1.3 IMPACTS DUE TO CHANGES IN THE ENVIRONMENT

1. **Climate change** is changing our economy, health and communities in the following diverse ways.

   (a) **Global warming**:

   It is the increase of Earth's average surface temperature due to effect of greenhouse gases, such as carbon dioxide emissions from burning fossil fuels or from deforestation, which trap heat that would otherwise escape from Earth.

   (b) **Global dimming**:

   - It is defined as the decrease in the amounts of solar radiation reaching the surface of the Earth.
   - The by-product of fossil fuels which are tiny particles or pollutants which absorb solar energy and reflect back sunlight into the space.
   - This phenomenon was first recognized in the year 1950.

   (c) **Impacts of fossil fuels:**

   They release carbon dioxide, nitrogen dioxide, sulphur dioxide, carbon monoxide etc. when burnt that can have severe consequences on the habitats.

   (d) **Sea level rise**:

   - As climate change increases ocean temperatures, initially at the surface and over centuries at depth, the water will expand, contributing to sea level rise due to thermal expansion.
   - Thermal expansion is likely to have contributed to about 2.5 cm of sea level rise during the second half of the 20th century.

   (e) **Increase in natural and anthropogenic disasters:**

- global warming is the root cause for the increase in natural disasters and the change in the environment is triggered by increasing differences in heat and cold.
- As industry injects more greenhouse gasses and particles into the atmosphere, there is a double edged sword effect of increasing temperature combined with global dimming.

2. **Environmental degradation and pollution:**

   At the point when environments are wrecked or common assets are exhausted, the environment is considered to be degraded and harmed.

   (a) **Habitat destruction**:

   - Habitat loss affects over 2,000 mammal species around the world, and is considered the greatest threat to species across the globe.
   - Habitat can be destroyed directly by many human activities, most of which involve the clearing of land for other uses such as agriculture, mining, logging, hydroelectric dams and urbanization.

   (b) **Invasive species:**

   - These species adversely affect the habitats and bioregions they invade economically, environmentally, and/or ecologically.
   - Such invasive species may be either plants or animals and may disrupt by dominating a region, wilderness areas, particular habitats, or wild land-urban interface land from loss of natural controls (such as predators or herbivores).

   (c) **Ozone depletion:**

- An invisible layer of protection around the planet that protects us from the sun's harmful rays is being depleted by chlorine and bromide found in Chloro-floro carbons (CFC's).
- Once these toxic gases reach the upper atmosphere, they destroy this layer of protection, the biggest of which is above the Antarctic.
- Ozone layer is valuable because it prevents the high energetic ultra violet radiation from reaching the earth's surface.

(d) **Photochemical Smog**:

- It is a type of air pollution produced when sunlight acts upon motor vehicle exhaust gases to form harmful substances such as ozone (O_3), aldehydes and peroxy acetyl nitrate (PAN).
- Photochemical smog formation requires two conditions: a still, sunny day and a temperature inversion (pollutants accumulate in the lower inversion layer).
- Ozone causes breathing difficulties, headaches, fatigue and can aggravate respiratory problems.
- The peroxy acetyl nitrate ($CH_3CO\text{-}OO\text{-}NO_2$) in photochemical smog can irritate the eyes, causing them to water and sting.

(e) **Land degradation**:

- Soil degradation has been defined as a process that leads to decline in the fertility or future productive capacity of soil as a result of human activity.
- It occurs whenever the natural balances in the landscape are changed by human activity through misuse or overuse of soil.
- Degraded soils which result in poor or no production are also called problem soils.

(f) **Eutrophication and algal blooms:**

- Eutrophication is when the environment becomes enriched with nutrients.
- This can be a problem in marine habitats such as lakes as it can cause algal blooms.
- Fertilisers are often used in farming, sometimes these fertilisers run-off into nearby water causing an increase in nutrient levels.

