

UNIT-4

CLR-5 : Address to different mitigation measures against global warming and their protocol

S1; SLO1: Climate change mitigations and adaptations

SLO2: Climate change Organization and programmes

S1- SLO-1 What is climate change Mitigation and Adaptation?

- Reducing emissions of and stabilizing the levels of heat-trapping greenhouse gases in the atmosphere (“**mitigation**”);
- Adapting to the climate change already in the pipeline (“**adaptation**”).

Adaptation:

- The goal is to **reduce our vulnerability to the harmful effects of climate change** (like sea-level encroachment, more intense extreme weather events or food insecurity).
- It also encompasses making the most of any **potential beneficial opportunities** associated with climate change (for example, longer growing seasons or increased yields in some regions).
- While climate change is a global issue, it is felt on a local scale. **Cities and municipalities are therefore at the frontline of adaptation.** In the absence of national or international climate policy direction, **cities and local communities** around the world have been focusing on solving their own climate problems. They are **working to build flood defenses, plan for heat waves and higher temperatures, install water-permeable pavements** to better deal with floods and storm water and **improve water storage and use.**

Mitigation:

- **Reducing climate change** – involves **reducing the flow of heat-trapping greenhouse gases** into the atmosphere, either **by reducing sources** of these gases (for example, the burning of fossil fuels for electricity, heat or transport) **or enhancing the “sinks”** that accumulate and store these gases (such as the oceans, forests and soil).

- The goal of mitigation is to avoid significant human interference with the climate system, and “stabilize greenhouse gas levels in a timeframe sufficient to allow ecosystems to adapt naturally to climate change, ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner”

How to mitigate climate change?

These are some of the mitigation measures that can be taken to avoid the increase of pollutant emissions:

1. Practice Energy efficiency
2. Greater use of renewable energy
3. Electrification of industrial processes
4. Efficient means of transport implementation: electric public transport, bicycle, shared cars ...
5. Carbon tax and emissions markets

Adaptation to climate change:

In terms of adaptation measures, there are several actions that help reducing vulnerability to the consequences of climate change:

1. More secure facility locations and infrastructures
2. Landscape restoration (natural landscape) and reforestation
3. Flexible and diverse cultivation to be prepared for natural catastrophes
4. Research and development on possible catastrophes, temperature behavior, etc.
5. Preventive and precautionary measures (evacuation plans, health issues, etc.)

In this info graphic you can learn what are the measures of adaptation and mitigation to climate change.

Mitigation and adaptation to climate change

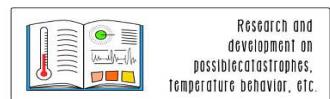
MITIGATION

Actions to reduce and curb greenhouse gas emissions



ADAPTATION

Actions to reduce vulnerability to climate change



Mitigation attends to the causes of climate change and adaptation addresses its impacts

Sustainability for all
www.activesustainability.com

 **Acciona**

S1- SLO-2 Climate change organization and programmes:

U.S. Environmental Protection Agency (EPA) - Climate Change Science

This section of the EPA website offers scientific information and data on climate change in the past and projections for the future. Specific information about the U.S. government's role in conducting and evaluating science as well as EPA's role in these efforts can be found on the Climate Change Science Program and EPA Research and Assessment pages in the Policy section

NOAA Education - Climate Change and Our Planet

This collection of resources from the National Oceanic and Atmospheric Administration (NOAA) are designed for teachers to use in the classroom or as background reference material

Intergovernmental Panel on Climate Change (IPCC)

The Intergovernmental Panel on Climate Change was established by the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO) to provide objective reports on climate change and its potential environmental and socio-economic consequences. Geography has played a central role in the IPCC's activities. Dr. Thomas Wilbanks, past president of the AAG and recipient of numerous honors in the field of geography, served as lead author of a chapter of the Fourth Assessment Report which was awarded the Nobel Prize in 2007.

National Center for Atmospheric Research (NCAR)

NCAR provides the university science and teaching community with the tools, facilities, and support required to perform innovative research. Through NCAR, scientists gain access to high-performance computational and observational facilities, such as supercomputers, aircraft and radar - resources researchers need to improve human understanding of atmospheric and Earth system processes. NCAR also houses the Geographical Information Systems (GIS) Strategic Initiative, an interdisciplinary effort to foster collaborative science, spatial data interoperability, and knowledge sharing with GIS, within the field of atmospheric research.

Center for Remote Sensing of Ice Sheets (CReSIS)

CReSIS was established by the NSF in 2005 and is headquartered at the University of Kansas. The Center uses a variety of geographic tools and technologies (including Geographic Information Systems, Remote Sensing, and spatial statistics) to complement its goal of measuring and predicting the response of sea level change to the mass balance of ice sheets in Greenland and Antarctica.

National Climate Data Center (NCDC)

NCDC is the world's largest active archive of weather data. NCDC produces numerous climate publications and responds to data requests from all over the world.

World Meteorological Organization

The World Meteorological Organization (WMO) is a specialized agency of the United Nations. It is the UN system's authoritative voice on the state and behavior of the Earth's atmosphere, its interaction with the oceans, the climate it produces and the resulting distribution of water resources.

United Nations Environment Programme (UNEP), Climate Change

The UNEP Climate Change website serves as a gateway to UNEP activities related to adaptation, mitigation, science, and communication/outreach on the effects of climate change, as well as programs to reduce emissions from deforestation and degradation of ecosystems

United Nations Framework Convention on Climate Change (UNFCCC)

The UNFCCC supports UN bodies involved in the climate change process. This UNFCCC website contains numerous resources, such as introductory and in-depth publications, the official UNFCCC and Kyoto Protocol texts and a search engine to the UNFCCC library.

Pew Center on Global Climate Change

The Pew Center on Global Climate Change brings together business leaders, policy makers, scientists, and other experts to bring a new approach to a complex and often controversial issue. The Center conducts analyses of key climate issues, works to keep policy makers informed, engages the business community in the search for solutions, and reaches out to educate the key audiences.

Food and Agriculture Organization (FAO) of the United Nations – Climate Change

FAO's activities in climate change are spread over all departments and **cover all agricultural sectors** (i.e. agriculture, livestock, forestry, fisheries) as well as highly cross-sectoral topics (e.g. bioenergy, biodiversity, climate risk management). The Interdepartmental Working Group on Climate Change and the Environment, Climate Change and Bioenergy Division (NRC) play an important role in coordinating these activities.

National Snow and Ice Data Center (NSIDC)

The NSIDC supports **research on snow, ice, glaciers, frozen ground, and climate interactions** that make up Earth's cryosphere. Dr. Mark Serreze, NSIDC Director, has carried out significant geographic research on climate warning in the Arctic and its implications.

International Geosphere-Biosphere Programme (IGBP)

IGBP is a research programme that **studies the phenomenon of Global Change**. IGBP provides scientific knowledge to improve the sustainability of the living Earth. IGBP **studies the interactions between biological, chemical and physical processes and interactions with human systems** and collaborates with other programmes to develop and impart the understanding necessary to respond to global change.

What is the IPCC?

The **Intergovernmental Panel on Climate Change (IPCC)** is the international body for assessing the science related to climate change. **The IPCC was set up in 1988** by the World Meteorological Organization (**WMO**) and United Nations Environment Programme (**UNEP**) **to provide policymakers with regular assessments of the scientific basis of climate change, its impacts and future risks, and options for adaptation and mitigation.**

IPCC assessments **provide a scientific basis** for governments at all levels **to develop climaterelated policies**, and they underlie negotiations at the UN Climate Conference – the United Nations Framework Convention on Climate Change (UNFCCC). The assessments are policy-relevant but not policy-prescriptive: they may **present projections of future climate change based on different scenarios and the risks** that climate change poses and **discuss the implications of response options**, but they **do not tell policymakers what actions to take.**

The IPCC embodies a unique opportunity to provide rigorous and balanced scientific information to decision-makers because of its scientific and intergovernmental nature. **Participation in the IPCC is open to all member countries** of the WMO and United Nations. It

currently has 195 members. The Panel, made up of representatives of the member states, meets in Plenary Sessions to take major decisions. The IPCC Bureau, elected by member governments, provides guidance to the Panel on the scientific and technical aspects of the Panel's work and advises the Panel on related management and strategic issues .

IPCC assessments are **written by hundreds of leading scientists** who volunteer their time and expertise as Coordinating Lead Authors and Lead Authors of the reports. They enlist hundreds of other experts as Contributing Authors to provide **complementary expertise in specific areas.**

IPCC reports undergo **multiple rounds of drafting and review** to ensure they are comprehensive and objective and produced in an open and transparent way. Thousands of other experts contribute to the reports by acting as reviewers, ensuring the reports reflect the full range of views in the scientific community. **Teams of Review Editors** provide a thorough **monitoring mechanism** for making sure that **review comments are addressed**

S2- SLO-1 IPCC -Intergovernmental Panel on Climate Change and assessment report highlights

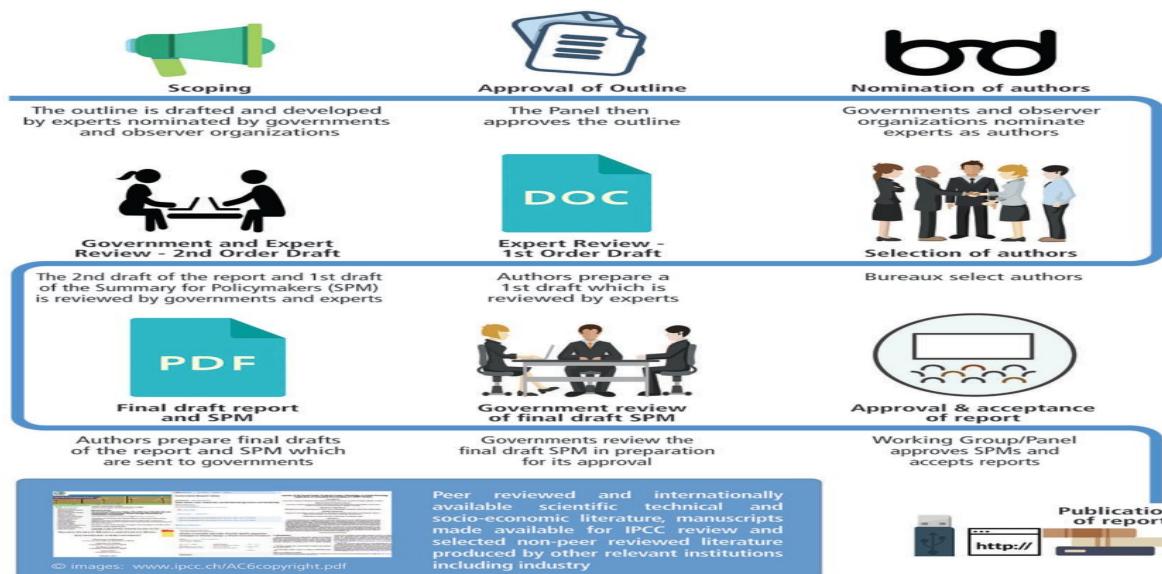
Assessment Reports consist of contributions from each Working Group and a Synthesis Report integrating these contributions and any Special Reports prepared in that assessment cycle. The IPCC also produces Special Reports on specific issues agreed by its member governments and Methodology Reports that provide practical guidelines for the preparation of greenhouse gas inventories. Each IPCC report starts with a scoping meeting to develop a draft outline. Experts nominated by member governments, Observer Organizations and the Bureau and selected by the relevant Bureau prepare a draft outline of the report for the Panel. Based on the report of the scoping meeting, the Panel decides whether work should continue on preparing the report and agrees on its scope, outline and work plan including schedule and budget. Member governments, Observer Organizations and the Bureau (Co-Chairs and Vice-Chairs) of the Working Group or Task Force producing the report then draw up lists of experts, from which the relevant Bureau or Bureaux select the authors of the report. The Bureau may consider other experts known through their publications and work. Scientists who are nominated but not selected as authors are invited to register as expert reviewers for the report. The selection of authors is a careful process that aims to reflect the range of scientific, technical and socio-economic expertise and to strike a good balance in terms of gender, geographical representation, and representation of experts from developing countries,

developed countries and those with economies in transition. It is also important to have a mixture of authors with and without previous experience in the IPCC.

About Reports

The IPCC prepares comprehensive Assessment Reports about the state of scientific, technical and socio-economic knowledge on climate change, its impacts and future risks, and options for reducing the rate at which climate change is taking place. The IPCC also produces Special Reports on specific topics agreed by its member governments, as well as Methodology Reports that provide practical guidelines for the preparation of greenhouse gas inventories. The Synthesis Report integrates the Assessment Report and any Special Reports prepared during an assessment cycle. A report consists of a number of chapters. It may also include a Technical Summary, prepared by the authors. Assessment Reports, Special Reports and the Synthesis Report include a Summary for Policymakers that is prepared by the authors and approved line by line by a Plenary Session of the IPCC with the delegates in dialogue with the authors. Since the Fifth Assessment Report, the Summary for Policymakers has generally included headline statements, providing a top-level summary and narrative of the key findings. Methodology Reports include an Overview Chapter corresponding to the Summary for Policymakers.

Preparation of Reports



Once the author teams are selected, they begin work on a First Order Draft of the report based on an assessment of all relevant scientific, technical and social-economic information. Although priority is given to peer-reviewed literature, the IPCC recognizes that non-peer

reviewed literature, such as reports from governments and industry, can be crucial for expanding the breadth and depth of the assessment. Use of this literature brings with it an extra responsibility for the author teams to ensure the quality and validity of cited sources. Review is an essential part of the IPCC process and ensures that the assessment of literature is transparent, objective and complete. In the first stage of review, experts from around the world are invited to comment on the accuracy and completeness of the scientific, technical and socio-economic content and the overall balance of the drafts. These expert reviewers self-nominate and are accepted by the IPCC on the basis of relevant expertise. Each and every review comment is considered by the authors in the preparation of a Second Order Draft of the report. At the same time, the authors also prepare a first draft of the Summary for Policymakers (SPM). This is a distillation of the main policy-relevant findings from the underlying report. The Second Order Draft of the report and the first draft of the SPM are then opened up to review by experts and governments, simultaneously. Each chapter of an IPCC report has two or more Review Editors assigned to it, who are selected by the Bureau on the basis of their expertise and whose job it is to make sure that all comments received during the reviews are taken into account by the author teams. All review comments, and the responses by authors, are published on completion of a report. In the assessment, authors express the confidence with which a statement is made, reflecting agreement in the scientific literature and the evidence available. They use calibrated language to communicate certainty in key findings. Following the second stage of review, the authors then prepare the final drafts of the report and Summary for Policymakers. These are distributed once again to governments, who provide comments on the Summary for Policymakers. Finally, all IPCC reports must be formally endorsed by the responsible Working Group or Working Groups or Task Force and by the Panel at an IPCC Plenary Session. There are three levels of endorsement:

1. “Approval” means that the material has been subjected to detailed line-by-line discussion and agreement. This is the procedure used for the Summary for Policymakers.
2. “Adoption” describes a section-by-section endorsement. This is used for the Synthesis Report and overview chapters of Methodology Reports.

