

Solid Waste Management Department Pune Municipal Corporation











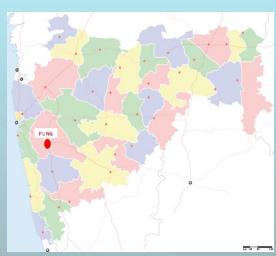


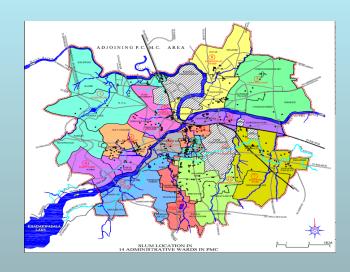
PUNE CITY 1960 PUNE CITY - 2018



PUNE CITY







Total Area	333.56 sq km
Geographical Location:	Western Part of Deccan Plateau
Latitude:	18° 25' to 18° 37' North
Longitude:	73° 44' to 73° 57' East
Average Climate:	
1. Summer:	22 °C – 41 °C
2. Winter:	8 °C – 25 °C
3. Rainfall:	650 – 700 mm
Altitude:	560 Meters above Sea Level

- > Pune is the 8th largest city in India and the 2nd largest in the state of Maharashtra.
- > Population : about 4.5 to 5 million
- > Households: nearly 1.2 million
- > Area: 333.56 sq. km.
- > 41 Electoral wards
- > 15 Administrative Ward
- > 5 Administrative Zones

Pune generates 2000 -2100 tons of solid waste per day.



"WASTE IS NOT WASTE UNTILL WASTED"

BACKGROUND

Rapid urbanization

Changing consumer habits

Space constraints for processing

Change in quality and composition of waste generated

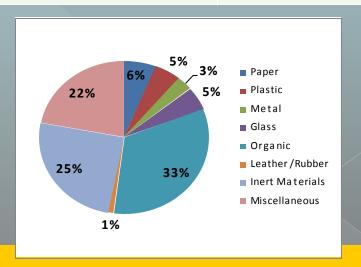
Innovative and sustainable solutions

Segregation at source and decentralised processing of waste

Sources and Composition of MSW

SN	Source of generation	Quantity(MT)	% of total
1	Household	950	69.1
2	Street sweeping & drainage cleaning	140	10.2
3	Hotels &restaurants	150	10.9
4	Markets / commercial area	50	3.6
5	C and D Waste	75	5.5
6	Fruit, vegetable, Vish meat market waste	7.5	0.5
7	Biomedical waste	1.8	0.1

Description	Percentage
Organic Matter	45 to 50
Recyclables from Residential & Commercial	35 to 40
Inert Material	10 to 15
Other Parameters	 437 Kg/m³ 937Kcal/Kg 22.85



INTEGRATED SOLID WASTE MANAGEMENT



Vehicle Name	Nos.
TipperTrucks	160
Compactors	24
Dumper Placers	85
Bulk Refuse Carrier (B.R.C.	59
Mechanical Sweepers	02
Other	119
Total	449

Year	Population	Waste Generation (TPD)
2011	3,115,431	1374
2021	4,487,573	2677
2031	6,211,404	4125
2041	8,597,417	6071

OVERVIEW OF WASTE MANAGEMENT

- > 160 trucks collect waste door-to-door, collecting an average of 225-250 tons per day.
- > 700 containers and buckets dispersed around Pune.
- Ward wise average- 350 to 750 gms per capita per day
- Construction and demolition waste generation –150-180 TPD
- Garden waste generation 50-60 TPD
- Hotel Waste Collection 120-125TPD
- Biomedical waste 5-6 TPD

