

# APAT

*Agency for the Protection of the Environment and for Technical services*



## Italian GHG Inventory

### Land Use, Land Use Change and Forestry

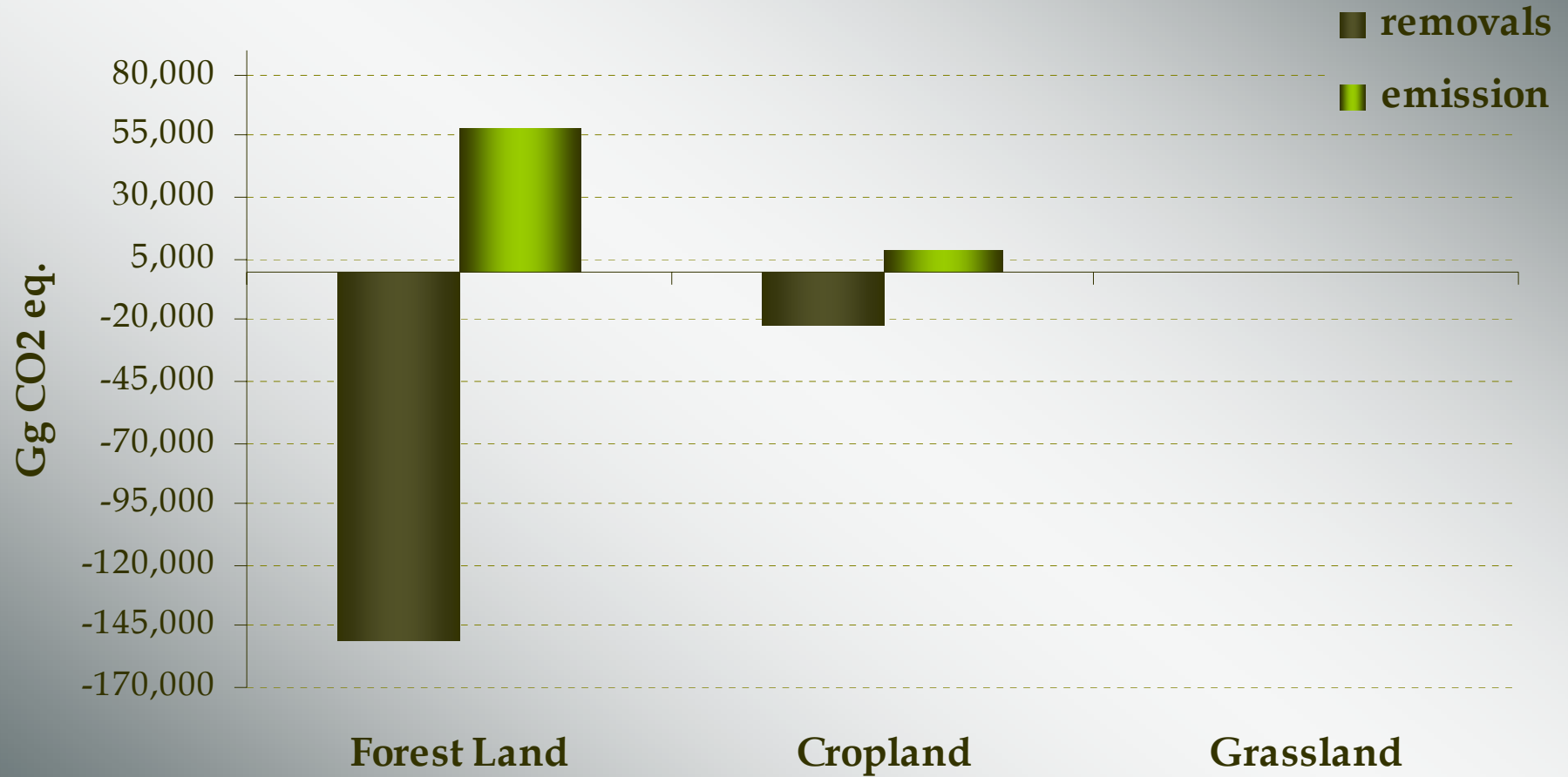
**Marina Vitullo**  
**Riccardo De Lauretis**

## Institutions involved in the compiling of national emission inventory

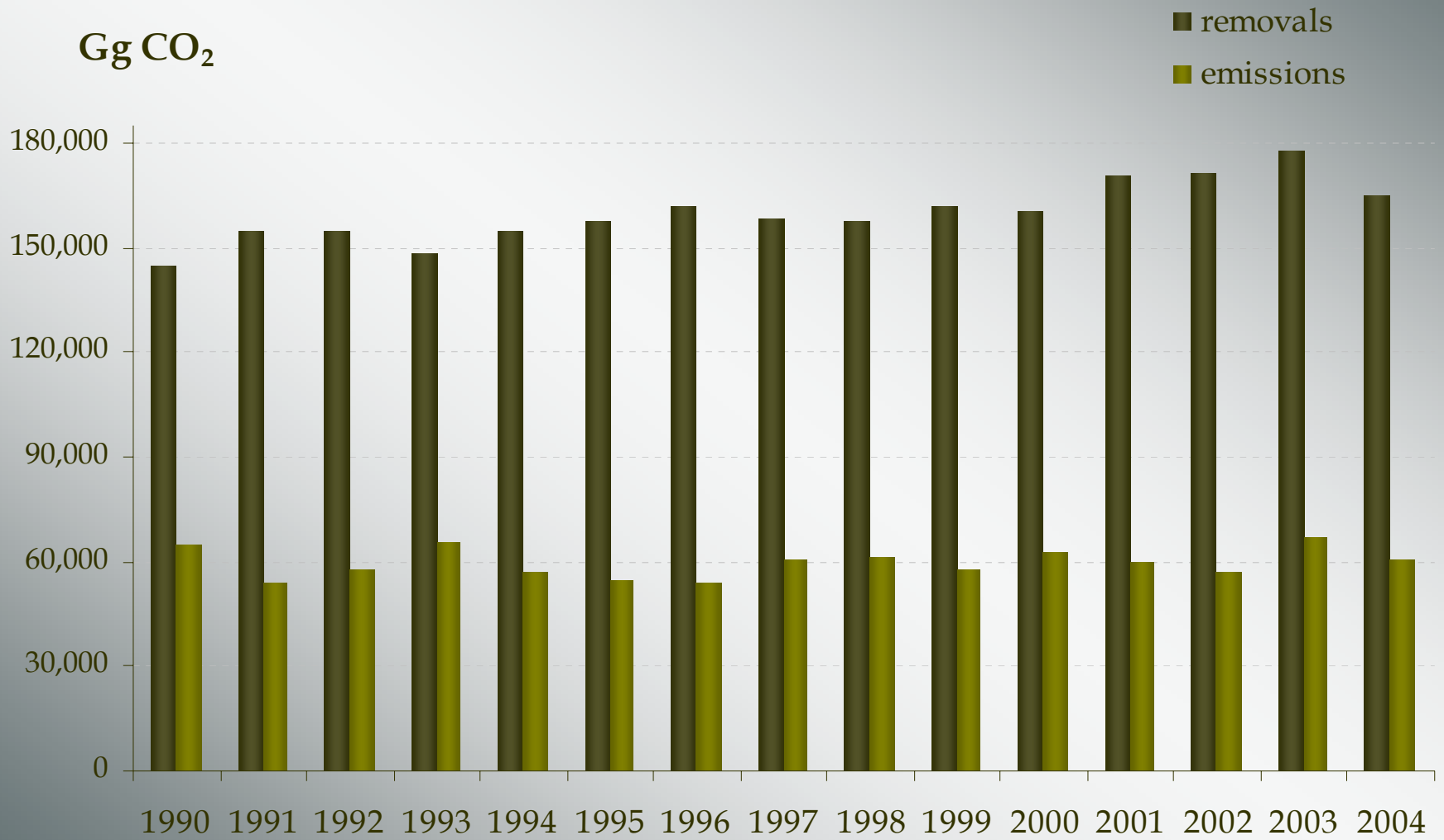
The national Agency for the Protection of the Environment and for Technical services (APAT) is responsible for the compilation of the national air emission inventory, including emissions and removals from LULUCF, through the collection, elaboration and diffusion of data, in the framework of the United Nation Convention on Climate Change and of the Kyoto Protocol