3. “Acceptance” signifies that the material has not been subject to line-by-line or section-by-section agreement but nevertheless presents a comprehensive, objective and balanced assessment of the subject matter.

Special rules apply to the Synthesis Report, which integrates the findings of the Assessment Report and any Special Reports prepared during an assessment cycle. These are written in a non-technical style suitable for policymakers and address a broad range of policy-relevant but policy-neutral questions approved by the Panel. The Synthesis Report consists of two sections: a Summary for Policymakers and a longer report. The IPCC Chair leads a writing team whose composition is agreed by the Bureau after nominations by the IPCC Chair in consultation with the Working Group Co-Chairs. It typically draws on members of the Bureau, authors of the Assessment Report, and experts from the Technical Support Unit and Secretariat for its Core Writing Team. The writing team prepares a draft of both the longer report and Summary for Policymakers, which undergo simultaneous review by governments and experts. The report is then revised and submitted to the Panel for consideration. The Panel approves the Summary for Policymakers line by line, and adopts the longer report section by section – roughly one page at a time.

https://www.youtube.com/watch?v=z_JMC9fhADA

S2-SLO-2 IPCC Assessment Report-1- 1990 & Sub1992

The **First Assessment Report (FAR)** of the Intergovernmental Panel on Climate Change (IPCC) was completed in 1990. It served as the basis of the United Nations Framework Convention on Climate Change (UNFCCC). This report had effects not only on the establishment of the United Nations Framework Convention on Climate Change (UNFCCC), but also on the first **conference of the parties (COP)**, held in Berlin in 1995.

The report was issued in three main sections, corresponding to the three Working Groups of scientists that the **IPCC had established**.

- Working Group I: Scientific Assessment of Climate Change
- Working Group II: Impacts Assessment of Climate Change
- Working Group III: The IPCC Response Strategies

Each section included a summary for policymakers. This format was followed in subsequent Assessment Reports.

The executive summary of the policymakers' summary of the WG I report includes:

- We are certain of the following: there is a natural greenhouse effect...; emissions resulting from human activities are substantially increasing the atmospheric concentrations of the **greenhouse gases**: CO₂, methane, CFCs and nitrous oxide. These increases will enhance the greenhouse effect, resulting on average in an additional warming of the Earth's surface. The main greenhouse gas, water vapour, will increase in response to global warming and further enhance it.
- We calculate with confidence that: ...**CO₂ has been responsible** for over half the enhanced greenhouse effect; long-lived gases would require immediate reductions in emissions from human activities of over 60% to stabilise their concentrations at today's levels...
- Based on current models, we predict: under [BAU] increase of global mean temperature during the [21st] century of about **0.3 °C per decade** (with an uncertainty range of 0.2 to 0.5 °C per decade); this is greater than that seen over the past 10,000 years; under other ... scenarios which assume progressively **increasing levels of controls**, rates of increase in global mean temperature of about 0.2 °C [to] 0.1 °C per decade.
- There are **many uncertainties** in our predictions particularly with regard to the timing, magnitude and regional patterns of climate change, due to our incomplete understanding of: sources and **sinks of GHGs**; clouds; oceans; polar ice sheets.
- Our judgement is that: global mean surface air temperature has **increased by 0.3 to 0.6 °C** over the last 100 years...; The size of this warming is broadly consistent with predictions of climate models, but it is also of the **same magnitude as natural climate variability**. Thus the observed increase could be largely due to this natural variability; alternatively this variability and other human factors could have offset a still larger human-induced greenhouse warming. The unequivocal detection of the enhanced greenhouse effect is not likely for a decade or more.
- under the IPCC business as usual emissions scenario, an average rate of **global mean sea level rise** of about **6 cm per decade over the next century** (with an uncertainty range of 3 – 10 cm per decade), mainly due to thermal expansion of the oceans and the melting of some land ice. The **predicted** rise is about 20 cm ... by 2030, and 65 cm by the end of the next century.

S3 SLO1: IPCC assessment report 2 - 1995

Key role regarding the adoption of Kyoto Protocol – COP meet

Cont...

This Report responds to the invitation for IPCC ‘... to provide a Special Report in 2018 on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways’ contained in the Decision of the 21st Conference of Parties of the United Nations Framework Convention on Climate Change to adopt the Paris Agreement

The IPCC accepted the invitation in April 2016, deciding to prepare this Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty. This Summary for Policymakers (SPM) presents the key findings of the Special Report, based on the assessment of the available scientific, technical and socio-economic literature relevant to global warming of 1.5°C and for the comparison between global warming of 1.5°C and 2°C above pre-industrial levels. The level of confidence associated with each key finding is reported using the IPCC calibrated language. The underlying scientific basis of each key finding is indicated by references provided to chapter elements. In the SPM, knowledge gaps are identified associated with the underlying chapters of the Report.

A.1. Human activities are estimated to have caused approximately 1.0°C of global warming above pre-industrial levels, with a *likely* range of 0.8°C to 1.2°C. Global warming is *likely* to reach 1.5°C between 2030 and 2052 if it continues to increase at the current rate.

A.1.1. Reflecting the long-term warming trend since pre-industrial times, observed global mean surface temperature (GMST) for the decade 2006–2015 was 0.87°C (*likely* between 0.75°C and 0.99°C higher than the average over the 1850–1900 period (*very high confidence*). Estimated anthropogenic global warming matches the level of observed warming to within ±20% (*likely* range). Estimated anthropogenic global warming is currently increasing at 0.2°C

(likely between 0.1°C and 0.3°C) per decade due to past and ongoing emissions (*high confidence*).

A.1.2. Warming greater than the global annual average is being experienced in many land regions and seasons, including two to three times higher in the Arctic. Warming is generally higher over land than over the ocean. (*High confidence*)

A.1.3. Trends in intensity and frequency of some climate and weather extremes have been detected over time spans during which about 0.5°C of global warming occurred (*medium confidence*). This assessment is based on several lines of evidence, including attribution studies for changes in extremes since 1950.

A.2. Warming from anthropogenic emissions from the pre-industrial period to the present will persist for centuries to millennia and will continue to cause further long-term changes in the climate system, such as sea level rise, with associated impacts (*high confidence*), but these emissions alone are *unlikely* to cause global warming of 1.5°C (*medium confidence*).

A.2.1. Anthropogenic emissions (including greenhouse gases, aerosols and their precursors) up to the present are *unlikely* to cause further warming of more than 0.5°C over the next two to three decades (*high confidence*) or on a century time scale (*medium confidence*).

A.2.2. Reaching and sustaining net zero global anthropogenic CO₂ emissions and declining net non-CO₂ radiative forcing would halt anthropogenic global warming on multi-decadal time's scales (*high confidence*). The maximum temperature reached is then determined by cumulative net global anthropogenic CO₂ emissions up to the time of net zero CO₂ emissions (*high confidence*) and the level of non-CO₂ radiative forcing in the decades prior to the time that maximum temperatures are reached (*medium confidence*). On longer time scales, sustained net negative global anthropogenic CO₂ emissions and/or further reductions in non-CO₂ radiative forcing may still be required to prevent further warming due to Earth system feedbacks and to reverse ocean acidification (*medium confidence*) and will be required to minimize sea level rise (*high confidence*).

A.3. Climate-related risks for natural and human systems are higher for global warming of 1.5°C than at present, but lower than at 2°C (*high confidence*). These risks depend on the magnitude and rate of warming, geographic location, levels of development and vulnerability, and on the choices and implementation of adaptation and mitigation options (*high confidence*).

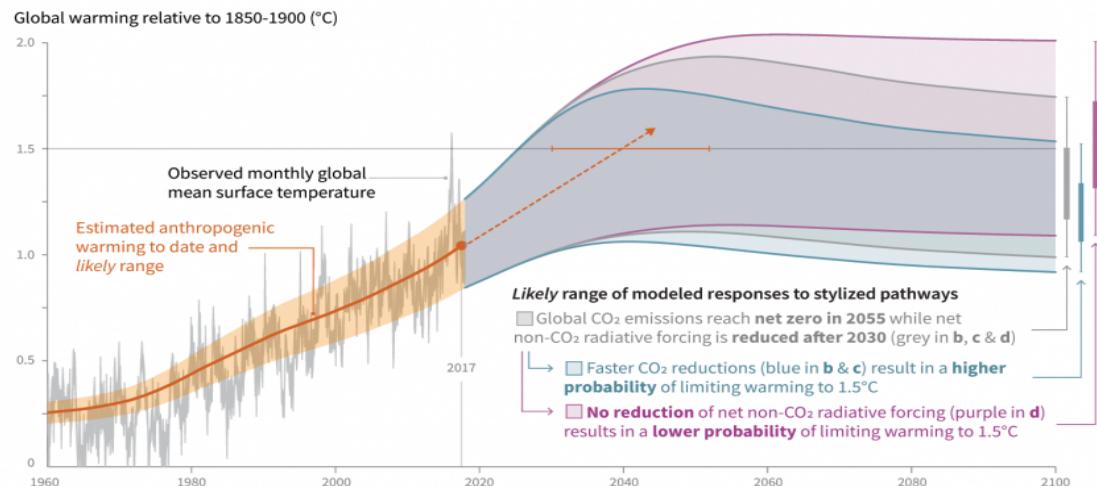
A.3.1. Impacts on natural and human systems from global warming have already been observed (*high confidence*). Many land and ocean ecosystems and some of the services they provide have already changed due to global warming (*high confidence*).

A.3.2. Future climate-related risks depend on the rate, peak and duration of warming. In the aggregate, they are larger if global warming exceeds 1.5°C before returning to that level by 2100 than if global warming gradually stabilizes at 1.5°C, especially if the peak temperature is high (e.g., about 2°C) (*high confidence*). Some impacts may be long-lasting or irreversible, such as the loss of some ecosystems (*high confidence*).

A.3.3. Adaptation and mitigation are already occurring (*high confidence*). Future climate-related risks would be reduced by the upscaling and acceleration of far-reaching, multilevel and cross-sectoral climate mitigation and by both incremental and transformational adaptation (*high confidence*).

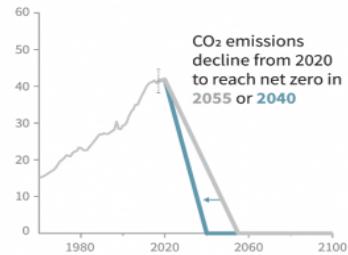
Cumulative emissions of CO₂ and future non-CO₂ radiative forcing determine the probability of limiting warming to 1.5°C

a) Observed global temperature change and modeled responses to stylized anthropogenic emission and forcing pathways



b) Stylized net global CO₂ emission pathways

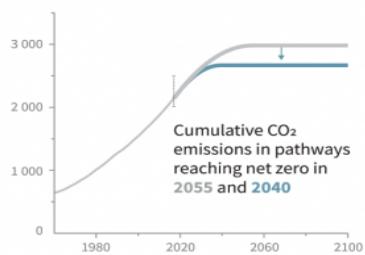
Billion tonnes CO₂ per year (GtCO₂/yr)



Faster immediate CO₂ emission reductions limit cumulative CO₂ emissions shown in panel (c).

c) Cumulative net CO₂ emissions

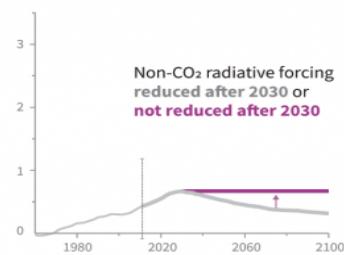
Billion tonnes CO₂ (GtCO₂)



Maximum temperature rise is determined by cumulative net CO₂ emissions and net non-CO₂ radiative forcing due to methane, nitrous oxide, aerosols and other anthropogenic forcing agents.

d) Non-CO₂ radiative forcing pathways

Watts per square metre (W/m²)



S3 SLO2: IPCC assessment report 3 - 2001

The Third Assessment Report of Working Group I of the Intergovernmental Panel on Climate Change (IPCC) builds upon past assessments and incorporates new results from the past five years of research on climate change. The global average surface temperature has increased over the 20th century by about 0.6°C. •The global average surface temperature (the average of near surface air temperature over land, and sea surface temperature) has increased since 1861. Over the 20th century the increase has been $0.6 \pm 0.2^\circ\text{C}$ ^{5,6} This value is about 0.15°C larger than that

estimated by the SAR for the period up to 1994, owing to the **relatively high temperatures** of the additional years (1995 to 2000) and improved methods of processing the data. These numbers take into account various adjustments, including urban heat island effects.

- The record shows a great deal of variability; for example, most of the warming occurred during the 20th century, during two periods, 1910 to 1945 and 1976 to 2000.
- Globally, it is very likely that the 1990s was the **warmest decade** and 1998 the warmest year in the instrumental record, since 1861
- New analyses of proxy data for the Northern Hemisphere indicate that the increase in temperature in the 20th century is likely to have been the largest of any century during the past 1,000 years. It is also likely that, in the Northern Hemisphere, the 1990s was the warmest decade and 1998 the warmest year. Because less data are available, less is known about annual averages prior to 1,000 years before present and for conditions prevailing in most of the Southern Hemisphere prior to 1861.
- On average, between 1950 and 1993, **night-time daily minimum air temperatures** over land increased by about 0.2°C per decade. This is about **twice the rate of increase** in daytime daily maximum air temperatures (0.1°C per decade). This has lengthened the freeze-free season in many mid- and high latitude regions. The increase in sea surface temperature over this period is about half that of the mean land surface air temperature. Some important aspects of climate appear not to have changed.
- A few areas of the globe have not warmed in recent decades, mainly over some parts of the **Southern Hemisphere oceans** and parts of Antarctica.
- No significant trends of Antarctic sea-ice extent are apparent since 1978, the period of reliable satellite measurements.
- Changes globally in tropical and extra-tropical storm intensity and frequency are dominated by inter-decadal to multi-decadal variations, with no significant trends evident over the 20th century. Conflicting analyses make it difficult to draw definitive **conclusions about changes in storm activity, especially in the extra-tropics**.
- **No systematic** changes in the frequency of **tornadoes, thunder days, or hail events** are evident in the limited areas analysed.

