Promoting source segregation for increasing efficiency of Chennai's SWM system

or

We Segregate

Final Report

March 2024

OKAPI

ROKA

URBAN OCEAN

The Circulate Initiative

CHENNAI RESILIENCE CENTRE

Project Team

Residents of Kasturba Nagar Association (ROKA) is a Resident Welfare Association formed for solid waste management. ROKA is leading the ground level work for this project.

Okapi Research and Advisory is tackling complex socio-ecological challenges faced by cities. Okapi is the primary implementing partner for the Urban Ocean program in Chennai and is anchoring the We Segregate project.

Bottles for Change by Bisleri International is a recycling and awareness program aimed to tackle plastic waste by creating awareness among citizens and channelizing different types of plastics for recycling into non-edible products such as - fabrics, hand bags, window blinds and other useful products.

Chennai Resilience Centre (CRC) is a unit of Care Earth Trust and supported by the Adrienne-Arsht Rockefeller Foundation Resilience Centre and the Resilient Cities Network. CRC is supporting Okapi in implementation of the Urban Ocean Program and by extension the We Segregate project.

Project Highlights

- *Lane composters have diverted 2699 kg of wet waste and nearly 100 kg of soft plastics have been diverted through the ptp hooks.*
- *Greater Chennai Corporation and Urbaser Sumeet report an increasing trend in the quantity of wet waste coming to the Micro Composting Centre in the neighbourhood suggesting improved segregation practices.*
- *Transformation in segregation behaviour is visible in the project area with the buildings 'not segregating' dropping from 48% to 31% and those 'segregating well' increasing from 37% to 54% between October 2023 to March 2024.*
- *The local government administered by the Greater Chennai Corporation has taken a keen interest in the project and wants to see it replicated in other wards as well.*
- *Additional financial support is required to cover operations, maintenance and monitoring for at least one to two years to ensure sustained behavior change and greater uptake by other localities and possibly the local government*

I. Background

Indian cities are grappling with solid waste management (SWM) challenges. Source segregation in our cities is minimal or inadequate and a large portion of recyclable, reusable, and compostable waste ends up in landfills/dumpsites (Joshi & Ahmed, 2016)[1]. Chennai is no exception – it has low rates of source segregation (~20 to 25 percent)[2] and a substantial portion of the mixed and contaminated waste ends up into the city's two dump sites – Kodungaiyur and Perungudi. The lack of segregation also results in unsafe working conditions for the city's SWM workforce and hampers recycling efforts.

Recognising these challenges in their neighbourhood and having worked on improving source segregation rates since 2018, the Residents of Kasturba Nagar Association (ROKA) collaborated with the Urban Ocean team with the aim of transforming Kasturba Nagar into a near Zero Waste Ward. A first step in this direction is the "We Segregate" project funded by The Circulate Initiative (TCI) which deploys lane composters and Punch-the-Plastic or PtP hooks as means of promoting source segregation and long term behaviour change with respect to waste management.

II. The Goal

The goal of the We Segregate project is to create awareness on sustainable solid waste management practices in three streets of Kasturba Nagar – 2nd, 3rd and 4th Main Roads covering approximately 1004 households and providing residents with opportunities to divert: a) some of their wet waste away from the dump yards by composting them using the three lane composters set up by the project team and, b) their low value plastics, specifically multi-layer plastics or MLPs including single use plastic bags, through the PtP hooks designed by Indian Institute of Technology, Madras. These two interventions are enabling space efficient collection of plastic waste and providing uncontaminated, well segregated waste for use in the lane composters, as well as to the waste collectors and/or aggregators.

III. Project Activities

a. Lane composters and segregation of wet waste

The first lane composter was installed on 2nd Main Road, towards the eastern end and was inaugurated on 11th October 2023 by Mr. Mahesan, the former Chief Engineer, Solid Waste Management Department, Greater Chennai Corporation and the local ward councillor – Ms. Subhashini in the presence of members from the project team, the Residents of Kasturba Nagar Association and community and officials from Urbaser Sumeet (fig 1). The inauguration was covered by local newspapers such as The Hindu, DT Next, Adyar Times and GCC's twitter page.