# Relevance of LULUCF emissions and removals in 2005 [Gg CO<sub>2</sub> eq]

CO<sub>2</sub>, CH<sub>4</sub> and NO<sub>2</sub> emissions and removals



# CO<sub>2</sub> removals and emissions in LULUCF sector [Gg CO<sub>2</sub>]



# LULUCF: methods and emissions factors

| GREENHOUSE GAS SOURCE AND SINK<br>CATEGORIES     | CO <sub>2</sub>       |                        | CH <sub>4</sub>       |                        | N <sub>2</sub> O      |                        |
|--|-----------------------|------------------------|-----------------------|------------------------|-----------------------|------------------------|
|  | <i>Method applied</i> | <i>Emission factor</i> | <i>Method applied</i> | <i>Emission factor</i> | <i>Method applied</i> | <i>Emission factor</i> |
| <i>5. Land Use, Land-Use Change and Forestry</i> |                       |                        |                       |                        |                       |                        |
| A. Forest Land                                   | T1,T2,T3              | CS,D                   | T1                    | D                      | T1                    | D                      |
| B. Cropland                                      | T1                    | D                      |                       |                        |                       |                        |
| C. Grassland                                     | T1                    | D                      |                       |                        |                       |                        |
| D. Wetlands                                      |                       |                        |                       |                        |                       |                        |
| E. Settlements                                   | T1                    | D                      |                       |                        |                       |                        |
| F. Other Land                                    |                       |                        |                       |                        |                       |                        |
| G. Other   |                       |                        |                       |                        |                       |                        |

Estimates for the category 5.A (*Forest Land*) were supplied by a growth model; the used emission factor are country specific (CS)

T1 (IPCC Tier 1)

T2 (IPCC Tier 2)

T3 (IPCC Tier 3)

D (IPCC default)

CS (Country Specific)

OTH (Other)

# LULUCF: outcomes of key categories analysis

|       | <i>gas</i>       | <i>categories</i>                 |            |
|-------|------------------|-----------------------------------|------------|
| 5.A.1 | CO <sub>2</sub>  | Forest land remaining forest land | key (L, T) |
| 5.A.2 | CO <sub>2</sub>  | Conversion to forest land         | key (L)    |
| 5.B.1 | CO <sub>2</sub>  | Cropland remaining cropland       | key (L, T) |
| 5.B.2 | CO <sub>2</sub>  | Conversion to cropland            | key (L, T) |
| 5.C   | CO <sub>2</sub>  | Grassland                         | Non-key    |
| 5.D   | CO <sub>2</sub>  | Wetlands                          | Non-key    |
| 5.E   | CO <sub>2</sub>  | Settlements                       | Non-key    |
| 5.A.1 | CH <sub>4</sub>  | Forest land remaining forest land | Non-key    |
| 5.A.1 | N <sub>2</sub> O | Forest land remaining forest land | Non-key    |
| 5.B.2 | N <sub>2</sub> O | Conversion to cropland            | Non-key    |

# Assumptions to estimate Land Use Change

LUC matrices for each year of the period 1990–2006 have been assembled based on time series of national land use statistics for forest lands, croplands, grasslands, wetlands and settlement areas.

|             |                    | 1990         |              |               |           |              |            |             |
|-------------|--------------------|--------------|--------------|---------------|-----------|--------------|------------|-------------|
|             |                    | Forest       | Grassland    | Cropland      | Wetland   | Settlements  | Other Land | Initial sum |
|             | <b>2004</b>        | 9,263        | 7,550        | 11,028        | 57        | 1,348        | 887        | 30,134      |
| <b>2004</b> | <b>Forest</b>      | <b>9,263</b> |              |               |           |              |            | 9,263       |
|             | <b>Grassland</b>   | 1,646        | <b>7,550</b> | 713           |           | 66           |            | 7,550       |
|             | <b>Cropland</b>    |              | 712          | <b>11,028</b> |           | 50           |            | 11,028      |
|             | <b>Wetland</b>     |              |              |               | <b>57</b> |              |            | 57          |
|             | <b>Settlements</b> |              |              |               |           | <b>1,348</b> |            | 1,348       |
|             | <b>Other Land</b>  |              |              |               |           |              | <b>887</b> | 887         |
|             | <i>Final sum</i>   | 10,909       | 5,837        | 10,980        | 57        | 1,464        | 887        | 30,134      |

Annual figures for areas in transition between different land uses have been derived by a hierarchy of basic assumptions (informed by expert judgment) of known patterns of land-use changes in Italy, as well as the need for the total national area to remain constant.

Growth in *forest land* area as detected by the National Forest Inventory is used as the basis. The rule then assumes that new *forest land* area can only come from grassland and no deforestation is occurring. *Settlements* area can only come from *grassland* or *cropland*. New *cropland* area can only come from *grassland* area, as new *grassland* area can only come from *cropland* area.

## Forest Land: methodological issues

Under this category, emissions and removals, from *living biomass*, *dead organic matter* and *soils*, from *forest land remaining forest land* and from *land converted to forest land* have been reported.

*Forest land* removals share 85% of total CO<sub>2</sub> 2004 LULUCF emissions and removals, while the mean forest land removals for the years 1990-2004 is 77% of total mean CO<sub>2</sub> LULUCF emissions and removals; in particular the *living biomass* removals represent 47%, while the removals from *dead organic matter* and *soils* stand for 9% and 45% of total 2004 *forest land* CO<sub>2</sub> removals, respectively.

