

Initiatives
Towards
Decentralized Waste Management

In
Rashtrapati Bhawan

Supported
By
President Secretariat

Facilitated by



Toxics Link
for a toxics-free world

Project Team
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ABOUT TOXICS LINK:

Toxics Link is an environmental NGO dedicated to bringing toxics related information into the public domain, both relating to struggles and problems at the grassroots as well as global information to the local levels. Toxics Link also engages in on-the-ground work especially in areas of municipal, hazardous and medical waste management and food safety among others. Driven by the increasing problem of waste resulting to environmental and health implications, we engage ourselves in finding means of sustainable waste management. One of our aims is to simplify the problem by working with communities and educational institutions and help facilitate in establishing a zero waste management in the respective campuses. It has been our constant endeavor to sensitize communities including schools for participating in the development of sustainable municipal waste management practices.

NEED FOR WASTE MANAGEMENT:

Management of Solid Waste (MSW) is a serious challenge being faced by the urban and rural communities all over the world. It has acquired grave proportions in urban areas, particularly in the large urban settlements. According to various estimates, about 48 million tonnes of municipal solid waste is currently being generated every year in India, which is likely to grow two-folds in another 15 years or so. It may also be noted that the quantity and physical composition of solid waste is continuously changing with population redistribution, changing lifestyles, income, and consumption patterns in Indian towns and cities. While the share of paper, plastics, rubber, glass and metals besides several multi-layered materials is constantly increasing, that of the biodegradable organic material still remains significant in our towns and cities.

In spite of several policy and organisational changes pertaining to the role of the local bodies, particularly the municipalities, collection and disposal of solid waste remains one of the major problems in urban India. The traditional method of collection and disposal in landfill sites is neither appropriate nor feasible in the contemporary context. The land required for landfills has already shrunk in view of the changing land use patterns besides innumerable, hazardous and insurmountable environmental and health problems it posits both in the short and long run.



Decentralised Solid Waste Management Systems (DSWMS) needs to be appreciated as a strategy, which aims at providing solutions to a large number of problems and issues mentioned above, provided that such initiatives are able to successfully harness the requisite synergy, interdependence, transparency and accountability involving various stakeholders such as the municipalities, local community, waste collectors and NGO/CBO among others. Decentralization pertains to the process of devolution of resources and decision-making powers through planned intervention at the local level defined on the basis of a geographical boundary. Residents of such local community who democratically participate, take decisions, monitor and share the cost fully or partially for certain activities and functions which can be performed more efficiently at the local level. Decentralized solid waste management strategy endeavors to bring together various stakeholders for achieving sustainable, environment friendly and economically viable solutions whereby the citizens gradually begin to look at wastes as a resource rather than refuse.

PROJECT BACKGROUND:

Considering the facts, the Presidents Secretariat called Toxics Link for the facilitation of community based solid waste management in Rashtrapati Bhawan. Toxics Link with the support of President Secretariat initiated the decentralized solid waste management following the concept of 'Zero Waste Management'. The project was formally launched in July 2009 with an active participation of the residents of President Estate.

There are altogether more than one thousand and five hundred households (1500 HHs) in The President's Estate that belong to the different economic categories such as lower income group (LIG), middle income group (MIG) and higher income groups (HIG). The approximate population of the President Estate is 7500. The estimated waste generation in the entire state was found to be around more than 1000 Kg. i.e., one tonne per day. The door-to-door collection of waste was taking place but segregation of waste was not happening in the Estate. The total collected waste from the households as well as the canteen was being disposed of in the landfill sites by NDMC (New Delhi Municipal Corporation). With the concept of the 'Zero Waste Management' i.e., total waste except

inert waste should be managed with in the estate with an active participation of the residents, the community based composting was initiated.

The sustainability of the intervention depends upon the involvement of the different stakeholders like the residents, Community Based Organizations, Self Help Groups (SHGs) and the waste collectors. Purposely, the project involved the already existed self-help group (SHG) members for performing the necessary activities for the composting of the organic waste. The total 8 female SHG members are actively participating in the decentralised waste management. The responsibilities of these members includes doing segregation before putting the garbage into the pit, regular turning of waste, sprinkling of EM solution, drying and sieving of ready compost and overall supervision of the entire waste management system.