VIDEO CLIP



Process

Collection

Storage

Segregation Recycle & Reuse

Transportation

Processing S

Scientific Disposal

Overall SWM system



Slums

- Non slums
- Commercial



Secondary Transportation

•From DTDC to transfer station •From

transfer station to processing / landfill

Processing and landfill

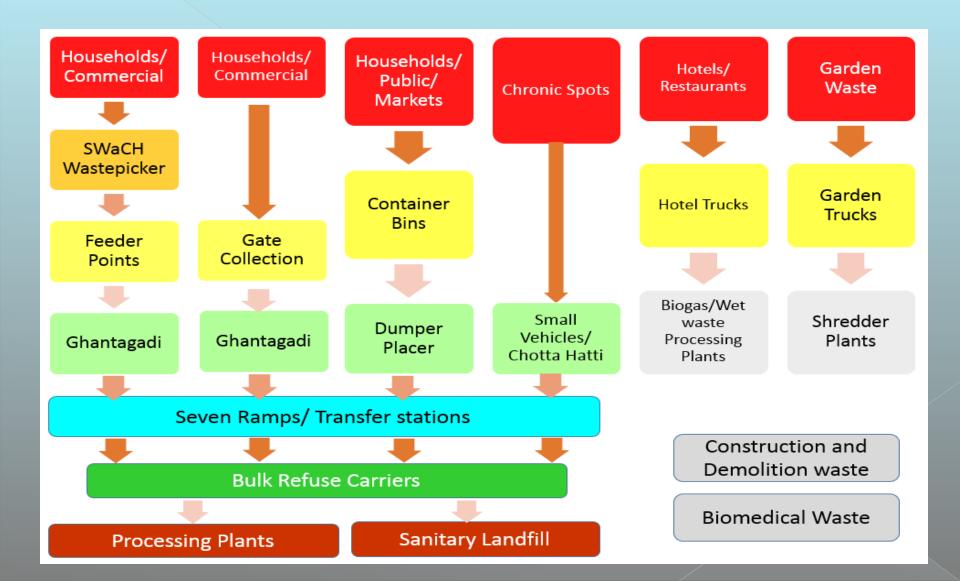
- Wet
- Dry
- Mixed
- Specialized
- Scientific landfill

Primary collection



Flow of waste





PMC -SWaCH MODEL

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



Now, waste-pickers get portable work space

Pune: In a bid to make Pune a healthy city, and to reduce visual discomfort caused to citizens due to waste-pickers sorting waste on roadsides, the Swach cooperative has introduced portable recycling centres and sheds in some parts of the city. These areas will be used by wastepickers to sort dry-waste.

While only four such centres have been started so far, the aim is to have one each in every neighbourhood.

Laxmi Narayan of Swach said the four centres have been started by raising donations and the Swach is now planning to reach out to the corporate sector for help.

"Ideally, the state should invest in setting up sorting centres, so that the waste- A sorting centre at Bhosalenagan



The idea of opening centres is to shield the waste-pickers, as people often complain about women sorting waste on roadsides or outside housing forced to sit on the road as they don't have any designated space to work

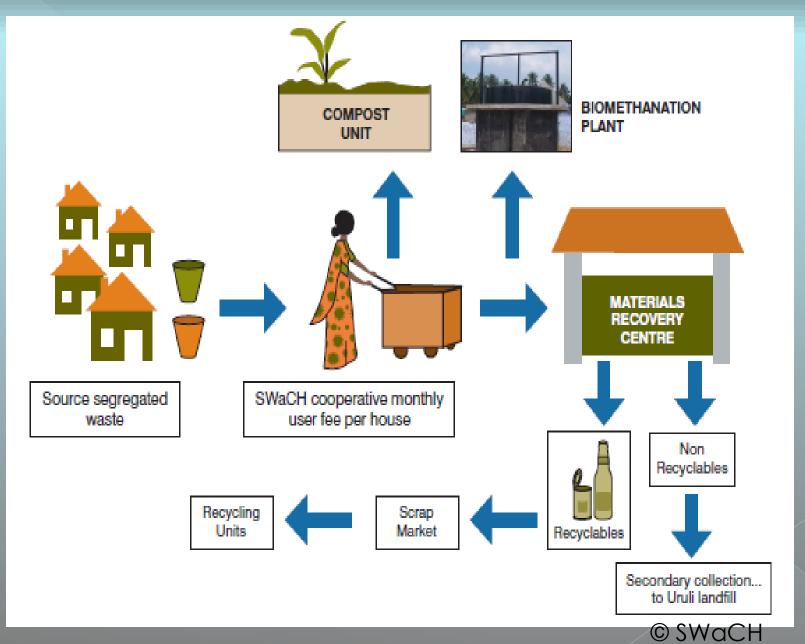
pickers have a proper space to do their job. The aim is to chayat, is an autonomous enshield the waste-pickers, as terprise of waste-pickers people often complain about that is authorised to provide women sorting waste on door-to-door waste collecroadsides or outside housing tion and waste management societies. This is because, services by the Pune Municiwaste-pickers do not have pal Corporation.

