

# **Solid Waste Management in Pune City**



**SURESH JAGTAP**  
**JOINT MUNICIPAL COMMISSIONER,**  
**PUNE MUNICIPAL CORPORATION**

# Waste Generation and Urbanization

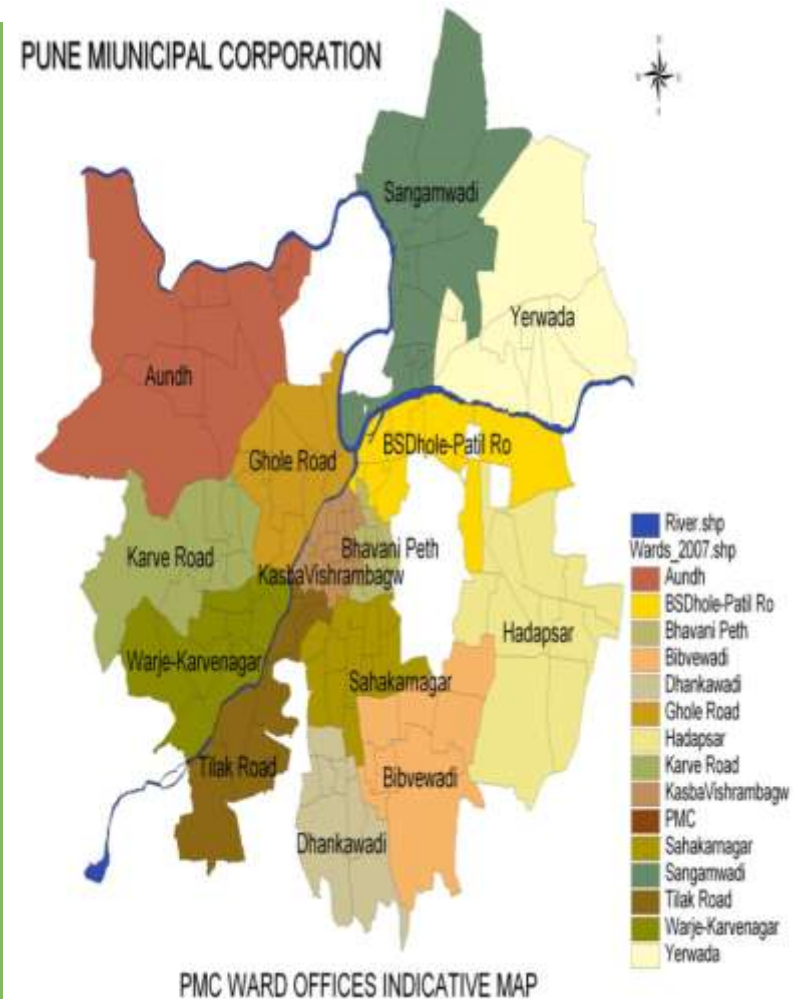


- Improved standards of living and the extent of commercialization in the cities have significantly changed the consumption patterns & thereby the waste composition.
- The inability to fully grasp the problems of waste generation and characterization have resulted in transforming SWM as one of the most compelling problem of urban environmental degradation.



# Pune City

- Pune is the 8<sup>th</sup> largest city in India and the 2<sup>nd</sup> 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



