

Building a Zero Waste Model in a Low-Income Community in Chennai

As part of its Zero Waste Cities effort, CAG is working to establish a zero waste system that is decentralised, waste is collected in a segregated manner at the doorstep, and managed within the community. This report presents the research objectives, initial challenges, and how the team navigated these.

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1. Introduction and Background

Solid waste management in Chennai has reached crisis proportions. With a per capita waste generation of nearly 700 grams, Chennai's figure is the <u>highest</u> in the country. Currently, the system of waste management in Chennai is centralised, with mixed waste from all parts of the city being dumped at the dump yards in Kodungayur and Perungudi. <u>Official sources</u> claim that the city generates nearly 5400 metric tonnes of waste per day. There is adequate research to establish the adverse impacts of centralised waste management system on public health, environment, and economy. As the country's urban population is slated to increase two-fold by 2030, and Tamil Nadu is one of the rapidly urbanising states, the challenge of managing solid waste in an environmentally and economically sustainable manner in Chennai is bound to assume gigantic proportions.

As a part of the Zero Waste Cities collaborative project (ZWC), an ongoing project to build and support zero waste cities, Citizen consumer and civic Action Group (CAG), is building on an opportunity to develop local alternate models of waste management that focuses on decentralisation. One of the project outcomes is to construct a model zero-waste community in a low-income settlement. Low income settlements are ordained to a lifestyle that is devoid of dignity, security and often are perceived as encroachers of government land. The aim of the study is to document the research on behaviour patterns and perceptions of waste and waste management in a low-income urban setting that could be used to create a replicable and scalable model for a zero-waste community.

2. Research objectives

The research aims to create a model zero waste community in an urban setup through inclusive, decentralised and sustainable Solid Waste Management (SWM) systems, mindful of the local context. Community participation is the key approach, which aims at creating ownership of the waste management project among the residents to improve the local environment and to mitigate the adverse effects of poor waste management. The table below shows the research objectives and the respective research activities undertaken in furtherance of the objective (Table 1).

Research objective	Research activity
1. Understanding SWM processes and systems	 Observation Semi- structured interviews/ Focus group discussions Quantitative survey Mapping the existing waste collection service
2. Creating resources for SWM planning	 Participatory action planning Transect walking to map the area for granular details with street details Spatial mapping of surface garbage hotspots and open spaces Trailing and mapping the current waste collection service
3. Quantitative studies	 Enumeration of waste generators Waste audit and characterisation study (WACS)
4. Information and Education campaign on SWM	 Street plays Regular community meetings FGDs using visual aids such as posters, digital stories Opportunities for members of the community to amplify their work in larger public forum. Opportunities for children's participation in event relating waste
5. Participatory	1. Identifying potential sites in the community for decentralised

planning for SWM	waste management through participatory action mapping.	
	2. Participatory decision making for setting up of a managing the	
	decentralised waste management facility	
	3. Community meetings for consultation	
6. Sustainability and scaling-up	1. Establishment of SWM committee	
	2. Formulation of SWM strategy	
	3. Pilot study of formulated SWM strategy	
	4. Establishment of SWM facility at household and community	
	level	
	5. Training for segregation and composting	
	6. Trial run, evaluation and revision of SWM systems	
	7. Implementation of revised SWM system	
	8. Monitoring and reporting	
7. Community	1. Developing circular models of waste to wealth	
development	2. Establishing micro enterprises with women SHGs.	
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Table 1: Research objectives and corresponding research activities

3. Understanding SWM processes in the community

In August 2017, CAG joined hands with Pennurimai Iyakkam (PI), a community-based organisation that has been working with several women in urban slum communities for various developmental activities like anti-eviction interventions, post-eviction rehabilitations, unorganised labour rights and rehabilitation, and socio-economic development. PI acquainted us with their members and key decision makers in the Greenways slum community. It is located in Ward 122, Zone 9 (Teynampet) of Greater Chennai Corporation. The area is a notified slum under TN Slum Areas (Improvement and Clearance) Act 1971 inhabited by roughly 1380 families at the time of initial enumeration. The common livelihood is unorganised work with an average income per family ranging from INR 8,000 to INR 15,000. Most women in the community work as housemaids or domestic help in the neighbourhoods of Raja Annamalai Puram and Mandaveli.

