



The Land Representation in the IPCC Inventory Software A Guide

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IPCC Inventory Software **Guide to Land Representation**

○ First Iteration

IPCC Inventory Software	
Guide to Land Representation	
<i>Draft as of 6 June 2023</i>	
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- Description of functionalities to be used to input a land representation in the IPCC Inventory Software

The Land Representation

- In a national GHG Inventory, estimates of land-related GHG emissions and removals are based on the consistent representation of land across the inventory time series
- **Land Representation** deals with:
 - I. **Classification of land** according to bio-physical -*climate, soil, vegetation*- and socio-economic -*use, management (e.g. age-class)*- variables aimed at identifying units of land more homogenous for C stocks levels and dynamics → [Land use categories/subcategories/subdivisions]
 - II. **Identification and tracking** across the inventory time series **of units of land** –*i.e. land area with same current and historical classification*– → [Area data to estimate C stock changes and other GHG emissions]
- **Consistency** of I and II across the inventory time series is key to ensure unbiasedness of estimates

The Land Representation

- A consistent land representation is a time series of annual area estimates of units of land, as disaggregated according to variables of stratification, that reports:
 - The land classification methodology is consistent across the entire time series *-no artifact land conversions caused by changes in the classification method/background-data-*
 - The total area of the territory is reported and it is constant across the entire time series
 - For Approaches 2 & 3:
 - ✓ In each year Y, all units of land under conversion are reported within the Land under conversion relevant categories 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 categories

Land use categories/subcategories/subdivisions → **The Land Use Manager**

- It is the **First step** when preparing a GHG inventory for land-related sources/sinks
- It deals with **Input of 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
- **There is not a limit to the number of subdivisions that can be input**
- It applies the **IPCC Climate** and the **IPCC Soil** classifications, although user-specific classifications can be input and applied instead
- It ensures **consistency in the land categories/subcategories/subdivisions across the inventories time series** (*although it does not deal with the methodology for land classification*)

- Forest Land
 - Managed Forest Land
 - Managed Natural
 - Plantation
 - Unmanaged Forest Lan
- Cropland
- Grassland
- Wetlands
- Settlements
- Other Land

Land use subdivision - common parameters

Land use subdivision name: Plantation

Soil Type: High Activity Clay Mineral

Soil Status: Natural

Country/Territory: Italy

Continent: Europe

Climate Region: Warm Temperate Dry

It is not possible to change some of the parameters since subdivision is already being used in Land Representation Manager

Land use subdivision - Managed Forest Land specific parameters

Ecological zone: User-defined

Species: Pinus

Natural Forest:

Plantation:

Abandoned managed land:

Land mass: Unspecified

Age class (yr): Unspecified

Above-ground biomass stock (t d.m. / ha): 212.000

Above-ground biomass growth (G) (t d.m. / ha / yr): 7.738

Ratio of below-ground biomass to above-ground biomass (R) (t root d.m. / t shoot d.m.): 0.220

Biomass carbon fraction (t C / t d.m.): 0.470

Growing stock level (V) (m3 / ha): >80

Average net annual increment of growing stock (lv) (m3 / ha / yr): 14.600

Biomass conversion and expansion factor for increment (BCEFi) (t d.m. / m3 wood volume): Specified 0.530

Biomass conversion and expansion factor for standing stock (BCEFs) (t d.m. / m3 wood volume): Specified 0.530

Biomass conversion and expansion factor for wood and fuelwood removal (BCEFr) (t d.m. / m3 wood volume): Specified 0.610

Basic wood density (D) (t d.m. / m3 fresh volume): 0.530

Biomass expansion factor for conversion of annual net increment to above-ground biomass increment (BEF1)

Biomass expansion factor for conversion of merchantable volume to above-ground biomass (BEF2)

Reference soil organic carbon stock (SOCref) (t C / ha): 45.200

Relative C stock change factors

Land use (FLU): 1.000 Management (FMG): 0.750 Input (FI): 1.000

Tier 2 parameters

Biophysical parameters

C-stock-related parameters

Adding/removing subdivisions

Add Copy Delete

Save Undo Close

Area data to estimate land's sources/sinks → **The Land Representation Manager**

- **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-checking in area data input
 - Tracking of unit of lands across the time series - *spatially explicit tracking under Approach 3-*
- **Identifies each unit of land through the identification code**
- **It is composed by 3 Tabs:**
 - Regions
 - Land Representation table
 - Annual land representation table