# Towards Sustainable SWM



- 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

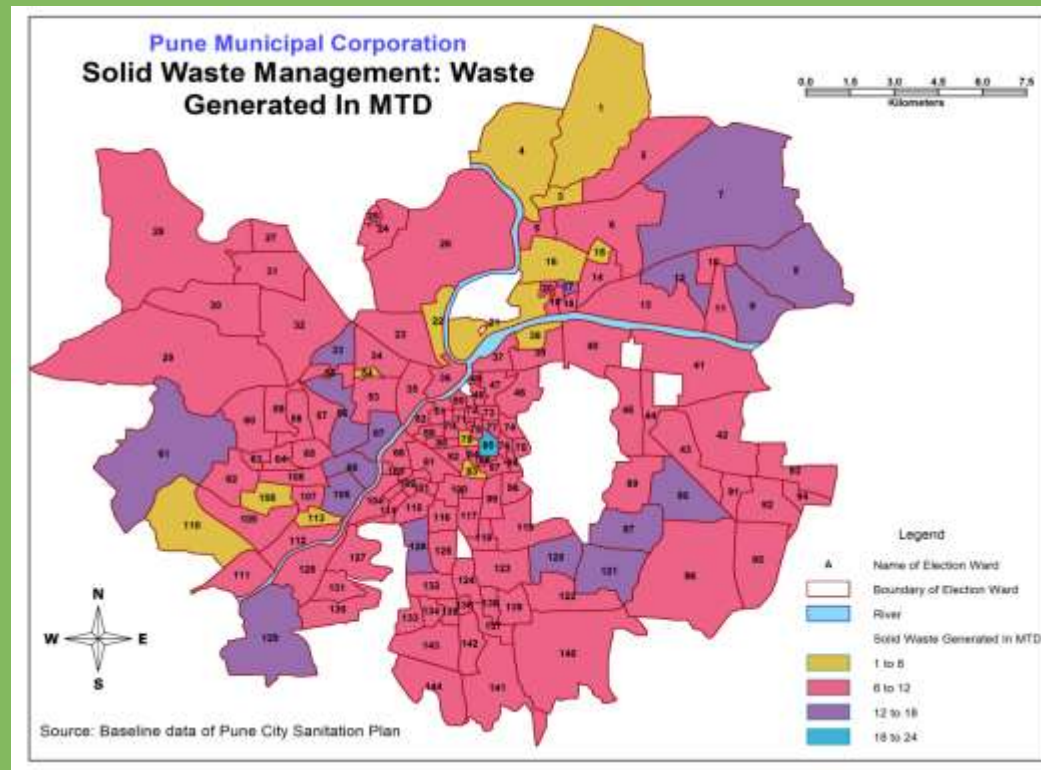


# Overview of Waste Management



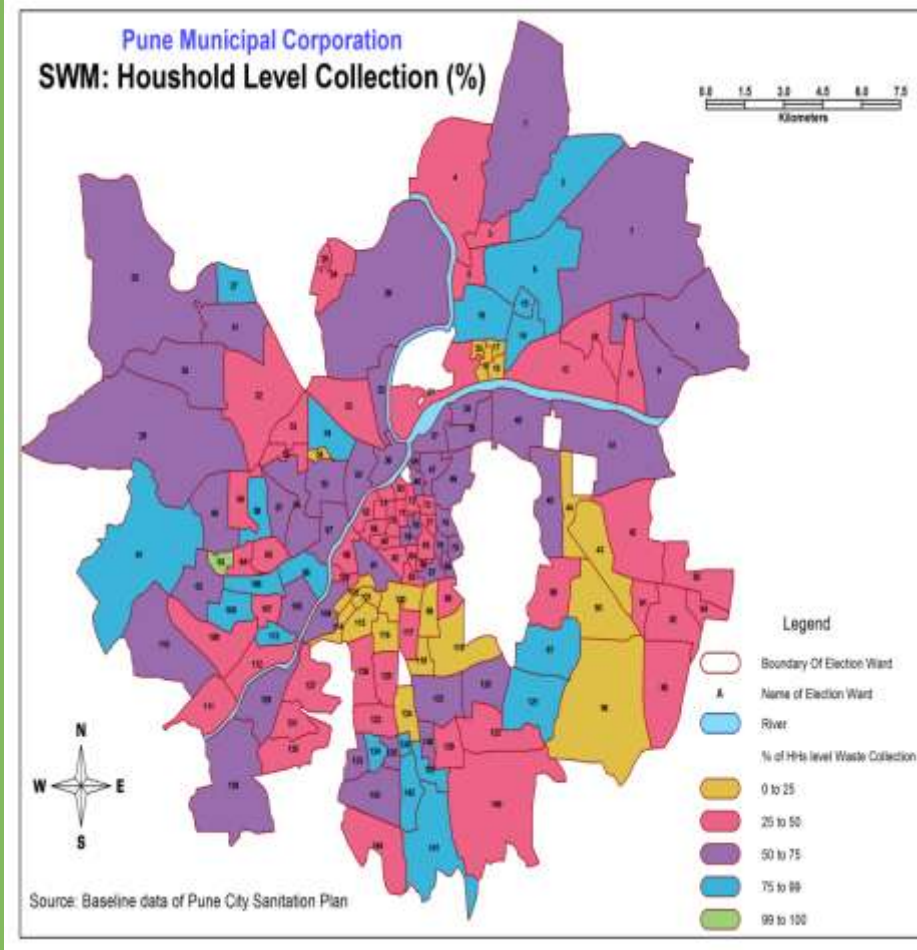
- Pune generates 1500 to 1600 tons of solid waste per day.
- 158 trucks collect waste door-to-door, collecting an average of 197 tons per day.
  - 56% of households have door-to-door coverage.
  - 44% of households provide segregated waste.
- 973 containers and 203 compactor buckets dispersed around Pune.
- SWaCH Cooperative, which is wholly owned by waste pickers, also provides services.
- Ward wise average- 350 to 750 gms per capita per day

# Solid Waste Generation in Pune



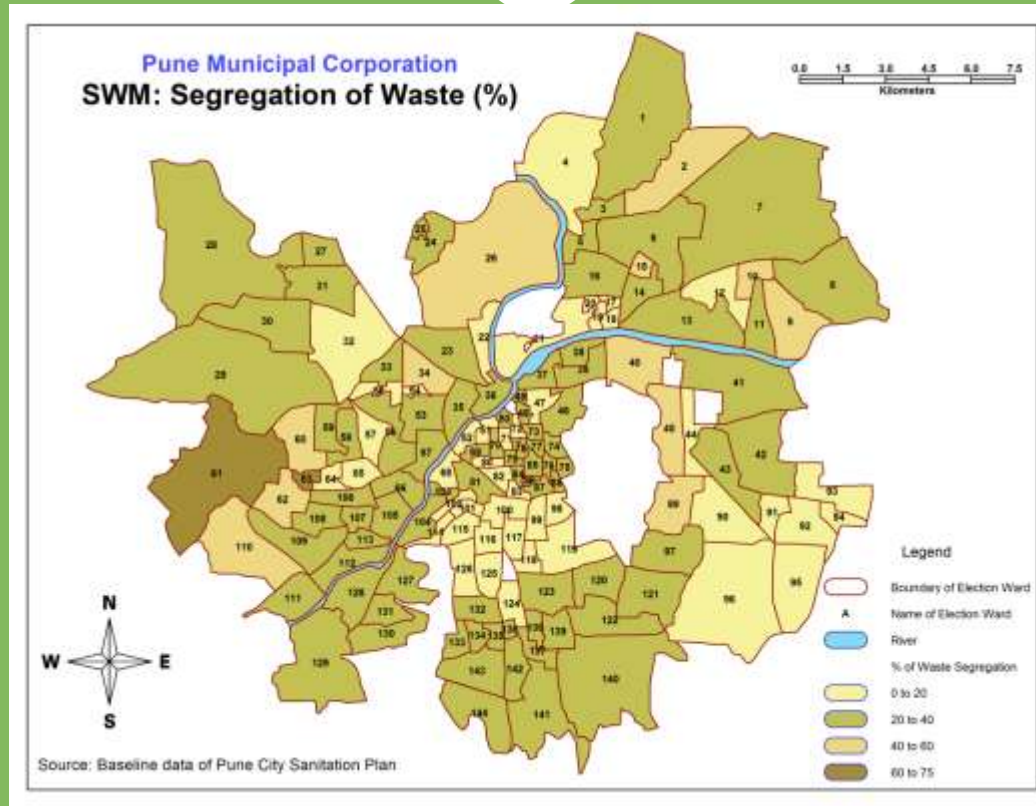
- Types of waste include organic, inorganic, bio-medical, E-waste, hazardous waste and construction and debris.

