

# Effects of Pollution



## Syllabus

**Effects of Pollution:** Effects — on the environment and human health.

All types of pollution — noise, air, water, soil and radioactive have an impact on all living organisms and their environment. Pollutants in the environment are responsible for environmental degradation. The effects of pollution range from mild discomfort to long term effects such as cancer and physical deformities. Increased pollution in the environment also cause psychological and behavioural disorders in human beings.

The effects of each type of pollution on the environment and on human beings are discussed below.

## EFFECTS OF NOISE POLLUTION

The effects of noise pollution are multifaceted and interrelated. Noise pollution has ill effects not only on the human beings but also on the environment.

### Effects on Environment

The noise booms cause cracks in national and archaeological monuments. Very high levels of noise are the cause of cracks in hills. High intensity explosions can break glass panes and cause vibrations in the buildings.

### Effects on Human Health

1. **Effect on hearing or Deafness:** Continuous exposure to noise levels above 100 dB has an adverse effect on hearing ability within a fairly short time. Many workers who are exposed to the noise of jet aircraft or very

noisy workshops for even moderate periods soon develop detectable hearing defects.

2. **Effect on Communication:** External sounds can interfere with conversation and use of the telephone, as well as the enjoyment of radio and television programmes. It can thus, affect the efficiency of offices, schools and other places where communication is of vital importance.
3. **Interference with sleep:** Different people have different depths of sleep and they can adjust to natural sounds. However, noisy conditions near residential areas at night causes difficulties in sleeping.
4. **Mental or Physiological Effects:** Many people complain that noise makes them mentally ill. Experiments have been performed to confirm or disprove these claims. Doctors and scientists have now medically confirmed that noise disturbs the biological organisms and their respective functions. Fire crackers and other excessive and continuous explosives become physically painful giving rise to neurosis, mental illness, cardiovascular diseases, stomach ulcers and respiratory disorders, thereby, reducing human life. Recent researches have

### Effects of High Intensity Noise on Human Beings

Noise (dB)	Effects Observed
<90	Threshold of audibility
130-135	Nausea, vomiting, dizziness.
140	Pain in ear.
150	Significant change in pulse rate
190	Permanent damage to hearing.



concluded that short exposures to noise (in excess of about 100 dB) can lead to adverse effects on the foetus and cause headache, dizziness and stomach problems.

5. **Effects on Physical health and Psychological problems:** Noise has little physical effect on the biological performance provided that the noise level is below about 90 dB. Damage to the inner ear may result if continuous noise levels exceed about 100 dB and can lead to physical illness. Psychiatrists and psychologists have in recent researches made observations that noise has certain relation with physical health causing tension resulting in problems such as speech interference, annoyance, fatigue, sleep interference and emotional distress. Noise levels in industries cause interference in efficiency and communication and raises possibilities of accidents.

### Effects on animals

Noise from industries, railways, crackers, explosions and commotion in the cities and aircraft, affect animals, birds, mice, fishes and domestic animals. Birds avoid migrating to places where noise level is above 100 dB. The noise emissions caused by supersonic aircraft and railways may cause miscarriage in mammals and fishes as well. Some of the birds have been found to have stopped laying eggs due to noise pollution.

## EFFECTS OF AIR POLLUTION

Air Pollution is the presence in the air of one or more noxious gases and minute particles of solid and liquid matter (particulates) in harmful concentrations, of such duration and characteristics that is injurious to plants, animals, human beings and other materials.

### Effects on Environment

The increase in the concentration of Carbon dioxide ( $\text{CO}_2$ ) and other Greenhouse Gases like Methane, Nitrogen Oxide, Chlorofluorocarbons and water vapour are responsible for increasing temperature on the earth. These gases trap the earth's heat and cause *Global Warming*, which will have the following effects on the environment:

- (i) Due to Global Warming, the regions of the Northern hemisphere will heat up

more than other areas of the planet. In temperate mountains, snowlines will melt earlier.

- (ii) Winter and night time temperatures will tend to rise more than those of summer and day time.
- (iii) Rising warmth will lead to an increase in the level of evaporation of surface water; the air will also expand and this will increase its capacity to hold moisture. This, in turn, will affect water resources, forests, and other natural ecological systems, agriculture, power generation, infrastructure, tourism, and human health.
- (iv) Due to excessive heat, water will evaporate quickly. The soil affected with erosion, and devoid of vegetative cover, will not retain moisture for long. Hence, there would be droughts.
- (v) The rise in temperature would lead to the melting of glaciers which will form natural lakes between the mounds of debris and rocks that are left behind by the sliding glaciers. These will result in an imbalance in the outflow of water. This means that the glacial lakes will be fed with water from the melting ice faster than the rate at which they can be drained, thus making glacier lakes flood more frequently.
- (vi) Deltas will be threatened by flooding, erosion and salt intrusion. Loss of coastal mangroves will have an impact on fisheries. For example, the major delta area of the Ganga, Brahmaputra and Indus rivers, which have large populations will be affected by floods, salt water intrusion and land loss.