any designated space to carry out their work," Narayan

Narayan explained that these sheds will also be a way to recycle scrap material "Flex-boards that we see across the city are the biggest concerns these days as they cannot be recycled and are seen lying around. We plan to use these boards as screens for the sheds. Eventually, these areas will be used for recycling garbage, or sale of scrap material," she said.

established by Kagad Kach Patra Kashtakari Pan-

GRAPHIC ILLUSTRATION OF MODEL



Integrating Informal Sector – SWaCH Model

- Pune city's efforts to partner with waste pickers organizations to provide better service – 2850 waste pickers cover about 0.45 Million Households
- PMC pays for management and equipment cost
- Health insurance provided by PMC
- Recent MOU 7000 WPs will cater services to the entire city.









Before and After









Primary Collection

Methods of primary collection

1. Door to door collection





2. Gate Collection from Households by ghantagadi directly



3. Community bin collection by Dumper Placers







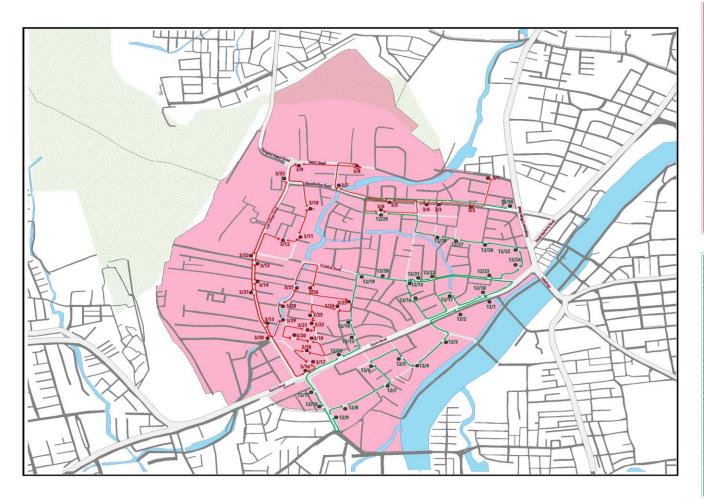
15%

4. Chronic spots -





GHANTAGADI ROUTE MAP



No.	Feeder Point	Time
1.	Near Gupte Hospital	0800
2.	Near Balshikshan School	0815
3.	Navyug Vinayak Mitra Mandal	0830
4.	Spencers Mall, Bhandarkar Road	0845
5.	Pawar Quarters, Bhandarkar Road	0900
6.	Kamala Nehru Park	0915
7.	Near Kale Path Container	0930
8.	Jain Hostel	0945
9.	NCC Headquarters	1000
10.	Near Lane 15 Container	1015
11.	Near Dabhade Path Container	1030
12.	Sw. Lohakur Chowk	1045
13.	Near Business Guild, Ram Mandir	1100
14.	Minar Apartments, Law College Road	1115
15.	Krishna Kunj Apartments, Law College Road	1130
16.	Vijay Agencies, Karve Road	1145
17.	Shilpa Apartments, Shangrila Lane	1200
18.	Gumpha Apartments, Kirloskar Path	1215
19.	Prabodhan Apartments, Rege Marg	1230
20.	Mukt Bunglow, Rege Marg	1245
21.	Near Prabodhan Container	0100
22.	Sulabh Bunglow, Ayakar Bhawan	0115
	Bharati Niwas Society	0130
24	Parshuram Kuti Sahakar Sadan	0145
25.	Anand Apartments, Thorat Colony	0200
	Payal Apartments, Ayakar Bhawan Road	0215
27.	Near Fattelal Container, Canal Road	0225
28.	Near Hajeri Kothi Container	0240
29.	Hajeri Kothi, SNDT	0245
30.	SNDT College Gate	0300
	Film and Television Institute	0305
32.	Hotel Barista, Law College Road	0310
	Bhandarkar Institute	0315

