

UNIT – III ENVIRONMENTAL POLLUTION

Points to be covered in this topic

INTRODUCTION

AIR POLLUTION

WATER POLLUTION

SOIL POLLUTION



INTRODUCTION

- **Environmental Pollution** can be defined as any **undesirable change** in physical, chemical, or **biological characteristics** of any component of the environment i.e. **air, water, soil** which can cause **harmful effects** on various forms of **life or property**.
- **Pollution** :- The term **pollution** can be defined as influence of any substance causing **nuisance, harmful effects,** and **uneasiness** to the organisms.
- **Pollutant** :- Any substance causing **Nuisance or harmful effects** or **uneasiness** to the organisms, then that **particular substance** may be called as the **pollutant**.

➤ TYPES OF POLLUTION

1. Air pollution
2. Water pollution
3. Soil pollution



AIR POLLUTION

- **Air Pollution** is the **release of pollutants** such as **gases, particles, biological molecules**, etc. into the air that is harmful to **human health** and the environment.



➤ TYPES OF AIR POLLUTANTS

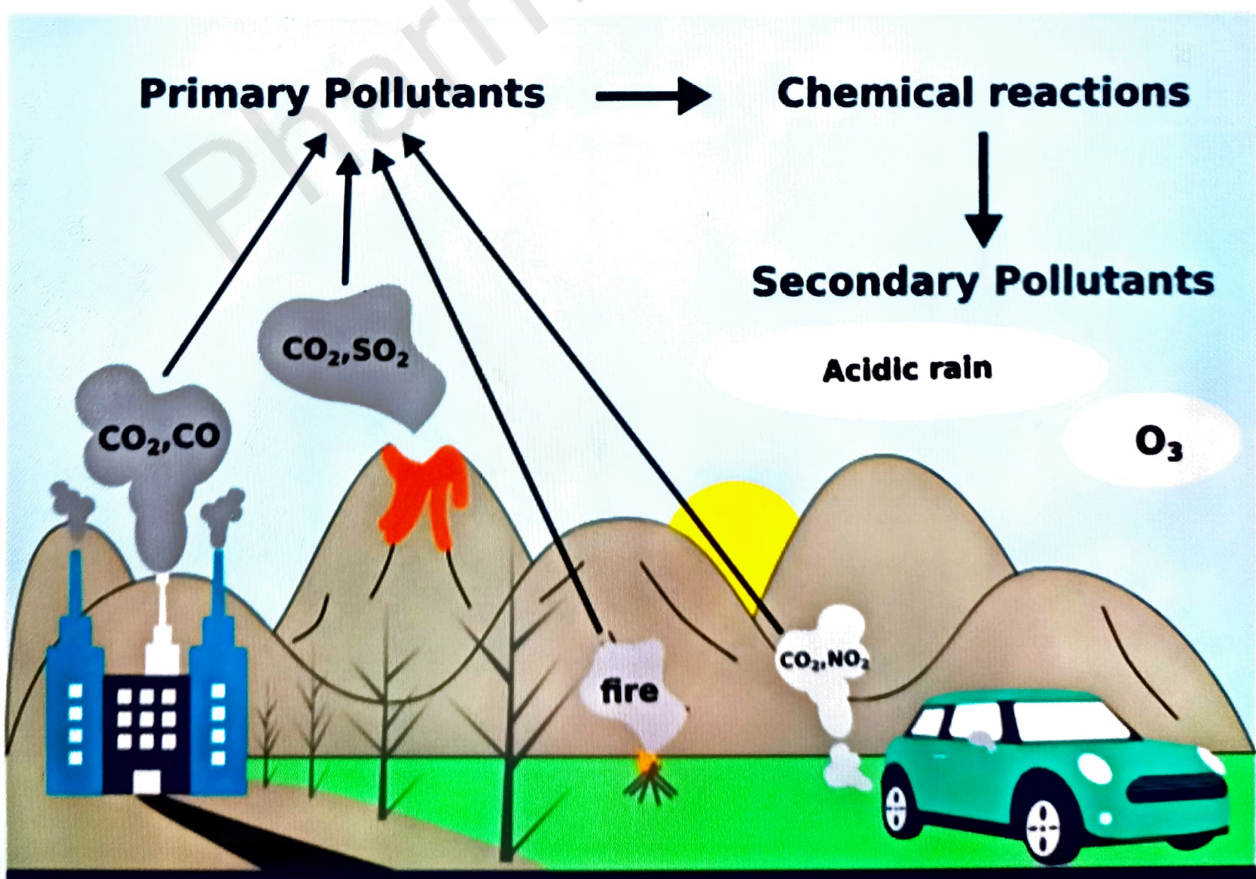
- There are two types of **air pollutants**:

❖ PRIMARY POLLUTANTS

- The **pollutants** that directly cause **air pollution** are known as **primary pollutants**. Sulphur-dioxide emitted from factories is a **primary pollutant**.

