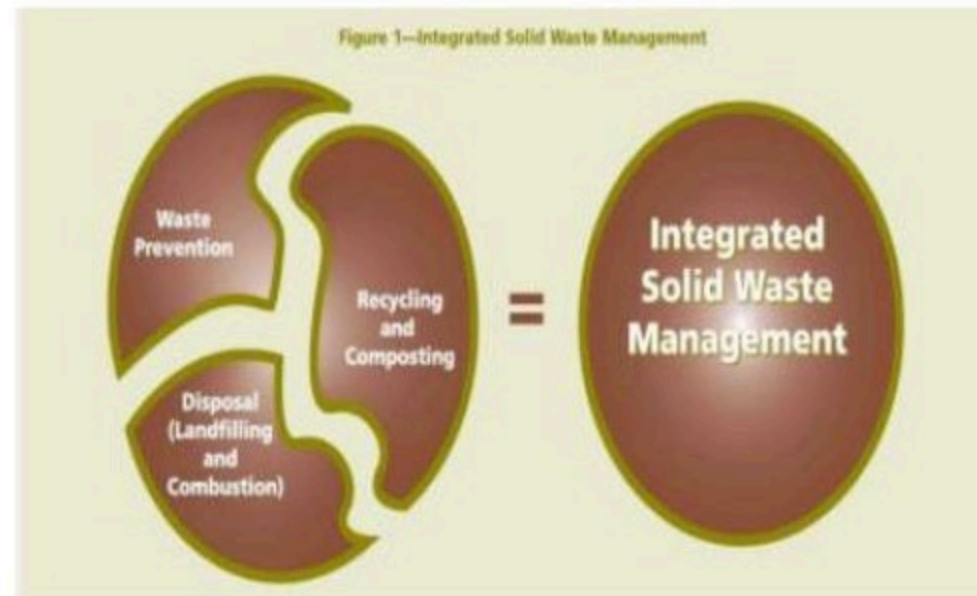
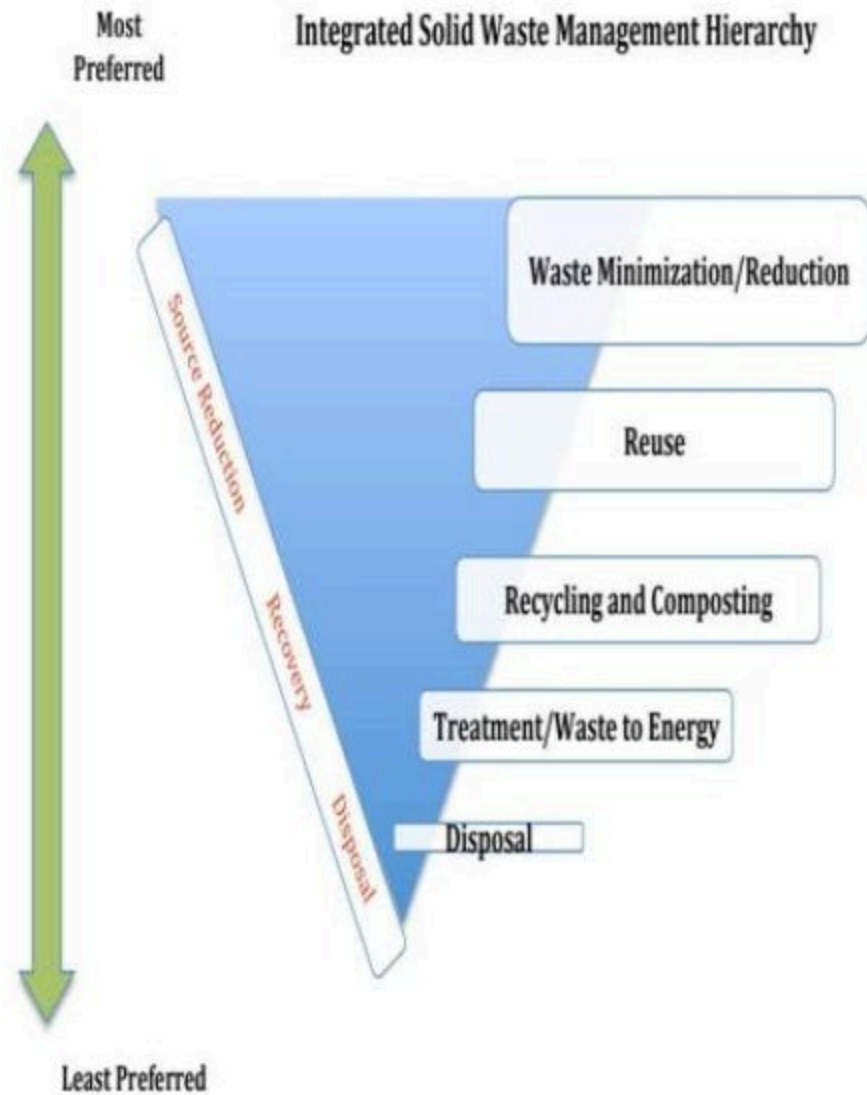


