IPCC Task Force on Inventories and IPCC Guidelines on AFOLU

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Outline

• Introduction
• IPCC Task Force on GHG Inventories
• IPCC Guidelines for national greenhouse gas inventories
  – The KP Supplement and Wetlands Supplement
• IPCC TFI products supporting the IPCC Guidelines
• Agriculture and land use in the IPCC Guidelines
• Summary
IPCC Task Force on National Greenhouse Gas Inventories
IPCC Task Force On National GHG Inventories (TFI)

- The IPCC National Greenhouse Gas Inventories Programme was managed from 1991 by the IPCC WG I in collaboration with the Organisation for Economic Co-operation and Development (OECD) and the International Energy Agency (IEA) until the setting up of the IPCC TFI.

- In 1998, IPCC TFI was set up as an independent component of the IPCC with its Technical Support Unit based in Japan and supported by the Government of Japan.
Objectives of IPCC TFI

- To develop and refine internationally-agreed methodologies and software for the estimation and reporting of national GHG emissions and removals; and

- To encourage the widespread use of these methodologies by countries participating in the IPCC and by Parties to the UNFCCC.

  - The IPCC TFI is responsible for assessing and developing inventory methods and practices which are scientifically sound and relevant to all countries, noting particularly the lack of information in developing countries.
IPCC Guidelines provide internationally agreed and harmonized methodologies for estimating and reporting national greenhouse gas inventories. They are periodically revised to improve the methodologies taking account of advances in scientific and technological knowledge as well as needs of international society.
Revised 1996 IPCC Guidelines

- The earliest set of IPCC Guidelines still being used by the Parties to the UNFCCC
- Contain guidance on 6 sectors:
  - Energy
  - Industrial Processes
  - Solvent and Other Product Use
  - Agriculture
  - Land Use Change and Forestry (LUCF)
  - Waste
- LUCF sector addressed only the most important land-use activities resulting in emissions/removals.
• Updated and complemented earlier guidelines while providing the concept of good practice

• Good practice Inventories are: “those that contain neither over- nor under-estimates so far as can be judged, and in which uncertainties are reduced as far as is practical.”

• Good practice inventories are Transparent, Accurate, Complete, Consistent, Comparable, and efficient in resource-use.

• Managed land is used in these guidelines as a proxy for identifying anthropogenic emissions by sources and removals by sinks.
  – Use of managed land as a proxy for anthropogenic effects was introduced in the GPG-LULUCF and is consistent with the Revised 1996 IPCC Guidelines.

• GPG-LULUCF Introduced comprehensive coverage of all land by dividing into 6 land-use categories.
2006 IPCC Guidelines

- Updated and expanded earlier guidelines while maintaining consistency

- Restructured main categories and sub-sectors to clarify and simplify inventories and to reduce chance of double-counting:
  - Agriculture + LULUCF $\rightarrow$ AFOLU
  - Industrial Processes + Solvent Use $\rightarrow$ IPPU

- Integrate good practice guidance for clarity and ease-of-use:
  - Require similar resources to implement as the 1996 IPCC Guidelines plus the two volumes of GPG
  - Does not pre-empt accounting choices - all the information needed is retained

- Include:
  - updated default values and methods
  - methods for additional categories and direct greenhouse gases

- The best globally applicable methods reflecting latest science
2006 IPCC Guidelines (2)

- Overview
- Vol 1: General Guidance and Reporting
- Vol 2: Energy
- Vol 3: Industrial Processes and Product Use (IPPU)
- Vol 4: Agriculture, Forestry and Other Land Use (AFOLU)
- Vol 5: Waste
Currently, all the Parties use these under the UNFCCC and the Kyoto Protocol.

Annex I Parties shall use GPG. Non-Annex I Parties are encouraged to use GPG.

