Best Practice Initiatives in Waste Management - Pune City

Suresh Jagtap
Joint Municipal Commissioner,
Pune Municipal Corporation
Pune City

Pune is the 8th largest city in India and the 2nd largest in the state of Maharashtra.

Population ; about 4 million
Households ; nearly 1 million
Area of city is 244 sq. kms.
4 Zones ; 15 Administrative Ward Offices ; 76 Prabhags
Overview of city waste management

- Pune generates 1500 to 1600 tons of solid waste per day.
- 122 trucks collect waste door-to-door, collecting an average of 137 organic tons per day.
- 56% of households have door-to-door coverage.
  - 44% of households provide segregated waste.
  - 125 tpd Hotel waste collected by 23 Hotel Trucks.
- 936 containers and 412 compactor buckets dispersed around Pune.
- SWaCH Cooperative, which is wholly owned by waste pickers, also provides services.
- Ward wise average- 350 to 750 gms per capita per day
The Paradigm Shift in Approach

- PMC’s approach towards waste management is in a comprehensive manner with careful selection and sustained application of appropriate technology, working conditions, and establishment of a ‘social license’ between the community and other service providers.
- Instead of something disposable, we see waste as a renewable resource with potential to aid in problems including electricity shortages and resource recovery.
- Effective use of IEC for community partnership.
Best practices to generate Wealth Out of Waste

- No open dumping and 100% scientific processing of waste
- Integrating Informal Sector in Municipal Solid Waste Management
- Pune’s Trash Solution: A Zero Garbage City
- Biomethanation cum power generation plants
- Waste to energy – Plasma gasification
- Sonia gram udyog prakalp for plastic recycling
Best Practices (Cont.)

- Shredding and composting of garden waste
- Mandatory onsite disposal in post 2000 residential and commercial schemes
- Data collection for MIS using Mobile SMS
- ALERT G-Complaint Redressal through citizens participation
- Celebration of Ganesh Utasav in Eco friendly manner
- Capping of old dumping site
SWaCH Cooperative: Public-Private Partnership

- SWaCH Cooperative is the first cooperative in India wholly owned by waste pickers.
- The organization was the joint effort of Pune Municipal Corporation and the waste picker trade union Kagad Kach Patra Kashtakari Panchayat (KKPKP).
- In 2008, the PMC signed a five-year Memorandum of Understanding to decentralize door-to-door collection services for households, shops, offices and small commercial establishments and allow SWaCH members to carry out this work.
Coverage of doorstep waste collection

Household Coverage with user fee recovery = 3,78,419 households

No. of Waste Collectors = 2300

Supervisors = 80

Coordinators = 11

Cycle rickshaws = 689

Buckets = 5958
PMC pays for Equipment and Management Costs
New Portable Sheds for SWaCH

- There are 25 sorting sheds including 6 Portable & Other
- **Sonia Gram Udyog Prakalp**
  1) Aundh 2) Katraj
- **200 – 250 Waste Picker**
- Directly Attached Processor
- **4 TPD of waste is Processed**
Benefits of SWaCH model

- **Decentralized:** Helps PMC to collect waste from door step in decentralized way.

- **Cost-effective:** reducing waste transport costs.

- **Energy efficient and environmentally sound:** Waste pickers often travel on foot or scooter and reduces waste sent to landfills.

- **High-resource recovery:** Enhancing recycling and climate change mitigation.

- **Labour friendly:** Makes use of available workers and improves their earnings and quality of work day.

- **Sustainable and accountable enterprise:** Cost and environmental benefits and availability of workforce make decentralized system administratively feasible.
ECO FRIENDLY GANESH UTSAV BY PMC
Pune’s Trash Solution: A Zero Garbage City

Adapting Katraj ward case study into an innovative model for a citywide system
Basic structure of Zero Garbage model

Households, societies, and commercial properties segregate waste into organic (wet) and inorganic (dry) waste.

Waste pickers collect segregated waste from households, societies, businesses.

- **DRY WASTE**
  - Further segregation by WP into recyclables and non-recyclables
  - WP sells recyclables to scrap buyers
  - WP delivers non-recyclables to PMC; sent to Hanjer Plant for processing

- **WET WASTE**
  - WP delivers wet waste for composting, biogas, pelletization
  - Wet waste reused as fertilizer, electricity or fuel
Zero Garbage Pune

WHAT IS THE MEANING OF ‘ZERO GARBAGE’?