No.	Feeder Point	Tim
1.	Karve Road Pani Purawatha Kendra	080
2.	Abasasaheb Garware College	081
3.	Central Mall Mahilashram	083
4.	Khilariwadi Wasti number 15	084
5.	Sonal Hall Mangal Karyalaya	090
6.	Bhalekar Wasti, Siddharth Hall	091
7.	Hotel Kalinga	093
8.	Near Agnishamakdal Kendra	094
9.	Raja Mantri Udyan	100
10	Samudra Hotel	101
11	Shaukeen Panwale	103
12	Kasat Petrol Pump Karve Road	104
13	Shyamrao Kalmadi School, Bhonde Colony	110
14	Shantabai Kalmadi Path, Bhonde Colony	111
15	Kachrewadi Chowk	113
16	President Hotel Chowk	114
17	Makarand Bhave Path, near Garware College	120
18	Sahyadri Hospital Chowk	121
19	Ghodke Chowk, Prabhat Road	123
20	Prabhat Road, Lane 10 and 11	124
21	Prabhat Road, Lane 6 and 7, near Laxman Hotel	010
22	Kelkar Nursing Home Lane 1,3,4	011
23	Deccan Police Station	013
24	Bhaji Mandai, near Post Office	014
25	Chitale Container	020
26	Near Deccan Sport Ground	021
27	Near PYC Ground	023
28	Near Balbheem Container	024
29	Near Kamla Nehru Park	030
30	Goodluck Chowk	031
	Sanitary Inspector – Sanjay Dhanwat Mobile 96899-31879	

