

DOCUMENTATION AND CATEGORY BY CATEGORY DESCRIPTION

Training Workshop on the National System for the GHG Inventory



Coalition for Rainforest Nations



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giz

UN-REDD
PROGRAMME



Overview of Presentation

- Aim of Category by Category description
- Category by Category description requirements
- Category by Category description items
- An example of Category by Category description
- Conclusions

Documentation and Category-by-Category description (CbC)

An estimated value has no meaning if all needed information has not been provided to understand how the value has been calculated -and reproduce it- and to assess what it represents.

Aim of CbC

The aim of the category by category description is to record all information regarding methods and data used for estimating the emissions/removals from the category

in order to:

- allow to reproduce the estimate;
- assess the consistency of method and data with IPCC guidelines and UNFCCC requirements;
- assess the correspondence of the estimates with the category boundary/definition.

CbC requirements

Transparency is the key principle; completeness is an essential requirement to achieve transparency.

- The assumptions and methodologies used should be clearly explained for each source or sink category to ensure transparency;
- The uncertainties in the data used for all source and sink categories must be quantitatively estimated;
- Any methodological or data gaps should be documented in a transparent manner to facilitate an assessment of completeness;
- A QA/QC plan is required from each Party, as well as general, for each source/sink category and specific for key categories, control procedures.

CbC requirements

The archiving of all information related to the methods and data used for estimating the emissions/removals from the category is essential.

All the reference material, estimates and calculation sheets, as well as the documentation on scientific papers and the basic data needed for the estimates from the category, should be stored and archived.

This information shall also include internal documentation on QA/QC procedures, external and internal reviews, documentation on annual key categories and key category identification and planned improvements.

CbC Items:

In category description, the items to be reported and documented, for each category, are:

- Category information
- Methodological information;
- Data Information
- Estimate's assessment

Category-information Elements

- Sector affiliation;
- Gas(es);
- Relevance (*is it a key category?*);
- Category description, definition and boundaries;
- Related human activities/practices and impacts;
- Impacts of indirectly human-induced and natural disturbances;
- Historical trends in emissions and removals;
- Any other national circumstance;

Methodological-information Elements

- Method description;
- Reasons for having selected the method;

then, in case of country-specific method, description of:

- Assumptions;
- Equations and related processes;
- Inputs;
- Sensitivity analysis
- Outputs;
- Reference(s);

Data-information Elements

→ Input Data:

- Activity data:

- Unit
- Source and date
- Methods for collecting and elaborating data
- Uncertainty
- QA/QC checks
- Verification with independent datasets;
- References

Data-information Elements

→ Input Data:

- Emissions factors/carbon stock change factors/other parameters:
 - Unit
 - Source and date
 - Methods for collecting and elaborating data
 - Uncertainty
 - QA/QC checks
 - Verification with independent datasets
 - References

Data-information Elements

then, in case of country-specific method, description of:

→ Parameters and country specific factors

- Unit
- Source and date
- Methods for collecting and elaborating data
- Uncertainty
- QA/QC checks
- Verification with independent datasets;
- References

→ Intermediate Output Data (outputs by an equation used as inputs in a next-step equation):

- Unit
- Uncertainty
- QA/QC checks
- Verification with independent datasets;

Estimate-Assessment Elements

→ Consistency with IPCC guidelines and UNFCCC requirements:

- Methods consistency:

 - equations and related processes

- Data consistency:

 - Activity data,

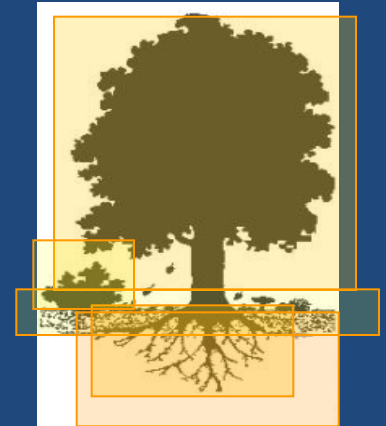
 - Emission/Carbon stock-change Factors / Parameters, Intermediate Outputs.

