

Solid Waste Management (SWM) is the systematic process of controlling the generation, storage, collection, transport, processing, and disposal of solid materials that are no longer useful. It is a critical municipal function aimed at protecting public health and preventing environmental degradation.

### **Key Components of SWM**

**Waste Generation:** Identification and quantification of waste from various sources like residential, commercial, and industrial areas.

**On-site Handling & Segregation:** The most crucial first step is separating waste at its source into categories such as Wet (organic/biodegradable), Dry (recyclables), and Hazardous (toxic/non-biodegradable).

**Collection & Transport:** Scheduled gathering of waste and moving it to transfer stations or processing sites using specialized vehicles.

**Processing & Recovery:** Converting waste into usable resources via recycling, composting, or energy recovery.

**Final Disposal:** The ultimate fate of residual waste, typically in engineered Sanitary Landfills designed to prevent soil and groundwater contamination.

### **Primary Management Methods**

**The 3R Principle:** Reduce (minimize waste at the source), Reuse (find new uses for items), and Recycle (transform waste into new products).

**Composting:** Biological decomposition of organic waste into nutrient-rich fertilizer.

**Waste-to-Energy (WtE):** Technologies like Incineration (burning waste to produce heat/electricity) and Pyrolysis (chemical decomposition without oxygen).

**Sanitary Landfills:** Highly engineered sites where waste is buried in layers, compacted, and covered with soil to minimize pollution.

### **Challenges and Regulations (India Perspective)**

**SWM Rules 2016:** India's national policy mandates source segregation and introduces Extended Producer Responsibility (EPR), holding manufacturers accountable for their product's packaging waste.

**Informal Sector:** Waste pickers play a vital role, handling 15–20% of recyclable waste; modern policies aim to formalize their contribution.

**Public Health:** Poor SWM leads to "bird menace" near airports, groundwater contamination via leachate, and the spread of diseases like cholera and malaria.

For 2026, many Indian cities are prioritizing zero waste output and bio mining to reclaim land from old, overflowing dump site