## Forest Land: methodological issues

The For-ests model was used to estimate evolution in time of 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.*

Model input data for the forest area, per region and inventory typologies, were the First Italian National Forest Inventory (1985) data and results of the Second Italian National Forest Inventory (2005) data.

Other data sources are:

| Author | year                  | Title                  | collection  | Editor |
|--------|-----------------------|------------------------|---|--------|
| ISTAT  | 1970-2006 time series | Woody and annual crops | <i>annuari; statistiche dell'agricoltura; dati congiunturali (dal 1999)</i> | ISTAT  |
| ISTAT  | 1980-2006 time series | Forest fires           | <i>Annuario, Statistiche Ambientali</i>                                     | ISTAT  |
| ISTAT  | 1990-2006 time series | Harvested wood         | <i>Annuario, Statistiche Ambientali, Statistiche dell'agricoltura</i>       | ISTAT  |

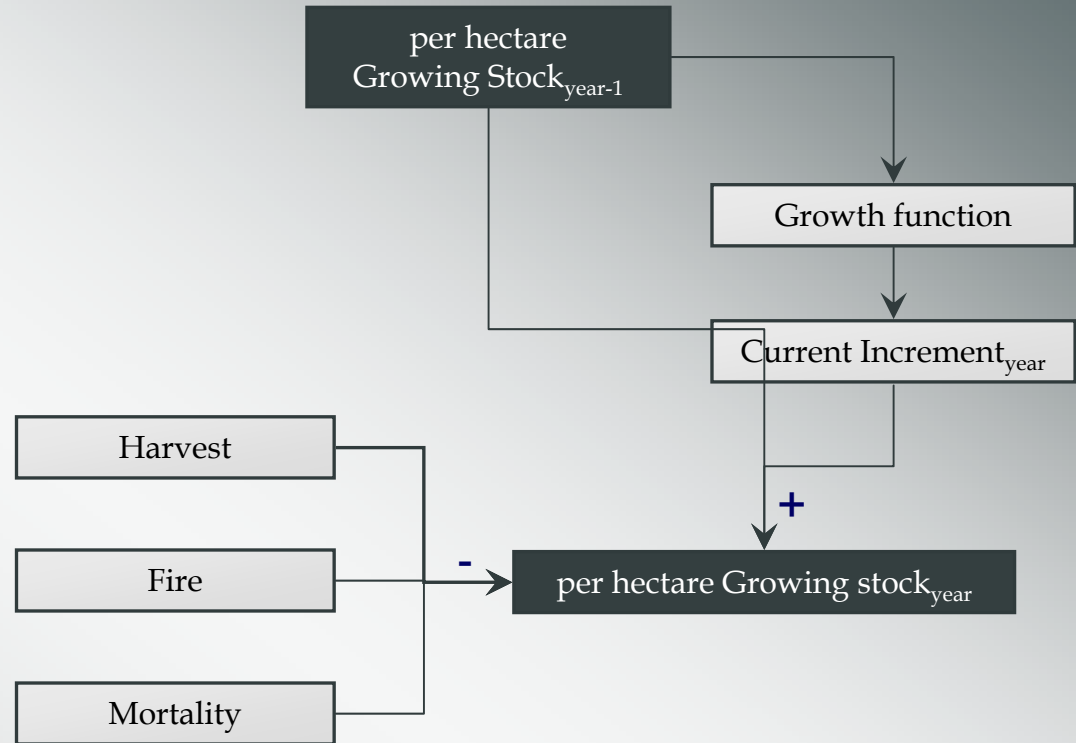
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# Forest Land: methodological issues

## Growing stock estimates:

→ starting from growing stock volume reported in the I INFI, for each year, the current increment per hectare is computed with the derivative Richards function, for every specific forest typology

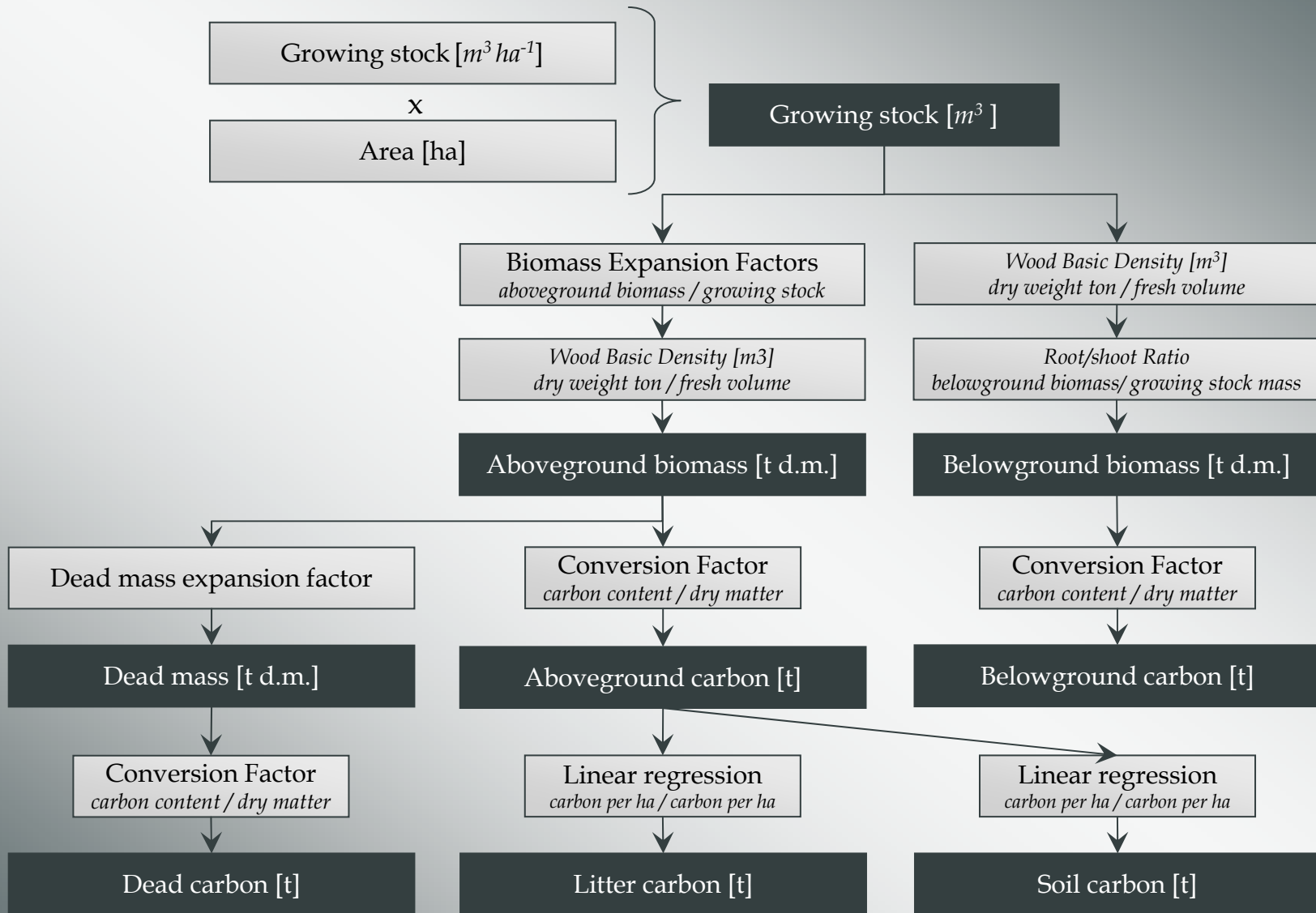
$$\frac{dy}{dt} = \frac{k}{v} \cdot y \cdot \left[ 1 - \left( \frac{y}{a} \right)^v \right] + y_0$$