INTEGRATED SOLID WASTE MANAGEMENT

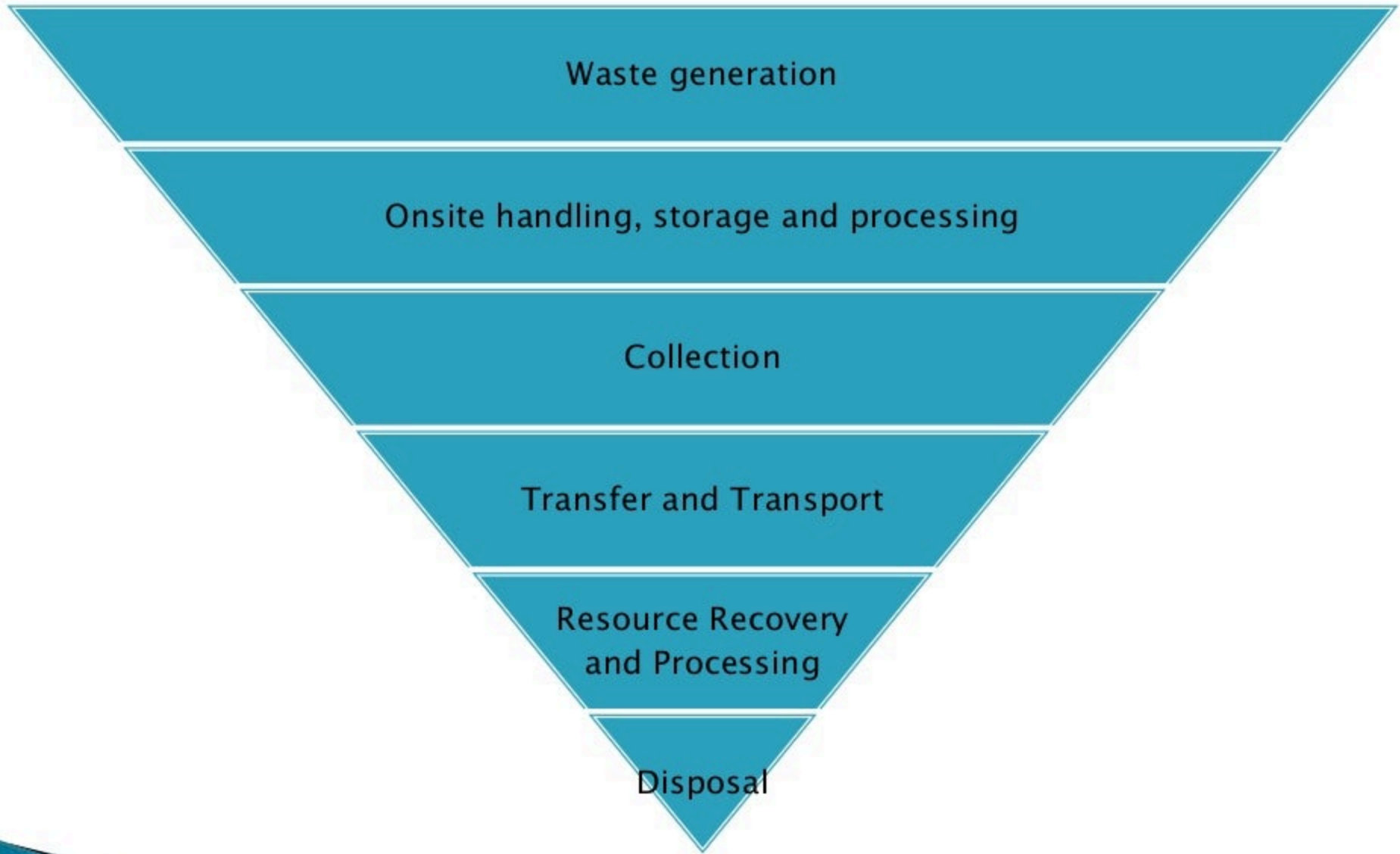


INTEGRATED SOLID WASTE MANAGEMENT

- ▶ Integrated solid waste management (ISWM) is a comprehensive waste collection, prevention, treatment, recycling, composting and disposal method that aims to provide environmental sustainability, economic affordability and social acceptance for any specific region.
- ▶ ISWM which combines a variety of strategies for both waste management and waste reduction.
- ▶ The major ISWM activities are waste reduction, recycling and composting, combustion and disposal is properly designed, constructed and managed landfills.
- ▶ This includes the three R's: reduce, reuse and recycle.



FUNCTIONAL ELEMENTS OF ISWM:



SOURCES OF SOLID WASTE :

- ▶ The materials that are collected under the term solid waste include many different substances from a multitude of sources.
- ▶ The sources of solid wastes are dependent on the socioeconomic and technological levels of a society.



ONSITE HANDLING, STORAGE AND PROCESSING

ON-SITE HANDLING

- ▶ On-site handling methods and principles involve public attitude and individual belief and ultimately affects the public health.
- ▶ It is an activity associated with the handling of solid waste until it is placed in the containers used for its storage before collection.
- ▶ On- site handling methods:
 1. Sorting
 2. shredding
 3. grinding
 4. composting

ON-SITE STORAGE:

- The first phase to manage solid waste is at home level. It requires temporary storage of refuse on the premises.