Regions Tab

Land Representation Manager

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

Whole country area (ha)

Region name	Area (ha)	Approach	Remark
Region I	1,000.000	Approach 1	
Region II	1,000.000	Approach 2	
Region III	1,000.000	Approach 3	
Region IV	1,000.000	Approach 2	
*			
Total	4000.000		

- The territory inventoried can be reported under 1 Region only or under a number of Regions
- For each Region to be input:
 - Name
 - Area –it cannot change across the inventory time series–
 - Approach for Land Representation –to be selected among the 3 IPCC Approaches–
- Thus, the IPCC Inventory Software builds a consistent land representation for each of the Regions of an inventoried territory

The Land Representation Manager

Land representation table Tab

Land Representation Manager

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

Region: Region 4 | Region area (ha)

Land use category

- Forest Land
- Cropland
- Grassland
- Wetlands
- Settlements

Land use subcategory

- Settlements (Treed)
- urban

Land Unit Parameters

C pools / Methods

- Biomass change: Gain & Loss
- DOM - Deadwood: Gain & Loss
- DOM - Litter: Gain & Loss
- SOM - Mineral: Default

Save | Cancel

Land unit code (Automatic)	Land unit code (User defined)	Previous Land use subcategory	Previous Land use subdivision	Transition Period (D) (years)	Year of conversion	Remark
TSL-U-1	history with multiple changes	Settlements (Treed)	urban	20	2002	
		Managed Forest Land	Tectona grandis Planted Forest	20	1983	
		Cropland Annual Crops	maize organic drained	20	1975	
		Managed Grassland	prairie organic rewetted inland	20		

All land use categories/subcategories/subdivisions including the historical

Input Transition period to each conversion

Tier 2 parameters

Select methodology for each C pool

Land Representation Manager

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 | 2035

Land use category	Area (2035) (ha)	Remark
Forest Land	2,270,000	
Managed Forest Land	1,540,000	
Managed Natural		

Land Representation Manager

Worksheets where GHG emissions/removals

Biomass increase (G&L 1/4) | Biomass loss (G&L 2/4) | Biomass loss (G&L 3/4) | Biomass loss (G&L 4/4) | Biomass change (SD) | Biomass change (Abrupt) | DOM (G&L 1/1) | DOM (SD 1/1) | SOM mineral - Formulation A - IPCC Eq 2.25 (Information Item) | SOM Mineral (Approaches 2 and 3) | SOM Mineral (SD) | SOM Organic Drained | SOM Organic Rewetted

Worksheet: Agriculture, Forestry and Other Land Use | 2035

Sector: Agriculture, Forestry and Other Land Use

Category: 3.B.1.a - Forest land Remaining Forest land

Sheet: For annual increase in carbon stocks biomass (includes above-ground and below-ground biomass)