→ Consistency of the estimate with category definition and boundary

An example of CbC description: *forest land remaining forest land (Italy)*

→ *Category information*

- Sector: LULUCF
- Gases: CO_2 , CH_4 , N_2O
- Relevance: *key category*



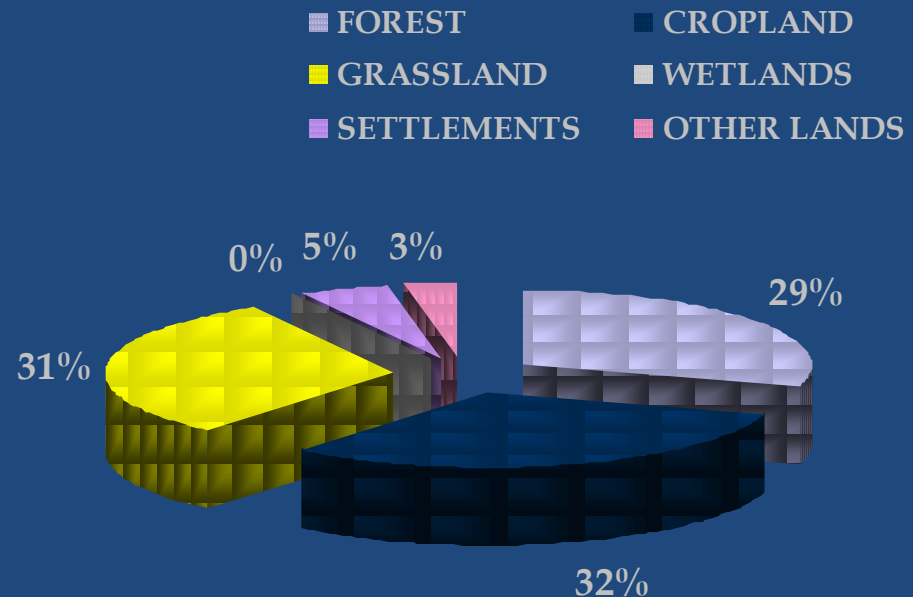
- Category description, definition and boundaries:

- *GHG emissions from living biomass, dead organic matter and soils, from forest land remaining forest land have been reported.*
- *Forest definition used by Country is the same definition applied by the FAO for its Global Forest Resource assessment (FAO FRA 2000). This definition is consistent with definition given in Decision 16/CMP.1*
- *The reporting area boundaries have been identified with the administrative boundaries of Italian regions (NUTS2 level).*