# Door to door Collection of Solid Waste



- 23 separate trucks collect about 125 Tons waste from hotel industries
- 2300 waste-pickers for door to door collection; about 4lacs properties covered
- 7 Intermediate Garbage Transfer Stations
- Separate Garden Waste 60-75 TPD Collected and shredded daily

# Segregation of Solid Waste



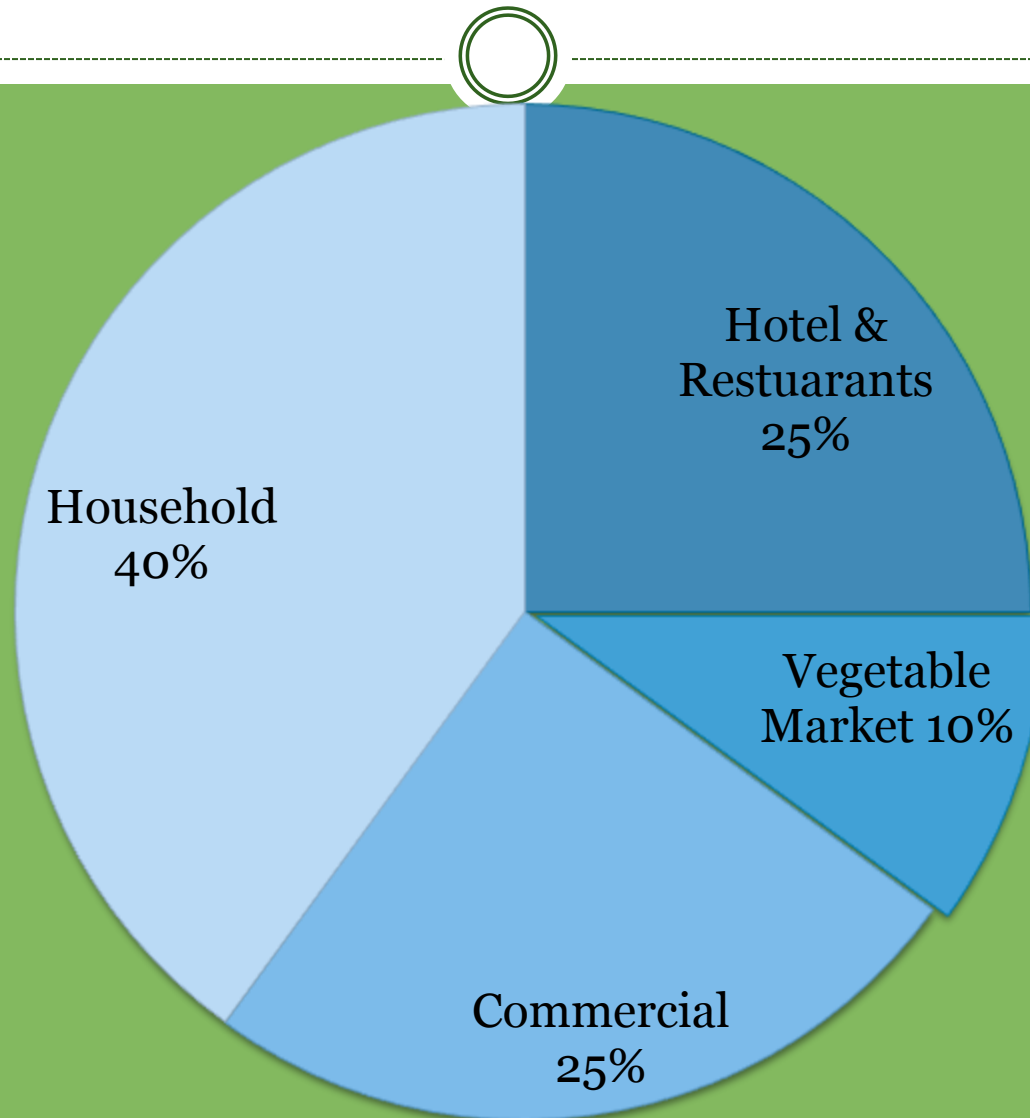
Around 44 percent of city waste is segregated

# MSW Characteristics



Description	Percentage
Organic Matter	45 to 50
Recyclables from Residential & Commercial	35 to 40
Inert Material	10 to 15
Other Parameters <ul style="list-style-type: none"><li>• Density</li><li>• GCV</li><li>• C/N</li></ul>	<ul style="list-style-type: none"><li>• 437 Kg/m<sup>3</sup></li><li>• 937Kcal/Kg</li><li>• 22.85</li></ul>