STEPS AND PROCESS

- Situational Analysis through base line survey
- Rapport Building, raising awareness amongst the residents, Self Help Group members and waste collectors to prepare them to anticipate in the community based solid waste management programme.
- Training and Capacity building of waste collectors.
- Regular Monitoring of the programme
- Community Based Composting through Effective Micro-organism (EM)

ACTIVITIES CARRIED OUT:

Situational analysis: Before the initiation of and developing a decentralized waste management model an observational survey was conducted. The aim of the survey was to understand the generation of waste, type of waste generated at household level, knowledge, practice and attitude of the residents towards the solid waste management. Based on the situation analysis the basic composting model was developed which includes the total land and number of pits required for intuition of community based solid waste management and maintain the cycle for a sustained composting.

Distribution of IEC materials: The success of any community based project depends upon the support and active collaboration of the residents in the project. With this view the organization distributed the Information and Education Material among the residents.

Impact of the Project:

When the project was initiated the door-to-door waste collection of waste from all the households and the canteen waste was in place by the waste collectors under the supervision of the sanitation department and all type of collected waste i.e., organic and the inorganic waste was stored in the community bins within the President's Estate and from these points the waste was finding its way to the landfill site through the NDMC.

Currently six self-help group members and ten waste workers are involved in the solid waste management project. Of the ten waste workers six take care of collection of waste from household level and the canteens, the segregation of the waste into the organic and recyclables. The wet waste (organic waste) is transported through rickshaw to the compost site and the recyclables go to the recycling streams by selling to the waste dealers. The remaining two waste workers and six SHG members look after the onsite segregation, regular turning, sprinkling of water & EM solution and monitoring of the compost site. Consequently, the project has greatly helped in avoiding the unhygienic and unsanitary condition on the municipal dhalao and also to recover the natural resources through the recycling of the waste in terms of composting and the recycling of recyclables.

According to the findings of the baseline survey conducted by Toxics Link, the estimate generation of garbage was found to be around 1000 kgs per day, which comprises around 750 kgs of organic waste (wet waste) and around 250 kg of inorganic waste (dry waste). Based on above data through the community based solid waste management system, the organic waste and the recyclables generated by households are being diverted from the landfill. By these small efforts approx 365 tones of solid waste can be diverted from the landfill site per annum.

On the basis of quantity of generation of garbage, Toxics Link prepared an Effective Microorganism (EM) composting model and with the support of The President Secretariat. Total 16 compost pits were constructed for the managing the total wet waste generated from the 1500 households. And the wet waste, which is around 750 kg, is being managed within the President Estate by EM composting. The ready compost can be used to maintain the parks, flowerpots and plantation in the area by the horticulture department and the residents.

The two fold segregation of waste i.e., primary as well as the secondary segregation i.e. on site segregation has helped to improve the quality recyclables as well the price of the recyclables. The earning by selling the recyclables is an extra income to the waste collectors involved in the system and results into the increased motivation among them.

Since, before the intervention no door-to-door collection was happening in the Estate and the total generated waste was going to the landfill sites through the municipal workers. Purposely for the active involvement of the residents in the paid door-to-door collection of waste was initiated by the Sanitation department of The President's Estate. Every household is contributing as the monthly user fee of rupees 10 to 15 per month as per their economic status. The monthly revenue generation through the user fee for the door to door waste collection is around rupees 12,000 and this amount contributes to the monthly salary of the workers. Segregation of waste is also being emphasized at household level as well as on-site segregation of waste.

Some of the important steps of decentralized composting have been shown in the picture given below in the next few pages.

'Photo Documentation of the Decentralized Waste Management'



