SWM Learning Program
in India

WBI
Promoting knowledge and learning for a better world

Reduce, Reuse and Recycling

In association with

IPE

CEE

Module Description

Provides information about the current practices of organic waste recycling and strategies for further improvements.

Promotes waste minimization concept for waste management.

Show pathways leading to improved recovery, reuse and recycling for obtaining more and better secondary raw material for the production sector

Brings to fore the unacknowledged services being provided by the informal waste pickers in India in conserving national resources and discusses various ways through which their contribution in this sector can be enhanced

Learning Objectives

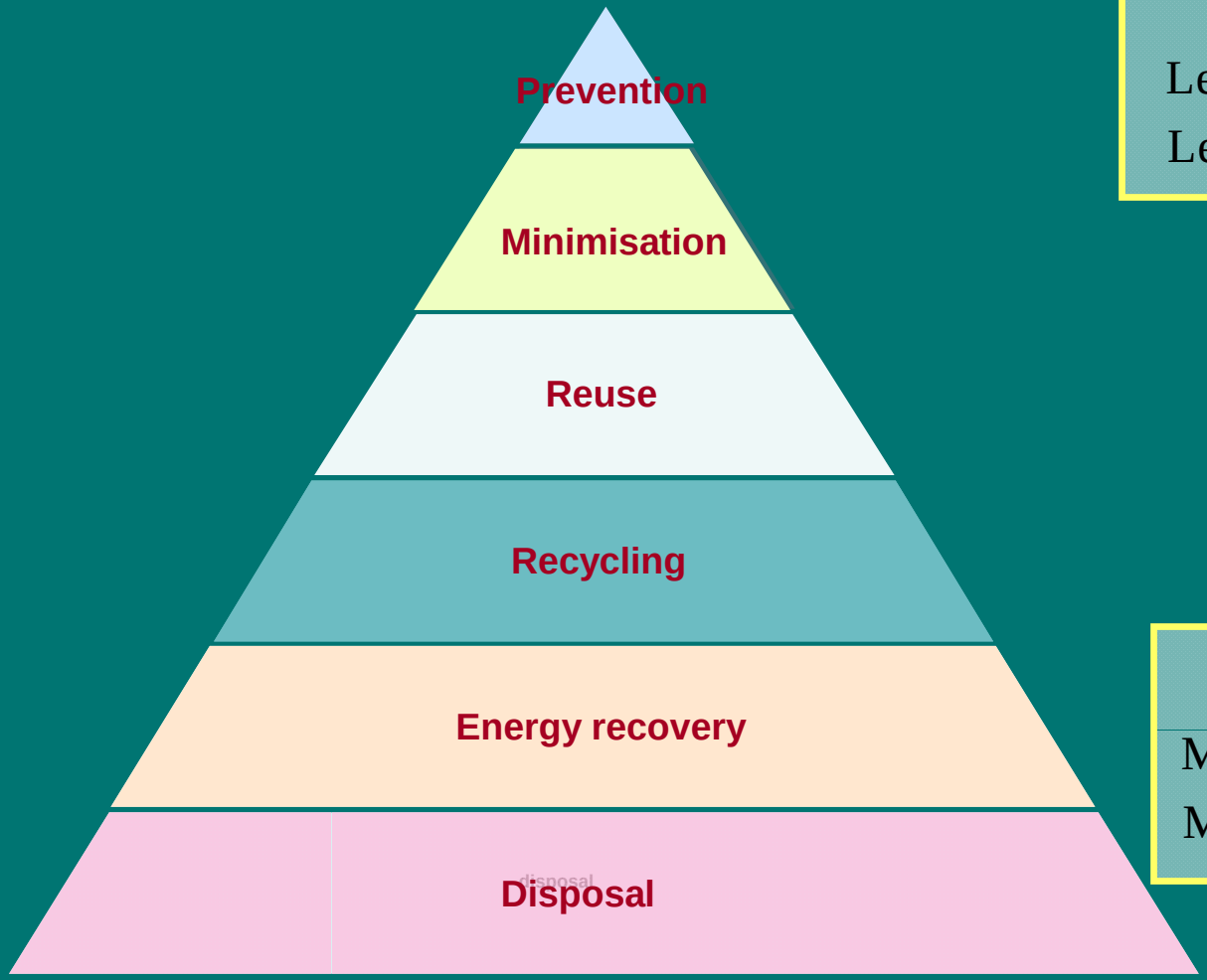
To understand the magnitude of reusable and recyclable material in the municipal waste stream which adds burden on the municipal authorities in managing such waste

To understand the concept of reduce, reuse and recycle which save resources and reduces the burden on the municipal authorities in collection, transportation and disposal of waste.

