Revision Notes on Environmental Issues

1) Environmental pollution means the contamination of air, water and land. It is a serious problem of the industralised nations.

(2) Air Pollution:

Air pollution refers to the undesirable change occurring in air causing harmful effects on man and domesticated species.

(i) **Air Pollutants :** The common air pollutants are : Dust, Smoke, Carbon monoxide (CO), Ammonia (NH_3), Sulphur dioxide (SO_2), Hydrogen sulphide (H_2S), Nitrogen dioxide (NO_2), Hydrogen cyanide, Hydrogen fluorides, Chlorines, Phosgenes, Arsines, Aldehydes, Ozone, Ionising and radiations. CO_2 is not a normal air pollutant. There is 0.03% CO_2 in the air its higher percentage is the cause of green house effect.

Types of air pollutants: It is two types:

(a) **Primary air pollutants:** Air is polluted by poisonous gases and undesirable substances. They are released by burning fossil fuels. These substances are called primary air pollutants. The primary air pollutants are the following:

- Soot released from unburned fuel.
- Sulphur dioxide (SO_2).
- Benzopyrene (hydrocarbon) released from cigarette smoke.
- Ammonia (NH_3).
- Oxides of nitrogen.
- Carbon monoxide (CO).
- Lead (Pb).

(b) **Secondary air pollutants:** Secondary air pollutants are poisonous substance formed from primary air pollutants. In bright sun light nitrogen, nitrogen oxides, hydrocarbons and O_2 interact to produce more powerful photochemical oxidants like ozone (O_3), peroxyacetyl nitrate (PAN), aldehydes, sulphuric acid, peroxides, etc. All these constitute photochemical smog, which retard photosynthesis in plants.

(ii) **Causes of air pollution**

(a) **Agriculture:** Hydrocarbons released by plants, pollen grains, insectisides etc. cause air pollution.

(b) **Dust:** Dust in the air is increased by dust storms wind, volcanoes, automobiles, etc.

(c) **Industries:** Combustion of fossil fuels like coal, petroleum, etc. Industrial smoke is the main source of pollution.

(d) **Automobiles:** The combustion of petrol and diesel in automobiles releases harmful gases into the air. They also produce dust.

(e) **Ionising radiations:** Ionizing radiations include alpha particles, beta particles and gamma rays. They are released into the air on testing atomic weapons.

(f) **Freons:** Use of freons and other chloro-fluoro-carbon compounds in refrigerants, coolants and as filling agents in aerosol also cause pollution.

(g) **Aerosols:** Aerosols are small particles of all sorts of solid or liquid substances suspended in the air. They block the stomata of plants and prevent the gaseous exchanges between plants and atmosphere. They may also change the climate of an area.

(iv) **Control of air pollution**

(a) The emission of exhaust from automobiles can be reduced by devices such as positive crankcase ventilation valve and catalytic converter.

(b) Electrostatic precipitators can reduce smoke and dust from industries.

(c) Gaseous pollutants arising from industries can be removed by differential solubility of gases in water.

(d) A finepray of water in the device called scrubber can separate many gases like NH_3, SO_2, etc. from the emitted exhaust.

(e) Certain gases can be removed by filtration or absorption through activated charcoal.

(f) Certain gases can be made chemically intert by chemical conversion.

(g) At the Government level pollution can be controlled by framing legislations.

(h) Vehicles based on compressed natural gas (CNG) should be introduced.

(3) Water Pollution:

Water pollution refers to the undesirable change occurring in water which harmfully affect the life activities of man and domesticated species.

Water Pollution

(i) **Water Pollutants:** The common water pollutants are : Domestic sewage, Industrial effluents, Pesticides, Herbicides, Fertilizers, Bacteria and Viruses, Plankton blooms and Heavy metals like Mercury, Temperature, Silt, Radioactivity, Oils etc.

(ii) **Causes of water pollution**

(a) **Domestic sewage:** Domestic sewage consists of human faces, urine, and the dirty used–up water in houses. It contains a large number of bacteria and virus. The sewage is released into the rivers on the banks of which most of the cities are situated.

