Use of the IPCC Inventory Software for Establishing National GHG inventories in the Agriculture, Forestry and Other Land Use (AFOLU) sector

GFOI Plenary 2023

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Outline

❑ **Version 2.85**

   ✓ Main features

   ✓ Work in progress

      ➢ Interoperability

      ➢ Supporting tools

❑ **Example on REDD+ activities:** *Reference scenario vs Actual GHG emissions and Removals estimates*

   ✓ Elements

   ✓ Land Dynamic

   ✓ Forest Management Variables

   ✓ Land Use Manager

   ✓ Land Representation Manager

      ➢ Units of Land

   ✓ Land Representation Matrix

   ✓ IPCC Inventory Software TABs for Land (3.B)

   ✓ Forest Land C stock changes in C pools

   ✓ Comparison *(NOT in the IPCC Inventory Software)*

❑ **Download, use, feedback**

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The Software

Selecting Functionalities

Selecting Worksheets

Selecting categories

➢ **Free to use**

Architecture

- MSAccess *(ACE OLEDB 12)* for WindowsOS
- Microsoft .NET Framework 4.6.2

Features

IPCC inventory software becomes a central component of a Party's institutional arrangements to facilitate meeting UNFCCC national reporting obligations.

❑ Supports Parties in estimating GHG emissions/removals

❑ Organizing framework for data collection efforts among entities

❑ Minimizes error

❑ Reduces reporting burden

❑ Ensures archiving of all GHGI information for the whole time series *(par.18(c), annex, dec.18/CMA.1),* thus securing the GHGI 'memory'

❑ Facilitates transparency *(e.g., availability of all information during technical expert reviews)*

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❑ implements **all IPCC Tiers and Approaches** to estimate GHG emissions/removals, as provided in the 2006 IPCC Guidelines and its 2013 Wetlands Supplement

❑ allows **subnational level of reporting** *(e.g. tracking specific activities or regions)*

❑ allows for each source/sink to use either a single methodological tier or a mix of tiers

❑ allows, in each equation, to **input user-specific values for EFs and parameters**

❑ allows different categories/sectors to be developed simultaneously

❑ implements **AR5 GWP100** values *(and allows any other metric to be applied)*

❑ elements from the ***Wetlands Supplement*** are distinguishable because marked in lilac colour

Ongoing work

❑ **Paris Agreement requirements**

- ✓ Indirect CO_2 emissions

- ✓ (memo item) Indirect N_2O emissions

- ✓ Interoperability with UNFCCC reporting tool for Common Reporting Tables -CRTs- (5/CMA.3)

❑ **Other**

- ✓ Notation Keys

- ✓ Time series export/import

- ✓ Supporting tools

Interoperability

❑ IPCC inventory software is being modified to match UNFCCC CRTs categorization, as well as information needs

Supporting tools

❑ **User Guidebook for each sector (step-by-step instructions)**

❑ **Land representation Add-on**

1. **based on wall-to-wall data collection and analysis** *(maps)*
   Under development by FAO SEPAL Team

2. **based on sampling data collection and analysis** *(inventories)*
   Under development through FAO-COLLECT EARTH customization

❑ **Excel-based tool for data upload**

1. **Harvested Wood Products** *(available)*

2. **Land Representation – LoGIc**
   (under development with FAO – Office of Climate Change, Biodiversity and Environment)

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Guidebook - Scope

Guide in implementing all methodological tiers and approaches provided in the:

- ✓ *2006 IPCC Guidelines*, its

- ✓ *2013* Wetlands Supplement and, where relevant for consistency with UNFCCC CRTs, its

- ✓ *2019 Refinement*,

to estimate anthropogenic GHG emissions and removals from each inventory category

Software users must be familiar with the IPCC methodologies and read the Software manual (downloadable from the "Help" menu) before going through the Guidebook. The Guidebook does not replace guidance provided in the IPCC Methodological Reports

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Guidebook - Structure

❑ **Category by category, the Guidebook shows the workflow of data input in each and every worksheet to be used when implementing any of the available IPCC methodological guidance:**

✓ From AD *(and ancillary parameters)*

✓ To EF *(and ancillary parameters)*

To get the estimate of associated anthropogenic GHG emissions/removals

❑ **Appendices describe the use of multi-category components** *(e.g. Land representation manager)*

Example

Example on the use of the IPCC Inventory Software to prepare time series of estimates of anthropogenic GHG emissions and removals from land subject to REDD+ activities

Scope

- This example **DOES NOT represent the point of view of IPCC on reporting for REDD+ activities under the UNFCCC**

- **It is an example on how REDD+ activities can be reported and tracked within IPCC Inventory categories when the entire dynamic of forest land use is included in the GHG Inventory,** and therefore on how the IPCC Inventory Software could be efficiently used

Example (elements)

❑ A territory of 4,000 ha divided in 3 land uses; where the **historical dynamic** of land-use/land-management in the period **2006-2015 (10 years)** is used to **project expected C stock changes** in the period **2016-2035 (20 years)**

❑ Forest management practices are assumed not to change, although the area to which different forest management practices are applied has historically changed and it is projected to change further

❑ Reference scenario and Actual emissions/removals have been compiled in 2 different databases of the IPCC Inventory Software for which C stock changes only have been estimated for all C pools in land that are undergoing a use/management change and in the woody biomass C pool of land not undergoing a use/management change

❑ For DOM and SOM changes in land undergoing a use/management change the time dependency for the transition from a long-term average to another long-term average is 20 years (IPCC default), while transition to a 0 stock value is assumed to occur completely in the conversion year

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Example (Land categories)

The territory subject to the Inventory is composed by:

❑ **3** land use categories:

- ➢ Forest land
- ➢ Cropland
- ➢ Grassland

❑ **3** Forest land subdivisions:

- ➢ Unmanaged Natural Primary
- ➢ Managed Natural Secondary
- ➢ Forest Plantation

❑ Other subdivisions:

- ➢ 1 Annual Generic Cropland
- ➢ 1 Managed Grassland Rangeland

Example (Land dynamic)

Ongoing land use/management dynamics:

❑ Conversion of Unmanaged Forest land to Annual Generic Cropland (*Deforestation*)

❑ Management change of Unmanaged Natural Primary Forest to Managed Natural Secondary Forest (*Long-term average C stock Degradation*)

❑ Management change of Managed Natural Secondary Forest to Forest Plantation (*Long-term average C stock Degradation*)

❑ Management change of Forest Plantation to Managed Natural Secondary Forest (*Long-term average C stock Enhancement*)

