Use of measurement data in national GHG inventories

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Introduction

- National GHG inventories: Estimates of anthropogenic emissions and removals of GHGs national territory and offshore areas over which the country has jurisdiction on an annual basis.
- National GHG inventories help understand the magnitude of the problem and are a key to policy development as well as reporting and monitoring progress towards targets.
- All Parties to the United Nations Framework Convention on Climate Change (UNFCCC) are obliged to prepare and submit their national GHG inventories.
  - Annex I Parties: Every year
  - Non-Annex I Parties: Every two years (Biennial Update Reports)
- In order to build mutual trust and confidence and to promote effective implementation of the Paris Agreement, an enhanced transparency framework for action is required and for that, good quality and credible national GHG inventory estimates are essential.

Paris Agreement and GHG Inventory Information

- Final Clauses of Paris Decision
  - 105. Also requests the secretariat, solely for the purposes of Article 21 of the Agreement, to make available on its website on the date of adoption of the Agreement as well as in the report of the Conference of the Parties at its twenty-first session, information on the most up-to-date total and per cent of greenhouse gas emissions communicated by Parties to the Convention in their national communications, greenhouse gas inventory reports, biennial reports or biennial update reports;

- Paris Agreement (Art. 13 para. 7)
  - Each Party shall regularly provide the following information:

  (a) A national inventory report of anthropogenic emissions by sources and removals by sinks of greenhouse gases, prepared using good practice methodologies accepted by the Intergovernmental Panel on Climate Change and agreed upon by the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement;

New Supplementary Guidance in 2013

IPCC Inventory Guidelines

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Non-Annex I Parties are encouraged to use GPGs.

Non-Annex I Parties should use 1996 Guidelines. (Annex to Decision 17/CP.8)

GPG2000 (non-LULUCF)

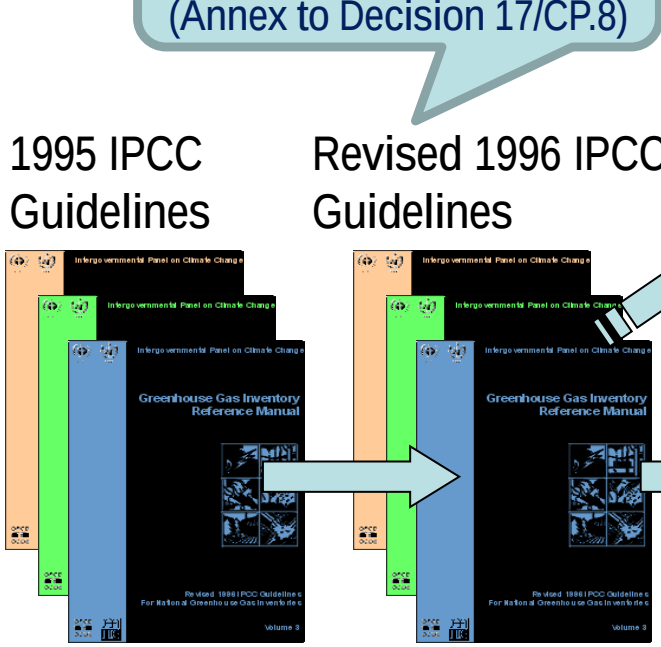
GPG2003 (LULUCF)

Annex I Parties must use from 2015

2006 IPCC Guidelines

1995 IPCC Guidelines

Revised 1996 IPCC Guidelines



Actually, 2006 Guidelines are being used by more and more Non-Annex I Parties.

Revision/Update by the IPCC

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2006 IPCC Guidelines

- Produced in 2006.
- Provide methodologies for estimating national inventories of anthropogenic emissions by sources and removals by sinks of greenhouse gases.
- May assist Parties in fulfilling their commitments under the UNFCCC on reporting on national GHG inventories.
- Consist of 5 volumes:
  - 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)
  - Vo.5: Waste

Use of measured data (particularly, satellite data) in 2006 IPCC Guidelines

- Use of satellite data (remotely sensed data) are referred to in the 2006 IPCC Guidelines for two different purposes.
  - For verification of emission/removal estimates
  - For collection of activity data for AFOLU Sector

- However, there is no detailed discussion or guidance on using remotely sensed data, its advantages and limitations.

Satellite Data in 2006 IPCC Guidelines

Verification

- Comparison with atmospheric measurements is one of the approaches to verification of emission/removal estimates.
- In this context, for example, use of inverse modelling with satellite-borne sensors for GHG concentration measurements is mentioned.
- However, it was considered not likely to be frequently applied as a verification tool of national inventories in the near future.

(Section 6.10.2, Chapter 6, Vol.1)

Satellite Data in 2006 IPCC Guidelines

Collection of activity data for AFOLU Sector

- Use of RS data (including satellite data) are explicitly referred to as a means to:
  - obtain, amongst other things, maps of land-use at regular intervals, estimates of changes in carbon stocks in above-ground biomass, and
  - assess areas and types of disturbances.
- However, detailed guidance is not provided in main chapters. Some guidance is provided only in an annex to Chapter 3 on consistent representation of lands.

