

*Regional workshop: Capacity Development for  
Sustainable National Greenhouse Gas Inventories – AFOLU sector  
(CD-REDD II) Programme*

Reporting Principles  
and  
Introducing the Use of 2006 Guidelines

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# Background

- Ultimate objective of the Convention (Art. 2):

Stabilization of greenhouse gas (GHG) concentrations in the atmosphere at a level that would prevent and reduce dangerous anthropogenic interference with the climate system.

- **How?** Through accurate knowledge of net GHG emission levels and trends, and on our collective ability to alter these trends.

# Background

## UNFCCC Art.4 Commitments

“All Parties, taking into account their common but differentiated responsibilities and their specific national and regional development priorities, objectives and circumstances, shall:

- (a) 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;”

# UNFCCC Reporting Principles

- |          |                      |
|----------|----------------------|
| <b>T</b> | <b>Transparency</b>  |
| <b>C</b> | <b>Consistency</b>   |
| <b>C</b> | <b>Comparability</b> |
| <b>C</b> | <b>Completeness</b>  |
| <b>A</b> | <b>Accuracy</b>      |

# TCCCA Principles

*Transparency* means that the **assumptions and methodologies** used for an inventory should be **clearly explained** to facilitate replication and assessment of the inventory by users of the reported information. **The transparency of inventories is fundamental to the success of the process for the communication and consideration of information.**

# TCCCA Principles

*Consistency* means that an inventory should be internally consistent in all its elements with inventories of other years. An inventory is consistent if the **same methodologies are used for the base and all subsequent years** and if **consistent data sets** are used to estimate emissions or removals from sources or sinks.

# TCCCA Principles

*Comparability* means that estimates of emissions and removals reported by Annex I Parties in inventories **should be comparable among Annex I Parties**. For this purpose, Annex I Parties should use the methodologies and formats agreed by the COP for estimating and reporting inventories. The allocation of different source/sink categories should follow the split of the IPCC guidelines & guidance.

# TCCCA Principles

*Completeness* means that an **inventory covers all sources and sinks**, as well as all gases, in existing relevant source/sink categories. Completeness also means **full geographic coverage** of sources and sinks of an Annex I Party.

# TCCCA Principles

***Accuracy*** is a relative measure of the exactness of an emission or removal estimate. Estimates should be accurate in the sense that they are systematically neither over- nor under- true emissions or removals, as far as can be judged, and that uncertainties are reduced as far as practicable. Appropriate methodologies should be used, in accordance with the IPCC good practice guidance, to promote accuracy in inventories.