❑ Conversion of Managed Grassland Rangeland to Forest land Plantation (*Long-term average C stock Enhancement*)

❑ Sustainable Management of Forests:
  ✓ selective logging of secondary forests (every 20-year)
  ✓ clearcut of forest plantations (20% thinning every 20-year and clearcut every 80-year)
  (*Long-term average C stock impact determined by species/harvesting-cycle changes. None modelized in this example*)

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Example (elements)

❑ 2 databases compiled in the IPCC Software: GFOI_example_reference *vs* GFOI_example_actual with data on the REDD+ activities and calculation of associated C stock changes

❑ GFOI_example_reference contains 7 inventory years: 2005 / 2010 / 2015 / *2020 / 2025 / 2030 / 2035*

❑ GFOI_example_actual contains 5 inventory years : 2005 / 2010 / 2015 / **2020 / 2025**

	Year	GFOI_example_reference	GFOI_example_actual	vs
reference period	2005	X	X	same hisotrical
	2010	X	X	
	2015	X	X	
projected period — actual estimates	*2020*	X	X	comparison
	2025	X	X	
projected period	*2030*	X		
	2035	X		

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Example *(Projected land dynamic 2020-2035)*

category	subcategory	subdivision		Area ha							yearly area change rate (ha yr⁻¹)
				2005	2010	2015	2020	2025	2030	2035	(2006-2015)
Forest land	FLrFL	unmanaged	Primary Forest [un]	[unRun]	1,000	970	910	865	820	775	730	-----
		managed	Secondary Forest [mn]	[mnRmn]	900	870	810	765	720	700	705	-----
		managed	Forest plantation [fp]	[fpRfp]	100	95	85	78	70	133	265	-----
		managed	Primary Forest to Secondary Forest	[unCmn]	0	20	60	90	120	130	120	12
		managed	Secondary Forest to Forest Plantation	[mnCfp]	0	30	90	135	180	195	180	18
		managed	Forest Plantation to Secondary Forest	[fpCmn]	0	5	15	22	30	32	30	2.95
	LcFL[GLcFL]	managed	Grassland to Forest Plantation	[mgCmp]	0	40	120	180	240	260	240	24
	Primary and Secondary Forest Land Total Area				1,900	1,865	1,795	1,742	1,690	1,637	1,585	-----
Cropland	CLrCL	annual	Generic crop [gc]	[gcRgc]	1,000	1,000	1,000	1,000	1,000	1,010	1,030	-----
	LcCL	annual	Primary Forest to Cropland	[unCgc]	0	10	30	45	60	65	60	6
Grassland	GlrGL	managed	Rangeland [mg]	[mgRmg]	1,000	960	880	820	760	700	640	-----

Reducing Deforestation
Reducing Degradation
Sustainable Forest Management
Conservation
Enhancement of C stocks

Excluding pre-2005 land dynamic. Historical rates applied to projected estimates

Example *(Actual land dynamic 2020-2025)*

category	subcategory	subdivision		Area ha						
				2005	2010	2015	2020	2025	*2030*	*2035*
Forest land	FLrFL	unmanaged	Primary Forest [un]	[unRun]	1,000	970	910	870	840		
		managed	Secondary Forest [mn]	[mnRmn]	900	870	810	770	740		
		managed	Forest plantation [fp]	[fpRfp]	100	95	85	78	73		
		managed	Primary Forest to Secondary Forest	[unCmn]	0	20	60	87	107		
		managed	Secondary Forest to Forest Plantation	[mnCfp]	0	30	90	130	160		
		managed	Forest Plantation to Secondary Forest	[fpCmn]	0	5	15	22	27		
	LcFL[GLcFL]	managed	Grassland to Forest Plantation	[mgCmp]	0	40	120	173	213		
		Primary and Secondary Forest Land Total Area			1,900	1,865	1,795	1,748	1,713		
Cropland	CLrCL	annual	Generic crop [gc]	[gcRgc]	1,000	1,000	1,000	1,000	1,000		
	LcCL	annual	Primary Forest to Cropland	[unCgc]	0	10	30	43	53		
Grassland	GlrGL	managed	Rangeland [mg]	[mgRmg]	1,000	960	880	827	787		
			Reducing Deforestation								
			Reducing Degradation								
			Sustainable Forest Management								
			Conservation								
			Enhancement of C stocks								

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Example *(Forest management variables)*

	Reference								Actual					

Harvesting practices and cycle

Natural Secondary Forest	selective logging	every	20-year	followed by natural regeneration
	thinning	every	20-year	followed by
Forest Plantation	clearcut	every	60-year	followed by replanting

Harvestable Area under SFM	2005	2010	2015	2020	2025	2030	2035		2005	2010	2015	2020	2025	2030	2035
Natural Secondary Forest	900	870	810	*765*	*720*	*675*	*655*		900	870	810	**770**	**740**		
Forest Plantation	100	95	85	*78*	*70*	*63*	*125*		100	95	85	**78**	**73**		

Area harvested under SFM	2005	2010	2015	2020	2025	2030	2035		2005	2010	2015	2020	2025	2030	2035
Natural Secondary Forest	46	45	42	*39*	*37*	*35*	*34*		46	45	42	**40**	**38**		
Forest Plantation	1.3	1.2	1.1	*1.0*	*0.9*	*0.8*	*1.6*		1.3	1.2	1.1	**1.0**	**0.9**		

Wood removal (m^3)	2005	2010	2015	2020	2025	2030	2035		2005	2010	2015	2020	2025	2030	2035
Natural Secondary Forest	3,146	3,042	2,832	*2,674*	*2,517*	*2,360*	*2,290*		2,635	2,547	2,372	**2,254**	**2,167**		
Forest Plantation	1,269	1,206	1,079	*984*	*889*	*980*	*1,945*		1,269	1,206	1,079	**994**	**931**		

Fuelwood removal (m^3)	2005	2010	2015	2020	2025	2030	2035		2005	2010	2015	2020	2025	2030	2035
Natural Secondary Forest	787	760	708	*669*	*629*	*590*	*572*		1298	1255	1168	**1110**	**1067**		
Forest Plantation	-	-	-	-	-	-	-		-	-	-	-	-		

Data Input

Data Input in the IPCC Inventory Software for Land (3.B) categories follows these steps:

I. **Input land-use subdivisions in the "Land Use Manager"**

II. **For each Region, input a consistent timeseries of activity data in the "Land Representation Manager"**

III. **For each C pool, Input C stock gains and losses or C stocks at different points in time** *(depending on methods selected)*