- For individual homes, industries, and other commercial centers, proper on-site storage of solid waste is the beginning of disposal, because unkept or simple dumps are sources of nuisance, flies, smells and other hazards.



STORAGE CONTAINER:

- ▶ Garbage and refuse generated in kitchens and other work areas should be collected and stored in properly designed and constructed water-proof garbage cans (waste bins).

TYPES OF CONTAINERS

- ▶ Plastic liners for cans and wrapping for garbage reduce the need for cleaning of cans and bulk containers, and keep down odors, rat and fly breeding.
- ▶ Galvanized metal is preferable for garbage storage because it is resistant to corrosion. Plastic cans are light in weight but are easily gnawed by rats.
- ▶ Bulk containers are recommended where large volumes of refuse are generated, such as at hotels, restaurants, apartment houses, and shopping centers.
- ▶ A concrete platform provided with a drain to an approved sewer with a water faucet at the site facilitates cleaning.



Plastic container



Galvanised metal



Concrete container



Bulk container

CONTAINER SIZE:

- ▶ ash: up to 80 to 128 liters
- ▶ mixed refuse: should not exceed 120 to 128 liters
- ▶ rubbish up to 200 liters
- ▶ kitchen waste is 40 liters
- ▶ garbage is 48 to 80 liters

Importance of on-site processing:

- ▶ reduces volume of waste generated
- ▶ alters physical form
- ▶ recovers usable materials

Factors that should be considered in evaluating On-Site processing are capabilities, reliability, environmental effects, ease of operation, etc.

