

Global Environmental Issues

Global environmental issues present major challenges that affect planetary health and human well-being. These issues include **climate change** and **global warming**, air and **water pollution**, **biodiversity loss**, **land degradation**, **inadequate waste management**, and **unsustainable development**. Comprehensive solutions and global efforts are needed to preserve the environment and ensure the sustainability of resources for future generations.

Global warming and greenhouse effects

Greenhouse Effect:

The solar energy coming from the sun passes through the atmosphere gases to reach the Earth's surface. Roughly one-third of this radiation is reflected directly back to the space. The remaining two-thirds are absorbed by the earth's surface and warm it. Some of IR radiation passes through the atmosphere into the space and some of it is absorbed by certain gases in the atmosphere, called greenhouse gases and re-emitted in all direction. The effect of this is to warm the Earth's surface and the lower atmosphere. This phenomenon is called the **greenhouse effect**. These gases essentially act as blanket, making the earth's surface warmer than otherwise it would be.

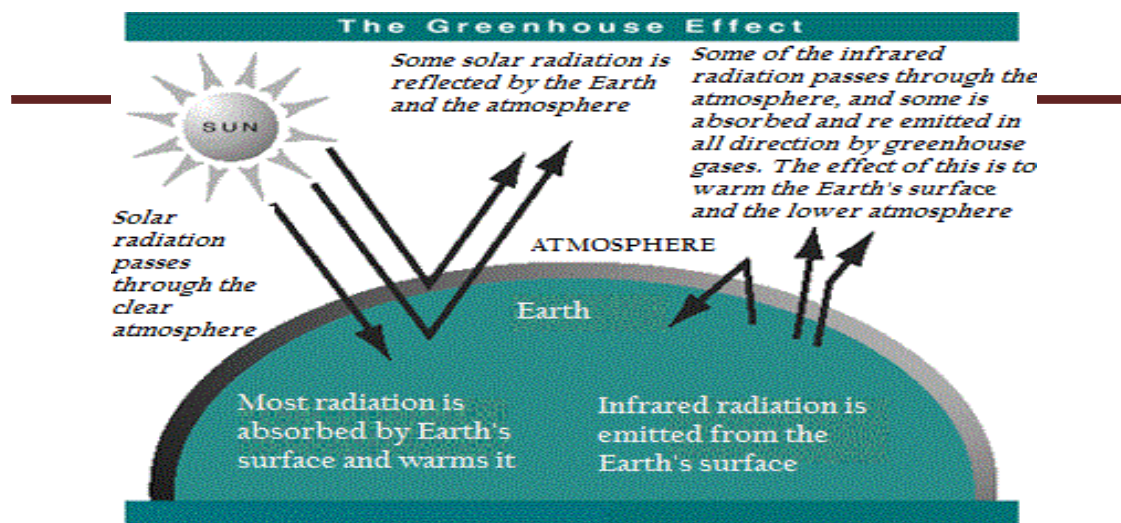


Figure (1): The Greenhouse effects.

Important of greenhouse effect:

The important of greenhouse effect is:

1. To maintain the average temperature of world. The average temperature should remain constant and governs all life process.
2. To maintain the sea level.
3. The polar ice caps remain intact.

Global warming

Global warming is increase in global average temperature near the Earth's surface as a result of increasing in concentration of greenhouse gases in the atmosphere from human activities. If more greenhouse gases are added to the atmosphere from human activities, they will absorb more of infrared radiation reflected by the Earth's surface. The surface and the lower atmosphere will warm further. This extra warming is called the **enhanced greenhouse effect**. Enhanced greenhouse effect causes global warming.

How does global warming happen?

The Global Warming occurs when the concentration of GHGs, such as carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O), increases in the atmosphere by burning fossil fuels, industrialization, mining, deforestation, and automobiles, trapping more heat and causing global temperatures to rise.

Effects of global warming

The following effects will result from the global warming:

- 1- Thermal expansion of the water and melting of polar ice caps would cause sea level to rise.
- 2- Changes in regional wind systems which would influence global rainfall distribution and lead to redistribution and frequently of flood, drought, and forest fires.
- 3- Growth in insect population, which this has bad effect on agriculture and human health.
- 4- Disrupts the Water supply and rain and the increase evaporation of surface water.
- 5- Leads to losing biodiversity

Controlling global warming

- 1- Reduce deforestation and develop way to sustainable agriculture.
- 2- Use of technologies to absorb CO₂ from emission and/or sequester CO₂ in deep ocean.
- 3- Increased absorption of CO₂ by planting more trees.
- 4- Increased dependence on renewable energy source and abandon dependence on fossil fuels.
- 5- Use electric and environmentally friendly transportation

Climate Change

Climate change is the long-term alterations in temperature, precipitation patterns, and other atmospheric conditions on Earth. It is primarily driven by **human activities** that release greenhouse gases (**GHGs**) into the atmosphere, leading to the enhanced greenhouse effect (Global Warming).

