

Solid Waste Management:

→ Solid waste refers to all non-liquid waste materials generated from domestic, commercial, industrial and institutional activities.

Based on composition and source, solid waste can be classified into following types:

1. Organic Waste:

→ includes food waste, vegetable waste, kitchen refuse and market waste.

→ It is biodegradable and decomposes naturally.

→ If unmanaged, it attracts flies, rodents and causes foul odor.

2. Combustible Waste:

→ Includes paper, cardboard, wood, dried leaves and packaging materials.

→ Has high organic content and low moisture.

→ Can be burned or incinerated under controlled conditions.

3. Non-combustible waste:

→ Includes metals, tin cans, glass bottles, stones and ceramics.

→ Does not burn easily and often requires recycling or landfill disposal.

4. Ashes and Dust:

→ Residue from cooking fires, stoves and burning activities.

→ Can cause air pollution and respiratory problems if dispersed.

5. Bulky waste:

- Includes tree branches, tyres, furniture and large discarded objects.
- Difficult to collect and transport due to size.

6. Dead Animals:

- Carcasses of domestic animals and livestock.
- Pose serious health risks if not disposed of properly.

7. Hazardous Waste:

- Includes oil, battery acid, chemicals, pesticides and medical waste.
- Highly dangerous to human health and the environment.

8. Construction Waste:

- Includes rubble, broken concrete, bricks and roofing materials.
- Generated during construction and demolition activities.

■ Understanding E-Waste:

E-waste (Electronic Waste) refers to discarded, obsolete, or damaged electrical and electronic equipment, such as computers, mobile phones, televisions, batteries, chargers and household appliances.

E-waste is a rapidly growing waste stream due to technological advancement and short product life cycles. It contains hazardous substances like lead, mercury, cadmium and brominated flame retardants, which can cause serious environmental pollution.

- Improper disposal of e-waste leads to:
- Soil and groundwater contamination.
- Air pollution during open burning.
- Health problems such as neurological disorders, respiratory diseases and skin issues.

However, e-waste also contains valuable materials like copper, gold and silver, which can be recovered through proper recycling.

■ Waste Management // Solid waste management:-

Waste management refers to the systematic process of handling waste from its generation to final disposal in a way that minimizes harm to human health and the environment.

It includes:

- Collection
- Storage
- Transportation
- Treatment
- Disposal
- Recycling and recovery

Types of waste:

- Solid waste
- Liquid waste
- Gaseous waste
- Hazardous waste

Solid waste management (core Focus):

Solid waste management deals with the safe handling of all non-liquid waste materials to prevent disease, pollution and environmental degradation.

→ Risks of Poor Solid Waste Management

- Spread of diseases (cholera, dysentery, dengue, malaria).
- Breeding of flies, mosquitoes, rats and snakes.
- Pollution of surface water and groundwater.
- Fire hazards and air pollution.
- Negative impact on public morale and living conditions.

→ Key components of solid waste management →

1. Generation:

- Waste becomes useless to the owner and is discarded.
- What is waste for one person may be useful for other.

2. Storage:

- Temporary holding of waste before collection.
- Includes household bins, communal bins, pits and depots.

3. Collection:

- Gathering waste from storage points.
- Must be regular to avoid overflow and health risks.

4. Transportation :-

- moving waste to the disposal sites.
- can be human-powered, animal-powered or motorized.

5. Disposal:

→ Final treatment of waste to minimize environmental risks.

→ Solid waste disposal methods →

a) Landfilling:

- waste is buried in pits or trenches and covered with soil.
- Most common disposal methods.

b) Incineration:

→ Controlled burning of combustible waste.

→ Reduces waste volume but may cause air pollution.

c) Composting:

→ Organic waste is decomposed into fertilizer.

→ Environmentally friendly but need management.

d) Recycling:

→ Recovery of reusable materials like plastic, metal, glass.

→ Reduces waste volume and conserves resources.