COLLECTION:

- ▶ This is the removal of refuse from the collection point to final disposal site.
- ▶ It is the most expensive as compared with other operation and management procedures, because it demands special vehicles, more manpower, hand tools, more funds for maintenance, gathering and picking up of solid waste from the various source taking the collected wastes to the location where it is unloaded .



COLLECTION SERVICES:

There are four types of collection services:

- ▶ **Curb (curb side):** The home owner is responsible for placing and returning the empty container. Never entirely satisfactory
- ▶ **Set-out (block collection):** Owner is responsible for returning the container. The full containers are brought or set at the collection site by the crew. Bins are not left out on the street for long periods.
- ▶ **Backyard carrying service (door to door collection):** Collection crews that go along with the collection vehicle are responsible for bringing out stored solid waste from the dwelling units. It is the only satisfactory system in which the householder does not get involved.
- ▶ **Alleys:** a narrow street or path between buildings in a town. That is difficult to get the container and also to the vehicle that will collect the waste.



Curb collection



Set out collection



backyard collection



Alley collection

Modes of operation in solid waste collection

- **Hauled container system**- The containers used for the storage of wastes are hauled to the disposal site, emptied and returned. The labour requirements for this system is one person, two for safety, and a driver to drive the vehicle load are needed.
- **Stationary container system** - The containers used for the storage of waste remain at the point of generation except for occasional short trips to the collection vehicles. The labour requirements for mechanically loaded is one driver and two helper are needed.

TRANSFER AND TRANSPORT


- ▶ Transfer stations are employed when the disposal site is situated at significant distance from the point of collection.
- ▶ It can reduce the cost of transporting refuse by reducing manpower requirement and total kilometers. For transfer one driver is needed.
- ▶ It may include stationary compactors, recycling bins, material recovery facility, mobile equipment.
- ▶ Transfer and transport station should provide welfare facilities for workers (lockers, toilets, showers); small stores for brooms, shovels, cleaning materials, parking facilities for hand truck, sweepers, refuse collectors.



RESOURCE RECOVERY AND PROCESSING

- ▶ Resource recovery is a partial solid waste disposal and reclamation process. It can be expected to achieve about 60% reductions in future landfill volume requirements.
- ▶ After recovery the materials from solid waste and remaining unwanted materials are disposed. A site location close to the center of the generators of solid.

