

Carbon sequestration by Forest and soil

...standard for accounts for carbon sequestration in the SEEA 2012...

- **Timber**
- **Tree biomass**
- Ground vegetation
- Soil
- TOTAL

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Introduction: Carbon in Finnish forests ten years ago

FINLAND / Draft 31.5.2002

Changes in total carbon storage in forest resources

	Opening stock	Change	Closing stock		
	1990	90-99	1999	1990	Change 90 to 99
FOREST ECOSYSTEM	Million tons of carbon			%	%
Tree biomass, of which	624	62	687	18,2	10,0
- stem wood ('timber')	373	39	412	10,9	10,4
- other tree biomass, of which	251	24	275	7,3	9,5
-- branches and twigs	76	7	83	2,2	9,2
-- needles and leaves	50	4	54	1,5	8,0
-- roots	125	13	138	3,6	10,4
Ground vegetation*	11	..	11	0,3	0,0
Forest soils, of which	2 798	-48	2 750	81,5	-1,7
- in mineral soil	938	27,3	..
- in peat land	1 860	54,2	..
TOTAL	3 433	15	3 448	100	0,4

*Includes litter on the ground, humus layer and earth down to 60 cm depth

Land use, land use change and forestry (LULUCF) in greenhouse gas reporting

In reporting greenhouse gases according to the UN Climate Convention and the Kyoto protocol, the LULUCF category is sub-divided into:

- Forest land,**
- Cropland,
- Grassland,
- Wetlands,
- Settlements and
- Other land.

Forest land in greenhouse gas (GHG) reporting

The Forest land consists of:

Forest land remaining forest land or converted to forest land:

1. Managed (intensively/extensively) forest land
2. Natural, undisturbed forest land

Managed forests are subject to periodic or ongoing human interventions.

The GHG reporting covers only Managed forests.

Forest land in greenhouse gas reporting

The key entity is

annual change in carbon stock, as a sum (1 + 2 + 3):

1 Change in carbon stocks in living biomass (of trees)

Increase due to above and below ground biomass growth

Decrease due to fellings, fuelwood gathering, disturbances

2 Change in carbon stocks in dead wood and litter

3 Change in carbon stocks in mineral and organic soil

Equations and instructions for calculations of changes in carbon stocks are available from the International panel on Climate Change (IPCC) Good Practice Guidance for LULUCF.

Carbon stock in the Global Forest Resource Assessment (FRA) of the FAO

- Carbon stock of forests indicates the contribution of Forest and Other wooded land to the carbon cycle.
- Unit of reporting is Million metric tonnes. Reported figures refer to area classified as **Forest** and as **Other wooded land**.
- Includes both managed and natural, undisturbed forests. Otherwise, categories and definitions used in FRA correspond to those by the IPCC.
- Carbon content of living biomass is usually derived from figures on growing stock of timber and biomass stock of trees by using conversion factors.
- Conversion factors from timber and biomass stock are not directly used for carbon stock changes of the soil. Data availability on carbon in soil is weaker than on timber and tree biomass.



Asset account for timber/tree biomass: C, GgCO² eq.

Statistics Finland

	Cultivated		Non-Cultivated		Total	
	Forest	Other wooded land	Forest	Other wooded land	Forest	Other wooded land
Opening stocks						
<i>Changes due to transactions</i>						
Changes in inventories						
Acquisitions less disposals of non-produced assets						
<i>Additions to stock</i>						
Natural growth						
Reclassifications / reappraisals						
<i>Deductions from stock</i>						
Extraction of natural resources						
Felling of timber						
Removals						
Industrial roundwood						
Woodfuel						
Timber left in the forest						
Reclassifications / reappraisals						
Environmental degradation of non-produced assets						
<i>Other changes in stock</i>						
Catastrophic losses and uncompensated seizures						
Change in classifications and structure						
Closing stocks						

Conclusions

- The GHG reporting on changes of carbon stocks cover only Managed forests. It excludes Natural, undisturbed forest.
- Timber in Managed forest can be seen equal to the SEEA asset category EA.1411 Cultivated timber resources.
- For the SEEA asset accounts, changes of carbon stock in both Cultivated timber and Non-cultivated timber are equally important
- A bridge table between the IPCC reporting and the SEEA asset accounts on carbon sequestration of forests is needed.

Conclusions

- **Changes** in carbon stock of timber and the rest of tree biomass could be included into the SEEA asset accounts on timber, as a standard in the volume 1.
- Rough estimates for annual **opening and closing stocks** of carbon can be derived by using conversion factors from timber to the whole tree biomass (from cubic metres of wood to tons of carbon).
- But: Should the forest asset accounts for carbon and carbon balances wait, until methodologies and data availability on ground vegetation and especially on soil are improved?
- Or do **changes in stocks** of carbon in tree biomass offer enough information for the decision making on optional uses of forests, such as e.g. intensive timber production or protection of forests to prevent climate change?