Subsequently, in the beginning of November and December the other two lane composters were installed. Currently all three composters are in operation. It was decided to install and feed one lane composter at a time so that there is continuity in waste diversion to the composters: as one gets filled up and is composting, the others can continue to take waste.

As such the process of getting official permission for installation of the composters from various levels of the local government – Greater Chennai Corporation and the Ward Councillor – took nearly three months and involved several meetings. After this the team was able to get Urbaser Sumeet, contracted for door-to-door collection of solid waste from households in the city, also to cooperate with the team on the project. This is critical for long term success of the initiative.

[1] Joshi, R., & Ahmed, S. (2016). Status and challenges of municipal solid waste management in India: A review. Cogent Environmental Science, 2(1), 1139434.

[2] Urban Ocean Project Statement Chennai: https://resilientcitiesnetwork.org/wp-content/uploads/2023/06/UrbanOcean_ProjectStatement_Chennai_final.pdf

The lane composters were ordered from Endlessly Green, a Bangaluru based company whose founders are well known for transforming and maintaining their community (HSR Layout) as a zero-waste neighbourhood. Of the three lane composters ordered two were of one model – Eartha, while the third was of a different model – Eira. Two different models were ordered to test and compare efficiency. Irrespective of the model, each composter has the capacity to take a total of 600kg to 750kg of organic waste and takes only 4ft*3ft of space. Further, showing their support for the project, Endlessly Green has provided one ton of high quality cocopeat, equivalent to Rs 40,000 free to the team.

Figure 1: Inaugurating the lane composters (top left), measuring temperature of the composting waste (top right); airing and layering the composters (middle); filling food waste (bottom)


Current Status: All three lane composters are working well and have been harvested at least once. The composters are generating interest among residents, other associations and organisations in the city who want to set up similar systems in their areas. We have had visits from other resident associations, students interested in understanding ground level SWM processes including a bunch of Urban Fellows from the Indian Institute of Human Settlements (IIHS) and teams from companies such as WIPRO (fig 2). We are also expecting a visit from the British High Commission who are interested in making their estate zero-waste and are looking to compost garden and food waste to be used in a kitchen garden that will be set up by CRC.

Direct Outcomes: Quantity of wet waste diverted:

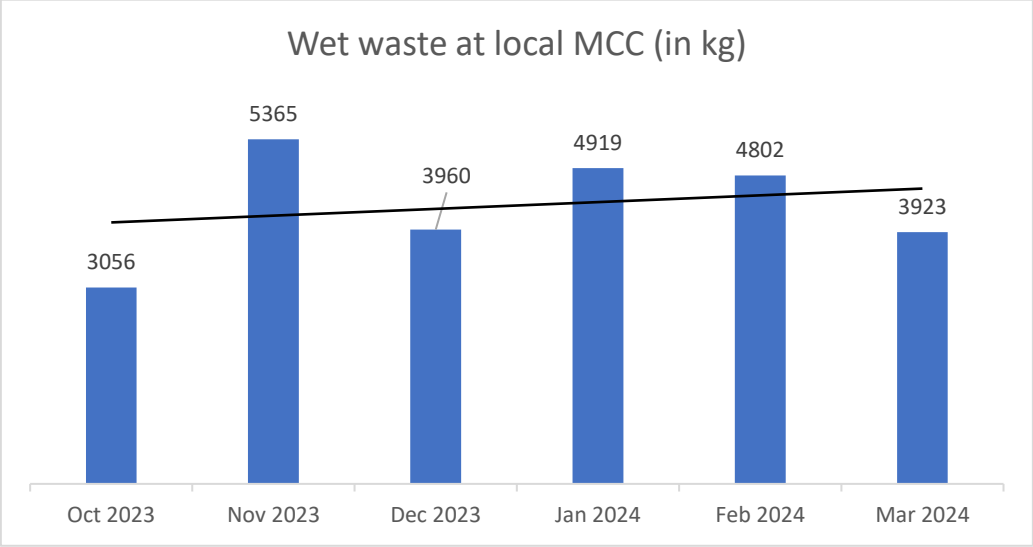
- **2699 kg of wet waste has been diverted through the composters** from October 11th, 2023, to March 26th 2024, which is nearly **30% more than the project target.**
- **530 kg of compost** has been harvested and during the project period. The compost was distributed to residents and used for the CRC supported edible garden set up in a government school in the neighbourhood.
- **65 lts of compost tea** harvested and distributed to residents who wanted it.