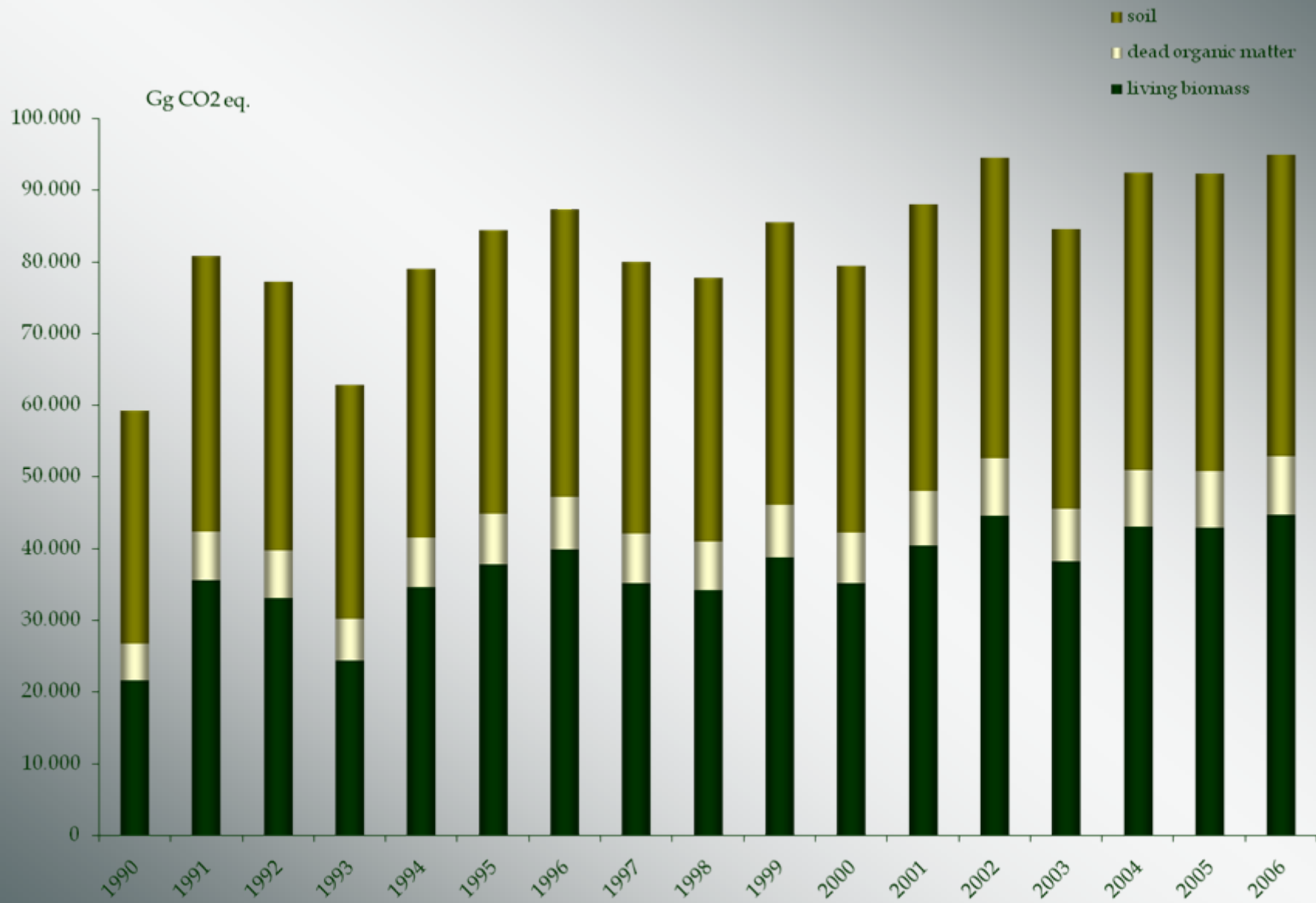
Where  $y$  represents the growing stock of the stand, while the  $y$  derivative ( $dy/dt$ ) is the correspondent increment computed with the Richards function - first derivative.

→ for each year, growing stock per hectare is computed from the previous year growing stock volume adding the calculated current increment (“ $y$ ” value of the derivative Richards) and subtracting losses due to harvest, mortality and fire occurred in the current year.

