

ISAS Brief

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India's Worlds of Waste – I

Data-driven Planning for Solid Waste Management in Chennai¹

The paper reports the advantages of data-based planning for solid waste management in a major Indian city, which have been demonstrated through three steps undertaken as part of a pilot project in a Chennai ward.

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Solid Waste Management (SWM) arguably represents the greatest challenge facing most Indian cities today, including Chennai which produces over 5,000 metric tonnes (MT) of waste daily. However, policy makers continue to have little or no access to reliable data to plan, design and implement SWM systems.³ This paper seeks to illustrate the retrograde impact(s) that the absence of reliable data has on SWM policy and practice in India. These include poor and iniquitous service provision, the inability to deploy appropriate SWM technologies, failure

¹ This paper arises from a workshop on “India’s Worlds of Waste”, organised in Singapore by the Institute of South Asian Studies (ISAS), an autonomous research institute at the National University of Singapore, on 27 and 28 July 2015. An executive summary of the dialogue at the workshop has been published as ISAS Special Report No. 28 on 17 September 2015.

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³ The Central Pollution Control Board, India’s primary environmental oversight authority, has said in its “Action Plan for Management of Municipal Waste” (2015) that “Presently, no systematic and authentic data on MSW generation at National Level and subsequently at State, District and at city/town level is available”.

to develop targeted policy-mechanisms for different types of waste-producers and inability to assess the efficacy of different policy-strategies.

Against this background, stakeholders in Chennai in early 2013-14 prioritised a data-informed pilot intervention, emphasising Door-to-Door collection, Segregation-at-Source and decentralised processing of waste as a step forward. The intervention consisted of a three-step data collection and planning exercise undertaken in the Corporation of Chennai's Ward – 173. The process is described below. This was preceded and followed by a series of stakeholder consultations to programme a ward-wide pilot project based on Zero-Waste principles.

Step 1: Mapping Waste-producers:

The mapping exercise entailed the construction of a detailed map of all waste-producers and SWM-relevant infrastructure in the ward through a simple paper-mapping methodology. Over 15,000 waste-producers were mapped, including 14,443 households. This figure exceeded the State's then-latest available demographic data by a staggering 41.5%, pointing both to the lack of reliable data and the gaps in service-provision that arise from this.

Step 2: Waste-characterisation study:

This step involved an intensive survey of 750 households and their waste (a 5% sample of the 15,000 waste-producers mentioned above) over 9 days to determine the prevailing SWM-practices as well as the quantities and composition of waste. Among other insights, the survey established per-household waste-generation rates at 0.864 kg/day. These numbers represent one of the few robust estimates of household waste-generation rates not just in Chennai, but in India as a whole. Our data also contest some widely-held assumptions that the quantity of waste produced by households increases significantly with socio-economic status. Rather, we observed a weak relationship between the household socio-economic status and the waste-generation rates, with some lower-income households bucking the trend altogether, producing more waste than the middle- and high-income households in the same area. ⁴

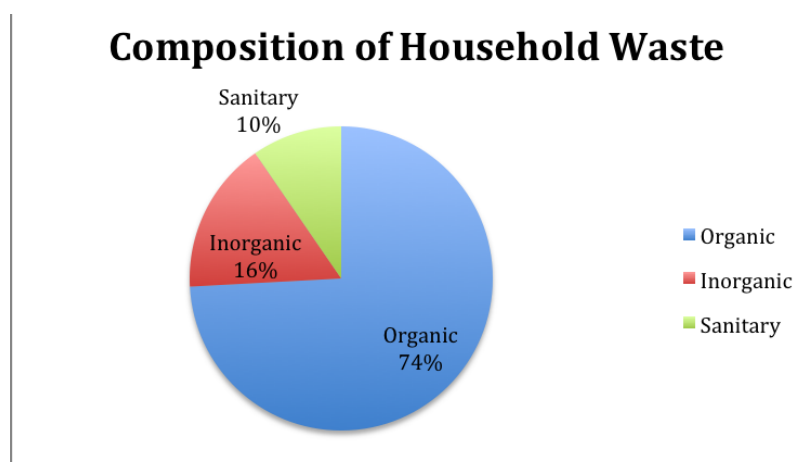
⁴ William Rathje and Cullen Murphy, *Rubbish! An Archaeology of Garbage* (Tucson: University of Arizona Press, 2001; first published 1992), p. 66, found a similar tendency in American garbage in the 1980s.