An example of CbC description: *forest land remaining forest land (Italy)*

→ *Category information*

- Italy's national circumstances

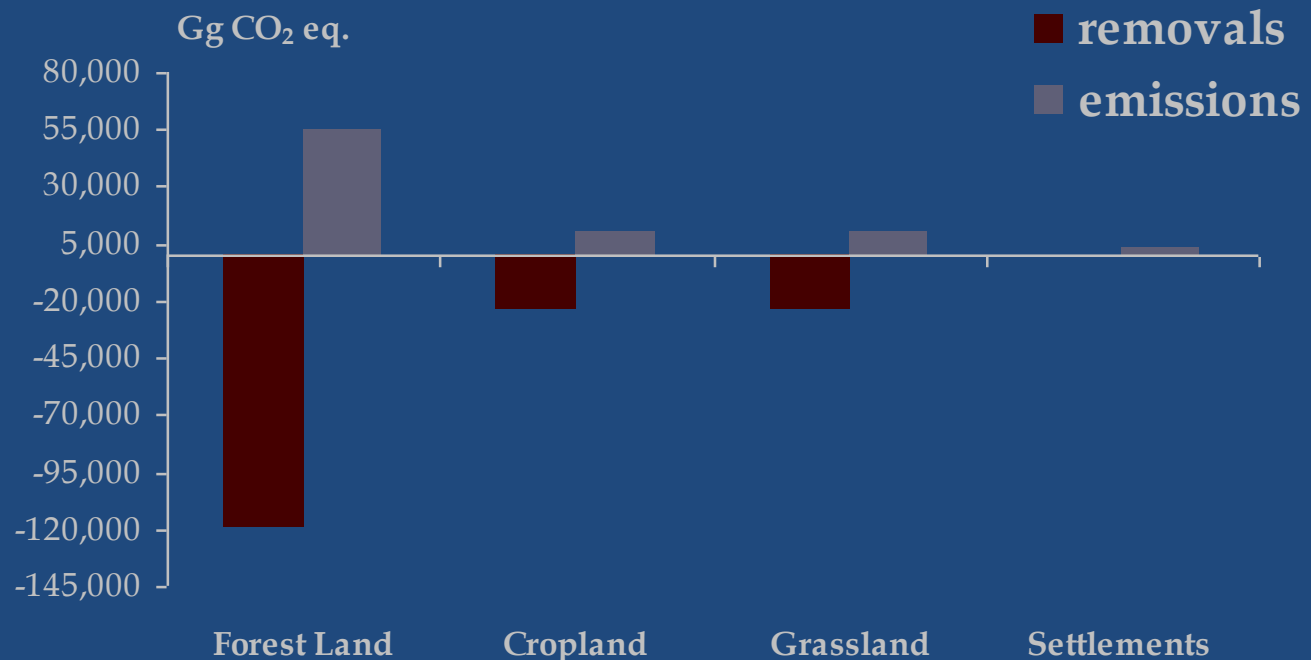


- *Forest Area: 8,838,665 ha, 30% ca of national territory*
- *Steady increase since the 70's, rate 77.000 ha· yr-1; + 1.7 milion ha from 1985 to 2008*
- *All forests are managed*

An example of CbC description: *forest land remaining forest land (Italy)*

→ *Category information*

- *Italy has committed to 6.5% reduction below base year GHG emission levels*
- *LULUCF sector is responsible for 87.3 Mt of CO₂ net removals from the atmosphere in 2008*



An example of CbC description: *Forest land remaining forest land (Italy)*

→ Category information

- Related human activities/practices and impacts;
 - *Information on current forestry activities have been reported.*
- Impacts of indirectly human-induced and natural disturbances;
 - *Information on fire occurrences have been reported.*
- Historical trends in emissions and removals;
 - *Time series of emissions and removals for different pools and subcategories have been reported.*

An example of CbC description: *Forest land remaining forest land (Italy)*

- Methodological information:

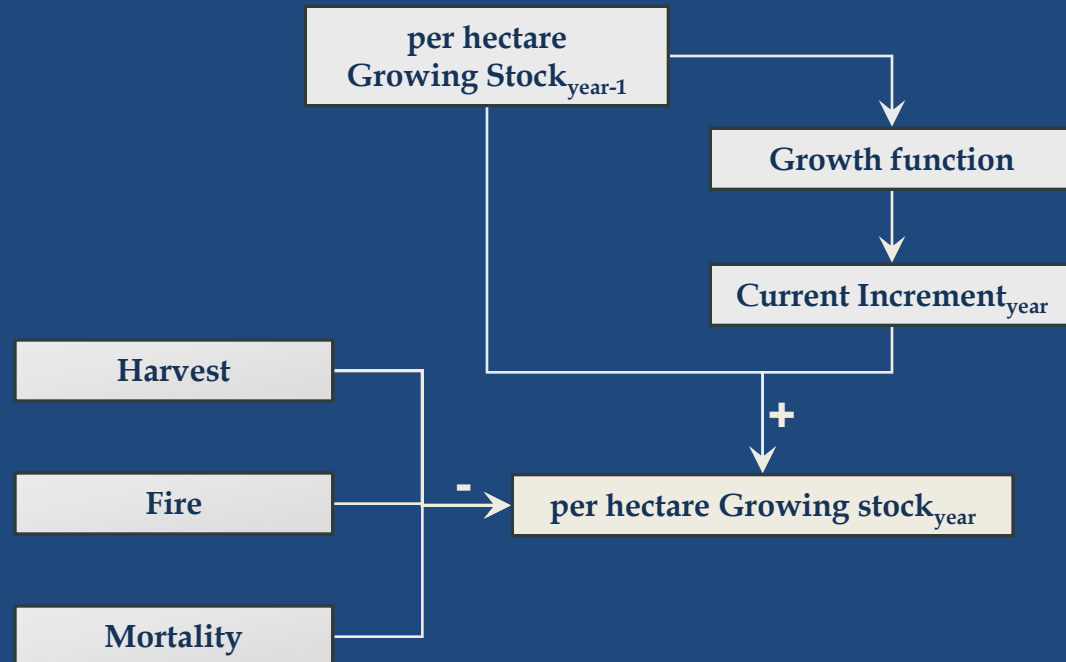
- *A model (for-est) has been used to assess data concerning the growing stock and the related carbon, estimating the evolution in time of the Italian forest carbon pools, according to the GPG classification and definition: living biomass, both aboveground and belowground, dead organic matter, including dead wood and litter, and soils as soil organic matter;*
- *It was conceived on an eco-physiological basis since it uses growing stock as drive variable, growth relationships and measured forest parameters*
- *The model has been applied at regional scale (NUTS2) because of availability of forest-related statistical data;*
- *Flowchart, equations and uncertainty of the model are provided in National Inventory Report.*

An example of CbC description: *Forest land remaining forest land (Italy)*

- Methodological information:

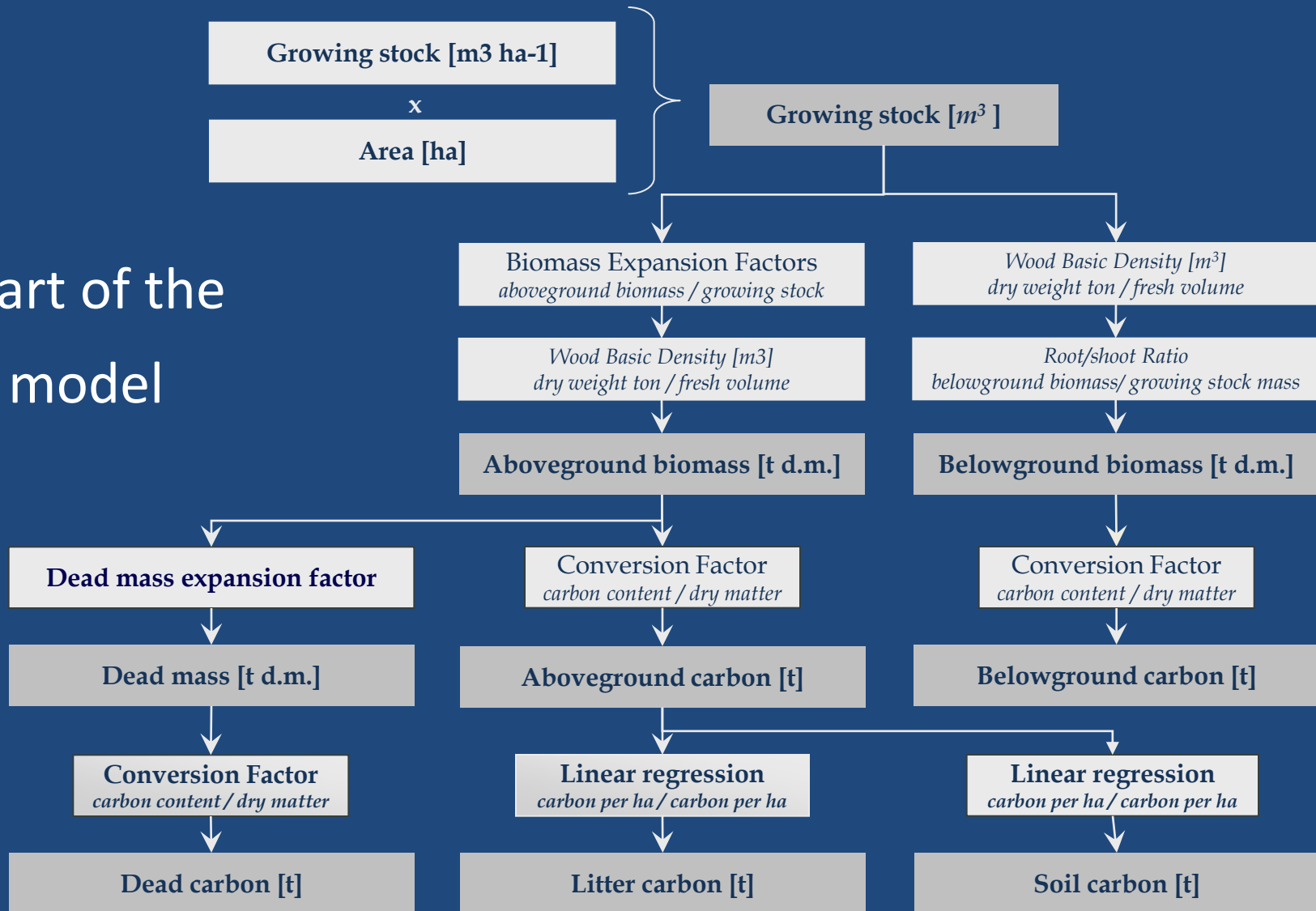
- **STEP 1.** from initial growing stock volume reported in the First Italian National Forest Inventory, for each year, the current increment is computed with the derivative Richards function, for every specific forest typology;