→ On-site and off-site Waste Management

→ On-site disposal: Family pits, communal pits, composting.

→ Off-site disposal: Landfills, incineration plants.

→ Importance of waste Management:

→ Protects public health.

→ Prevents environmental pollution.

→ Improves quality of life.

→ Supports sustainable development.

→ Conserves natural resources.

Conclusion:

Waste management, specially solid waste management, is essential for maintaining environmental health and social well-being. Proper handling, treatment and disposal of waste reduce disease risks, protect natural resources and ensure a cleaner and safer environment for present and future generations.

Lec→06 Notes:-

Solid wastes, (Types, Impacts, waste management)

→ Solid waste non-liquid waste (except human excreta).

Main types are:

- Industrial waste: by products from factories, manufacturing, chemicals.
- Hazardous waste: battery chemicals, medical waste, industrial toxins.
- Biomedical waste: Syringes, infected materials, expired medicines.
- Agricultural waste: crop residues, animal dung, pesticides.
- Construction waste: concrete, bricks, wood, debris from demolition.

Impacts of solid waste:

1. On human health: Spread of diseases like cholera, typhoid, dengue, Toxic exposure from e-waste and chemical affecting lungs, skin and ~~nerve~~ system.

2. on the Environment:-

- Soil contamination due to chemical leakage.
- Water pollution when waste leachate enters rivers.
- Air pollution from open burning releasing harmful gases (dioxins, CO).

3. On Wildlife & Ecosystem:-

- Animals ingest plastics → injury or death.
- Natural habitats disturbed by unmanaged waste accumulation.
- Waste Management :-
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### The 3 Rs strategy:

- Reduce: Minimize generation at source.
- Reuse: Find new uses instead of discarding.
- Recycle: Convert waste into reusable materials.

### Key Components (The process):-

1. Generation: When materials become valueless to the owner.
2. Storage: Keeping materials after discarding but before collection.
3. Collection: Gathering waste for transportation.
4. Transportation: Moving waste to the final site.
5. Disposal: Final stage where risks are minimized.

→ Disposal Methods: Land application (Burial or Landfilling)  
Composting  
Burning  
Recycling (Resource Recovery)

## **Q19 • What are the types of solid waste? What is your understanding about E-waste?**

Solid waste, often categorized based on its source and composition, includes various types of waste materials. One specific and significant category of solid waste is electronic waste, commonly known as **E-waste**. Here are some types of solid waste and an explanation of E-waste:

### **Types of Solid Waste:**

1. **Municipal Solid Waste (MSW):** This includes everyday household and commercial waste, such as food scraps, packaging materials, paper, plastics, and textiles.
2. **Industrial Waste:** Generated from manufacturing and industrial processes, this waste can include hazardous materials, chemicals, and byproducts.
3. **Construction and Demolition Waste (C&D):** Produced during construction, renovation, and demolition activities, it comprises materials like concrete, wood, steel, and insulation.

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4. **Hazardous Waste:** Materials that pose a risk to human health or the environment, such as chemicals, solvents, medical waste, and certain electronic components.
5. **Biomedical Waste:** Generated from healthcare facilities, it includes infectious and hazardous waste, like used syringes, contaminated materials, and pathological waste.
6. **Electronic Waste (E-waste):** Discarded electronic products like computers, smartphones, televisions, and appliances that contain hazardous substances and valuable metals.

### **Understanding E-waste:**

E-waste refers to discarded electronic devices and electrical equipment that have reached the end of their useful life or are no longer needed. These items can include computers, mobile phones, televisions, refrigerators, and more. E-waste is a growing concern due to the rapid advancement of technology, which leads to frequent product obsolescence.

