Environment Class 11

9th March, 2024 at 1:00 PM

THE CLASS STARTED WITH A BRIEF OVERVIEW OF THE PREVIOUS TOPICS (01:07 PM)

IMPACT OF CLIMATE CHANGE ON OCEANS (01:11 PM)

- **a) Sea level rise:**
- The sea level rise occurs due to the melting of ice sheets, and global warming.
- **b) Ocean Stratification:**
- Melting glaciers and ice sheets release fresh water into oceans affecting its salinity, this can lead to stratification where layers of water do not mix well.
- **c) Ocean acidification:**
- The ocean absorbs about 30% of CO_2 released in the atmosphere, when CO_2 reacts with sea water it forms carbonic acid which releases hydrogen ions increasing the ocean's acidity, this affects marine organisms particularly those with Calcium Carbonate shells making it difficult for them to build and maintain these structures.
- **d) Ocean warming:**
- The upper layer of the ocean has been warming significantly causing more marine heat waves in fact the increasing sea surface temperature can also lead to more intense tropical cyclones and more frequency of tropical cyclones.
- **e) Ocean deoxygenation:**
- Warmer water holds less oxygen which causes some reasons to experience reduced oxygen levels.
- It can be fatal to marine organisms leading to dead zones.
- **f) Changes in ocean currents:**
- Changes in temperature and salinity can influence as these currents are essential for distributing heat around the planet, these changes can have implications for weather patterns and marine ecosystems.
- There is also a concern that fresh water from melting glaciers could disrupt thermohaline circulations (Ocean Conveyor Belt) potentially impacting global climate patterns.
- **g) Shifts in marine ecosystem:**
- Warmer temperatures are causing marine species to move polewards or to deeper water in search of cooler conditions.
- We are witnessing mass coral bleaching.

IMPACT OF CLIMATE CHANGE ON LAND (01:41 PM)

- Mountain areas such as the Himalayas may witness a Glacial Lake outburst flood, a disaster that can destroy life and property.
- The melting glacier and glacial retreat can increase the amount of water in rivers for a duration but gradually the availability of water may decrease because of more glacial retreat.
- In coastal areas, rising sea levels can lead to saltwater intrusion, and in natural aquifers reducing freshwater availability.
- We are witnessing more frequent, prolonged, and intense heat waves.
- Increased instances of heavy rainfall can result in flash floods damaging crops and infrastructure, while many regions are also experiencing longer and more severe droughts.
- Land degradation and desertification.
- Increased rainfall and flooding can cause more soil erosion adversely affecting agricultural productivity.
- In general, Agriculture is adversely affected particularly in tropical regions.
- Changing climate can also allow agricultural pests and diseases to spread to new areas.
- Increased heat waves can result in heat stroke and related illness.
- Many vectors such as mosquitoes can expand their range with warmer temperatures and thus diseases such as Malaria and Dengue can spread to new areas.
- Many scientists fear the melting of glaciers and thawing of permafrost may also release dangerous pathogens which many animals, and plants may not have immunity against them.

SOCIO-POLITICAL AND ECONOMIC IMPACTS OF CLIMATE CHANGE (02:13 PM)

- **Social Impacts:**
- Heat-related illness.
- Food and Water security.
- Climate refugees and migration due to climate change.
- Cultural and identity loss.
- Many reports have highlighted the impact of climate change on gender relations for Example in a patriarchal society men often have more resources available in case of resource scarcity due to climate change.
- Women become more vulnerable.
- **Economic impacts:**
- Loss to agriculture and fishery industry.
- Increased cost of infrastructure because of floods and storms.
- Adverse impact on tourism, for example, coral reefs, Gulmarg, etc.
- Extreme weather events can disrupt the global supply chain.
- **Political Impacts:**
- Conflicts within a country regarding resource allocation such as water.
- Decreased water supply can also be a source of conflict between countries that share water bodies.
- Migration due to climate change can create geopolitical tensions.
- Climate change necessitates global cooperation, however, there are conflicts between developed and developing nations regarding responsibilities, transfer of finance, and technology.

CLIMATE TIPPING POINTS (02:27 PM)

- It refers to thresholds in the earth's ecosystem where small changes lead to significant and often irreversible changes in the state of the system crossing these tipping points can have profound consequences for the planet's climate and ecosystem.
- **These are:**
- a) Loss of Arctic sea ice.
- b) Greenland ice sheet disintegration.
- c) West Antarctica ice sheet disintegration.
- d) Drying of boreal forests and more susceptible to wildfire.
- e) Amazon rainforest dieback.
- f) West African Monsoon Shift.
- g) Indian Monsoon Shift.
- h) Permafrost loss.
- i) Atlantic meridional overturning circulation breakdown.