(Section 3A.2.4, Annex 3A.2, Vol.4)

Expert Meeting on Uncertainty & Validation (March 2010)

- Expert Meeting on Uncertainty and Validation of Emission Inventories was held in March 2010.
- The meeting concluded, among others:
  - Some RS techniques, particularly for area and area change mapping, are sufficiently well-developed today that they could be used in combination with other data … to improve the quality of GHG inventories directly by contributing activity data (e.g., land conversion data).
  - More work needs to be done in improving the availability, accessibility and processing of RS information (e.g. data, satellite images) and developing standards. Interpretation and data analysis may be resource-intensive.

Expert Meeting on RS (October 2012)

- Expert Meeting: *Role of Remote Sensing in Forest and National Greenhouse Gas Inventories* was held in October 2012, to review the use of RS in forest GHG inventories.
- The meeting concluded, among others:
  - While using RS to monitor forest areas can be a routine activity, given sufficient resources and capacity, widespread monitoring of forest carbon stocks in many countries is still not widely applicable.
  - There are a number of techniques under development and new satellites to be launched in the next few years that will lead to increased capabilities of RS of forests. However, to speed up the development of operational techniques, closer collaboration of RS experts, terrestrial biosphere modellers and emission inventory experts is needed.

Technical Assessment of Inventory Guidelines (2015-2016)

- In August 2014, TFI Bureau decided to undertake technical assessment of the IPCC Inventory Guidelines.
- In 2015-2016, TFI assessed where science and data availability have developed sufficiently to support the refinement or development of methodological advice.
- A number of issues were considered, including:
  - Development or improvement of guidance on the verification using other estimation results like … GHG concentration in atmosphere by satellite observation
  - Update guidance on activity data for land representation to link land classification system with digital maps (RS or GIS data), and also to capture land use conversion as well as stratification.

Refinement of 2006 IPCC Guidelines (2016-2019)

- In October 2016, the IPCC decided at its 44th Session to produce a new Methodology Report to refine the 2006 IPCC Guidelines with a view to publication in 2019.

  2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories

- Scope and outline of the *2019 Refinement* was considered and approved by the IPCC at the same session, based on the outcome of the Scoping Meeting held in August 2016.

  Decision IPCC/XLIV-5
  http://www.ipcc.ch/meetings/session44/p44_decisions.pdf

Refinement in relation to Satellite Data

Volume 1: General Guidance and Reporting

Chapter 6: Quality Assurance/Quality Control and Verification

- **Issue:** Update/elaborate verification guidance because the existing guidance is outdated (especially the guidance on comparisons with atmospheric measurements and new datasets).
- **Location in 2006 IPCC Guidelines:** Section 6.10
- **Type of refinement:** Update/Elaboration

Refinement in relation to Satellite Data

Volume 4: Agriculture, Forestry and Other Land Use (AFOLU)

Chapter 2: Generic Methodologies Applicable to Multiple Land-use Categories

- **Issue:** Develop guidance on how to use biomass density (amount per unit area) maps generated from RS data for biomass estimation.
- **Location in 2006 Guidelines:** New Subsection in Section 2.3.1
- **Type of refinement:** New guidance

Chapter 3: Consistent Representation of Lands

- **Issue:** Develop guidance on how RS data, ground based data, and ancillary data can be integrated and used to derive consistent time series estimates of land use and land-use change.
- **Location in 2006 Guidelines:** Section 3.3 and Annex 3A.1 and 3A.2
- **Type of refinement:** Update/Elaboration/New guidance

From Users Perspective…

- In order for measured data (particularly satellite data) to be useful to national GHG inventory compilers, particularly those in developing countries:
  - Measured data need to be easily accessible.
  - Practical guidance on how to use such data for verification and/or activity data collection (for AFOLU) needs to be provided.
- Input from GEO experts to IPCC would be useful in refining the IPCC Inventory Guidelines (2019 Refinement).
- Furthermore, continuous support to national GHG inventory compilers by making measured data obtainable in a manner consistent with the refined IPCC Inventory Guidelines will greatly contribute to the successful implementation of Paris Agreement.

Summary

- Good quality national GHG inventories are essential to the enhanced transparency framework for action under the Paris Agreement.
- Refinement of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories planned by IPCC ("2019 Refinement") is expected to help all Parties to the UNFCCC in improving their national GHG inventories.
- Enhanced/new guidance will be included in the 2019 Refinement about use of measured data in national GHG inventories particularly for:
  - Verification of estimates of GHG emissions/removals
  - Collection of activity data for Agriculture, Forestry and Other Land Use Sector
- Cooperation of GEO experts will be of great help to national GHG inventory compilers, which will eventually contribute to the successful implementation of the Paris Agreement.
  - Input to IPCC to help refining the IPCC Inventory Guidelines (2019 Refinement)
  - Continuous support to national GHG inventory compilers by making measured data obtainable in a manner consistent with the refined IPCC Inventory Guidelines.

Thank you for your attention.

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