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Slovenian forest inventory data

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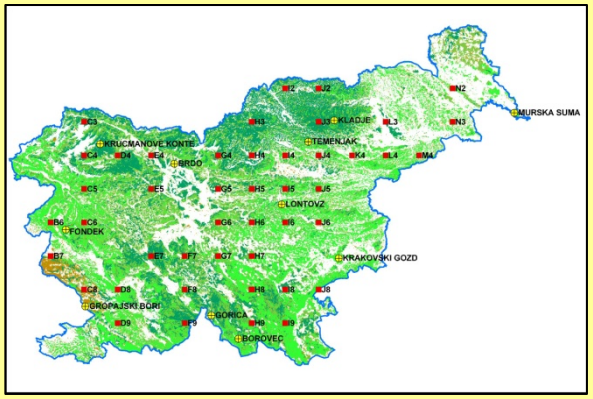
Forests in Slovenia



Slovenia (GFRA 2010 – Slovenia country report, data source NFI):

- forest area: 1.253.000 ha forest (62 %; 0.6 ha forest cover per capita)
- growing stock (326 m3/ha)
- deadwood 18,6 m3/ha (trees, stumps, snags, coarse woody debris)
- increment 8,6 m3/ha year
- removal 3,4 m3/ha year
- accumulation: 5,3 - 6,2 m3/ha year (2000-2007)

CO_2 accumulation:

- CO_2 accumulation in **above and belowground forest biomass** is **20 times** higher than year CO_2 emission
- Yearly CO_2 accumulation in **forest** is about 44 **% of total** annually GHG emissions (CO_2 equivalent Gg)
- FM: co-natural sustainable forest management practice since 1950-1960 (no clear cuts & fertilisation etc., problematic age structure!)

UNFCCC/Kyoto protocol report - LULUCF sector

- time series since 1986 (base year for Slovenia)

Kyoto protocol:
- article 3.3
- article 3.4, FM

5. carbon pools:
- above-ground biomass (calculated from growing stock, data source NFI)
- below-ground biomass (calculated from above-ground biomass, data source NFI)
- dead wood biomass (measurements and calculation, data source NFI)
- litter (samples and soil analysis, data source SFI, BF, expertise)
- soil (samples and litter analysis, data source SFI, BF, expertise)

Data about **land use categories** (area) state and changes:
- agricultural land use map (ALUM) from Ministry of agriculture, forestry and food.

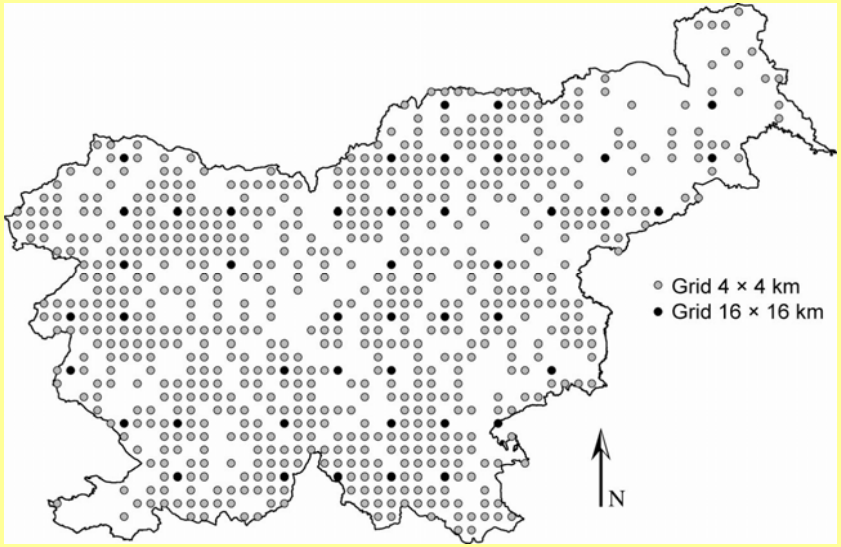
Data sources in forestry – two inventories