INTERMEDIATE TRANSFER STATION





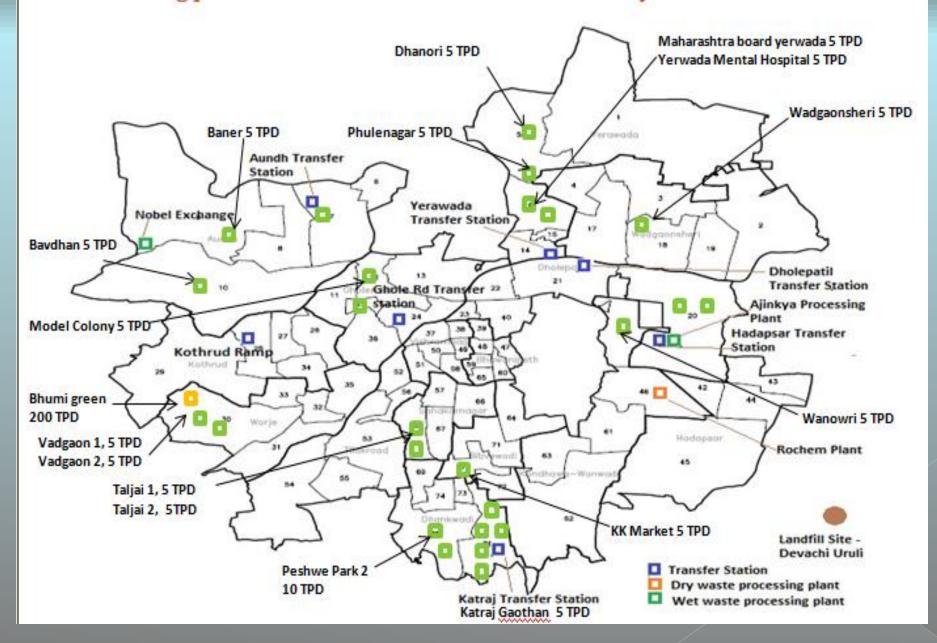


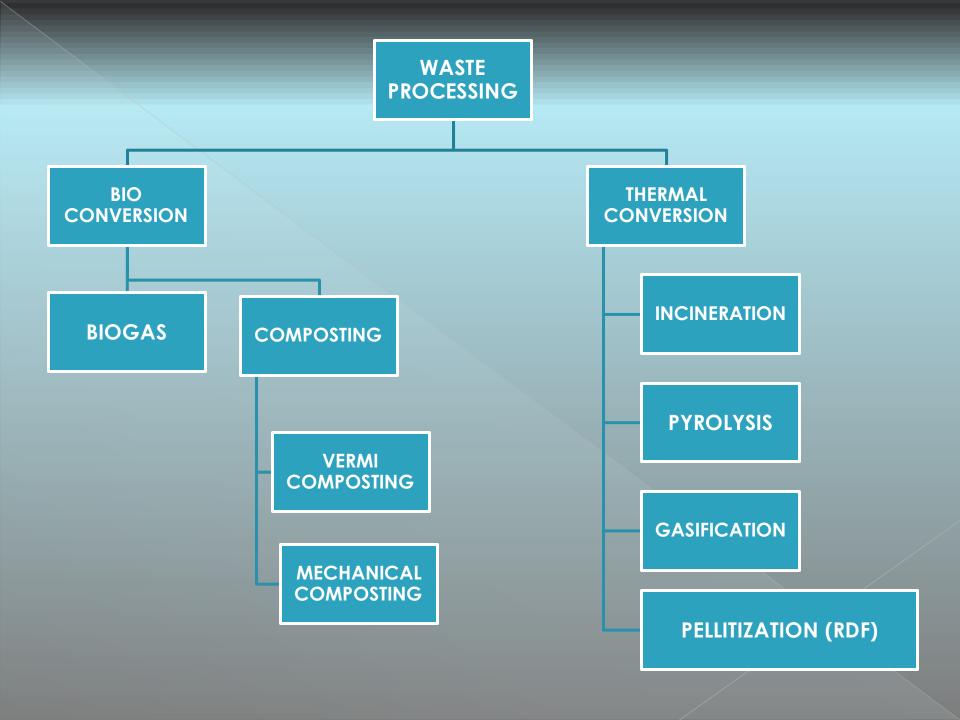
CURRENT PROCESSING OF WASTE

- Since June 2010; scientific processing and scientific landfilling.
- Decentralized waste processing plants operational at institutional and society level.

Bhumi Green Solutions Pvt. Ltd.	200 TPD; Compost Hadapsar Ramp and Ram Tekdi Industrial Estate
Mechanical compost, Thermal compost & Microorganism	50-100 TPD; Vermi- compost and compost 13 decentralized plants
Biomethanation	125TPD; Electricity and Compost 25 Decentralized Plants
Noble Exchange Pvt. Sol.	300 TPD; Bio CNG Location: Baner and Talegaon
A.D. Eco Solution Green Solutions Adarsh Construction	 50 TPD : Mechanical + manual Segregation; Katraj 25 TPD : Mechanical + manual Segregation; Dhayari 50 TPD ; Mechanical + manual Segregation ; Ramtekdi
Rochem Separation Systems	• 300-350 TPD; RDF and Compost • Ram Tekdi Hadapsar

