Sustainable and Affordable Sanitation Solutions for Small Towns
Prof. N C Narayanan
Department of Centre for Technology Alternatives for Rural Areas
Indian Institute of Technology, Bombay

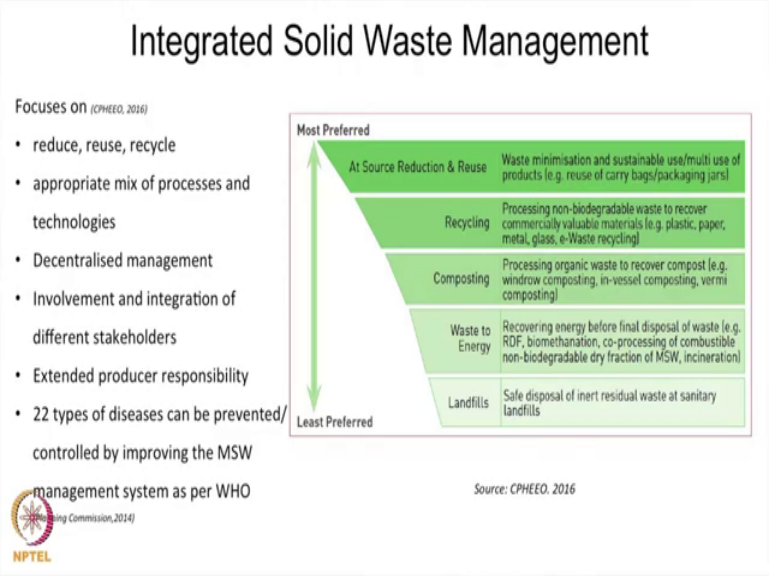
Lecture - 11
Integrated Municipal Solid Waste Management

So, whatever principles that we discussed decentralization, reduction of solid waste at the source itself, segregation. All these have been put under one conceptual framework which is known as Integrated Solid Waste Management.

(Refer Slide Time: 00:33)

This is recently being introduced, it was there from the beginning itself, but it was recently given a name under a CPHEEO manual 2016 and under solid waste management rules 2016. So, the basic principle is again minimum amount of waste should go to the landfills, it is an inverted pyramid sort of a framework.

(Refer Slide Time: 01:03)



You have to segregate, reduce, recycle as much as possible before you are releasing everything into the landfill. So, this is an integrated solid waste management framework. Under this again as I said that at you have to at source minimization, you have to do.

(Refer Slide Time: 01:19)

One thing which I want to draw your attention is extended producer responsibility through brand auditing, are you aware of this term extended the producer responsibility?

Student: No.

Student: Expected producer responsibility is the extended, what we call responsibility given to the producer like just I quote an example of Flipkart only. I mean they are using a lot of packing material only. So, I am I would not say like they are managing it, but there should be a responsibility of these people, like what happens through this packaging material wastes. So, if they are managing it then they are adding to their extended producer responsibility.

Right.

Student: Yeah hope you all understand exactly.

So, was it clear.

Student: Yes.

So, it is like when you buy something like for example, a packet of lays; you pay for the product you do not pay for the wrapping or the wrapper. So, that is what they say as it what are these are the claims of people whoever you know propose this phenomena this concept. So, what they do is that, you want the producer to take the responsibility of managing this waste and how do you do that?

So, for that there is one exercise which was done in different parts of India for different cities which is called brand auditing; brand auditing. So, we tried this thing in Kerala. So, what we did is that we have aerobic bins and there are plastic and other kind of waste is being deposit by the household. So, what we do is that we sought waste according to the brands like how many packets of lays are being or chips are being you know from a particular brands.

Say lays or other kind of uncle chips and different kind of thing and how many packets of waste are from local producers or international brands and then we weigh them and then we find the weight of that and then accordingly we can, we want to tell the producer that you all, you are producing this much waste, you should be taking responsibility of that.

So, that is what is known as brand auditing ok. So, this is a report that was released on 5th of June this environment day, you can find it on internet actually. And there are other things that you can do to reduce you know usage of such kind of material.

(Refer Slide Time: 03:53)

Segregation I have spoken about before, so there is a three bin system for wet, dry and domestic hazardous waste which was collected in black container. I think most of the bigger cities are started to adopt this particular model of segregation. Collection and transportation, so there are two kind of collections can happen; one is primary and another is secondary. Primary is directly from the household or the producer and secondary which is from the community bins, waste storage depots, transfer stations. Like in Alleppey you have secondary system of collection.