### Effects on Human Health

The extent to which human beings are affected by air pollution depends on the duration of exposure and the concentration of the pollutants. Based on this criteria, air pollution has both *short-term* and *long-term* effects on human health.

The *short-term* effects of air pollution are:

- (i) irritation in the eyes, nose and throat;
- (ii) respiratory infections such as bronchitis and pneumonia;



## Common Air Pollutants and Their Effects on Human Health

Pollutants	Effects on Human Health
1. Carbon monoxide	Damages lungs, weakens bones, reduces the oxygen carrying capacity of blood and damages heart.
2. Sulphur dioxide	Obstructs breathing, causes irritation of eyes and throat.
3. Suspended Particulate Matter (as soot, smoke)	Causes Asthma, irritation of eyes and cancer.
4. Oxides of Nitrogen (nitric oxide, nitrogen dioxide and nitrous oxide)	Cause acute respiratory infections, bronchitis, lowers resistance to influenza.
5. Hydrocarbons	Affect the respiratory system.
6. Ozone	Causes irritation of eyes and aggravates asthma.
7. Lead	Causes brain damage, affects growth and leads to high blood pressure.
8. Arsenic	Damages kidneys, cause jaundice, lung and skin cancer.

- (iii) headaches, nausea, vomiting, dizziness, convulsions and allergic reactions;
- (iv) slurring of speech.

The *long-term* effects of air pollution are:

- (i) chronic respiratory disease;
- (ii) lung cancer;
- (iii) cardiovascular diseases and coma;
- (iv) damage to the nerves, brain, liver and kidneys.

**Example:** Bhopal Gas Tragedy was the worst industrial accident that happened on December 3, 1984. About 40 tons of toxic methyl isocyanate (MIC) gas leaked into the atmosphere from Union Carbide's pesticide factory in Bhopal in

Madhya Pradesh. As a result of the accident, 3500 people were killed and about 40,000 people were affected in an area of 100 sq km.

The gas leak engulfed the city blinding people, choking their breathing and suffocating them. The gas affected the tissues of their eyes and lungs and attacked their nervous systems. People lost control of their bodies. Urine and faeces ran down their legs. Women lost their unborn children.

### Effects of Pollutants on Plants

Air pollutants affect the growth of plants and metabolism by destroying chlorophyll and disrupting photosynthesis. The effects of air pollution on plants are:

- (i) Sulphur dioxide ( $\text{SO}_2$ ) bleaches the surface of the leaves, causes loss of chlorophyll and results in yellowing of the leaves, especially in green leafy vegetables.
- (ii) Nitrogen dioxide ( $\text{NO}_2$ ) results in the premature falling of leaves and suppressed growth of plants. This leads to reduced yield of crops.
- (iii) Ozone damages the leaves of plants.
- (iv) Peroxyacetyl Nitrate (PAN) damages leafy vegetables and causes premature fall, discolouration and curling of sepals.



**Fig. 18.1.** Union Carbide Factory, Bhopal



## Effects on Animals

Animals that feed on grass and plants (coated with polluted particulate matter) are affected with arsenic poisoning. Lead poisoning results in bronchitis and lack of appetite in pet animals.

## Effects on Materials

The effects of air pollution on materials may be summarised as:

- (i) Soot, dust and fumes from air pollutants cause damage to the painted surfaces, fabrics and buildings.
- (ii) Sulphuric acid mist and Acid rains damage marble and limestone. The Taj Mahal has suffered damage caused by Sulphur dioxide ( $\text{SO}_2$ ) in the atmosphere. Its marble structure is getting discoloured and corroded.
- (iii) Sulphur dioxide ( $\text{SO}_2$ ) together with moisture forms Sulphuric acid ( $\text{H}_2\text{SO}_4$ ) and causes corrosion of metals like steel, copper, and zinc.
- (iv) Paper becomes brittle and leather undergoes disintegration by  $\text{SO}_2$  and Acid gases.
- (v) Ozone,  $\text{SO}_2$ ,  $\text{NO}_2$ , etc, discolour, deteriorate and reduce the strength of textiles.