# Sources of Waste Generation

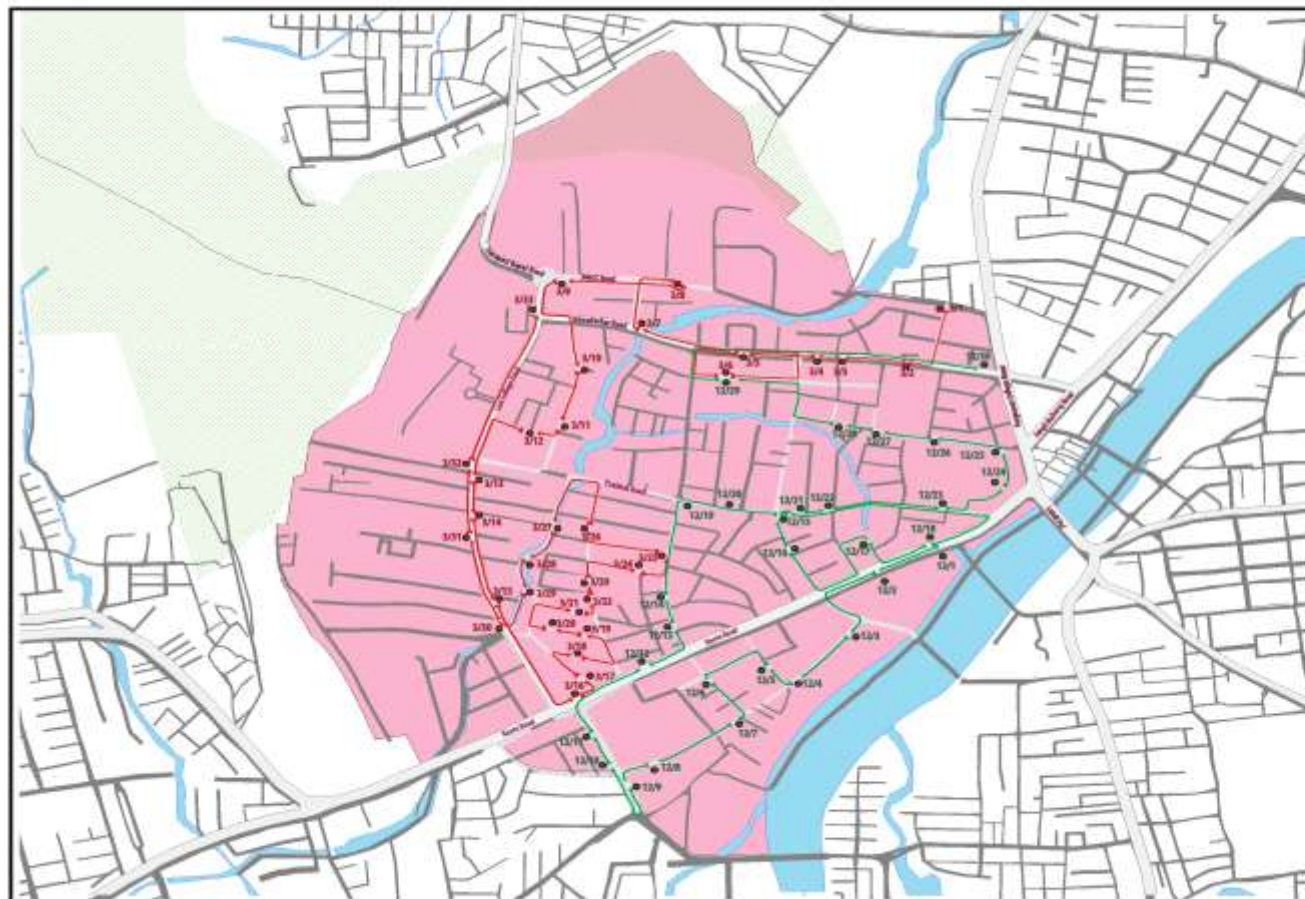


# Transportation



Vehicle Name	Nos.
Tipper Trucks	158
Compactors	12
Hotel Trucks	23
Tractors	10
Dumper Placers	89
Bulk Refuse Carrier (B.R.C.)	65

# Ghantagadi Route Map



Ghantagadi # 3 / Pratihag 36		
No.	Feeder Point	Time
1.	Near Gupta Hospital	0000
2.	Near Balakrishna School	0015
3.	Near Virendra Mitra Mandir	0030
4.	Spencers Bldg, Bhanderkar Road	0045
5.	Near Quarters, Bhanderkar Road	0060
6.	Karnala Park	0075
7.	Near Kala Path Container	0090
8.	Jala Hotel	0105
9.	PCC Headquarters	0120
10.	Near Lane 35 Container	0135
11.	Near Indradevi Path Container	0150
12.	Sh. Lefekar Chowk	0165
13.	Near Business Guild, Ram Mandir	0180
14.	Minor Apartments, Lane College Road	0195
15.	Krishna Kunj Apartments, Lane College Road	0210
16.	Vijay Apartments, Karve Road	0225
17.	Shiksha Apartments, Shantiga Lane	0240
18.	Gompha Apartments, Kirloskar Path	0255
19.	Prabodhan Apartments, Raga Marg	0310
20.	Maharajwadi, Raga Marg	0325
21.	Near Prabodhan Container	0340
22.	Sachin Bhargava, Ayakar Bhawan	0355
23.	Shivaji House Society	0410
24.	Parashram Kuti Sahakar Sadan	0425
25.	Anand Apartments, Throat Colony	0440
26.	Pooja Apartments, Ayakar Bhawan Road	0455
27.	Near Lalitlal Container, Teral Road	0510
28.	Near Hajari Kuti Container	0525
29.	Hajari Kuti, SMT	0540
30.	SMT College Gate	0555
31.	Film and Television Institute	0610
32.	Hotel Bhatia, Lane College Road	0625
33.	Bhanderkar Institute	0640

Ghantagadi # 12 / Pratihag 36		
No.	Feeder Point	Time
1.	Karve Road Post Paraswati Kavadi	0000
2.	Akashdeepi Ganesha College	0015
3.	Central Mail Maildahan	0030
4.	Khyatnadi Wadi number 35	0045
5.	Near Hall Margal Karyalaya	0060
6.	Bhanderkar Wadi, Siddhant Hall	0075
7.	Hotel Kalyan	0090
8.	Near Agrisharmadhi Kanda	0105
9.	Raja Mantri Mahan	0120
10.	Sandhya Hotel	0135
11.	Mahadevi Panavale	0150
12.	Kasat Petrol Pump Karve Road	0165
13.	Nipravara Kalyani School, Bhonde Colony	0180
14.	Shantidul Kalyani Path, Bhonde Colony	0195
15.	Kalyanwadi Chowk	0210
16.	President Hotel Chowk	0225
17.	Maharaj Bhona Path, near Ganesha College	0240
18.	Kalyanwadi Hospital Chowk	0255
19.	Shiksha Chowk, Pratihag Road	0310
20.	Pratihag Road, Lane 30 and 31	0325
21.	Pratihag Road, Lane 30 and 31, near Laxman Hotel	0340
22.	Kolkar Nursing Home Lane 3, 3, 4	0355
23.	Deewan Police Station	0410
24.	Wing Mandir, near Post Office	0425
25.	Chitale Container	0440
26.	Near Deewan Sport Ground	0455
27.	Near PCC Ground	0510
28.	Near Balakrishna Container	0525
29.	Near Kanda Refini Path	0540
30.	Kandark Chowk	0555

Sandhya Inspector - Sandhya Dhanwant  
Mobile 94806-31879

Driver for route 3 - Shashikant Thakur  
Driver for route 12 - Bharat Chavan

# Intermediate Transfer Stations





# 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
- Mandatory onsite disposal in post 2000 residential and commercial schemes

# Best Practices (Cont.)



- Loknete Yashwantrao Chavan Pune City Cleanliness Drive
- Data collection for MIS using Mobile SMS
- ALERT G-Complaint Redressal through citizens participation
- Celebration of Ganesh Utsav in Eco friendly manner
- Sonia gram udyog prakalp for plastic recycling
- Shredding and composting of garden waste

# 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.



# Integrating Informal Sector



- Pune city's efforts to partner with waste pickers organizations to provide better service – 2300 wastepickers cover about 4 Lacs HHs
- PMC pays for management and equipment cost
- Health insurance provided by PMC



# PMC - SWaCH MODEL



- ✦ Segregation by citizens and user fee based model
- ✦ Decentralized waste management and processing
- ✦ Better conditions of work for waste pickers
- ✦ Climate change mitigation
- ✦ Cleaner waste for recycling industry
- ✦ Poverty Alleviation
- ✦ Public Private Partnership
- ✦ Reduction in municipal expenses for waste management
- ✦ Better waste management
- ✦ Compliance of MSW 2000 rules