1. ELIMINATING NEED FOR LANDFILLS by reusing organic waste through biogas, composting and other technology and recycling plastic, paper, glass, metal, etc.

2. ADDING VALUE TO WASTE through use of innovative technologies to reuse organic waste and enhancing recycling through segregation and doorstep collection.

3. CREATING A PARADIGM SHIFT from garbage as disposal to garbage as a renewable resource by changing attitudes about the value and potential of trash.

WHO DOES IT HELP? ZERO GARBAGE MODEL HAS WIDE-RANGING BENEFITS

PHASE 1 WARDS
Warje Karve Nagar
Kothrud
Aundh
Ghole Road
Dhole Patil
Sangamwadi
Nagar Road
Kasaba Visram
Tilak Road
Sahakaranagar
Bhavani Peth
Hadsar
Bibvewadi
Dhankwadi (a)
Dhankwadi (b)

RESIDENTS
- Cleaner streets and neighborhoods.
- Improved quality of life by reducing health risks, such as dengue fever and malaria, associated with garbage piles.
- Doorstep collection service at low cost.

WASTE PICKERS
- Improved quality of life with integration into doorstep collection to eliminate need to climb in community waste bins.
- Better health because of new conditions.
- Higher, more stable income.

GOVERNMENT
- Reduced transportation and landfill maintenance costs.
- Citizens forced to take responsibility for waste generation.
- Cleaner, more appealing city.

Contact: Dr. Ketaki Ghatge, Zonal Medical Officer for PMC, at 9689931364 or Saroj Badgujar, Deputy Manager for Janwani, at 9970078596.
Results in Katraj

- First waste management system in India to receive ISO certification.
  - Manual developed for ISO establishes correct practices for waste collection, transportation and disposal.
  - Manual outlines process for complaints by both residents and waste pickers.
  - Certification process paid by Cummins India.
Mandatory onsite scientific disposal of solid waste


*Tax Rebate Incentive Scheme*

<table>
<thead>
<tr>
<th>DETAILS</th>
<th>No. of Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar</td>
<td>4075</td>
</tr>
<tr>
<td>Vermiculture</td>
<td>10429</td>
</tr>
<tr>
<td>Solar &amp; Vermiculture</td>
<td>7254</td>
</tr>
<tr>
<td>Vermiculture &amp; Rain Harvesting</td>
<td>1024</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>22782</strong></td>
</tr>
</tbody>
</table>
MIS using Mobile SMS

- Aim is to make available real time MIS reports for SWM system
- Deploys up to 5000+ sweepers across 4 zones comprising of 15 wards having a total of 165 sub offices.
- Total attendance at each of the 165 sub office is recorded in registers. Data in registers is used for generating MIS.
- Day to day MIS of all these activities was recorded using Registers.
**ALERT G**

**Complaint Redressal-Citizens’ Participation**

- Activated new mobile SMS Alert system for timely and effective complaint redressal about garbage containers.
- Citizens have to type- ALERT G Ward Office Name, complaint site area name and complaint and SMS is to be sent to 9223050607.
- PMC officials and staff effectively redress the complaint within 8-10 hrs and give feedback to the concerned complainant.
- Installation of this system will help in forming Public Private Partnership
Current processing of waste in Pune

- No open dumping since June 2010; scientific processing only.
- Decentralized waste processing plant. (around 27 TPD)

- Hanjer Biotech 1 & 2
  - 1000 TPD; Composting, RDF, Pellets and Bio-fuel.
  - Location: Urali and Fursungi

- Ajinkya Biofert
  - 100 TPD; Vermi-compost and compost
  - Hadapsar Ramp

- Disha Waste Management
  - 100 TPD; Vermi-compost and compost
  - Ram Tekdi Industrial Estate

- Biogas and Mechanical Compost
  - 60 TPD; Electricity and Compost
  - 14 Decentralized Plants

- Rochem Separation Systems
  - 700 TPD; Electricity
  - Ram Tekdi, Hadapsar
Hanjer Biotech – Composting and RDF
Ajinkya Biofert - Composting
Disha Waste Management - Composting
# Methanation Plants