1995 IPCC Guidelines

Revised 1996 IPCC Guidelines

GPG2000 (non-LULUCF)  GPG2003 (LULUCF)

Annex I Parties must use from 2015

2006 IPCC Guidelines

Revision/Update by the IPCC
The 2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol (KP Supplement) provides supplementary methods and good practice guidance for estimating and reporting anthropogenic greenhouse gas (GHG) emissions and removals resulting from LULUCF activities under Article 3.3 and Article 3.4 of the Kyoto Protocol for the second commitment period, 2013-2020. Supplementary methods are additional guidance to produce the supplementary information needed in greenhouse gas inventories to meet the LULUCF rules for the Kyoto Protocol.
Background

- Chapter 4 of IPCC GPG LULUCF provides the supplementary methods and good practice guidance for reporting of LULUCF activities under Article 3.3 and 3.4 of the Kyoto Protocol for the first commitment period.

- The UNFCCC CMP7 invited the IPCC “...to review and, if necessary, update supplementary methodologies for estimating anthropogenic greenhouse gas emissions by sources and removals by sinks resulting from land use, land-use change and forestry (LULUCF) activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol (KP), related to the annex to 2/CMP.7, on the basis of, inter alia, Chapter 4 of IPCC’s 2003 Good Practice Guidance for Land-use, Land-use Change and Forestry.”
Production of the **KP Supplement**

35th Session of the IPCC (Jun 2012): Proposal approved by the IPCC Plenary

- IPCC invitation for nominations (Jun 2012)
- Selection of Authors/REs by TFB (Aug 2012)
  - 1st Lead Author Meeting, Japan (Sep 2012): To develop Zero Order Draft (ZOD)


- 3rd Lead Author Meeting Norway (Mar 2013): To consider comments and develop Second Order Draft (SOD)
- Expert Review (Jan Feb 2013)
  - 2nd Lead Author Meeting, Australia (Nov 2012): To develop First Order Draft (FOD)

4th Lead Author Meeting, Thailand (Jul 2013): To consider comments and prepare Final Draft

- Distribution of Final Draft to Governments (Sep 2013)
- Adoption/acceptance of the **KP Supplement**, Georgia (Oct 2013)
  - Publication (Feb 2014)
Reasons for Revision of Chapter 4 of the GPG-LULUCF

- New rules for accounting of FM
- Mandatory accounting of HWP
- Other consequential changes
- 2006 IPCC Guidelines
- New rules for natural disturbances of ARD and FM activities
- Wetland Drainage and Rewetting as an elected activity under Art. 3.4
- New rules for harvest and conversion of forest plantations to non-forest
The structure and content of the KP Supplement

Overview Chapter

Chapter 1: Introduction

Chapter 2: Methods for estimation, measurement, monitoring and reporting of LULUCF activities under Articles 3.3 and 3.4

Broadly maintains the structure and general content of Chapter 4 in GPG-LULUCF, while incorporating some important changes as mandated by Decision 2/CMP.7 and other COP/CMP decisions.

Also contains Glossary, List of Abbreviations & Annex 2A.1: Reporting Tables
Wetlands Supplement

• The 2013 Supplement to the 2006 IPCC Guide-lines for National Greenhouse Gas Inventories: Wetlands (Wetlands Supplement) extends the content of the 2006 IPCC Guidelines by filling gaps in coverage and providing updated information reflecting scientific advances, including updating emission factors.

• It covers inland organic soils and wetlands on mineral soils, coastal wetlands including mangrove forests, tidal marshes and seagrass meadows and constructed wetlands for wastewater treatment.

• The coverage of the 2006 IPCC Guidelines on wetlands was restricted to peatlands drained and managed for peat extraction, conversion to flooded lands, and limited guidance for drained organic soils.
Background

• At its 33rd Session (December 2010 in Cancun), SBSTA invited the IPCC:

  To undertake further methodological work on wetlands, focusing on the rewetting and restoration of peatland, with a view to filling in the gaps in the 2006 IPCC Guidelines in these areas and to complete this work for the thirty-ninth session of the SBSTA.