Figure 2: Urban Fellows from IIHS visit the project site (top left); members of various associations visiting (top right); Visit from Swachh Bharath Mission Nodal Officer (middle left); visit from WIPRO CSR team (middle right); harvesting compost tea and compost (bottom)

Co-benefit/Indirect Outcome: Micro Composting Centre (MCC)

GCC and Urbaser Sumeet have been recording data on the wet waste coming into the local MCC since October 2023. This data suggests a general increasing trend in the waste coming in which suggests improved segregation levels in the three streets (fig 3).

Figure 3: Wet waste coming in from Kasturba Nagar to the local MCC



Note: Data for March has been recorded only till March 24th

Learnings from running the Lane Composters:

- Urbaser Sumeet has been very supportive of the project, enlisting their conservancy workers who drive the battery operated vehicles (BoVs) to cooperate with our field team. However, there are some ground level issues. The project is dependent on BoV drivers for collecting and transporting waste to the composters which is causing some challenges as there is no back up in the event of a worker taking off, waste coming in from commercial establishments and so on. The field team is working closely with Urbaser Sumeet to resolve these issues as they arise.

- GCC data on quantity of wet waste going to the Micro Composting Centres from the neighbourhood shows some variation which we are trying to understand. The data is also not as accurate and the team is working with GCC and Urbaser Sumeet to understand and streamline their data collection and reporting process to improve data quality and accuracy.

b. PtP hooks and dry waste

PtP hooks were installed in 40 buildings across the three streets in a phased manner, after repeated interactions with building associations, social media messages by ROKA and door-to-door promotion activities. For the residents to understand what types of plastics to punch in the hook, an illustrative poster was designed and fixed near the hooks (fig 4).

As mentioned in the Interim report and the project proposal, the PtP hooks are designed by IIT Madras and enable easy and space saving storage of soft plastics. Collection, transportation and processing of the 'hooked' waste is being done through Bisleri's Bottles for Change Program who were very keen to help in our efforts despite recognising that they may not be able to collect

the required quantity to break even with collection and transport costs. In fact, the team was struggling to find an aggregator who was willing to bear the collection and transportation cost.

Further, based on discussions with Bisleri and the Waste Processor - Spreco Recycling Private Ltd. - we also learnt that to recycle MLP, it needs to be combined with a proportion of other soft plastics such as LDPE to produce a material of sufficient strength to be reused in various applications. Therefore, we decided to collect both MLPs and other soft plastics using the PtP hooks.

Following the discussions with Bisleri, as a part of our due diligence protocol, the Okapi and ROKA teams decided to visit the processing centre where the collected plastics from Kasturba Nagar would be processed. The waste processing site is owned and managed by Spreco Recycling Pvt. Ltd. who's founder was part of UO discussions earlier in her tenure with Saahas Zero Waste. We learnt that that the collected plastics would be further sorted, shredded and sent to Shakti Plastic Industry in Indore where these will be made into boards used for making furniture. A detailed note on the visit can be accessed here.

Current Status: Seven collection drives have been held thus far since January 2024. It was mutually decided to collect the waste once a month. To make collection easy for the Bisleri drivers, the team also designed gate stickers to stick on the gates of apartments which had the hooks.

Nearly 100kg of soft plastics including MLPs haven been diverted as of 26th March 2024.