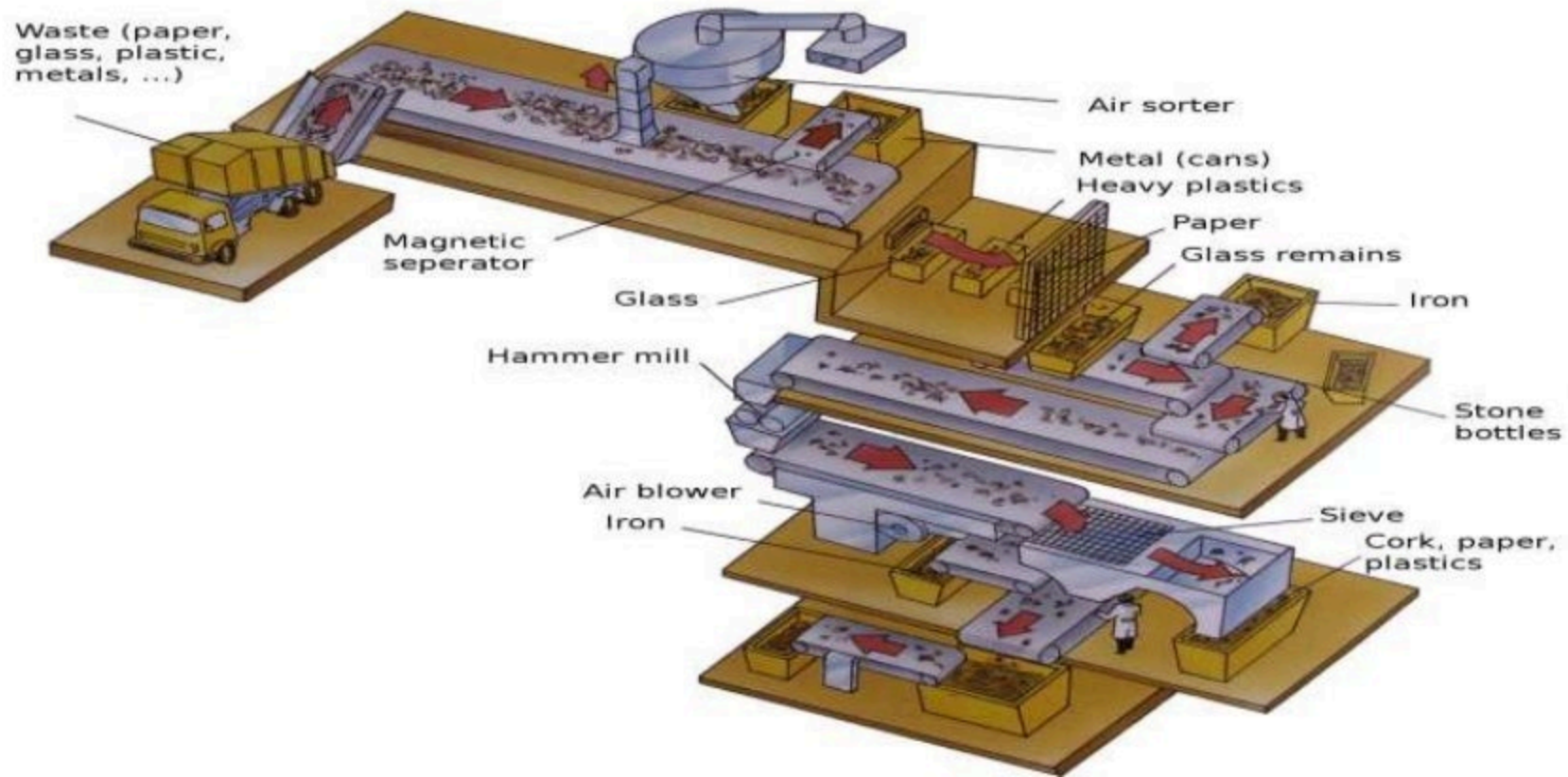
Products that can be recycled

- Plastic
 - Tires
 - Paper
 - glass
- 





TECHNIQUES INVOLVED IN RESOURCE RECOVERY

- ▶ Compaction , which mechanically reduces the volume of solid waste
- ▶ chemical volume reduction by incineration
- ▶ mechanical size reduction by shredding, grinding and milling
- ▶ component separation by hand-sorting, air separation, magnetic separation and screening



DISPOSAL OF SOLID WASTE

- ▶ In solid waste management, disposal is one of basic programs that has to be done with maximum precautions. If it is not done effectively and efficiently, the whole program will not be satisfactory.
 - ▶ Disposal of solid waste has to be accomplished without the creation of nuisance and health hazards in order to fulfill the objectives of SWM. These are
 1. Improvement of aesthetic appearance of the environment
 2. Avoidance of smells and unsightliness
 3. Reduction of disease by curtailing fly and rodent breeding
 4. Prevention of humans and stray dogs from scavenging
- 

- ▶ In disposal of solids wastes, it is recommended that the following be done to avoid any risks:
 1. The disposal site should be 30 meters from water sources in order to prevent possible contamination
 2. Radioactive materials and explosives should not be together.
 3. The site should be fenced to keep way scavengers.
 4. All surfaces of the dump should be covered.
 5. All wastes should be dumped in layers and compacted.
 6. The disposal site should be about 500 meters from residential areas.
- 

Generally there are several methods of solid waste disposal that can be utilized. These methods are:

1. Ordinary open dumping
2. Incineration
3. Sanitary landfill
4. Composting
5. Grinding and discharge into sewer
6. Recycling
7. Dumping into water bodies.