-**STEP 2.** for each year, growing stock per hectare [m^3ha^{-1}] is computed from the previous year growing stock volume adding the calculated current increment and subtracting losses due to harvest, mortality and fire occurred in the current year.



An example of CbC description: *Forest land remaining forest land (Italy)*

Flowchart of the
For-est model



An example of CbC description: *Forest land remaining forest land (Italy)*

- Data Information

- *National Forest Inventories data were input data for the forest area, per region and inventory typologies;*
- *Total commercial harvested wood and forest fires data have been obtained from national statistics;*
- *Biomass Expansion Factors which expands growing stock volume to volume of aboveground woody biomass, Root/shoot ratios which converts growing stock biomass in belowground biomass and Wood Basic Density for conversions from fresh volume to dry weight have been used and referred in National Inventory Report.*

An example of CbC description: *Forest land remaining forest land (Italy)*

- Data Information: List of parameters and data source

Parameter	Source
<i>ABOVEGROUND BIOMASS</i>	
growing stock	From Forest Inventory
biomass expansion factor	From Forest Inventory
wood basic density	From Literature
<i>BELOWGROUND BIOMASS</i>	
root-shoot ratio	From Literature
<i>LITTER</i>	
mass of aboveground litter	From Literature (CANIF project)
<i>SOIL</i>	
soil organic C content	From Literature (CONECOFOR project)
<i>DEAD MASS</i>	
dead mass expansion factor	From Literature (IPCC GPG 2003)

An example of CbC description: *Forest land remaining forest land (Italy)*

- Data Information

- *Uncertainties linked to the carbon pools estimation were calculated for the years from 1985 onward, using GPG Tier 1 Approach (error propagation method)*
- *The overall uncertainty related to the model estimates between 1985 and 2008 was 61.7%*

$$E_{1985-2008} = \frac{\sqrt{(E_{1985}V_{1985})^2 + (E_{2008}V_{2008})^2}}{|V_{1985} + V_{2008}|}$$