# IPCC Guidelines for GHG Inventories

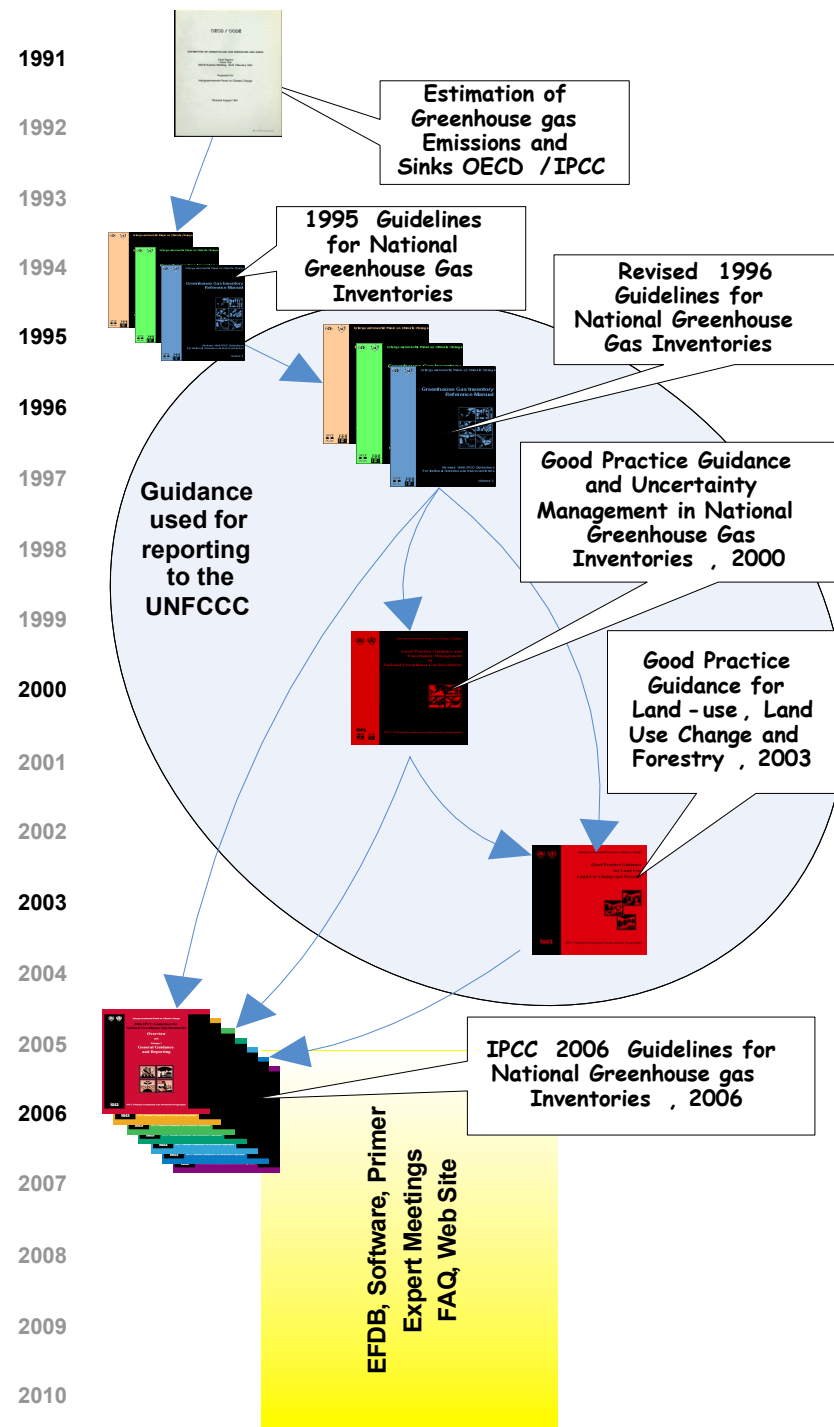
*Scope:* To assist

- any country in the world
- under any particular circumstances

in estimating and reporting national inventories of anthropogenic GHG emissions and removals.

# IPCC Guidelines

- Process started before 1991
- Revised 1996 Guidelines for National Greenhouse Gas Inventories
  - Revised 1996 Guidelines
- 2000 Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories
  - GPG 2000
- Good Practice Guidance for Land Use, Land-Use Change and Forestry
  - GPG LULUCF
- 2006 IPCC Guidelines for National Greenhouse Gas Inventories
  - 2006 Guidelines



# IPCC 2006 Guidelines

**Structure:** 5 volumes, one for each sector and one for general guidance

- **Volume 1: General Guidance and Reporting**
- Volume 2: Energy
- Volume 3: Industrial Processes and Product Use (IPPU)
- **Volume 4: Agriculture, Forestry and Other Land Use (AFOLU)**
- Volume 5: Waste

# IPCC 2006 Guidelines: AFOLU

- **Scope:** To provides guidance for preparing annual GHG inventories in the AFOLU Sector
- Recognition that GHG emissions and removals processes can occur across all types of land
- Recognition that land-use changes can involve all types of land

# IPCC 2006 Guidelines: AFOLU

Unique characteristic of the AFOLU sector:

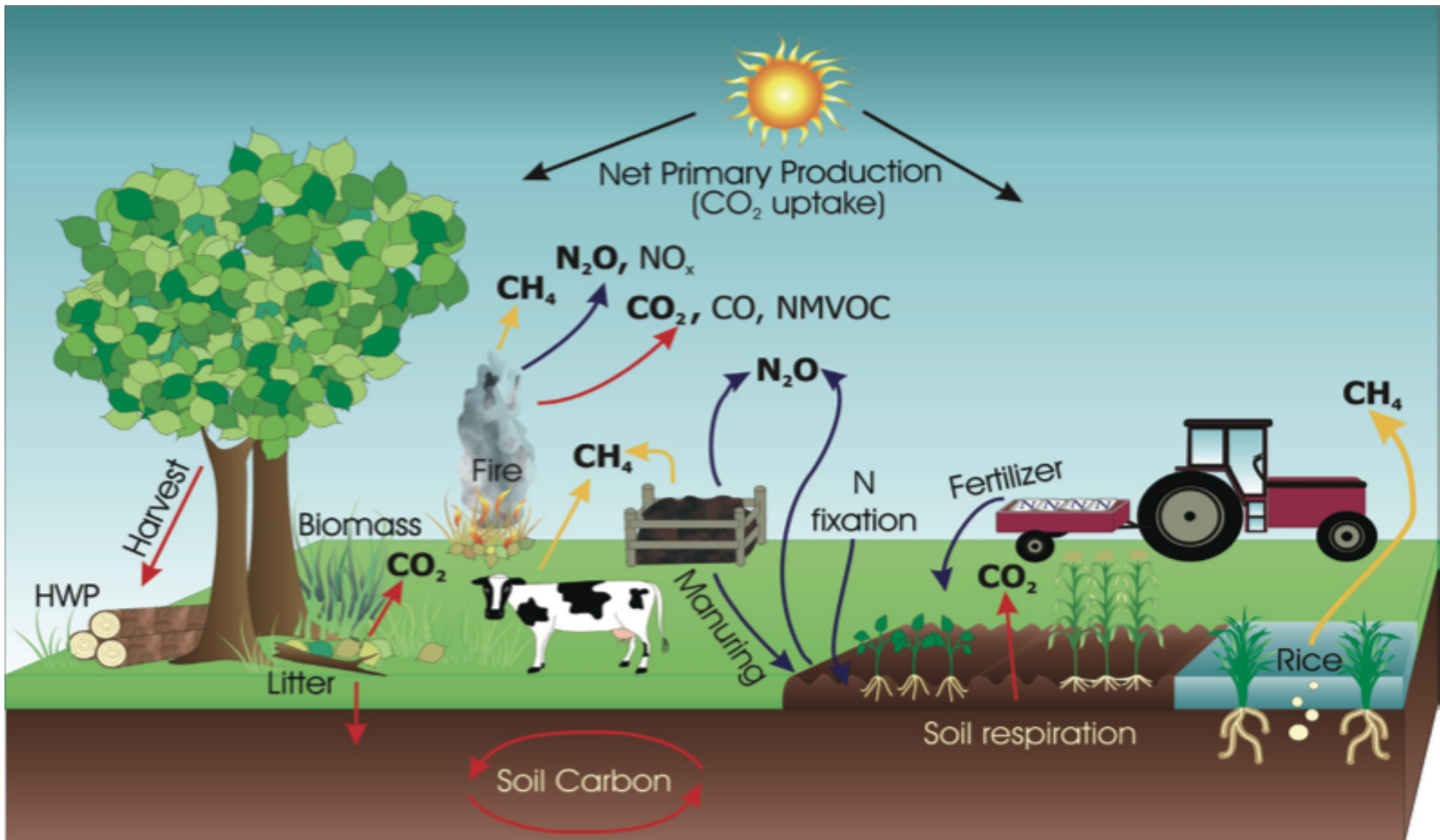
- Use of “**managed land**” as a proxy for anthropogenic emissions by sources and removals by sinks.
  - Only emissions from managed land have to be reported
  - “**managed land** is land where human interventions and practices have been applied to perform production, ecological or social functions.”
  - definitions should be specified at the national level, described in a transparent manner, and applied consistently over time;
  
- Why use Managed Land as a proxy?
  - Preponderance of anthropogenic effects occurs on managed lands
  - Practicality: Information needed for inventory estimation is largely confined to managed lands.
  - By definition, all direct human-induced effects on GHG emissions and removals occur on managed lands only.