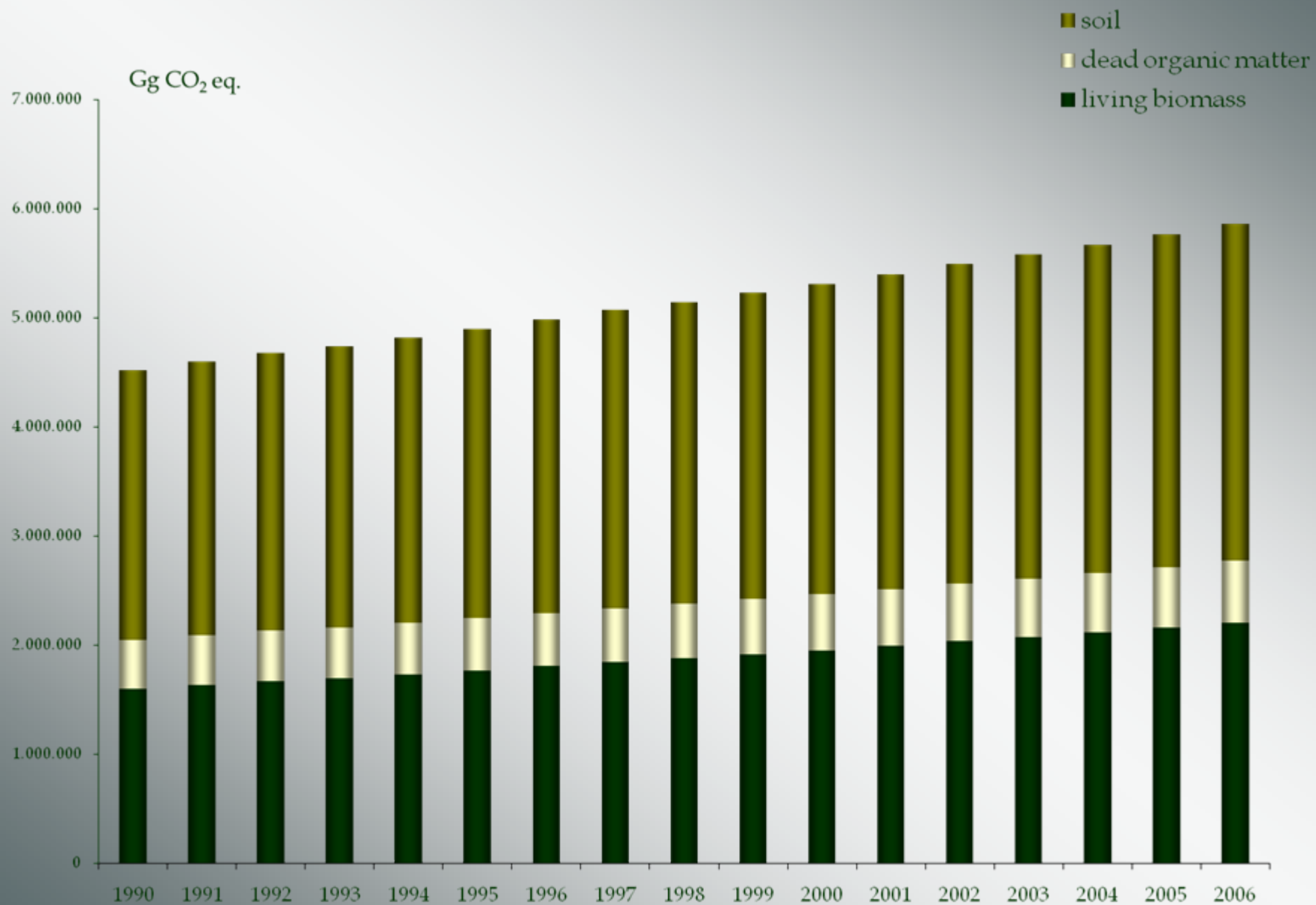
# Forest Land: For-est model flowchart



# Forest Land: carbon stock changes in carbon pools



# Forest Land: carbon stock in carbon pools



## Preliminary estimates of aboveground carbon stock - ITALY

|  |                    |
|--|--------------------|
| <b>Massa arborea</b><br>(Mg o tonnellate)                              | <b>972.037.000</b> |
| <b>Carbonio</b><br>(Mg o tonnellate)                                   | <b>486.018.500</b> |
| <b>Carbonio per ettaro</b><br>(Mgha <sup>-1</sup> o tonnellate per ha) | <b>55</b>          |



**486.018.500 Mg (tonnellate) di Carbonio**  
corrispondente a  
**1.782.068.000 Mg (tonnellate) di CO<sub>2</sub>**

Estimate related to year 2006 with For-est model: 1.801.398.000 Mg CO<sub>2</sub>

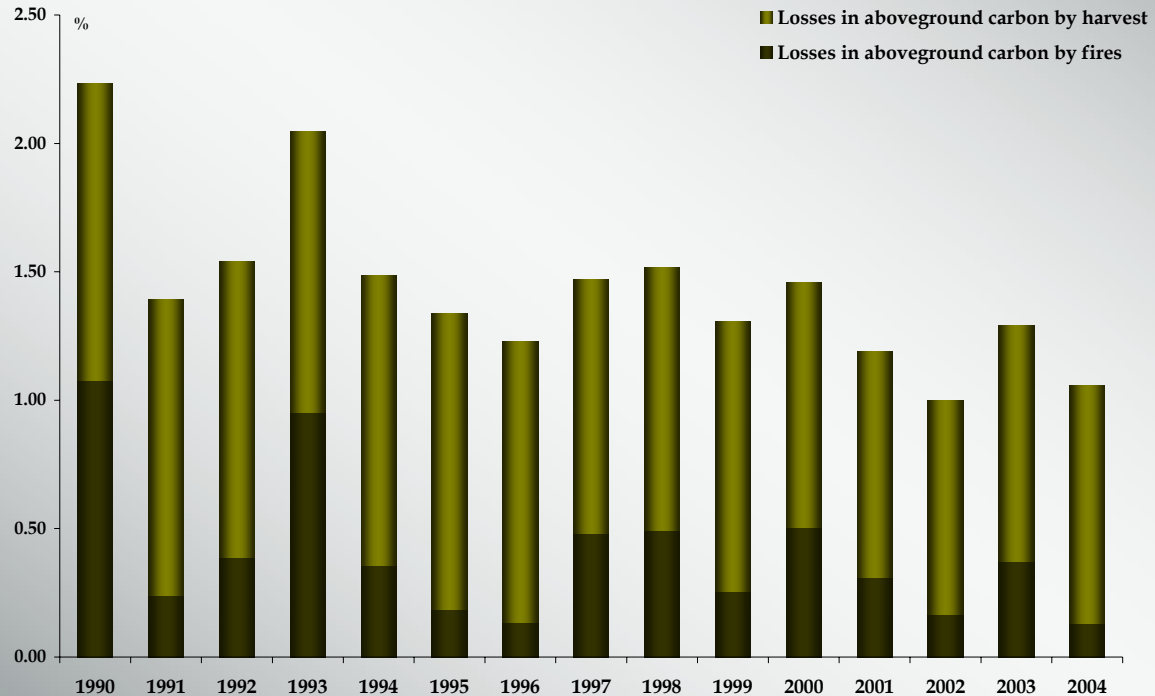
→ **1% difference with NFI**

# Land converted to Forest Land: methodological issues

The area of *land converted to forest land* is always coming from *grassland*. There is no occurrence for other conversion.

