Topic A2. Wetlands in the IPCC processes
• In this module we will learn what IPCC is, how it is formed and structured, and how it works.
• We will also learn what kind of report it produces and the process it takes.
• More specifically, we will see how wetlands have been part of the product as IPCC evolves over time.
• The Intergovernmental Panel on Climate Change (IPCC) was established by the World Meteorological Organization (WMO) and UN Environment Programme (UNEP) in 1988 and is open to all member countries of the UN.
• IPCC does not conduct research but it carries out assessment, analysis and synthesis of published literature, from which policy makers will receive rigorous and balance scientific information.
• IPCC reports are policy relevant and policy neutral; they are not policy prescriptive.
• After more than 20 years, IPCC work was recognized widely and awarded a prestigious Nobel Peace Prize in 2007.
• IPCC is organized in three working groups, which work on:
  • the science of climate change (WGI);
  • climate change impact, adaptation and vulnerability (WG II); and
  • mitigation of climate change (WG II).
• In addition, IPCC is equipped with a task force which is dedicated to develop guidelines for national greenhouse gas inventories.
• All activities are governed by the IPCC Bureau which meets regularly in plenaries to agree on the plan and approve the work executed by the IPCC Executive Committee, who work with every group.
• The secretariat is hosted in UNEP or WMO headquarters in Geneva.
There are three types of IPCC reports:

- Assessment reports
- Special reports
- Guidelines or guidances.
Since 1990, there have been five assessment reports delivered by the IPCC with an interval of 5 to 6 years between reports. Assessment reports reflect the state of our current understanding with regard to climate change.
In assessing scientific literature, Working Group I is tasked to reconstruct the trends of greenhouse gas concentrations and their warming implication for the earth’s atmosphere. Among the primary gases are: carbon dioxide (CO₂), methane (CH₄) and
nitrous oxide (N$_2$O).

• Modelling is performed to make projections.

• Working Group I also provides key findings and provides information on the level of uncertainty related to the projections.
• Working Group 2, however, is less technical as it usually describes the impacts of increasing temperature on various sectors, including water, ecosystems, food, coasts and health qualitatively.

• Responding to climate
change will then depend on each sector’s adaptive capacity and key vulnerability issues.

• The sectors and regions affected are provided with information associated with particular numbers. For example, coastal wetlands will experience damages due to floods and storms. Globally 30% of coastal wetlands will be lost and millions of people will be affected.
Working Group 3 focuses on the actions to mitigate climate change and provides economic analyses, including cost/benefit ratios, and policy measures and instruments needed to intervene to mitigate the effects of climate change.
• There have been several special reports produced by the IPCC.
• These are usually delivered based on the request of Parties to the UN Framework Convention on Climate Change (UNFCCC) through the Subsidiary Body for Technical Advice (SBSTA).
• Among the special reports are:
  • emission scenarios (SRES)
  • land use, land-use change and forestry (LULUCF), and
  • carbon dioxide capture and storage (CCS)
IPCC guidelines are a series of methods to conduct an inventory of greenhouse gas emissions by sector such as energy; transport; buildings; industry; agriculture, forestry and other land-use (AFOLU); and waste management.
Over a 20-year period, IPCC guidelines have evolved considerably.

- IPCC guidance on agriculture and land-use changed from a process-based categorization in the 1996 IPCC Guidelines to a land-use based categorization introduced in the 2003 IPCC GPG-LULUCF.

- 2006 IPCC Guidelines sought to remove inconsistencies and double counting issues by integration of agriculture and land-use categories.

- 2006 IPCC Guidelines have progressively included better estimation methods, default parameters and new and improved guidance on more source/sink categories, while maintaining consistency and similarity of the approach throughout.