Processing plants and transfer stations across the city





COMPOSTING

ŸVermiculture

Society level disposal technique

YCritical factors

- Moisture
- Temperature
- Expert maintenance needed





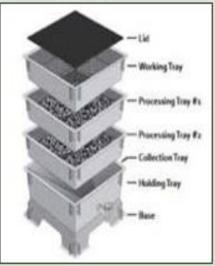


VERMICULTURE BINS

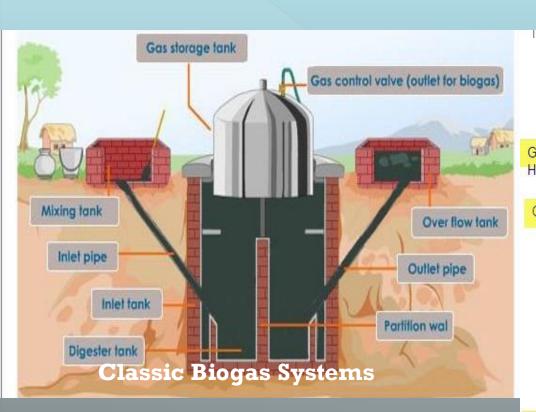








Anaerobic biogas digesters



Portable Biogas Systems



Bio Methanation Plants





Description	Value
Biogas Generation	300+5% m3/day
CaloriVic Value	48005000 Kcal/cum
Engine EfViciency	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

Refuse derived fuels

 Conversion of waste to energy is a process of waste disposal to result in the production of usable form of energy

• Thus refuse derived fuel (RDF) or solid recovered fuel/specified recovered fuel (SRF) is a fuel produced by shredding and dehydrating solid waste (MSW) with a waste

converter technology

Pelletization

Briquetting



BIO - CNG

BIO-CNG is the purified form of biogas from which all the unwanted gases are removed to get more than 93 per cent of pure methane gas.



Sanitary Waste Management

- Sanitary Napkin vending machines installed in 12 schools
- 3 Sanitary Napkin Incinerators units installed in ladies hostel/girls and schools toilets
- 700-800 napkins incinerated per unit per day





MODE OF IMPLEMENTATION - STRATEGIC APPROACH

- 1) Domestic Scale Privately Owned Bungalow's /Flats / Housing Complexes / Hotels / Institutes / Resorts. / Residential Colonies. (50 Kg. to 2 TPD)
- Ÿ 31 Nos. Biomethanation plants at Housing Society levels.

- Medium Scale (Decentralized Manner) Owned by ULB's (5 10 TPD)
- Ÿ 25 Decentralized Biomethanation Plants installed & are in operations Processing @
 100-120 TPD Wastes and Generating @ 600 KW electricity.

PPP APPROACH

Tax rebate given by PMC for eco-friendly measures practiced by citizen.

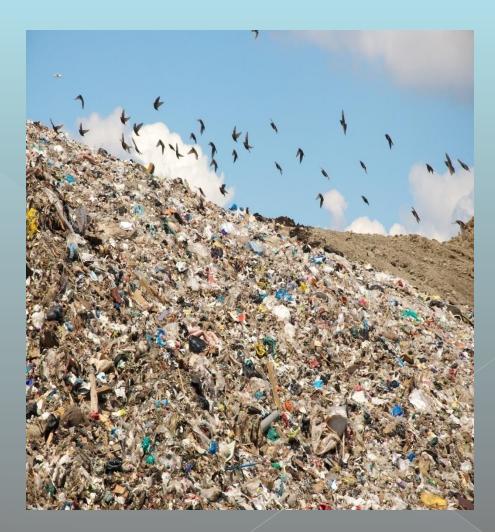




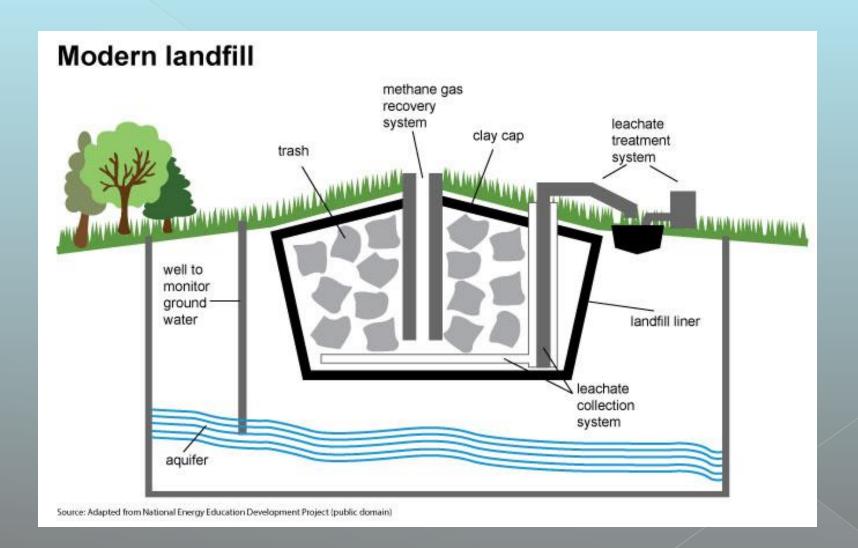
DETAILS	No. of Properties
Solar	4075
Vermiculture	10429
Solar & Vermiculture	7254
Vermiculture & Rain Harvesting	1024
TOTAL	22782