❖ SECONDARY POLLUTANTS

- The **pollutants formed** by the intermingling and reaction of **primary pollutants** are known as **secondary pollutants**. Smog, formed by the intermingling of **smoke and fog**, is a secondary pollutant.



➤ CAUSES OF AIR POLLUTION

- Following are the important causes of **air pollution**

❖ BURNING OF FOSSIL FUELS

- The combustion of **fossil fuels** emits a large amount of **sulphur dioxide**.
- **Carbon monoxide** released by incomplete combustion of fossil fuels also results in **air pollution**.



❖ AUTOMOBILES

- The **gases** emitted from **vehicles** such as jeeps, trucks, cars, buses, etc. pollute the environment.
- These are the **major sources** of greenhouse gases and also **result in diseases** among individuals.



❖ AGRICULTURAL ACTIVITIES

- Ammonia is one of the **most hazardous gases** emitted during **agricultural activities**.
- The **insecticides, pesticides** and fertilizers emit **harmful chemicals** in the **atmosphere** and **contaminate it**.



❖ FACTORIES AND INDUSTRIES

- **Factories and industries** are the main source of carbon monoxide, organic compounds, hydrocarbons and chemicals.
- These are released into the **air, degrading its quality**.



❖ MINING ACTIVITIES

- In the **mining process**, the minerals below the **earth are extracted** using large pieces of equipment.
- The **dust and chemicals** released during the process not only **pollute the air**, but also deteriorate the **health of the workers** and people living in the **nearby areas**.



❖ DOMESTIC SOURCES

- The household **cleaning products** and paints contain **toxic chemicals** that are released in the air.
- The smell from the **newly painted walls** is the smell of the **chemicals present** in the paints.
- It not only **pollutes the air** but also affects breathing.



➤ EFFECTS OF AIR POLLUTION

- The **hazardous effects** of air pollution on the environment include:

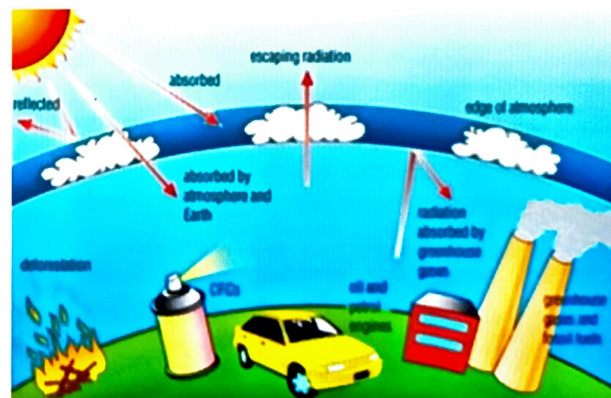
❖ DISEASES

- **Air pollution** has resulted in several **respiratory disorders** and **heart diseases** among humans.
- The cases of **lung cancer** have increased in the last **few decades**. Children living near polluted areas are more prone to **pneumonia** and asthma.



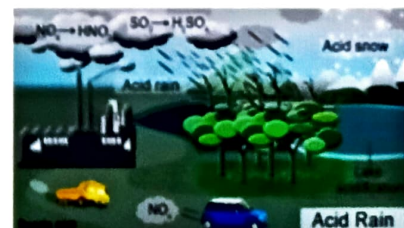
❖ GLOBAL WARMING

- Due to the **emission of greenhouse gases**, there is an imbalance in the **gaseous composition** of the air.
- This has led to an increase in the **temperature of the earth**.
- This increase in **earth's temperature** is known as **global warming**.



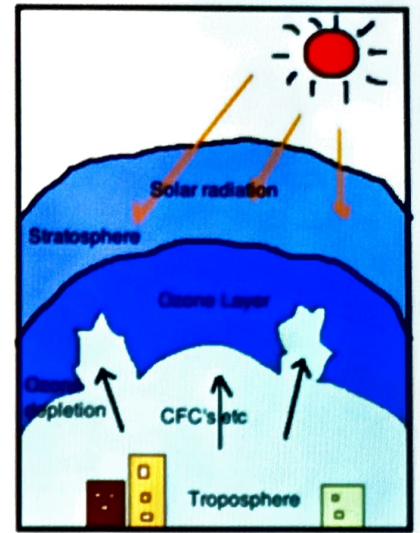
❖ ACID RAIN

- The burning of **fossil fuels** releases **harmful gases** such as **nitrogen oxides** and sulphur oxides in the air.
- The **water droplets** combine with these pollutants, become **acidic and fall** as acid rain which damages **human, animal and plant life**.