To learn the ways of promoting the objective of 3 R

Concept of 3 Rs

Waste Management Hierarchy



Most Economic
Least wasted economic value
Least environmental damage

Least Economic
Most wasted economic value
Most environmental damage

Concept of 3Rs

3Rs fosters cooperation among waste generators, waste collectors processors and manufacturers. Recycling allows for production and consumption with reduced depletion of natural resources and energy, and can reduce the negative impact on the environmental system (air, water and soil).

1. Waste prevention, reduction or minimisation
2. Reuse
3. Recycling
4. Recovery
5. Disposal

Typical Recycling Materials

Material	Advantages
Aluminium	• High market value • Can be easily recycled by shredding and melting • Can be recycled indefinitely as it does not deteriorate from reprocessing • Its recycling requires significantly less energy than producing it from ore.
Batteries	• Recycling recovers valuable metals • Prevention of pollution due to heavy metals such as lead, cadmium and mercury
Concrete / Demolition waste	• Can be crushed to gravel and reused in road construction and landscaping
Glass	• Glass can be sorted into colors and melted. • Saves energy compared to processing raw material • Can be recycled indefinitely as it does not deteriorate from reprocessing

Other metal	Metal scrap has high market values (e.g. steel, copper, silver, platinum) Alike aluminium it can be recycled indefinitely as it does not deteriorate from reprocessing
Paper	Can be easily recycled; however quality is deteriorating with each recycling cycle. Paper or cardboard from recycled paper requires less energy and protects forests.
PET	Can be recycled if segregated from other waste. Reprocessing into granulate is easily possible. Has a high market value if processing plants are available.
Other plastic	Other plastic such as Polyethylene or PVC can be recycled but have less value on the market than PET. The value depends on recycling and manufacturing options in the vicinity.
Electronic waste	Computers or mobile phones contain high value metals, therefore they are often dismantled, reused or recycled.

Waste generation rates

According to the Ministry of Urban Development (Government of India), about 42 million metric tonnes of solid waste is generated per year in urban India with per capita waste generation rate ranging between 0.2 and 0.6 kg per day.

- A significant increase in India's urban population, which has resulted in an enormous increase in the rate of waste generated in the cities
- Lack of serious efforts by municipal authorities.
- Increasing income levels will have a multiplier effect on the amount of waste produced in the cities.
- The waste collection efficiency in an Indian city ranges from 50 to 90%

Physical composition of waste

	Compostable	Paper	Plastic	Glass	Metal	Others
India	41.8	5.7	3.9	2.1	1.9	44.6

Name of the city	Total Compostable	Paper	Plastic	Glass	Metal	Inert	Rubber & leather	Rags
Bangalore	51.84	11.58	9.72	0.78	0.35	17.34	1.14	2.29
Ahmedabad	40.81	5.28	5.29	0.79	0.30	39.28	0.92	5.00
Nagpur	47.41	6.87	7.45	0.92	0.29	18.01	5.38	9.48
Lucknow	47.41	6.87	7.45	0.92	0.29	18.01	5.38	9.48
Indore	48.97	6.10	5.77	0.55	0.15	31.02	2.95	2.41
Bhopal	52.44	9.01	12.38	0.55	0.39	18.88	0.09	2.65
Agra	46.38	6.12	8.72	0.85	0.11	30.07	1.97	3.92

Source: Central Pollution Control Board, 2005

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Current practices of RRR in Indian Society