Land Use Manager (LUM)

➢ Input land-use subdivisions to the 12 main land subcategories

[managed Forest land, unmanaged Forest land, annual Cropland, perennial Cropland , managed Grassland, unmanaged Grassland, managed Wetlands, unmanaged Wetlands, Settlements (Treed), Settlements (Other), managed Other land, unmanaged Other land]

➢ Describe as **subdivisions**, each and every different use/management-system of land in the territory inventoried, **further stratified by climate zone and soil type**

➢ Parameters to be input are subcategory-specific and are used by the software to estimate C stock changes and associated GHG emissions/removals

➢ There are not limits to the number of subdivisions that can be input

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Land Use Manager (LUM) – Primary Forest

Land Use Manager (LUM) – Secondary Forest

Land Use Manager (LUM) – Forest Plantation

Land Use Manager (LUM) – Cropland

Land Use Manager (LUM) – Grassland

LUM – Soil Types

> User-specific soil classification can be input and applied to estimate SOC changes in mineral soils

LUM – Climate Regions

User-specific climate classification can be input

Consistent Land Representation

➢ A consistent land representation is a time series of annual area estimates of units of land, as disaggregated according to stratification, that:

✓ reports the total area of the territory constant across the entire time series

✓ classify land using a consistent methodology across the entire timeseries *(no artifact land conversions caused by changes in the classification method/background-data)*

✓ in each year Y, all units of land under conversion are reported within the "*Land converted to*" relevant category until the end of the transition period (D)

✓ in each year Y, all units of land that did not undergo a conversion in the last Y-D years are reported within the "*Land remaining*" relevant category

Land Representation Manager (LRM)

➤ **Allows to use any of the three IPCC approaches**

    ✓ Approach 1 *-no land use change identification-*

    ✓ Approach 2 *-land use change identification-*

    ✓ Approach 3 *-land use change identification and tracking across time-*

➤ **Ensures consistency of land representation**

    ✓ Discrepancy-check in area data input

    ✓ Tracking of unit of lands across the time series *-spatially explicit tracking under Approach 3-*

➤ <u>Area data are automatically transferred to relevant worksheets</u> where GHG emissions/removals from land-related activities are estimated

➤ <u>Each unit of land gets assigned an identification code</u> based on the current and previous land use/management; although, to ease the work of compilers, an additional user-defined code can be assigned to each unit of land

Units of land Area (ha) Time Series — REFERENCE

Unit of Land				2005	2010	2015	2020	2025	2030	2035
Forest Land	1	I	Unmanaged Natural Forest remaining Unmanaged Natural Forest	1,000	970	910	865	820	775	730
	2	II	Managed Natural Forest remaining Managed Natural Forest	900	870	810	765	720	700	705
	2.11			0	20	20	20	20	0	0
	2.12			0	0	40	40	40	40	0
	2.13	III	Unmanaged Natural Forest converted to Managed Natural Forest	0	0	0	30	30	30	30
	2.14			0	0	0	0	30	30	30
	2.15			0	0	0	0	0	30	30
	2.16			0	0	0	0	0	0	30
	2.21			0	5	5	5	5	0	0
	2.22			0	0	10	10	10	10	0
	2.23	IV	Forest Plantation converted to Managed Natural Forest	0	0	0	7	7	7	7
	2.24			0	0	0	0	8	8	8
	2.25			0	0	0	0	0	7	7
	2.26			0	0	0	0	0	0	8
	3	V	Forest Plantation remaining Forest Plantation	100	95	85	78	70	133	265
	3.11			0	30	30	30	30	0	0
	3.12			0	0	60	60	60	60	0
	3.13	VI	Managed Natural Forest converted to Forest Plantation	0	0	0	45	45	45	45
	3.14			0	0	0	0	45	45	45
	3.15			0	0	0	0	0	45	45
	3.16			0	0	0	0	0	0	45
	3.21			0	40	40	40	40	0	0
	3.22			0	0	80	80	80	80	0
	3.23	VII	Managed Rangeland converted to Forest Plantation	0	0	0	60	60	60	60
	3.24			0	0	0	0	60	60	60
	3.25			0	0	0	0	0	60	60
	3.26			0	0	0	0	0	0	60
Cropland	4	I	Annual Cropland Remaining Annual Cropland	1,000	1,000	1,000	1,000	1,000	1,010	1,030
	4.11			0	10	10	10	10	0	0
	4.12			0	0	20	20	20	20	0
	4.13	II	Unmanaged Natural Forest converted to Cropland	0	0	0	15	15	15	15
	4.14			0	0	0	0	15	15	15
	4.15			0	0	0	0	0	15	15
	4.16			0	0	0	0	0	0	15
Grassland	5	I	Managed Grassland remaining Managed Grassland	1,000	960	880	820	760	700	640
				4,000	4,000	4,000	4,000	4,000	4,000	4,000

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Land use			Unit of Land	2005	2010	2015	2020	2025	2030	2035
Forest Land	1	I	Unmanaged Natural Forest remaining Unmanaged Natural Forest	1,000	970	910	870	840		
	2	II	Managed Natural Forest remaining Managed Natural Forest	900	870	810	770	740		
	2.11			0	20	20	20	20		
	2.12			0	0	40	40	40		
	2.13	III	Unmanaged Natural Forest converted to Managed Natural Forest	0	0	0	27	27		
	2.14			0	0	0	0	20		
	2.15			0	0	0	0	0		
	2.16			0	0	0	0	0		
	2.21			0	5	5	5	5		
	2.22			0	0	10	10	10		
	2.23	IV	Forest Plantation converted to Managed Natural Forest	0	0	0	7	7		
	2.24			0	0	0	0	5		
	2.25			0	0	0	0	0		
	2.26			0	0	0	0	0		
	3	V	Forest Plantation remaining Forest Plantation	100	95	85	78	73		
	3.11			0	30	30	30	30		
	3.12			0	0	60	60	60		
	3.13	VI	Managed Natural Forest converted to Forest Plantation	0	0	0	40	40		
	3.14			0	0	0	0	30		
	3.15			0	0	0	0	0		
	3.16			0	0	0	0	0		
	3.21			0	40	40	40	40		
	3.22			0	0	80	80	80		
	3.23	VII	Managed Rangeland converted to Forest Plantation	0	0	0	53	53		
	3.24			0	0	0	0	40		
	3.25			0	0	0	0	0		
	3.26			0	0	0	0	0		
Cropland	4	I	Annual Cropland Remaining Annual Cropland	1,000	1,000	1,000	1,000	1,000		
	4.11			0	10	10	10	10		
	4.12			0	0	20	20	20		
	4.13	II	Unmanaged Natural Forest converted to Cropland	0	0	0	13	13		
	4.14			0	0	0	0	10		
	4.15			0	0	0	0	0		
	4.16			0	0	0	0	0		
Grassland	5	I	Managed Grassland remaining Managed Grassland	1,000	960	880	827	787		
			Total	4,000	4,000	4,000	4,000	4,000		