The housing in the community is clustered, having tenements of single-level to multi-level with asbestos roofing, or cemented mortar type roofing (Image 1). Despite the over built nature of the community, one can observe a large number of drumstick trees in the area, with most houses maintaining small green patches with potted plants, indicating a healthy level of green consciousness. A considerable number of households practice open defecation despite most houses having toilets. There are two public toilets in the community out of which one is non-functional and the other is poorly maintained rendering it unusable. Following a large scale eviction after the 2015 floods, of families living along the Adyar River, that area has now become an open dump and site for defecation (Image 2). The area has a residential school, several small commercial establishments, such as hotels, meat shops and grocery stores and eight well maintained temples with an established annual schedule of celebrations and festivals, serving as ephemeral bulk waste generators.



Image 1 : Tenements in the Greenways slum community



Image 2: Area from which residents were evicted has been turned into an open dump

3.1. Mapping the area with street details

The first step was to understand the topography of the area. The street and by-lanes in the community were too narrow to be found on open source and was mapped using GPS device. Distinct waste generators like school, laundry facility, child care, and public toilets were also marked and mapped. This was repeated for all streets and alleyways, finally giving rise to the base map of the community. A similar methodology was followed for mapping open spaces

and garbage hotpots. After creating the base map of the community, the next step was to explore and map the existing waste collection services to understand the extent of coverage of SWM services in the community, the frequency and efficiency of service. Greenways community is Zone 09 of GCC, which is one of the three zones contracted to a private contractor (Ramky Enviro Services Pvt. Ltd.) until 2019.



Image 3: Developing layers to the base map with spatial particulars

3.2. Baseline survey

A baseline survey was conducted to develop a basic understanding about practices followed by different waste generators in the community. We learnt that almost 88% of the respondents surveyed, possessed basic infrastructure for storing mixed waste. None of them possessed any infrastructure for segregation. Most respondents accumulated recyclable nonbiodegradable waste, such as glass liquor bottles, milk packets, metals and other plastic waste, in plastic covers. They sold these to the scrap shops situated in the community or outside. Almost 50% of the respondents resorted to open dumping, either in the open space or in the canal. We also learnt that nearly 72% of the people were willing to segregate their waste and 30% of the people were willing to compost their biodegradable waste if infrastructure and training was provided to them.

3.3. Mapping the existing waste collection system

The existing waste management system in the community was mapped in four stages of research activities. Qualitative data was obtained from the community residents in the first stage. The residents in different streets were interviewed to understand the route, time, and schedule of the waste collection tricycle. This gave an understanding on what, how and when to observe the collection service. This was followed by a primary research to trail the conservancy workers and their tricycle for three random days. Two observers were required as two tricycle routes were known to exist. Observations included route and stop timings, arrival announcements, number of personnel serving, number of residents being served and difficulties faced in both providing the service and accessing the service. This was followed by recording the tricycle timings for four weeks by resident- volunteers to triangulate the information collected by trailing the tricycle.

conducted with the conservancy workers to obtain information on source segregation, frequency of services and challenges faced during collection.