# New Portable Sheds for SWaCH



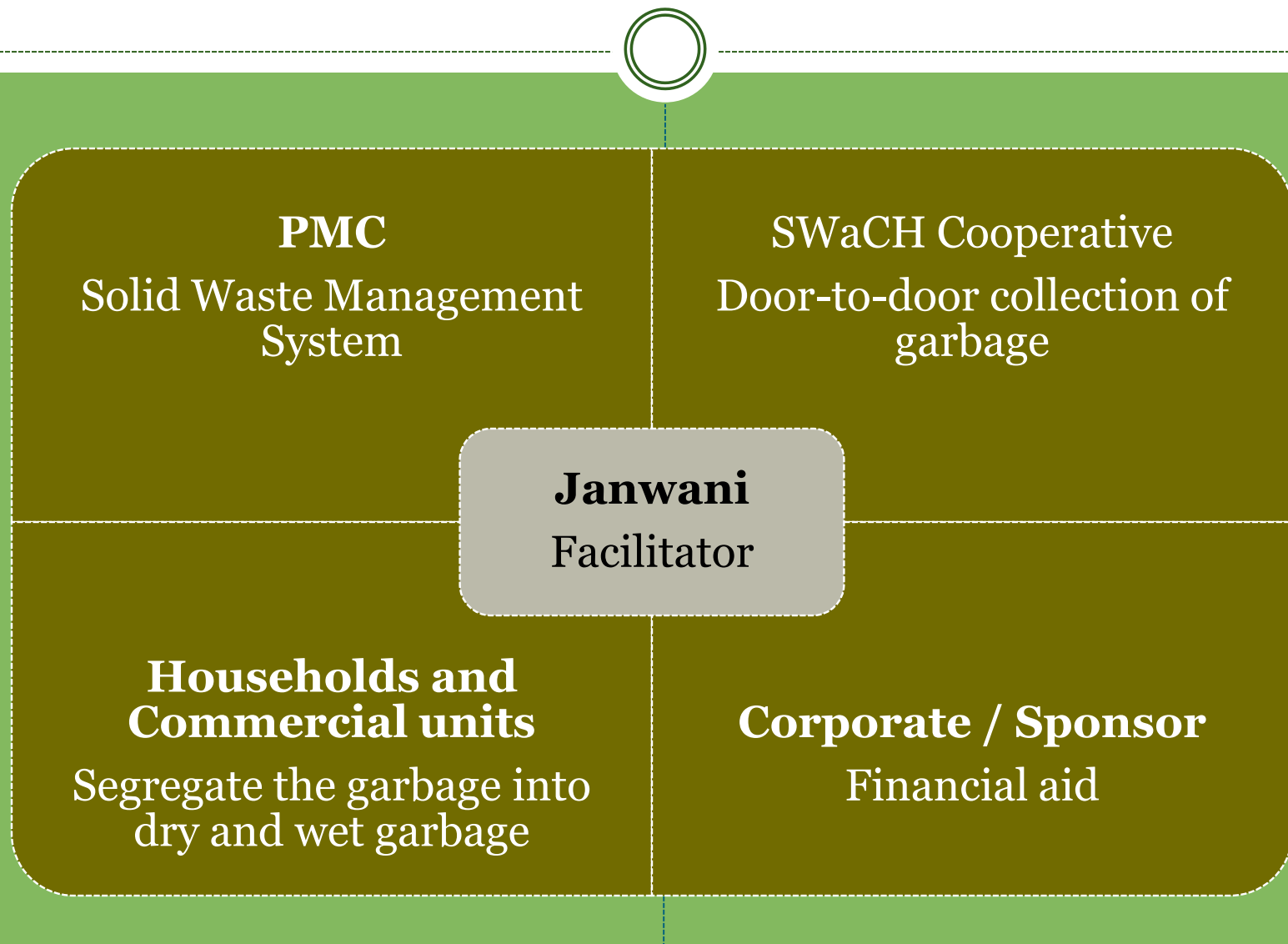
- There are 25 sorting shed Including 6 Portable & Other
- Sonia Gram Udyog Prakalp
- 1) Aundh 2) Katraj
- 200 – 250 Waste Picker Directly Attached Processor
- 4 TPD of waste is Processed



