Module 1: Introduction to the course

Circular Economy and Waste Management Division

1 hour

Solid Waste Management, SDGs

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Module Outline

Introduction to Municipal Solid Waste (MSW)
Examining the sources, types and composition of MSW
Historical Progress and Evolution of SWM Policies
Swachh Bharat Mission
Legislative Framework
Functional Elements of MSW Management
Challenges in waste management
Understanding the significance of SWM in the context of SDG
Establishing connections between SWM, Climate Change and Marine Litter
Introducing the concept of integrated solid waste management

About this course

Modern urban environments face intricate SWM challenges due to the large volume and diverse nature of waste, technological interventions, and the need for sophisticated urban infrastructure

Effective SWM requires a comprehensive understanding of the entire waste management process, from generation to disposal. Grouping activities along this continuum helps in identifying key areas for intervention

Detailed knowledge of these elements is crucial for assessing the impacts of changes and technological advancements in SWM, enabling better planning and decision-making.

This course provides an in-depth understanding of the SWM process, focusing on both traditional and innovative practices, including the circular economy. It aims to equip participants with the knowledge needed to address the current SWM challenges effectively

Learning Objectives (1/2)

1. Identify and describe the sources, types, and composition of Municipal Solid Waste (MSW) in India.
2. Understand the significance of SWM in the context of Sustainable Development Goals (SDGs).
3. Recognize the challenges and issues inherent to Solid Waste Management.
4. Comprehend the concept of Integrated Solid Waste Management (ISWM).
5. Trace the historical progress of SWM in India and its evolution over time.
6. Familiarize themselves with SWM policies, programs, and regulations in India.

Learning Objectives (2/2)

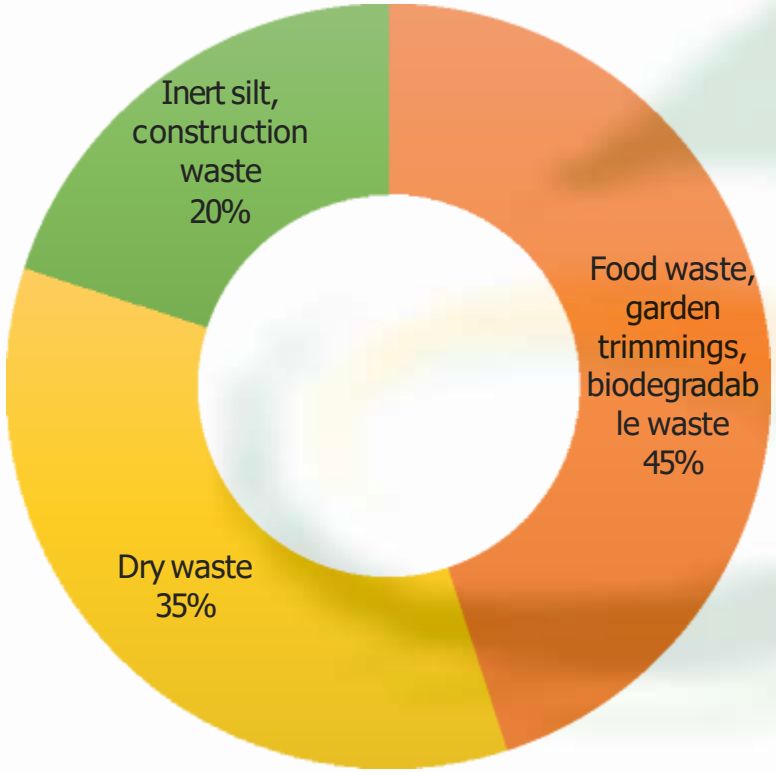
1. Gain insights into the value chain of solid waste management
2. Explore processing and treatment technologies for waste management.
3. Understand various waste disposal technologies.
4. Grasp the financial aspects of solid waste management.
5. Differentiate between circular and linear economy concepts and their application in SWM
6. Investigate innovation technologies across the SWM value chain

Introduction

- Population: 1.43 billion, the largest globally
- India is presently ranked as the world's fifth-largest economy and is forecasted to achieve the third position by 2030.
- India ranks among the top 10 countries for municipal solid waste (MSW) generation
- Economic boom leading to a rise in annual material consumption
- Current per capita daily generation stands at 0.34 kg, with an anticipated rise in municipal solid waste (MSW) production to 0.7 kg per capita per day by 2025.
- Projected waste generation: 165 million tonnes by 2031, and 436 million tonnes by 2050
- Fast urbanization, over population, change in life style and unscientific disposal of wastes caused problem to health and environment.