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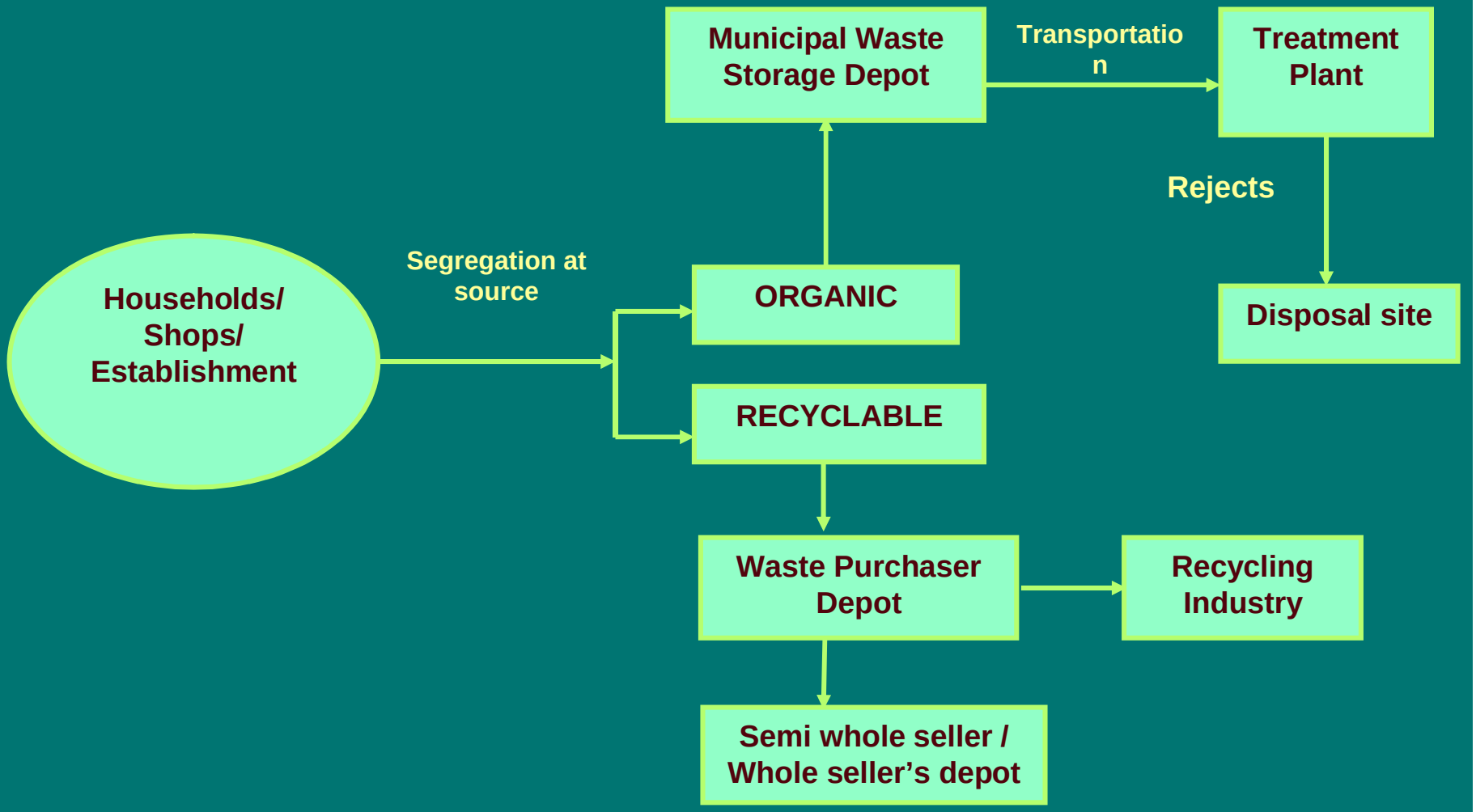
Steps in the Recycling Chain



Contribution of the informal sector

It is estimated that about 8 to 10 % of the waste i.e. about 4 million MT of waste generated in the urban areas is retrieved by the waste pickers and given away to a recycling industry

Contribution of the informal sector

- Comprises mostly women and children from lower income strata (and often lower caste) with relatively small percentage of males.
- No use of protective gears to generally collect paper, plastic, metal, glass and other waste materials which have some value.
- materials are then sold to a middle man who purchases the waste from them at a low price.
- These middle men in turn store and resell the materials in bulk to a waste dealer with a higher profit margin.
- The waste dealer then again sells the material in large quantities to the recycling or even production industry at a even higher price.

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Income of waste pickers

National Benefit
4 million tones of recyclable material retrieved by about 0.5 million (5lakh) gives them a minimum of Rs. 12 billion (1200Crores) each year at the rate of Rs. 3 / Kg and reaches the industry through middlemen.

Category	Earning
Adult Waste Picker	40 - 45 Rs / day
Child Waste Picker (moving with mother)	10 – 15 Rs / Day
Child Waste Picker (moving alone)	20 – 30 Rs / Day
Waste Picker with cycle	50 – 80 Rs / Day
Waste Picker with tricycle	150 – 200 Rs / Day
Overall average Earning	50 Rs / Day

Source: "Recycling Responsibility" by Srishti in 2002

The old tradition of households and small commerce selling reusable/recyclable materials such as newspaper, plastic bags, bottles, clothes, tins and glass to waste purchasers at the doorstep is well known as "Kabadiwalas".