• At its 33rd Session (May 2011 in Abu Dhabi), IPCC decided to produce the 2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands (Wetlands Supplement)
Production of the *Wetlands Supplement*

1. **IPCC Approves Outline**
2. **Governments, Organisations nominate experts**
3. **Bureau selects authors (CLA, LA and RE)**
4. **Authors draft first order draft, LA 1 & LA2**

**Authors Prepare Final Draft, LA4**

**Expert & Government Review**

**Authors prepare Second Order Draft, LA3**

**Expert Review**

**Final Distribution and Government Review**

**IPCC adopts Overview Chapter and accepts Report (Oct 2013)**

**Publication (Feb 2014)**
Structure of the Wetlands Supplement

2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands

- Methodological Guidance on Lands with Wet and Drained Soils, and Constructed Wetlands for Wastewater Treatment

- Overview Chapter
- Glossary
- Chapter 1: Introduction
- Chapter 2: Drained Inland Organic Soils
- Chapter 3: Rewetted Organic Soils
- Chapter 4: Coastal Wetlands
- Chapter 5: Inland Wetland Mineral Soils
- Chapter 6: Constructed Wetlands for Wastewater Treatment
- Chapter 7: Cross-cutting Issues and Reporting

List of CLAs, LAs, CAs, REs and reviewers
IPCC TFI Tools Supporting IPCC Guidelines
Emission Factor Database (EFDB)

- Emission Factor Database (EFDB)
  - Library of a wide range of well-documented emission factors and other parameters to help users (inventory compilers) select those that best reflect their national circumstances
  - Supplements all the IPCC Guidelines/GPG
  - Available through the internet and in the form of CD-ROM
  - Efforts being continuously made to get a wider range of EFs (expert meetings for data collection, literature search, etc.)
  - Open to relevant data proposals — **New proposals welcomed!!**
    - New data will be evaluated for acceptance by EFDB Editorial Board.

http://www.ipcc-nggip.iges.or.jp/EFDB/
Find EF - Search criteria

Click [here](#) for online help.

IPCC Guidelines version: [2006](#) OK

**IPCC Source/Sink Category**
- Root -> Waste (4) -> Wastewater Treatment and Discharge (4.D)
  - 4.D.1: Domestic Wastewater Treatment and Discharge
  - 4.D.2: Industrial Wastewater Treatment and Discharge

**Gases**
- CO₂, CH₄ & N₂O

<table>
<thead>
<tr>
<th>Gas name</th>
<th>Formula</th>
<th>Select gas</th>
</tr>
</thead>
<tbody>
<tr>
<td>CARBON DIOXIDE</td>
<td>CO₂</td>
<td></td>
</tr>
<tr>
<td>METHANE</td>
<td>CH₄</td>
<td>✓</td>
</tr>
<tr>
<td>NITROUS OXIDE</td>
<td>N₂O</td>
<td>✓</td>
</tr>
</tbody>
</table>

Status of search
- IPCC 2006 Source/Sink Category: Waste (4) -> Wastewater Treatment and Discharge (4.D) -> Domestic Wastewater Treatment and Discharge (4.D.1)
- Gases: CH₄, N₂O
- Number of emission factors covered by your criteria: 129

Results can be exported in excel format
IPCC Inventory Software

- The latest version was released on 28 Nov 2013.
- It implements the 2006 IPCC Guidelines, but it can also be used for reporting under the Revised 1996 IPCC Guidelines.
  - Countries can use the improved methods and updated default data.
- It can be used for the whole inventory or individual categories.
- It includes Uncertainty & Key Category Analysis and aids QA/QC
- Will output in Non-Annex I National Communications format
- It improves on earlier software.
  - It is stand-alone – does not depend on specific versions of MS Windows or MS Office.
  - Does not require internet access or expensive hardware

http://www.ipcc-nggip.iges.or.jp/software/index.html
Hierarchical list of categories

Category selected: Energy

Data Entry

Worksheet-based calculations follow 2006 Guidelines

Time Series Display

Main menu
FAQ Website

• Answers to Frequently Asked Questions (FAQs) such as:
  ▪ Q1-3-2: “What is the difference between accuracy and precision? Does uncertainty assessment relate to both?”
  ▪ Q2-10: “According to the IPCC Guidelines CO₂ Emissions from the combustion of biomass are reported as zero in the Energy sector. Do the IPCC Guidelines consider biomass used for energy to be carbon neutral?”