Classification of MSW

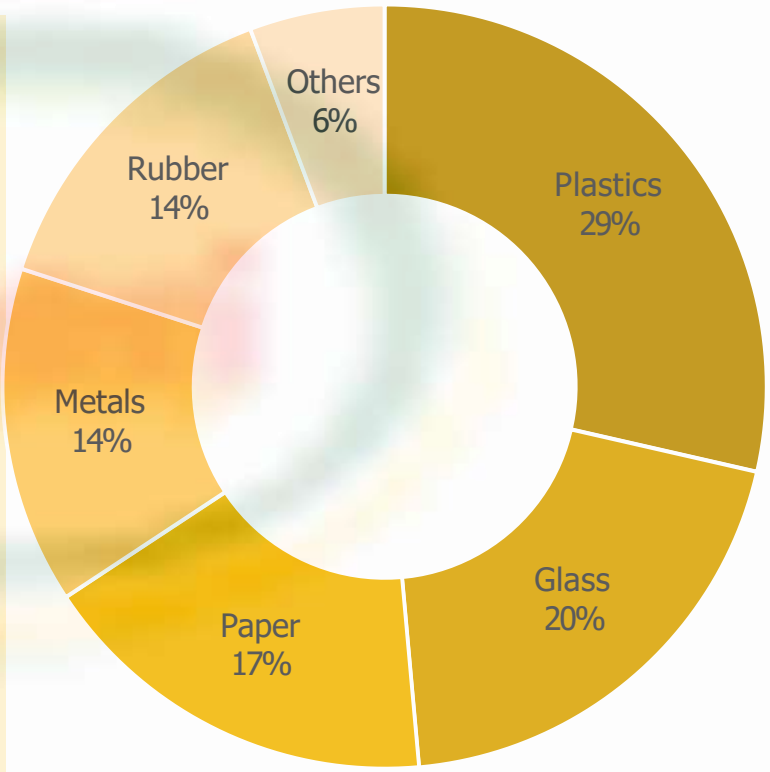
Composition of MSW



Municipal Solid Waste Composition

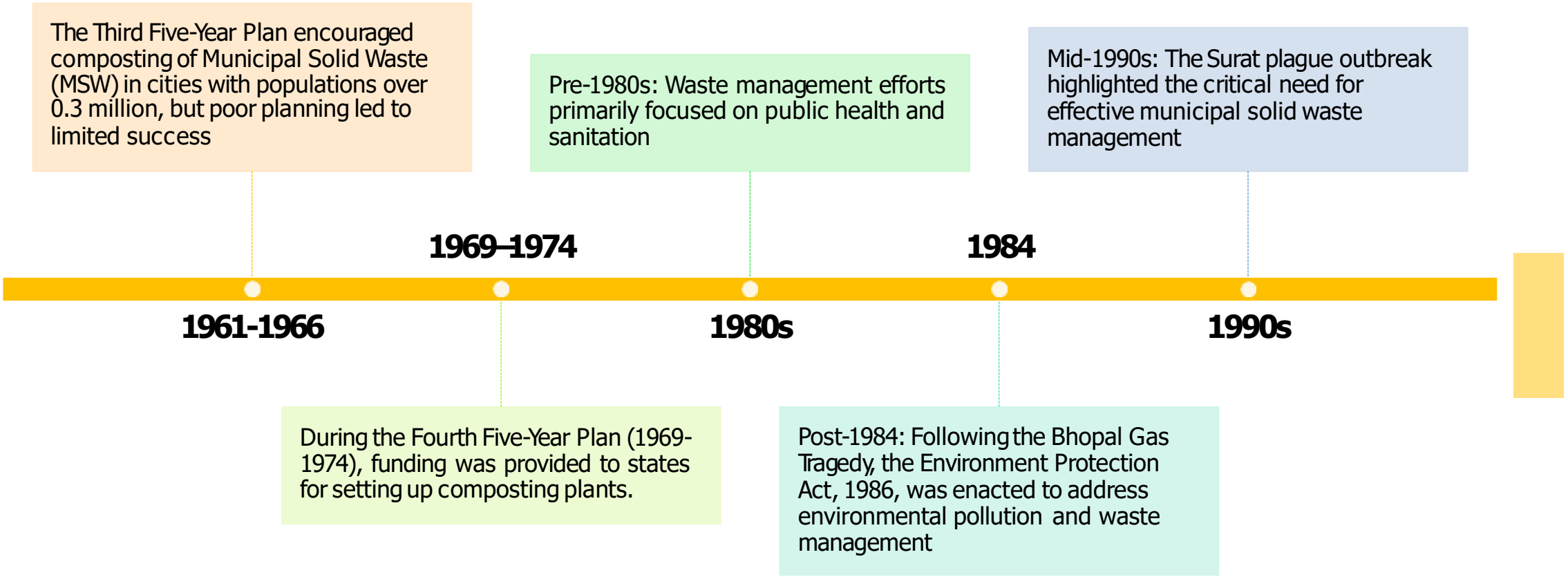
- Organic Waste (40-60%): Predominantly food and kitchen waste, high composting potential.
- Recyclables (10-15%): Includes paper, plastics, metals; often underutilized.
- Inert Waste (30-40%): Construction debris, silt; typically sent to landfills.
- Plastic Waste (6-10%): Rapidly growing due to urbanization; major pollution concern.