(g) **Ocean acidification**:

- It is the ongoing decrease in the pH of the Earth's oceans, caused by the uptake of carbon dioxide (CO_2) from the atmosphere.
- An estimated 30–40% of the carbon dioxide from human activity released into the atmosphere dissolves into oceans, rivers and lakes.

(h) **Groundwater contamination**:

- Groundwater pollution occurs when pollutants are released to the ground and make their way down into groundwater.
- Groundwater contaminants come from two categories of sources: point sources and distributed, or non-point sources.
- Landfills, leaking gasoline storage tanks, leaking septic tanks, and accidental spills are examples of point sources.
- Infiltration from farm land treated with pesticides and fertilizers is an example of a non-point source.

(i) **Thermal pollution:**

- It is the act of altering the temperature of a natural water body, which may be a river, lake or ocean environment.
- Many organisms are killed instantly by the hot water resulting into a high mortality.
- It may bring other disturbance in the ecosystem. The egg of fish may hatch early or fail to hatch at all.

- It may change the diurnal and seasonal behaviour and metabolic responses of organisms.
- It may lead to unplanned migration of aquatic animals. Macro-phytic population may also be changed.
- As temperature is an important limiting factor, serious changes may be brought about even by a slight increase in temperature in a population.

(j) **Loss of biodiversity**:

- Human activities are leading to the extinction of species, habitats and ultimately there is a loss of bio-diversity.
- Eco systems, which took millions of years to perfect, are in danger when any species population is decimating.
- Balance of natural processes and biogeochemical cycling is crucial to the survival of the eco-system and yet human activity threatens the same.

Health Concerns - Environmental factors are a root cause of a significant disease burden that can be attributed to poor water quality, availability, and sanitation; vector-borne diseases; poor ambient and indoor air quality; toxic substances; and global environmental change..

- **Unsafe water**, and poor sanitation and hygiene kill an estimated 1.7 million people annually, particularly as a result of diarrhoeal disease.
- **Indoor smoke** – primarily from the use of solid fuels in domestic cooking and heating – kills an estimated 1.6 million people annually due to respiratory diseases.
- **Malaria** kills over 1.2 million people annually.
- **Urban air pollution** generated by vehicles, industries, and energy production kills approximately 800 000 people annually.

- **Road traffic** injuries are responsible for 1.2 million deaths annually; low- and middle-income countries bear 90% of the death and injury toll.
- **Lead exposure** kills more than 230 000 people per year and causes cognitive effects in one third of all children globally; more than 97% of those affected live in the developing world.
- **Climate change** impacts – including more extreme weather events, changed patterns of disease and effects on agricultural production – are estimated to cause over 150 000 deaths annually.
- **Unintentional poisonings** kill 355 000 people globally each year (3). In developing countries – where two-thirds of these deaths occur – such poisonings are associated strongly with excessive exposure to, and inappropriate use of, toxic chemicals and pesticides present in occupational and/or domestic environments.

3. **Overpopulation**:

    - It is among the most pressing environmental issues, silently aggravating the forces behind (global warming, environmental pollution, habitat loss, the sixth mass extinction, intensive farming practices).
    - The consumption of finite natural resources, such as fresh water, arable land and fossil fuels, at speeds faster than their rate of regeneration.

4. **Resource depletion**:
    - Due to the rise in population, deforestation is introduced An estimated 18 million acres of forests are destroyed each year.
    - Since deforestation is so extensive, it has made several significant impacts on the environment, including Soil erosion, Global Warming caused by the rise of greenhouse gases, Extinction of species and loss of biodiversity, flooding and drought.

- One of the most pressing issues that deforestation creates is soil erosion. The removal of trees causes higher rates of erosion, increasing risks of landslides, which is a direct threat to many people living close to deforested areas.
- As forests get destroyed, so does the habitat for millions of animals.
- It is estimated that 80% of the world's known biodiversity lives in the rainforests, and the destruction of these rainforests is accelerating extinction at an alarming rate.