Figure 4: Buildings with the ptp hooks (top); poster (bottom left), Bisleri collection vehicle (right)

Learnings from installing ptp hooks

- Diverting plastics via the ptp hooks has worked better in buildings which were already segregating their waste to an extent compared to those which were not segregating. This is because the hooks require a second, higher level of segregation involving washing and drying e.g. the milk packets.

- The decision to collect MLPs and soft plastics worked well for the team as it was easier to convince residents and make them understand that they needed to segregate all MLPs and soft plastics from hard plastics rather than picking out MLPs only from the soft and hard plastics. Further, since soft plastics are also low value, they are not missed by conservancy workers or waste pickers who pick out high value hard plastics for recycling.

- Multiple hooks are required for buildings with several households so that they can punch all their plastics. Once the hooks are full in apartments that have a larger number of households, residents have been asked to move their plastics collected in the hook to a temporary arrangement like a sack or a box enabling residents to continue punching their plastics till the specified pick up date.

- The residents have found ingenious ways to make the most of their hooks – in buildings where segregation is happening efficiently and the hooks get filled up fast, people are collecting the plastics in bags which are hung in the hook. This highlights the role of the hooks as nudges for residents to segregate soft plastics diligently.

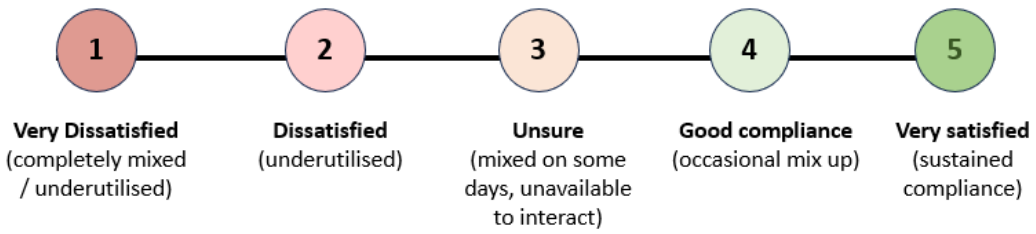
- The team did face some push back from residents when installing the hooks in terms of not wanting holes drilled in the walls to install the hooks, residents complaining that they had to segregate into one more category. The team worked on convincing these residents by nudging them into segregating their plastics in a carton box.

c. Door-to-door (DtD) campaign

The team began the DtD campaign just before the launch of the lane composter on 1st October 2023. Two individuals were hired as part of the team to help ROKA volunteers to carry out the awareness campaign. Each resource person was allocated a fixed route and covers as many apartments as they can everyday on 2nd, 3rd and 4th main roads. The purpose of the campaign is to promote source segregation amongst residents, so uncontaminated waste can be diverted to the three bins and the ptp hooks and to inspect the common bins in each building to ensure proper segregation is happening in practice. In buildings where segregation is not happening, the resource persons talk to the secretary or other individual tasked with segregation – usually the watchman – on why it is important and how to segregate properly. A brochure has also been prepared and designed by the Okapi team which is being used for the awareness campaign.

As the resource persons engage in the DtD campaign, they record data using a tool called KOBO. We used the data to examine changes in the segregation level in each building by using a rating system (fig 5); the idea is to compare these ratings over a period of time to see how our efforts including the DtD awareness campaign is transforming behaviour.

Figure 5: Rating system used by the field team during the DtD



Data gathered through the DtD campaign suggests that at the beginning of the intervention, nearly half the buildings visited had completely mixed waste in their common bins (48%) whereas towards the end (after 5 to 6 months), this percentage has dropped to 31%. It is also encouraging to note that the buildings that are doing a good job in segregating into three categories consistently has increased from 37% to 54%.

Based on the door-to-door surveys and ratings, 12 residents were also appreciated as 'segregating champions' for their good work and were awarded with gift vouchers from an online shop selling natural home necessities.