- The wetlands category received attention in 2013 by including a supplement to these ecosystems.
• As a land-use based methodology, 1996 Guidelines separates agriculture from land-use change and forestry (LUCF).
• It is focused on the most important activities resulting in greenhouse gas emissions or removals.
• Land-use change and forestry (LUCF) includes changes in forest and other woody biomass stocks, forest and grassland conversion, abandonment of managed lands, CO₂ emissions and removal from soil.
• Agriculture includes enteric fermentation, manure management, rice cultivation, agricultural soils, prescribed burning of savannas, and field burning of agricultural residues.
• The initial 2000 IPCC **Good Practice Guidelines or GPG** did not include the land-use sector.
• **2003 IPCC GPG LULUCF** introduces the change of agriculture and land use changed from a process-based categorization (in the **1996 IPCC Guidelines**) to a land-use based categorization.
• However, the emission reporting still followed the initial design and steps.
The main features of the 2006 IPCC Guidelines include:
• the integration of agriculture and LUCF/LULUCF sectors into ‘Agriculture Forestry and Land Use’ (AFOLU) to remove inconsistencies and double counting;
• managed land as a proxy for anthropogenic emissions;
• inclusion and consolidation of several previously optional categories (e.g. nitrous oxide emissions from peatlands, carbon stocks in settlements);
• guidance on Harvested Wood Products (HWP);
• Refinement of methods and improved defaults.
Greenhouse gas inventory: Agriculture, forestry and other land use (AFOLU)

- **Forest land**: All woody vegetation according to national definitions
- **Cropland**: Crops including rice and agroforestry not included above
- **Grassland**: All rangelands and pastures not included above
- **Settlements**
- **Wetlands**: Wetlands not included above (pastures and flooded lands)
- **Other Lands**: Includes bare soil, rock, ice and lands not included above
• To estimate greenhouse gas emissions, we need two main pieces of information: emission factor (EF) and activity data (AD).
• The development of emission factors uses two approaches:
  • a stock-change approach as shown in the left-hand panel;
  • A flux-difference approach as shown in the right-hand panel.
• The first approach is cost-effective and therefore, widely adopted.
To obtain activity data we need to track the change (in area) of land use using, for example, a matrix as shown here, with initial land use listed in the columns (up and down) and final land use listed (across) in the rows.
IPCC Guidelines mentioned three possible levels of complexity of approaches for methodological tiers:

**Tier 1:** A simple first order approach that uses spatially coarse default data based on globally available data characterized by large uncertainties and sometimes with methods involving several simplifying assumptions;

**Tier 2:** A more accurate approach substituting country or region specific values for the general defaults and more disaggregated activity data characterized by relatively smaller uncertainties;

**Tier 3:** Higher order methods involving detailed modeling and/or inventory measurement systems driven by data at a greater resolution that provide estimates with lower uncertainties than the previous two methods.
greater resolution.
The reported total emissions from land use is a product of activity data (hectares per year) and emission factor (tonnes of carbon per hectare).
• As a reporting category, wetlands include any land that is covered or saturated by water for all or part of the year.
• To date, the guidance is restricted to managed wetlands where the water table is artificially changed or wetlands are created through human activity (for example, damming a river and creating reservoirs).
• Therefore, emissions from unmanaged ecosystems such as natural wetlands, rivers and lakes are not reported.
• Wetland guidance is spread across different land uses (organic soils) regardless of the sub-categories that may exist.
• As shown in the table which summarizes emissions from managed wetlands, there is a limited methodology or no guidance to address emissions from wetlands which remain wetlands or other lands converted to wetlands.

• When they are available, they must follow the categories adopted in the different land-use categories.
• The IPCC produced the 2013 supplement to 2006 Guidelines; the methodologies are more specific, encompassing various land-use activities for wetlands.

• Chapters 2, 3 and 4 are particularly interesting because they are related to tropical peatlands and mangroves ecosystems.

• Countries are encouraged to use these methodologies, including the compiled emission factors and activity data, in the next round of reporting.
Summary

- Methodologies to estimate greenhouse gas emissions from wetlands have gone through various processes and improvements.
- The needs for capacity building and research on tropical wetlands are huge, especially in relation to Chapters 2, 3 and 4.
- Estimating emission factors and tallying activity data in a systematic way is key to reducing uncertainties.
- Science plays a key role in generating knowledge and improving methodologies.
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Science plays a key role in generating knowledge and improving methodologies.
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