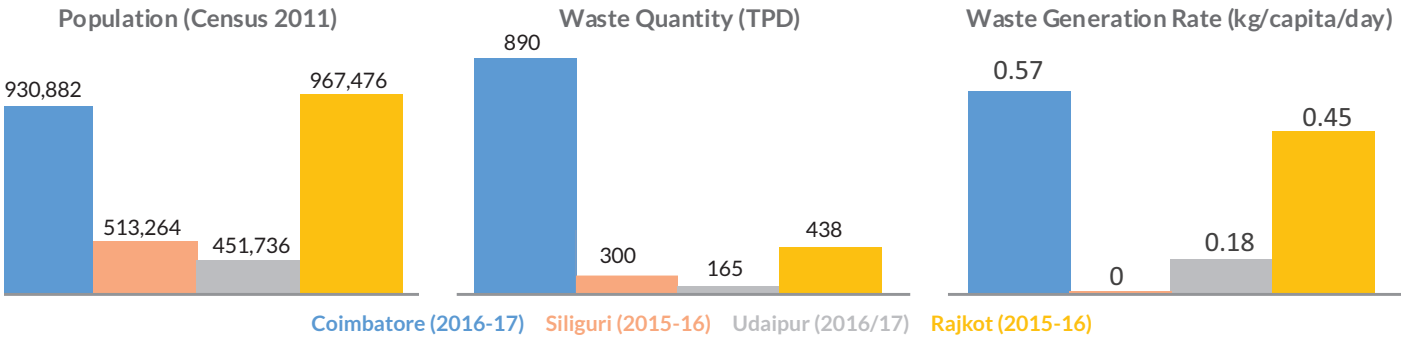
As per the illustration, Coimbatore and Rajkot have a higher mitigation potential due to its bigger population than Siliguri and Udaipur. This is expected to report electricity savings of over 40 million kWh each, while Siliguri and Udaipur will save under 6 million kWh each. The GHG mitigated by implementing all the identified interventions through the CapaCITIES project, represented by the emission ratio (Total GHG emission mitigation potential / Total GHG emission), is expected to be 64% for Coimbatore, 72% for Siliguri and 56% for Udaipur.

SWM priorities in the project cities

The four project cities have a growing population and require additional support in SWM. In these cities, waste generated ranges from 0.18 kg/c/day in Udaipur to 0.57 kg/c/day in Coimbatore. Waste composition is in line with the national trend where ~60% of waste generated by HHs is wet waste (biodegradable/organic) the methanization of which produces GHGs. The rest of the dry solid waste which when improperly discarded adds to the soil and water pollution littering the city. Support in identifying methods, capacity building and infrastructure to collect, process and scientifically dispose waste requires attention.

In Siliguri, a high daily floating population of 1,50,000 people increases the pressure on the cities' infrastructure. While designing the SWM plan for the city, this was kept in consideration. Rajkot and Coimbatore are progressive cities that calls for innovative solutions to help identify concrete implementable workplans based on good practices. The risk assessment in the Fragility Statement generated in the CRCAPs of the 4 cities indicates that the city's drains are at high risk of choking from solid waste during high intensity rainfall events which can lead to flooding and related health hazards.

Sewage data in the CapaCITIES project cities identified in the project CRCAPs



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Primary Challenges

Capacity building, training, identification of waste disposal processes and best practices for the better management of waste across wards has been a priority across the project cities. The red line connecting these measures is behaviour change of residents for managing waste, and the ULBs to develop processes and infrastructure to adequately manage waste through a decentralized system. The primary challenges identified in SWM were:

- Waste characterization, source segregation, collection, transportation and disposal of solid waste
- The existing centralized approach to waste processing and treatment is not effective
- Managing existing dumping grounds, processing legacy waste and the scientific capping of landfills
- Strategic decentralized SWM action plan to be defined that complements the existing city plans

The implementation of the resilience interventions proposed in the cities CRCAPs would lead to a sizable reduction in the cities GHG emissions from the solid waste sector. For the project cities, if all the waste generated is treated, and the consequent reduction in GHG emissions would improve socioeconomic co-benefits, such as better health facilities and livelihood for vulnerable sections.

City	Key Resilience Interventions Proposed in SWM from the CRCAPs	Total Mitigation Potential (tCO_2e)
COIMBATORE (Waste is 8.05% total GHG emissions)	• 4 Bio methanation plants of total 200 TPD • Waste incineration facility of 215 TPD • Establish zone wise collection and processing centers • Encourage community driven private start-ups to manage solid waste in the city • Develop and implement user charges	1,065,600 (~61% of total)
SILIGURI (Waste is 12% of GHG emissions)	• Scaling up SUNYA to whole of Siliguri • Improved waste processing at end point – composting, recycling, RDF palletisation etc • Policy mandates	86,472 (56% of total)
RAJKOT (Waste is 7% of total GHG emissions)	• 18 compost plants • 7.5MW waste to energy plant • Scientific capping of landfill • Notification by RMC on waste segregation	89,310 (23.52% of total)
UDAIPUR (Waste is 8% of total GHG emissions	• Composting and RDF integrated plant and sanitary landfill • E-Garbage vehicles in place of trippers	99,213

Quickwin Project: Behaviour Change Communication through SUNYA, Udaipur

Quickwin Project: Waste Segregation post SUNYA intervention, Siliguri

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Quickwin Projects and Bankable Projects with specific technical studies further enhanced city level climate resilience.

Pilot (Quickwin) Project SUNYA

The SUNYA or Zero Waste Quickwin project was successfully facilitated by the CapaCITIES team in Coimbatore, Udaipur and Siliguri in wards differing in socio-economic status in order to collect segregated waste at source from HHs by the local city sanitation workers from these three cities. SUNYA is a decentralized, zero waste approach, which involves segregation of waste at the house hold level by the local residents; rather than by the ULBs. This was done by involving the residents right from the onset of the planning and implementation of the project; creating a sense of community and ownership.