Residents generally sell recyclable wastes to kabadiwallahs at a pre-determined price

Problems faced & caused by "Rag pickers"

- Harassed by the police as they suspect them for committing thefts.
- Municipal authorities harass them as they spread the waste while retrieving the recyclable materials.
- Unhygienic practices pose health threats to waste pickers

Problems caused by "Rag pickers"

- Waste pickers often cause additional littering on streets when rummaging the waste bags and bins .
- They also burn waste at the dumpsites to salvage valuable material such as wires from the tyres and some portion of metals causing environmental pollution.
- They move around the bull dozers/ the compactors at the landfill to pick up recyclable materials and often accidents are caused when they try to pick up waste alongside the moving lauries bull dozers etc at the landfill

Mandatory directions under MSW Rules to promote 3Rs

Segregation of municipal solid wastes

In order to encourage the citizens, municipal authority shall organise awareness programmes for segregation of wastes and shall promote recycling or reuse of segregated materials. The municipal authority shall undertake phased programme to ensure community participation in waste segregation. For this purpose, regular meetings at quarterly intervals shall be arranged by the municipal authorities with representatives of local resident welfare associations and non-governmental organizations.

Source: Schedule II of MSW Rules 2000

Mandatory directions under MSW Rules to promote 3Rs

Municipal authorities shall adopt suitable technology or combination of such technologies to make use of wastes so as to minimize burden on landfill. Following criteria shall be adopted, namely:-

The biodegradable wastes shall be processed by composting, vermicomposting, anaerobic digestion or any other appropriate biological processing for stabilization of wastes.

Mixed waste containing recoverable resources shall follow the route of recycling.

Source: Schedule II of MSW Rules 2000

Recommendations for Implementation of the mandates

Promoting storage and segregation of waste at source

- Involving the informal sector & extending financial help to NGOs and co-operatives
- Organizing them for into door step "waste collectors" by motivating them to stop picking up soiled and contaminated solid waste and instead collect recyclable clean material directly from the households
- The upgraded rag-pickers on becoming door step waste-collectors may be given an identity card by the NGOs organizing them so that they may have acceptability in society.

Processing of Municipal Solid Wastes:

- Promote segregation at source
- Till 100% source segregation is achieved the mixed waste containing recyclable material may be subjected to segregation at the secondary level.
- If waste is of high calorific value consider WTE options.
- Special care must be taken prior to considering WTE technologies for treatment of MSW waste.

Promote Composting of Waste

Composting reduces (separated) biodegradable waste to 25-30 % of its initial weight. By adopting composting technology for treatment of MSW, municipal authorities will save up to 55% of waste going to landfill.

Role of Industrial Sector & EPR

- The central and state governments may consider introducing the concept of Extended Producers Responsibility (EPR).
- Industry needs to realize the problems their packaging material creates once they are discarded by the purchaser of their products.
- Ideally, industries should show self commitment (e.g. in form of a sector agreement) to reduce waste from packaging and reuse or recycle production waste as much as possible.

Extended Producer Responsibility

1. Extended Producer Responsibility (EPR) provides an overall framework to link formal systems of production to the existing informal system of recycling through a product life cycle approach where the producer is responsible.

2. It provides an opportunity to resolve several inter-related waste management problems.

3. EPR can act as a pressure tool for making big corporate houses, which generate large quantities of waste, to invest in recycling and take back their product waste. Discouragement and higher taxes on packaging materials, which are non-recyclable, can help reduce the problem of waste.

Government's Role

- Encourage technology advancements for waste recycling
- Help create logistic chains and market for recyclable products.
- Examine the issue of recycling within the framework of Extended Producer Responsibility (EPR).
- Promote the use of re-usable or eco-friendly packaging material.
- Direct the industries to reduce the packaging material and its composition.
- Levy eco-surcharge on hard-to-recycle or ecologically unfriendly packaging to encourage compliance.
- Help in marketing of compost through extension methods to the agricultural sector.

