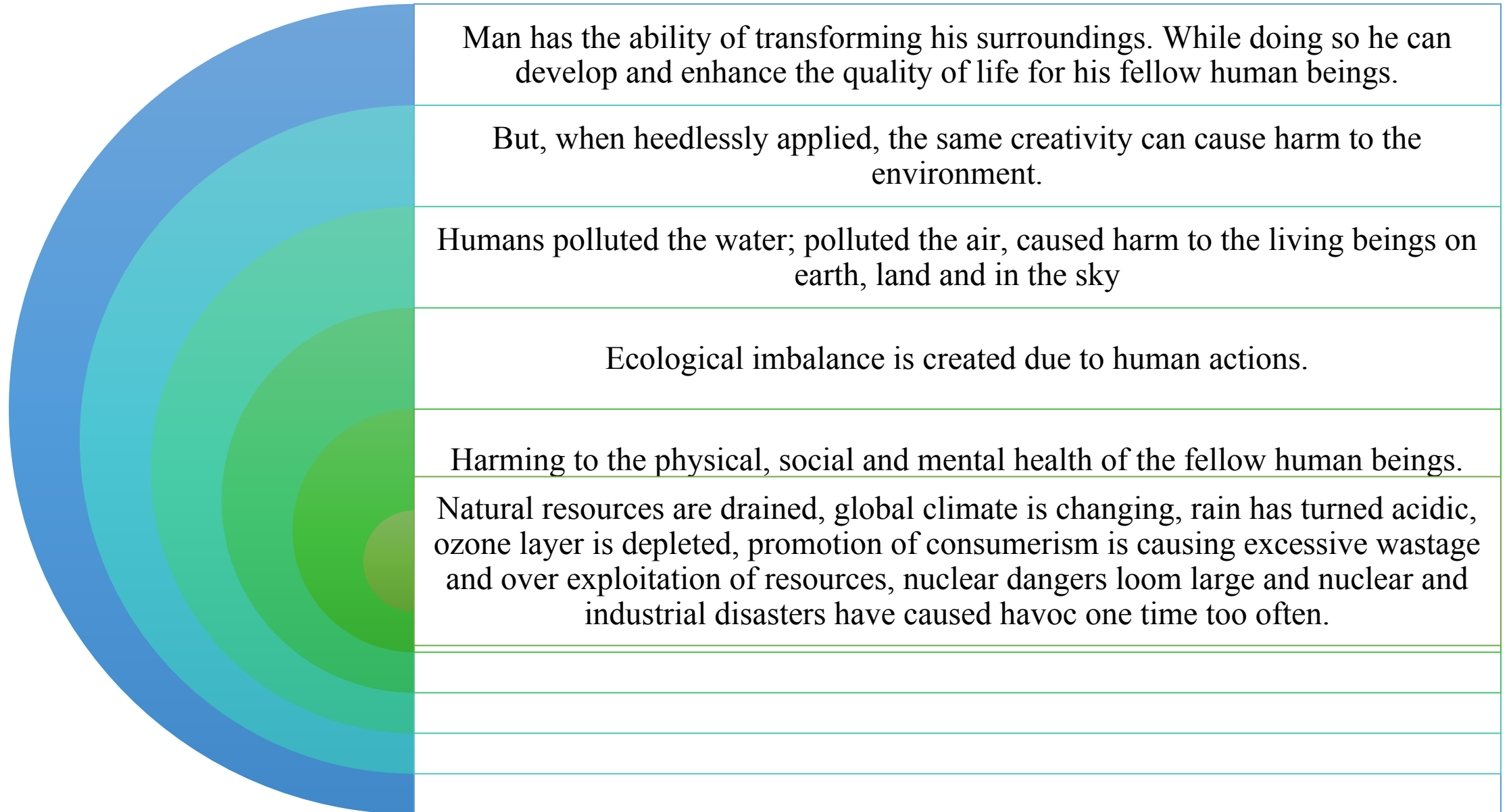


# Module 6: Environmental Policies & Practices

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- . 1. Climate change, 2. global warming, 3. ozone layer depletion, 4. acid rain and impacts on human communities and agriculture.
- . 5. Environment Laws : Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act; International agreements; Montreal and Kyoto protocols and conservation on Biological Diversity (CBD). The Chemical Weapons Convention (CWC).
- . 6. Nature reserves, tribal population and rights, and human, wildlife conflicts in Indian context