### **Key points about E-waste:**

1. **Composition:** E-waste contains a mix of valuable and hazardous materials, including metals (like gold, silver, and copper), plastics, glass, and toxic substances (such as lead, mercury, and brominated flame retardants).
2. **Environmental Impact:** If not managed properly, E-waste can leach toxic materials into the environment, contaminating soil and water. Incineration of E-waste can release harmful pollutants into the air. Improper disposal and informal recycling practices in some regions can lead to health and environmental hazards.
3. **Global Issue:** E-waste is a global problem, with vast quantities generated worldwide. The informal recycling of E-waste in developing countries is a significant concern due to the health

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risks faced by workers and the environmental contamination that occurs.

4. **Recycling and Responsible Disposal:** Proper recycling and disposal of E-waste involve recovering valuable materials, reducing environmental harm, and ensuring safe working conditions for those involved in the process. Many countries have established regulations and recycling programs to address E-waste management.
5. **Extended Producer Responsibility (EPR):** EPR programs hold manufacturers accountable for the end-of-life management of their products. They encourage producers to design products with recyclability and sustainability in mind.

In summary, E-waste is a specific type of solid waste resulting from discarded electronic devices. It poses environmental and health risks when not managed responsibly, highlighting the importance of proper disposal, recycling, and regulation to address this growing global issue.

**Q19:** If you are appointed as a consultant of Waste Management of an area; how would you plan your program to manage the waste and make the people aware.

As a waste management consultant, I would develop a comprehensive waste management program that includes effective waste collection, recycling initiatives, and a robust public awareness campaign. The goal would be to promote responsible waste disposal practices, reduce the environmental impact of waste, and ensure the well-being of the community. Here's how I would plan the program:

#### **1. Waste Collection and Segregation:**

- Implement a well-organized waste collection system that covers all residential and commercial areas.

- Encourage households to segregate waste at the source into categories like recyclables, organic waste, and non-recyclables.

#### **2. Recycling Infrastructure:**

- Set up recycling centers and collection points for recyclable materials like paper, cardboard, plastics, glass, and metals.
- Establish partnerships with recycling facilities and businesses to process collected recyclables.

#### **3. Composting Facilities:**

- Promote home composting and community composting programs for organic waste, reducing the amount of waste sent to landfills.
- Develop centralized composting facilities for larger-scale organic waste management.

#### **4. Hazardous Waste Disposal:**

- Educate residents about the proper disposal of hazardous waste materials like batteries, electronic waste, and chemicals.
- Organize periodic hazardous waste collection events for safe

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## **5. Public Awareness Campaign:**

- Launch a multimedia campaign to inform residents about the waste management program and the importance of responsible waste disposal.
- Conduct educational workshops, seminars, and outreach programs to engage the community.

## **6. Incentives and Rewards:**

- Introduce incentive programs such as discounts or rewards for those who actively participate in waste reduction and recycling efforts.

## **7. Waste Reduction:**

- Encourage businesses and households to reduce waste at the source through practices like purchasing products with minimal packaging and using reusable items.

## **8. Monitoring and Evaluation:**

- Establish a system to monitor waste collection, recycling rates, and the effectiveness of the program.
- Regularly assess the program's impact and make necessary adjustments for improvement.

## **9. Community Involvement:**

- Collaborate with local schools, community organizations, and volunteers to engage residents in waste reduction and recycling initiatives.

## **10. Local Regulations and Compliance:**

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- Ensure compliance with national and local waste management

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#### **10. Local Regulations and Compliance:**

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- Ensure compliance with national and local waste management laws and regulations.

#### **11. Sustainable Funding:**

- Identify funding sources, which may include user fees, government support, and partnerships with recycling industries and organizations.

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#### **12. Data Management:**

- Establish a robust data management system to track waste generation, collection, and recycling rates for informed decision-making.

#### **13. Continuous Improvement:**

- Regularly assess the program's performance and seek opportunities for improvement, including technology upgrades and expansion of services.

By implementing these measures, the waste management program aims to create a culture of responsible waste disposal, reduce the environmental impact of waste, and contribute to a cleaner, healthier, and more sustainable community. Public awareness and community involvement are key elements of this comprehensive approach.