**Units of land
Area (ha) Time Series
ACTUAL**

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Land Representation Manager (LRM)

➤ **Data input shall be done from the first inventory year forward**

➤ Once input in an inventory year, the unit of land is copied by the software in all years of the time series updating its "conversion-status" according to the time passed since its conversion and the transition period set

➤ Approach 1 does not identify land-use conversions, thus:

    ✓ SOC changes are estimated comparing total SOC stock across the land representation (Region/Country) in the inventory year and 20 years before the inventory year

    ✓ The Land Representation Manager requires for each unit of land to input the area in the inventory year as well as the area of 20 years before

➤ Any Unit of land is an area homogenous per

    ✓ physical conditions *-climate/vegetation zone and soil type-* and

    ✓ current and historical socio-economic functions *-land use & management type-*

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LRM – Regions Tab

- ➢ A country can be represented in a single set of National data or in a number of Regions
- ➢ For each Region the land representation approach is to be selected

LRM
Land
Representation
Tab

LRM – Land Representation Tab – *Functionalities*

➢ To each C pool the methodology to estimate C stock changes is to be assigned through the functionality "**P**" *(Pools)*, where the icon is to be clicked to open a dialogue box to selected between the **IPCC Default method** and the **Stock-Difference method**

➢ By default, **Gain&Loss** is selected for Biomass and **Stock Difference** for DOM

LRM – Land Representation Tab – *Functionalities*

➢ For each unit of land, the time period to which the area input applies is to be assigned through the functionality "**<>**" *(double arrows)*, where the icon is to be clicked to open a dialogue box to selected between 4 options:

➢ By default, **Current inventory Year & all subsequent inventory years** is selected

LRM – Land Representation – *Transition Period*

➢ Once the unit of land has been reported in a land-under-conversion category for a number of years equivalent to the Transition Period, the Software shows the unit in a blue color and the previous land use subcategory and subdivisions are set equal to the current ones

➢ Thus, the user can merge those units that are not anymore undergoing the Transition Period with the any unit within the same stratification *(climate, soil, land use category/subcategory/subdivision)* that is not under conversion

LRM – Land Representation Tab

➢ Each unit of land that underwent the entire Transition Period can be merged with any other unit with the same stratification (climate, soil, land use category/subcategory/subdivision) through the functionality "**M**" *(Merge)*, where the icon is to be clicked to open a dialogue box

Land Representation Manager

Tabs: Regions | Land representation table | Annual land representation matrix (Approach 2 & 3)

Region: GFOI example   Region area (ha): 4,000.000   Discrepancy (ha): OK   Approach 2   2030

Left window

Land use category	Area (2030) (ha)	Remark
Forest Land	2,225	

Land use subcategory	Area (2030) (ha)	Remark
Managed Forest Land	1,450	

Current Land use subdivision — Managed Natural

Land unit code (Automatic)	Land unit code (User defined)	Previous Land use subcategory	Previous Land use subdivision	Transition Period (D) (years)	Year of conversion	Area (2030) (ha)	Remark	P	M
MFL-MN-NF-UD-2	U2	Managed Forest Land	Managed Natural	NA	NA	675			
MFL-MN-NF-UD-6	U2.11	Managed Forest Land	Managed Natural	NO	NO	20			
MFL-MN-NF-UD-7	U2.21	Managed Forest Land	Managed Natural	NO	NO	5			
MFL-MN-NF-UD-11<-UFL-...	U2.12	Unmanaged Forest Land	Unamanaged Natural	20	2015	40			
MFL-MN-NF-UD-12<-MFL-...	U2.22	Managed Forest Land	Plantation	20	2015	10			
MFL-MN-NF-UD-16<-UFL-...	U2.13	Unmanaged Forest Land	Unamanaged Natural	20	2020	30			
MFL-MN-NF-UD-17<-MFL-...	U2.23	Managed Forest Land	Plantation	20	2020	7			
MFL-MN-NF-UD-22<-UFL-...	U2.14	Unmanaged Forest Land	Unamanaged Natural	20	2025	30			
MFL-MN-NF-UD-24<-MFL-...	U2.24	Managed Forest Land	Plantation	20	2025	8			
MFL-MN-NF-UD-28<-UFL-...	U2.15	Unmanaged Forest Land	Unamanaged Natural	20	2030	30			
MFL-MN-NF-UD-29<-MFL-...	U2.25	Managed Forest Land	Plantation	20	2030	7			

Current Land use subdivision — Plantation

Land unit code (Automatic)	Land unit code (User defined)	Previous Land use subcategory	Previous Land use subdivision	Transition Period (D) (years)	Year of conversion	Area (2030) (ha)	Remark	P	M
MFL-P-PL-P-3	U3	Managed Forest Land	Plantation	NA	NA	63			
MFL-P-PL-P-8	U3.11	Managed Forest Land	Plantation	NO	NO	30			
MFL-P-PL-P-9	U3.21	Managed Forest Land	Plantation	NO	NO	40			
MFL-P-PL-P-13<-MFL-MN-...	U3.12	Managed Forest Land	Managed Natural	20	2015	60			
MFL-P-PL-P-14<-MGL-MR-...	U3.22	Managed Grassland	Managed Rangeland	20	2015	80			
MFL-P-PL-P-18<-MFL-MN-...	U3.13	Managed Forest Land	Managed Natural	20	2020	45			
MFL-P-PL-P-19<-MGL-MR-...	U3.33	Managed Grassland	Managed Rangeland	20	2020	60			
MFL-P-PL-P-25<-MFL-MN-...	U3.14	Managed Forest Land	Managed Natural	20	2025	45			
MFL-P-PL-P-26<-MGL-MR-...	U3.34	Managed Grassland	Managed Rangeland	20	2025	60			
MFL-P-PL-P-30<-MFL-MN-...	U3.15	Managed Forest Land	Managed Natural	20	2030	45			
MFL-P-PL-P-31<-MGL-MR-...	U3.35	Managed Grassland	Managed Rangeland	20	2030	60			