# Environmental Issues



# 1. Climate change

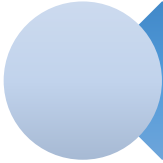
Climate change was caused by subtle shifts in the Earth's angle and orbit around the sun and the location of the continents, all of which affects the amount of solar energy absorbed on Earth.

Emissions from cars, factories, and burning forests are changing the Earth's atmosphere adding CO<sub>2</sub> and other greenhouse gases making the atmosphere now trap more of the sun's energy, which leads to rising temperatures.


The problem therefore is that high CO<sub>2</sub> related warming has not been known in the earth's history of climate.

Human greenhouse gas emissions are producing a warming not seen for some 125,000 years as per Paleoclimatologists.

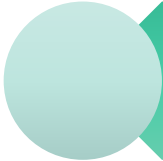
# Climate Change



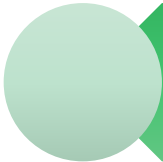
Paleoclimatologists are scientists who study ancient climate. Reliable temperature records only date back to the late nineteenth century.



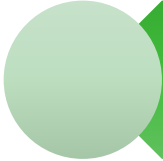
Everything beyond the last 150 years is based on deduction and deciphering proxy data that is of tree rings, ice cores, ocean sediments, corals, or cave stalagmites.




Tiny bubbles of air locked in ice samples (so-called ice cores) contain a record of every stable molecule in the ancient air: nitrogen, oxygen, carbon dioxide, argon, methane.



These records help us to understand the atmospheric composition of ancient times.



The oldest ice collected from a core in Antarctica contains 800,000 years of ice while Greenland ice sheet records date back more than 100,000 years of composition.



But the fact that brings concern is that there are no ice core samples with levels of CO<sub>2</sub> as high as they are today!

# Causes for Climate Change

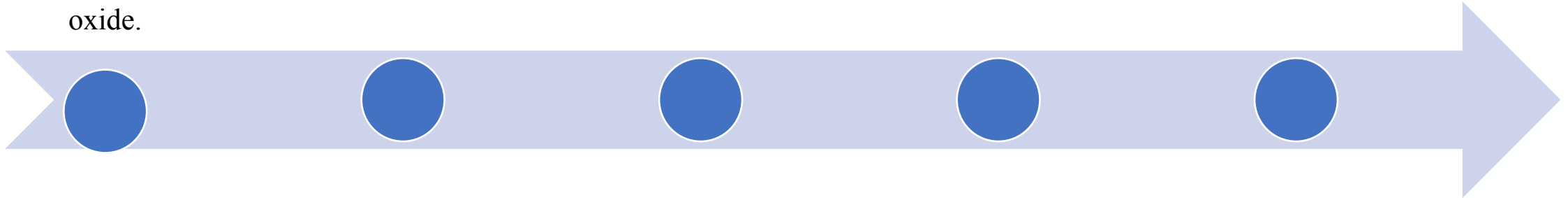
Human activity since the Industrial Revolution has increased the amount of greenhouse gases in the atmosphere, like CO<sub>2</sub>, methane, tropospheric ozone, CFCs and nitrous oxide.

These levels are much higher than at any time during the last 800,000 years, the period for which reliable data has been extracted from ice cores.

The rest of this increase is caused mostly by changes in land-use, particularly deforestation.

The concentrations of CO<sub>2</sub> and methane have increased by 36% and 148% respectively since 1750.

Fossil fuel burning has produced about three-quarters of the increase in CO<sub>2</sub> from human activity over the past 20 years.