LANDFILL: Contamination of ground water

- During landfill site operation, a liquid known as leachate is produced.
- It is a mixture of organic degradation products, liquid waste and rainwater.
- It has a high organic carbon content, high concentrations of nitrogen and is usually slightly acidic
- The liquid is highly toxic and can pollute land, groundwater and waterways.



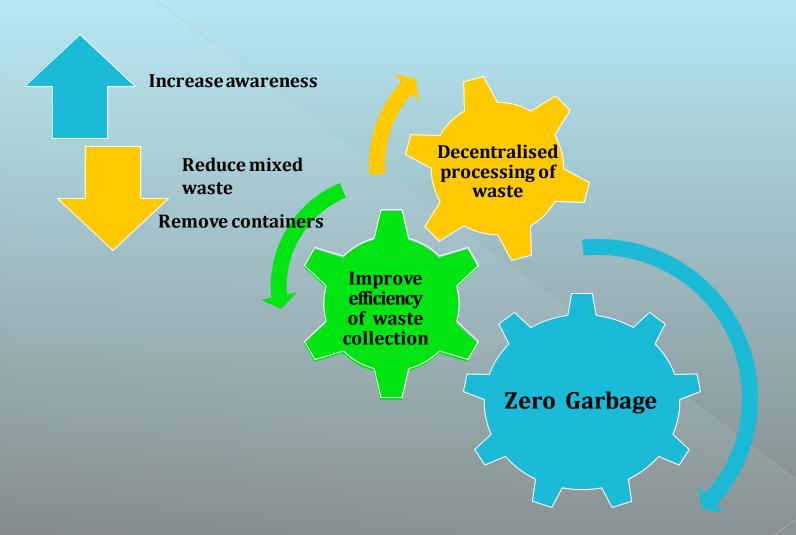
SCIENTIFIC LANDFILL



What is Zero Waste?

- "Zero waste" means that garbage should be reused locally to avoid sending the trash to landfills.
 - **∞**Alleviates both environmental issues related to landfills as well as city maintenance costs.
- How to reuse: Enhanced recycling of plastic, glass, metal and paper and harness potential of organic waste through investment in biogas, composting and other technologies.
 - ©Ultimate goal: Create *value* out of waste to produce a paradigm shift from garbage as disposable to garbage as a renewable resource.

Zero Waste Model



Key Elements of Zero Garbage Model

1. Segregation at Source

2. Doorstep collection of Segregated Waste

4. Organic waste to biogas or other processing plant

3. Further sorting and segregation of dry waste and linkage with scrap dealers

5. Systems for handling specialized waste (C&D, E Waste, Garden Waste)

Zero Garbage Pune 🚱





WHAT IS THE MEANING OF 'ZERO GARBAGE'?



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



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



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 denaue 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 responsibilty 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

Sahakaranaaar

Bhavani Peth

Hadpsar

Bibvewadi

Dhankwadi (a)

Dhankwadi (b)

Zero Waste ward

- **❖PMC** initiated "Zero Waste Ward" model pilot project in PMC's Katraj ward in 2010
- ❖Till date, the Zero Waste model has been rolled out to 20 Prabhags covering almost 2.61 Lacs properties and roughly 8.5 lacs residents
- Based on its success, the model is being rolled out in Pune Municipal Corporation in a phased manner.