Land use subcategory	Area (2030) (ha)	Remark
Unmanaged Forest Land	775	

Current Land use subdivision — Unamanaged Natural

Land unit code (Automatic)	Land unit code (User defined)	Previous Land use subcategory	Previous Land use subdivision	Transition Period (D) (years)	Year of conversion	Area (2030) (ha)	Remark	P	M
UFL-UN-NF-UD-1	U1	Unmanaged Forest Land	Unamanaged Natural	NA	NA	775			

Right window

Land use category	Area (2030) (ha)	Remark
Forest Land	2,225	

Land use subcategory	Area (2030) (ha)	Remark
Managed Forest Land	1,450	

Current Land use subdivision — Managed Natural

Land unit code (Automatic)	Land unit code (User defined)	Previous Land use subcategory	Previous Land use subdivision	Transition Period (D) (years)	Year of conversion	Area (2030) (ha)	Remark	P	M
MFL-MN-NF-UD-2	U2		Unmanaged Natural	NA	NA	700			
MFL-MN-NF-UD-11<-UFL-U...	U2.12	Unmanaged Forest Land	Unamanaged Natural	20	2015	40			
MFL-MN-NF-UD-12<-MFL-P-...	U2.22	Managed Forest Land	Plantation	20	2015	10			
MFL-MN-NF-UD-16<-UFL-U...	U2.13	Unmanaged Forest Land	Unamanaged Natural	20	2020	30			
MFL-MN-NF-UD-17<-MFL-P-...	U2.23	Managed Forest Land	Plantation	20	2020	7			
MFL-MN-NF-UD-22<-UFL-U...	U2.14	Unmanaged Forest Land	Unamanaged Natural	20	2025	30			
MFL-MN-NF-UD-24<-MFL-P-...	U2.24	Managed Forest Land	Plantation	20	2025	8			
MFL-MN-NF-UD-28<-UFL-U...	U2.15	Unmanaged Forest Land	Unamanaged Natural	20	2030	30			
MFL-MN-NF-UD-29<-MFL-P-...	U2.25	Managed Forest Land	Plantation	20	2030	7			

Current Land use subdivision — Plantation

Land unit code (Automatic)	Land unit code (User defined)	Previous Land use subcategory	Previous Land use subdivision	Transition Period (D) (years)	Year of conversion	Area (2030) (ha)	Remark	P	M
MFL-P-PL-P-3	U3	Managed Forest Land	Plantation	NA	NA	133			
MFL-P-PL-P-13<-MFL-MN-N...	U3.12	Managed Forest Land	Managed Natural	20	2015	60			
MFL-P-PL-P-14<-MGL-MR-S...	U3.22	Managed Grassland	Managed Rangeland	20	2015	80			
MFL-P-PL-P-18<-MFL-MN-...	U3.13	Managed Forest Land	Managed Natural	20	2020	45			
MFL-P-PL-P-19<-MGL-MR-S...	U3.33	Managed Grassland	Managed Rangeland	20	2020	60			
MFL-P-PL-P-25<-MFL-MN-N...	U3.14	Managed Forest Land	Managed Natural	20	2025	45			
MFL-P-PL-P-26<-MGL-MR-S...	U3.34	Managed Grassland	Managed Rangeland	20	2025	60			
MFL-P-PL-P-30<-MFL-MN-N...	U3.15	Managed Forest Land	Managed Natural	20	2030	45			
MFL-P-PL-P-31<-MGL-MR-S...	U3.35	Managed Grassland	Managed Rangeland	20	2030	60			

Land use subcategory	Area (2030) (ha)	Remark
Unmanaged Forest Land	775	

Current Land use subdivision — Unamanaged Natural

Land unit code (Automatic)	Land unit code (User defined)	Previous Land use subcategory	Previous Land use subdivision	Transition Period (D) (years)	Year of conversion	Area (2030) (ha)	Remark	P	M
UFL-UN-NF-UD-1	U1	Unmanaged Forest Land	Unamanaged Natural	NA	NA	775			

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Annual land representation matrix

Actual matrix

		initial 2030					
		Forest land			**Cropland**	**Grassland**	
		Unmanaged natural	Managed natural	Managed plantation	Annual generic	Managed rangeland	
final 2035	Forest land — Unmanaged natural	U1 730	-----	-----	-----	-----	730
	Forest land — Managed natural	U2.13 30, U2.14 30, U2.15 30, U2.16 30	U2 655, U2.12 40, U2.22 10	U2.23 7, U2.24 8, U2.25 7, U2.26 8	-----	-----	855
	Forest land — Managed plantation	-----	U3.13 45, U3.14 45, U3.15 45, U3.16 45	U3 125, U3.12 60, U3.22 80	-----	U3.23 60, U3.24 60, U3.25 60, U3.26 60	685
	Cropland — Annual generic	U4.13 15, U4.14 15, U4.15 15, U4.16 15	-----	-----	U4 1,010, U4.12 20	-----	1,090
	Grassland — Managed rangeland	-----	-----	-----	-----	U5 640	640
		910	885	295	1,030	880	4,000
							4,000

AFOLU anthropogenic GHG Emissions and Removals

❑ **Emission and Removal Processes** - GHG fluxes in the AFOLU Sector can be estimated in two ways

1. Indirectly, as net changes in C stocks in C pools over time [*C stock changes are used to estimate CO_2 emissions and removals from C pools since changes in biogenic C stocks are predominately through CO_2 exchange between the land surface and the atmosphere* (including HWP, excluding other C transfer process such as leaching)]
   Used for most CO_2 fluxes

2. Directly, as gas flux rates to and from the atmosphere
   Used for non-CO_2 emissions, CO_2 emissions not sourced from C pools and some CO_2 emissions/removals from C pools when C stocks are not quantifiable in an operational way

The IPCC Inventory Software has capacity to estimate each and every source and sink of GHG by applying both IPCC methodologies. This exercise focus on way 1 only

IPCC methodological approaches to estimate C stock changes

❑ IPCC provides 2 methodological approaches to estimate C stock changes as:

  ✓ **The Gain and Loss method**: all C stock gains and C stock losses in a C Pool are identified and estimated individually

  ✓ **The Stock Difference method**: C stocks are measured across time and changes estimated through difference of C stock at two point in time

Method 1 (IPCC Default)
The Gain & Loss Method is a process-based approach, which estimates the net balance of C stock additions to and removals from a carbon pool

Method 2
The Stock Difference Method is a stock-based approach, which estimates the difference in C stocks at two points in time