S4 SLO1: IPCC assessment report 4 -2007

Greater attention to integrate the climate change with substantial development policies

Relation between mitigation and adaptation

FOURTH ASSESSMENT OF IPCC- 2007

IPCC stands for Intergovernmental Panel on Climate Change. It is a group of scientists chosen by governments and other large groups from around the world who study the way that **humans are making the Earth heat up unnaturally**. The group was established in 1988 by the World Meteorological Organization and the United Nations Environment Programme, two organizations of the United Nations. The report is the largest and most detailed summary of the climate change situation ever undertaken, produced by thousands of authors, editors, and reviewers from dozens of countries, citing over 6,000 peer-reviewed scientific studies. The report was released in four principal sections:

- Contribution of Working Group I: Climate Change 2007: The Physical Science Basis
- Contribution of Working Group II: Climate Change 2007: Impacts, Adaptation and Vulnerability
- Contribution of Working Group III: Climate Change 2007: Mitigation of Climate Change
- Contribution of Working Groups I, II, and III: The Synthesis Report (SYR)

WORKING GROUP I: The physical science basis:-

The first working group states (WGI) was published in March 2007. It includes a Summary for Policymakers (SPM), which was published in February 2007, and a Frequently Asked Questions section. It assessed current scientific knowledge of "the natural and human drivers of climate change" as well as observed changes in climate. It looked at the ability of science to attribute changes to different causes, and made projections of future climate change. It was produced by 676 authors from 40 countries, then reviewed by over 625 expert reviewers. More than 6,000 peer-reviewed publications were cited. Before being approved, the summary was reviewed line

by line by representatives of 113 governments during the 10th session of WGI, in January to February 2007. The key observations of this report were

- Changes in the atmosphere
- Warming of the planet
- Ice, snow, permafrost, rain and oceans.
- Hurricanes

This report also stated the factors responsible for climate change and thy term it as radiative forcing. It shows the individual contribution of the various gases.

- Total radiative forcing from the sum of all human activities is about +1.6 watts/m²
- Radiative forcing from an increase of solar intensity since 1750 is about +0.12 watts/m²
- Radiative forcing from carbon dioxide, methane, and nitrous oxide combined is very likely (>90%) increasing more quickly during the current era (1750–present) than at any other time in the last 10,000 years.

Climate sensitivity had also been discussed. Climate sensitivity is defined as the amount of global average surface warming following a doubling of carbon dioxide concentrations. It is likely to be in the range of 2 to 4.5 °C, with a best estimate of about 3 °C.

WORKING GROUP II:- Impacts, adaptation and vulnerability:-

It was released on April 6, 2007. WGII states that "evidence from all continents and most oceans shows that many natural systems are being affected by regional climate changes, particularly temperature increases. With a high confidence WGII asserts that climate change has resulted in Increasing ground instability in permafrost regions. Increasing rock avalanches in mountain regions. With a very high confidence WGII asserts that climate change is affecting terrestrial biological systems in that Spring events such as the unfolding of leaves, laying of eggs, and migration are happening earlier.

Fresh water

Heavy precipitation events are very likely to become more common and will increase flood risk.

Water supplies stored in glaciers and snow cover will be reduced over the course of the century.

Ecosystems

Carbon removal by terrestrial ecosystems is likely to peak before mid-century and then weaken or reverse. This would amplify climate change.

It is projected with very high confidence that coasts will be exposed to increasing risks such as coastal erosion due to climate change and sea-level rise.

WORKING GROUP III:- Mitigation of Climate change:-

Working Group III's was published on 4 May 2007 at the 26th session of the IPCC. The full WG III report was published online in September, 2007. The IPCC convened in Bangkok on April 30 to start discussions on the draft Summary, with the participation of over 400 scientists and experts from about 120 countries. Despite this, the figures from the original proposal were incorporated into the Summary for Policymakers. The Summary concludes that stabilization of greenhouse gas concentrations is possible at a reasonable cost, with stabilization between 445ppm and 535ppm costing less than 3% of global GDP.

WORKING GROUP IV:- The synthesis report:-

A draft version of the Synthesis Report, said to be subject to final copyedit, was published on 16 November 2007. In fact, this Conference was postponed to December to allow the IPCC Synthesis Report to come out first. The six topics addressed in the Synthesis Report are:

- Observed changes in climate and its effects (WGI and WGII).
- Causes of change (WGI and WGIII).
- Climate change and its impacts in the near and long term under different scenarios (WGI and WGIII).
- Adaptation and mitigation options and responses, and the inter-relationship with sustainable development, at global and regional levels (WGII and WGIII).
- The long-term perspective: scientific and socio-economic aspects relevant to adaptation and mitigation, consistent with the objectives and provisions of the Convention [sic], and in the context of sustainable development (WGI and WGIII).
- Robust findings, key uncertainties (WGI, WGII and WGIII).

IPCC FIFTH Assessment Report – 2014

The Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) finds, beyond reasonable doubt, that the Earth's climate is warming.¹ Since the 1950s, the rate of global warming has been unprecedented compared to previous decades and millennia.² The Fifth Assessment Report presents a long list of changes that scientists have observed around the world. Since the mid-19th century, the average increase in the temperature of the Earth's surface has been 0.85 degrees Centigrade (°C).³ Globally, sea levels have risen faster than at any time during the previous two millennia – and the effects are felt in South Asia.⁴ Changing patterns of rainfall or melting snow and ice are altering freshwater systems, affecting the quantity and quality of water available in many regions, including South Asia.⁵ Climate change will have widespread impacts on South Asian society and South Asians' interaction with the natural environment.⁶ The IPCC finds with 95% scientific certainty (Box 1) that increasing concentrations of greenhouse gases in the atmosphere due to human activities have been the dominant cause of the observed warming since the mid-20th century.⁷ Current science provides the clearest evidence yet that human activity is changing our climate.⁸ The impacts of climate change will influence flooding of settlements and infrastructure, heat-related deaths, and food and water shortages in South Asia.⁹ The following pages explore these risks in more depth. Given the interdependence among countries in today's world, the impacts of climate change on resources or commodities in one place will have far-reaching effects on prices, supply chains, trade, investment and political relations in other places. Climate change will progressively.

The IPCC assigns a degree of certainty to each key finding based on the type, amount, quality and consistency of evidence (e.g., data, theory, models, expert judgment), and the degree of agreement among scientists. The terms to describe evidence are: limited, medium or robust; and to describe agreement: low, medium or high. When the Fifth Assessment Report talks about 'confidence' in a finding, the level of confidence derives from a synthesis of the evidence that exists and the degree of scientific agreement on what the evidence means. The levels of

confidence IPCC assigns are: very low, low, medium, high and very high. IPCC describes the likelihood or certainty of an outcome having occurred or occurring in the future in terms of percentages: Virtually certain 99% or more Extremely likely 95% or more Very likely 90% or more Likely 66% or more More likely than not more than 50% About as likely as not 33–66% Unlikely 33% or less Very unlikely 10% or less Extremely unlikely 5% or less Exceptionally unlikely 1% or less On this scale, the world's leading climate scientists consider it extremely likely that human activities have been the dominant cause of observed warming. Scientists consider 95% confidence as the 'gold standard', the standard at which theories are accepted as valid. For example, the theory of evolution, the theory on the age of the Earth and the Big Bang theory all meet this standard of scientific confidence.

The draft outlines had been prepared following a scientific scoping meeting in May held in Addis Ababa, Ethiopia. At the meeting in Montreal, representatives of the IPCC's 195 member governments discussed this draft and agreed on a final outline.

The IPCC includes three working groups: Working Group I assesses the physical science basis of climate change; Working Group II is responsible for impacts, adaptation and vulnerability; and Working Group III assesses the mitigation of climate change. It also includes a Task Force on National Greenhouse Gas Inventories that focuses on developing internationally agreed methodologies for calculating and reporting greenhouse gas emissions.

The outline of the Synthesis Report, the final instalment of AR6, will be agreed in 2019. The Synthesis Report will integrate the three working group contributions and the Special Reports produced during the AR6 cycle. It will be finalized in April 2022.

The agreed outlines, subject to final copy edits, are available now on the IPCC website. The full agenda and documents can be found [here](#).

Among other business in Montreal the IPCC also considered options for strengthening the financial stability of the IPCC and for aligning its work with the global stocktake cycles of the United Nations Framework Convention on Climate Change. WMO scientific products, including

its annual statement on the status of the global climate and its Greenhouse Gas Bulletin contribute to the global stocktake between the full IPCC assessment reports.

Temperature trends: Warming has occurred, at a country scale, across most of South Asia over the 20th century and into the 2000s (Figure 1). There were more temperature extremes (high confidence).¹⁴ Records indicate that it is likely that the numbers of cold days and nights have decreased and the numbers of warm days and nights have increased across most of Asia since about 1950. Heat wave frequency has increased since the middle of the 20th century in large parts of Asia.¹⁵ **Rainfall trends:** Most areas of the Asian region lack sufficient observational records to draw conclusions about trends in annual rainfall over the past century. Rainfall trends, including extremes, are characterised by strong variability, with both increasing and decreasing trends observed in different parts of Asia (Figure 2).¹⁶ Observations also show that there have been more extreme rainfall events and fewer weak rainfall events in the central Indian region.¹⁷ **Sea level rise:** Globally, the rate of sea level rise since the 1850s has been larger than the average rate during the previous 2,000 years (high confidence). Sea level rise can vary between regions, though. Shifting surface winds, the expansion of warming ocean water, and the addition of melting ice can alter ocean currents which, in turn, lead to changes in sea level that vary from place to place. Past and present variations in the distribution of land ice affect the shape and gravitational field of the Earth, which also cause regional fluctuations in sea level. Additional variations are caused by sediment and tectonics. Changes of sea level in the Indian Ocean have emerged since the 1960s, driven by changing wind patterns.

Observed effects of climate change: Even today, climaterelated risks threaten lives, food security, health and wellbeing across many parts of South Asia. There are clear signs that the impacts of climate change are already being felt.²¹ The Asia region as a whole experienced the most weatherand climate-related disasters in the world between 2000 and 2008 and suffered the second highest proportion (almost 30%) of total global economic losses.²² The risk of deaths due to flooding is highly concentrated in Asia. At the same time as sea levels are rising, most Asian deltas are sinking as a result of groundwater extraction, floodplain engineering and trapping of sediments by dams.²³ Severe floods in Mumbai in 2005 have been attributed to both climatic and non-climatic factors, suggesting an interaction between climate change and other stressors.²⁴ Extreme rainfall and flooding is causing illnesses, deaths and mass displacement. In

2008, the embankments of the Kosi River, a tributary of the Ganges, broke, displacing over 60,000 people in Nepal and 3.5 million in India, and disrupting transport and power across large areas.²⁵ Climate change is impacting on human health in several ways. Contaminated urban flood waters have caused exposure to disease and toxic compounds, for example, in India and Pakistan.²⁶ The incidence of many diseases increases at higher temperatures: the pathogens and parasites that cause disease multiply faster. Dengue and Japanese encephalitis outbreaks in South Asia have been associated with temperature and rainfall. Malaria prevalence in India and Nepal has been linked to rainfall patterns.

Special issue

The IPCC accepted the invitation in April 2016, deciding to prepare this Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty.

- **Understanding the global warming of 1.5°C**

Human activities are estimated to have caused approximately 1.0°C of global warming. Warming from anthropogenic emissions from the pre-industrial period to the present will persist for centuries to millennia and will continue to cause further long-term changes in the climate system, such as sea level rise, with associated impacts, but these emissions alone are *unlikely* to cause global warming of 1.5°C.

Climate-related risks for natural and human systems are higher for global warming of 1.5°C than at present, but lower than at 2°C. These risks depend on the magnitude and rate of warming, geographic location, levels of development and vulnerability, and on the choices and implementation of adaptation and mitigation options.

- **Projected climate change**

Temperature extremes on land are projected to warm more than GMST (high confidence): extreme hot days in mid-latitudes warm by up to about 3°C at global warming of 1.5°C and about 4°C at 2°C, and extreme cold nights in high latitudes warm by up to about 4.5°C at 1.5°C and about 6°C at 2°C. The number of hot days is projected to increase in most land regions, with highest increases in the tropics.

By 2100, global mean sea level rise is projected to be around 0.1 metre lower with global warming of 1.5°C compared to 2°C. Sea level will continue to rise well beyond 2100, and the magnitude and rate of this rise depend on future emission pathways. A slower rate of sea level rise enables greater opportunities for adaptation in the human and ecological systems of small islands, low-lying coastal areas and deltas.

On land, impacts on biodiversity and ecosystems, including species loss and extinction, are projected to be lower at 1.5°C of global warming compared to 2°C. Limiting global warming to 1.5°C compared to 2°C is projected to lower the impacts on terrestrial, freshwater and coastal ecosystems and to retain more of their services to humans.

Limiting global warming to 1.5°C compared to 2°C is projected to reduce increases in ocean temperature as well as associated increases in ocean acidity and decreases in ocean oxygen levels (high confidence). Consequently, limiting global warming to 1.5°C is projected to reduce risks to marine biodiversity, fisheries, and ecosystems, and their functions and services to humans, as illustrated by recent changes to Arctic sea ice and warm-water coral reef ecosystems.

Climate-related risks to health, livelihoods, food security, water supply, human security, and economic growth are projected to increase with global warming of 1.5°C and increase further with 2°C.

- **Strengthening the Global Response in the Context of Sustainable Development and Efforts to Eradicate Poverty**

The avoided climate change impacts on sustainable development, eradication of poverty and reducing inequalities would be greater if global warming were limited to 1.5°C rather than 2°C, if mitigation and adaptation synergies are maximized while trade-offs are minimized.

Adaptation options specific to national contexts, if carefully selected together with enabling conditions, will have benefits for sustainable development and poverty reduction with global warming of 1.5°C, although trade-offs are possible.

Limiting the risks from global warming of 1.5°C in the context of sustainable development and poverty eradication implies system transitions that can be enabled by an increase of adaptation and mitigation investments, policy instruments, the acceleration of technological innovation and behaviour changes.

Sustainable development supports, and often enables, the fundamental societal and systems transitions and transformations that help limit global warming to 1.5°C. Such changes facilitate the pursuit of climate-resilient development pathways that achieve ambitious mitigation and adaptation in conjunction with poverty eradication and efforts to reduce inequalities.

- **Contributors**

Researchers from 40 countries, representing 91 authors and editors contributed to the report, which includes over 6,000 scientific references

- **Reactions from different countries**

Australia

Prime Minister [Scott Morrison](#) emphasised that the report was not specifically for Australia but for the whole world.

Canada

Canadian Environment Minister [Catherine McKenna](#) acknowledged that the SR15 report would say Canada is not "on track" for 1.5 °C. Canada will not be implementing new plans but it will continue to move forward on a "national price on carbon, eliminating coal-fired power plants, making homes and businesses more energy-efficient, and investing in clean technologies and renewable energy.