4. Findings

We found that the entire community is serviced in two different routes (Image 5). One services Dr. Radhakrishnapuram Road (Route 1) and other services two broad perpendicular streets, Pughs Road and Gandhi Street (Route 2). Route 1, on average, was serviced only once in two days. The compactor service was also found to be haphazard; in that, for six consecutive observation days the dumpsters were found to be overflowing due to the lack of collection service. The tricycle waited at alleyway entrances for a maximum of five minutes. In Route 2, there was again no door-to-door service, but households were serviced only by waiting at entrances of every street for about three minutes. Many small commercial establishments also emptied their bins in this tricycle. The service in this route was found to be worse, as confirmed by the monitoring exercise where there was service only on three out of 17 days. The dumpster on Route 2 was mostly found overflowing and therefore the contents of the tricycle were emptied on the road, near it. While two collectors were assigned to each route, in reality, the two routes were covered by only two staff. We also observed that there was no 'whistle' call in both the routes to indicate the arrival of the tricycle. A verbal call was made at the entrance of the alleyway and this was transmitted down an informal network of communication to reach other households. There was very little awareness amongst the community on waste segregation, other than for some awareness fliers that had been distributed following the GCC's directive on October 2, 2017.



Image 4: Waste collection service map

5. Discussion

It appears that there is a glaring mismatch in the demand and supply of SWM services in the community. The infrastructure and the number of personnel provided in the current

arrangement is not commensurate with the demand in the community. As per the service <u>contract</u>, the private service provider is supposed to assign one conservancy worker for every 300 households. On most days, the work of four workers were seen to be carried on by just two workers for the entire community. The inadequacy of the collection service is one of the major root causes that has lead to open dumping in the community. Secondly, the workers also face ergonomic challenges in dragging the tricycle along non-linear and fragmentary paths. This worsens the quality of provision offered by the already understaffed service. We observed that the infrastructure for both collection and disposal were inconsistent with the needs in the community. Several commercial entities such as hotels, saloon, and meat shop and other waste generators access these two dumpsters for their everyday disposal, over and above the tricycle service.

6. Interventions

6.1. Enumeration of waste generators

To fill the lacuna of absence of reliable data to determine the quantum of waste generated in the community, an enumeration exercise was carried out. A team of 10 members following a training session, was assigned the task. Each category of the waste generator was counted and entered in the respective columns. The data collected on the map was then digitised to give different qualitative insights like the number of people in a house etc. The different categories of waste generators in the community were found to be: households (1379), small commercial establishments (22) and institutional generators (13) which included the residential school, the anganwadi, and a laundry. While this exercise helps understand the nature of mixed waste, to throw more light on the characterisation and individual categories of waste characterisation audit will have to be carried out.

6.2. Information and Education campaign

A street play "Say no to plastics" in Tamil by a group of folk artists to create awareness on environmental and social issues was conducted (Image 6). Using traditional story-telling methods, the event was attended by about 60 people, with several others watching from their terraces. Gifts and rewards were given to children to encourage participation and motivation to shift to good practices.



Image 5: Street Play artists in one of the alleyways in the community

We also convened several small meetings on different streets and educated the people about the problems with the current solid waste management practices in the community (Image 7). Visual aids, such as powerpoint presentations and videos on a big screen, helped explain simple techniques for managing the waste at both household and community level (Image 6). We observed that children took a keen interest in these sessions and this paved the way for our third activity that focussed on making children the SWM champions of the community. The children in the community were invited to participate in the first '*Kuppai Thiruvizha*' conducted at Anna Nagar. They were given space to perform a dance and talk about the state of SWM in their community in front of hundreds of people who had attended the event.



Image 6: Researcher presenting a video on segregation at source

6.3. Participatory action planning for SWM

Weekly meetings were used for formulating a SWM strategy for the community. Given that biodegradable waste formed nearly 75% of the household waste, we decided to get started with household composting for residents as the first step. Keeping in mind the space constraints in the houses and narrow streets in the community, we decided to give simple and suitable infrastructure such as a flower pot for segregation and composting. A central community composting facility was also mooted as the second step. Ten women were recruited for a pilot, which lasted one month. During this period, the women were given a flower pot, provided training on segregation and composting (Image 9 and Image 10). The process was monitored and tested in regular intervals (Image 11 and Image 12). The pitfalls in the different stages of the composting and monitoring were addressed.



