

Plastic Pollution

1. What is Plastic Pollution?

Plastic Pollution refers to the **accumulation of plastic products in the environment** to such an extent that they harm **wildlife, ecosystems, and human health**.

Key Features

- Plastics are **non-biodegradable or degrade very slowly**
- They persist in the environment for **hundreds of years**
- It is a major type of **environmental pollution**

Sources of Plastic Pollution

1. Marine Sources

Direct Sources

- Dumping of plastic debris into oceans

Indirect Sources

- Plastic waste from land enters oceans through:
 - Rivers
 - Stormwater runoff
 - Drainage systems

2. Terrestrial Sources

Major land-based sources include:

- Plastic shopping bags
- Plastic toys
- PET bottles
- Disposable plastic items
- Poor plastic waste disposal
- Low recycling rates

Impacts of Plastic Pollution

1. Impact on Marine Ecosystem

Long-term Persistence

- Plastics deposited in marine sediments remain for **centuries**

Ecosystem Disruption

- Plastic accumulation affects **benthic ecosystems**
- Limits **gas exchange between water and sediments**

Harm to Marine Animals

- **Ingestion of plastic** by fish, seabirds, turtles
- **Entanglement** in fishing nets and plastic debris

Microplastic Entry into Food Chain

- Microbeads and fragments enter marine food chains

Spread of Invasive Species

- Floating plastics transport **alien species across oceans**

2. Impact on Terrestrial Ecosystem

Human Health Risks

- Plastics contain **carcinogenic petrochemicals**
- Microplastics found in:
 - food
 - water
 - air

Threat to Animals

- Stray animals ingest plastic waste, causing:
 - choking
 - digestive blockage

Air Pollution

- Burning plastic releases **toxic gases**

Urban Flooding

- Plastic blocks drainage systems

Land Degradation

- Reduces soil quality
- Affects agriculture

Groundwater Pollution

- Chemicals from plastics contaminate groundwater

Effects of Plastic Pollution

Marine Life Impact

- Millions of marine animals die annually due to:
 - ingestion
 - entanglement

Ecosystem Damage

- Plastics disrupt the ecological balance
- Release toxic chemicals into soil and water

Human Health Risks

Microplastics may cause:

- Hormonal imbalance
- Respiratory problems
- Toxic chemical exposure

Economic Costs

Plastic pollution affects:

- Tourism industry
- Fisheries
- Coastal economies

Plastic Waste

Plastic waste forms a **major component of Municipal Solid Waste (MSW)**.

Reasons for High Usage

- Low cost
- Convenience
- Durability

Environmental Hazards

- Non-biodegradable
- Drain blockage
- Toxic emissions from burning
- Harm to animals

Types of Plastics

1. Thermoplastics

Plastics that **soften on heating and harden on cooling**.

Features

- Easily recyclable
- Most common type

Examples

- Polyethylene (HDPE, LDPE)
- Polyvinyl Chloride (PVC)
- Polyamide

Share in India

≈ **80% of plastic waste**

2. Thermosetting Plastics

Characteristics

- Irreversibly hardened during manufacturing
- Cannot be remoulded
- Difficult to recycle

Examples

- Synthetic resins
- Unsaturated polyesters

Share in India

≈ **20% of plastic waste**

Types of Plastic Waste

1. Single-Use Plastics

Short-term plastics are discarded after one use.

Examples:

- Plastic bags
- Straws
- Packaging materials

2. Microplastics

Plastic particles are **less than 5 mm in size**.

Sources

- Breakdown of larger plastics
- Cosmetics
- Synthetic clothing

3. Hard Plastics

Examples:

- Bottles
- Containers
- Household plastic items

4. Thermoset Plastics

Used in:

- Electronics
- Automobile components

Not easily recyclable.

5. Biodegradable Plastics

Designed to break down faster but require **specific environmental conditions**.

Measures Taken to Curb Plastic Pollution

Plastic Waste Management Rules 2016

Key objectives:

- Reduce plastic waste generation
- Improve collection and recycling

Plastic Waste Management (Amendment) Rules 2022

1. Extended Producer Responsibility (EPR)

Producers are responsible for the **end-of-life management of plastic packaging**.

2. Ban on Certain Single-Use Plastics

Effective **1 July 2022**

Plastic Packaging Categories

Category I

Rigid plastic packaging

Category II

Flexible plastic packaging

Category III

Multi-layered plastic packaging

Category IV

Compostable plastic carry bags and sheets

Centralised Online Portal

Managed by the **Central Pollution Control Board (CPCB)**

Purpose:

- Registration of producers
- Filing annual returns
- Monitoring EPR compliance

Environmental Compensation

Based on the **Polluter Pays Principle** for failure to meet EPR targets.

Funds used for:

- Plastic waste collection
- Recycling
- Safe disposal

Extended Producer Responsibility (EPR)

Definition

EPR is a policy approach where **producers are responsible for the environmental impact of their products throughout the life cycle.**

Objectives

- Encourage eco-friendly design
- Improve recycling
- Reduce plastic waste

Applied to

- Plastic waste
- E-waste
- Battery waste

India first introduced **EPR in the E-Waste Rules 2011.**

Government Initiatives

MARPOL Convention

India is a signatory to the **International Convention for Prevention of Marine Pollution.**

India Plastic Challenge – Hackathon

Encourages innovation for:

- Plastic alternatives
- Waste management technologies

'Prakriti' Mascot

Launched by the **Ministry of Environment** to promote sustainable lifestyle practices.

Other Initiatives

- Swachh Bharat Mission
- India Plastics Pact
- Project REPLAN
- Un-Plastic Collective
- GoLitter Partnerships

- National Dashboard on Single-Use Plastics
- EPR Portal for plastic packaging
- Graphene production from waste plastic

Control Measures for Plastic Pollution

1. Promote Alternatives

- Jute bags
- Paper bags
- Cloth bags

2. Reusable Products

- Reusable water bottles
- Reusable containers

3. Proper Waste Disposal

- Segregation
- Scientific landfill management

4. Recycling

- Strengthen recycling infrastructure

5. Government Regulations

- Ban low-thickness plastic bags
- Enforce waste management laws

6. Public Awareness

- Community education programs
- Behavioural change campaigns