India

The [Centre for Science and Environment](#) said the repercussions for developing countries such as India, would be "catastrophic" at 2 °C warming and that the impact even at 1.5 °C described in SR15 is much greater than anticipated. Crop yields would decline and poverty would increase.

New Zealand

The Minister for Climate Change [James Shaw](#) said that the Report "has laid out a strong case for countries to make every effort to limit temperature rise to 1.5° Celsius above pre-industrial levels. ... The good news is that the IPCC's report is broadly in line with this Government's direction on climate change and it's highly relevant to the work we are doing with the Zero Carbon Bill."

United States

President [Donald Trump](#) said that he had received the report, but wanted to learn more about those who "drew it" before offering conclusions. In an interview with ABC's "This Week" the director of the [National Economic Council](#), [Larry Kudlow](#), stated, "personally, I think the UN study is way too difficult," and that the authors "overestimate" the likelihood for environmental disasters. Since the publication Trump stated in an interview on [60 Minutes](#) that he didn't know that climate change is manmade and that "it'll change back again", the scientists who say it's worse than ever have "a very big political agenda" and that "we have scientists that disagree with [manmade climate change]."

IPCC Sixth Assessment Report – 2018 – sub2019.....

Course Code: **18CEO406T**

Course Name: GLOBAL WARMING AND CLIMATE CHANGE

Unit – 4; CLO-4: Understand different protocol related to climate change

S5

SLO-1; UNEP - United Nations Environment Programme

SLO-2; WMO - World Meteorological Organization

S6

SLO-1; UNFCCC - United Nations Framework Convention on Climate Change

SLO-2; UNDP - United Nations Development Program

S5 SLO-1; UNEP - United Nations Environment Programme



<https://www.unenvironment.org/>

The United Nations Environment Programme (UNEP) is the **leading global environmental authority that sets the global environmental agenda**, promotes the coherent

implementation of the environmental dimension **of sustainable development** within the United Nations system, and serves as an authoritative advocate for the global environment.

Headquartered in Nairobi, Kenya, we work through our divisions as well as our regional, liaison and out-posted offices and a growing network of collaborating centres of excellence. They also host several environmental conventions, secretariats and inter-agency coordinating bodies. UN Environment is led by our Executive Director.

Process of UNEP

The United Nations Environment Programme (UNEP) is the leading environmental authority in the United Nations system. UNEP uses its expertise to strengthen environmental **standards and practices** while helping implement environmental obligations at the country, regional and global levels. **UNEP's mission** is to provide **leadership and encourage partnership** in caring for the environment by inspiring, informing, and enabling nations and peoples to improve their quality of life without compromising that of future generations.

UNEP's categorize their work into **seven broad thematic areas**: climate change, disasters and conflicts, ecosystem management, environmental governance, chemicals and waste, resource efficiency, and environment under review. In all of our work, we maintain our overarching commitment to sustainability.

1. CLIMATE CHANGE UNEP **strengthens** the ability of countries to **integrate** climate change responses by providing leadership in **adaptation, mitigation**, technology and finance. UNEP is focusing on facilitating the transition to low-carbon societies, improving the understanding of climate science, facilitating the development of renewable energy and **raising public awareness**.
2. POST-CONFLICT AND DISASTER MANAGEMENT UNEP conducts environmental assessments in crisis-affected countries and provides guidance for implementing legislative and institutional frameworks for **improved environmental management**. Activities undertaken by UNEP's Post-Conflict & Disaster Management Branch (PCDMB) include post-conflict environmental assessment in Afghanistan, Côte d'Ivoire, Lebanon, Nigeria and Sudan.

3. ECOSYSTEM MANAGEMENT Facilitates management and **restoration of ecosystems** in a manner consistent with sustainable development, and promotes use of ecosystem services. **Examples** include the Global Programme of Action (GPA) for the Protection of the Marine Environment from Land-Based Activities.
4. ENVIRONMENTAL GOVERNANCE UNEP supports governments in establishing, implementing and strengthening the necessary processes, institutions, **laws, policies** and programs to **achieve sustainable development** at the country, regional and global levels, and mainstreaming environment in development planning.
5. HARMFUL SUBSTANCES UNEP strives to minimise the impact of harmful substances and hazardous waste on the environment and human beings. UNEP has launched negotiations for a global agreement on mercury, and implements projects on mercury and the Strategic Approach to International Chemicals Management (SAICM) to reduce risks to human health and the environment.
6. RESOURCE EFFICIENCY/SUSTAINABLE CONSUMPTION AND PRODUCTION UNEP focuses on regional and global efforts to ensure natural resources are produced, processed and consumed in a more environmentally friendly way. For example, the Marrakesh Process is a global strategy to support the elaboration of a 10-Year Framework of Programs on sustainable consumption and production.

UNEP's **work** is made possible by partners who fund and champion our mission. UNEP's depend on voluntary contributions for 95 per cent of our income.

Every year, UNEP's **honor** and celebrate individuals and institutions that are doing outstanding work on behalf of the environment.

UNEP's host the secretariats of many critical multilateral environmental agreements and research bodies, bringing together nations and the environmental community to tackle the greatest challenges of our time. These include the following:

- The Convention on Biological Diversity
- The Convention on International Trade in Endangered Species of Wild Fauna and Flora
- The Minamata Convention on Mercury
- The Basel, Rotterdam and Stockholm Conventions

- The Vienna Convention for the Protection of Ozone Layer and the Montreal Protocol
- The Convention on Migratory Species
- The Carpathian Convention
- The Bamako Convention
- The Tehran Convention

UNEP's main activities are;

- climate change
 - including the Territorial Approach to Climate Change (TACC)
- disasters and conflicts
 - UNEP has endeavored to lighten the influence of emergencies or natural disasters on human health and to prepare for future disasters. It contributes to the reduction of the origin of disasters by controlling the balance of ecosystems and actively support Sendai Framework for Disaster Risk Reduction which aims to reduce the risk of disasters (DRR). As well as preventing natural disasters, the UNEP supports countries such as to make laws or policies which protect the countries from getting serious damage by disasters. Since 1999 it has helped 40 countries to recover from the effect of disasters.
- ecosystem management
- environmental governance
- environment under review
 - UNEP provides information and data on the global environment to stakeholders including governments, non-governmental organizations and the public for them to engage in realizing the Sustainable Development Goals. The information which UNEP shares is based on the latest science and is collected in a proper way. This makes policy makers find reliable information effectively. Through this The Environment Outlook and the Sustainable Development Goals Indicators stakeholders can have access to information easily. In addition, the UN environment Live Platform and Online Access to Research in Environment(OARE) provide transparent information collected by UNEP.[19]

- harmful substances
- resource efficiency

https://en.wikipedia.org/wiki/United_Nations_Environment_Programme

UNEP Collaboration with Geneva-based UN Organisations

- UNEP and The World Health Organization (WHO)
- UNEP and The International Labour Organization (ILO)
- UNEP and The UN High Commissioner for Refugees (UNHCR)
- UNEP and The World Meteorological Organization (WMO)
- UNEP and The UN Conference on Trade and Development (UNCTAD)
- UNEP and The World Trade Organization (WTO)
- UNEP and the International Telecommunication Union (ITU)
- UNEP and the Office of the High Commissioner for Human Rights (UNHCHR)



<https://unep.ch/glo/glo%20pages/areas%20of%20cooperation.htm>

UNITED NATIONS ENVIRONMENT PROGRAMME

- UNEP is the leading global environmental authority that sets the global environmental agenda and promotes the implementation of sustainable development within the United Nations system.
- UNEP is headquartered in Nairobi, Kenya, and operates through its divisions, regional offices, liaison offices, and collaborating centers of excellence.
- UNEP hosts several environmental conventions, secretariats, and inter-agency coordinating bodies.
- UNEP serves as an authoritative advocate for the global environment.
- UNEP is led by its Executive Director.

PROCESS OF UNEP

- 1. UNEP is the leading environmental authority in the United Nations system, with a mission to inspire and enable nations to improve their quality of life without compromising the future.
- 2. UNEP categorizes its work into seven thematic areas: climate change, disasters and conflicts, ecosystem management, environmental governance, harmful substances, resource efficiency, and environment under review.
- 3. Under the thematic areas:
 - UNEP focuses on strengthening countries' ability to respond to climate change through leadership in adaptation, mitigation, technology, and finance.
 - UNEP conducts environmental assessments in crisis-affected countries and provides guidance for improved environmental management in post-conflict and disaster scenarios.
 - UNEP promotes ecosystem management and restoration in a sustainable manner, including the protection of marine environments.
 - UNEP supports governments in establishing processes, institutions, laws, policies, and programs for sustainable development and environment integration in planning.
 - UNEP works to minimize the impact of harmful substances and hazardous waste on the environment and human health, including global negotiations on mercury and related projects.

- UNEP focuses on regional and global efforts to promote environmentally friendly production and consumption, such as the Marrakesh Process.
- 4. UNEP depends on voluntary contributions for 95% of its income, and it partners with organizations that support its mission.
- 5. UNEP annually honors individuals and institutions for their outstanding work in environmental protection.
- 6. UNEP hosts the secretariats of crucial multilateral environmental agreements and research bodies, addressing global challenges related to biodiversity, endangered species, mercury, ozone protection, migratory species, and more.

UNEP'S MAIN ACTIVITIES

1. Climate Change
2. Disaster of conflicts
3. Ecosystem Management
4. Environmental Governance
5. Environment Under Review
6. Harmful Substances
7. Resource Efficiency

UNEP Collaboration with Geneva-based UN Organisations

- UNEP and The World Health Organization (WHO)
- UNEP and The International Labour Organization (ILO)
- UNEP and The UN High Commissioner for Refugees (UNHCR)
- UNEP and The World Meteorological Organization (WMO)
- UNEP and The UN Conference on Trade and Development (UNCTAD)
- UNEP and The World Trade Organization (WTO)
- UNEP and the International Telecommunication Union (ITU)
- UNEP and the Office of the High Commissioner for Human Rights (UNHCHR)

SLO-2; WMO - World Meteorological Organization



<https://public.wmo.int/en>

The World Meteorological Organization (WMO) is an intergovernmental organization with a membership of 193 Member States and Territories. It originated from the International Meteorological Organization (IMO), the roots of which were planted at the 1873 Vienna International Meteorological Congress. Established by the ratification of the WMO Convention on **23 March 1950**, WMO became the **specialised agency** of the United Nations for meteorology (weather and climate), operational hydrology and related geophysical sciences a year later. The Secretariat, **headquartered** in Geneva, is headed by the Secretary-General. Its supreme body is the World Meteorological Congress.

WMO has **187 Member States** and 6 Member Territories. Members are divided into six regions:

- Region I: Africa
- Region II: Asia
- Region III: South America
- Region IV: North America, Central America and the Caribbean
- Region V: South-West Pacific
- Region VI: Europe

Vision, Mission, Strategic Planning

WMO provides world leadership and expertise in international cooperation in the delivery and use of high-quality, authoritative weather, climate, hydrological and related environmental services by its Members, for the improvement of the well-being of societies of all nations.

WMO Mission

WMO works to facilitate worldwide cooperation in the design and delivery of meteorological services, foster the rapid **exchange of meteorological information**, advance the standardization of meteorological data, build cooperation between meteorological and hydrological services, encourage research and training in meteorology, and expand the use of meteorology to benefit other sectors such as **aviation, shipping, agriculture and water management**.

Focus area, within its mandate in the areas of weather, climate and water, WMO focuses on many different aspects and issues from observations, information exchange and research to weather forecasts and early warnings, from capacity development and monitoring of greenhouse gases to application services and much, much more

WMO Strategic Plan 2020–2023

WMO strategic and operational planning is built on the results-based management concept established by the fifteenth World Meteorological Congress as fundamental for managing the planning, budgeting, implementation, monitoring and reporting of programmatic work. The **WMO planning process** is based on three interlinked components:

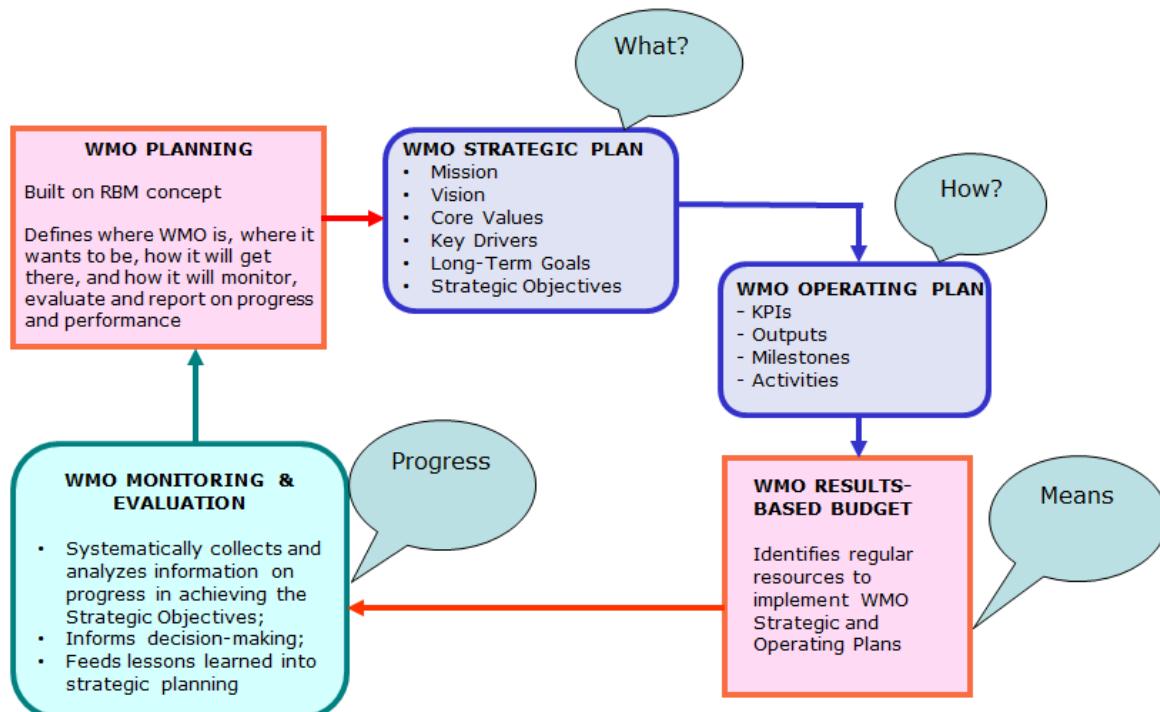
1. The WMO Strategic Plan articulates the high-level vision, mission, core values and overarching priorities of the Organization. It outlines a set of long-term goals and strategic objectives with a 2030 horizon as well as identifies areas of focus for the 2020–2023 financial period.
2. The WMO Operating Plan 2020-2023 translates the strategy into specific actions by defining outputs to be delivered (i.e. lower-level results) and annual milestones to be achieved. It also lists planned activities, indicates the resources available, and outlines performance indicators intended to measure progress in achieving the strategic objectives.
3. The WMO Results-based Budget (maximum expenditure approved by Congress) identifies resources for implementation of the Strategic Plan, including the functioning of constituent bodies and the Secretariat.

