

DECENTRALIZED COMMUNITY- LED HOUSEHOLD LEVEL WASTE MANAGEMENT



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1. BACKGROUND

India is the second largest country in the world with a population of over 1.21 billion accounting for 17.5 percent of the world population (Census of India, 2011). Currently the Indian cities generate over 1,70,000 metric tons, of municipal solid waste (MSW) per day that includes organic waste, recyclables like paper, plastic, wood, glass etc. Only about 75-80% of the municipal waste get collected and out of this only 25% is processed and treated. It is assumed that urban India will generate Solid Waste Management (SWM) is one of the most important functions of environment conservation that needs immediate attention to control the adverse effect of waste disposal on human beings, climate and environment.

The problem of effective solid waste management is one of the major problems emerging in India. The solid waste management practices are ever changing with growth in population, quantum and types of waste generated and keeping up the pace have become a challenge for the country. With the rapid urbanization, CHFIF promotes decentralized solid waste management, which is community-led, so as to enable the community to be a part of the process, making the system more viable and sustainable for the long-term. After our intervention with school students, community, and panchayat, significant changes are observed in the project/ field areas, such as students have been motivating their family members for the segregated waste at the households level. At Gram Panchayat many officers have been visiting the SWM plant. Many volunteers from corporate sectors were involved in the field level volunteering activities.

2. DIVERSITY OF WASTE

2.1 Different types of waste:

In a study that was conducted by CHF India Foundation based on the implementation experience, it was found that the waste received from households can be broadly divided into four categories: Organic Waste, Recyclable dry Waste, E-waste/ Toxic Waste and Rejects.

Organic Waste:

Organic waste, is organic material such as food leftovers, garden waste, etc., that is bio-degradable and comes from either a plant or animal and may also be referred to as wet waste. Most of the time, it is made up of vegetables and fruit debris, paper, bones and human waste which quickly disintegrate.



Places where CHFIF has SWM units

Recyclable Dry Waste:

Recyclable wastes are the ones that can be recycled, by using different mechanisms. Recyclable materials include many kinds of glass, paper & cardboard, metal, plastic, tires, textiles etc. So "recycling" of many products or materials involves their reuse in producing different materials (for example, paperboard) instead.

Toxic Waste:

Toxic waste is any material in liquid, solid, or gas form that can cause harm by being inhaled, swallowed, or absorbed through the skin. Many of today's household products such as televisions, computers and phones contain toxic chemicals that can pollute the air and contaminate soils and water. Disposing of such waste is a major public health issue.

E-Waste:

E-waste typically includes electrical and electronic devices such as computers, cellular phones, mobile phones, Laptops, CDs, Pen drives and large household appliances such as refrigerators, washing machines, microwaves, and air conditioners. Looking at its exponential growth, it is now time to rethink the policy framework and recognize the local government as one of the key institutions to spearhead e-waste management.

Rejects:

The wastes that cannot be recycled are termed as rejects. Biomedical waste generated from hospitals and in house medical rooms such as needles, syringes, cotton/bandage with body fluids, expired medicines, sanitary napkins, etc. are rejected and should be handed over to an authorized biomedical waste vendor.

2.2 Types of key and popular composting method:

Composting is one of the options for treatment of organic waste. In composting process the organic matter breaks down under bacterial action resulting in the humus like material called compost.

i) Windrow composting:

Forming organic waste into rows of long piles called windrow and aerating them periodically by either manually or mechanically turning the piles.

ii) Nadep Composting:

Nadep method of composting was first invented by a farmer named Narayan Deotao Pandharipande, so it is called Nadep, taking initial letters from three words in the name. Nadep method uses a permanent tank of mud or clay bricks or cement blocks with holes on the sides for aeration. The Nadep method of organic composting uses a wide range of organic material such as, a crop residue, weeds, forest litter and kitchen waste with an end-product of a fertilizer.

iii) Pits Method:

As per our projected collection of wet waste we can built pits with bricks. Several adjacent compost pits are made to transfer organic material to the next. The aerobic composting process starts with the formation of the pile.

2.3 Adopted methods of composting and its rational:

CHFIF has the experience of implementing projects on Solid Waste Management in both rural and urban areas of in Maharashtra (Pune) and Karnataka (Kalburgi and Malkhed) and Andhra Pradesh (Kadapa). In all the areas, the organization has trained local people mainly women (90%), who collect segregated waste from door to door and fill the pits with the wet waste. The process followed in the different areas are mentioned below:

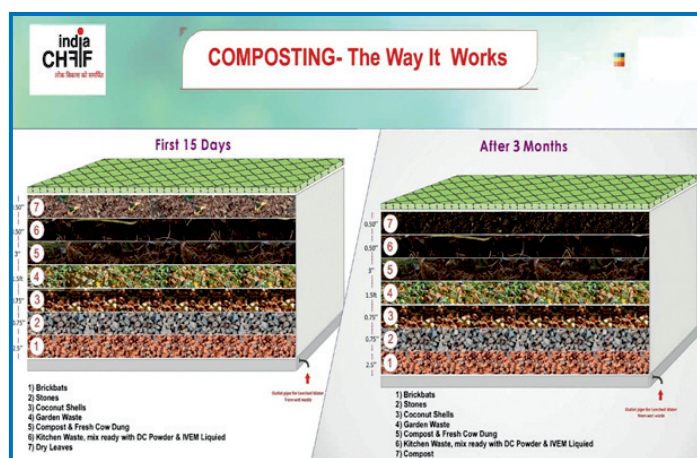
a) Pit (Two pits Batch wise) Method:

In the SWM units of Koregaon Bhima, (Pune), Kadapa(Andhra Pradesh), Kalburgi(Karnataka), Malkhed (Karnataka), We have initiated the batch method of composting, where two pits are

used at a time. Brickbats are used as the base material. It covered with stones and this layer covered with half coconuts shell. This bottom layer covered with fresh cow dung and dry garden waste or saw dust. On top of the base layer, the wet waste is put and an EM solution, made of EM liquid, molasses, curd and water, is sprinkled, on the bio-degradable waste and covered with dried leaves. The pit is closed and left to rest for a day. The next day, another pit is used. In the same manner, two pits are used for a month alternatively, till both are full and are closed with the lids. While two other pits are used to put waste, the pits which are filled are churned after every 3 days for aeration. After 2 months, the waste is converted into compost and is then shared to refine them into smaller particles and pack them to be distributed to farmers.

b) Diagram of the Pits-

Below is the diagram of the pits method which, currently, we have successfully used in our project area.



3. COMMUNITY ENGAGEMENT- THE KEY TO PROGRAM:

Before our intervention, local government body used to dump waste in open plot on its own, leading to many health and environmental problem. There were no centralized or decentralized waste treatment system/plant in the villages. Rotten garbage had piled up on roadsides, and drains were clogged with plastic bottles. CHF India Foundation focuses largely on the community awareness and enables them to manage its own waste at the household level. The main idea is that the families must manage their waste at the household level, itself. Awareness campaign to promote source-level segregation led to remarkable changes in the attitude of community people. Waste is not seen as someone else's problem but as the problem of the entire community which requires everyone to come together. Thus, the projects undertaken by the organization is operationalized in the community and through the ward level committee of women. Involvement also bring about changes in attitudes towards waste management. While the people are involved in the process of managing their own waste, the community will become self-sustained and the project will be more sustainable in terms of operations.

4. Organic Manure Test Report

The Organic Manure was tested in a Government laboratory and result is as follows:

Sr. No.	Specification	Composition	Composition as per FCO (Fertilizer Control Order, 1985)	Remark
1	Moisture	18.2	15.0 to 25.0	Within the Range
2	Total Nitrogen (as N)	0.87	0.5	Per cent by weight, Minimum
3	Total Phosphate (as P2O5)	2.94	0.5	Per cent by weight, Minimum
4	Water soluble potash	2.12	1	Good
5	Zinc (as Zn)	0	300	Metal Element absent - excellent
6	Copper (as Cu)	0	1000	Metal Element absent - excellent
7	pH	7.25	6.5 to 7.5	Within the range
8	Odour	ABSENT	Absence of foul odour	Desired
9	Bulk Density	0.89	0.7 to 0.9	Within the range
10	Conductivity	1.87	4	At lower range and within the max limit
11	Colour	Brown to Black	DARK BROWN TO BLACK	Excellent

5. KEY ADVANTAGES OF COMMUNITY- LED SWM:

Better access to citizens: The SWM unit that is built in the community is easily accessible to all the people. In such a case, the community is well aware of how the project is being implemented, who are associated with the project and what are the outcome of the project. Also, as the unit is in the community, it leads to a better ownership of the community people towards the project.

Lower over-head costs: In a social project, it is very important to employ the community people as center managers and outreach workers, as the other people will trust them more and also cooperate in their work. Instead of using Automatic machine, pits method is easy to operate without maintenance. In a community-led SWM project, where most of the workers are from the nearby locality, the over- head costs required to operationalize the project is lesser in comparison to the one that is set- up away from the community.

6. IMPACT:

At Community Level-

Bringing behavioral changes at mass level is not an easy task. CHF India Foundation took multiple steps to spread awareness among community people and motivate them for segregation at source . Push carts and auto tripper are used for door-to-door collection of garbage on daily basis through two bins distributed initially to people. The campaign was carried out in all residential and commercial area, including public places. Awareness activities was used extensively, along with street plays, wall painting, rallies, cleanliness drive, corner meeting etc. Now we are able to get 70% segregated waste at source as against 0 to 5% at the

beginning. Effectively we have reduced many open waste dumping corners in the villages.