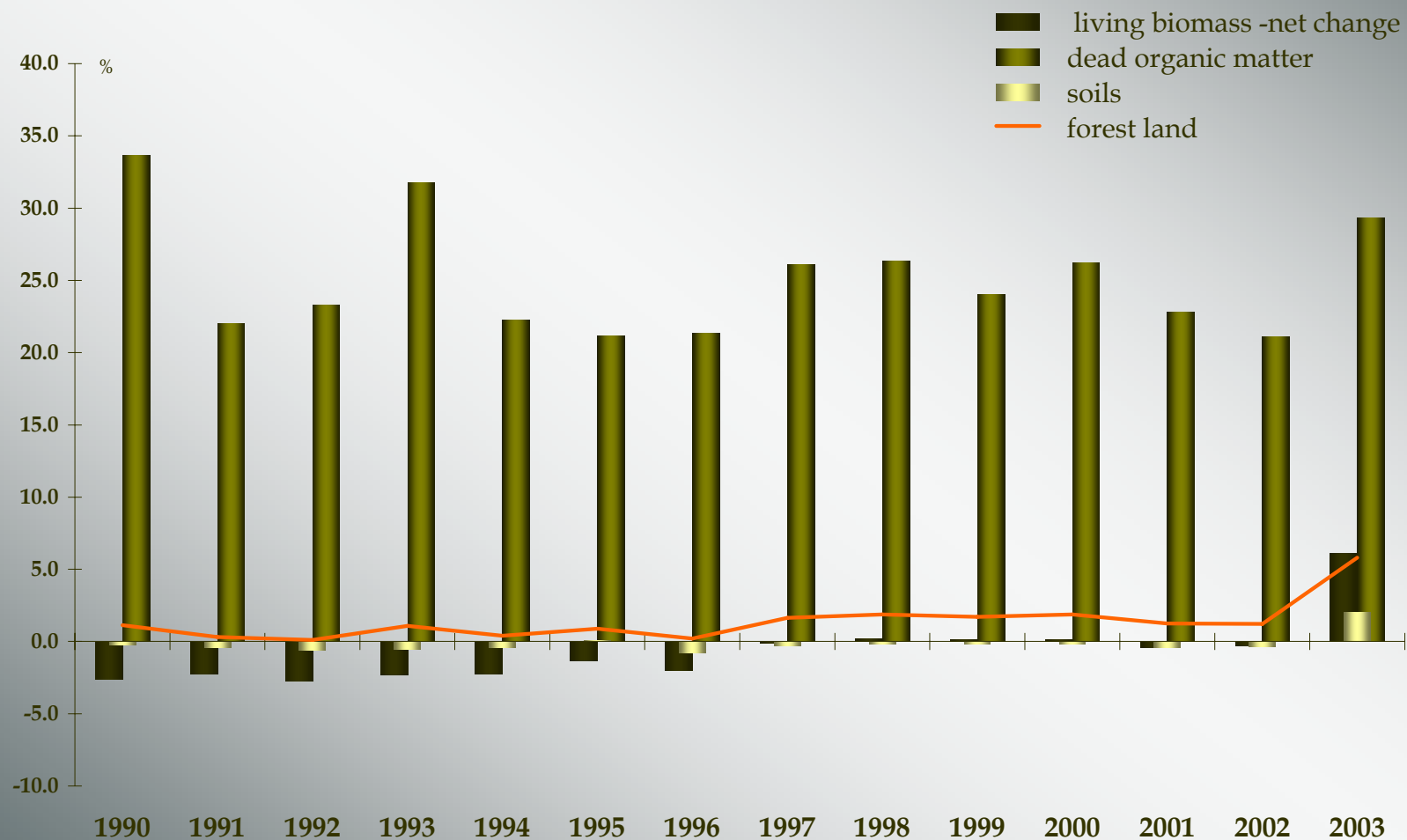
The carbon stock change of *living biomass* has been calculated, taking into account increase and decrease of carbon stock related to the areas in transition to *forest land*. Net carbon stock change in *dead organic matter* and *soils* have been calculated as well.

Carbon amount released by forest fires has been included in the overall assessment of carbon stocks change (table 5.A.1, carbon stocks change in *living biomass*, decrease). The most conservative hypothesis has been adopted: all growing stock of burned forest areas has been assumed to be completely oxidized and so released.



# Forest Land: recalculation

Recalculations of emissions and removals have been carried out; deviations from the precedent sectoral estimates occurred, essentially because of changes in the new values available used to model the litter carbon amount, resulting in a mean increase of 25% in *dead organic matter* carbon pool estimate, and in mean increase of 1.6% in total *forest land* category.



## Cropland: methodological issues

*Cropland* removals share 13.5% of total CO<sub>2</sub> LULUCF emissions and removals, in particular the *living biomass* removals represent 75%, while the emissions from *soils* stand for 25% of total *cropland* CO<sub>2</sub> emissions and removals.

*Cropland* includes all annual and perennial crops; the change in biomass has been estimated only for perennial woody crops.

Tier 1 based on highly aggregated area estimates for generic perennial woody crops, has been used; default factors of aboveground biomass carbon stock at harvest, harvest/maturity cycle, biomass accumulation rate, biomass carbon loss, for the temperate climatic region have been applied, even though they are not very representative of the Mediterranean area.

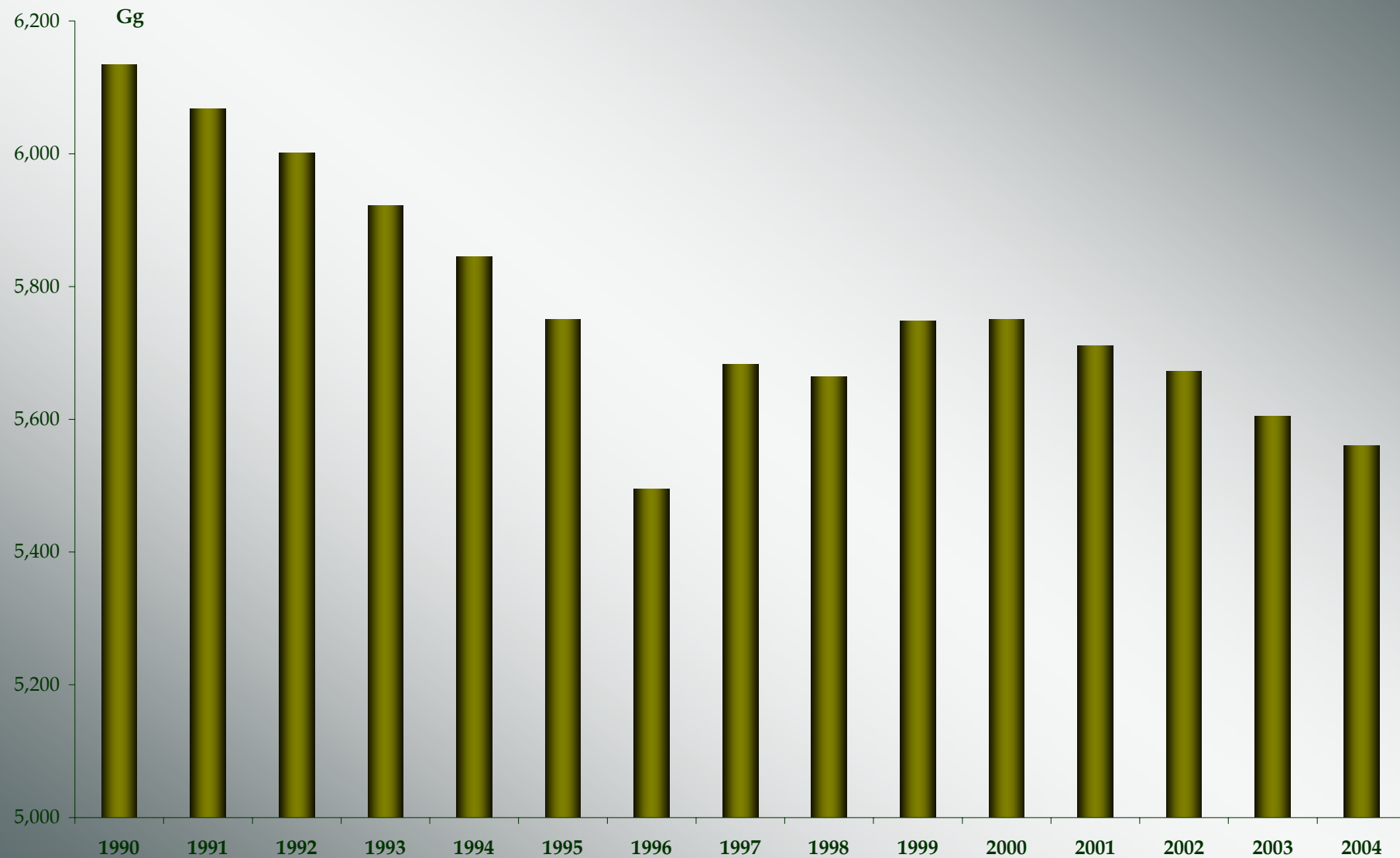
No biomass carbon loss is estimated: crops are unlikely totally removed after an amount of time equal to a nominal harvest/maturity cycle, as implied by the basic assumption of Tier 1 (since croplands are abandoned or consociated with annual crops) and no data about biomass clearing, in wooden cropland, are available.