❖ OZONE LAYER DEPLETION

- The release of **chlorofluorocarbons**, **halons**, and **hydrochlorofluorocarbons** in the atmosphere is the major cause of depletion of the **ozone layer**.
- The **depleting ozone layer** does not prevent the **harmful ultraviolet** rays coming from the sun and **causes skin diseases** and **eye problems** among individuals.



❖ EFFECT ON ANIMALS

- The **air pollutants** suspend in the **water bodies** and affect aquatic life.
- Pollution also compels the animals to leave their **habitat and shift** to a new place.
- This renders them stray and has also led to the **extinction** of a large number of **animal species**.



➤ AIR POLLUTION CONTROL

- Following are the measures one should adopt, to control air pollution:

❖ AVOID USING VEHICLES

- People should **avoid using vehicles** for **shorter distances**.
- Rather, they should **prefer public modes** of **transport to travel** from one place to another.
- This not only **prevents pollution**, but also **conserves energy**.



❖ ENERGY CONSERVATION

- A large number of **fossil fuels** are burnt to **generate electricity**.
- Therefore, **do not forget** to switch off the **electrical appliances** when not in use.
- Thus, you can save the **environment** at the individual level.



❖ USE OF CLEAN ENERGY RESOURCES

- The use of **solar, wind** and **geothermal energies** reduce air pollution at a larger level.



WATER POLLUTION

- **Water pollution** can be defined as the contamination of **water bodies**.
- **Water pollution** is caused when water bodies such as **rivers, lakes, oceans, groundwater** and aquifers get contaminated with industrial and **agricultural effluents**.
- When water gets polluted, it **adversely affects** all lifeforms that directly or **indirectly depend** on this source.



➤ SOURCES OF WATER POLLUTION

- The key causative of water pollution in India are:
 - ✓ **Urbanization**
 - ✓ **Deforestation**
 - ✓ **Industrial effluents**
 - ✓ **Social and Religious Practices**
 - ✓ Use of **Detergents and Fertilizers**
 - ✓ **Agricultural run-offs**- Use of insecticides and pesticides

➤ CAUSES OF WATER POLLUTION

1. DOMESTIC SEWAGE

- **Untreated sewage** water that contains **soaps, chemicals, food waste, human waste** etc is the **single largest source** of water pollution.



2. INDUSTRIAL EFFLUENTS

- **Manufacturing units** are generally located near rivers. Untreated wastewater from these factories is **high on toxic content** and resistant to breakdown by microorganisms.



3. AGRICULTURAL WASTE

- Runoff of **fertilizers, pesticides** and manure used in agricultural **production contaminate** the water.
- This process of **toxic chemicals** entering the food chain is called **Biomagnification**.



4. SPILLAGE OF PETROLEUM PRODUCTS

- **Petroleum products** contaminating **sea water** as a result of **accident spillover** is a regular news item.



➤ EFFECTS OF WATER POLLUTION

- Destruction of **marine life** and **aquatic ecosystem**
- Degradation of **water quality** and scarcity of **fresh drinking water**.
- **Waterborne disease** like cholera, typhoid etc
- **Biomagnification**

➤ CONTROL MEASURES OF WATER POLLUTION

- **Water pollution**, to a **larger extent**, can be controlled by a variety of methods.
- Rather than **releasing sewage** waste into water bodies, it is better to treat them **before discharge**.
- Practising this can reduce the **initial toxicity** and the remaining substances can be degraded and **rendered harmless** by the **water body itself**.
- If the **secondary treatment** of water has been carried out, then this can be reused in **sanitary systems** and **agricultural fields**.
- A **very special plant**, the Water Hyacinth can absorb **dissolved toxic chemicals** such as **cadmium** and other such elements.
- Establishing these in **regions prone** to such kinds of pollutants will reduce the **adverse effects** to a large extent.

SOIL POLLUTION

- **Soil pollution** is defined as the presence of **toxic chemicals** (pollutants or contaminants) in the soil, in **very high concentrations** to pose a risk to human health and the **ecosystem**.



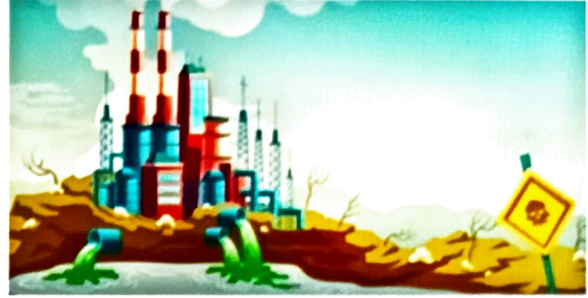
➤ TYPES OF SOIL POLLUTION

- Agriculture **soil pollution** is caused due to the excessive use of **pesticides and insecticides**.
- Soil Pollution by **industrial discharges** of chemicals from mining and manufacturing of goods.
- Solid waste **soil pollution/ Poor management** or inefficient disposal of waste.
- Soil Pollution due to **urban activities** etc.