Seasonal & Regional Variations: Waste composition varies across regions and seasons.

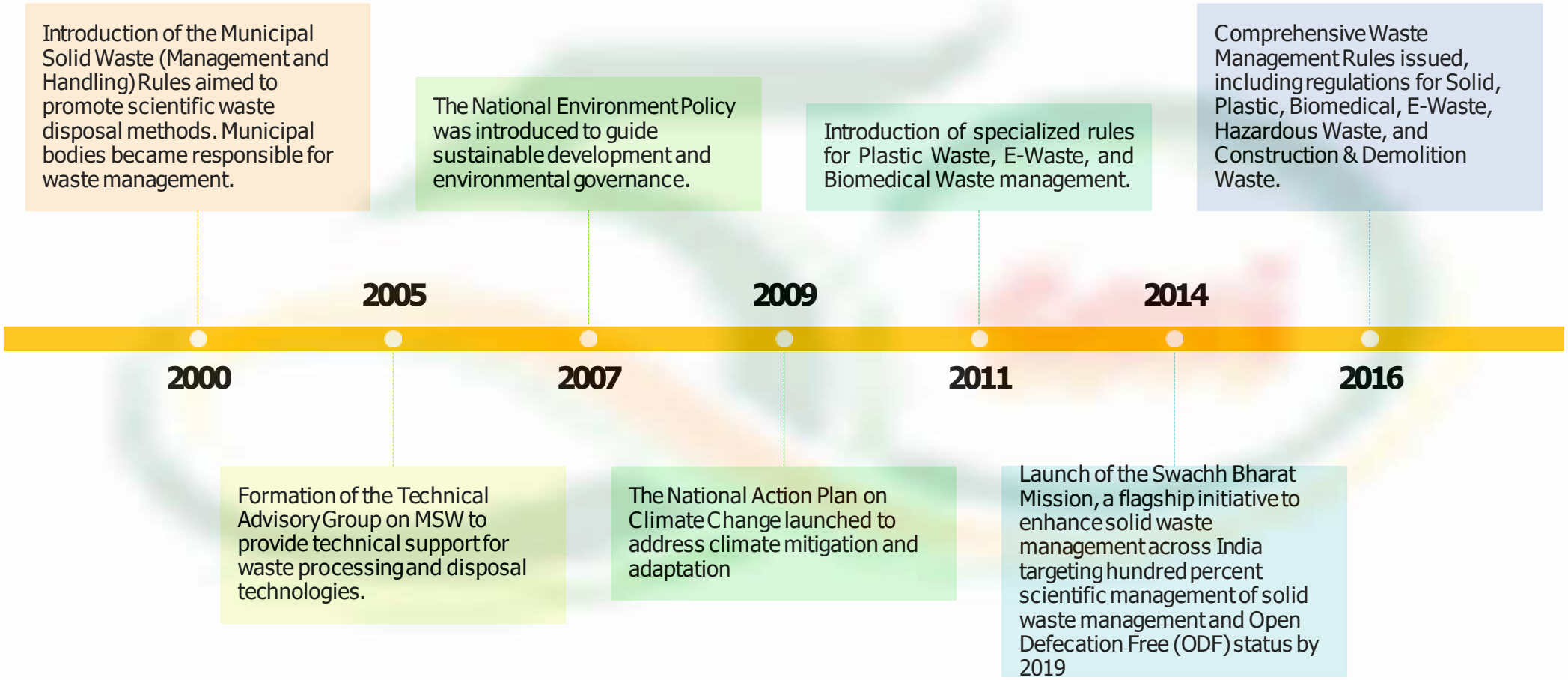


Dry Waste Composition

Historical Progress and Evolution of SWM Policies