$V_{1985}, V_{2008} = \text{growing stock (m}^3\text{ha}^{-1}\text{)}$

- *Information on data sources, uncertainty, QA/QC checks, references are provided in in National Inventory Report.*

Carbono stock	Aboveground biomass	tCO _{2eq} ha ⁻¹	137.8
	Belowground biomass	tCO _{2eq} ha ⁻¹	31.5
	Dead mass	tCO _{2eq} ha ⁻¹	20.8
	Litter	tCO _{2eq} ha ⁻¹	27.4
	Soil	tCO _{2eq} ha ⁻¹	264.7
Uncertainty	Growing stock	E _{NFI}	3.2%
	Current increment	E _{NFI}	51.6%
	Harvest	E _H	30%
	Fire	E _F	30%
	Drain and grazing	E _D	30%
	Mortality	E _M	30%
	Bef	E _{BEF1}	30%
	R	E _{BEF2}	30%
	DCF	E _{DEF}	30%
	Litter	E _L	161%
	Soil	E _S	152%
	Basic density	E _{BD}	30%
	C Conversion factor	E _{CF}	2%

An example of CbC description: *Forest land remaining forest land (Italy)*

→ Estimate's assessment

- Methods consistency:

- *According to annual reviews by UNFCCC ERT's, the applied model is fully consistent with IPCC guidelines and UNFCCC requirements; equations and information are reported in National Inventory Report to ensure transparency and to facilitate the review process.*

- Data consistency:

- *Time series of the activity data, and the different EF, C stock change factor and parameters used are reported in National Inventory Report to ensure transparency and facilitate the review process.*

- Consistency of the estimate with category definition and boundary:

- *The C stock changes assessment is fully consistent with IPCC forest land category.*

An example of CbC description: *Forest land remaining forest land (Italy)*

→ Critical issues:

- *Need to use remote sensed data to create a reliable informative basis (i.e. to assess land areas, to report the land use categories), consistent with the IPCC methodologies and definitions*
- *need to track land use changes on a spatial basis, to answer Kyoto reporting requirements;*
- *needs of more consistent informative basis on soils and dead mass carbon pools;*
- *To address these issues, a so-called “National registry for carbon sinks” has been designed and included in the Italian national system.*
- *One of the key elements of the accounting system in the National registry for forest carbon sinks is the National Land-Use Inventory (IUTI), aimed at identifying the land uses and land-use changes over the national territory.*

An example of CbC description: *Forest land remaining forest land (Italy)*

- *The Land-Use Inventory is based on a sampling grid and the relative sample plots (1,200,000 sampling points), uniformly distributed throughout the entire Italian national territory, with a non-aligned systematic statistical model.*
- *The Land-Use Inventory is going to provide annually time-series , at NUT2 level, of the areas classified within any land-use category and any land-use change subcategory to and from forest land use. The analysis of sample plots is being carried on using remote sensed data.*
- *The adopted classification methodology ensures that any unit of land could be classified univocally (exclusion of multiple classification of the same unit of land) under a category (exclusion of the null case), by means of:*
 - *a systematic sampling design to select classification points;*
 - *a list of land-use definitions as reported in the IPCC GPG land-use classification;*
 - *a list of land-use indicators able to indicate the presence of a certain use on the land;*
 - *a classification hierarchy to facilitate land use classification*

Annotated NIR Outline: Chapter 7 LULUCF

Annotated NIR Outline:

http://unfccc.int/files/national_reports/annex_i_ghg_inventories/reporting_requirements/application/pdf/annotated_nir_outline.pdf

7.1 Overview of sector

7.2 Forest Land (5A)

7.2.1 Description

7.2.2 Information on approaches used for representing land areas and on land-use databases used for the inventory preparation

For the land use conversion, the use of land use change matrices have to be documented, detailing their elaboration, data sources and final use.

Annotated NIR Outline: Chapter 7 LULUCF

7.2.3 Land-use definitions and the classification systems used and their correspondence to the LULUCF categories

Information on forest definitions adopted by Country, under Kyoto Protocol and under the Convention have to be provided, to ensure transparency and to maintain coherence and congruity between the two forest-related reporting.