➤ CAUSES OF SOIL POLLUTION

❖ INDUSTRIAL POLLUTION

- The discharge of **industrial waste** into soils can result in soil pollution.
- In India, as **mining and manufacturing** activities are increasing rapidly, **soil degradation** is also increasing.
- The **extraction of minerals** from the earth is responsible for **affecting soil fertility**.



❖ AGRICULTURAL ACTIVITIES

- The use of **insecticides and pesticides** for a long period can cause **soil pollution**.
- Repetitive use can cause **insects and pests** to become resistant to it.
- Instead of **killing pests** and insects, it degrades the soil quality.



❖ WASTE DISPOSAL

- **Disposal of plastics** and other solid waste is a serious issue that causes soil pollution, disposal of **electrical items** such as batteries causes an **adverse effect** on the soil due to the **presence of harmful chemicals**. Eg: **lithium** present in batteries can cause the **leaching of soil**.



❖ ACID RAIN

- It is caused when **pollutants present** in the air mix with the **rain and fall** back on the ground.
- The **polluted water** could dissolve away some of the **essential nutrients** found in **soil and change the structure** of the soil thus making it **unsuitable for agriculture**.



❖ HEAVY METALS

- The presence of **heavy metals** (such as lead and mercury) in very **high concentrations** present in soils can cause them to become **highly toxic** for human beings.



❖ OIL SPILLS

- **Oil leaks** can happen during the **storage or transport** of chemicals, the chemicals present in the **fuel deteriorates** the quality of soil and make them unsuitable for further **cultivation, chemicals** can also enter into the groundwater through the soil, and hence it will make water **undrinkable**.



➤ EFFECTS OF SOIL POLLUTION

❖ HUMAN HEALTH

- **Crops and plants** that are grown on polluted **soil absorb** most of the pollution and then pass them to humans.
- **Living, working, or playing** in contaminated soil can lead to **respiratory diseases, skin diseases,** and other **health problems**.



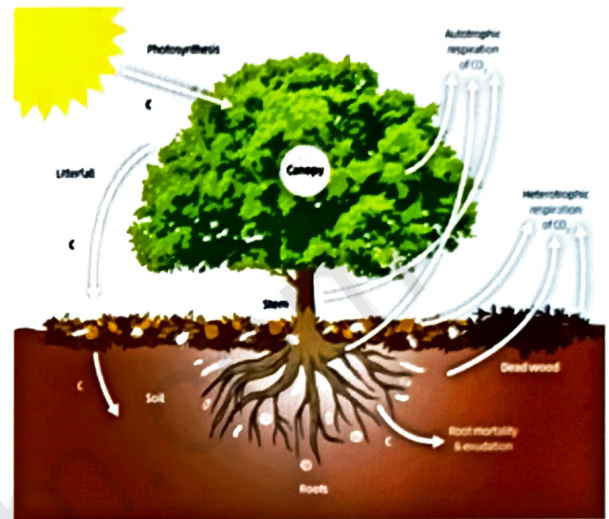
❖ PLANTS

- Regular use of **chemical fertilizers**, **inorganic fertilizers**, **pesticides** will decrease the fertility of the soil and alter the **structure of soil**.
- This will lead to a **decrease in soil quality** and **poor quality of crops**.



❖ ECOSYSTEM

- The soil is an **important habitat** for different types of **microorganisms**, **birds**, and **insects**.
- Thus, change in the **chemistry of soil** can negatively impact the lives of **living organisms** and can result in the **gradual death** of many organisms.



➤ CONTROL OF SOIL POLLUTION

❖ REDUCED USE OF CHEMICAL FERTILIZERS

- The right quantity can help the soil become **more fertile**, too much might **potentially poison** it.

❖ REFORESTATION AND AFFORESTATION SHOULD BE PROMOTED

- **Soil erosion**, which is produced by **deforestation**, is one of the major sources of **soil pollution**.
- With an **ever-increasing population**, it is only logical that mankind requires more and more room to expand their **civilization**.
- It is **frequently accomplished** at the expense of **soil health**. Reforestation of a deforested area should be encouraged to prevent this from happening.



❖ RECYCLE AND REUSE PRODUCTS

- These measures not only **reduce waste output**, but they also **reduce soil pollution**.
- Plastic now makes up a **significant portion** of the waste flow.
- The **great majority** of these **wastes are buried** in landfills.