Historical Progress and Evolution of SWM Policies

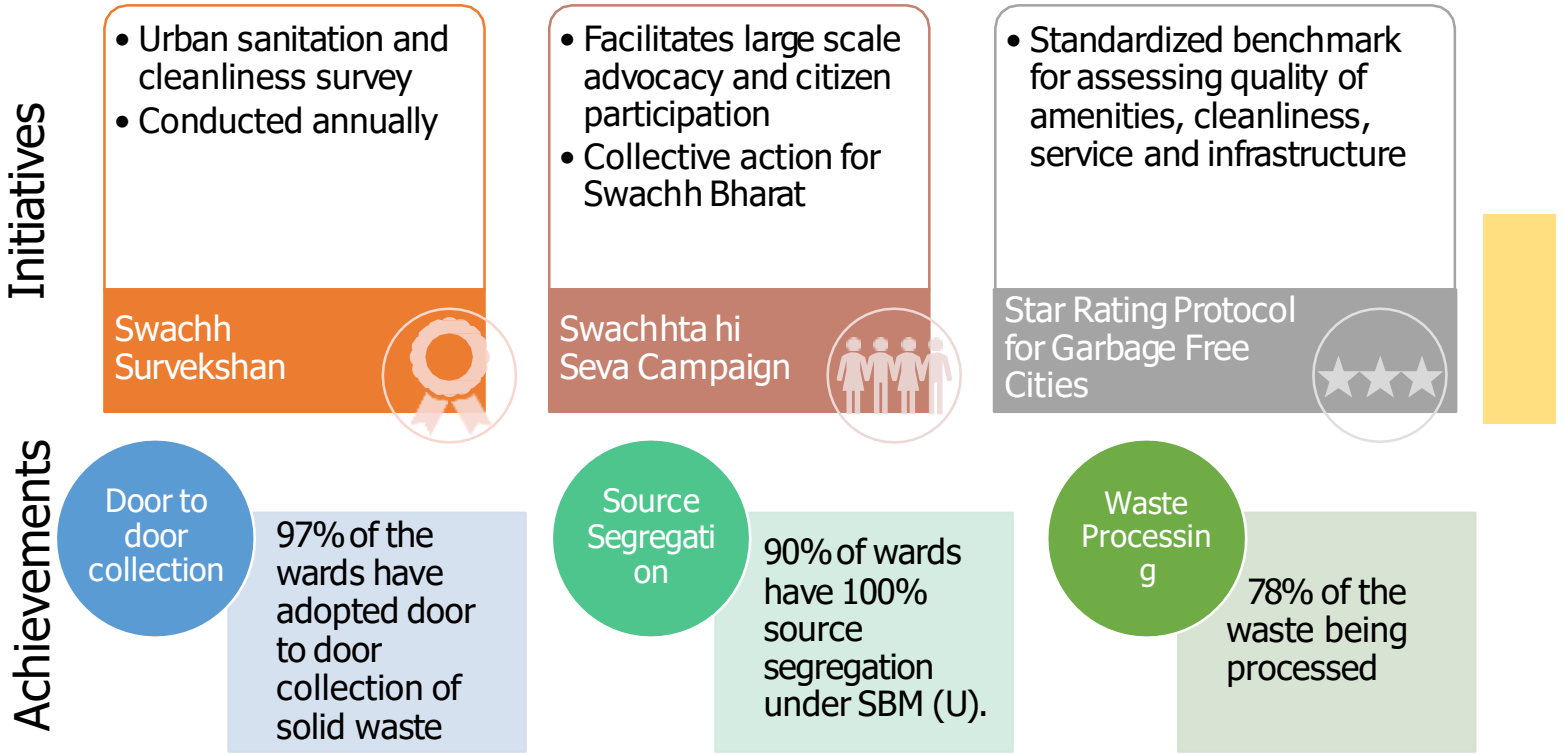


Swachh Bharat Mission

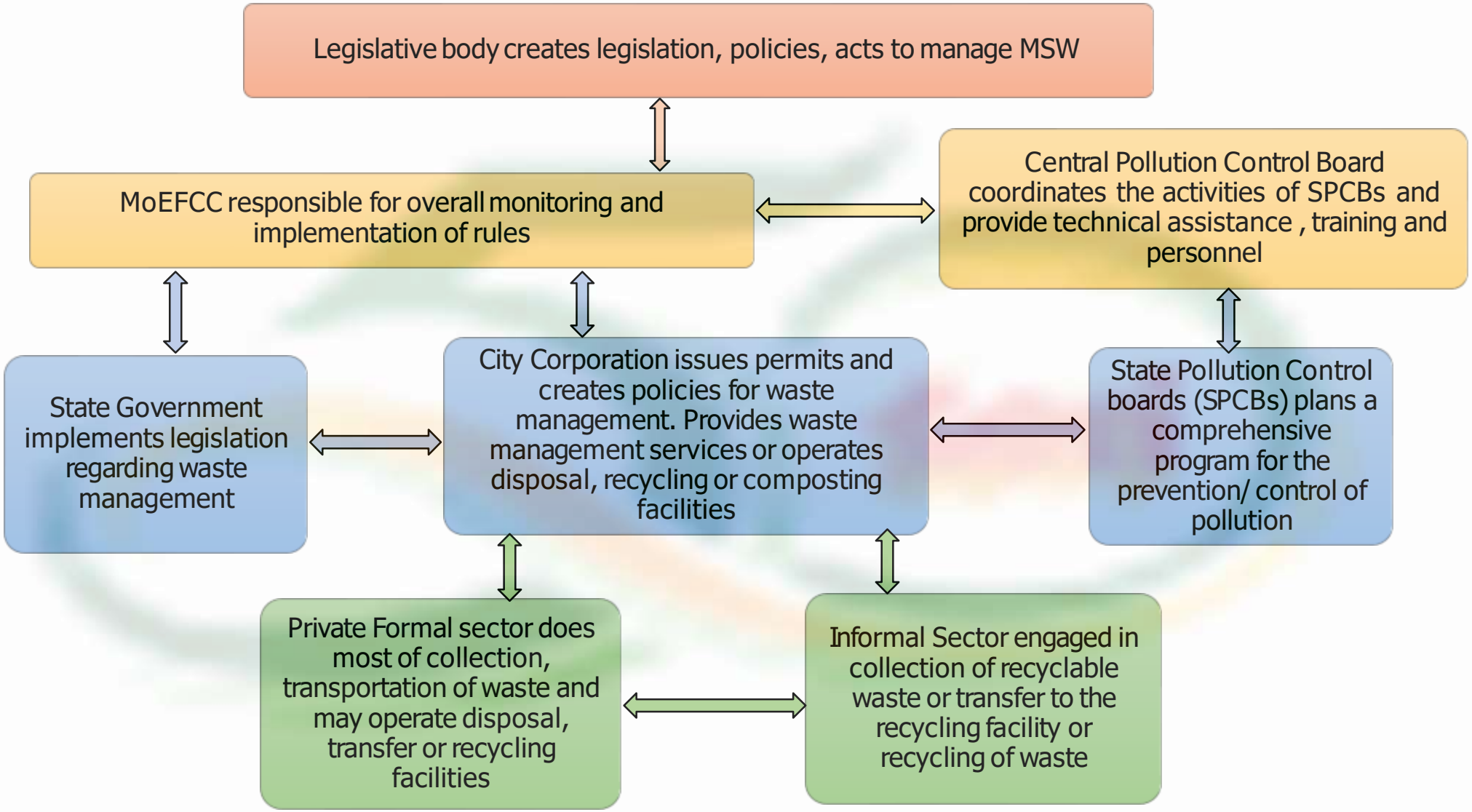
Implemented by: Ministry of Housing Affairs (MoHUA)
Launched on 2nd October 2014 aims at making urban India free from open defecation and achieving 100% scientific management of municipal solid waste in 4000+ statutory towns in the country