The IPCC Inventory Software allows to estimate each C Pool in each Unit of Land either with the IPCC default or with the Stock-Difference approach

Land C pools, processes & associated GHG emissions and CO$_2$ removals

Reporting on C Pools

❑ Using C stock changes as a proxy, to estimate CO_2 emissions and removals require that, for a C Pool, annual estimates of C stock changes are reported:

- ✓ **All C stock gains and C stock losses are to be estimated in that C pool**

- ✓ **Each C stock gain in a C pool is to be paired by an equivalent C stock loss from the C pool from which the C stock has been transferred, or by a removal of CO_2 from the atmosphere** *(aboveground biomass pool only)*

- ✓ **Each C stock loss in a C pool is to be paired by an equivalent C stock gain in the C pool(s) to which the C stock has been transferred, or by an emission of CO_2 to the atmosphere**

The IPCC Inventory Software allows to estimate each C stock gain and loss in each C pool, thus the user can ensure mass balance in C stocks and symmetry in C pools reporting

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IPCC Category	Worksheets Number	
	Total	
3.A. – Livestock	**158**	
3.A.1 – Enteric fermentation		44
3.A.2 – Manure management		114
3.B. – Land	**292**	
3.B.1 – Forest land		73
3.B.2 – Cropland		55
3.B.3 – Grassland		55
3.B.4 – Wetlands		28
3.B.5 – Settlements		61
3.B.6 – Other land		20
3.C. – Aggregated Sources and non-CO_2 emissions sources on land	**38**	
3.C.1 – Biomass burning		12
3.C.2 – Liming		1
3.C.3 – Urea application		1
3.C.4 – Direct N_2O emissions		10
3.C.5 – Indirect N_2O emissions from managed soils		2
3.C.6 – Indirect N_2O emissions from manure management		4
3.C.7 – Rice cultivation		1
3.C.8 – CH_4 emissions from drained inland organic soils		1
3.C.9 – CH_4 from drainage ditches on organic soils		1
3.C.10 – CH_4 from rewetting of inland organic soils		1
3.C.11 – CH_4 from rewetting of mangroves and tidal marshes		1
3.C.12 – N_2O emissions from aquaculture		1
3.C.13 – CH_4 from rewetted and created Wetlands in inland wetland mineral soils		1
3.C.14 – Other		1
3.D. - Other	**14**	
3.D.1 – Harvested Wood Products		13
3.D.2. – Other		1
TOTAL AFOLU SECTOR		**502**

Data & Calculation Tabs in the AFOLU sector of the IPCC Software

3.B.1 – Forest land - Worksheets map

IPCC Category	Number of Worksheets			
	Total	IPCC Tier (Equations)		
		Tier 1	Tier 2	Tier 3
3.B.1 – Forest land	**73**			
3.B.1.a – Forest land remaining Forest land	13	4 B + (1**)		
		1* SOM 2.25A +1 +1		
			1** SOM 2.25B	3 SD
			1 DOM G&L	
3.B.1.b – Land converted to Forest land	*60*			
3.B.1.b.i – Cropland converted to Forest land	12	4 B + (1)		
		1 SOM 2.25B +1 +1		3 SD
			1 DOM G&L	
3.B.1.b.ii – Grassland converted to Forest land	12	4 B + (1)		
		1 SOM 2.25B +1 +1		3 SD
			1 DOM G&L	
3.B.1.b.iii – Wetlands converted to Forest land	12	4 B + (1)		
		1 SOM 2.25B +1 +1		3 SD
			1 DOM G&L	
3.B.1.b.iv – Settlements converted to Forest land	12	4 B + (1)		
		1 SOM 2.25B +1 +1		3 SD
			1 DOM G&L	
3.B.1.b.v – Other land converted to Forest land	12	4 B + (1)		
		1 SOM 2.25B +1 +1		3 SD
			1 DOM G&L	

The IPCC Default –Gain and Loss– method *(for which default values are provided by IPCC)* applies to all Tiers, while the Stock-Difference method applies to Tier 3 only

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Worksheets map [notes]

()   for biomass and in the year of change only

+1   for drained organic soils only

+2   on-site and off-site emissions associated with extracted peat decay

+1   for rewetted organic soils only

+2   for rewetted organic soil or for SOM excavation in Wetlands

*   for regions where Approach 1 of land representation is applied only

**   for management changes only

***   IPCC generic methodology [ADxEF] applies, but no IPCC default values are provided for EF

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Forest Land: C Stock Changes – Biomass

- ➤ **4 Tabs for biomass Gain and Loss method**:

  - ✓ **1 Tab Gain** (annual net increment) [natural mortality included]

  - ✓ **3 Tabs Losses** [natural mortality excluded]:

    - ▪ Industrial Roundwood removal *in this example assumed to occur in land NOT undergoing conversion only*

    - ▪ Fuelwood removal (as entire tree or part of tree) *in this example assumed to occur as part of tree only and thus already included in losses of industrial roundwood through $BCEF_R$*

    - ▪ Disturbance *in this example disturbances are assumed NOT to occur*

- ➤ **1 Tab for Stock-Difference method**, *where the time-dependency is to be input*

Biomass C Stock Changes – Gain and Loss [Gains]

Biomass C Stock Changes – Gain and Loss [Loss - Harvest]

Forest Land: C Stock Changes – Dead Organic Matter (DOM)

- ➢ **DOM estimate disaggregated in its 2 components:**

  - ✓ Dead Wood

  - ✓ Litter

- ➢ **1 Tab for Gain and Loss method**, *no IPCC default values*

- ➢ **1 Tab for Stock-Difference method**, *where, for the sake of easy calculation, the time-dependency is input as 20-year*

DOM C Stock Changes – Stock-Difference

Forest Land: C Stock Changes – Soil Organic Matter (SOM)

➢ **2 Tabs for IPCC default method [Equation 2.25]**

  ✓ Formulation A [Approach 1 for Land Representation]

  ✓ Formulation B [Approaches 2 or 3 for Land Representation], *in this example Formulation B [Approach 2] is applied*

➢ **1 Tab for Stock-Difference method**, *where the time-dependency is to be input*

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SOC Changes – Equation 2.25, Formulation B