WMO STRATEGIC PLAN 2020-30

Long-Term Goals



Risk management and quality assurance are embedded in both strategic and operational planning, as well as in monitoring and evaluation processes.



Operational planning

Implementation of the strategic plan is facilitated by the WMO Operating Plan 2020-2023 which reflects the results chain towards strategic objectives and long-term goals and provides details on:

- Focus Areas / Outcomes
- Performance Indicators
- Outputs
- Milestones
- Activities

These elements are expected to contribute to achieving the long-term results defined in the WMO Strategic Plan, with the resources provided under the WMO Results-based Budget – Maximum expenditure approved by Congress, and the in-kind support of technical commissions and regional associations.

For each strategic objective, regional aspects and priorities are highlighted based on the WMO Monitoring and Evaluation system, data collected through the Country Profile Database, and information provided by regions. Risks and mitigation measures are also defined for each Strategic Objective.

Monitoring and evaluation

Monitoring and Evaluation are essential components of the WMO Results Based Management System. They constitute the tools for measuring performance in the timely implementation of the WMO Strategic Plan and Operating Plan. They also contribute to the identification of good practices and lessons learned which inform the next phase of the strategic planning cycle.

**S6 - SLO-1; UNFCCC - UNITED NATIONS FRAMEWORK CONVENTION ON
CLIMATE CHANGE**



<https://unfccc.int/>

What is the purpose of the Secretariat?

The UNFCCC secretariat (UN Climate Change) is the United Nations entity tasked with supporting the global response to the **threat of climate change**. **UNFCCC stands for United Nations Framework Convention on Climate Change**. The Convention has near universal membership (**197 Parties**) and is the parent treaty of the **2015 Paris Agreement**. The **main aim** of the Paris Agreement is to **keep the global average temperature rise this century as close as possible to 1.5 degrees Celsius above pre-industrial levels**. The UNFCCC is also the parent treaty of the **1997 Kyoto Protocol**. The ultimate objective of all three agreements under the UNFCCC is to **stabilize greenhouse gas concentrations in the atmosphere at a level that will prevent dangerous human interference with the climate system**, in a time frame which allows ecosystems to adapt naturally and enables sustainable development.

When was the secretariat created?

The secretariat was established in 1992 when countries adopted the UNFCCC. The original secretariat was in Geneva. Since 1995, the secretariat has been located in Bonn, **Germany**.

Who works at the secretariat?

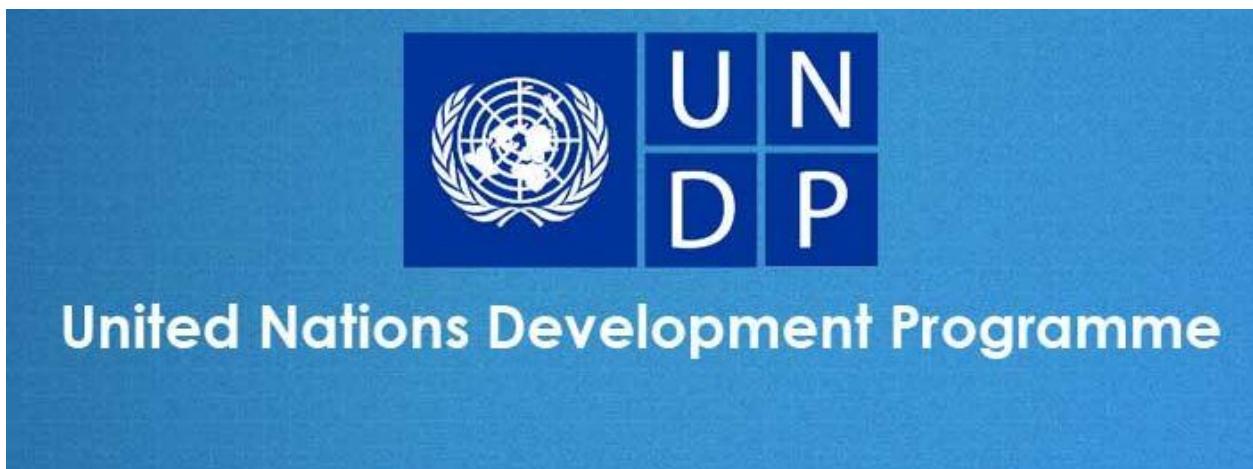
Around 450 staff are employed at UN Climate Change. Secretariat staff come from over 100 countries and represent a blend of **diverse cultures, gender and professional backgrounds**.

At the head of the secretariat is the Executive Secretary, a position currently held by Patricia Espinosa.

What does the secretariat do?

Focussing in its early years largely on facilitating the intergovernmental climate change negotiations, the secretariat today supports a complex architecture of bodies that serve to advance the implementation of the Convention, the Kyoto Protocol and the Paris Agreement.

S6 - SLO-2; UNDP - UNITED NATIONS DEVELOPMENT PROGRAMME



<https://www.undp.org/content/undp/en/home.html>

<https://www.youtube.com/watch?v=a4zLqIGXxbg&feature=youtu.be>

Mission

On the ground in about 170 countries and territories, **UNDP works to eradicate poverty while protecting the planet**. We **help countries develop strong policies, skills, partnerships and institutions so they can sustain their progress**.

Impact in 2018

- 31M people had better access to services to tackle poverty
- 20M people gained access to financial services
- 256M tonnes of carbon emissions cut

Function of UNDP

UNDP is committed to ending poverty once and for all. That's why we work to get to the root causes of poverty and create lasting change. The good news is we have a plan. But we need your help to get the job done.

Functions of UNDP

- ❖ Sponsors innovative projects & local based development programs.
- ❖ Work with countries to strengthen their national response to HIV & AIDS.
- ❖ Promote fair & inclusive election with a special focus on women & marginalized people.
- ❖ Helps countries to prevent natural disaster & recover crisis.
- ❖ Raises climate related funds.
- ❖ Provide facilities to access & manage national & international resources.

The Objectives

UNDP supports countries in their efforts to successfully address diverse development challenges, framed around three broad settings which require different forms of support:

1. Eradicating **poverty** in all its forms and dimensions;
2. Accelerating structural transformations for **sustainable development**; and
3. **Building resilience** to crises and shocks

These **three development challenges** often coexist within the same country, requiring tailored solutions that can adequately address specific deficits and barriers. Underpinning all three development challenges is a set of core development needs, including the need to **strengthen gender equality** and the empowerment of women and girls, and to ensure the **protection of human rights**.

The Progress to success

To fulfill the aims of the Strategic Plan with the multi-dimensionality and complexity that the 2030 Agenda demands, UNDP is implementing **six cross-cutting approaches** to development, known as Signature Solutions. A robust, integrated way to put our best work – or 'signature' skillset – into achieving the Sustainable Development Goals.

1. Keeping people out of poverty
2. Governance for peaceful, just, and inclusive societies
3. Crisis prevention and increased resilience
4. Clean, affordable energy
5. Women's empowerment
6. gender equality

Working together with partners across the UN system and beyond, UNDP is implementing these Solutions building on UNDP's strengths and expertise to help countries reach the SDGs. Because the six Solutions are interrelated, we can tailor a unique combination to best meet each country's needs.

Protecting Development Gains

The **2030 Agenda** is a plan of action for **people, planet and prosperity**. It also seeks to strengthen universal **peace** in larger freedom. It recognizes that eradicating poverty in all its forms and dimensions, including extreme poverty, is the greatest global challenge and an

indispensable requirement for sustainable development. All countries and all stakeholders, acting in collaborative **partnership**, are implementing this Agenda.

SDG Integration

The Sustainable Development Goals (SDGs), also known as the Global Goals, were adopted by all United Nations Member States in 2015 as a universal call to **action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030**.

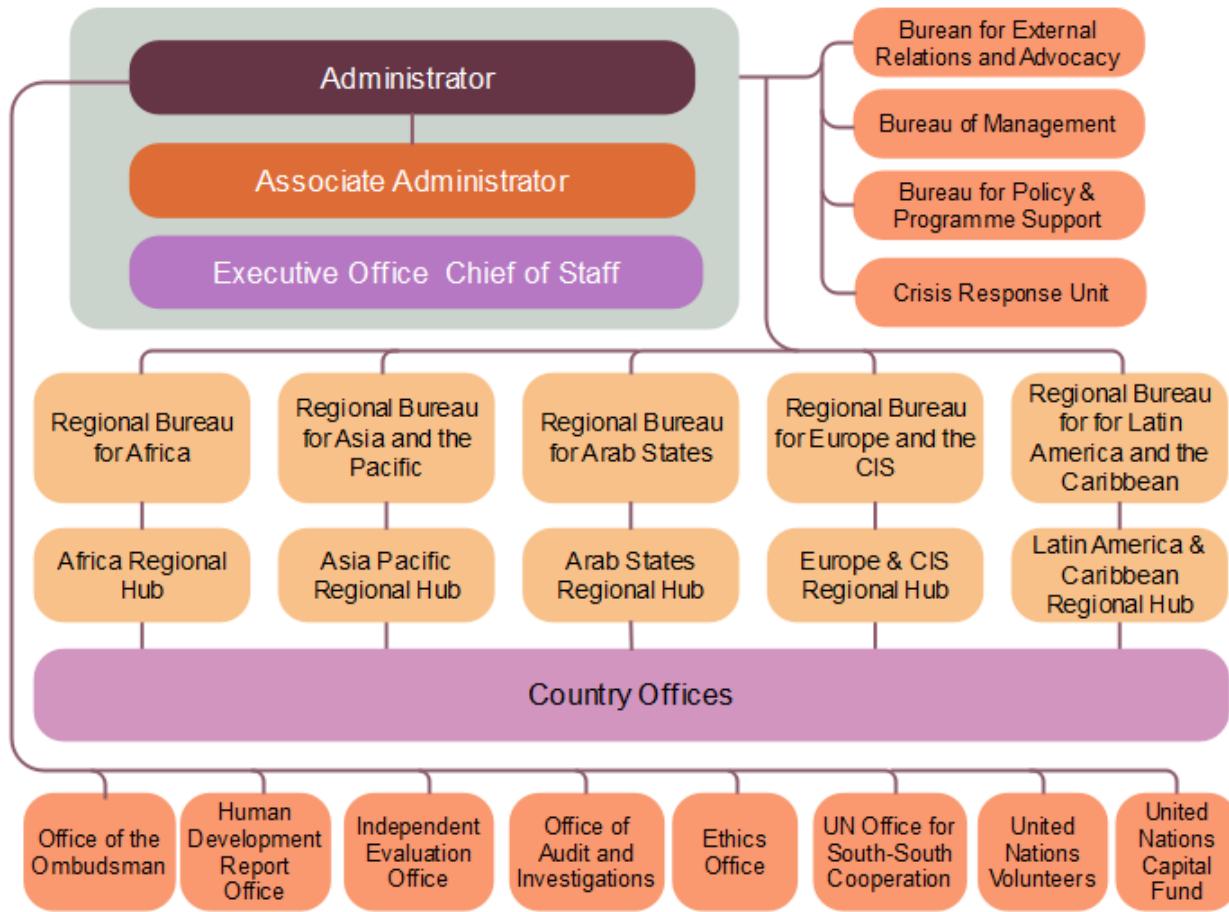
The **17 SDGs** are integrated—that is, they recognize that action in one area will affect outcomes in others, and that development must balance social, economic and environmental sustainability.

Through the pledge to **Leave No One Behind**, countries have committed to fast-track progress for those furthest behind first. That is why the SDGs are designed to bring the world to several life-changing ‘zeros’, including **zero poverty, hunger, AIDS and discrimination against women and girls**.

Everyone is needed to reach these ambitious targets. The creativity, knowhow, technology and financial resources from all of society is necessary to achieve the SDGs in every context.



UNDP Org Chart



18CEO406T - Global Warming and Climate Change

UNIT – IV

[S7 – S9]

Topic; S7

SLO 1: Need for international protocols of climate change

SLO 2: Kyoto protocol

SLO 1: Need for international protocols of climate change

The main objective of this important **climate change** treaty is to: achieve stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the **climate** system.

The atmosphere and climate change illustrate the need for, but also the difficulty of negotiating institutionalized cooperation in order to avert the tragedy of a global commons. Climate change became an issue of political concern as the scientific evidence of human interference with the climate system increased and this was coupled with growing public concern over global environmental issues in the mid-1980s.

The **greenhouse gas emissions** of a country correlate with its gross domestic product (GDP) and thus its economic growth.

Over the course of successive **Conferences of the Parties — known as COP** — new elements have been introduced into the international structure of the negotiations on climate change. These elements allow for specific challenges to be tackled such as **mitigation financing, adaptation to climate change, and the technological transfer**.

The **United Nations Conference on Environment and Development**, held in Rio de Janeiro in 1992, was a reflection of the international consensus when it came to approaching the problem of climate change. **During the summit, the United Nations Framework Convention on Climate Change (UNFCCC)** was created, which was initially signed by 166 countries and finally came into force on 21 March 1994. As of today, its has been ratified by 197 countries.

Below are the most significant agreements on climate change:

- i. The setting of the target for developed countries to provide 100 billion dollars for climate finance projects in developing countries.
 - ii. The formalisation of the goal to limit the global temperature rise to below 2°C compared to the pre-industrial era.
 - iii. The launching of the Ad Hoc Working Group on the Durban Platform and its two lines of work: Workstream 1, dedicated to working towards a binding global climate agreement for the post-2020 era; and Workstream 2, dedicated to raising the level of climate ambition before 2020.
 - iv. The second period of commitment arising from the Kyoto Protocol runs until 2020, through what is known as the Doha Amendment (COP18).
 - v. The launch of the Marrakesh Partnership for Global Climate Action as a platform to involve the general public and increase their role in the process of global climate action.
-

S7: SLO 2: Kyoto protocol

The Kyoto Protocol was adopted on Kyoto, Japan , 11 December 1997. Owing to a complex ratification process, it entered into force on 16 February 2005. By 1997, 186 nations signed kyotoprotocoal. Currently, there are 192 Parties to the Kyoto Protocol.

In short, the Kyoto Protocol operationalizes the [United Nations Framework Convention on Climate Change](#) by committing industrialized countries and economies in transition to limit and reduce greenhouse gases (GHG) emissions in accordance with agreed individual targets. The Convention itself only asks those countries to adopt policies and measures on mitigation and to report periodically.

