

## **Pollution – Notes (UG Semester II)**

### **Introduction**

Pollution refers to the **undesirable change** in the physical, chemical, or biological characteristics of the environment, making it harmful for humans, plants, animals, and materials.

The agents that cause pollution are called **pollutants**.

### **Types of Pollution**

#### **Air Pollution**

**Definition:** Contamination of air by harmful substances such as gases, smoke, and particulate matter.

##### **Major Air Pollutants**

- Carbon monoxide (CO)
- Sulphur dioxide (SO<sub>2</sub>)
- Nitrogen oxides (NO<sub>x</sub>)
- Particulate matter (PM2.5, PM10)
- Lead, ozone, hydrocarbons

##### **Sources**

- Industrial emissions
- Vehicle exhaust
- Burning fossil fuels
- Agricultural burning
- Natural events (volcanoes, forest fires)

##### **Effects**

- Respiratory diseases (asthma, bronchitis)
- Global warming
- Acid rain
- Ozone layer depletion
- Reduced visibility (smog)

##### **Control Measures**

- Use of filters and scrubbers in industries
- Adoption of clean fuels (CNG, LPG)

- Afforestation
- Vehicle emission standards (Bharat Stage norms)

## **Water Pollution**

### **Definition:**

Degradation of water quality due to the presence of harmful chemicals, microorganisms, or waste.

### **Sources**

- Industrial effluents
- Sewage discharge
- Agricultural runoff (pesticides, fertilizers)
- Oil spills
- Plastic dumping

### **Effects**

- Spread of diseases (cholera, typhoid)
- Eutrophication
- Loss of aquatic life
- Contamination of drinking water

### **Control Measures**

- Sewage treatment plants (STPs)
- Proper waste disposal
- Use of eco-friendly fertilizers
- Water quality monitoring

## **Soil Pollution**

**Definition:** Contamination of soil due to chemicals, waste, or harmful biological agents.

### **Sources**

- Excessive use of pesticides and fertilizers
- Industrial waste dumping
- Mining activities
- Landfills

### **Effects**

- Reduced soil fertility
- Loss of beneficial microorganisms
- Bioaccumulation of toxins
- Reduced agricultural productivity

### **Control Measures**

- Organic farming
- Proper waste management
- Phytoremediation (using plants to absorb toxins)

## **Noise Pollution**

### **Definition:**

Unwanted or excessive sound that disrupts normal activities.

### **Sources**

- Traffic and vehicles
- Loudspeakers, music systems
- Industrial machinery
- Construction work

### **Effects**

- Hearing loss
- Stress and irritation
- Sleep disturbances
- Reduced concentration

### **Control Measures**

- Use of sound barriers
- Strict noise regulations
- Plantation of trees (noise buffers)
- Maintenance of vehicle silencers

## **Thermal Pollution**

**Definition:** Increase in water temperature due to human activities.

### **Sources**

- Power plants releasing hot water
- Industrial cooling systems

### **Effects**

- Disrupts aquatic life
- Reduced dissolved oxygen
- Fish migration patterns affected

### **Control Measures**

- Cooling ponds/towers
- Use of heat exchangers

## **Radioactive Pollution**

### **Definition:**

Presence of radioactive substances in the environment.

### **Sources**

- Nuclear power plants
- Radioactive waste
- Nuclear explosions
- Medical and research facilities

### **Effects**

- Genetic mutations
- Cancer and health hazards
- Soil and water contamination

### **Control Measures**

- Proper disposal of radioactive waste
- Strict safety standards
- Use of protective shielding

## **Pollution Control Laws (India)**

- Air (Prevention and Control of Pollution) Act, 1981
- Water (Prevention and Control of Pollution) Act, 1974

- Environment Protection Act, 1986
- National Green Tribunal Act, 2010 (NGT)

## **Conclusion**

Pollution poses a serious threat to the environment and human health. Sustainable practices, strict laws, technological innovations, and public awareness are essential to minimize pollution and protect our ecosystem.