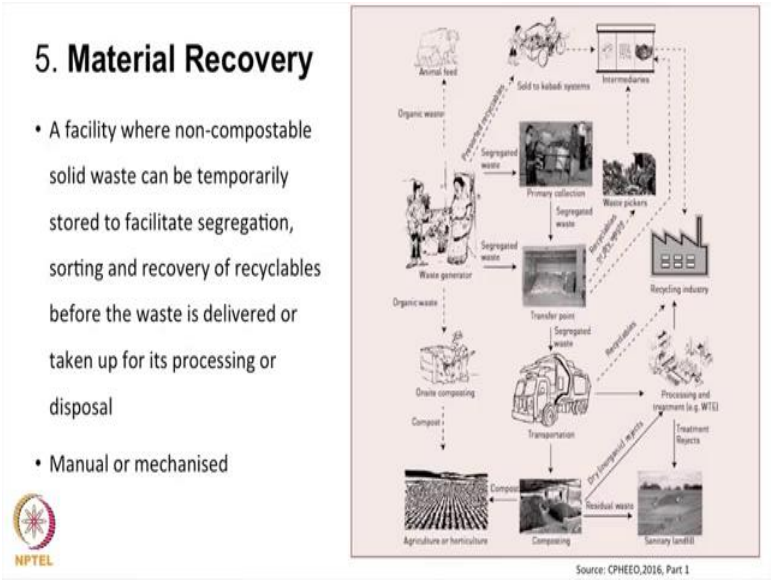
So, households have to deposit their wastes in a community bin or aerobic bin and from there the municipality takes care of the waste and in other cities you might found, that might find that collection is happening at the household level. So, these are the two basic types of collection systems that the cities can adopt. So, primary type can work for the small larger towns and this might can work in all cities .

(Refer Slide Time: 04:55)

Recycling I do not have to tell you, what are the benefits of recycling right?

Material recovery. So, this is the thing that we were talking about, how do you recover different types of material. I am going to talk about this is the material recovery facility which is in Trivandrum for plastic waste ok.

(Refer Slide Time: 05:17)

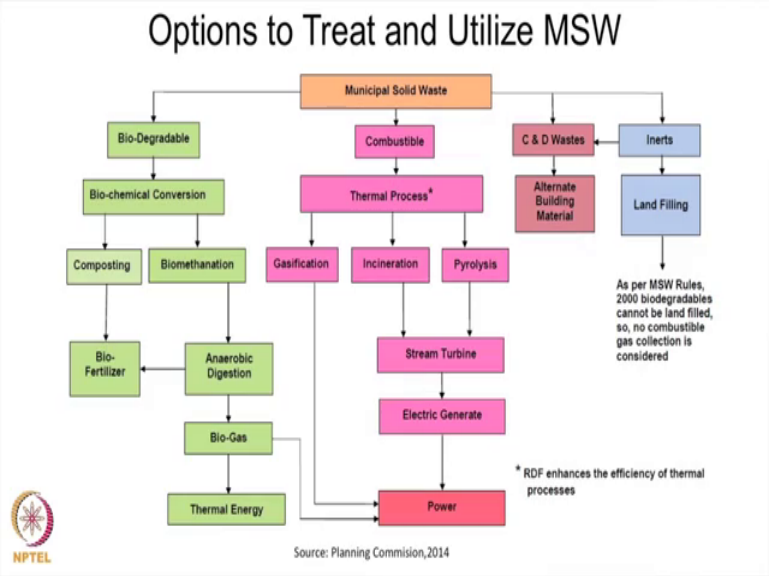


So, what they do is that all the plastic wastes comes to this particular facility and what they do is that, whatever is the recyclable plastic is shredded and is then sold at 20 INR

per kg to making for making the roads to mix it with bitumen. So, this is MRF facility for the plastic waste.

Similar kind of MRF facility you can have for other kind of waste like batteries, aluminium and all kind of things you can have. These are the options for treating and utilising different kind of municipal solid waste management ok.

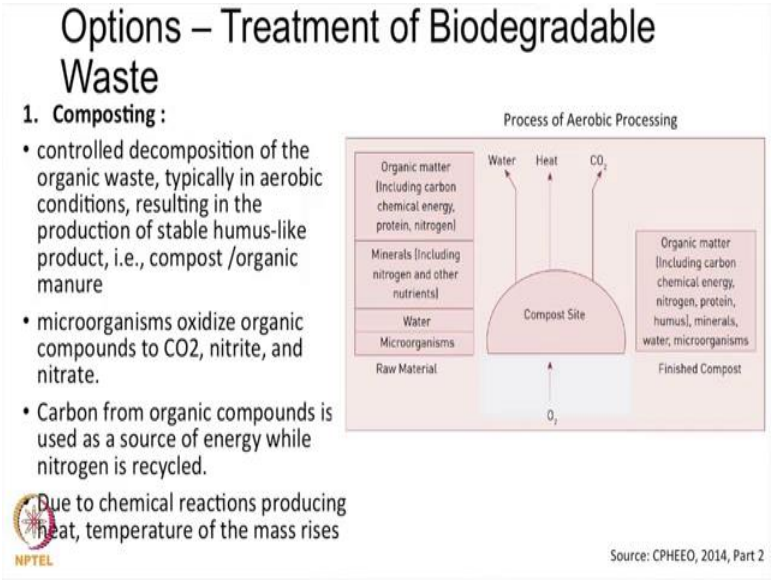
(Refer Slide Time: 06:01)



Biodegradable waste can be managed through composting everybody knows what is composting right. And then there is another process called biomethanation through which biogas is produced and you can use it for cooking and heating purposes and other kind of purposes. Combustion is another process which is used for non biodegradable waste.