Step 3: Planning with data:

Deploying the data generated through the mapping and waste-characterisation study, we developed a detailed, community-fed proposal for a ward-wide Zero-Waste pilot project. The proposal was work-shopped with the Ward-residents in a series of community meetings before it was accepted by the civic body. The data and maps were invaluable in legitimising the pro-poor and pro-environment ideas, long held by researchers and activists in the policy space. Salient among these was an affirmation that households' willingness to segregate their waste could be boosted through concerted outreach and education efforts.

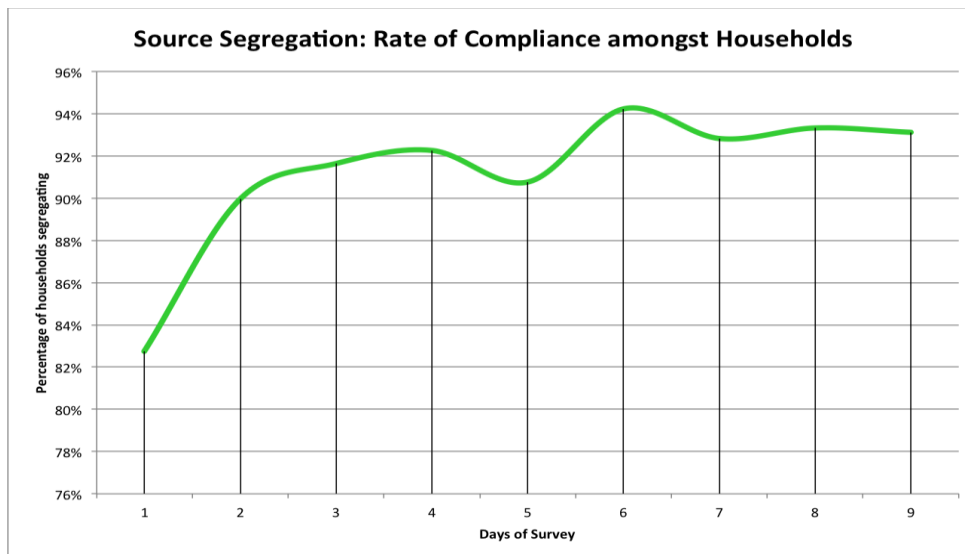
The mapping and waste characterisation studies conducted in Ward 173 present a variety of interesting and useful datasets with considerable relevance to public policy and planning. These included spatial representations of the study area and comprehensive demographic data on various categories of waste-producers, as well as intensive data on levels of waste-generation in the ward and the physical composition of the waste.

Figure 1.



The sample survey, the first of its kind in Chennai, helped establish, or cast doubt on, the validity of certain existing notions regarding waste-generation and composition. Notably, the results affirmed that waste-producers in India produce a greater preponderance of organic waste with over 70% of the ward's waste being accounted for by organic matter. We also found that households at higher levels on the socio-economic scale produced more waste, with a greater proportion of their waste being recyclable, as compared to lower-income households. However, this difference was not as pronounced (in fact, it was very subtle) as has been suggested by a number of past studies.

Figure 2. Improvement in residents' segregation of waste over the nine-day survey period



The mapping exercise also helped reveal some of the key failures of the current SWM system. Data on the placement of dumpsters, their state of disrepair and incidents of overflowing garbage paint a picture of a ward with chronically under-served areas. These areas were invariably in dense, low-income settlements. Thus, the data collection exercise provided evidence for the long-held views of activists that low-income settlements receive little or no services from the municipality.

The outcome of the data-collection and planning exercise has been a phased introduction of Zero-Waste to Ward 173. Only one locality within the Ward has had its SWM system reformed, while the lack of availability of land, financial restrictions and other issues typical of the Indian urban context have undermined efforts to scale up to the entire ward. However, a sustained community engagement has been maintained via community meetings, with a view to generating an understanding of and support for the proposals from residents of the area.

Figure 3. Community meeting with residents of Ward 173 to present findings of data collection exercise.



Photo: Vijay Senthil Kumar (Civic Action Group, Chennai, India)

The studies described above also suffered from a few shortcomings, the most noteworthy of which was the fact that many household respondents either had little or no sanitary waste for us to weigh or chose not to hand it over for reasons of propriety. Future studies should seek to address this concern proactively at the time of recruitment. Additionally, being a one-time engagement, the survey does not account for seasonal variations in waste-generation. Similarly, while the survey's time series included a weekend, the lack of data relevant to a day/time of festivals is a shortcoming.

However, notwithstanding the above caveats, the data and learnings from the Ward 173 studies are robust and comprehensive enough to draw some general inferences. They help plan effectively for the ward as well as to develop our understanding of urban solid-waste systems. The data collection methodologies have been made available in the form of a toolkit which can be applied in other Indian and Asian cities to facilitate SWM planning, design and implementation.

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