

Environment Class 12

11th March, 2024 at 9:00 AM

A BRIEF OVERVIEW OF THE PREVIOUS CLASS (9:07 AM)

PARIS AGREEMENT, 2015 (9:24 AM)

- Limiting global temperature increase to 2 °C above pre-industrial level and pursuing efforts to keep it below 1.5 °C.
- The agreement expects net zero emissions by 2050.
- The agreement to mitigate climate change expects all member nations to maintain intended Nationally Determined Contribution (NDC) targets which should be updated every five years.
- A global stocktake i.e. to assess collective progress towards achieving the purpose of the agreement.
- The first stocktake was done in 2023 and will occur every five years thereafter.
- Carbon markets
- Addressing loss and damage.
- Framework for finance, technology, and capacity-building support to developing nations.
- To facilitate implementation in a non-punitive manner (the Paris Agreement is technically a legally binding agreement).

Carbon Market under the Paris Agreement

- Under Article 6 of the Paris Agreement, there are mainly two mechanisms:
- 1. Cooperative approaches:
 - It allows countries to voluntarily cooperate in the implementation of their INDC targets
- 2. Sustainable Development Mechanism (SDM):
 - It is similar to the clean development mechanism of the Kyoto Protocol but applicable to both developed and developing nations.
 - It aims to make certain changes in the overall mitigation of global emissions.
 - Parts of emission reduction achieved by SDM activities will not be used as offset credits but will be automatically cancelled to achieve a net decrease in global emissions.
 - Avoidance of double counting i.e. if one country funds a reduction in another country both countries cannot count that reduction towards their own target.

Climate Financing

- It refers to local, national, or transnational financing that seeks to support mitigation, adaptation, and loss and damage to address climate change.
- The main mechanisms are as follows:
- Global Environment Facility (GEF)
- It was established on the eve of the Rio Earth Summit 1992, a unique partnership of UN agencies, multilateral development banks, and global NGOs that financially supports five major conventions UNFCCC, UNCBD, UNCCD, Stockholm Convention, and Minimata Convention.
- Green Climate Fund (GCF)
- It was established in 2010 with UNFCCC as an operating entity with a goal of raising \$ 100 million a year by 2020.
- NABARD is the operating entity of GCF in India.
- Special Climate Change Fund and Least Developed Countries Fund
- Both were established in 2001 under GEF.
- It aims to support developing nations and LDCs respectively.
- Adaptation Fund
- Established in 2001, it aims to help in adaptation projects.
- One of the funding mechanisms for this fund is 2% of the proceeds from the CDM (Clean Development Mechanism) activities, similarly a certain percentage from SDM activities.
- Loss and Damage Fund
- Conceptualized in 2013 under the Warsaw Mechanism, announced in COP 27 and operationalized in COP 28.

IMPACT OF CLIMATE CHANGE ON INDIA (10:17 AM)

- India's average temperature has risen by about 0.7 °C between 1901 and 2018.
- Extreme rainfall events have increased by 75% between 1901 and 2015.
- There is a 6% decline in summer monsoon rainfall between 1951 and 2015.
- 1 °C rise in sea surface temperature between 1951 and 2015.
- 1.3% increase in area affected by drought per decade between 1951 and 2016.
- The frequency of severe cyclonic storms has increased in both the Arabian Sea and the Bay of Bengal.
- A 15% decline in glaciers in the Hindu Kush since the 1970s.
- Karakoram Anomaly: Glaciers in the Karakoram range are resisting glacial melt defying the global trend that might be happening due to the revival of western disturbances.

Steps taken by India

- INDC targets
- 45% reduction in carbon intensity by 2030 from 2005 levels.
- 50% of all electricity to be generated by non-fossil fuels by 2030.
- Additional carbon sink of 2.5 to 3 billion tons of CO₂ through tree and forest cover by 2030.
- At COP 26 India announced five targets known as Panchamrit:
- Achieve net zero emission or carbon neutrality by 2070.
- Non-fossil energy capacity to 500 GW
- 50% of energy from renewable sources by 2030.
- 45% reduction in carbon intensity by 2030.
- Reduce total projected carbon emissions by one billion by 2030.
- The relative amount of carbon emitted per unit of some other variable which can be per unit of energy or GDP, thus, it is the emission rate of a given pollutant relative to the intensity of some specific activity.
- National Action Plan on Climate Change
- The government of India 2008 launched the National Action Plan on Climate Change which consists of eight missions:
 - National Solar Mission
 - National Mission for enhanced energy efficiency.
 - National Mission on Sustainable Habitat
 - National Water Mission
 - National Mission for Sustaining the Himalayan Ecosystem
 - National Mission for a Green India
 - National Mission on Sustainable Agriculture
 - National Mission for Strategic Knowledge for Climate Change

What more can be done?(11:15 AM)

- Solar Geoengineering
- This technique aims to reflect a small proportion of the sun's energy back into space, counteracting global warming due to a greenhouse gas increase in the atmosphere.
- Some proposed techniques include:
 - Space reflectors
 - Stratospheric aerosols injection
 - Marine cloud brightening
 - Albedo enhancement of the Earth's surface
- Carbon Capture, Utilisation, and Storage (CCUS)
- This technique aims to remove CO₂ and other greenhouse gasses from the atmosphere through:
 - 1. Afforestation
 - 2. Ocean alkalization by adding substances like lime (CaO), and olivine (magnesium iron silicate) to seawater to increase the pH of the ocean which leads to the formation of carbonates and bicarbonates from CO₂ and water.
 - 3. Enhanced rock weathering
 - It involves spreading finely ground silicate rocks such as basalt over large areas of land that will react with CO₂ in the atmosphere and in the presence of water form carbonate minerals.
 - 4. Use of biochar in soil.
 - Biochar is a lightweight residue remaining after the pyrolysis of biomass.
 - Burying biochar in the soil increases the carbon sequestration of soil and also increases the fertility and water-holding capacity.
 - 5. Post-combustion capture
 - These technologies capture CO₂ emissions from flue gases after fossil fuel combustion.
 - Absorbents such as amines and ammonia are used to capture CO₂ which can be then compressed, transported, and stored.
 - 6. Pre-combustion capture
 - 7. Oxy-fuel combustion
 - This involves burning fossil fuel in oxygen instead of air resulting in flue gases that are mainly water vapor and CO₂.
 - Water vapor can be condensed leaving almost pure CO₂ to be captured easily.
 - 8. Direct air capture
 - This technology captures CO₂ directly from the ambient air.
 - 9. Bioenergy along with CCUS
 - This process combines biomass conversion to energy with carbon capture and storage.
 - Since plants absorb CO₂ as they grow, capturing emissions from bioenergy theoretically leads to negative emissions.
 - After CO₂ is captured it must be transported and stored.
 - Some of the options for CO₂ storage include injecting CO₂ in geological formations such as depleted oil and gas fields, unminable coal mines, deep saline aquifers, and deep oceans where it is stored as a liquid under high pressure.

Topic for the next class: Ozone depletion and Land degradation