❖ Continuously updated

http://www.ipcc-nggip.iges.or.jp/faq/faq.html
Expert Meetings

- Meant to support users of the IPCC Guidelines through expert meetings addressing various topics of interest, e.g.:
  - Revisiting the Use of Managed Land as a Proxy for Estimating National Anthropogenic Emissions and Removals
    (São Paulo, Brazil, 5-7 May 2009)
  - Uncertainty and Validation of Emission Inventories
    (Utrecht, the Netherlands, 23-25 March 2010)
  - Use of Facility and Project Information in National Inventories
    (Wellington, New Zealand, 18-20 July 2011)
  - Role of Remote Sensing in Forest and National GHG Inventories
    (Hayama, Japan, 23-25 October 2012)
  - Fugitive Emissions of GHGs from Oil and Natural Gas Systems
    (Washington D.C., USA, 20-22 August 2013)

- Meeting reports are available at:
  http://www.ipcc-nggip.iges.or.jp/meeting/meeting.html
Agriculture and Land Use in the IPCC Guidelines
Introduction

• Changes due to land use change and management of the biosphere have a significant influence on the greenhouse gas concentrations in the atmosphere.

• Processes accounting for emissions and removals in the biosphere are: photosynthesis, respiration, decomposition, nitrification/de-nitrification, enteric fermentation, and combustion that are driven by the biological activity and physical processes.

• Agriculture and land-use emissions and removals account for a very significant proportion of GHG emissions/removals in developing countries.
Terrestrial sources/sinks of GHGs

Photosynthesis

Oxidation

Methanogenesis

Methanogenesis

Oxidation

Nitrification & denitrification
A simple first order approach in the IPCC Guidelines

The IPCC Guidelines make two assumptions:

A) \( \text{C}_{\text{flux}} = \Delta \text{C}_{\text{stocks}} \)

B) Change in carbon stocks can be estimated from land use/change and management at various points in time, their impacts on carbon stocks and the biological response to them.
Estimating C stock changes

1. Carbon Stock in year 1 → Carbon Stock in Year 2
   - Difference between carbon stocks (Stock-Difference Method)

2. Land Use type
   - C uptake through Growth
   - Sum of gains and losses (Gain-Loss Method)
   - Disturbances
   - Harvest

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Evolution of IPCC Guidance on agriculture and land-use

1996 IPCC GLs
• Agriculture and Land Use and Change and Forestry (LUCF) separate sectors
• Only the most important activities resulting in GHG emissions/removals
• Implicit assumption about estimating emissions and removals only over lands subject to human intervention
• Only accounted for above-ground biomass and soil C pools

GPG & GPG-LULUCF
• Agriculture and Land Use, Land-use Change and Forestry (LULUCF) separate sectors
• Provides good practice and uncertainty management guidance
• Now includes all land use emissions/removals split into six land-use categories from all pools
• Explicit Use of managed land as a proxy for anthropogenic emissions/removals

2006 IPCC Guidelines
• Agriculture and Land Use and Change and Forestry (LUCF) combined into a single sector Agriculture, Forestry and Other Land Use (AFOLU)
• Same approach as GPG-LULUCF
• Retained use of managed land
• Inclusion and consolidation of several previously optional categories
• Refinement of methods and improved defaults
Summary

- IPCC Guidelines provide robust, internationally acceptable and comparable methodologies for estimation and reporting national GHG emissions/removals.
  - Inventory management and good practice are important to ensure the quality and credibility of GHG inventory estimates.
- IPCC TFI has also developed products (e.g., EFDB, IPCC Inventory Software) to support the users of the IPCC Guidelines.
- IPCC Guidelines are periodically revised and updated to improve the methodologies taking into account advances in scientific and technological knowledge as well as evolving international needs.
Thank you for your attention!!

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