Comparison: *Reference* vs Actual

	Unit of Land	REFERENCE SCENARIO 2020						REF 2025						ACTUAL 2020						ACTUAL 2025					

REFERENCE SCENARIO — **ACTUAL GHG EMISSIONS & REMOVALS**

#	Unit of Land	REF2020 BG	BL	BN	D	L	SOM	REF2025 BG	BL	BN	D	L	SOM	ACT2020 BG	BL	BN	D	L	SOM	ACT2025 BG	BL	BN	D	L	SOM
1	I Unmanaged Natural Forest remaining Unmanaged Natural Forest	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2	II Managed Natural Forest remaining Managed Natural Forest	1,847.77	-1,847.45	0.32	NE	NE	NE	1,739.08	-1,738.78	0.30	NE	NE	NE	1,859.85	-1,859.33	0.52	NE	NE	NE	1,770.48	-1,770.25	0.23	NE	NE	NE
2.11		48.31	0.00	48.31	-10.90	-6.80	-7.23	48.31	0.00	48.31	-10.90	-6.80	-7.23	48.31	0.00	48.31	-10.90	-6.80	-7.23	48.31	0.00	48.31	-10.90	-6.80	-7.23
2.12		96.62	0.00	96.62	-21.80	-13.60	-14.46	96.62	0.00	96.62	-21.80	-13.60	-14.46	96.62	0.00	96.62	-21.80	-13.60	-14.46	96.62	0.00	96.62	-21.80	-13.60	-14.46
2.13	III Unmanaged Natural Forest converted to Managed Natural Forest	72.46	-3,103.25	-3,030.78	-16.35	-10.20	-10.85	72.46	0.00	72.46	-16.35	-10.20	-10.85	65.22	-2,792.92	-2,727.71	-14.72	-9.18	-9.76	65.22	0.00	65.22	-14.72	-9.18	-9.76
2.14		NO	NO	NO	NO	NO	NO	72.46	-3,103.25	-3,030.78	-16.35	-10.20	-10.85	NO	NO	NO	NO	NO	NO	57.97	-2,482.60	-2,424.63	-13.08	-8.16	-8.68
2.15		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2.16		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2.21		12.08	0.00	12.08	0.58	0.48	1.02	12.08	0.00	12.08	0.58	0.48	1.02	12.08	0.00	12.08	0.58	0.48	1.02	12.08	0.00	12.08	0.58	0.48	1.02
2.22		24.15	0.00	24.15	1.10	0.95	2.03	24.15	0.00	24.15	1.10	0.95	2.03	24.15	0.00	24.15	1.15	0.95	2.03	24.15	0.00	24.15	1.10	0.95	2.03
2.23	IV Forest Plantation converted to Managed Natural Forest	16.91	-850.93	-834.02	0.81	0.67	1.42	16.91	0.00	16.91	0.81	0.67	1.42	24.15	-1,215.61	-1,191.45	1.15	0.95	2.03	24.15	0.00	24.15	1.15	0.95	2.03
2.24		NO	NO	NO	NO	NO	NO	19.32	-972.49	-953.16	0.92	0.76	1.63	NO	NO	NO	NO	NO	NO	55.55	-2,795.90	-2,740.34	2.65	2.19	4.68
2.25		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2.26		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
3	V Forest Plantation remaining Forest Plantation	346.08	-344.13	1.91	NE	NE	NE	310.59	-310.95	-0.36	NE	NE	NE	332.77	-347.68	-14.90	NE	NE	NE	235.15	-320.74	-85.59	NE	NE	NE
3.11		133.11	0.00	133.11	-3.45	-2.85	-6.10	133.11	0.00	133.11	-3.45	-2.85	-6.10	133.11	0.00	133.11	-3.45	-2.85	-6.10	133.11	0.00	133.11	-3.45	-2.85	-6.10
3.12		266.22	0.00	266.22	-6.90	-5.70	-12.20	266.22	0.00	266.22	-6.90	-5.70	-12.20	266.22	0.00	266.22	-6.90	-5.70	-12.20	266.22	0.00	266.22	-6.90	-5.70	-12.20
3.13	VI Managed Natural Forest converted to Forest Plantation	199.66	-9,475.14	-9,275.48	-5.13	-4.28	-9.15	199.66	0.00	199.66	-5.13	-4.28	-9.15	177.48	-8,422.35	-8,244.87	-4.60	-3.80	-8.14	177.48	0.00	177.48	-4.60	-3.80	-8.14
3.14		NO	NO	NO	NO	NO	NO	199.66	-9,475.14	-9,275.48	-5.13	-4.28	-9.15	NO	NO	NO	NO	NO	NO	164.17	-7,790.67	-7,626.50	-4.26	-3.52	-7.53
3.15		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
3.16		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
3.21		177.48	0.00	177.48	21.80	0.00	-22.60	177.48	0.00	177.48	21.80	0.00	-22.60	177.48	0.00	177.48	21.80	0.00	-22.60	177.48	0.00	177.48	21.80	0.00	-22.60
3.22		354.96	0.00	354.96	43.60	0.00	-45.20	354.96	0.00	354.96	43.60	0.00	-45.20	354.96	0.00	354.96	43.60	0.00	-45.20	354.96	0.00	354.96	43.60	0.00	-45.20
3.23	VII Managed Rangeland converted to Forest Plantation	266.22	-653.68	-387.46	32.70	0.00	-33.90	266.22	0.00	266.22	32.70	0.00	-33.90	354.96	-871.57	-516.61	43.60	0.00	-45.20	354.96	0.00	354.96	43.60	0.00	-45.20
3.24		NO	NO	NO	NO	NO	NO	266.22	-653.68	-387.46	32.70	0.00	-33.90	NO	NO	NO	NO	NO	NO	789.78	-1,939.24	-1,149.46	97.01	0.00	-100.57
3.25		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
3.26		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
4	I Annual Cropland Remaining Annual Cropland	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
4.11		NO	NO	NO	NO	NO	-4.52	NO	NO	NO	NO	NO	-4.52	NO	NO	NO	NO	NO	-4.52	NO	NO	NO	NO	NO	-4.52
4.12		NO	NO	NO	NO	NO	-9.04	NO	NO	NO	NO	NO	-9.04	NO	NO	NO	NO	NO	-9.04	NO	NO	NO	NO	NO	-9.04
4.13	II Unmanaged Natural Forest converted to Cropland	NO	-4,684.62	-4,684.62	-361.50	-232.50	-6.73	NO	NO	NO	NO	NO	-6.73	NO	-4,060.01	-4,060.01	-313.30	-201.50	-5.88	NO	NO	NO	NO	NO	-5.88
4.14		NO	NO	NO	NO	NO	NO	NO	-4,684.62	-4,684.62	-361.50	-232.50	-6.73	NO	NO	NO	NO	NO	NO	NO	-3,747.70	-3,747.70	-289.20	-186.00	-5.42
4.15		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
4.16		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
5	I Managed Grassland remaining Managed Grassland	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Column groups: Biomass (BG, BL, BN); DOM (D, L); SOM. Under REFERENCE SCENARIO (2020, 2025) and ACTUAL GHG EMISSIONS & REMOVALS (2020, 2025).