# Pune's Trash Solution: A Zero Garbage City

Adapting Katraj ward case study into an innovative model  
for a citywide system

# Implementation Partners



# 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



### 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

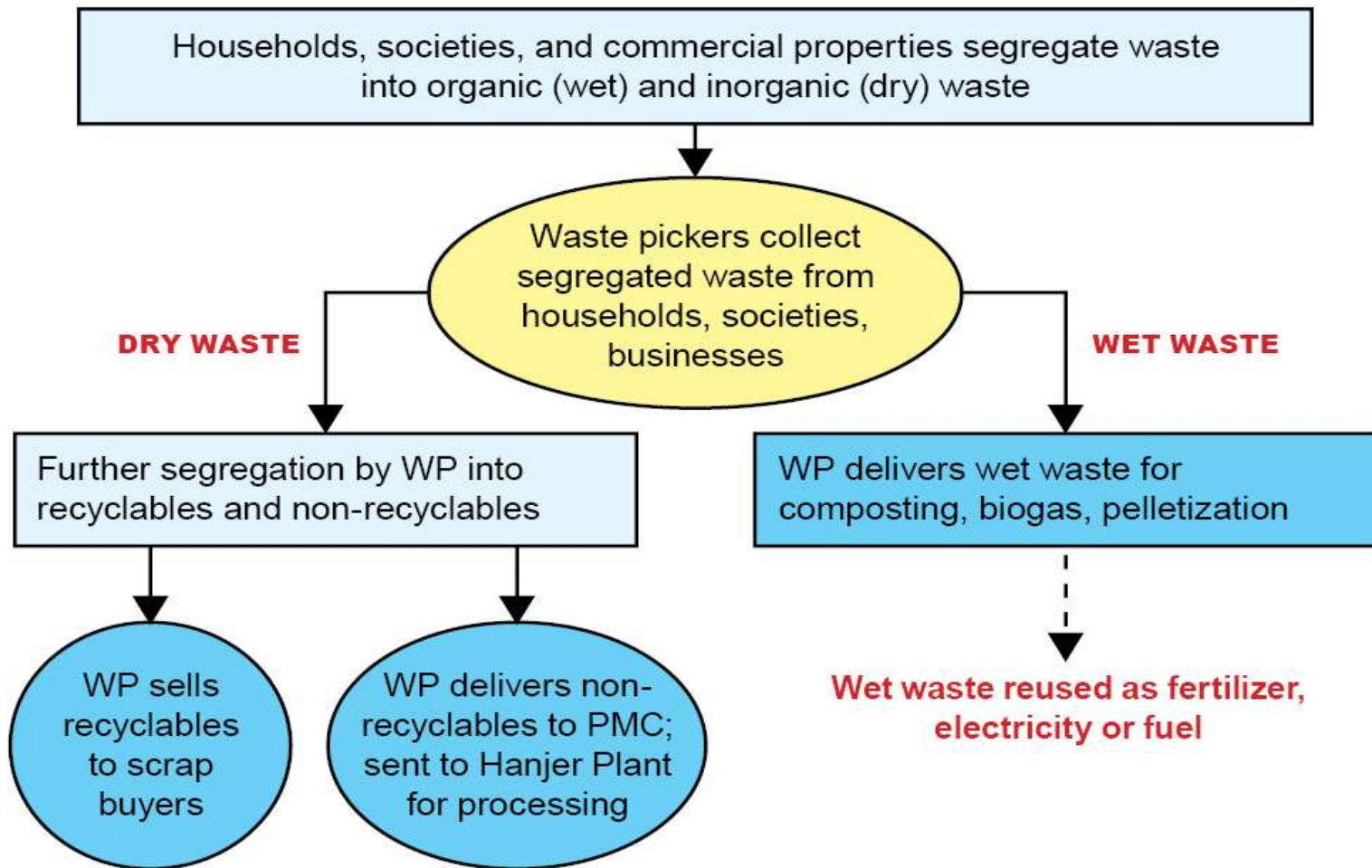
- Reduced transportation and landfill maintenance costs.
- Citizens forced to take responsibility for waste generation.
- Cleaner, more appealing city.

### PHASE 1 WARDS

Warje Karve Nagar  
Kothrud  
Aundh  
Ghole Road  
Dhole Patil  
Sangamwadi  
Nagar Road  
Kasaba Visram  
Tilak Road  
Sahakranagar  
Bhavani Peth  
Hadpsar  
Bibvewadi  
Dhankwadi (a)  
Dhankwadi (b)

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

# Basic structure of Zero Garbage Model



# Results in Katraj



- First waste management system in India to receive ISO certification.



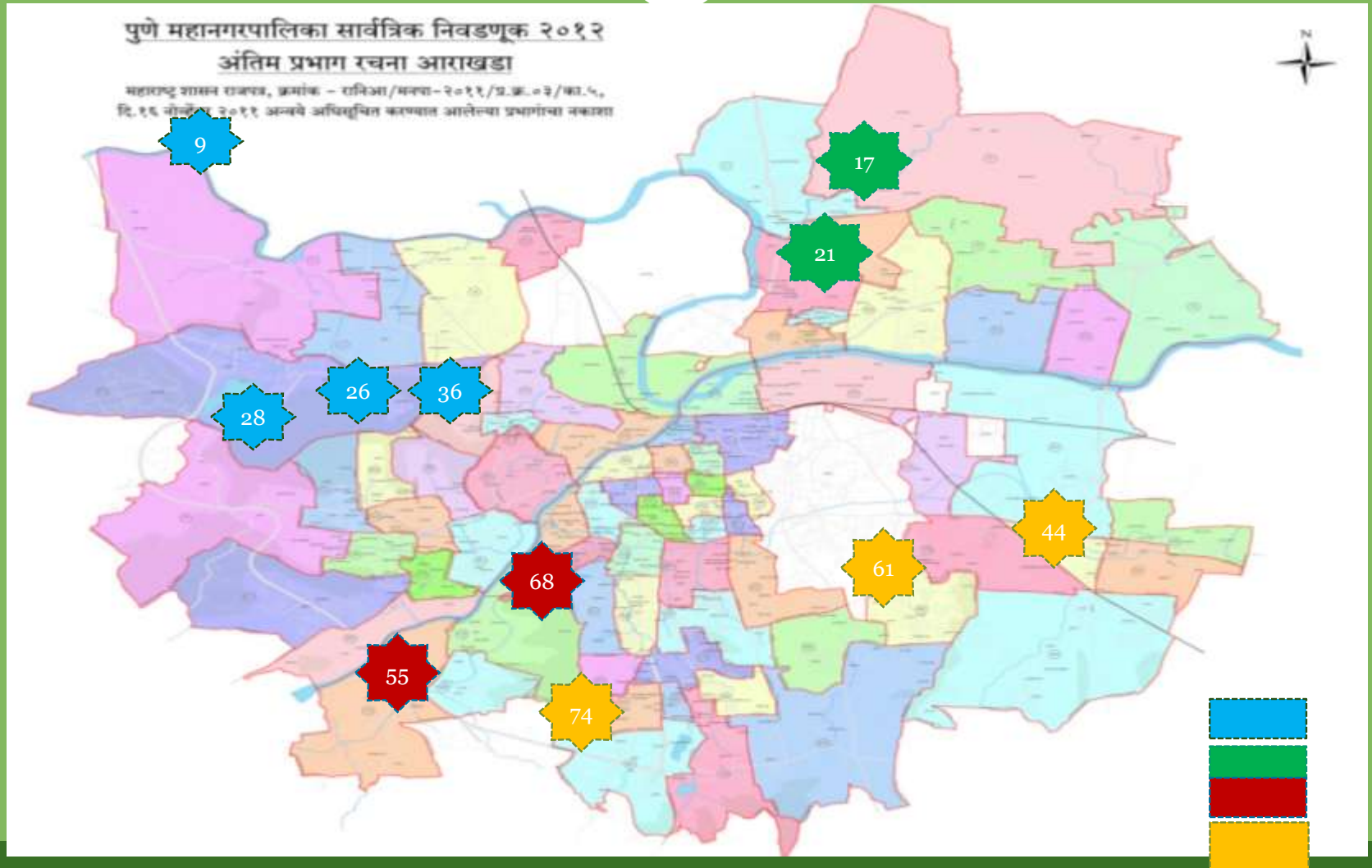
- Manual developed for ISO establishes correct practices for waste collection, transportation and disposal.
- Manual outlines process for complaints by both residents and waste pickers.
- Certification process paid by Cummins India.

