

# SOLID WASTE AND ITS MANAGEMENT

Solid waste is waste generated by domestic, commercial, industrial, healthcare, agricultural and mineral extraction activities and accumulates in streets and public places.

The words “garbage”, “trash”, “refuse” and “rubbish” are used to refer to some forms of solid waste

## Types of waste:

1. Solid Waste
2. Liquid Waste
3. Gaseous Waste

## Classification of wastes according to their origin and type

- **Municipal Solid wastes:** Solid wastes that include household garbage, rubbish, construction & demolition debris, sanitation residues, packaging materials, trade refuges etc. are managed by any municipality.
- **Bio-medical wastes:** Solid or liquid wastes including containers, intermediate or end products generated during diagnosis, treatment & research activities of medical sciences.
- **Industrial wastes:** Liquid and solid wastes that are generated by manufacturing & processing units of various industries like chemical, petroleum, coal, metal gas, sanitary & paper etc.
- **Agricultural wastes:** Wastes generated from farming activities. These substances are mostly biodegradable.
- **Fishery wastes:** Wastes generated due to fishery activities. These are extensively found in coastal & estuarine areas.
- **Radioactive wastes:** Waste containing radioactive materials. Usually these are byproducts of nuclear processes. Sometimes industries that are not directly involved in nuclear activities, may also produce some radioactive wastes, e.g. radio-isotopes, chemical sludge etc.
- **E-wastes:** Electronic wastes generated from any modern establishments. They may be described as discarded electrical or electronic devices. Some electronic scrap components, such as CRTs, may contain contaminants such as Pb, Cd, Be or brominated flame retardants.
- **Construction and Demolition Waste:** Bricks, brick bats, concrete, asphaltic material, pipes etc.
- **Residential Waste:** Garbage including food waste, paper, crockery and ashes from fires, furniture.
- **Commercial Waste:** Similar to residential wastes produced from offices, shops, restaurants etc.
- **Institutional Waste:** Similar to residential wastes plus hazardous, explosive, pathological and other wastes which are institution specific (hospital, research institute etc.)

# Sources of Solid Wastes

The main sources for solid wastes are domestic, commercial, industrial, municipal, and agricultural wastes.

- The composition of a city waste is as follows:
  - Paper, wood, cardboard **53 %**
  - Garbage **22 %**
  - Ceramics, glass, crockery **10 %**
  - Metals **8 %**
  - Rubber, plastics, discarded textiles **7 %**

# Causes of Solid Waste

The increase in the quantity of solid waste is due to

- \* Overpopulation,
- \* Affluence (material comfort)
- \* Technological advancement

# Effects of Solid Waste

## a) Health Hazard:

- If solid wastes are not collected and allowed to accumulate, they may create unsanitary conditions.
- This may lead to epidemic outbreaks.
- Many diseases like cholera, diarrhea, dysentery, plague, jaundice, or gastro-intestinal diseases may spread and cause loss of human lives.
- In addition, improper handling of the solid wastes is a health hazard for the workers who come in direct contact with the waste

## b) Environment Impact:

- If the solid wastes are not treated properly, decomposition and putrefaction (decay) may take place.
- The organic solid waste during decomposition may generate obnoxious (intolerable) odors.

# How solid waste affected us in recent years?

- Cloudburst clogged the sewage line due to large no. of plastic bags
- Blast in the Bhusan Steel factory at Noida, caused due to imported scrap from Iran
- Reduction in the number of migratory birds due to consumption of contaminated foods
- Stray animals dying on streets and farmland due to consumption of plastic bags, which blocks the food movement in their stomach

# Major Polluting Industries in India

- Around 2500 tanneries discharge 24 million cu m of waste water containing high level of dissolved solids and 4, 00,000 tonnes of hazardous solid waste
- 300 distilleries discharge 26 million kilo-liters of spend wash per year containing several pollutants
- Thermal power plants discharge huge waste materials

# Management of Solid Waste

There are two fundamental objectives of solid waste management.

- To minimize the waste.
- To manage the waste still produced.

## Waste Minimization

- Prevention of waste being created is known as waste reduction which is an important method of waste management.
- The modern concepts based on the four 'R's are: Reduce, Reuse, Rebuy and Recycle.
- Methods of avoidance include reuse of second hand products, designing products to be refillable or reusable, repairing broken items instead of buying new etc.

## 4 R's Concept

Four R's (**Refuse, Reuse, Recycle and Reduce**) to be followed for waste management.

**Refuse:** Instead of buying new containers from the market, use the ones that are in the house. Refuse to buy new items though you may think they are prettier than the ones you already have.

**Reuse:** Do not throw away the soft drink cans or the bottles; cover them with homemade paper or paint on them and use them as pencil stands or small vases.

**Recycle:** Use shopping bags made of cloth or jute, which can be used over and over again.

**Reduce:** Reduce the generation of unnecessary waste, e.g. carry your own shopping bag when you go to the market and put all your purchases directly into it.

## Control Measures:

The main purpose of solid waste management is to minimize the adverse effects on the environment. The steps involved are:

- ✓ Collection of solid wastes
- ✓ Disposal of solid wastes
- ✓ Utilization of wastes

## Collection of Solid Waste

- From individual houses, wastes can be collected in person with the help of vehicle.
- To minimize the time and cost involved in collecting waste through vehicles, public can be given instruction to dump their house wastes in one place (nearby their street).

