Sources of Pollution

Air Pollution

The contamination of air by pollutants such as dust, smoke and harmful gases is known as **air pollution**. Air pollutants can be categorised into various categories. These are

On the basis of origin	Primary and secondary pollutants	**Primary pollutants:** These pollutants are emitted directly into the atmosphere. Examples: Smoke, ash **Secondary pollutants:** These pollutants are formed as a result of chemical reactions occurring between primary pollutants and atmospheric constituents.
On the basis of state of matter	Gaseous pollutants and particulate pollutants	**Gaseous pollutants**: These pollutants are present in the atmosphere in the form of gases. Example: Carbon dioxide **Particulate pollutants**: These are not gaseous pollutants but are suspended solid particles. Examples: Dust, fumes, smoke
On the basis of sources	Natural and man-made sources	**Natural sources**: Volcanic eruptions and wild fires **Man-made sources**: Air pollution occurring because of human activities. Examples: Industrial pollution, nuclear experiments

Sources of Air Pollution

Main sources of air pollution are

Automobile Pollution

- Vehicular emissions form more than 80% of the total air pollution.
- Carbon dioxide, carbon monoxide, nitrogen monoxide and unburnt hydrocarbons are some major air pollutants.
- Metropolitan cities in India such as Delhi, Kolkata and Mumbai suffer from acute air pollution.
- Air pollution is also caused by gaseous and volatile hydrocarbons such as methane, acetylene and ethylene. A hydrocarbon like ethylene forms petrochemical oxidants when it comes into contact with sunlight and nitrogen oxide. Petrochemical oxidants such as bad ozone are harmful for the environment.

Industrial Air Pollution

- Chemical and cement industries, cotton and paper mills, and oil refineries cause air pollution.
- Smoke emitted by these industries can cause serious health hazards as it includes dust, carbon, metals and radioactive elements.
- Burning of coal in thermal power plants releases SO2. When SO2 combines with oxygen and water, it produces sulphuric acid. This results in acid rain.
- Industrialised cities experience high air pollution because of smoke and dust emitted by factories. Smog is a mixture of fog, smoke and dust particles. It is formed in areas which have large concentration of industries.

Burning of Garbage

- When garbage and wastes are burnt, gases such as carbon dioxide, sulphur dioxide and nitrogen oxides are formed which pollute the environment.
- The open burning of wastes also pollutes the environment.
- Burning of forests because of fires produces nitrogen dioxide in the atmosphere. It is soluble in water and forms nitric acid resulting in acid rain.

Brick Kilns

- When coal is used for burning bricks in brick kilns, huge quantities of carbon dioxide, smoke and dust are released which pollute the atmosphere.
- The suspended dust particles in the atmosphere are known as suspended particulate matter.
- Smoke is caused either because of the incomplete burning of coal, wood, tobacco or other harmful chemical processes.

Burning of Fuels

- Fossil fuels are mainly burnt for producing electricity. In India, coal is used in large quantities for the generation of electricity.
- As coal is burnt in the raw form, it produces gases such as carbon dioxide, hydrocarbons, nitrogen oxides, smoke and other dangerous particles.
- Sulphur is one of the main gases which are emitted because of the burning of coal. It causes acid rain when it combines with water. Other fossil fuels such as oil and natural gas also damage our environment by producing various greenhouse gases.

Water Pollution and Its Sources

Contamination of water bodies because of the discharge of pollutants into them is known as water pollution. Sources of water pollution are

Natural Sources

- Gases, minerals, humus and wastes created by living organisms are some natural wastes which pollute water.
- Minerals such as nickel, sodium, lead and mercury also pollute water.

Man-made Sources

- Household detergents and wastes pollute water bodies. Water which is drained out after its use in various households is called wastewater. When this wastewater mixes with solid wastes such as plastics, animal dung and human faecal material, it is known as municipal wastes.
- When detergents and fertilisers containing phosphates are discharged into water, it promotes the growth of algae. This is known as eutrophication. Aquatic wastes interfere with fishing, navigation and irrigation.
- Industrial wastes include heavy metals and synthetic organic compounds. Discharge of these wastes into water bodies causes water pollution. Lead, manganese and mercury affect marine life.

Offshore Drilling and Oil Spills

- Drilling of oil under the sea may prove dangerous for marine life.
- Oil is transported to distant places by ships. An oil spill or tragedy at sea wherein the ship capsizes causes degradation of marine and aquatic organisms. It also threatens ecosystems which exist under the sea.
- Oil may also spill into the sea as a result of offshore drilling.

Radioactive Pollution

Release of radioactive substances into the atmosphere, water and soil mainly because of human activities is known as radioactive pollution. Sources of radioactive pollution are

- X rays are used for detecting skeletal disorders. X rays are harmful to human health because these rays can pass through genetic cells which affect chromosomes. This can hamper the development of the brain and can even cause mutations.
- Mining of radioactive ores: Mining of ores like uranium produces radioactive by-products resulting in radioactive pollution.
- Use of Uranium 235 and Plutonium 239 while testing nuclear weapons leads to the emission of radioactive wastes. These radioactive particles are then carried away by wind to different places or are brought down by rain. This results in soil pollution which in turn pollutes water. Aquatic organisms then consume these radioactive wastes which are passed onto humans by the food chain.
- In atomic and nuclear power plants, fuels and coolants are sources of radioactive pollution. The radioactive wastes emitted by these power plants are extremely dangerous for living organisms.
- Radioactive isotopes are used in research laboratories. Used water from these laboratories pollutes various water bodies.

Thermal Pollution

- Thermal pollution is the rise in the temperature of water bodies largely because of human activities. Thermal power plants use water as a cooling agent in their plants. Most of the power plants are located near rivers. When these plants release recycled hot water into the rivers, the temperature of the river water rises resulting in thermal pollution.
- Thermal pollution can have disastrous effects on organisms living in water as hot water does not have the same oxygen-holding capacity as cold water.
- Some water organisms which require higher concentration of oxygen in water either die or migrate to some other water bodies. Blue algae thrive well in warm water; they produce toxins which endanger the lives of aquatic organisms.

Soil Pollution

A change or alteration in the natural physical, chemical and biological properties of soil because of human activities degrades the quality and productivity of soil. This is known as soil pollution.

Sources of soil pollution are

- Discharge from industries such as used chemicals and fly ash are dumped into the ground polluting the soil.
- Municipal wastes, hospital wastes and market wastes lead to soil pollution.
- Use of chemical fertilisers which contain nitrogen, potassium and phosphorus results in soil pollution as it contaminates soil with impurities.
- Disposal of biomedical wastes such as hospital wastes and domestic wastes contaminates the soil with pathogens (disease-causing bacteria) which may affect human health. Intestinal parasites cause the most serious soil pollution problems in third world countries.
- Pesticides and weedicides which are used for controlling pests and weeds on agricultural fields may settle on soil permanently, passing these toxic materials to plants.