Comparison area of each land subdivision: *Reference* vs **Actual**

subdivision		Area (ha)			
		Reference		**Actual**	
		2020	*2025*	*2020*	*2025*
Primary Forest [un]	[unRun]	865	820	870	840
Secondary Forest [mn]	[mnRmn]	765	720	770	740
Forest plantation [fp]	[fpRfp]	78	70	78	73
Primary Forest to Secondary Forest	[unCmn]	90	120	87	107
Secondary Forest to Forest Plantation	[mnCfp]	135	180	130	160
Forest Plantation to Secondary Forest	[fpCmn]	22	30	22	27
Grassland to Forest Plantation	[mgCmp]	180	240	173	213
Primary and Secondary Forest Land Total		1,742	1,690	1,748	1,713
Generic crop [gc]	[gcRgc]	1,000	1,000	1,000	1,000
Primary Forest to Cropland	[unCgc]	45	60	43	53
Rangeland [mg]	[mgRmg]	820	760	827	787
Reducing Deforestation					
Reducing Degradation					
Sustainable Forest Management					
Conservation					
Enhancement of C stocks					

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Comparison C balance of each land subdivision: *Reference* vs **Actual**

subdivision			2020 (Mg C)						2025 (Mg C)					
			Biomass		DOM		SOM		Biomass		DOM		SOM	
			R	*A*	*R*	*A*	*R*	*A*	*R*	*A*	*R*	*A*	*R*	*A*
Primary Forest [un]		[unRun]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Secondary Forest [mn]		[mnRmn]	0.3	0.5	NE	NE	NE	NE	0.3	0.5	NE	NE	NE	NE
Forest plantation [fp]		[fpRfp]	1.9	-1.6	NE	NE	NE	NE	-0.4	-1.7	NE	NE	NE	NE
Primary Forest to Secondary Forest		[unCmn]	-2,885.9	-2,582.8	-79.7	-77.0	-32.5	-31.5	-2,813.4	-1,810.4	-106.2	-94.7	-43.4	-38.7
Secondary Forest to Forest Plantation		[mnCfp]	-8,876.2	-7,845.5	-28.4	-27.3	-27.5	-26.4	-8,676.5	-5,606.8	-37.8	-33.6	-36.6	-32.5
Forest Plantation to Secondary Forest		[fpCmn]	-797.8	-797.8	4.6	4.6	4.5	4.5	-900.0	-542.6	6.3	5.6	6.1	5.5
Grassland to Forest Plantation		[mgCmp]	145.0	190.2	98.1	94.3	-101.7	-97.7	411.2	509.3	130.8	191.3	-135.6	-120.3
Generic crop [gc]		[gcRgc]	NE	NE	NE	NE	NE	0.0	NE	NE	NE	NE	NE	0.0
Primary Forest to Cropland		[unCgc]	-4,684.6	-4,060.0	-594.0	-514.8	-20.3	-19.4	-4,684.6	-3,123.1	-594.0	-396.0	-27.1	-14.9
Rangeland [mg]		[mgRmg]	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
	FLrFL		-12,557.6	-11,227.2	-103.4	-99.7	-55.5	-53.4	-12,390.0	-7,961.1	-137.8	-122.7	-73.9	-65.7
	LcFL		145.0	190.2	98.1	94.3	-101.7	-97.7	411.2	509.3	130.8	191.3	-135.6	-120.3
	LcCL		-4,684.6	-4,060.0	-594.0	-514.8	-20.3	-19.4	-4,684.6	-3,123.1	-594.0	-396.0	-27.1	-14.9
	ToT		-17,097.2	-15,097.0	-599.3	-520.2	-177.6	-170.6	-16,663.4	-10,574.8	-601.0	-327.4	-236.6	-201.0

NOT in the IPCC Inventory Software

Download it at *https://www.ipcc-nggip.iges.or.jp/software/index.html*

Inventory Software

New Version 2.85 – IPCC Inventory Software

This is the new version 2.85 of the IPCC Inventory Software released on March 14, 2023.

Please note that version 2.85 comes in 2 different files for installation. Thus, before downloading the file you shall check which one you actually need by using this decision tree.

- Ver. 2.85 IPCC Inventory Software - **64bit**

- Ver. 2.85 IPCC Inventory Software - **32bit**

If you find any issues in the use of the IPCC Inventory Software, come back to us at ipcc-software@iges.or.jp .

Thank you very much for your support.

In coming months, according to the software development plan as well as to feedback from testing, new versions will be released until the work on interoperability is completed

Version 2.85 of the IPCC Inventory Software comes with 2 alternative installation packages –i.e. **64**bit vs **32**bit–.

Please support us through testing and reporting your findings at *ipcc-software@iges.or.jp*

ipcc
INTERGOVERNMENTAL PANEL ON **climate change**

Thank you

Promoting Accuracy, Minimizing Uncertainty

❑ **Activity data statistical population and its stratification in subdivisions**

➢ Stratification of activity data promotes accuracy since subdivisions are more homogenous than the whole population. Further, summing up subdivisions' estimates to a total reduces uncertainty because error propagation tends to cancel those out -*Systematic Errors instead DO NOT cancel out across propagation-*

Thus, GOOD PRACTICE is to always REMOVING any identified SYSTEMATIC ERROR *-a biased estimate is NOT acceptable in an NGHGI-*; while minimizing RANDOM ERRORS *-these indeed cannot be removed!-*.

Random errors do bias neither the level of emissions/removals estimated nor the estimated change across time (mitigation); while Systematic errors do.

Opening new stratum in the worksheet for data input

➢ **On the right hand side:**

✓ <u>The symbol ⊞ indicates that there is a sub-layer to be compiled</u>

Always click on it to open the sub-layer and input the information

Adding row of data input

➢ **On the right hand side:**

✓ The symbol ✳ indicates that a row of data can be input

Once data input is completed a new row appears at the bottom to allow to input a further row of data, and so on

LRM – Land Representation Tab

Additional functionalities

Letter "**C**" (Conversion) to input a further conversion to a unit of land that is still undergoing a conversion *(no 20-year period passed since the previous conversion)*

It is available in Approach 3 land representation only