The Kyoto Protocol is based on the principles and provisions of the Convention and follows its annex-based structure. It only binds developed countries, and places a heavier burden on them under the principle of “common but differentiated responsibility and respective capabilities”, because it recognizes that they are largely responsible for the current high levels of GHG emissions in the atmosphere.

In its [Annex B](#), the Kyoto Protocol sets binding emission reduction targets for 37 industrialized countries and economies in transition and the European Union. Overall, [these targets](#) add up to an average 5 per cent emission reduction compared to 1990 levels over the **five year period 2008–2012 (the first commitment period)**.

Doha Amendment

- i. In Doha, Qatar, on [8 December 2012](#), the [Doha Amendment](#) to the Kyoto Protocol was adopted for a [second commitment period, starting in 2013 and lasting until 2020](#). However, the Doha Amendment has not yet entered into force; a total of [144 instruments](#) of acceptance are required for entry into force of the amendment. New commitments for Annex I Parties to the Kyoto Protocol who agreed to take on commitments in a second commitment period from 1 January 2013 to 31 December 2020.
 - ii. A revised list of greenhouse gases (GHG) to be reported on by Parties in the second commitment period.
 - iii. Amendments to several articles of the Kyoto Protocol which specifically referenced issues pertaining to the first commitment period and which needed to be updated for the second commitment period.
- On 21 December 2012, the amendment was circulated by the Secretary-General of the United Nations, acting in his capacity as Depositary, to all Parties to the Kyoto Protocol in accordance with Articles 20 and 21 of the Protocol.
 - During the first commitment period, 37 industrialized countries and the European Community committed to reduce GHG emissions to an average of five percent against 1990 levels.
 - During the second commitment period, Parties committed to reduce GHG emissions by at least 18 percent below 1990 levels in the eight-year period from 2013 to 2020; however, the composition of Parties in the second commitment period is different from the first.

KYOTO MECHANISMS

- Under the Protocol, countries must meet their targets primarily through national measures. However, the Protocol also offers them an additional means to meet their targets by way of three market-based mechanisms.

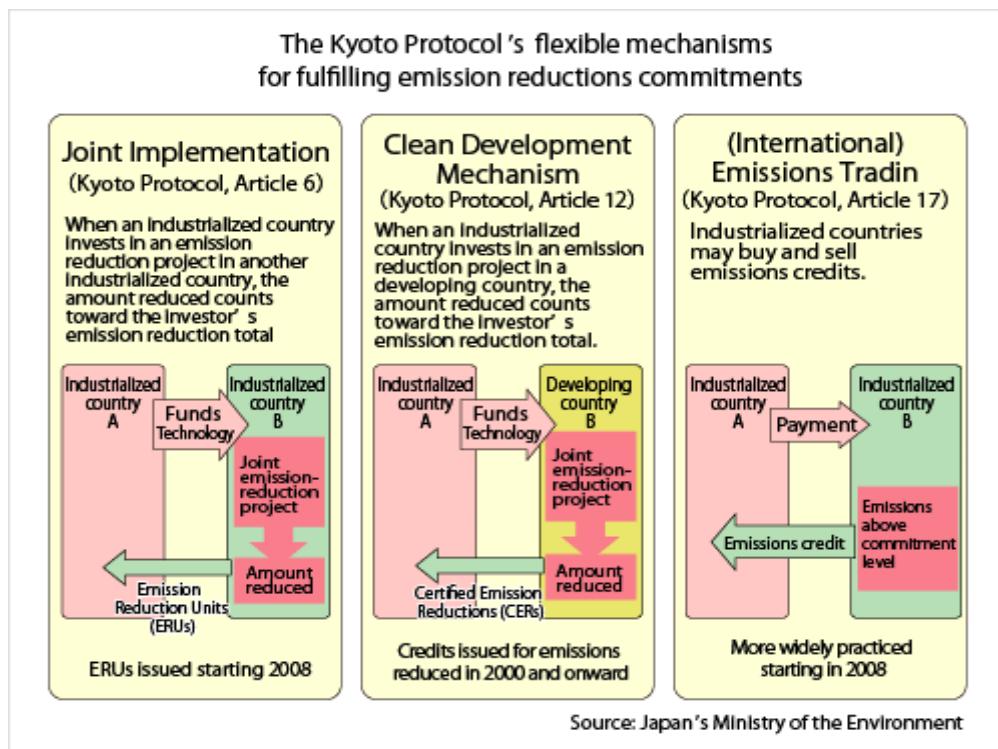
The Kyoto mechanisms are:

- 1) International Emissions Trading [Article 17]
- 2) Clean Development Mechanism (CDM) [Article 12]
- 3) Joint implementation (JI) [Article 6]

These mechanisms help to stimulate green investment and help Parties meet their emission targets in a cost-effective way.

These mechanisms are introduced in the Protocol with a **two fold aim**:

- To aid Annex I countries to meet their emissions reduction and limitation commitments.
- To offer support for sustainable development in developing countries, non-Annex I countries, through the transference of clean technologies.



Features of the Kyoto mechanisms as defined in the Kyoto Protocol.

<i>Article</i>	<i>Mechanism</i>	<i>Units</i>	<i>Participants</i>	<i>Requirements</i>
17	Emissions trading (ET)	Assigned amounts units (AAU)	Annex I Parties	Any trading shall be supplemental to domestic actions.
6	Transfer or acquire emissions reduction units resulting from projects (JI)	Emissions reduction units (ERU)	Annex I Parties and legal entities authorized by Parties	Emissions reductions must be: Approved by the Parties involved; additional to measures that would have otherwise been implemented; acquired only by Parties that comply with their reporting obligations; and supplemental to domestic action.
12	Acquire certified emission reductions from projects in non-Annex I Parties from 2000 and onwards (CDM)	Certified emissions reductions (CER)	Annex I Parties buy, non-Annex I Parties sell Private and/or public entities	Supervised by an executive board; emissions reductions will be certified by operational entities designated by the COP/MOP. ⁵ A share of the proceeds of certified project activities shall cover administrative costs as well as assist particularly vulnerable developing countries with adaptation.

1. International Emissions Trading (IET)

- Under this mechanism, an Annex I Party may transfer Kyoto units to or acquire units from another Annex I Party.
- Emissions trading does not affect the total assigned amount of Annex I Parties collectively; rather, it re-distributes the assigned amount among them.
- A Party may acquire an unlimited number of units.
- The number of units that a Party may transfer to other Parties is limited by the Party's commitment period reserve (CPR).
- The CPR is the minimum level of units that a Party must hold in its national registry at all times. The requirement for each Party to maintain a CPR prevents a Party from over-transferring units, and thus impair its ability to meet its commitments

2. Joint implementation (JI)

- It is a project-based mechanism by which one Annex I Party can invest in a project that reduces emissions or enhances sequestration in another Annex I Party, and receive credit for the emission reductions or removals achieved through that project.
- The unit associated with JI is called an emission reduction unit (ERU).
- The total projected emission savings from JI by 2012 are about one tenth that of the CDM.
- Russia accounts for about two-thirds of these savings, with the remainder divided up roughly equally between the Ukraine and the EU's New Member States.

3. Clean Development Mechanism

- CDM credits may be generated from emission reduction projects or from afforestation and reforestation projects in non-Annex I Parties.
- Unlike emissions trading and JI, projects under the CDM create new Kyoto units and their acquisition by Annex I Parties increases both the total assigned amount available for those Annex I Parties collectively and their allowable level of emissions.
- CDM projects result in three types of Kyoto units.
 - Certified emission reductions (CERs) are issued for projects that reduce emissions
 - Temporary CERs (tCERs)
 - Long-term CERs (lCERs) both of which may be issued for projects that enhance removals through afforestation and reforestation projects.



MONITORING EMISSION TARGETS

- Under the Protocol, countries' actual emissions have to be monitored and precise records have to be kept of the trades carried out.
- Registry systems track and record transactions by Parties under the mechanisms. The UN Climate Change Secretariat, based in Bonn, Germany, keeps an international transaction log to verify that transactions are consistent with the rules of the Protocol.
- Reporting is done by Parties by submitting annual emission inventories and national reports under the Protocol at regular intervals.
- A compliance system ensures that Parties are meeting their commitments and helps them to meet their commitments if they have problems doing so.

Adaptation:

- The Kyoto Protocol, like the Convention, is also designed to assist countries in adapting to the adverse effects of climate change. It facilitates the development and deployment of technologies that can help increase resilience to the impacts of climate change.
 - The Adaptation Fund was established to finance adaptation projects and programmes in developing countries that are Parties to the Kyoto Protocol. In the first commitment period, the Fund was financed mainly with a share of proceeds from CDM project activities. In Doha, in 2012, it was decided that for the second commitment period, international emissions trading and joint implementation would also provide the Adaptation Fund with a 2 percent share of proceeds.
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Topic; S8

SLO 1: Climate Change and Carbon credit

SLO 2: Clean Development Mechanism

S8 SLO 1: Climate Change and Carbon credit

S8: Climate Change

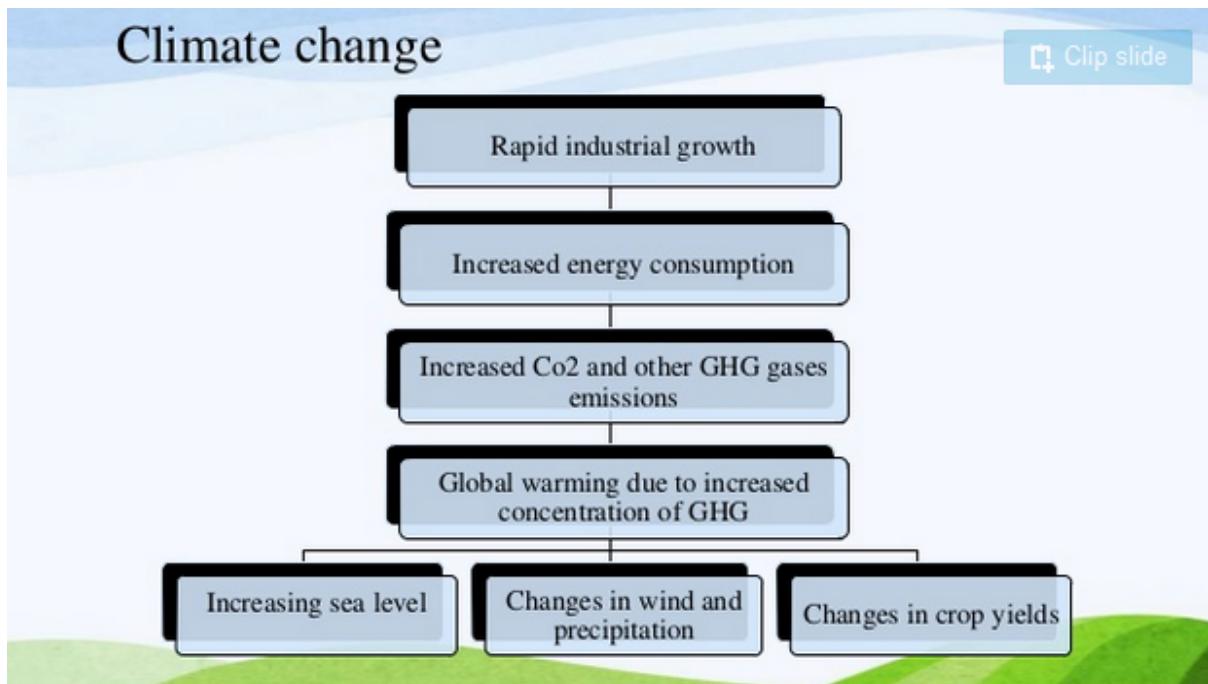
Climate Change is the defining issue of our time and we are at a defining moment. From **shifting weather patterns that threaten food production**, to rising sea levels that increase the risk of catastrophic flooding, the impacts of climate change are global in scope and unprecedented in scale. Without drastic action today, adapting to these impacts in the future will be more difficult and costly.

There are some basic well-established scientific links:

- The **concentration of GHGs** in the earth's atmosphere is directly linked to the average global temperature on Earth;
- The most abundant GHG, accounting for about **two-thirds of GHGs, carbon dioxide (CO₂)**, is largely the product of burning fossil fuels.

State Indicators of Climate Change

- The anthropogenic concentrations of the greenhouse gases, and among them **carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O)**, have grown significantly since pre-industrial times. These trends can be attributed to human activities, mostly fossil fuel use, land-use change and agriculture. Concentrations of other anthropogenic greenhouse gases have also increased. An increase of greenhouse gas concentrations leads on average to an additional warming of the atmosphere and the Earth's surface. Many greenhouse gases remain in the atmosphere-- and affect climate for a long time (IPCC, 1995). UNFCCC Article 4.1(a) states that:
- All Parties, taking into account their common but differentiated responsibilities and their specific national and regional development priorities, objectives and circumstances, shall develop, periodically update, publish and make available to the Conference of the Parties, in accordance with Article 12, national inventories of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol, using comparable methodologies to be agreed upon by the Conference of the Parties.
- Atmospheric concentrations of CO₂, CH₄, and N₂O are key indicators** in formulating policies for mitigating the effects of climate change.



S8 : Carbon Credit: A Step Towards Green Environment

Carbon Credit Trading is generated from the **Kyoto Protocol**. The main aim of this concept is basically to trade the carbon credit in the market. This type of trading is now the one of the fastest trading market in India.. This research is used for the several benefits and challenges which are directly or indirectly associated with carbon credit trading. It is a tradable certificate or permit representing the right to emit **1 tonne of carbon di oxide**.

In today's scenario Global Warming is costing a lot of money, so Green Environmentalist aims to promote policy and business that works for the environment. As we all know, **carbon dioxide, the most important greenhouse gas** produced by combustion of fuels, has become a cause of global panic as its concentration in the Earth's atmosphere has been rising alarmingly. This has created an opportunity for the trade of carbon credits both within and outside of the regulated area, thereby creating a global "carbon market".

In this system of carbon trading, controls are imposed on **Green House Gas (GHG) emissions under the Kyoto Protocol**, and the pre-decided emission limits are then allocated across countries, which have to control the greenhouse gas emissions from the various industries and commercial units operating within them.

What Is Carbon Credit?

Carbon credits are basically an element which is used to aid in regulation of the amount of gases that are being released into the air. This is basically a larger international plan which has been created in an effort to reduce global warming and its effects. International treaties have set quotas on the amount of GHG countries can produce, which in turn set quotas for businesses. **Instruments like carbon credits and carbon offset were introduced in order to improve the scenario by encouraging firms** to be more environment friendly in conducting their business.

One carbon credit allows one tonne of carbon dioxide or a corresponding amount of other greenhouse gases to be discharged in the air.. The amount of global emissions can be controlled through the buying and selling of carbon credits in the carbon trading method. But still the increased demand flowing to carbon credits and the introduction of newer financial instruments for emission trading are all signs of heightened activity. It can also be concluded that India is an emerging leader for the developing countries in designing innovative strategies and portfolios for carbon trading.

