

# Environment Pollution: Types, Causes, Effects

## **What is Environmental Pollution?**

- Environment Pollution is the addition of contaminants into the natural environment that causes detrimental effects to nature, natural resources and mankind.
- Any unnatural and negative changes in all the dimensions like chemical, physical and biological characteristics of any component of the ecosystem i.e. air, water or soil which can cause harmful effects on various forms of life and property is called environmental pollution.

## **What is a Pollutant?**

- Any substance which causes harmful effects or uneasiness in the organisms, then that particular substance may be called as the pollutant.

The materials that cause pollution are of two types:

1. **Persistent pollutants:** Those pollutants which remain consistent in the environment for a long period of time without any change in its original form are called persistent pollutants. For example pesticides, nuclear wastes, and plastics etc.
2. **Non-persistent pollutants:** These pollutants are the opposite of persistent pollutant and break down in the simple form. If this process of breaking down is done by living organisms, then such pollutants are referred to as biodegradable pollutants.

From another perspective, pollutants can be classified as follows:

1. **Primary Pollutants:** Primary pollutants are those which remain in the form in which they were added to the environment for ex. DDT, Plastic
2. **Secondary Pollutants:** Secondary pollutants are formed due to interaction of primary pollutants amongst themselves viz. PAN by the interaction of NO<sub>x</sub> & Hydrocarbons.

According to their existence in nature:

1. **Quantitative Pollutants:** These substances are already present in the atmosphere but they become pollutant when their concentration level reaches to a particular level which is above a threshold limit.
2. **Qualitative Pollutants:** These are man-made pollutants eg. Fungicides, herbicides etc.

According to origin:

1. **Man-made Pollutants**
2. **Natural Pollutants**

According to the nature of disposal:

1. **Biodegradable Pollutants**
2. **Non-biodegradable Pollutants**
- 3.

## **Types of Environment Pollution:**

### **AIR POLLUTION:**

- Air pollution is the presence of one or more disadvantageous content in such quantity and for such duration, as it is catastrophic, or tend to be catastrophic, to human health and welfare, animal or plant life.
- It is the contaminants of air by the discharge of detrimental substances.

### **Some of the air pollutants, their sources, and effects:**

<b>Name of pollutants</b>	<b>the Sources</b>	<b>Health effects</b>
Nitrogen oxides	Industries, vehicles and power plants	Problems in the lungs, respiratory systems and causes asthma and bronchitis.
Carbon monoxide	Emission and burning of fossil fuels	Severe headache, irritation to mucous membrane, unconsciousness and death.
Carbon dioxide	Burning of fossil fuels	Vision problem, severe headache and heart strain.
Suspended particulate matter	Vehicular emission and burning of fossil fuels.	Lung irritation reduces development of RBC and pulmonary malfunctioning.
Sulphur oxide	Industries and power plant	Irritation in eyes and throat, allergies, cough etc.
Smog	Industries and vehicular pollution	Respiratory and eye problems
Hydrocarbons	Burning of fossil fuels	Kidney problems, irritation in eyes, nose and throat, asthma, hypertension and carcinogenic effects on lungs.
Chlorofluorocarbons	Refrigerators, emission from jets	Depletion of ozone layer, global warming

- Other pollutants are cadmium, lead, mercury, silica, coal dust and particles and radioactive pollutants.

### **Control measures:**

- Policy measures
- Modification of industrial process and selection of suitable fuels and its utilization.
- Collection of pollutants and convert it into less toxic forms by different methods.

### **Government initiatives:**

- National air quality monitoring programme (NAMP)
- National ambient air quality standards (NAAQS)

### **WATER POLLUTION**

- Addition of certain substances such as organic, inorganic, biological and radiological to the water, which degrades the water quality and makes it unhealthy for use.
- Water pollution is not only confined to surface water but also spread to groundwater, sea, and ocean.

### **Sources**

**Point sources:** These are directly pointed towards the water bodies from the source of origin of pollution and are thus easy to regulate.

**Non-point sources:** These sources are related to many diffuse sources and are thus difficult to regulate.

Some of the sources are:

- Industrial and community wastewater: Industries like mining, iron and steel, pharmaceuticals, food processing, soap and detergent and paper and pulp.
- Agricultural sources, thermal pollution (discharge of hot water by thermal power plants cause deficiency of dissolved oxygen in water) and underground water pollution.
- Marine pollution: river discharge, manmade pollution and oil spills etc.

### **Effects**

- An excessive amount of mercury in water can cause Minamata disease in humans and dropsy in fishes; Lead in large amount can cause dyslexia, Cadmium poisoning causes Itai – Itai disease, etc.
- Polluted water has less amount of Dissolved oxygen (DO) content which is important for sensitive organisms, thereby eliminates sensitive organisms.
- Excess of nitrate in drinking water is dangerous for infants and human health, excess fluoride cause neuromuscular disorder and teeth deformity, hardening of bones and painful joints.
- Biological magnification and eutrophication.

**Note:** ‘Eu’ means healthy and ‘trophy’ means nutrition. The improvement of nutrients in water bodies causes eutrophication. Domestic waste discharge, agricultural waste, land drainage and industrial waste in a water body leads to a rapid increase in nutrients in a water body which initiates early ageing of water bodies.

### **Control measures**

- Usage of water should be minimized by changing the techniques involved.
- Recycling and treatment of water should be used to the maximum extent possible.
- The quantity of discharge of wastewater can be minimized.
- Excessive use of pesticides and fertilizers should be avoided.
- Organic farming and efficient use of animal residues as fertilizers.