(b) **Industrial effluents:** All industrial plants produce some organic and inorganic chemical wastes. Those nonusable chemical are dumped in water as a means of getting rid of them. The industrial wastes include heavy metals (*Hg, Cu*, lead, zinc etc), Detergents, Petroleum, Acids, Alkalies, Phenols, Carbonates, Alcoholcyanides, Arsenic, Chlorine, etc.

(c) **Thermal pollution:** Many industries use water for cooling. The resultant warm water is discharged into rivers. This brings about thermal pollution.

(d) **Agricultural pollution:** The fertilizers used for crops are washed into ponds and rivers.

(e) **Pesticides:** Pesticides are used to control pests in fields and houses. They include DDT, BHC, endrin etc.

(f) **Radioactive wastes:** Liquid radioactive wastes are released into the sea around nuclear installations. The oceanic currents carry the radioactive contaminants everywhere.

(g) **Oil pollution:** Oil is a source of pollution in sea-water. Oil pollution is due to ship accidents, loading and discharging of oil at the harbour, oil refineries and off-shore oil production. Degree of impurity of after due to organic matter is measured in terms of BOD (Biochemical Oxygen Demand). It is the demand for O_2 to decompose organic wastes in liter of water.

(h) **Eutrophication:** Rich growth of micro-organisms consumes most of the dissolved oxygen, so as to depreve other organisms. It generally occurs at the bottom layers of deep lakes. Addition of excessive plant nutrients intensifies eutrophication. It is harmful to fish and other aquatic life.

(iii) **Control of water pollution:** Pollution control by sewage treatment includes the following steps:

(a) **Sedimentation:** When sewage is allowed to stand, the suspended particles settle to the bottom. So by sedimentation the suspended particles are removed from sewage.

(b) **Dilution:** The sewage can be diluted with water. This increases the O_2 contents and reduces BOD and CO_2.

(c) **Storage:** The diluted sewage is stored in a pond. This facilitates the growth of micro-organisms. This renders further oxidation of sewage.

(4) **Land pollution:** The undesirable change in the land that harmfully affect the life activities is called land pollution.

(i) **Land pollutants:** Manure, crop–residues, ashes, cinders (pieces of coal), garbage (waste food), paper, card board and plastics. Plastics are the most important land pollutants.

(ii) **Pesticides:** Pesticides are chemicals used to kill pests like insects, rats, snails, fungi, herbs, etc. They are collectively called biocides because they kill life.

(4) Radioactive pollution:

This pollution occurs through radiations. Radiations are of two types:

(i) **Non ionising radiations:** UV rays, IR rays, etc. UV rays cause skin burning, IR rays increases atmospheric temperature and leads to the green house effect.

(ii) **Ionising radiation:** X – rays, x-rays, beta-rays, gamma-rays cause genetic injury on mutation.

Certain elements continuously disintegrate by emitting ionizing radiations. These elements are called radioactive isotopes. Ecologically important radioactive elements are Strontium-90, Argon-41, Iodin-131, Cobalt-60, Cesium – 137, Plutonium – 238, etc. Among these Sr-90' is the most dangerous radioactive pollutant.

(i) **Types of ionizing radiations:** Radioactive isotopes release three types of radiations:

(a) **Alpha particles:** These are large particles emitted by radioactive isotopes (as U^{238}). They travel only short distances. They cannot penetrate the organisms. They cause ionization.

(b) **Beta particles:** These are small particles emitted by radioactive isotopes. They can travel long distances. They can easily penetrate the body tissues and cause ionization.

(c) **Gamma rays:** These are short wavelength rays emitted by radioactive isotopes. They can travel long distances. They can easily penetrate the body tissues and cause ionization. On the basis of the biological effects produced, the radioactive radiations can be grouped into two types, namely internal emitters and external emitters.

(5) Noise pollution

(i) Noise pollution is the result of modern industrialized urban life. It impairs the power of hearing as well as the general health of man.

(ii) It can be controlled by installing noise sources away from residential areas, restricting the use of public address systems, improving machinery and running it in sound proof chambers.

(iii) Occupational exposure to noise can be reduced by using ear muffs or cotton plugs.

Global Warming

Increase in atmospheric concentrations of green house gases (CO_2, CH_4, CFCs, N_2O) causes **global warming** (enhanced green

house effect), changes in sea level, weather and climate change etc.