Objectives

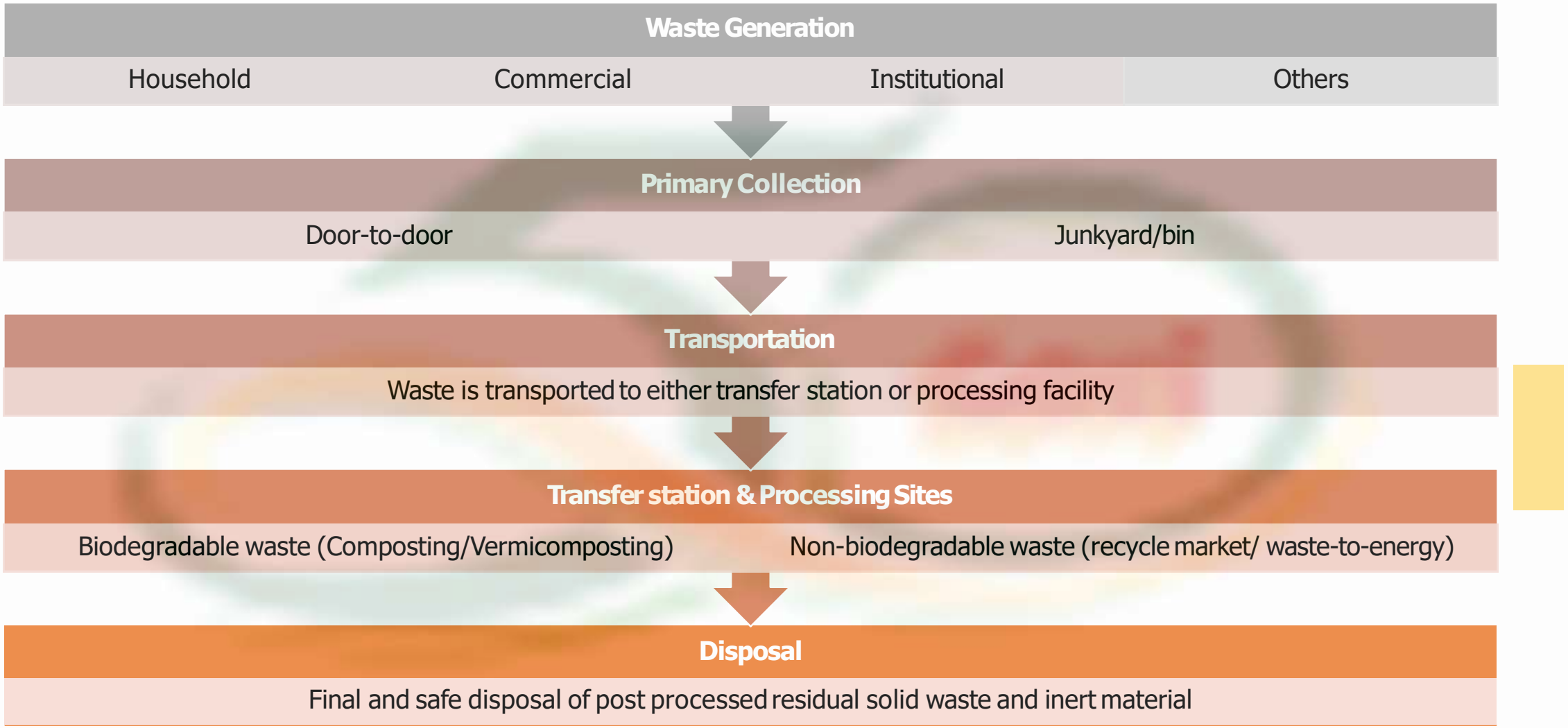
- Waste segregated into wet and dry at all households
- 100% door-to-door collection of segregated waste
- Scientific management and safe disposal of all waste
- Legacy dumpsites converted into green zones)
- Safe containment, transport and treatment of wastewater and fecal sludge to prevent contamination



Legislative Framework



Functional Elements of MSW Management



Challenges

Waste Segregation and Processing

- Poor segregation of waste at source reduces processing efficiency.
- Inadequate infrastructure for transporting segregated wet waste to processing facilities.

Compliance Issues and Regulatory

- Bulk waste generators' non-compliance with SWM Rules 2016.
- Lack of SWM Rules 2016 provisions for compost testing.

Data and Designing

- Lack of data on waste generation hampers facility design.