# Process for scaling up



- Meeting with Corporate houses for involvement in SWM
- Expression of Interest invited from different organizations, Janwani an organization has experience has selected
- 20 prabhags have been shortlisted for scaling up the project in the first year

# Replication of Zero Garbage Ward



# 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

# Mandatory onsite scientific disposal of solid waste



Residential & commercial schemes. Built after Yr 2000.

\*Tax Rebate Incentive Scheme\*

DETAILS	No. of Properties
Solar	4075
Vermiculture	10429
Solar & Vermiculture	7254
Vermiculture & Rain Harvesting	1024
TOTAL	22782



# Hanjer Biotech – Composting and RDF



# Ajinkya Biofert - Composting



# Disha Waste Management - Composting



# Bio Methanation Plants



Description	Value
Biogas Generation	300+5% m <sup>3</sup> /day
Calorific Value	4800-5000 Kcal/cum
Engine Efficiency	25%
Electricity Generation	1.5 kWh/cum of Biogas
Equivalent Electricity Generation	450kWh/day
Auxiliary Power requirement	@50 kWh/day
Net Surplus Electricity for sale	400 kWh/day

# Processing- Mechanical Composting

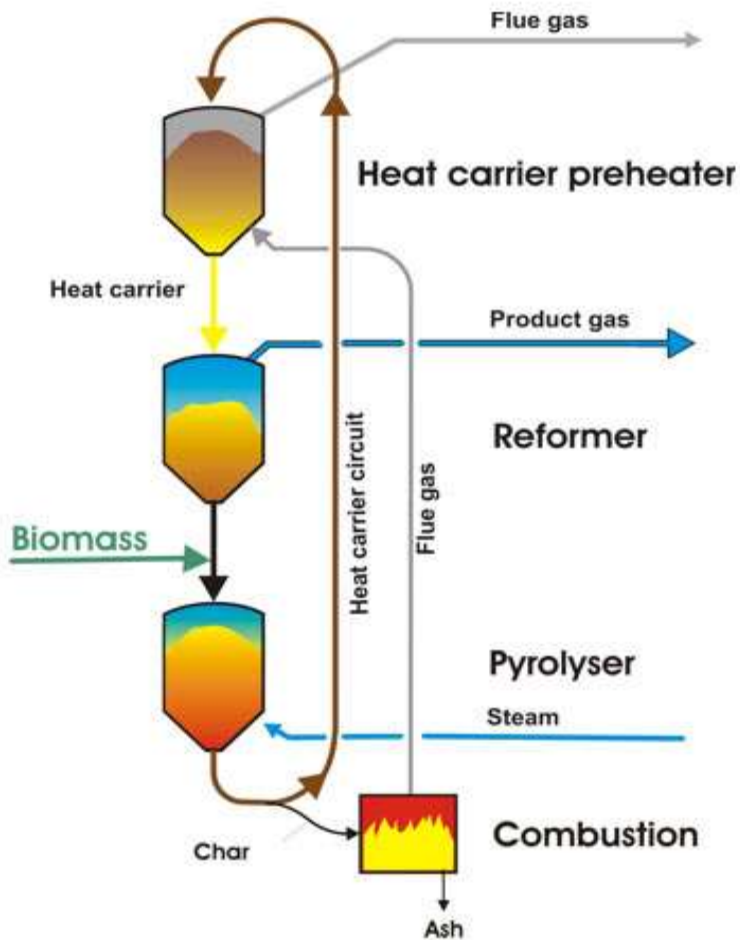


Sr. No	Location of Biogas Plants	Capacity of Plant
1	Ram Tekdi Garden	2 TPD
2	Aundh Ward office	2 TPD



मेकॅनिकल कंपोस्टिंग प्रकल्प ( क्षमता २ मे. टन प्रतिदिन )

# 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.

# Rochem Separation System



Shredding



Drying



Pre Conditioning



Gasification

# Celebration of Eco Friendly Ganesh Utsav



*PMC* arranges sessions in which students are taught to make idol of Lord Ganpati from traditional clay and by using natural colors.

# Eco-friendly Ganesh Utasav



# Data Collection For 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 15wards having a total of 165 sub offices.
- Total attendance at each of the 165 sub office is recorded in registers.
- 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 help in forming sustainable Public Private Partnership



# Scientific Closure of MSW Dump Site



As per MSW Rules 2000, Scientific closure and beautification of 30 hectares of dumping site at Urali Devachi is in progress

