

## **CHAPTER 18: Pollution of Air and Water**

- **Air pollution:**

Air is a mixture of gases. It is made up of about 78% nitrogen, about 21% is oxygen. The remaining 1% has Carbon dioxide, argon, methane, ozone and water vapor present in very small quantities.

➤ **Air pollution:** Air contaminated with unwanted substances which are harmful for living and nonliving things.

➤ **How does air get polluted?**

**1.) Air pollutants:**

- Contaminants of air are called air pollutants.
- They can be having varied sources such as natural sources like smoke and dust arising from forest fires or volcanic eruptions or man-made sources like factories, power plants, automobile exhausts and burning of firewood and dung cakes.
- Vehicles produce high levels of pollutants like carbon monoxide, carbon dioxide, nitrogen oxides and smoke.
- Carbon monoxide is produced from incomplete burning of fuels such as petrol and diesel.
- Smog: It is a thick fog-like layer in the atmosphere, especially during winters. It is made up of smoke and fog.
- Smoke contains oxides of nitrogen which combine with other air pollutants and fog to form smog.
- Many industries are responsible for causing air pollution.
- Petroleum refineries are a major source of gaseous pollutants like Sulphur dioxide and nitrogen dioxide.
- Sulphur dioxide is produced by combustion of fuels like coal in power plants.
- Chlorofluorocarbons (CFCs) which are used in refrigerators, air conditioners and aerosol sprays.

**2.) Effects of air pollution:**

- a. Respiratory problems are associated with air pollution.
- b. Carbon monoxide is a poisonous gas which reduces the oxygen-carrying capacity of the blood.
- c. Smog causes breathing difficulties such as asthma, cough and wheezing in children.
- d. Sulphur dioxide can cause respiratory problems, including permanent lung damage.
- e. CFCs are known to damage the ozone layer of the atmosphere. The ozone layer protects from harmful ultraviolet rays of the sun.
- f. Small particles are also produced during industrial processes like steel making and mining can cause disease when inhaled.
- g. Power plants give out tiny ash particles which also pollute the atmosphere.

➤ **Case Study—The Taj Mahal**

- The taj mahal is one of the seven wonders of the world. It is a world heritage site and major tourist attraction.
- Air Pollutants are discoloring its white marble.
- The industries located in and around Agra such as rubber processing, automobile, chemicals and oil refinery, have been responsible for producing pollutants like Sulphur dioxide and Nitrogen dioxide.
- The gases react with the water vapors present in the atmosphere to form sulphuric acid and nitric acid, making the rain acidic.
- Acid rain corrodes marble of the monument. This is called “Marble cancer”.
- Suspended particulate matter emitted by oil refinery have contributed towards the yellowing of the marble.
- The Supreme Court has taken several steps to save the Taj.
- It has ordered industries to switch to cleaner fuels like CNG (Compressed Natural Gas) and LPG (Liquefied Petroleum Gas).
- The automobiles should switch over to unleaded petrol in the Taj zone.

➤ **Greenhouse Effect:**

- A part of the radiation (Sun light) that falls on the earth is absorbed and a part is reflected back into space.
- The reflected part of radiation is trapped by the atmosphere which further warms the earth.
- The trapping of radiation by the earth’s atmosphere so that it is not emitted out is called the greenhouse effect.
- Life on earth is dependent on this effect.
- But now it threatens life. Excess of CO<sub>2</sub> in the air is responsible for this effect.
- CO<sub>2</sub> is continuously being released because of human activities, area under forests is decreasing.
- CO<sub>2</sub> traps heat and does not allow it to escape into space due to the average temperature of the earth’s atmosphere is gradually increasing.
- This is called global warming.
- Gases like methane, nitrous oxide and water vapors also contribute towards this effect. These are also called greenhouse gases.
- Global warming has become a major concern for governments worldwide.
- Many countries have reached an agreement to reduce the emission of greenhouse gases. The Kyoto Protocol is one such agreement.