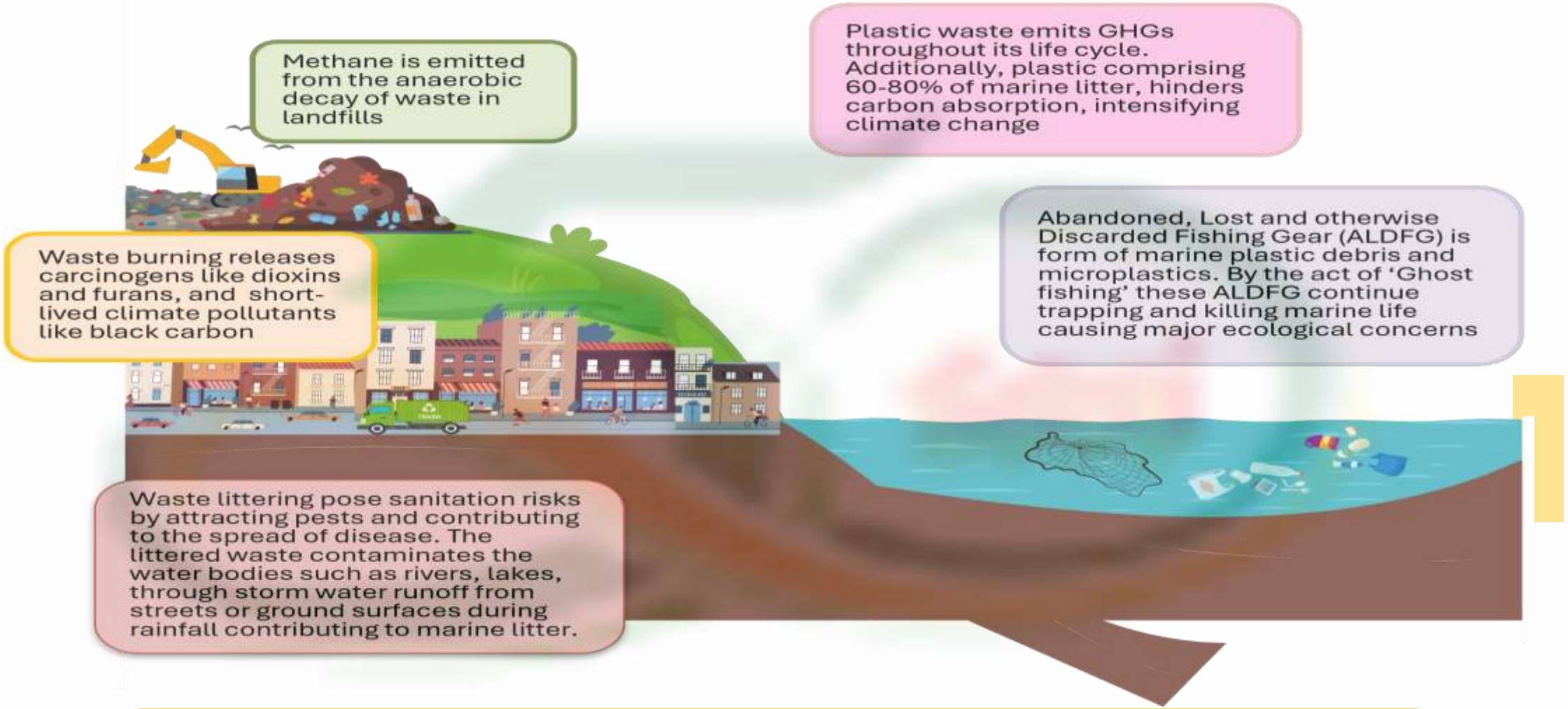
Financial Feasibility and Quality Concerns

- Financial feasibility issues with wet waste processing models.
- Quality challenges in compost from mixed waste.

Infrastructure and Awareness Issues

- Insufficient testing labs and monitoring protocols for compost.
- Inadequate awareness of compost policy and Market Development Assistance among ULBs and compost producers.

Establishing the Connections Between SWM, Climate Change, and Marine Litter



Of the total generated 62 million tonnes of municipal solid waste per annum. Only 43 million tonnes (MT) of the waste is collected, 11.9 MT is treated and 31 MT is discarded

Source:https://www.sciencedirect.com/science/article/pii/S0048969723046867#:~:text=Increasingly%2C%20marine%20litter%20is%20being,%2C%20and%2C%20in%20turn%2C%20greater

Sustainable Development Goals

Goal 6

- Missions such as Swachh Bharat Mission aims to improves sanitation, reduces open defecation, and ensures proper waste disposal, protecting water bodies and soil

Goal 7

- Missions such as bioenergy programmes aims to promote the use of bioenergy, including biogas from organic waste, as a renewable energy source

Goal 11

- Urban waste management under Smart Cities Mission and AMRUT focus on integrating advanced waste management systems into urban planning, reducing pollution, and enhancing the livability of cities.