## **DISPOSAL OF SOLID WASTES:**

- Before the final disposal of the solid wastes, it is processed to recover the usable resources and to improve the efficiency of the solid waste disposal system.
- The main processing technologies are
  - 1) Compaction
  - 2) Incineration
  - 3) Manual separation.

The appropriate solid waste disposal method has to be selected, keeping in view the following objectives:

1. Should be economically viable
2. Should not create a health hazard
3. Should not cause adverse environmental effects
4. Should not result in unpleasant sight, odor, and noise

## **UTILIZATION OF WASTES**

The solid wastes can be properly utilized to gather the benefits such as:

- ✓ Conservation of natural resources
- ✓ Economic development
- ✓ Generate many useful products
- ✓ Employment opportunities
- ✓ Control of air pollution

## **PROCESSES CARRIED OUT DURING SOLID WASTE MANAGEMENT**

Integrated solid waste management through the following processes can provide a better reliable solution for the problem of municipal solid waste generation.

- **SEGREGATION**
- **RECYCLING**
- **SHREDDING OR PULVERIZING**
- **COMPOSTING**

### **SEGREGATION**

- Segregation of wastes into degradable and non-degradable wastes is to be done to recover or divert non-degradable wastes (electric items, plastics, tyres etc.) and degradable items (wood, textiles etc.) to its recycling plant and if possible, it can be reused.
- It is a tedious process which therefore needs labour. Magnets can also be used to segregate ferrous metals.
- This process will help in reducing the amounts of waste going for composting and also earns money (through selling wastes to recycling plant).

### **RECYCLING**

- The non-degradable and degradable wastes can be recycled very economically in the recycling plants.
- Apart from sending wastes to recycling plant, recycling of some organic waste is possible.
- Some of the waste recycling techniques are: Fly ash, Organic wastes, Slag and scrap, Industrial gases, Waste waters, Recovery of silver from photographic films.

### **Benefits of recycling:**

- Reduce environmental degradation.
- Making money out of waste.
- Save energy that would have gone into waste handling & product manufacture.

### **Saving through recycling:**

- When Al is resmelted- considerable saving in cost.
- Making paper from waste saves 50% energy.
- Every tonne of recycled glass saves energy equivalent to 100 litres of oil.

## **The most common consumer products recycled include:**

- Aluminum such as beverage cans
- Copper such as wire
- Steel food and aerosol cans
- Old steel furnishings or equipment
- Polyethylene and PET bottles
- Glass bottles and jars
- Paperboard cartons
- Newspapers, magazines and light paper
- Corrugated fiberboard boxes.

## **Recycling not a solution to all problems!**

- Recycling is not a solution to managing every kind of waste material
- For many items recycling technologies are unavailable or unsafe
- In some cases, cost of recycling is too high.

## **SHREDDING OR PULVERIZING**

- This process involves in size reduction of organic wastes before it goes for composting.
- This process reduces the overall volume by 40%.

### **Advantages:**

- It will increase surface area availability for bacterial activity (decomposition).
- Facilitates easy handling of moisture content and aeration.

## **COMPOSTING**

- Aerobic composting is one of the cheapest and easiest methods that are being available for MSW.
- Generally, composting can be carried out in three techniques. They are
  - i) Windrow composting
  - ii) Aerated static pile method
  - iii) In vessel method

## **WASTE DISPOSAL ON LAND**

Despite all efforts to minimize waste, the following requirement for storage/disposal of the following types of waste will continue to remain.

- The solid waste that cannot be recycled.
- The residual waste after all types of processing has been undertaken.

### **Available Options**

- Disposal on the earth's surface.
- Disposal deep below the earth's surface.
- Disposal at the Ocean bottom.

Among all the above three options, Option 1 is the least desirable but it will remain the best practical option for the foreseeable future.

# CONCLUSION

- None of the cities has an integrated solid waste management system.
- Collection rate 5 1-69 % of total waste generated.
- Hospital and industrial wastes are treated as ordinary waste.
- A lot of potential for recycling and involvement of private sector which is overlooked.
- No disposal facilities.
- Open burning of waste or open disposal is most common practice.
- No weighing facilities are installed at any disposal sites.
- Open burning of non-degradable components like plastic bags are adding to air pollution.
- Much of the uncollected waste poses serious health hazards.

# RECOMMENDATIONS

The following recommendations are proposed for sustainable SWM:

1. The involvement of people and private sector through NGOs could improve the efficiency of SWM.
2. Public awareness should be created especially at primary school.
3. Littering of SW should be prohibited in cities, towns and urban areas.
4. The collection bins must have a large enough capacity to accommodate 20% more than the expected waste generation in the area.
5. Municipal authorities should maintain the storage facilities to avoid unhygienic and unsanitary conditions.
6. Proper segregation would lead to better options and opportunities for scientific disposal of waste.
7. An open dump or an uncontrolled waste disposal area should be rehabilitated. It is advisable to move from open dumping to sanitary land filling in a phased manner.
8. Land filling should be restricted to non-biodegradable, inert waste and other waste that are not suitable either for recycling or for biological processing