Walking with the Battery Operated Vehicle (BoV): In Feb 2024 the team decided to change the door-to-door campaign a bit to walk with the BoV driver from Urbaser Sumeet. Walking with these drivers helps us to better understand the ground reality and gives accurate information on the level of segregation at apartment. Through the experience of walking with the drivers, the ground team is noticing that apartments are responding better to instructions / evidence presented to them by the driver. The collected information along with photos of the status of the coloured bins as the case maybe, is given to the secretary or SPOC (Single point of contact) in that apartment immediately for further action (fig 5).

Figure 6: Field team engaged in BoV walks

Play Cricket and Bingo for SWM: In the first week of March, the project team put together an interactive, fun event in the form of a Bingo game and a cricket match to reach out to more residents (fig 7). The Bingo puzzle was designed keeping young children in mind and entailed a visual exercise where the participants had to cross off items they found in their household trash. The cricket match was subsequently held in a local playground on 10th March 2023 during the following weekend. The match culminated in a prize distribution for the winners and a discussion on the importance of waste segregation. As always, the event was completely zero-waste and even the medals distributed to the winners were made from recycled coconut shells.
The cricket match was a huge success with over 30 residents both young and old participating in the event.

Figure 7: Cricket match participants (top left); awarding the winners of bingo (top right); medals made from dry coconut shells handed to winners (bottom left); bingo puzzle sheet (bottom right)

Waste Rally: On 18th November 2023, a rally was held in the streets covered by the project to promote source segregation (fig 8). The rally was supported by Bisleri's Bottles for Change who decided to give certificates to all participants and provide placards for participants to carry. The project team were joined by enthusiastic young residents who were happy to join in this worthy cause.

Figure 8: Pictures from the waste rally in Kasturba Nagar

Learnings:

- Only after approaching the same buildings two to three times, is there some change in behaviour towards better segregation which suggests the need for consistent, long term interaction and follow up with residents on a daily basis.

- There seems to be difference between the three main roads in terms of cooperation towards segregation. On 3rd and 4th Main Roads, which have lesser number of apartments and lesser number of housing units within these apartments, it has been easier to reach out to most residents and ensure that the entire building complies. We are also noticing small improvements in behaviour after several visits. However, on 2nd Main Road, there are more apartments with more housing units making it challenging to reach every unit to ensure good segregation practices as one unit not complying reflects on the entire building. Currently, the team is conducting a survey with the residents and also plans to have discussions with the BOV operators - these may help us better understand these variations and identify strategies to address this issue.

- The team has noticed that it is relatively easier to work with new residents in the neighbourhood who are eager to comply with association rules and generally be responsible neighbours.

- DtD campaign has helped to monitor and maintain hygiene and cleanliness in and around the common bins within buildings.

IV. Impact of Intervention

- **Behaviour change**: A sample survey of 95 households, approximately 10% of the total number of households in the three streets was conducted in December 2023 to understand existing segregation practices and how the project interventions have nudged better SWM behaviour. Here are some key findings from the survey and the DtD campaign:
  - **Both the survey and observations from the DtD campaign showcase an increasing trend in waste segregation with more and more buildings and households** following three way segregation more consistently over six months. However, while there is an increase in the segregation levels, it is important to understand that for recycling / upcycling/ reusing, it is not enough to just segregate but ensure the segregated waste is of a certain quality (for e.g. the plastic milk packets needs to be cleaned and dried) that enables it to be recycled/ upcycled/reused.

  - Further, **despite respondents saying they segregate, some stated that it was not their responsibility to do so.** This is important as it suggests that a) there is need to raise awareness about the importance of household level involvement in source segregation of waste before secondary segregation may happen at the micro-composting or resource recovery centres under the GCC supervision and b) stricter interventions which involve pressure from the local government/ Urbaser Sumeet through issue of challans/fines on non-compliant households is required to trigger behaviour change.

  - We also find that around **41% of respondents started segregating after the introduction of the project interventions** which is very encouraging.