Net changes in *cropland* C stocks obtained are equal to 6.134 Tg C for 1990, and 5.560 Tg C for 2004, as well concern *living biomass* pool, for 2004..

## Cropland: methodological issues

According to the GPG, the change in soil C stocks is the result of a change in practices or management between the two time periods and concentration of soil carbon is only driven by the change in practice or management. It wasn't possible to point out different sets of relative stock change factors [ $F_{LU}$  (land use),  $F_{MG}$  (management),  $F_I$  (input factor)] for the period 1990-2004 under investigation; therefore, as no management changes can be documented, resulting change in carbon stock has been reported as zero.

# Cropland: C stock change in living biomass



## Land converted to Cropland: methodological issues

Estimates of carbon stock change in *living biomass* has been provided; concerning *soils* carbon pool, changes in carbon stocks associated with the transitions have been estimated only for a single year (i.e. the year of conversion): dynamics of soil carbon storage and release are complex and still not well understood, even if current approaches assume that after a cultivation of a forest or grassland, there is an initial carbon loss over the first years which rapidly reduces to a lower subsequent loss rate in the following years (Davidson and Ackerman 1993). On this basis and by considering the spatial resolution of data we used, we assumed, in calculating the effect of transition to cropland, that the changes in carbon stocks carbon occur in the first year after the land conversion, in spite to considered them over the time period (20 years as default) specified by GPG.

Land use change matrices have permitted to figure out the average area of land undergoing a transition from non *cropland*, only *grassland* in Italian case, to *cropland*, during each year, from 1990 to 2004.

## Land converted to Cropland: methodological issues

The carbon stocks change, for *land converted to cropland*, is equal to the carbon stocks change due to the removal of biomass from the initial land use plus the carbon stocks from one year of growth in *cropland* following the conversion.

The Tier 1 has been followed, assuming that the amount of biomass is cleared and some type of *cropland* system is planted soon thereafter. At Tier 1, carbon stocks in biomass immediately after the conversion are assumed to be zero.

Only conversion from *grassland* to *cropland* has occurred; changes in C stocks from one year of *cropland* growth have been obtained using default GPG estimates for standing biomass grassland and default biomass carbon stocks per crop type by climate region.

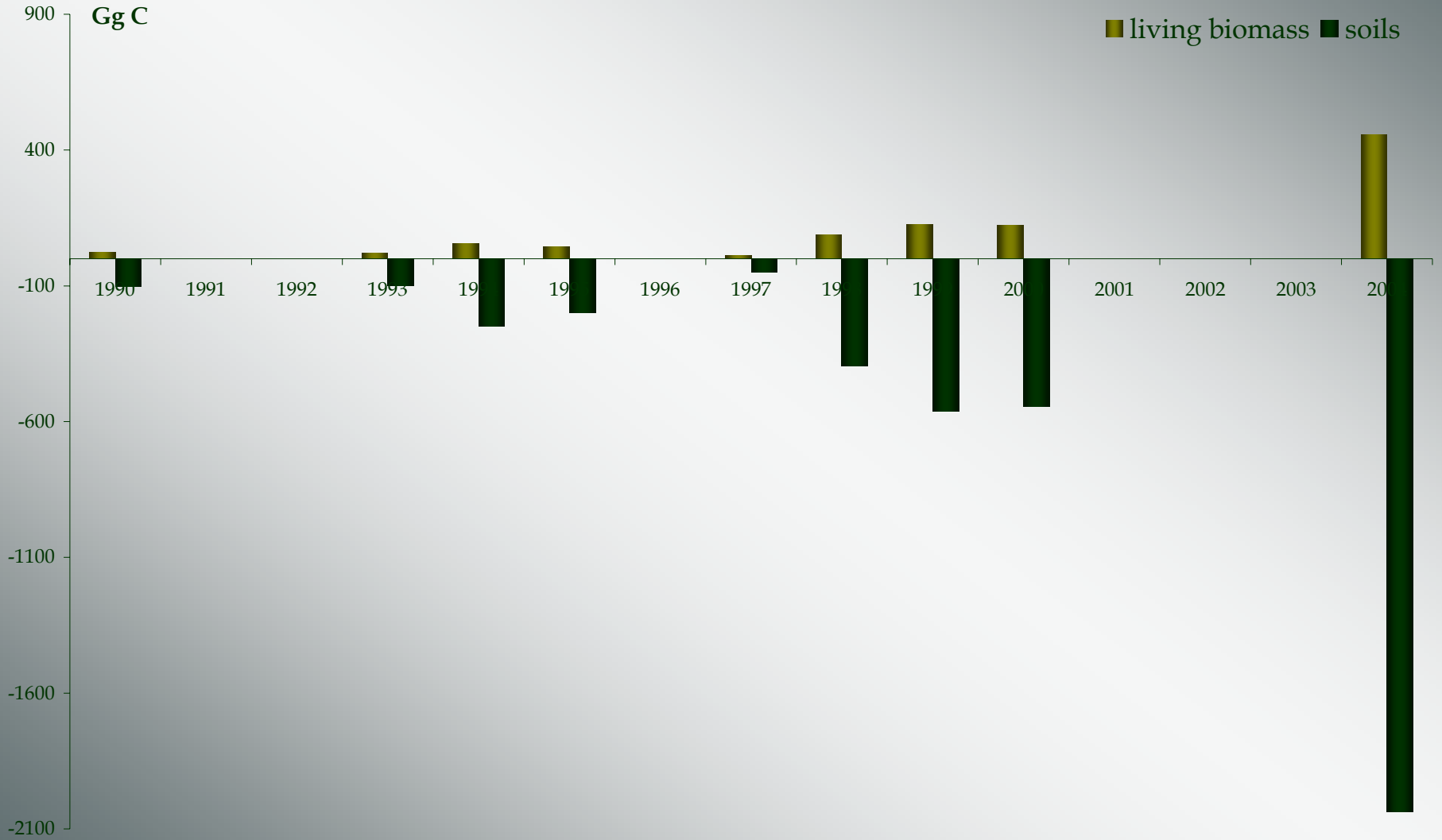
In accordance to national expert judgment, it has been assumed that the final crop type, for the areas of transition land, is annual *cropland*.