Composting Site in Rashtra Pati Bhawan



Talk with residents at Rashtrapati Bhawan before the initiation



Meeting with the SHG members



Construction of Compost Pits



Onsite Segregation of waste



Organic Waste (Wet Waste) into the pit



Segregated bio degradable (wet waste) in compost pits



Sprinkling of EM solution with water



Covering with Jute Sheet after sprinkling of water



Ready organic Compost in the pits



Drying of Ready Compost



Sieving of ready compost



Organic Compost ready for use

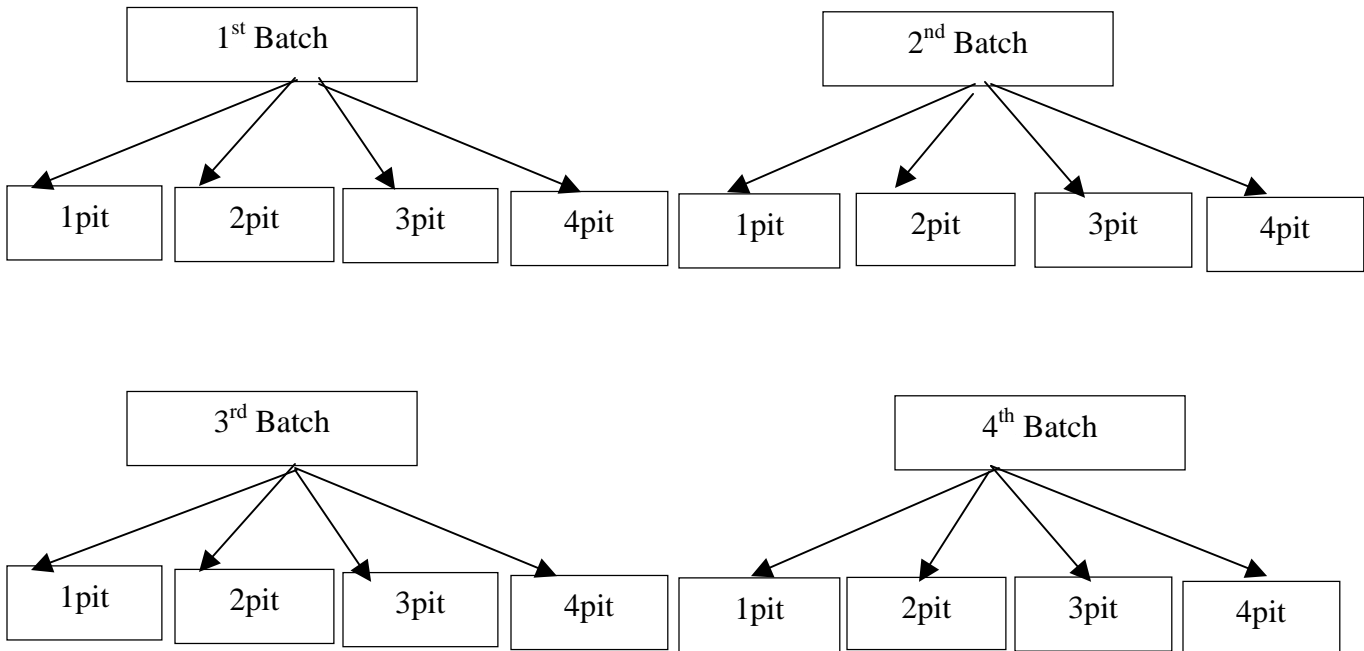
“DECENTRALISED COMPOSTING MODEL” RASHTRAPATI BHAWAN

Estimated generation of waste:

- Total population of the society: 7,500
- Average per capita per day waste generation: 200 gram
- Average per capita per day wet waste generation: 100 gram
- Total wet waste generation from 7,500 population is 750 Kg per day
- Monthly wet waste generation from 7,500 populations would be 22,500 Kg.

Size of the pits and Land required for composting:

- So $9 \times 9 \times 3.5$ i.e. 283.5 cubic ft of land is required for 5670 Kg Garbage
- 4 pits of the size of $9 \times 9 \times 3.5$ Cubic ft are required to manage the total waste generated in a month according to the design laid down below:



- Size of one pit is $9 \times 9 \times 3.5$ cubic ft i.e. 283.5 cubic ft
- Total no of pits require in each batch = 4
- Then, total no of pits require in four batches = 16
- Total land require for one batch is = $283.5 \times 4 = 1134$ cubic ft

- Total area required for 4 pits is = $9 \times 9 \times 4 = 324$ sq ft
- The measurement of the pits can be altered as per the availability of land but the depth should not be more than 3.5 ft since maintenance of pits becomes difficult.

