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

- Energy efficiency
- Greater use of renewable energy
- Electrification of industrial processes
- Efficient transport (electric public transport, bicycles, etc.)
- Carbon tax and emissions markets

ADAPTATION

Actions to reduce vulnerability to climate change

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

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

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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

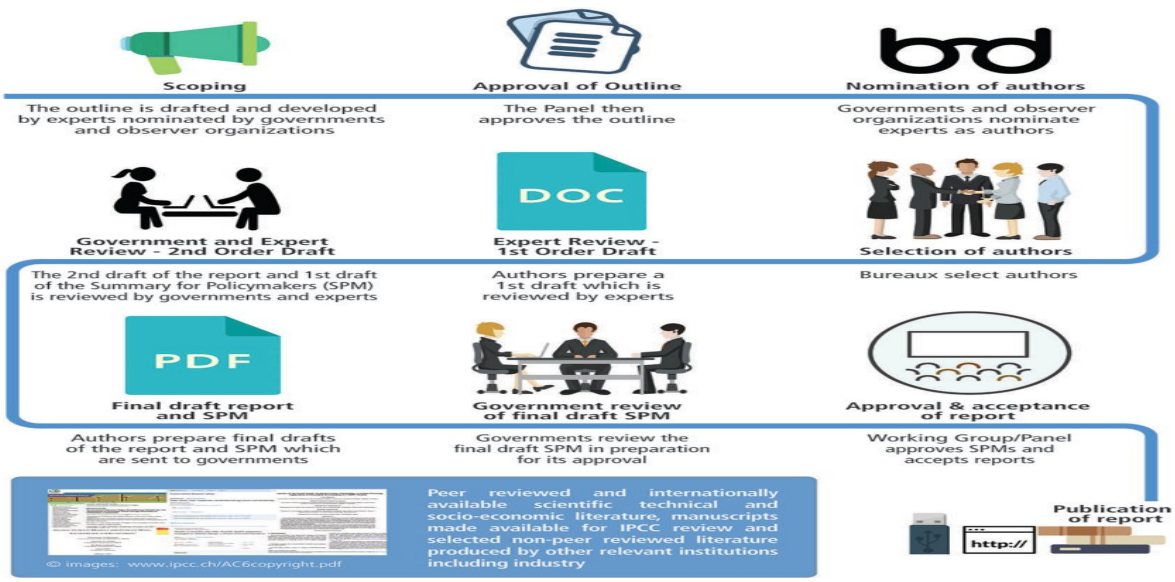
Assessment Reports consist of contributions from each Working Group and a Synthesis Report integrating these contributions and any Special Reports prepared in that assessment cycle. The IPCC also produces Special Reports on specific issues agreed by its member governments and Methodology Reports that 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 the 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:** CO_2, 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: ...**CO_2 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.