7.2.4 Methodological issues

The description of the methodologies used has to be provided, explaining assumptions made and parameters used. In case of country specific methodology, reference to any method, EF, parameter or data source should be provided.

7.2.5 Uncertainty and time-series consistency

Uncertainty assessment has to be documented, referring methods and assumptions.

Annotated NIR Outline: Chapter 7 LULUCF

7.2.6 Category-specific QA/QC and verification

Specific QA/QC procedures and different verification activities implemented during the inventory development process should be figured out.

7.2.7 Category-specific recalculations

To meet the requirements of transparency, consistency, comparability, completeness and accuracy of the inventory, the entire time series from 1990 onwards should be checked and revised every year during the annual compilation of the inventory. Differences from previous sectoral estimates have to be transparently explained, taking into account changes in the methodologies, changes due to different allocation of emissions and changes due to error corrections, new information available.

7.2.8 Category-specific planned improvements

Planned improvements (data sources, emission factors, parameters, new methodologies) have to be reported, in order to document the potential update of the overall quality objectives of the inventory.

Annotated NIR Outline: Chapter 11 KP-LULUCF

11.1 General information

11.1.1 Definition of forest and any other criteria

including forest parameters submitted in initial report and in tab. NIR.1, and any other criteria (e.g. minimum width) or any relevant information.

11.1.2 Elected activities under Article 3.4 of the Kyoto Protocol

11.1.3 Description of how the definitions of each 3.3 activity and any elected 3.4 activity have been implemented and applied consistently over time.

11.1.4 Description of hierarchy among 3.4 activities, and how they have been consistently applied in determining how land was classified.

Annotated NIR Outline: Chapter 11 KP-LULUCF

11.2 Land-related information

11.2.1 Spatial assessment unit used for determining units of land under 3.3

If the monitoring unit is different from the spatial unit used in reporting, the computation procedures / statistical approach to convert data should be documented transparently

11.2.2 Methodology used to develop the land transition matrix

Consistency of land area reporting over time is fundamental. The land use change matrices allow to check this consistency; they should be developed both for Convention and KP reporting (table NIR 2).

Annotated NIR Outline: Chapter 11 KP-LULUCF

11.2 Land-related information

11.2.3 Maps and/or database to identify the geographical locations, and the system of identification codes for the geographical locations

Describe clearly the reporting method used (1 or 2).

Areas of lands subject to Art. 3.3 and 3.4 activities need to be “identifiable” (particularly important if FM does not match “managed forest”, or if there are “unmanaged forests” reported under Convention).

In case the approach used is not spatially-explicit, or if the spatial resolution at which land-use changes are tracked is not consistent with the size parameter selected by a country to define forest, supplementary information must be provided to allow identification of lands under Art 3.3 or 3.4 activities in a complete and transparent way.

Annotated NIR Outline: Chapter 11 KP-LULUCF

11.3 Activity-specific information

11.3.1 Methods for carbon stock change and GHG emission / removal estimates

11.3.1.1 Description of the methodologies and the underlying assumptions used (e.g. including verification of results from higher tier methods, discussion on activity data and emission factors)

Indicate any difference with Convention reporting

Explain the methodological choice: if an activity is a “key category”, higher tiers methods should be used.

For Forest land, Tier 1 approach provided assumes no change in DOM and soil pools. However, under KP reporting, this Tier 1 assumption can be applied only if FM is not a key category. Otherwise, Tier 2 or 3 methods should be applied to all pools, unless the Party chooses not to report a certain pool and can demonstrate that it is not a source.

Given the high uncertainty of the LULUCF sector, any verification efforts help increasing the overall confidence on the reported numbers.