Pit Capacity and the procedure of composting:

- If Garbage generation per day = 750 Kg
- Total garbage of one month = 22,500 Kg
- Capacity of one pit (size $9 \times 9 \times 3.5$ cubic ft) = 5670Kg
- Capacity of four pits = 22,500 Kg
- So the all four pits of first batch will be filled up in 30 days.
- Initially start with four pits of 1st batch.
- By putting 190-200 Kg segregated compostable garbage into each pit the 1st batch till 30 days i.e. 5,670 kg/pit.
- Regular turning, spray of EM (Effective Microorganism) solution and water is necessary for reducing the foul odor and preparing the compost fast as well as maintenance of optimum moisture.
- After 30 days all four pits would be filled up. Then cover it up with jute sheet and maintain moisture by regularly watering the pit. It should not dry up.
- Now start the same process with 2nd batch, 3rd and 4th batch respectively.
- In the mean time after 2-3 months the compost will be ready in the first batch and empty the pits and again follow the same process with the first batch

Community Based Composting Through Effective Micro-organism (EM) Solution

ABOUT EM (EFFECTIVE MICRO-ORGANISM):

- EM is a liquid concentrate (brownish liquid suspension made by collecting and growing natural microorganisms. The microorganisms are chiefly Lactobacillus, photosynthetic bacteria, yeast and filamentous fungi.
- The technology was developed at the University of Ryukus, Okinawa, Japan by a distinguished professor of horticulture, Dr. Teruo Higa.
- The uniqueness of EM stems from the fact that what humans consider contaminated and offensive is food for microorganisms.
- No harm will result even if EM is accidentally put in the mouth.

PREPARATION OF EM SOLUTION FOR COMPOSTING:

Equipments required for preparing Extended Solution:

1. Two barrels of 125 Liters. Capacity with tight lids.
2. One L EM Bottle
3. 2 Kg. Jaggery
4. 100 L Water

Steps for preparing the extended EM solution:

1. Mix the jaggery and the water well.
2. Add the EM Solution (Whole Bottle)
3. Cover it with the lid tightly.
4. On third and 5th day, stir it properly to release the gas and cover it again.
5. The solution is ready for use on the 7th day.

INFRASTRUCTURE & EQUIPMENTS REQUIRED FOR COMPOSTING:

1. Spade
2. Fork
3. Water sprinkler
4. Genti
5. Jute Sheet
6. Plastic Sheet
7. Bucket
8. 1 L capacity empty bottle
9. Sieve

COMPOSTING PROCESS

Steps:

- Put the garbage into the ready pit
- Sprinkle the prepared EM solution to the garbage (@ 1 L Extended. Solution / 200 Kg garbage)
- *Mix 1 L Solution +10 L Water in a bucket.
- Add water just enough to make it moist. (May be run the pipe for 3 mins). Watering should be done evenly all across the garbage in the pit
- Then cover it with the jute sheet
- The garbage should be turned every two days (minimum. thrice a week)
- EM solution and the watering should be strictly done daily. (This is important to avoid offensive smell and flies and mosquitoes)
- During rainy season, the pit must be covered with plastic sheet

IMPORTANT INFORMATION REGARDING EM COMPOSTING

- Average Density of garbage – 500 - 600 Kg/cubic meter
- 20kg garbage requires 1 Cubic ft
- 1 Lt EM solution + 50 Lt water + 2 Kg gur = 53 lit Extended Solution
- 5 Liter Extended Sol treats - 1000 Kg garbage
- So, 0.5 lit treats – 100 Kg of garbage
- Around 8000kg garbage can be dumped into the pit 12x8x4cubic ft
- If Per day generation of garbage is 500kg
- One bottle EM sufficient for around 20 days

PROBLEM AND SOLUTION IN COMPOSTING

Problems	Problem Cause	Solution
Too wet	Turning waste and dry straw or leaves etc	Cover during rain
Too Dry	Need Water	Add Water
Compost Smell like rotten egg	Not enough air	Turn and aerate
Compost smell like ammonia	Too much green matter, Not enough carbon	Add dry brown material and mix in well
Compost is dry and not warm	Not enough moisture	Mix in water
Compost is dug up by animals	Meat or dairy are added	Don't add meat, bones or dairy products. Build secure fence

MONITORING

- Formation of a Monitoring Team
- The team will check the segregation of waste (only organic waste such as food and garden waste will be composted)
- Check the use of EM and regular turning of waste.
- Check the moisture (it should not be completely dry or too wet)
- Ensuring no dumping of meat bones and dairy products.
- Coconut shell must be removed.
- Ensure that no chemical waste gets mixed with the municipal solid waste.