# Effects:

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Sudden climate change due to anthropogenic activities has no precedence in earth's climatic history.

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High greenhouse gases is also against earth's atmospheric nature and so effects from this manner of climate change can't be predicted and could be very sudden, damaging and unpleasant.

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Stable climates have resulted in the current distribution of wildlife and area specific agriculture and hence even slight changes in climate may disturb agriculture and hence crops, which lead to food problems and require migration of wildlife to suitable climates.

## 2. Global warming

Global warming is the term used for the rise in temperature of the Earth above its usual average temperature because of the trapping of sun's heat and light in the earth's atmosphere by an excess of greenhouse gases (carbon dioxide, water vapor, nitrous oxide, and methane).

The greenhouse effect is the process by which absorption and emission of infrared radiation by gases in the atmosphere warm a planet's lower atmosphere and surface.

It was proposed by Joseph Fourier in 1824 and was first investigated quantitatively by Svante Arrhenius in 1896.



# Global warming

The Earth is compared by scientists to a greenhouse that is constructed in cold countries as the effect is similar.

A greenhouse is a glass covered enclosure that provides a warm moist atmosphere to grow plants.

Glass allows the short wave radiations of the sun to come in but the earth radiates it back in the form of long waves which are not allowed to escape by the glass and hence the greenhouse is heated up. This effect is called greenhouse effect.

# Global warming

The earth's atmospheric gases like CO<sub>2</sub> and methane act like the glass of the greenhouse.

Water vapor is the most abundant greenhouse gas, followed by carbon dioxide and other trace gases.

The greenhouse effect makes the earth appropriate for people to live on. Without the atmosphere to hold the radiated heat, the earth would be freezing. As per the rate of emission from the earth, the average temperature of the earth should be -20° C but the measured average temperature of the Earth is +15°C. This is achieved by the composition of our atmosphere contributing to the greenhouse effect. Naturally occurring greenhouse gases have a mean warming effect of about 33 °C (59 °F).

# Causes

- Burning large quantities of fossil fuels
- Agricultural practices
- Introduction of new chemicals with little foresight
- Land clearing or deforestation

# Measuring Global Warming

- NASA's Goddard Institute for Space Studies since 1880 has conducted studies
- The scientific consensus on climatic changes related to global warming is also that the average temperature of the Earth has risen between 0.4 and 0.8 °C over the past 100 years.
- Scientists from the Intergovernmental Panel on Climate carrying out global warming research have recently predicted that average global temperatures could increase between 1.4 and 5.8 °C by the year 2100.
- Increasing Levels of Green House Gases

# Effects

- Sea Level Rise
- Glaciers and mountain snows are rapidly melting
- "Arctic ice is rapidly disappearing
- Droughts and heat waves
- Hurricane intensity and frequency
- The effects of Global Warming on Mankind

# Control of Climate Change and Global warming

- Control at the Global level - The **United Nations Framework Convention on Climate Change** (UNFCCC or FCCC) is an international environmental treaty produced at the United Nations Conference on Environment and Development (UNCED), held in Rio de Janeiro from June 3 to 14, 1992, signed by 154 nations on June 12th.
- The objective of the treaty is to **stabilize greenhouse gas concentrations** in the atmosphere at a level that would prevent dangerous anthropogenic interference with the systems of climate. According to terms of the UNFCCC, having received over 50 countries' instruments of ratification, it entered into force on March 21, 1994. It committed the signatories' governments to reduce atmospheric concentrations of greenhouse gases. As of May 2011, **UNFCCC has 194 parties.**

# Control of Climate Change and Global warming

- UNFCCC, through the parallel efforts of the **Intergovernmental Panel on Climate Change (IPCC)**, aims to gain consensus through meetings and the discussion on various strategies for stabilizing the emissions of greenhouse gases of the developed/industrialized countries which were listed
- The treaty itself set no mandatory limits on greenhouse gas emissions for individual countries and contains no enforcement mechanisms and hence was not legally binding. Instead, the treaty provides updates (called "protocols") that would set mandatory emission limits.