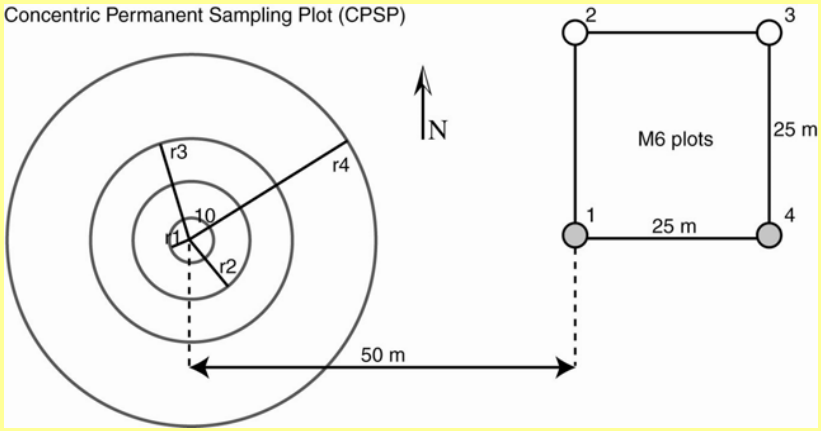
1. **Slovenian forest service (SFS) inventory** for forest management plans: stand wise inventory with permanent sampling plots, problems with consistent time series (change of method), unreliable, quality, 1/10 every year, not updated data, on average 5 years old... **– traditionally data included in Slo official statistical journal and NIR before 2010!)**

2. **Forest and Forest Ecosystem Condition Survey**
   - until y. 2000 no statistical based, reliable large scale forest inventory (national forest inventory) in Slovenia,
   - in y. 2000 - ICP 4x4 km forest health monitoring system was upgraded with additional concentric permanent sampling plots and variables measured

   - reported to GFRA (...2010) and "improved" NIR 2010--

Forest and Forest Ecosystem Condition Survey – Forest inventory system in Slovenia





Sampling grid

- 4x4 km (780 clusters):
  - -periodical (5-10 years)
  - -data from 2000, 2007
- -16x16 km (44 clusters), every year
  - -to detect a changes
- 8x16 km, 8x8 km,...
  - -special surveys (soil, litter, forest functions...)

Sampling cluster

-4 M6 plots (ICP) (right), since 1985

-1 concentric (four cycles) permanent sampling plot (left), since 2000

Forest Inventory 2007

- NIR revision in 2006 – Forest remaining Forest key category, Tier 3, stock change method!
- at the begining of Kyoto period
- new inventory (repetition) in 2012
- 778 sampling clusters
- 4x4 km sampling grid

Data:

- growing stock (DBH <10 cm)
- small trees growing stock (DBH from 0 to 10 cm)
- deadwood
- carbon in litter and soil (plots on 8 x 8 km grid; *16 x 16 grid was a part of the BiosSoil- Soil module Forest Focus EU demonstratrion project; deadwood – a part of the BiosSoil- Biodiversity FF EU*)

Group of variables:

- forest site and stand (general info, site and stand conditions)
- growth and yield (growing stock, increment, mortality, felling)
- biodiversity (woody plants, tree species, dead wood biomass)
- forest functions ***and aditional***
- litter & soil sampling & analysis – limited chemical and phisycal properties

Forest Inventory 2007 – plots, variables, thresholds

Plots	$CPSP_1$	$CPSP_2$	$CPSP_3$	$CPSP_4$
Radius (R) of the plots [m]*	3.09	7.98	13.82	25.23
Area (P) of the plots [m²]	30	200	600	2,000
Characteristics of stand and site	Area of 2,000 m²			
Standing living trees	dbh > 0 cm h ≥ 1.3 m	dbh ≥ 10 cm	dbh ≥ 30 cm	/
Standing dead trees	dbh ≥ 10 cm		dbh ≥ 30 cm	
Lying dead trees	dbh ≥ 10 cm		dbh ≥ 30 cm	
Stumps	d ≥ 10 cm h ≥ 20 cm		/	
Snags	d ≥ 10 cm h ≥ 50 cm		d ≥ 30 cm h ≥ 50 cm	
Coarse woody debris – woody parts of trees (branches, parts of stem etc.)	d ≥ 10 cm l ≥ 50 cm		d ≥ 30 cm l ≥ 50 cm	

Forest Inventory 2007 – calculation

Above-ground biomass (AGB):

- **tree volume** (m^3) input data: **DBH** and **tariffs**: V = f(DBH)
- **growing stock (GS)** (m^3/ha), * area (ha) → (m^3)
- from **GS** to **carbon stock** in **AGB** (tree species)
    - biomass expansion factors (**BEF**): **GS** (m^3) → **AGB** (m^3)
    - wood density (**WD**): **AGB** (m^3) → **AGB** (t)
    - biomass/carbon factor (**CC**): **AGB** (t) → $\mathbf{C_{DWB}}$ (t)

Below ground biomass (BGB):

- input data: **AGB** (t)
- from **AGB** to **carbon stock** in **BGB** (tree species):
    - Root-shoot ratio (**R**): **AGB** (t) → **BGB** (t)
    - biomass/carbon factor (**CC**): **BGB**(t) → $\mathbf{C_{BGB}}$(t)