Annotated NIR Outline: Chapter 11 KP-LULUCF

11.3 Activity-specific information

11.3.1.2 Justification when omitting any carbon pool or GHG emissions/removals from activities under Article 3.3 and elected activities under Article 3.4

Information to demonstrate that excluded pools, if any, are not a net source of GHGs, may include: representative and verifiable sampling and analysis to show that the pool has not decreased; reasoning based on sound knowledge of likely system responses; surveys of peer-reviewed literature; models (if transparently documented and appropriately verified).

KP reporting has more C pools than Convention reporting (above biomass, below biomass, litter, dead wood, soil).

Annotated NIR Outline: Chapter 11 KP-LULUCF

11.3 Activity-specific information

11.3.1.3 Information on whether or not indirect and natural GHG emissions and removals have been factored out (elevated CO₂, nitrogen deposition; effects of age structure resulting from activities prior to 1990)

For 3.4 activities the issue of “factoring out” was solved during negotiations with the cap for forest management and with the net-net accounting for the other 3.4 activities.

For 3.3 activities, the dynamic effect of age is not relevant since all these activities have occurred after 1990. For the elevated CO₂ concentration and the indirect nitrogen deposition there are not methodologies adopted by the UNFCCC to account for. The absence of methodologies could be used by Parties in order to justify the absence of the factoring out.

11.3.1.4 Changes in data and methods since the previous submission (recalculations)

Annotated NIR Outline: Chapter 11 KP-LULUCF

11.3 Activity-specific information

11.3.1.5 Uncertainty estimates

Separate annual uncertainty estimates should be provided for each LULUCF activity, for each reported carbon pool, each greenhouse gas and geographical location. The IPCC GPG LULUCF provides default values that can be used in the uncertainty estimation when national data on the uncertainties are difficult to derive.

11.3.1.6 Information on other methodological issues

measurement intervals, inter-annual variability, etc or planned activities that may lead to a potential change in estimates reported

11.3.1.7 The year of the onset of an activity, if after 2008

Annotated NIR Outline: Chapter 11 KP-LULUCF

11.4 Article 3.3

11.4.1 Information that demonstrates that activities under Art. 3.3 began on or after 1 January 1990 and before 31 December 2012 and are **direct human-induced**.

It is *good practice* to provide documentation that all afforestation and reforestation activities included in the identified units of land are direct human-induced. Relevant documentation includes forest management records or other documentation that demonstrates that a decision had been taken to replant or to allow forest regeneration by other means

11.4.2 Information on how harvesting or forest disturbance that is followed by the re-establishment of forest is distinguished from deforestation

11.4.3 Information on the size and geographical location of forest areas that have lost forest cover but which are not yet classified as deforested

Annotated NIR Outline: Chapter 11 KP-LULUCF

11.5 Article 3.4

11.5.1 Information demonstrating that 3.4 activities have occurred since 1 January 1990 and are human-induced;

11.5.2 Information relating to Forest Management

(e.g. that the definition of FM conforms with the definition of forest by the country and of FM in Decision 16/CMP.1)

11.5.2 Information relating to CM, GM and RV, if elected, for base year;

Annotated NIR Outline: Chapter 11 KP-LULUCF

11.6 Other information

11.6.1 Key category analysis for 3.3 and any elected 3.4 activities

i.e. table NIR.3 + discussion on how this analysis is used to prioritize improvement of the KP-LULUCF inventory.

If a category is identified as key in the LULUCF sector under the Convention reporting, it should be considered as a key category also for KP reporting.

If a LULUCF activity can be included under several categories under the Convention (e.g. D), it should be considered as key if the total emissions from this activity is larger than the smallest category considered key in the key category analysis under the Convention

11.7 Information relating to Article 6

(Joint Implementation, if applicable)

Conclusion

The category by category description requires to describe and list information on data and methods used for estimating the emissions/removals from the category.

The category by category description is functional to the key category analysis.

The category by category description is essential to ensure transparency and to assess consistency with IPCC Guidelines and UNFCCC requirements.

How to track CbC documentation

- see Word template file