Goal 12

- Waste management policies such as SWM Rules 2016 and EPR for e-waste focus on minimizing waste, promoting recycling, and sustainable use of resource

Goal 13

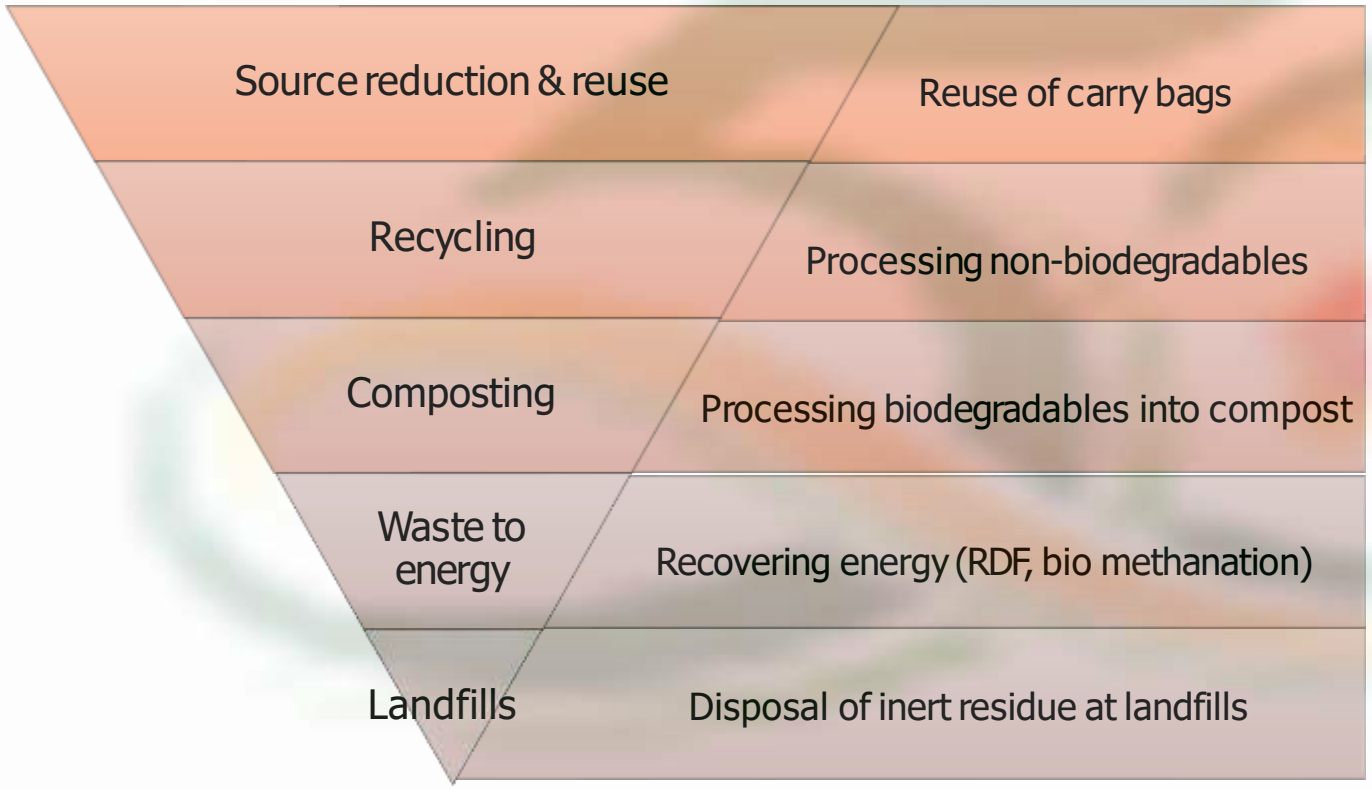
- Proper waste management reduces greenhouse gases and supports climate action via NAPCC and waste-to-energy projects.

Goal 15

- Effective waste management, particularly in rural areas protects ecosystems by preventing soil contaminatio n ,illegal dumping, and ensuring safe disposal of hazardous waste

Concept of Integrated Solid Waste Management (ISWM)

The Integrated Solid Waste Management (ISWM) hierarchy aims to minimize waste disposal and maximize resource conservation and efficiency. It prioritizes waste management practices based on their environmental, economic, and energy impacts.



Stakeholders

- Local authorities
- NGOs
- Private Informal Sector
- Private Formal Sector
- Donor Agencies

Factors

- Technical
- Economic
- Environmental
- Socio-cultural
- Institutional
- Regulatory

References

1. https://cpcb.nic.in/rules-2/
2. https://mohua.gov.in/pdf/627b825fd31b3Circular-Economy-in-waste-management-FINAL.pdf
3. https://mohua.gov.in/upload/uploadfiles/files/Part1(1).pdf
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7. https://pib.gov.in/PressReleasePage.aspx?PRID=2032857#:~:text=SDG%2011%20%E2%80%93%20Sustainable%20Cities%20and%20Communities&text=The%20percentage%20of%20municipal%20solid,2020%20to%2078.46%25%20in%202024.

Thank you !!!

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