- It is also motivating to note that among the interventions, **66% of respondents who segregate their waste (n=89) felt the DtD awareness campaign has encouraged them to segregate.** In addition, 42% mentioned ROKA's consistent messaging via social media, rallies and help with other civic issues as interventions which nudged their segregation activities and 17% mentioned the presence of lane composters and PtP hooks as influencing factors. This suggests the need to invest more (human and financial resources) in DtD awareness and social messaging to help sustain the change.

- In terms of waste disposal, 93% stated that they dispose of their wet waste in designated green bins, 96% said that they dispose of their dry waste in the designated blue bins and 83% said that they dispose of their domestic hazardous waste in the designated red bins. The relatively lower percentage of households reporting proper disposal of hazardous waste indicates the need for more attention in the area of domestic hazardous waste disposal practices.

A more detailed report on findings from the survey and DtD campaign can be found here.

- **Wet waste diverted**: In terms of wet waste, in the proposal, the team had estimated diverting around 2100 kg of wet waste in the project period i.e. six months. **As of March 25th 2023, 2699 kg of wet waste** has been diverted through all three composters

- **Dry waste diverted:** The PtP hooks that have been installed in 40 houses and so far from three collection drives, nearly **100 kg of soft plastics including MLPs have been diverted.**

- **Impact within and outside government:** GCC is continuing to supply coco-peat free of charge from their MCC for the lane composters. Other RWAs are also interested in taking the model to their areas and are visiting the composters to see if they can replicate in their neighbourhoods.

V. Way Forward

Discussion with residents: Towards the end of March 2024 a discussion was held with residents of Kasturba Nagar, to present updates and learnings from the project thus far and discuss how more residents can contribute to the project (fig 9). The meeting began with a sustainability game to stimulate the participants, followed by a quick de-brief of the Urban Ocean program, how We Segregate emerged and findings from the survey/door-to-door work. Residents were then asked to split into three smaller groups to deliberate on specific ways in which they can help for each of the project components and the project in general. 51 participants came for the meeting and as always care was taken to ensure the event was zero-waste with refreshments being served in reusable steel cups and tumblers. Key suggestions for the future include:

- Organizing a dedicated flat level volunteer group to monitor segregation at building level.
- Mandating segregation as part of each building's rules and enforce fines for lack of compliance.
- Organising training for household help on how to segregate.
- Conducting more awareness sessions and activities - focused on flat residents and also for specific age groups: children, teenagers, adults
- Conducting field visits to waste recovery centers/ dump yards for better awareness and more impact on behaviour.

- Activating building level WhatsApp groups for better communication of doubts and accountability.

Figure 9: A resident talking about her composting experience (top); brainstorming solutions (bottom left, right)

Plan for the next three months: In the next three months the team plans to continue with the following activities:

- Filling the lane composters, harvesting and distributing harvest to local residents and CRC's rooftop gardens in the area.
- Collecting soft plastics including MLPs with support from Bisleri.
- Continuing with the door-to-door awareness building campaign.
- Document impact from the project by continuing to record data, have detailed discussions with conservancy workers, MCC staff, Urbaser Sumeet, residents who are not segregating.

Project Continuity: The project proposal had mentioned that the TCI grant will be leveraged to look for additional funding to support the project. The team is happy to share that a small one year research grant from IIT Madras has been secured to study behavioural transformation through Urban Ocean interventions from an academic perspective. It is this grant that is supporting the project's monitoring and evaluation work currently. Since this is a purely academic grant, the team is unable to use it for

supplementing day-to-day maintenance activities beyond the end of the project period i.e. March 2023.

The places where similar interventions have worked and taken a life of its own, have needed years of handholding and support before becoming a self-sustainable process (e.g. in HSR layout in Bangaluru). As such, the team needs to sustain the project at least for a year or two to showcase the potential of the intervention and expect GCC or other agencies to step-in. Therefore, while the team is actively looking for funding opportunities within CSR and other networks any support from TCI / RCN / Urban Ocean Consortium would be highly appreciated.

In the medium term, the team will explore the possibility of engaging local self-help-group women or the conservancy workers to sell the harvested compost to develop a self-sustaining business model.