# Control of Climate Change and Global warming

- The parties of the convention have met annually from 1995 in Conferences of the Parties (COP) to assess progress in dealing with climate change.
- In 1997, in the third COP, the **Kyoto Protocol** was concluded and established legally binding obligations for developed countries to reduce their greenhouse gas emissions. COP 3 or the World summit on global warming was held in **Kyoto Japan (Kyoto Summit) in December 1997**.
- It adopted the Kyoto Protocol, which outlined the greenhouse gas emissions reduction obligation for Annex I countries, along with what came to be known as Kyoto mechanisms such as emissions trading, clean development mechanism and joint implementation.
- Most industrialized countries and some central European economies in transition (all defined as Annex B countries) agreed to legally binding reductions in greenhouse gas emissions of an average of 6 to 8% below 1990 levels between the years 2008–2012, defined as the first emissions budget period.
- It was signed by 169 countries and approved by their governments (ratified) by 1998.
- The United States was required to reduce its total emissions an average of 7% below 1990 levels; however Congress did not ratify the treaty after Clinton signed it.
- The Bush administration later explicitly rejected the protocol in 2001.



# Important Aspects of the UNFCCC treaty

- Benchmarking
- Precautionary principle
- Conferences of the Parties
- 2005 – COP 11/MOP 1, Montreal, Canada
- 2002 – COP 8, New Delhi, India
- 2000 – COP 6, The Hague, Netherlands
- The agreements included:
  - Flexible Mechanisms
    - Emissions trading
    - Clean Development mechanisms
    - Joint implementation
    - Control at individual level, regional level,
  - Carbon Sinks

### 3. Ozone layer depletion

- Ozone is present in the stratosphere.
- It is a form of oxygen with three atoms in a molecule instead of the normal two.
- Stratosphere extends from 10 to 50 km of the earth's atmosphere.
- The ozone in the stratosphere is present in its top end for 24 kms that is it extends from 16 km to 40 km of the stratosphere above the Earth.
- Its concentration is about 100 ppm and this equilibrium concentration is maintained by the continuous formation and destruction of ozone due to the UV radiations.
- It is continuously formed in the stratosphere by the absorption of UV radiation less than 242nm which break up O<sub>2</sub> into O which in turn reacts with molecular oxygen again to form O<sub>3</sub>.
- This ozone formed absorbs UV radiations between 200 to 320nm and in the process is again continuously converted back to molecular oxygen.
- The ozone layer protects us from deadly amounts of UV-B radiation.

# Causes

- The main cause of ozone depletion is the release of CFCs, (e.g. CFC-12), chlorofluorocarbons.
- Other causes being halos (used in fire extinguishers), carbon tetrachloride (used as a dry cleaning solvent and as a refrigerant) and methylchloroform (used as an industrial solvent, degreaser, a coolant etc)
- CFC was discovered in the 1930s by American chemist Thomas Midgley, CFCs came to be used in refrigerators, home insulation, plastic foam, and throwaway food containers.
- Refrigerators used rather dangerous gasses that were deadly if they leaked.
- Only in 1984, when the ozone layer hole was discovered over Antarctica, was the proof truly conclusive.
- Dr. Joe C. Farman and his colleagues in the British Antarctic survey had been recording ozone levels over the Antarctic region since 1957.

# How is ozone depleted?

- The overall cause of ozone depletion is the presence of chlorine-containing source gases (primarily CFCs and related halocarbons).
- In the presence of UV light, these gases dissociate, releasing chlorine atoms, which then go on to catalyze ozone destruction.
- The breakdown products of anthropogenic chlorofluorocarbons (CFCs) are turned into aggressive, ozone destroying substances during exposure to extremely cold conditions.
- The advantage of CFCs being stable and uncreative in the lower atmosphere proved a disadvantage in the long run as most of the CFC ever produced would reach the stratosphere where they would be dissociated by UV light, releasing Cl atoms.
- These chlorine atoms removed from the CFC, attracts one of the three oxygen atoms in the ozone molecule, thus removing O<sub>3</sub> and producing O<sub>2</sub>.