At School Level-

The nearby educational institutions play a vital role in the projects as students are involved in the project. It is our belief that students are the future of the society, thus enabling them to be a part of a social movement. Schools were engaged to promote practice of segregation among students through sessions, drawing competition, oath taking ceremony etc. in the morning assembly. The students have now started to keep their classroom and house cleaner by not littering waste.

At Local Panchayat Level-

Without the participation of all community people and local level panchayat, it is impossible to build and sustainably operate the kind of efficient and reliable waste management system. The land for the units are donated by the local Government and they are contributing in maintaining free water, electricity supply to waste management unit apart from giving additional space for expansion in case of Koregaon bhima.

Highlights of key visible change observed -

About 27 farmers have benefited from the organic manure that they used for their crops like sugarcane, Onion, Garlic, Tapico, Ginger, Brinjal, and Animal Grass. The switch from chemical fertilizers to organic manure means a more sustainable way of agriculture. Organic manure/ compost certainly has a positive effect on soil and food quality and therefore benefit the farmers as well as the consumers. It has to be noted that farmers are now using regularly organic manure for their crops on some selected crops and parcel of land.

1) Dyaneshwar Jayvant Shinde (60 yrs), a farmer from Koregaon Bhima Said, "This year I used organic manure/ compost from the SWM unit on an experimental basis in crops like onion, garlic and yam (Retail). The onion crop yielded better and weighted better along with colourful onions than past years. Also, organic manure was given to the Yam(Ratali) crop, and the crop size is bigger and more in quantity. Organic manure has also been given to other fruit trees. Chiku, papaya, banana, guava, and drumsticks are getting better results from organic manure. Therefore, I urge all farmers to use organic manure."

2) Gulab Savashe (65 yrs), a farmer from Perane fata Said, "This year I used organic manure for crops like garlic, brinjal, lemon. I got better results than chemical fertilizer. I am so happy."

15-25 women were regularly using our organic compost for their plants and terrace garden namely, lemon tree, coconut tree, drum stick, Jasmine, Rose, Mogra, Tampico, flower and they got significant results after using organic compost.

1) Nanda Dherenge (40 Yrs.) Community Resident from Dherenge Chawl Said, "I am one of the members of the ward level committee since the inception of waste management unit in 2016, before covid 19 pandemic, I was regularly attending ward level monthly meetings. I understood the importance of organic manure. So I started using organic manure on the flowers and plants in my garden. I noticed a great result, so I decided to have a terrace garden on my terrace. The use of organic compost has resulted in very nice flowers and vegetables in my terrace garden. They look beautiful. Now many women in my community also started using organic compost for their flowers."

2) Vrushali Dherenge (35 yrs.) community resident from Dherenge Chawl Said, "Earlier my lemon and Chiku trees did not bear fruit but due to the use of organic compost, they started bearing the fruit."

7. Key Result:

A gist of progress of annual waste collection and compost generation at all SWM Centres are given below:

Sr. No	Centre	Starting Date	No. of Month	Wet Waste processed (Ton)	Dry Waste collected (Ton)	Compost harvested (Ton)	% of compost conversion from wet waste	Remark (Dry waste Sent for Re-fuel) (Ton)
1	Koregaon Bhima (Maharashtra)	14 March 2017 to April 2022	62	154	199	18	12	-
2	Kadapa (Andhra Pradesh)	July 2017 to April 2022	60	80	725	15	19	365
3	Kalburgi (Karnataka)	Sept 2018 to April 2022	26	106	63	7	7	179
4	Malkhed	24 Aug 2021 to April 2022	9	51	83	0.62	1	7
		TOTAL		391	1070	40.62	10 (Average)	551

8. Environmental Initiative-

Decentralized Solid Waste Management is a simple idea that could be integrated in the local government policy framework. The idea is simple, manage the waste from the source itself, and develop subsequent chains. At the source, that is at the household level, the waste is to be segregated as wet waste and dry waste. Due to this, corner dumping spots have reduced in the villages. The area of the village started to become cleaner. The health of the community people has improved. Proper waste removal helps improve air and water quality as well as reduces greenhouse gas emission.

The project helped gram panchayat and repaired & improved RO Plant (3000 Litre) of Gram panchayat so the people of the village in Koregaon Bhima started getting safe drinking water. School sanitation is necessary for the safe, secure and healthy environment for children. Project on Koregaon Bhima also provided separate flush toilets for girls and boys in the Zila Panchayat school. Impact of separate toilet for girls, increased their enrollment and attendance in the school. The RO Plant has a capacity of 500 Litres and providing safe drinking water to around 600 student in the school. This has improved children's health, school enrollment, attendance and retention and paves the way for a new generation of healthy children.

CHFIF wishes to replicate community led waste management program in various locations in India and take the learning to new areas and make the program more efficient and cost effective.

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Collection of waste at community



Primary segregation of waste at unit.



Processing-installing at the pit by women waste collector



Churning of waste in the pit



Heap of ready compost with packaging in printed bags



Distribution of compost to farmers



Dry waste going to kiln in the factory



Farmer using compost in their farm