GLOBAL INITIATIVE TO TACKLE CLIMATE CHANGE (02:56 PM)

- **1972**: The **UN Conference on Human Environment** took place which marked a turning point in international environmental politics.
- It is also called the '**Stockholm conference'**.
- **'UN Environment programme'** came into existance.
- **Montreal Protocol** to restrict ozone-depleting substances a legally binding agreement was adopted.
- **1988**: When the **Intergovernmental Panel on Climate Change (IPCC)** was set up under **UNEP** and **WMO**.
- It is an intergovernmental scientific body under the UN, that provides the world with a clear scientific view of the knowledge regarding climate change, its potential impacts, and possible solutions.
- These reports are called **Assessment Reports**.
- A first Assessment Report (**AR1**) was released in 1990.
- **1992: Rio Summit (Earth Summit)**
- It is also called the **'UN Conference on Environment and Development'**
- **Three legally binding agreements came into existence in Rio Summit:**
- **i) UNFCCC** (United Nations Framework to Combat Climate Change)
- **ii) UN CBD** (United Nations Convention on Biological Diversity)
- **iii) UN CCD.**
- **Some non-binding documents were also released such as:**
- **'Agenda 21':** An agenda for sustainable development for the 21st century.
- **Forest Principles:** It is a set of guidelines to stop deforestation and increase the quality of forest cover.
- **1994:** UNFCCC entered into force.
- **COP-1 of UNFCCC** occurred in 1995 in Berlin.
- **1997: Kyoto Protocol:**
- The first legally binding agreement to reduce greenhouse gases for developed countries was adopted, It entered into force in 2005.
- **2010: Cancun Agreement:**
- A comprehensive package adopted by governments to assist developing nations in dealing with climate change was adopted.
- **Green Climate fund** was established.
- In 2012, the **Doha Amendment** to the Kyoto Protocol occurred adding new targets for participating countries (2012-2020)
- In 2013, a Mechanism was set up to address **loss and damage** known as the **'Warsaw Mechanism'**.
- **Paris Agreement:**
- The first universal agreement to tackle climate change was adopted.
- **2023: COP-28 occured.**

KYOTO PROTOCOL,1997 (03:26 PM)

- The protocol applies to 7 GHGs CO_2, CH_4, N_2O, HFCs, PFCs, SF_6 and NF_3 (NF_3 was added in **Doha Amendment**)
- The protocol adopted common but differentiated responsibilities and respective capabilities because it recognized that developed nations are largely responsible for the current high level of GHG in the atmosphere and accordingly protocol was binding for developed nations.
- **UNFCCC divides the country mainly into three groups according to differing commitments:**
- **a) Annex-1 Countries:**
- These include industrialized countries which were members of the OECD, In 1992, and **Economies in Transition (EIT)** which included Russia, countries of Eastern Europe, central Europe, and Baltic countries.
- **b) Annex-2 Countries:**
- It consists of OECD Members of Anex-1 but not the EIT parties.
- **c) Non-Anex Countries:**
- These are mostly developing countries.
- Kyoto Protocol was applicable to Annex-1 countries.
- Annex-2 countries apart from reducing greenhouse gases are also supposed to help non-annex countries.
- **Least Developed Countries:**
- A group of 49 small countries is given special consideration under the convention because of their high vulnerability to climate change and limited capacity to mitigate and adapt.
- Under the protocol countries must meet their targets primarily through national measures however it also offers additional means to meet the targets via three **market-based mechanisms:**
- **a) International Emission Trading:**
- This created a carbon market.
- Countries or industries within the countries that emitted less than their Kyoto target could sell their excess allowance to countries that exceeded their targets.
- Carbon was now tracked and traded like any other commodity.
- **b) Clean Development Mechanism (CDM):**
- **Carbon offset:** It is the reduction or removal of emissions of carbon dioxide or other greenhouse gases in order to compensate for emissions made elsewhere.
- CDM allows developed countries to invest in sustainable development projects that reduce emissions in developing countries this can include afforestation, solar panel installation, and energy-efficient boilers among others.
- For Every one ton of CO_2 reduction, the organization generated **certified emission reduction credits** that can be used to fulfill its obligations under Kyoto targets, It can also be traded.
- **c) Joint Implementation:**
- Similar to CDM but involves projects between Anex-1 countries.
- The Kyoto Protocol did not work properly because of limited participation (the US and Canada withdrew from the protocol), Low ambition, double counting and volatility in carbon markets.

TOPIC FOR THE NEXT CLASS: CLIMATE CHANGE AND OZONE DEPLETION.