➤ **What can be done to prevent greenhouse effect?**

- Individuals should switch to fuels like CNG and unleaded petrol. There is a need to switch over to alternative fuels instead of the fossil fuels for our energy requirements.
- These could be solar energy, hydropower and wind energy.
- These measures have resulted in lowering of the air pollution.
- Generate awareness about air pollution among friends and neighbors.
- Plant a number of trees and protect the ones already present in the neighborhood.

➤ **Water Pollution:**

- Clean water in the environment is becoming scarce due to increase in population, industries and agricultural activities.
- Use of water for washing clothes, bathing, etc. has led to its pollution which spoils its quality and change its smell and color.
- Harmful substances such as sewage, toxic chemicals, silt, etc., get mixed with water causing its pollution
- The substances that pollute water are called water pollutants.

### ➤ **How does Water Get Polluted?**

- World Wide Fund for Nature (WWF) found that Ganga is one of the ten most endangered rivers in the world.
- The pollution levels in Ganga have risen for many years.
- Large quantities of garbage, untreated sewage, dead bodies, and many other harmful things, directly into the river.
- The increasing population and industrialization have already damaged this mighty river beyond repair.
- The Government of India has launched a new initiative known as National Mission for Clean Ganga (NMCG) in 2016.
- Many industries discharge harmful chemicals into rivers and streams, causing the pollution of water
- Examples include oil refineries, paper factories, textile and sugar mills and chemical factories.
- These industries cause chemical contamination of water.
- The chemicals released include arsenic, lead and fluorides which lead to toxicity in plants and animals.
- Industries are supposed to treat the waste produced before discharging it into waters, but quite often the rules are not followed.
- The soil is affected by impure water, causing changes in acidity, growth of worms, etc.
- Pesticides and weedicides are used for the protection of crops. All these chemicals dissolve in water, are washed into water bodies from the fields.
- They also seep into the ground to pollute ground water.
- Algal growth can be seen on the surfaces of water when excessive quantities of chemicals which get washed from the fields.
- These act as nutrients for algae to flourish.
- On dying, algae serve as food for decomposers like bacteria.
- A lot of oxygen in the water body gets used up which results in a decrease in the oxygen level which may kill aquatic organisms.
- Untreated sewage is thrown directly into rivers contains food wastes, detergents, microorganisms, etc.
- Water contaminated with sewage may contain bacteria, viruses, fungi and parasites responsible for causing diseases like cholera, typhoid and jaundice.
- The bacteria present in the faeces of mammals are indicators of the quality of water.

- If water has these bacteria, it means that it has been contaminated by fecal matter. Such water is used by us can cause various infections.
- Hot water from power plants and industries can also be a pollutant
- If released into the rivers can raise the temperature of the water body, adversely affecting the animals and plants living in it.

➤ **Potable Water and How is Water Purified?**

- Water which is suitable for drinking is called potable water.
- Water looks clean but can have disease-carrying microorganisms and dissolved impurities.
- Boiling it can reduce the pollutant load.
- A number of various physical and chemical processes in the sewage treatment plants help to clean water before discharging it into water bodies.
- Municipal bodies treat the water before supplying it to households.

➤ **Making water safe for drinking:**

- Filter water before use which is a physical method of removing impurities.
- Candle filters are commonly used in homes to filter water.
- Boiling water is a safe method to obtain safe drinking water.
- Boiling kills the germs present in the water.
- Chlorination is a commonly used chemical method for purifying water.
- Chlorine tablets or bleaching powder is added to the water.

➤ **What Can be Done?**

- Strict implementation of policies so that polluted water is not disposed of directly into rivers and lakes.
- Water treatment plants should be installed in all industrial areas.
- At individual levels consciously save water and should not waste it.
- Reduce, reuse and recycle water. One can do this by reusing water used for washing and for other household tasks

- Pollution is no longer a distant phenomenon and is affecting the quality of our daily lives.