2019 Refinement to the 2006 IPCC Guidelines: Volume 4 (AFOLU) Overview

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Outline

- Introduction to Volume 4 (AFOLU)
- Major refinements
- Summary

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

- Refinements are made in all chapters except chapter 9 (*Other Land*)
- Contains annexes
  - Annex 1: Mapping tables
  - Annex 2: Worksheets
- The refinements include new and updated default data as well as new and up-to-date information and guidance, among others.

Chapter 1: Introduction

- The chapters is updated/elaborated to reflect the refinements made in other chapters
- Organization of Volume 4 is also explained

Chapter 2: Generic methodologies applicable to multiple land-use categories

- New guidance on the use of allometric models and biomass density maps for estimation of biomass
  - Choice of appropriate allometric models (e.g., by comparing the estimates to ones obtained with Tier 1) and use of biomass density maps for GHG inventory (e.g., requires maps well-calibrated for national circumstances)
- New guidance (Tier 2 and Tier 3) for estimation of change in carbon (C) stocks of mineral soils associated with biochar amendments
- Updated/new default data (e.g., litter and dead wood C stocks; reference soil organic carbon (SOC))
- Elaborated guidance on application of Tier 3 methods (model-based and measurement-based)
- New guidance on inter-annual variability
  - Optional/voluntary approach for disaggregation of total emissions and removals managed land proxy (MLP) into those that are associated with human effects and those due to natural disturbances

Chapter 3: Consistent representation of lands

- Updated and new guidance (e.g., elaborated/updated guidance on data for land representation; new guidance on methods for estimating areas of land use and land-use change (sample-based, survey-based and wall-to-wall); new guidance on combining multiple data sources and derivation of IPCC land-use categories from land cover information)

Chapter 4: Forest land

- Elaborated/updated guidance on developing Tier 2 stock change factors for mineral soils for *Forest Land Remaining Forest Land and Land Converted to Forest Land*
- Elaborated/updated guidance on developing consistent time series including an example of resolving forest data gaps through extrapolation based on functional relationships
  - It is *good practice* that the model used for extrapolation utilizes information on the methodological elements that is consistent with those used in the rest of the time series.
- Updated/new default values for biomass (e.g., ratio of below-ground biomass to above-ground biomass (R); above-ground biomass in natural forests; above ground biomass in forest plantation; above-ground net biomass growth in natural forests as well as tropical and sub-topical plantation forests)

Chapter 5: Cropland

- Refinements are made in biomass, soil C and rice cultivation sections
- Biomass: Updated/new default factors
- Soil C: New guidance (e.g., Tier 2 steady state method; estimation of the impact of biochar C amendments on C stocks in mineral soils) and updated stock change factors (F_{LU}, F_{MG}, F_I)
  - Tier 2 steady state method can be used to estimate country-specific stock change factors
- Rice cultivation: Elaborated/updated guidance (e.g., calculation example for CH_4 emissions for Tier 1, and estimation of adjusted daily EFs); updated and new default parameters (e.g., updated scaling factors for water regime; new/updated default baseline EFs stratified by region; new default values for cultivation period)

Chapter 6: Grassland

- Refinements are made in soil C section
  - New guidance (Tiers 2 and 3) for estimation of the impact of biochar C amendments on C stocks in mineral soils
  - Updated default stock change factor (management factor (F_{MG}) for high intensity grazing instead of moderately degraded systems)

Chapter 7: Wetlands

- *Flooded Land Remaining Flooded Land*
  - New guidance for estimation of CH_4 emissions
- *Land Converted to Flooded Land*
  - Updated guidance for estimation of CO_2 emissions (based on CO_2 fluxes instead of C stock changes)
  - New guidance for estimation of CH_4 emissions
- An optional approach to develop indicative estimates of the anthropogenic component of total CO_2 and non-CO_2 emissions from flooded lands
- New default EFs for CO_2 and non-CO_2 emissions

Chapter 8: Settlements

- Refinements are in biomass section
- New/updated Tier 2 default values for crown cover area-based growth rates and average annual C accumulation for *Settlements Remaining Settlements*, and updated Tier 1 default biomass C stocks removed due to land conversion to settlements
- Elaborated guidance (e.g., how to use default values)

Chapter 10: Emissions from livestock and manure management

- New advanced Tier 1a method for consideration of differing productivity systems (high and low productivity systems)
  - Definitions of high and low productivity systems are provided
- Updated/new default values:
  - Enteric fermentation (e.g., EFs disaggregated by high and low productivity systems, where possible (distinction between developed and developing countries is removed; new EFs for llamas and ostrich), CH_4 conversion factor (Ym))
  - Manure management (e.g., CH_4 EFs by animal category, climate zone and high and low productivity systems, where possible; methane conversion factors (MCF), N excretion rate by region, and by high and low productivity systems, where possible; updated EFs for direct N_2O emissions; updated and new default values N loss fractions due to volatilization and leaching from manure management)
- Updated and elaborated guidance (e.g., estimation of dry matter intake, estimation of annual N excretion rate)

Chapter 11: N_2O emissions from managed soils and CO_2 emissions from lime and urea application

- New and updated default values (EF_1, EF_{1FR} and EF_{3PRP}) for direct N_2O emissions
  - EF_1 disaggregated by wet and dry climate (for wet climate distinction between synthetic and other fertilizers); EF_{1FR} by flooding/drainage regime; $EF_{3PRP,\ CPP}$ by wet and dry climate
- New and updated default values (EF_4, EF_5, $Frac_{GASF}$, $Frac_{GASM}$ and $Frac_{LEACH-(H))}$ for indirect N_2O emissions
  - EF_4 disaggregated by wet and dry climate; $Frac_{GASF}$ by chemical composition of fertilizer categories

Chapter 12: Harvested wood products

- Maintains the existing approaches in the *2006 IPCC Guidelines*
- Restructured to clarify the relationship between new information and the *2006 IPCC Guidelines* and to allow for updating and inclusion of new parameters (e.g. disaggregation of semi-finished HWP commodity classes into 3 instead of 2)
- Elaborated and updated guidance (e.g., detailed guidance on wood product in use including *good practice* in the choice of method; explanation of the different approaches clarifying essential differences between approaches; clarifications of HWP used for energy purpose; clarifications of treatment of wood in solid waste disposal sites)
- Updated and new parameters (e.g., default conversion factors and half-lives for HWP commodity classes)

Summary

- Refinements are made in all chapters of Volume 4 except chapter 9
- Major refinements:
  - Updated and elaborated guidance
  - New guidance
  - New and updated default data
- The *2019 Refinement* provides improved accuracy, completeness and more clearer guidance, among others.

Thank you

https://www.ipcc-nggip.iges.or.jp/

https://www.ipcc-nggip.iges.or.jp/home/2019refinement.html