Region: GFOI example | - Approach 2

Land use category				Equation 2.9				Equation 2.10					Equation 2.9	
Land unit code	Initial land use	Land use during reporting year	Area (ha)	Average net annual increment of growing stock (m ³ / ha / yr)	Biomass expansion factor for conversion of annual net increment to above-ground biomass increment	Basic wood density (t d.m. / m ³ fresh volume)	Biomass conversion and expansion factor for increment (t d.m. / m ³ wood volume)	Average annual above-ground biomass growth (tonnes d.m. / (ha * yr))	Ratio of below-ground biomass to above-ground biomass (t bg d.m. / t ag d.m.)	Average annual biomass growth above- and below-ground (tonnes d.m. / (ha * yr))	Carbon fraction of dry matter (tonnes C / tonne d.m.)	Annual increase in biomass carbon stocks due to biomass growth (tonnes C / yr)		
Land unit code	Initial land use	Land use during reporting year	National statistics or international data sources	National statistics or international data sources	Table 3.A.1.10 / National statistics or international data sources	Tables 4.13 / 4.14 / 4.6 WS / National statistics or international data sources	BCEFI = BEF1 * D / Specified	Gw = Iv * BCEFI / Specified	Zero (0) or Table 4.4 / 4.5 WS / National statistics or international data sources	Gtotal = Gw * (1+R)	0.47 / Table 4.3 / 0.451 WS mangroves	ΔCG = A * Gtotal * CF		
	Δ	Δ	A	Iv	BEF1	D	BCEFI	Gw	R	Gtotal	CF	ΔCG		
U2	Managed For...	Managed Nat...	Managed For...	Managed Nat...	705,000	4,600		0.840	3,864	0.330	5,139	0.470	1,702,847	
U3.13		Managed Nat...		Plantation	45,000	14,600		0.530	7,738	0.220	9,440	0.470	199,664	
U3.14		Managed Nat...		Plantation	45,000	14,600		0.530	7,738	0.220	9,440	0.470	199,664	
U3.15		Managed Nat...		Plantation	45,000	14,600		0.530	7,738	0.220	9,440	0.470	199,664	
U3.16		Managed Nat...		Plantation	45,000	14,600		0.530	7,738	0.220	9,440	0.470	199,664	
U2.23		Plantation		Managed Nat...	7,000	4,600		0.840	3,864	0.330	5,139	0.470	16,908	
U2.24		Plantation		Managed Nat...	8,000	4,600		0.840	3,864	0.330	5,139	0.470	19,323	
U2.25		Plantation		Managed Nat...	7,000	4,600		0.840	3,864	0.330	5,139	0.470	16,908	
U2.26		Plantation		Managed Nat...	8,000	4,600		0.840	3,864	0.330	5,139	0.470	19,323	
U3		Plantation		Plantation	265,000	14,600		0.530	7,738	0.220	9,440	0.470	1,175,797	
U2.13	Unmanaged...	Unmanaged...		Managed Nat...	30,000	4,600		0.840	3,864	0.330	5,139	0.470	72,462	
U2.14		Unmanaged...		Managed Nat...	30,000	4,600		0.840	3,864	0.330	5,139	0.470	72,462	
U2.15		Unmanaged...		Managed Nat...	30,000	4,600		0.840	3,864	0.330	5,139	0.470	72,462	
U2.16		Unmanaged...		Managed Nat...	30,000	4,600		0.840	3,864	0.330	5,139	0.470	72,462	
Total					1,300,000						93,454		4,039,607	

Current Land use subdivision

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 (2035) (ha)	Remark	P	M
UFL-UN-NF-UD-1	U1	Unmanaged Forest Land	Unmanaged Natural	NA	NA	730,000			

Annual land representation matrix Tab

Land Representation Manager

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

Region: GFOI example | Region area (ha): 4,000,000 | Approach 2 | 2035

		Initial	Forest Land		Cropland		Grassland		Wetlands		Settlements		Other Land		Final Area (ha)	Net change (ha)
Final		Managed Forest Land	Unmanaged Forest Land	Cropland Annual Crops	Cropland Perennial Crops	Managed Grassland	Unmanaged Grassland	Managed Wetlands	Unmanaged Wetlands	Settlements (Treed)	Settlements (Other)	Managed Other Land	Unmanaged Other Land			
Forest Land	Managed Forest Land	1,450,000	30,000			60,000								1,540,000	90,000	
	Unmanaged Forest Land		730,000											730,000	-45,000	
Cropland	Cropland Annual Crops		15,000	1,075,000										1,090,000	15,000	
	Cropland Perennial Crops													0,000	0,000	
Grassland	Managed Grassland					640,000								640,000	-60,000	
	Unmanaged Grassland													0,000	0,000	
Wetlands	Managed Wetlands													0,000	0,000	
	Unmanaged Wetlands													0,000	0,000	
Settlements	Settlements (Treed)													0,000	0,000	
	Settlements (Other)													0,000	0,000	
Other Land	Managed Other Land													0,000	0,000	
	Unmanaged Other Land													0,000	0,000	
	Initial Area (ha)	1,450,000	775,000	1,075,000	0,000	700,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	4,000,000	0,000	

IPCC Inventory Software **Guide to Land Representation**

○ Download it at

<https://www.ipcc-nggip.iges.or.jp/software/index.html>

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○ Next iteration, a step-by-step description of a land representation input to be added



Thank you

<https://www.ipcc-nggip.iges.or.jp/software/index.html>

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INTERGOVERNMENTAL PANEL ON climate change