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biogas Generation</td>
<td>300+ / - 5% m³/day</td>
</tr>
<tr>
<td>Calorific Value</td>
<td>4800-5000 Kcal/cum</td>
</tr>
<tr>
<td>Engine Efficiency</td>
<td>25%</td>
</tr>
<tr>
<td>Electricity Generation</td>
<td>1.5 kWh/cum of Biogas</td>
</tr>
<tr>
<td>Equivalent Electricity Generation</td>
<td>450 kWh/day</td>
</tr>
<tr>
<td>Auxiliary Power requirement</td>
<td>@50 kWh/day</td>
</tr>
<tr>
<td>Net Surplus Electricity for sale</td>
<td>400 kWh/day</td>
</tr>
</tbody>
</table>
## Processing - Mechanical Composting

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Location of Biogas Plants</th>
<th>Capacity of Plant</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ram Tekdi Garden</td>
<td>2 TPD</td>
</tr>
<tr>
<td>2</td>
<td>Aundh Ward office</td>
<td>2 TPD</td>
</tr>
</tbody>
</table>
Facility for MSW to Energy at Pune Rochem plant

1. MSW Processing plant of capacity 700 TPD
2. Technology: Gasification/Pyrolysis
3. Output: Electricity generation@ 10 MW per hour
4. DBOOT basis
5. Space Requirement: 10000 sq mts
6. Waste disposal in 48 hours
7. Less inert material after treatment
8. Carbon credit system under CDM.
As per MSW Rules 2000, Scientific closure and beautification of 30 hectares of dumping site at Urali Devachi is in progress.
Achievement @ Glance

- **SWaCH model**: Substantial reduction in waste handling cost
- Waste pickers & itinerant buyers collect recyclable materials that amount to 22% of municipal solid waste
- Reduction in Greenhouse Gas Emissions of $2,94,316$ Metric Tonnes of Carbon Dioxide Equivalent ($\text{mtCO}_2\text{-eq}$) per annum (2006)

- **Zero Garbage Ward**: improved service delivery of DTDC and segregation of waste.
- ISO Certification for Decentralized Solid Waste Management System: Easy to transfer and replication
- **Energy generation**: More than half MW of energy from 60 tons of organic waste using biogas (*Pay back period-3 Years*)

- About 10 MW /hr of energy from 700 Tons of waste by using plasma pyrolysis technology

  *Less space required, no capital cost, and share in Carbon credits.*

- 100 percent scientific disposal since 2010 and no open Dumping - *Scientific land filling & Capping*
Awards

- NagarRatna Award by JNNURM in 2010-2011.
- ICON SWM 2012- Award of Excellence in SWM.
  - By International Society of waste management, Jadavpur University & Karnataka Govt, 2011-12.
- HUDCO Awards for Best Practices to “Improve the living Environment 2012-13”
Challenges

Primary collection:

- Limitation of waste collection coverage in slum areas as collection of user fee is not possible
- Improving professionalism among the waste pickers. Success of the model depends upon economic class, psychology, demographics of the area
- Political intrusion disturbs the system
- Existence of the community bins gives the relaxation to the citizens to dispose mixed waste.
- Lack of proper sorting sheds. Place for segregating the waste not available.
- Gap in market availability for the Scrap dealers and no proper market value chain.
- Irregularity in payment by citizens disturbs the model.
- With segregation at source, the Society watchman and maids take out valuables which affects overall income and sustenance of the model.
- Getting Citizens to participate is the biggest challenge.
Secondary collection and transportation:
- Synchronization of both the primary (operated run by waste pickers) and secondary (operated by PMC staff) systems is difficult
- Increased prices of fuel disturbs the economic calculation

Processing and scientific disposal:
- Land acquisition for garbage processing and changing mindset of citizens
- Identification of proper technology and its sustainability
- Success of the processing technology depends upon economic status, psychology, demographics of the area

Street Sweepings:
- Inadequate staff and out sourcing leads to labor issues
- Mechanical sweeping – Operation and Maintenance issues
CONCLUSION

- The city is making use of important partnerships and achieving results with involvement of informal sector, citizens, NGO’s & with the active participation of elected representatives.
- Combination of decentralized and centralized models of waste processing with sustained application of appropriate technology.
- Zero Garbage and SWaCH Models enhance the quality of work of the waste picker, while also meeting demands for neighborhood cleanliness and limiting garbage sent to landfills.
Thank you for patient listening.