## SOIL POLLUTION

- Addition of unwanted substances to the soil which negatively affects physical, chemical and biological properties of soil and reduces its productivity is called soil pollution.
- The factors which disturb the biological balance of the soil and deteriorate the quality, texture, and mineral content are called soil pollutants.
- Use of fertilizers, pesticides, insecticides, dumping of solid waste, deforestation, and pollution due to urbanization and other anthropogenic substances causes soil pollution.

### Sources

- Industrial waste: lead, cadmium, mercury, alkalies, organic substances, and chemicals.
- Agricultural waste: fertilizers, pesticides, insecticides, and manures.
- Discarded materials and radioactive elements and plastic bags.

### Effects

- Agriculture: It reduces soil fertility and thus crop yields; increase soil erosion and salinity.
- Ecological imbalance and imbalance in flora and fauna further increases.
- Problems in urban areas like clogging in drains, the release of gases, foul smells, and problems in wastewater management.
- Release of radioactive rays, biomagnification and pollutant gases cause health problems.

### Control measures

- Afforestation, reforestation and use of organic farming.
- Solid waste management and reduction of waste from the construction area.
- Stop the use of plastic bags and use bags of degradable materials like paper and cloth.
- Biomedical waste should be collected and incinerated in incinerators.

## NOISE POLLUTION

- When unpleasant noise is created by machines or people which is annoying, distracting and physically painful then it is called noise pollution.
- Sound is measured in **decibels (dB)**, a person's hearing can be damaged if exposed to noise levels over 75 dB over a period of time.
- WHO recommends 30 dB sound levels for indoor.

**Note:** Noise pollution (control and regulation) Rules, 2000 define ambient noise levels for various areas.

The government of India launched a Real-time ambient noise monitoring system in March 2011, in which five remote noises monitoring each have been installed in different metros and 35 monitoring station will be in different cities.

## **Sources**

### **Indoor sources**

- It includes noise produced by radio, television, generators, electric fans, air coolers etc.
- Due to the higher population, industries and transportation, effects of noise pollution is more in cities.

### **Outdoor sources**

- It include loudspeakers, industrial activities, automobiles, rail traffic, aero-planes and activities in social religious places etc.

## **Effects**

- Noise pollution is annoying and irritating. Noise causes many problems like disturbs sleep, causes hypertension (high blood pressure), emotional complications such as aggression, mental depression and annoyance.
- Noise pollution adversely affects the efficiency of individuals.
- Noise pollution can cause damage to the material of building due to exposure to ultrasonic/infrasonic waves.

## **Control measures**

- Making noise mounds, walls for noise attenuation and well-maintained roads and smooth surfacing of it are some of the noise abatement measures.
- Air traffic noise can be tackled by the appropriate introduction of noise regulations for takeoff and landing of aircraft at the airport.
- Use of soundproofing equipment like generators in areas producing a lot of noise can reduce industrial noise.
- Reducing noise level from domestic sectors, maintenance of automobiles, and prohibition of uses of loudspeakers for certain time.
- A green belt of trees is a good noise absorber.

## **RADIOACTIVE POLLUTION**

**Note:** Radioactivity is a phenomenon of emission of alpha, beta and gamma rays due to the disintegration of atomic nuclei of some elements.

- Radioactive pollution is the pollution caused on account of the release of radioactive substances or radiations in the environment. There are many ways of radiation pollution like nuclear wastes from nuclear power plants, mining and processing of nuclear material etc.
- Radiations are mainly of two types:
- **Non-ionizing radiations:** The electromagnetic waves at the longer wavelength of the spectrum ranging from near infra-red rays to radio waves constitute non-ionizing radiations.
- It affects only those components which can absorb them.
- **Ionizing radiations:** when ionizing radiations pass from a medium, they ionize the atoms and molecules of the medium.
- They have high penetration power and can cause breakage of even macromolecules.

#### **Sources:**

- Natural sources: cosmic rays from space and terrestrial radiation in earth's crust etc.
- Man-made sources: nuclear power plant, disposal of nuclear waste, nuclear transportation, uranium mining and nuclear weapons etc.

#### **Effects:**

- The effects depend upon energy releasing capacity, half-life, rate of diffusion of pollutants and various environmental activities like wind, rainfall and temperature.
- Non-ionizing radiation can damage eyes due to coastal sand, snow etc.
- They destruct the cells and blood capillaries and can cause sunburns.
- Ionizing radiations cause sunburns, dead tissues, death of organisms, mutation increase in the occurrence of cancer and tumours etc.

#### **Control measures:**

- Prevention is the best method for this pollution because no specific cure is available. All safety measure should be strictly enforced and leakage of the radioactive element should be checked.
- Regular monitoring and safe disposal of nuclear waste and safety measure against nuclear accidents.
- Banning of nuclear weapons and nuclear explosions.

#### **E-WASTE**

- Discarded electronic products like computers, equipments used in information technology, home appliances, audio and video product etc are known as electronic waste.
- E-waste is not problematic if it is safe storage or recycled from time to time but it can be hazardous if recycled by primitive methods.
- Most of the e-waste in India is recycled by unorganized sector.
- Proper education, awareness, cost-effective technology and a need for a holistic approach are necessary.

## **Conclusion:**

- Depletion of the natural resources occur due to developmental activities and produce a large number of wastes that leads to pollution of all the resources of the environment and cause global warming and acid rains.
- River pollution and environmental degradation due to untreated or improper methods of treating waste is the root cause of ill health and loss of crop productivity.
- Pollution in effect is an undesirable by-product of industrialization and urbanization.
- Prevention and control measures are necessary for pollution otherwise it will become hazardous to human and other organisms.