In India there are three methods for that - gasification, incineration and pyrolysis. In India incineration is most famous, other two are still being tried and tested then there is no proven technology that kind of fits Indian condition because India is quite humid in that sense. So, you need to maintain certain kind of temperature that is one thing and the second thing is that for these two methods gasification and pyrolysis you need to have a well sorted waste which is not possible in Indian cities, no matter how much you segregate there will be issues.

(Refer Slide Time: 07:01)

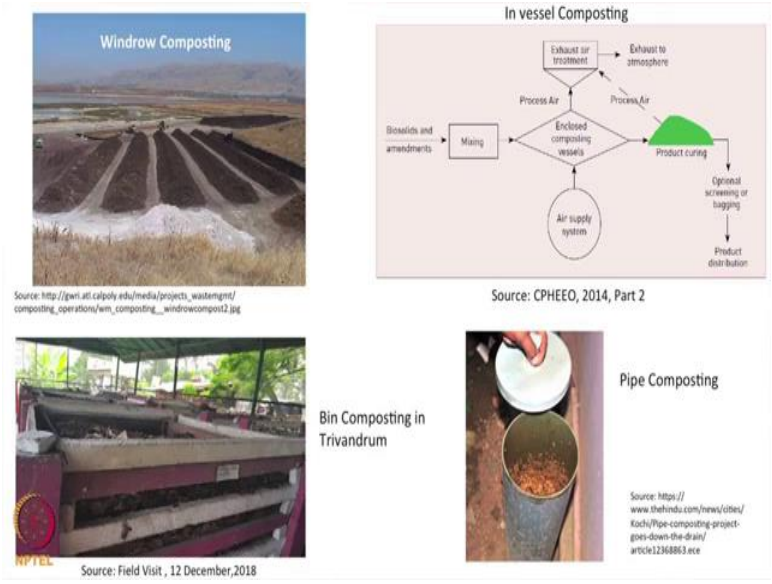


Do I need to explain to you what is composting? Sure.

Student: Yes.

How great, my work is reduced. So, we have four different type of composting technologies, I am not going to explain to you or do you want me to explain, I can show you the graphs, sorry not graphs, photographs. So, this is windrow composting, I think one of the participants mentioned that they have windrow yeah. So, can you explain little bit more about it.

(Refer Slide Time: 07:29)



Student: Yeah.

Just shortly.

Student: Windrow basically, they will have yards may be it is covered in my case they have shedss and they will segregated organic waste is layered with cow dung or other organic material which is collected from the place. And they will, there is a cycle, they will activate the compost with some inputs or vermicompost or other things and then there will like, 45 days they will turn the waste. So, after this is complete the, they will sieve it for other solid metal or something and then they will directly apply wherever needed.

So, which city are you talking about?

Student: I am talking about panchayath in Coimbatore in Trivandrum .

Right; so, are there any other examples in your city which you are like using vermi composting, te this is the bin.

Student: Bin.

Composting that we have in Trivandrum and this is there in Alleppey also and this is the pipe composting which is meant for households. So, this is yeah pipe composting I was talking about pipe composting is it was tried in Alleppey in this city which is suitable for household level.

Because in Alleppey as I said that they do not have much of land available. So, they wanted to process the biodegradable waste whatever the constraints of land over there. So, this was the pipe composting that they tried and Shridhar is going to talk about that if it succeeded or failed in this context.

(Refer Slide Time: 09:21)

Summary of Composting Technologies

Parameters	Windrow	In-vessel	Vermi - composting
Scale	simple technology for large application	Large Scale for commercial purposes	Small
Amount of inout waste/day to be treated (tonnes)	1-500	1-300	upto 50 tonnes
Land Requirement (ha)	8 ha for 500 TPD	4 ha for 500 TPD	2 ha for 50 TPD
Time	8 weeks	4 weeks	8-10 weeks
Ambient Temperature	Not temperature sensitive	Not temperature sensitive	temperature sensitive (20 - 40 degreeC)
Energy Input	Moderate	High	Low
Financial Implications	Moderate	Very costly	Moderate . But purchase of exotic earthworms suitable for MSW makes in expensive
Odour and Aesthetic	Is an issue if turning is inadequate	Minimum	None

Source: CPHEEO, 2014, Part 2

NPTEL

This is summary of compost technology, it actually talks about what should be the scale where you can you know, employ different kind of technology like windrow, when in vessel could be in large scale, where you have to deal with large scale biodegradable waste. And vermi composting is; obviously, small, but vermi composting is very temperature sensitive you know technology and you need experts for that. So, these are the different methods and appropriateness of different methods for that.