Eco-friendly Ganesh Utasav

- Tank is filled with solution made up of baking powder, which helps to dissolve Plaster of Paris (PoP) and turn the residue into fertilizer.
- Offerings to the lord are converted to holi colours







For Ganesh idol immersion... Follow an Eco-friendly Solution!!!

Benefits

- Prevention of water pollution on large scale
- · Liquid residue can be used as fertilizer for plants
- · Multiple uses of calcium carbonate (sludge) which is a by-product
- Very simple to implement!

Plaster of Paris (calcium sulphate) is not soluble in water. Extensive research has given simple solution for dissolving POP Ganesh idols in water using ammonium bicarbonate (Baking Soda).

It is simple and safe – you can easily do it at home!



Step 1: Take a bucket in which the idol can be fully immersed. Fill it with water and add ammonium bicarbonate powder weighing approximately same as weight of Ganesh idol.



Step 2: Remove Nirmalya and other decorative items from the Ganesh Idol. Then immerse the Ganesh idol in the solution prepared in the step 1.



Step 3: Gently stir the mixture in the container every 2 to 3 hours. In approximately 48 hours, Ganesh idol will get completely dissolved. Sludge, that settles at the bottom of the container is calcium carbonate.



Step 4: The liquid left is ammonium sulphate which is a popular fertilizer and can be used as such, for watering plants and lawns.

Scientific treatment of waste



The total CO₂ 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

AWARENESS PROGRAMS



Organised Area

(Societies and Commercial complexes)

Un Organized Area

(Slums and Gaothan)

Rallies and Meetings with housing societies

Poster exhibition and video on segregation shown in Societies

Games to help spread awareness about segregation

Surprise Visit to check compliance of segregation

Issue notice from PMC for compost pits and segregation of garbage

Awareness Rallies

Door to Door awareness

Street play, puppet shows

Surprise Audit to check compliance of segregation

Meetings with SHGs, Ganesh Madals and other

Segregation - Approach

PPP- - with help of NGOs and waste picker's Organization (like SWaCH).

Pune Trash Solution – Zero Garbage Ward project

Awareness- - Through IEC.

Incentives- - Distribution of dry and wet waste bins to households and tax rebate for practicing ecofriendly methods

Bell ringing vehicles - 160 nos for separate collection of waste Establishment of Separate system for Garden Cutting and 8

Shredder Machines Vixed at various location for garden waste processing

Separate system for hotel waste collection through 23 trucks Post 2000 constructions have compulsion of insitu wet waste management

PMC's Complaint redressal system



Pune Municipal Corporation





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ACHIEVMENT @ A GLANCE

SWaCH model:

- ∞ Saved more than Rs. 15 crores per annum in waste handling costs
- ∞ Collect recyclable materials that amount to 20% of municipal solid waste
- ∞ They save Greenhouse Gas Emissions of 2,94,316 Metric Tonnes of Carbon Dioxide Equivalent (mtCO₂--eq) per annum (2006)

Zero Garbage Ward

- ∞ Improved service delivery of DTDC and segregation of waste and reduced transportation cost.
- ∞ ISO CertiVication for Decentralized Solid Waste Management System: Easy to transfer and replicate
- Energy generation: About 1 MW energy from 100 tons of organic waste using biogas (Pay back period 5--6Years)
- 100 percent scientific disposal since 2010 and no open Dumping – Scientific land Hilling & Capping

CONCLUSION

- Pune Municipal Corporation has a head start in MSWM over other ULBs in India.
- The ethos and working culture of the MSWM staff at all levels is conducive to up-gradation of the existing treatment and disposal options.
- The 2043 horizon will require management of about 6000 TPD waste with state of the art reduction technologies for resource & energy recovery.
- Higher degree of mechanization and enhanced monitoring techniques will need to be employed.
- Emphasis will also shift to full consumption of treated waste products within the city limits.
- Emphasis will also be on reduction of residues to go into landfill.

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.



Thank you.