# Overview of GHG emissions & removals in AFOLU Sector

- Science background
- Greenhouse Gases in AFOLU
- Emission and Removal Processes

# Science background

Main GHG emission sources/removal and processes in managed ecosystems



# Greenhouse Gases in AFOLU

## Key GHGs:

- *Carbon dioxide (CO<sub>2</sub>)*: uptake through plant photosynthesis, release via respiration, decomposition and combustion of organic matter
- *Nitrous oxide (N<sub>2</sub>O)*: primarily emitted from ecosystems as a by-product of nitrification and denitrification
- *Methane (CH<sub>4</sub>)*: emitted through methanogenesis under anaerobic conditions in soils and manure storage, through enteric fermentation, and during incomplete combustion while burning organic matter.

## Other gases of interest (from combustion and from soils):

- *Nitrogen oxides (NO<sub>x</sub>)*, *Ammonia (NH<sub>3</sub>)*, *non-methane organic volatile compounds (NMVOC)* and *Carbon monoxide (CO)* (precursors for the formation of GHG in the atmosphere)

# Emission and Removal Processes

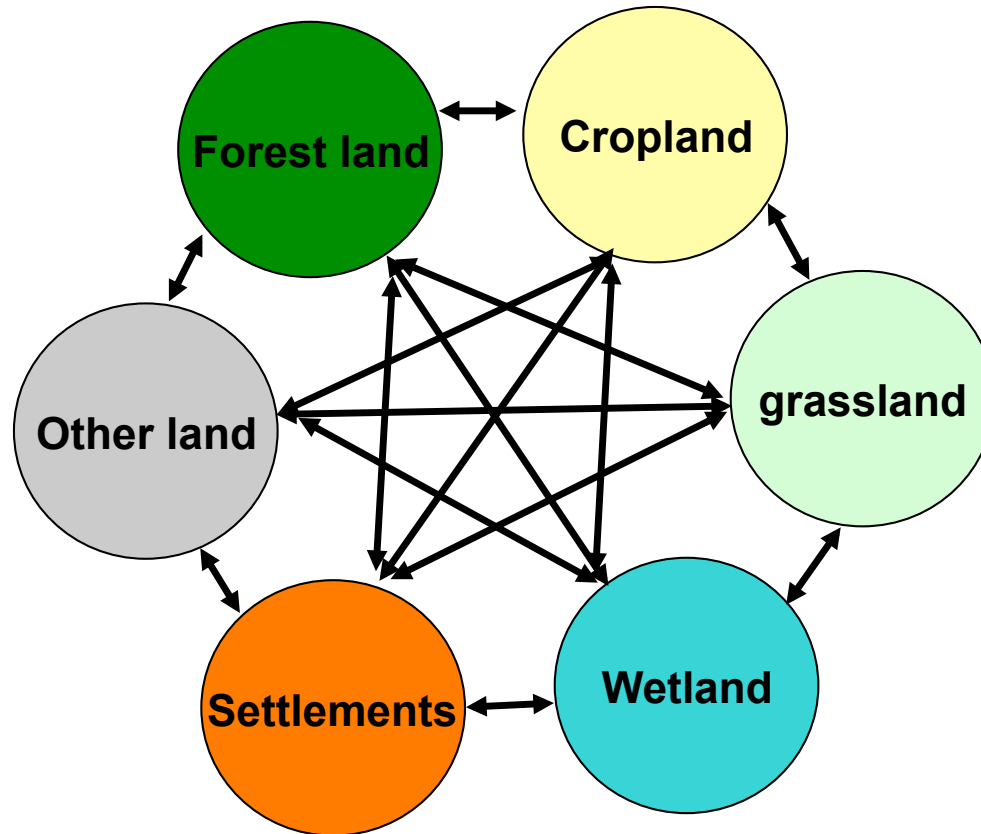
Two ways to estimate GHG fluxes in the AFOLU Sector:

- 1) as net changes in C stocks over time (used for most CO<sub>2</sub> fluxes)
  - 2) directly as gas flux rates to and from the atmosphere (used for estimating non-CO<sub>2</sub> emissions and some CO<sub>2</sub> emissions and removals)
- Major ecosystem stocks and processes, by ecosystem components:
    - Biomass
    - Dead Organic Matter
    - Soils
    - Livestock