# Reducing Carbon Emissions with Eco friendly technologies

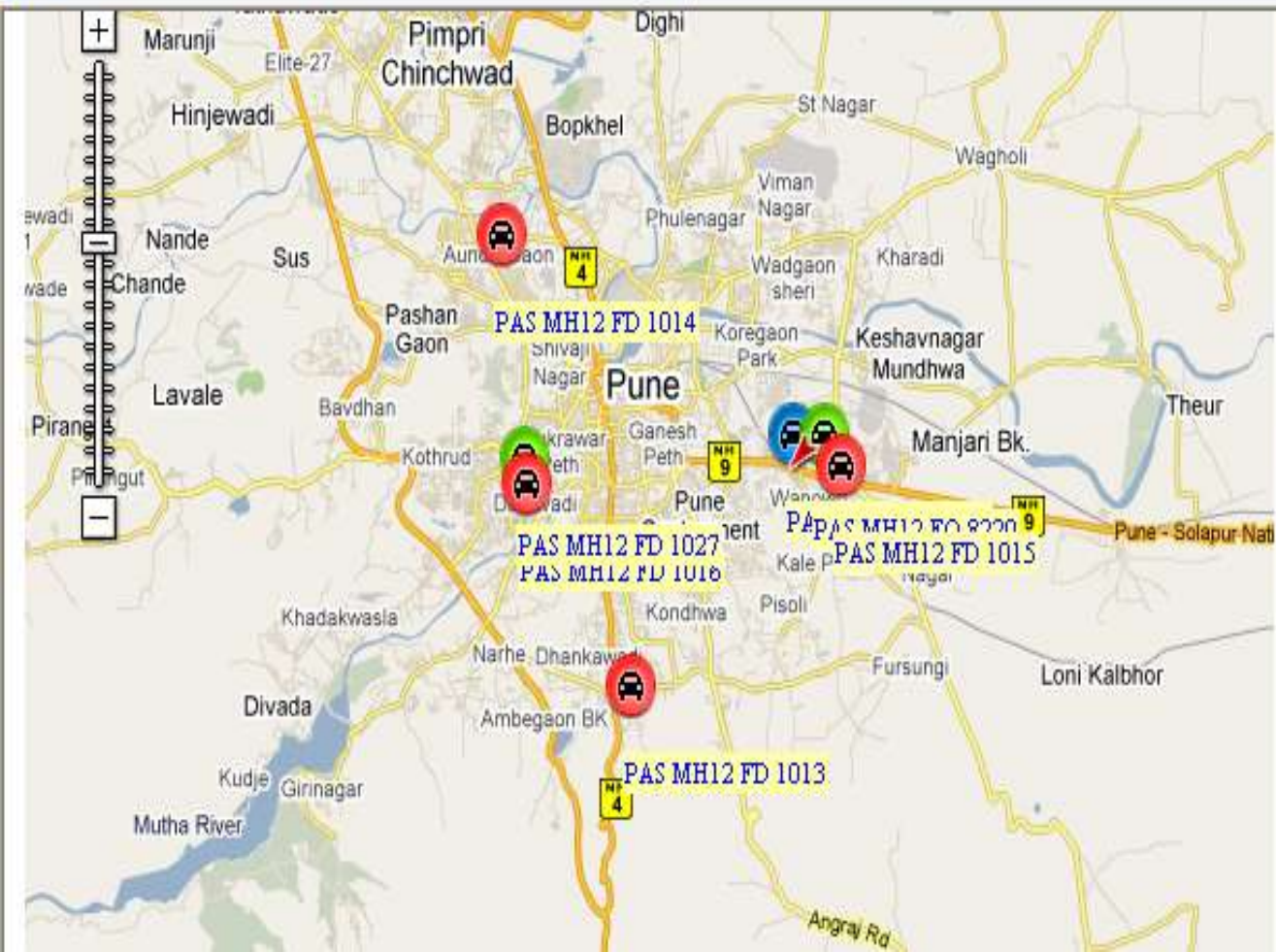


- The total CO<sub>2</sub> equivalent emissions could have been **5.58 times** the current emissions in case PMC had not installed the scientific technologies to process MSW in Pune city

# Biomedical Waste Management



Special Vehicles for collection



☐ Last Update Time  
☐ Speed  
Update Location(s)

Auto-update every 15 min Start

Show GeoFence none

## Vehicle List: Details

Filter All

Show All Hide All

- ☒ PAS MH12 EQ 1792 LiveTrack
- ☒ PAS MH12 EQ 8220 LiveTrack
- ☒ PAS MH12 FD 1013 LiveTrack
- ☒ PAS MH12 FD 1014 LiveTrack
- ☒ PAS MH12 FD 1015 LiveTrack
- ☒ PAS MH12 FD 1016 LiveTrack

# E Waste Management



1. PMC , GIZ and SWaCH has developed a model for collection and recycling
2. Establishment of Informal Sector Capacity building
  - Training of trainers on Business Management
  - Basic training of Scrap Dealers
3. Policy dialogues and Dissemination activities
  - Poster Competitions for school students
  - Posters and Flyers
  - Collection bins
4. E collect drives



# Behavioral Change Communication



## Central level

- Making short films for theater.
- Arches & Standees.
- Puppet shows
- Informative CD's for Societies.
- Mohalla Committee meetings.

## Local level

- Meetings with hotel owners, citizens
- Training of scrap shop owners for E-Waste.
- School Training Programme.
- Mohalla committee meetings in Ward Office on every last Thursday.
- Student Rally
- Cleanliness Drives by School & College Students.

# Trainings



- PMC conduct systematic training of sanitation staff for delivery of public services efficiently, and improving their communication skills
- Conducted training of sanitation staff and RCV's on SWM
- Meetings of women kothi leaders and sanitation are held on the last day of each month to discuss all relevant issues.

# Monitoring mechanism



- Reporting System
  - Weekly report format.
  - SI & N.D.Squard fine collection report.
  - Notices to Societies for non segregation.
- Notices & fine to plastic bag sellers.( $<50$  microns)
- Legal action.
- Publication of Ghata trucks route maps
- Third party auditing
  - Indicators defined for auditing
  - Based on these an independent body ensure procedures are followed
- Mohalla Committee
- Swachhta mitra
  - Local residents become involved with the project
  - Ensures sustainability





# Achievement @ Glance



- **SWaCH model** : Saved more than Rs. 12 crores per annum in waste handling costs
- Waste pickers & itinerant buyers collect recyclable materials that amount to **22%** of municipal solid waste
- They save Greenhouse Gas Emissions of **2,94,316 Metric Tonnes of Carbon Dioxide Equivalent (mtCO<sub>2</sub>-eq)** per annum (2006)
- **Zero Garbage Ward**: improved service delivery of DTDC and segregation of waste and reduced transportation cost bet Rs 500-800 /Ton.
- ISO Certification for Decentralized Solid Waste Management System: Easy to transfer and replication



- **Energy generation** : About half MW/hr 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*

# Conclusion



- Pune has a significant growth and development trajectory. It has seen its transformation from art and cultural capital of Maharashtra to oxford of east to Auto Hub of India to global IT centre.
- PMC has responded to the challenges of urbanization and is making every possible efforts to improve quality of life of its citizens.



# Conclusion



- The city has taken multi dimensional approach to overcome the challenges of urbanization.
- The solution lies in using different technologies tailor made to solve the specific needs of the problems at local level.
- Citizen and Governance have come together and mutually agreed to execute solutions.
- Pune- An Emerging ECO-Friendly City.



# Recognition



- Vasundhara Award 2013 by Maharashtra
- Pollution Control Board for best practices
- Vasundhara film Award 2013 for - Awareness film '*Kachara Muktnichya Dishene*'
- HUDCO Awards for Best Practices to “ Improve the 2012-13”
- ICON SWM 2012- Award of Excellence in SWM.
  - By International Society of waste management, Jadhavpur University & Karnataka Govt,2011-12.
- NagarRatna Award by JNNURM in 2010-2011.



# THANK YOU FOR PATIENT LISTENING...



**Pune Municipal Corporation, Maharashtra**