Reason for SUNYA's success

- Behavior change: The importance of correctly managing the waste produced daily was driven by the residents, which led to their behavior change. This is different from the usual training of officials.
- Forming a link between the City and the Citizenry: The SUNYA Quickwin acts as a process to link the residents with the city while leveraging the cities support, create awareness, strengthen the regulatory system.
- Livelihoods, Trainings and Capacity Building: In Udaipur, SUNYA is linked with women Self-Help Groups (SHGs) where female workers were involved in the campaigning for source segregation of waste in more than 3,500 HHs. Additionally, as part of the City's sanitation team, SHG members maintained a daily ledger of the quantification of waste.
- SUNYA is adaptable: In Siliguri, school children were involved in awareness building exercises and were catalysts for change in waste management in their homes. SUNYA in each city is customizable to the cities specifications and this factor contributed to its success.

Outcome

In the CapaCITIES project 3 of the 4 cities are ranked in the Swachta Sarvekshan under the Clean India Mission. Udaipur improved from being ranked at 310 to being ranked at 85 in India, the improvement is a result of CapaCITIES technical assessment and SUNYA quickwin project implementation in the city.

- Nearly 100% waste segregation at source across the SUNYA wards across Siliguri, Coimbatore and Udaipur
- Nearly 90% of these wards in each of the project cities are bin free
- SUNYA is self-sustaining in the wards across cities
- SUNYA is planned on being scaled up across the project cities.

Technical Studies to Support the Project Cities

Indian and Swiss subject experts through a number of studies identified the best approach and methodology to deal with solid waste in the cities, e.g. Studies on bio-methanization, composting and biomining. These technical studies provided valuable insight towards supporting the bankable projects and interventions and provide a scientifically sound baseline to make the proposed bankables more robust, applicable and financially viable.

In Coimbatore a waste characterization study conducted indicates that wet waste can be used to generate compost that can be sold at market rates and the dry waste can be used to generate refuse-derived fuel pellets which can be used as fuel. Also technical assistance for the review of a detailed project report for SWM incineration in Vellalore was provided to support the Corporation to create a bankable project. In Siliguri, 80% of the 300 TPD waste generated in the city is transported to an open dump site. The assessment study of the physical composition of the dump site revealed the primary composition of the waste. It is comprised mostly of organic waste, which is ideal for thermochemical conversion and can be used for RFD as fuel for the cement industry.

Financially Viable (Bankable) Projects

The bankable projects are those proposed for the future that can be taken up by the City Authorities. These projects would help mitigate GHG emissions while generating revenue and increase the cities resilience to climate change. They should be viewed as an intrinsic part of the SWM strategy of the city.

To support the Zero Waste Strategy of Coimbatore City Municipal Corporation, through the project a long-term SWM strategy for the city as a holistic internal planning and monitoring document has been developed for the Coimbatore City Municipal Corporation in to reduce GHG emissions from this sector through better treatment and disposal of waste. Additionally, technical advice for overall planning of the dumpsite at Vellalore including dewatering system and leachate treatment plant, landfill gas management, environmental control and monitoring system provided to the City Corporation.

For Siliguri, a pre-feasibility study to assess the viability of partial closure of the existing dumpsite and exploring alternatives will be undertaken as the existing dumpsite that had reached its capacity in 2014, however, it continues to be used for dumping waste. Additionally a MCC is currently under construction at Uttorayan Township.

Following the success of SUNYA; the Udaipur Municipal Corporation proposed to expand the project to further wards and build a 2 TPD bio-methanization plant for market bio waste, and a 60 TPD MRF and composting facility at Tithardi dump site, which will focus on the reduction of GHG emission from waste disposal. Additionally, solutions and recommendations for the scientific closure of Tithardi dumpsite with landfill gas estimation and guidance on tender preparation has been prepared.

What contributed to the success of CapaCITIES

- The initial buy-in by the government to kick-start the process for climate resilient development in the community provided clear leadership, strategy and direction to get the process off to a good start. Such clear direction is essential in facilitating success for a multipronged project as CapaCITIES.
- Setting up institutional structures through a Climate Core Committee by the ULBs, headed by the Mayor and important officials representing various departments. The Committee supported the preparation of CRCAP and internal institutional capacity building to effectively fulfil the long- term climate resilience plan. This augmented effective integration of planned initiatives into the city's developmental plans.
- Keeping the citizenry well informed and involved especially in quickwin projects, recognizing and celebrating the achievers, creating a positive buzz towards the success of the project.

Challenges faced and lessons learnt

- Availability of necessary data to conduct the City GHG inventory was a challenge due to lack of background in procuring the data. In the future, tracking and monitoring of data thematic and climatic data relevant to the analysis of various studies for the CapaCITIEs project needs to be made an integral part of the planning and implementation.
- Accessing funds to action upon the interventions limited the scope of the project. Therefore the interventions identified in the CRCAPs need to be seeded carefully, complementing the existing Schemes and Missions across the City, State and Centre or other available sources of funding.
- Reaching a consensus between differing political ideologies governing the cities can affect the reach and applicability of the potential interventions. The importance of dialogue across all levels of governance and political stakeholders needs to be reinforced at the project inception phase itself.
- The project called for an expansion on the existing capacities of the staff at the ULBs as well as the city infrastructure. Future undertakings must involve more training and awareness building to enhance on the knowledge base, especially of junior staff as their capacity contributes to its successful implementation.
- Follow up to knowledge sharing workshops, capacity building and continued outreach events need be conducted in the form of proceedings and activities on meeting resolutions, etc. to ensure continuity as well as to monitor impacts.

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