# Effects

- Energy from the sun reaches the earth as visible, infrared, and ultraviolet rays.
- Global warming
- Climate changes
- Intolerable environment for living beings

# Control

- The **Montreal Protocol** on Substances That Deplete the Ozone Layer (a protocol to the Vienna Convention for the Protection of the Ozone Layer) is an international treaty adopted under the UN umbrella designed to protect the ozone layer by phasing out the production of numerous substances believed to be responsible for ozone depletion.
- The treaty was opened for signature on September 16, 1987, and entered into force on January 1, 1989, followed by a first meeting in Helsinki, May 1989. Since then, it has undergone seven revisions, in 1990 (London), 1991 (Nairobi), 1992 (Copenhagen), 1993 (Bangkok), 1995 (Vienna), 1997 (Montreal), and 1999 (Beijing).
- The treaty has been amended to ban CFC production after 1995 in the developed countries, and later in developing countries. If the international agreement is adhered to, the ozone layer is expected to recover by 2050.

# Control

- In the Montreal Protocol, 30 nations worldwide agreed to reduce usage of CFCs and encouraged other countries to do so as well.
- Work on alternatives for chlorofluorocarbons in refrigerants (like HCFC) began in the late 1970s after the first warnings of damage to stratospheric ozone were published.
- The hydrochlorofluorocarbons (HCFCs) are less stable in the lower atmosphere, enabling them to break down before reaching the ozone layer.

## **4. Acid rain and impacts on human communities and agriculture.**

- Acid rain is rain or any other form of precipitation that is unusually acidic .
- There are many forms of acid rain that are seen around the world. In parts of the world where there is wet weather, there is acid rain, acid snow, and acid fog.
- In parts of the world where there is dry weather, there is acid gas and acid dust.



# Causes

- Acid rain is mainly caused by Carbon dioxide, Nitrogen oxides and Sulphur dioxides etc in the air resulting in the formation of carbonic acids, nitric acid, sulphuric acids besides some other organic acids on reaction with the atmospheric moisture.
- Damage from acid rain is widespread in North America, Europe, Japan, China and South-east Asia.

# Effects

- Acid rain that falls or flows as ground water to reach rivers, lakes and wetlands causes the water in them to become acidic. This affects plant and animal life in aquatic ecosystems. Fishes are sensitive to pH levels of water. Fresh water has pH close to neutral.
- Acid rain dissolves and washes away nutrients in the soil, which are needed by plants.
- Acid rain falling on slopes dissolves metals like aluminium in the soil as it flows down into the lakes. Aluminium irritates fish gills, forms mucus and suffocates the fish.
- Acid rain indirectly affects plants by removing nutrients from the soil in which they grow.
- The acidified water containing toxic metals are absorbed into fruits, vegetables; sea food etc and these are magnified in humans and animals that eat them. Acid, along with other chemicals in the air, produces urban smog, which causes respiratory problems.
- They can corrode stone statues like happened to Parthenon Greece and Italy and buildings of marbles like Taj Mahal.
- In 1967 the bridge over Ohio collapsed killing 46 people and cause was traced to corrosion by acid rain.
- It can damage metals and car finishes.

## 5. Environmental Laws:

- Wild Life Protection Act, 1972
- Water (Prevention and Control of Pollution) Act, 1974
- Air (Prevention and Control of Pollution) Act, 1981
- Forest Conservation Acts
- Environment Protection Act 1986

# International Agreements: Montreal

- Protocol was primarily established to protect the ozone layer.
- it can be seen as a precursor to the international efforts focusing specifically on climate change for three reasons.
- Firstly, the Montreal Protocol covers some of the greenhouse gases that cause global climate change,
- secondly its focus is also on the atmosphere as a global commons and
- thirdly, the process that led to the negotiation and subsequent renegotiation of the Montreal Protocol has provided a paradigm for future global environmental agreements where the scientific basis for action is initially uncertain, as is the case with climate change.
- The problem of ozone depletion attracted political concern from as early as the 1970s when it was proposed that chlorofluorocarbons (CFCs) – an increasingly versatile class of industrial chemicals – are broken down in the stratosphere to release catalysts (Chlorine atoms), which destroy ozone.