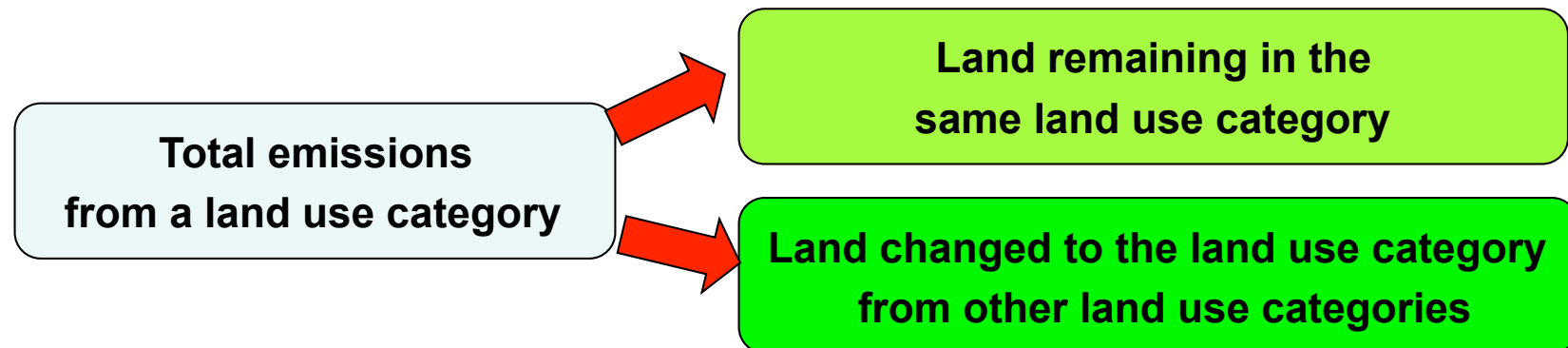
# Overview of Inventory Preparation for the AFOLU Sector

- Land-use and management categories
- Tier definitions for methods in AFOLU
- Identification of key categories

# Land-use and management categories



# Land-use and management categories



Emissions from a land-use category  
are reported under the final land-use category

# Tier definitions for methods in AFOLU

- **Tier1 : Simple first order approach**
  - easiest to use
  - spatially coarse default data based on globally available data
  - large uncertainties
  - methods involving several simplifying assumptions.
  - default values of the parameters from the IPCC guidelines
- **Tier 2: A more accurate approach**
  - country- or region- specific values for the general defaults
  - more disaggregated activity data
  - relatively smaller uncertainties
- **Tier 3: Higher order methods**
  - detailed inventory measurement and/or complemented by modeling systems
  - data at a greater resolution
  - lower uncertainties than the previous two methods

***or their combination***

# Identification of key categories

- **Key category:** “One that is prioritised within national inventory system because its estimate has significant influence on a country’s total inventory of direct GHGs in terms of absolute level, the trend, or the uncertainty in emissions or removals, or both”
  - A land-use system or C-pool or non-CO<sub>2</sub> gas is significant if its contribution to GHG emissions/removals is >25%-30% of overall national inventory or overall LUCF sector inventory.
- The term “key category” is used to represent **both sources and sinks**
- Key category analysis required to identify the significant:
  - land-use and management activities
  - land-use or livestock (sub)category
  - CO<sub>2</sub> emissions or removals by sinks from various carbon pools
  - non-CO<sub>2</sub> gases
  - tier required for reporting

Key category analysis helps a country to achieve the most reliable inventory given the resources available.

## Conclusion: Learning by doing

- ✓ IPCC guidelines are designed to walk inventory compilers from basic methods and general datasets (i.e., Tier 1) to complex and accurate methods.
- ✓ The uncertainty analysis and the key category analysis guide inventory compilers on where and how to put efforts for improving the quality of estimates.

## Conclusion: Learning by doing

✓ Accuracy of estimates increases along time in each subsequent inventory, as uncertainties are reduced - because new methods and data are applied according to the key category and uncertainty analysis - and as skills of technical people increases, i.e., less errors and better use of data.

## Conclusion: Learning by doing

- ✓ **Continuity** is thus essential for the GHG inventory: involving the same people, maintaining institutional arrangements, building complexity of methods year after year, and therefore higher accuracy of estimates.
- ✓ It is therefore worth starting a GHG inventory from simple methods and available data, in order to be cost-effective and allow time to inventory compilers to evolve their skills.

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**Thank for your attention**