Recycling



Waste Incineration



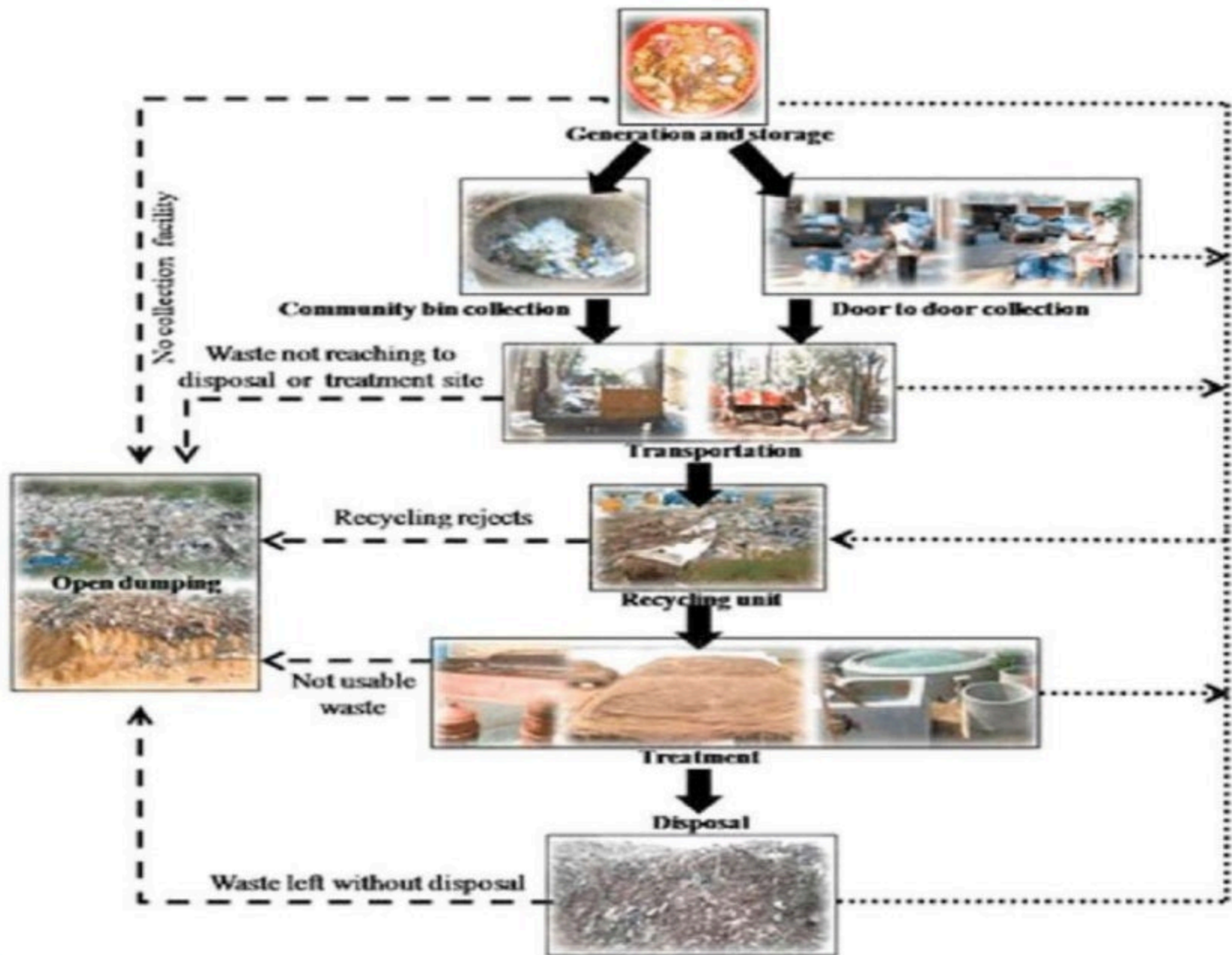
Composting



Sanitary Landfills



Waste Disposal in Ocean



THANK YOU