# International Agreements: Montreal

- As a result increased levels of ultra violet radiation reaches the Earth's surface and in turn causes increases in skin cancers and other health and environmental damages.
- However, there was at least a 10-year period of intense scientific confusion.
- The discovery of the hole in the ozone over Antarctica and the confirmation that it resulted from CFCs stimulated the international efforts in the 1980s.
- At a meeting of 33 countries and the European Commission in Washington in 1977 the Coordinating Committee on the Ozone Layer was established, which met annually up to 1985 and prepared reports for policymakers on ozone research.
- In 1985, after several efforts by first Norway and then the Toronto Group (consisting of the US, Canada, The Nordics, Austria and Switzerland) to get countries to include control measures of CFCs in an international agreement, the Vienna Framework Convention was signed.
- It did not include control measures, but empowered the United Nations Environment Program (UNEP) to convene working groups that would negotiate a protocol to be signed in 1987.
- Such as protocol was indeed signed in Montreal and substantially amended in 1990 in London and in 1992 in Copenhagen.

# International Agreements: Kyoto Protocol

- The Kyoto Protocol is an international agreement linked to the United Nations Framework Convention on Climate Change (UNFCCC).
- The UNFCCC was adopted at the Rio Earth Summit in 1992 and entered into force on March 21, 1994.
- The Convention commits its Parties to reduce greenhouse gas (GHG) emissions by setting internationally binding emission reduction targets.
- The Kyoto Protocol was adopted in 1997 and entered into force on February 16, 2005.
- It implements the objective of the UNFCCC to stabilize GHG concentrations “at a level that would prevent dangerous anthropogenic (human induced) interference with the climate system”<sup>1</sup> , setting a heavier burden on developed nations under the principle of “common but differentiated responsibilities”<sup>2</sup> , because of their historical responsibility for current levels of greenhouse gases in the atmosphere.

# Convention on Biological Diversity (CBD)

- The Convention on Biological Diversity was opened for signature at the Earth Summit in Rio de Janeiro on 5 June 1992 and entered into force on 29 December 1993.
- To date, there are 193 Parties
- Components of biodiversity are all the various forms of life on Earth including ecosystems, animals, plants, fungi, microorganisms, and genetic diversity
- With its three objectives, the CBD is often seen as the key international instrument for sustainable development
- Ecosystems, species and genetic resources should be used for the benefit of humans, but in a way that does not lead to the decline of biodiversity.
- Substantial investments are required to conserve biodiversity, but it will bring significant environmental, economic and social benefits in return.
- The Ecosystem Approach, an integrated strategy for the management of resources, is the framework for action under the Convention
- The precautionary principle states that where there is a threat of significant reduction or loss of biodiversity, lack of full scientific certainty should not be used as a reason for postponing measures to avoid or minimize such a threat.

## 6. Nature Reserve

- A nature reserve is a protected area of importance for wildlife, flora, fauna or features of geological or other special interest, which is reserved and managed for conservation and to provide special opportunities for study or research.
- Main objectives:
  - to protect our biodiversity- the degree of variation of life.
  - to keep our ecosystem in natural balance
  - it provides ecosystem regulating services
  - provides biological resources for us
  - allow us to recover our body to the pink of health



# Human Wild Conflict (HWC)

- Human – Wildlife Conflict (HWC) is defined as ‘interaction between humans and wildlife where negative consequences, whether perceived or real, exist for one or both the parties when action of one has an adverse effect on the other party.
- It has been in existence for as long as wild animals and humans have co-existed and shared the same resources.
- Growing human dependency on natural resources and degradation of wild life habitats have resulted in human wild life conflicts.

Thank You