Sectors in Which Carbon Credits Can Work?

There are several sectors in which carbon credits work as shown in figure.

Energy Supply
Transport
Residential and Commercial Buildings
Industry
Agriculture
Forestry
Waste management

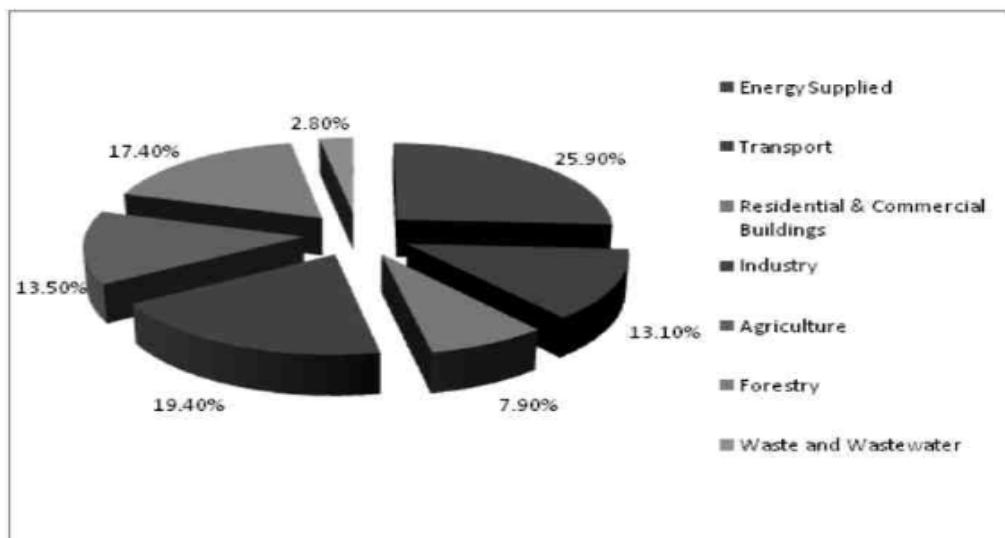
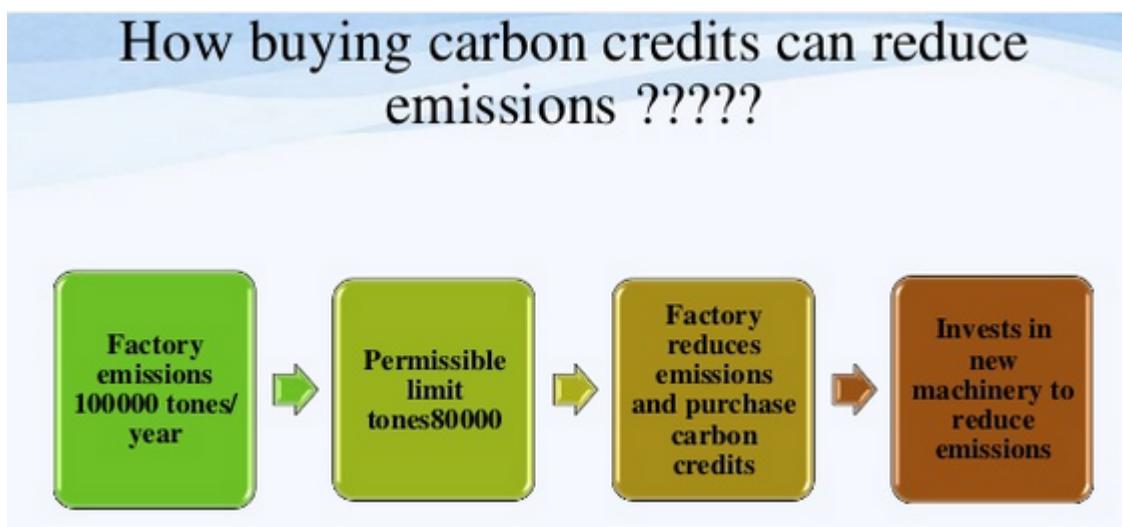


Fig. Different Sectors in which Carbon Credit Works with Percentage

How buying carbon credits can reduce emissions?



Reducing carbon emissions

- i. Use of renewable energy such as wind farms, installation of solar.
- ii. Afforestation

- iii. Reforestation
- iv. It is also duty of each individual to contribute the following
 - Drive less
 - Use solar energy
 - Plant more trees
 - Turn off electronic devices
 - Reuse and recycle.

Carbon credits in India

India signed the **kyoto protocol in August 2002**.

India is the second largest seller of carbon credits globally with **489 CDM projects**.

Carbon credit traders in India

- | | |
|---|---|
| <ul style="list-style-type: none"> • Andhyodaya green energy • Grasim industries Ltd. • Indo gulf fertilizer • Indus technical and financial consultants Ltd. • Madhya Pradesh rural livelihoods project • Rajasthan renewable energy corporation | <ul style="list-style-type: none"> • Reliance energy Ltd. • Tata motors Ltd. • Tata steel Ltd. • Bajaj Fiserv Ltd. • Dhariwal industries Ltd. • Tata power company Ltd. • Blue star energy services Inc. • Valera global Inc. |
|---|---|

Merits and demerits of carbon credits

Merits of carbon credits	De merits of carbon credits
Technology transfer from developed to developing countries Better technology for company Can change country's financial situation Development of cleaner technologies Environmental benefits Helps in developing extra income	Gives false sense of pollution It is not regulated Developed countries purchase CER's rather than finding new ways to reduce emissions Lack of comprehensive and structured international system.

S8: SLO2: Clean Development Mechanism (CDM)

Clean Development Mechanism (CDM)

- A mechanism that allows Annex B Countries to undertake GHG emission reduction projects in non-annex B countries, and to use the achieved emission reductions to meet their own emission goal. The Clean Development Mechanism (CDM), defined in **Article 12 of the Protocol**, allows a country with an emission-reduction or emission-limitation commitment under the Kyoto Protocol (**Annex B Party**) to implement an emission-reduction project in developing countries. Such projects can earn saleable **certified emission reduction (CER)** credits, each equivalent to one tonne of CO₂, which can be counted towards meeting Kyoto targets.
- It is the first global, environmental investment and credit scheme of its kind, providing a standardized emissions offset instrument, CERs.
- A CDM project activity might involve, for example, a rural electrification project using solar panels or the installation of more energy-efficient boilers.
- The mechanism stimulates sustainable development and emission reductions, while giving industrialized countries some flexibility in how they meet their emission reduction or limitation targets.

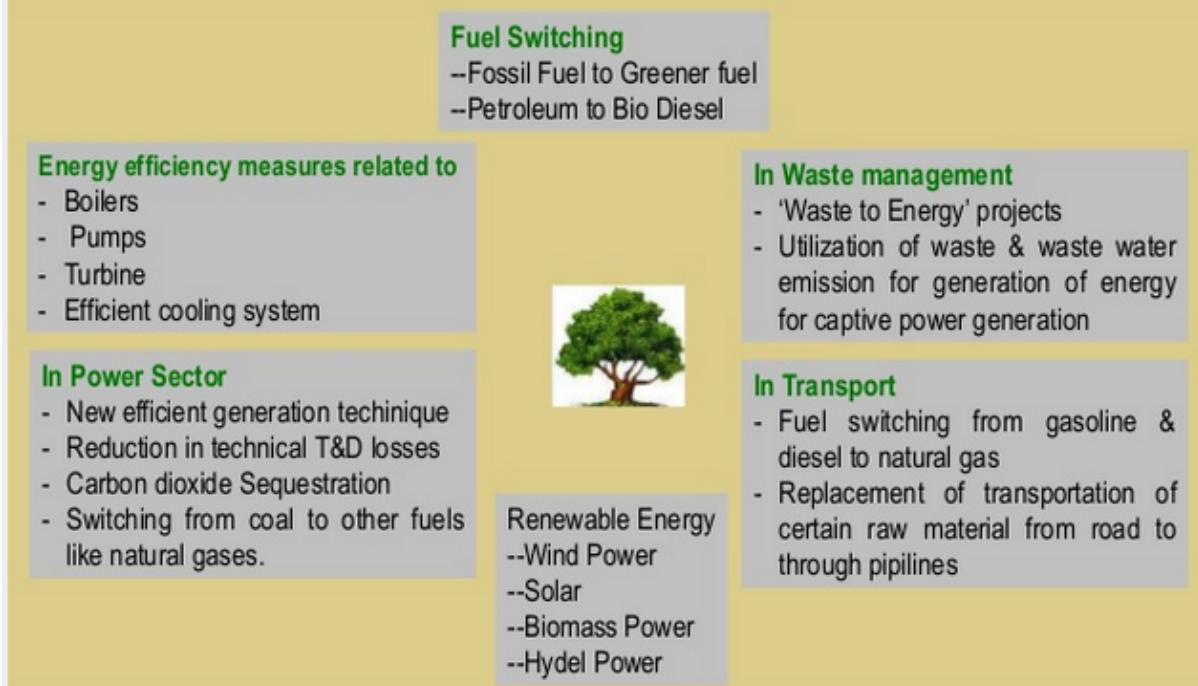
Annex B: A list in the Kyoto Protocol of 38 countries plus the European Community that agreed to QELRCs (emission targets), along with the Quantified Emission Limitation and Reduction Commitment (QELRCs) they accepted. The list is nearly identical to the Annex I Parties listed in the Convention except that it does not include Belarus or Turkey.

Two main goals of CDM

- i. To assist countries **without emissions targets (i.e developing countries)** in achieving sustainable development.
- ii. To help those countries **with emission reduction targets under Kyoto (i.e developed countries)** in achieving compliance by allowing them to purchase offsets created by CDM projects.

Where CDM will be applicable?

Where is CDM applicable ????..



Operating details of the CDM

- A CDM project must provide emission reductions that are additional to what would otherwise have occurred. The projects must qualify through a rigorous and public registration and issuance process. Approval is given by the Designated National Authorities. Public funding for CDM project activities must not result in the diversion of official development assistance.
- The mechanism is overseen by the CDM Executive Board, answerable ultimately to the countries that have ratified the Kyoto Protocol.
- Operational since the beginning of 2006, the mechanism has already registered more than 1,650 projects and is anticipated to **produce Certified Emission Reductions (CERs) amounting to more than 2.9 billion tonnes of CO₂ equivalent in the first commitment period of the Kyoto Protocol, 2008–2012**

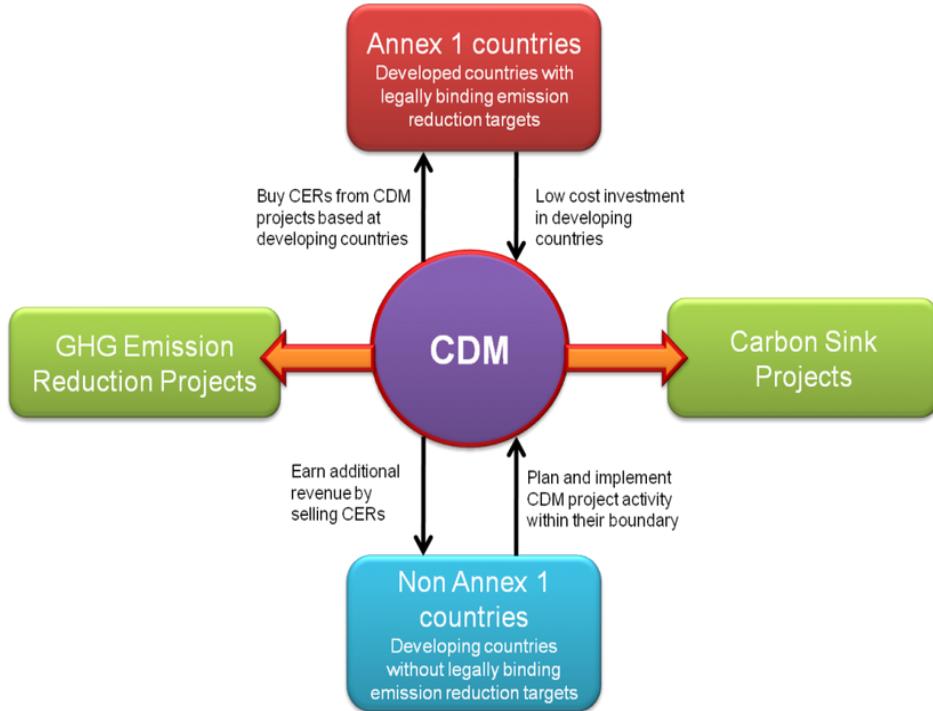


Fig: CDM Mechanism

Article 6 lay the foundation of a new mechanism different from JI and CDM

CDM and Joint Implementation [JI]were created to reach countries' commitments of GHG emission reduction. CDM allows developed countries to generate certified emission reduction (CER) emitted thanks to a mitigation project in developing countries. JI is very similar but includes mitigation outcomes transfers between Annex I countries.

CDM PROJECT CYCLE

The Designated National Authority in India is the National Clean Development Mechanism Authority (NCDMA). The Chairperson of the NCDMA is the Secretary of Environment and Forests. The NCDMA meets once per month to review project proposals, evaluating them on the probability of success and the extent to which they meet sustainable development objectives

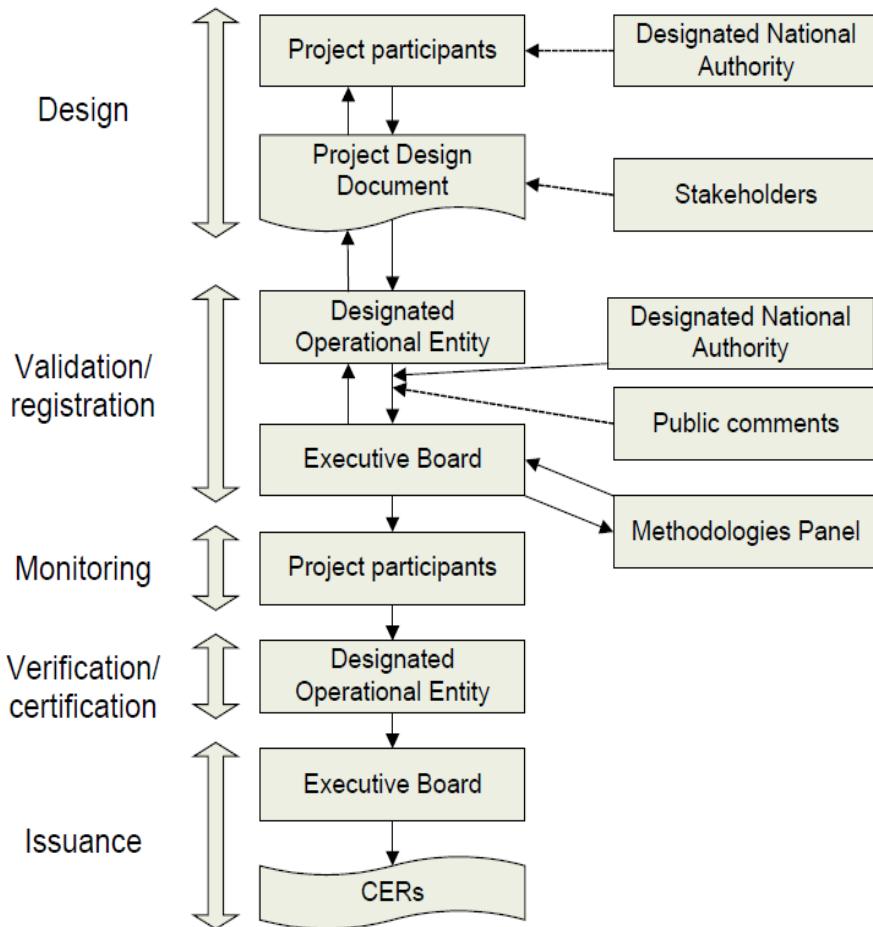


Fig: Project cycle of CDM

CDM Benefits for industrialized and developing countries.