Forest Inventory 2007 – calculation

Dead wood biomass (outer circle, 20 ar**):**

- **volume:** measuring: **diameter**, **length**
- **type**: large wood piece (D>10 cm, L > 1 m), stump, snag, dead trees (lying/standing)
- **decomposition rate**
- **tree species:** where possible

Dead wood biomass (DWB):

- dead wood **volume** (m^3) input data: **D** and **L, Huber equation, tariffs for trees**
- dead wood stock **(DWS)** (m^3/ha), * area (ha) → (m^3)
- from **DWS** to **carbon stock** in **DWS** (tree species):
  - wood density (**WD**): **DWB** (m^3) → **DWB** (t)
  - biomass/carbon factor (**CC**): **DWB** (t) → $\mathbf{C_{DWB}}$(t)

NIR 2010

- CRF tables 1986-2008 - **change** from previous reports!!!!

- Emissions and removals from sector 5 LULUCEF:
-5,8 Gg CO2 (NIR 2009) » -8,6 Gg CO2 (NIR 2010)

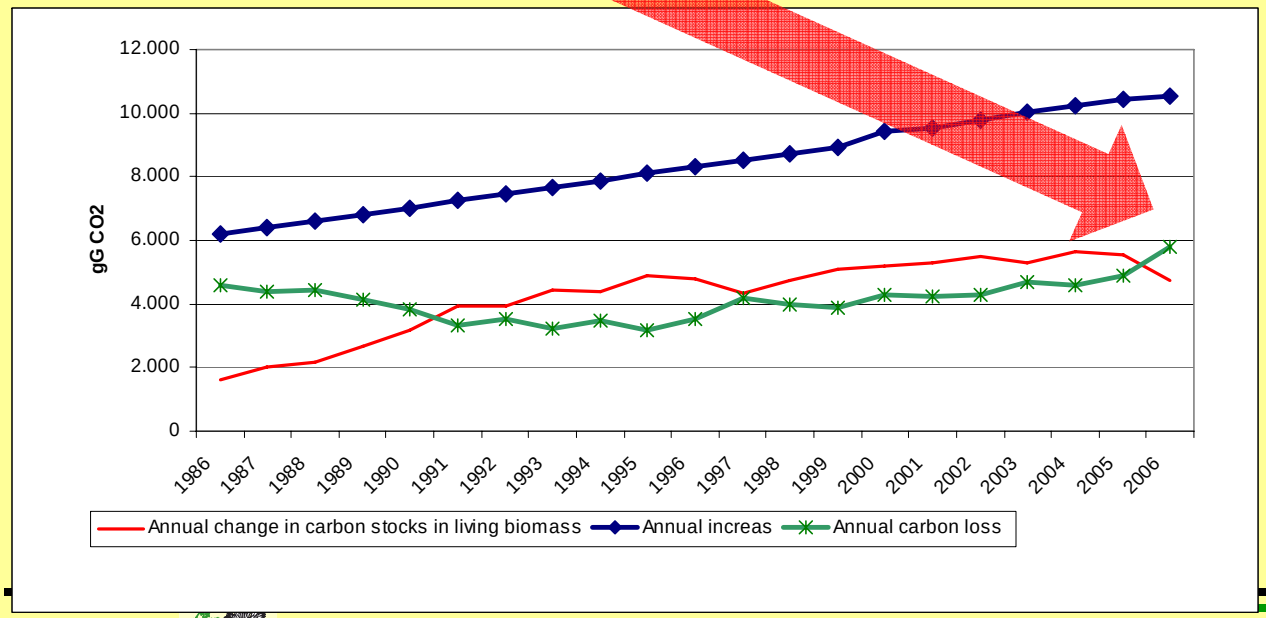
- For NIR 2010 new data from Forest Inventory 2007 was used
  - Method was changed from default to stock change (Tier 3)

- Inventory of other land use categories – **NE / no data (biomass in settlement,…) ??**

- Forest area for UNFCCC and Kyoto report are not the same – **different definitions of forests change forest area**

Figure 7.1.1: LULUCF sector net removals from 1986 to 2008

NIR 2010, improved version, NFI data



NIR 2007, SFS data

UNFCCC vs Kyoto Forest definition

Reporting under **UNFCCC Inventory** considers all forests (according to broader definition and land cover categories from ALUM map) and includes managed forests and unmanaged forests.

Reporting under **KP LULUCF** cover forests which are managed. All forests covered by forest management plans are considered as managed forests. Forests, which are not covered by management plans do not fall into category of managed forests and are consequently treated as unmanaged and are not applicable for article 3.4 of Kyoto Protocol.