Image 7: Weekly community meeting in Pandian Street



Image 8: Flower pots for compost





Image 10: More wet waste being accumulated





The learning from one street was implemented in other streets and each experience strengthened the test, trial run, evaluation, revision and implementation module. In order to keep the momentum going and to incentivise participation, a cloth tote bag was given to participants in appreciation of their time, dedication, and commitment towards the initiative.



Image 12: Women display the cloth bags they received for participating in the pilot study

6.4. Participatory mapping for shared facility

As the household composting was being scaled up, the next step was to plan for a shared processing facility to compost the organic waste for the community. A simple well-ring structure made of concrete was agreed upon by the community members as the design for the compost unit (Image 13). However, identifying a potential site for the installation of this unit continued to remain a challenge.



Image 13: Concrete rings assembled as a well-ring for composting biodegradable waste

We decided to undertake a participatory mapping activity to identify the potential site for installing the compost unit, again mobilising the aid of children. The kids first drew the base map on the chart and prepared a legend to indicate features such as houses, commercial entities, open spaces, garbage hotspots and potential sites for the installation of central SWM facility. They also marked ancillary resource centres such as cow dung shed and goat rearing area (Image 14).



Image 14: Children posing with the map of the community

After much deliberation, one spot was collectively agreed as the potential spot for decentralised SWM area. The same exercise was repeated for Pughs Road, though on this occasion, the youth contributed much to the success of the task. Systems for SWM maintenance was discussed through multiple meetings, which included administrative and financial components. A manager for the facility was identified by the community members themselves and he was trained for his role. His role and responsibilities was discussed in the community meetings and participatory decision was taken on his salary and a user-fee of INR 10 per household per week was agreed upon.

In November 2017, the first central facility for composting in the community was inaugurated (Image 15). The event was attended by nearly 200 residents who resolved to segregate their waste and compost biodegradable waste. There was a cultural performance by the kids and a knowledge-sharing talk by some of the women who were recruited for the pilot on their experience in segregation and home composting.



Image 15: The central composting facility being set up in the community

6.5. Monitoring and reporting

Periodic monitoring of primary segregation and household composting was planned and executed with the help of an established schedule. A note book with the weekly monitoring record was maintained and was available for viewing by any member of the community. The task of monitoring was solely done by the researcher with the help of a community organiser who had prior knowledge of composting techniques.

7. Learning from the engagement

7.1. Impact of local politics and interest

The disposal practices in the community were found to be widely different based on a resident's proximity to the nearest dumping site. The residents residing in Dr. Radhakrishnapuram street which is close to the Buckingham canal dispose mixed waste directly into canal without due regard to the state of the canal. Residents who lived on the end of the roads converging at the open dumping area often blamed the residents living on the other end for their poor disposal practices. On the whole, the community perceived the open area as a dumping ground with each resident shifting the blame on to someone else in the locality and this blame game compounded from a household level to the street level and the community level. As a result, none of them were willing to take ownership to change the fate of the community.

7.2. Children as agents of change

We observed that children took keen interest in civic matters in the community. They exhibited high amounts of enthusiasm in participating in activities, whether it was community meetings or participation in events outside the community (Image 16). The children had an alternative vision for the open dump and longed for a park/ playground in the community. We leveraged the potential of children to spread the message across the community and to motivate their mothers to change their behaviour.



Image 16: Children from Greenways performing in Kuppai Thiruvizha, Anna Nagar

7.3. Apathy of the GCC officials

Despite several attempts to engage the conservancy inspector and private supervisor of the ward in the SWM activities in the community, they remained apathetic. They often hinted at potential evictions and tried to dissuade us from carrying out activities. any The Conservancy Inspector was also dismissive of the residents in both action and vocabulary, which made the engagement with her more difficult than we had anticipated. We also observed that the open dump inside the community was used by the agents of GCC to dump construction and demolition (C&D) waste (Image 17). Despite repeated calls and petitions to the officials to facilitate the clearing up of the dump, no support extended. The friction between the GCC and the residents made compliance to source segregation extremely challenging.



Image 17: Freshly deposited C&D waste