What are the causes of climate change? (مهم)

Climate change is primarily caused by:

- **Natural Factors:** such as volcanic eruptions, solar radiation variations, and natural climate cycles can also influence the Earth's climate.
- **Human Activities:** that release greenhouse gases (GHGs) into the atmosphere which include:
 1. **Burning Fossil Fuels:** The combustion of fossil fuels such as coal, oil, and natural gas for energy production, transportation, and industrial processes releases carbon dioxide (CO₂) into the atmosphere.
 2. **Industrial Processes:** Various industrial activities release GHGs such as methane (CH₄) and nitrous oxide (N₂O) into the atmosphere, contributing to the greenhouse effect.
 3. **Agricultural Practices:** Agriculture, particularly livestock farming, produces methane through enteric fermentation in animals and the decomposition of organic matter in anaerobic conditions.
 4. **Land Use Changes:** Alterations in land use, such as urbanization and conversion of natural habitats into agricultural land, can impact the carbon cycle and contribute to climate change.
 5. **Poor Waste Management:** Improper waste disposal and landfill practices can lead to the release of methane from decomposing organic waste.
 6. **Transportation:** The use of vehicles powered by fossil fuels releases CO₂ and other pollutants into the atmosphere, contributing to global warming.
 7. **Deforestation:** The removal of trees and forests reduces the Earth's capacity to absorb CO₂, leading to higher concentrations of GHGs in the atmosphere.

The Effects of climate change:

1. **Changes in Precipitation Patterns:** Altered rain patterns cause more intense storms, droughts, and floods.
2. **Sea Level Rise:** Melting ice caps and glaciers contribute to rising sea levels, which can result in coastal erosion, flooding, and threats to coastal communities.
3. **Loss of Biodiversity:** Climate disrupts ecosystems, shifting habitats and putting many species at risk of extinction.
4. **Extreme Weather:** Climate change increase frequent and severe hurricanes, wildfires, and heatwaves.
5. **Ocean Acidification:** Increased CO₂ harms marine life as oceans absorb more atmospheric carbon.
6. **Health Impacts:** Climate change threatens human health through heatstroke, air pollution illnesses, and disease spread.
7. **Loss of Food Security:** Changing weather patterns disrupt agriculture, leading to food shortages in vulnerable regions.

How can we mitigate climate change?

Confronting climate change requires collective action at individual, community, national, and global levels. Here are some key strategies to address and mitigate the impacts of climate change:

1. Reduce Greenhouse Gas Emissions be achieved by transitioning to renewable energy sources and promoting sustainable transportation.
2. Promote Sustainable Practices such as reducing waste, conserving water, and adopting eco-friendly habits.
3. Support Renewable Energy like solar, wind, and hydropower.
4. Protect and Restore Ecosystems such as forests, wetlands, and other natural ecosystems.
5. Developing and implementing adaptation strategies to cope with the impacts of climate change such as enhancing water management systems, protecting

coastal areas from sea-level rise, and promoting climate-resilient agriculture practices.

6. Implementation of policies and regulations that promote sustainable development, reduce emissions, and support climate action.
7. Raising awareness about climate change is key to mobilizing support for mitigation and adaptation efforts.

The international conferences and agreements

Several international conferences and agreements have been instrumental in addressing climate change and promoting global cooperation to mitigate its impacts.

Some key conferences and agreements include:

- **United Nations Framework Convention on Climate Change (UNFCCC):** Adopted **in 1992**, the UNFCCC is a foundational international treaty that **aims to stabilize greenhouse gas concentrations in the atmosphere** to prevent dangerous anthropogenic interference with the climate system.

- **Kyoto Protocol:** Adopted in 1997 as an extension of the UNFCCC, the Kyoto Protocol established legally binding emission reduction targets for developed countries. It introduced mechanisms such as emissions trading and Clean Development Mechanism (CDM) to help countries meet their targets. The protocol **entered into force in 2005** and played a significant role in shaping international climate policy.

- **Paris Agreement:** Agreed upon in **2015 at the 21st Conference of the Parties (COP 21)**, the Paris Agreement is a landmark international treaty that **aims to limit global warming to well below 2 degrees Celsius above pre-industrial levels**, with efforts to limit it **to 1.5 degrees Celsius**. The agreement includes nationally determined contributions (**NDCs**) through which countries outline their climate action plans.

- **COP Meetings:** The Conference of the Parties (**COP**) is the supreme decision-making body of the **UNFCCC**, where the **197 countries** and territories that have signed the Framework Convention, participate in this conference. The Conference of the Parties (COP) has met annually since **1995**. COP meetings have been crucial in advancing international cooperation on climate change, with each meeting focusing on key issues and agreements to address climate challenges.

- **Montreal Protocol:** While primarily **focused on protecting the ozone layer**, the Montreal Protocol has also contributed to climate change mitigation by phasing out ozone-depleting substances that are also potent greenhouse gases. The success of the Montreal Protocol demonstrates the effectiveness of international cooperation in addressing environmental challenges.