Need of intervention by Municipal Authorities

- Promote segregation of waste at source of generation.
- Collection of recyclable waste from the door step
- Involve citizens and citizens organistions/ NGOs in SWM planning
- Integrate the informal sector in the formal SWM system by
  - ✓ organizing waste picker cooperatives through NGOs for door to door collection
  - ✓ providing work places for sorting and sheds for storing recyclables
  - ✓ providing marketing chains and direct links to industries for recyclables

NGO Intervention

- Undertake phased programmes to encourage citizens in segregating waste at source.
- Organize rag pickers for door to door collection in urban areas for collection of organic and recyclable waste separately.
- Eliminate the middlemen in this sector, through forming cooperatives of rag pickers
- Provide access to health clinics, livelihood skills and saving schemes.
- Promoting conversion of waste materials (paper and plastics) into useful products.

Case Study

Centre for Environment Education, Bangalore

- Centre for Environment Education (CEE) setup a hand made paper making unit and a plastic weaving loom in Coorg.

- The waste polythene bags are collected from schools through the eco-clubs, houses, through waste retrievers and Self help Groups
- These polythene bags are washed, dried, cut into strips and woven in handlooms to make attractive bags, mats, folders, pencil cases, wall charts, curtains for windows and doors etc.
- These products are sold at various exhibitions and fairs.

Polybag weaving unit at the Coorg facility

Community Participation

- Keep two domestic bins at home. One for biodegradable food waste and another for recyclable material.
- Not to litter on the streets and handover the waste kept separately to the waste collector on a day today basis.
- May compost their kitchen waste, leaves, grass clippings and garden plants within their premises if there is space available

Community project

Muskan Jyoti Samiti, Lucknow

- Work with 150 households
- Services offered are collection of waste from door-to door and sweeping of roads, twice a week. The project took two years to reach a financial stable position.
- The District Authorities allocated 65 acres of land, free of cost, for vermi-composting and monetary assistance for preparation of compost beds and pits and also for procuring cycle rickshaws.
- Currently the project serves the upper, middle and lower income colonies . It charges different user fee in different colonies, which vary between Rs 15-30 per household per month.
- 900 waste pickers are Employed.
- Waste pickers are not paid any salary however they have a right over the recyclables and on an average, every waste collector gets between Rs 1200-Rs 1500 per month by selling the recyclables.

International Examples

Germany's recycling policy and it's green dot" system

- Residual household waste: The annual or monthly waste fee varies depending on bin volume (e.g. 40l, 80l, 120l, 240l, 660l, and 1100l) and frequency of pick-up. People either choose the frequency in advance or is billed according to the number of times they presented their bin at the kerbside for emptying.

- This represents a unit-based price system even though the calculation base is quite crude, since the volume of the bin is measured and not the content of waste which can vary within the bin.

International Examples

Germany's recycling policy and it's green dot" system

- Organic waste: The fee varies according to bin volume chosen or is included in the residual waste fee.
- Paper and cardboard: Costs are covered by the residual waste fee or base fee and to a certain percentage by the Green Dot Programme (see below).
- Pick-up and recycling of light packaging materials and glass is financed by the Green Dot Program.

- Waste management is financed through different tariffs:
  - a unit-based pricing system charging for each bag
  - a unit-based pricing system charging for each bag in combination with a flat fee, or
  - a weight-based system in combination with the bag-based system.

- The recycling system is financed through:
  - an 'advanced recycling contribution' which is a voluntary contribution on every recyclable unit made by the producers to organizations that organize the collection and recycling (applied for PET-bottles, aluminium cans and packaging, steel and tin cans),
  - an 'advanced disposal fee' which the producer has to pay by law on glass packaging and batteries and which is included in the retail price,
  - taxes or flat fee component of a two-tiers unit-based pricing system (applied for metals, paper and cardboard), or
  - Revenues from sales of recyclable materials (applied for textiles).

Recycling status in EU

Material	Year	Consumption / Per capita / year	Waste generation consumption	Recycling Rate	Recovery rate	Main sectors
Plastic	2002	95	56 %	15%	38%	Household
Paper & Cardboard	2002	205	96%	56 %	56%	-
Aluminium	2002	22	-	84%(1)	84%	Transport, building packaging
Steel	2003	412 (2)	-	55 % (3)	55%	
Glass	2002	38	83 % (4)	59 %	59%	Packaging
Rubber (5)	2003	7		47%	73%	Transport
Inert Waste	-					Building
Textile Waste	-					Household

Other Examples

- Recycling of waste electrical and electronic equipment (WEEE) in Delhi.
- Privately-initiated resource recovery and recycling program in the Philippines.
- Composting in Dhaka, Bangladesh.
- A new solid-waste management and recycling concept for Bais City, Philippines