CDM benefits for industrialized and developing countries

- Industrialized Countries
 - CDM emission reductions count towards the GHG emissions targets of the Kyoto Protocol.
 - Lower cost for GHG emissions reductions in developing countries than in industrialized countries.
 - Opportunities to market new technologies in developing countries.

- Developing countries
 - CDM projects generate sustainable development benefits (for example sustainable energy and poverty reduction).
 - Transfer of technologies to achieve sustainable development
 - Additional financial assistance for sustainable development

Disadvantages of CDM

- Concerns have also been raised regarding the conduct of project owners, with certain CDM projects implicated in land rights issues and human rights abuses.
 - Meanwhile, the geographical distribution of CDM projects, over 80% of which originate in China and India, calls into question the ability of the CDM to drive broad engagement with sustainable development across developing countries.
 - What's more, critics would suggest a more fundamental flaw in the CDM is that it is impossible to prove the 'additionality' of a project in comparison to a hypothetical baseline.
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S9: TOPIC

SLO 1: UNFCCC and India

SLO 2: MONTREAL PROTOCOL

SLO 1: UNFCCC and India

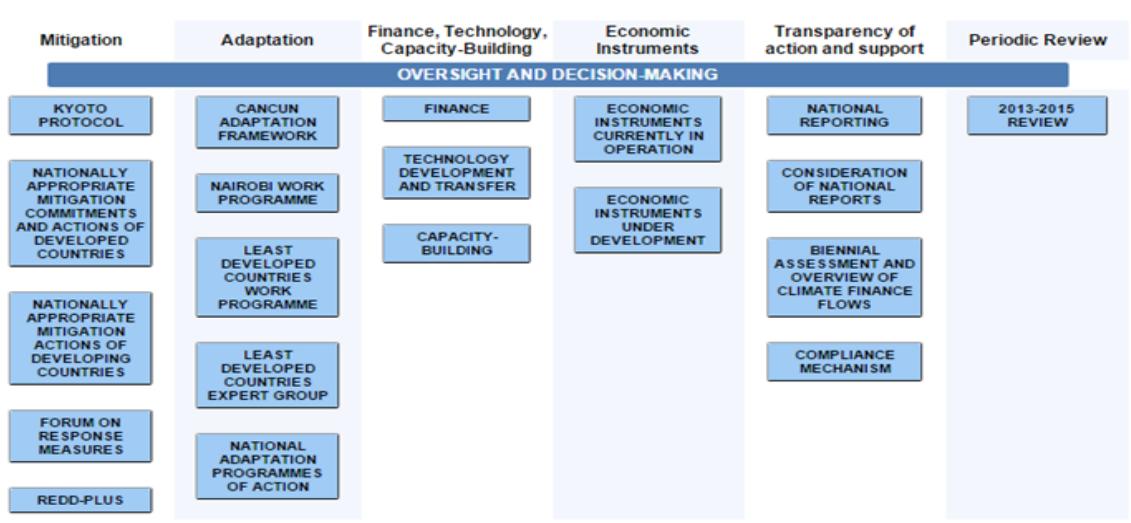
The UNFCCC [**United Nations Framework Convention on Climate Change**] is a framework Convention which aims to limit the level of climate change. The UNFCCC is a framework Convention which focuses on promoting cooperation by means of systematic observations, research and information exchange on the effects of human activities on climate, and adopting legislative or administrative measures against activities likely to have adverse effects. Climate change is a complex problem, which, although environmental in nature, has consequences for all spheres of existence on our planet. It either impacts on or is impacted by global issues, including poverty, economic development, population growth, sustainable development and resource management. The (**UNFCCC**) is an international environmental treaty negotiated at the Earth Summit in Rio de Janeiro from 3 to 14 June 1992, then entered into force on 21 March 1994.

The main objective of UNFCCC is to "**stabilize greenhouse gas concentrations in the atmosphere** at a level that would prevent dangerous anthropogenic interference with the climate system One of the first tasks set by the UNFCCC was for signatory nations to establish national greenhouse gas inventories of greenhouse gas (GHG) emissions and removals, which were used to create the 1990 benchmark levels for accession of Annex I countries to the Kyoto Protocol and for the commitment of those countries to GHG reductions.

UNFCCC Members

- 1) Annex 1 countries** Developed Nations and Nations with Economies in Transition (EIT)
- 2) Annex II Countries** These are Annex I countries without the countries with Economies in Transition (EIT).
- 3) Non-annex I countries** Developing countries

Action of UNFCCC



The UNFCCC secretariat supports all institutions involved in the international climate change negotiations, particularly the **Conference of the Parties (COP)**, the Conference of the Parties serving as the **meeting of the Parties (MOP)**. The question of what happens beyond 2020 was answered by Parties in Durban in 2011.

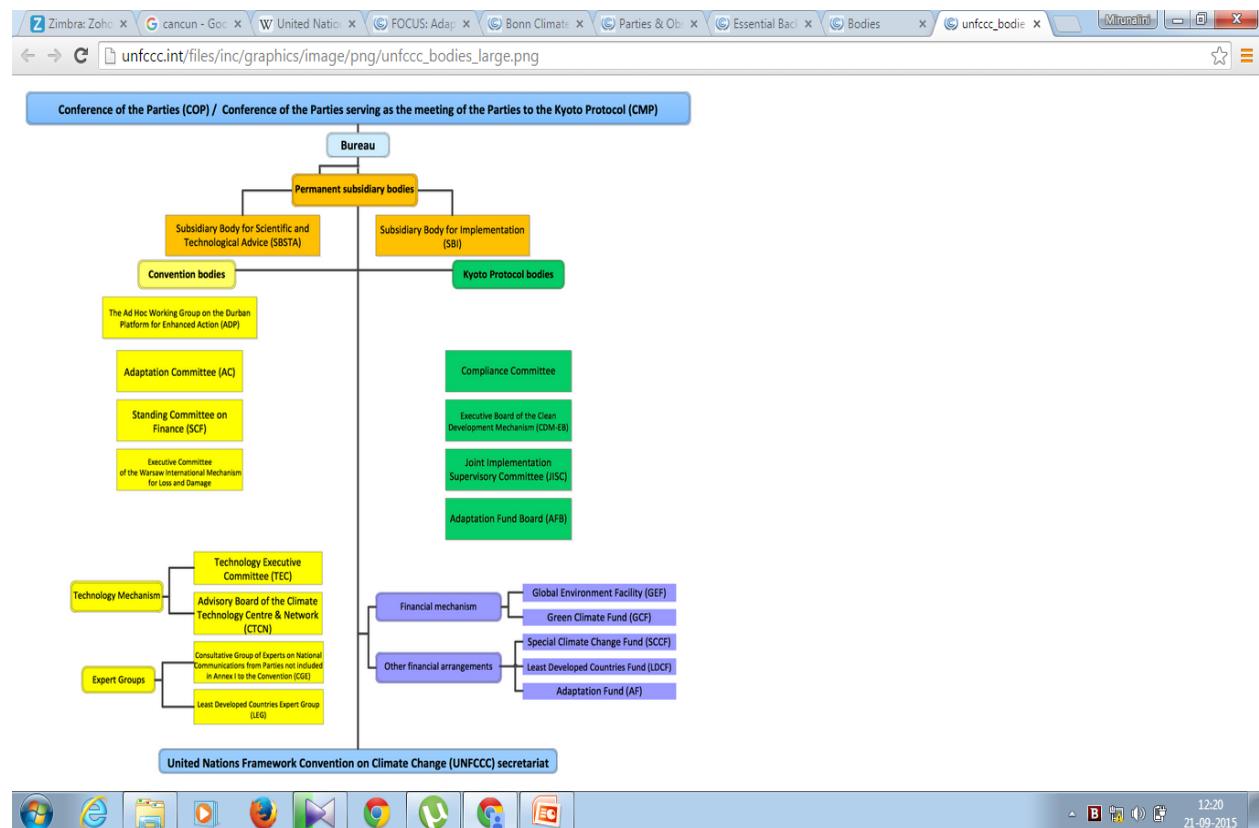
At the very heart of the response to climate change, however, lies the need to reduce emissions. In 2010, governments agreed that emissions need to be reduced so that global temperature increases are limited to below 2 degrees Celsius.

In 1992, countries joined an international treaty, the United Nations Framework Convention on Climate Change, to cooperatively consider what they could do to limit average global temperature increases and the resulting climate change, and to cope with whatever impacts were, by then, inevitable.

By 1995, countries realized that emission reductions provisions in the Convention were inadequate. They launched negotiations to strengthen the global response to climate change, and, two years later, adopted the Kyoto Protocol. The Kyoto Protocol legally binds developed countries to emission reduction targets. The Protocol's first commitment period started in 2008 and ended in 2012. The second commitment period began on 1 January 2013 and will end in 2020.

There are now

**195 Parties to the Convention and
192 Parties to the Kyoto Protocol.**



S9 : SLO 2: MONTREAL PROTOCOL

- 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 designed to protect the ozone layer by phasing out the production of numerous substances that are responsible for ozone depletion.
- It was developed under the management of **UNEP | United Nations Environment Programme** on **16 September 1987**, and entered into force on **1 January 1989**, followed by a first meeting in Helsinki, May 1989. Since then, it has undergone eight revisions, in 1990 (London), 1991 (Nairobi), 1992 (Copenhagen), 1993 (Bangkok), 1995 (Vienna), 1997 (Montreal), 1998 (Australia), 1999 (Beijing) and 2007 (Montreal).
- The **Montreal Protocol and Vienna convention frame work aggreement from which protocol was born were the first global aggreements to protect the earth's atmosphere.**
- International treaty ratified in 1987 in which 180 signatory nations agrred to **restrict production of chlorofluorocarbon [CFC]** inorder to forestall stratospheric ozone depeltion. Because of its effectiveness in **decreasing global CFC emissions**, the **Montreal protocol is considered the most successful effort to date in addressing a global environment problem.**
- As a result of the international agreement, the ozone hole in Antarctica is slowly recovering. Climate projections indicate that the ozone layer will return to 1980 levels between 2050 and 2070.
- Due to its widespread adoption and implementation it has been hailed as an example of exceptional international co-operation, the single most successful international agreement to date has been the Montreal Protocol".
- In comparison, effective burden sharing and solution proposals mitigating regional conflicts of interest have been among the success factors for the Ozone depletion challenge, **where global regulation based on the Kyoto Protocol has failed to do so.**
- In case of the **ozone depletion** challenge, there was global regulation already being installed before a scientific consensus was established. As well in comparison, lay people and public opinion were more convinced about possible imminent risks.

- The two ozone treaties have been ratified by **197 parties**, which includes 196 states and the European Union, making them the first universally ratified treaties in United Nations history.

Terms and purposes

- The treaty is structured around several groups of halogenated hydrocarbons that have been shown to play a role in ozone depletion.
- All of these ozone depleting substances contain either chlorine or bromine (substances containing only fluorine do not harm the ozone layer).
- For each group, the treaty provides a timetable on which the production of those substances must be shot out and eventually eliminated.

Scope of Protocol

The Montreal Protocol is an international agreement adopted in 1987 to control the production and consumption of specific man-made chemicals that destroy the ozone layer, the earth's protective shield. An agreement /mechanism to reduce and eliminate the production and consumption of ODS Developed and developing countries have different phase out schedules

INDIA'S COMMITMENT TO THE MONTREAL PROTOCOL

- i. 19th June 1991 : India became a Party to the Vienna convention.
- ii. 17th September 1992 : India became a Party to the Montreal Protocol and ratified the London Amendment.
- iii. 3rd March 2003 : India ratified Copenhagen Amendment (1992), Montreal Amendment (1997) and Beijing Amendment (1999).
- iv. November 1993 : India's Country Programme was prepared.
- v. January 2006 : India's Country Programme was updated.

MONTREAL PROTOCOL – Prevention of OZONE Depletion

The Montreal Protocol is designed to protect the ozone layer by phasing out the production of **ODS (Ozone Depleting Substances)**, Chemicals that potentially deplete the ozone layer.

Gases considered in terms of **Ozone Depletion Potential (ODP)**:

The ODP is based on the **amount of chlorine** which is released by the refrigerant as it degrades.

Reference ODP is for CFC R11 (also known as Freon-11, CFC-11, or R-11) which is taken as 1.

Most of refrigerants are strong GHG emissions and thus limitation of ODS will help climate change as well.

Without the Montreal Protocol by 2050

Ozone depletion would have reached to at least 50 % in the northern hemisphere's mid latitudes 70% in the southern mid latitudes.

Doubling on the UV-B radiation reaching earth's surface.

Estimated increases of 19 million more cases of non-melanoma cancer 1.5 million more cases of melanoma cancer 130 million more eye cataracts

Montreal Protocol

• Signed	16 September 1987
• Location	Montreal
• Effective ratified by then	1 January 1989 if 11 states have ratification by 20 states
• Condition	46
• Signatories	197 (all United Nations members, as well as Niue, the Cook Islands, the Holy See and the European Union)
• Ratifiers	Secretary-General of the United Nations
• Languages	Arabic, Chinese, English, French, Russian and Spanish.

Results to date

- The Montreal Protocol is working.
There is clear evidence of a decrease in the atmospheric burden of ozone-depleting substances in the lower atmosphere and in the stratosphere;
- Some early signs of the expected stratospheric ozone recovery are also evident.
- Furthermore, if the Parties were to eliminate all emissions of ozone depleting substances soon after 2006, it would advance by about 15 years (from around 2050 to 2035) the global ozone layer recovery to pre-1980 levels