Changes in carbon stocks in mineral soils have been estimated following land use changes, resulting in a change of the total soil carbon content. Initial land use soil carbon stock [ $\text{SOC}_{(0-T)}$ ] and soil carbon stock in the inventory year [ $\text{SOC}_0$ ] for the cropland area have been estimated from the reference carbon stocks.

# Land converted to Cropland: C stock change in living biomass and net C stock change in soils

Initial land use: *Grassland*

Final land use: *Cropland*



## Grassland and land converted to grassland: methodological issues

No emissions from *grassland* have occurred in 2004, because of the choice of the inventory time and the method applied (Tier 1) for the estimates of *living biomass* emissions. In the period 1990-2004 mean *grassland* emissions share 1% of absolute CO<sub>2</sub> LULUCF emissions and removals, in particular the *living biomass* emissions represent 18.3%, while the emissions from *soils* stand for 81.7% of total *grassland* CO<sub>2</sub> emissions.

Carbon stock changes in *grassland* soils have been reported as zero, as no management changes can be documented, and it wasn't possible to obtain different sets of relative stock change factors, as for *cropland* soils.

Regarding *land converting to grassland*, estimates of carbon stock change in *living biomass* has been provided; changes in soil carbon stocks associated with the transitions have been estimated only for a single year (i.e. the year of conversion), assuming, as for the other categories in transition, that the changes in carbon stocks occur in the first year after the land conversion, in spite to considered them over the default time period (20 years).

## Grassland and land converted to grassland: methodological issues

Tier 1 has been followed, assuming that C stocks in biomass immediately after the conversion are equal to 0 t C ha<sup>-1</sup>. GPG default biomass C stocks present on *land converted to grassland* have been used.

The annual area of land undergoing a transition from non *grassland to grassland* during each year, from 1990 to 2004, has been pointed out, through the use of the land use change matrices, one for each year. Changes in biomass carbon stocks have been accounted for in the year of conversion.

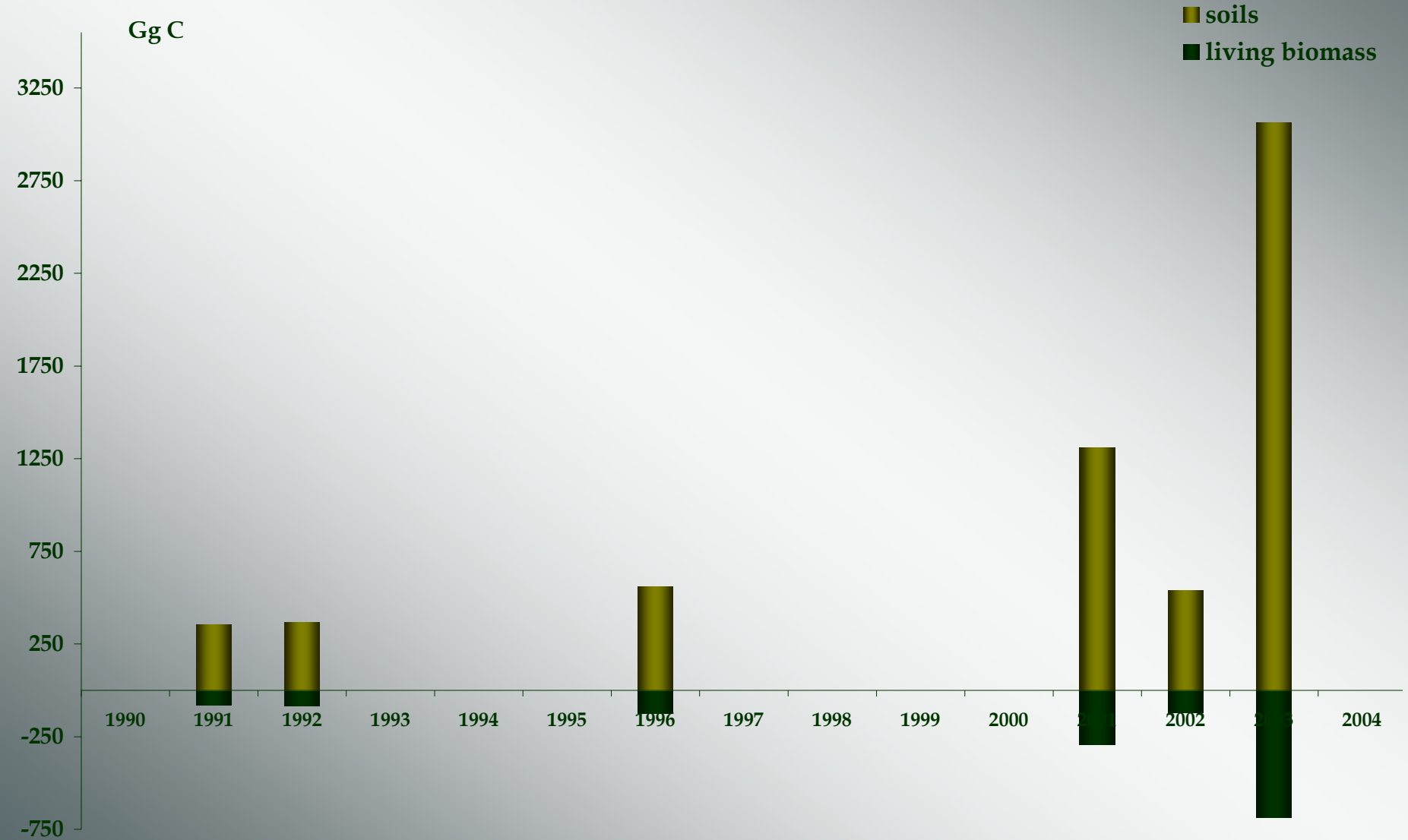
Concerning Italian territory, only conversion from *cropland to grassland* has occurred; moreover, according to national expert judgment, it has been assumed that *lands in conversion to grassland* are mostly annual crops.

Changes in carbon stocks in mineral *soils in land converted to grassland* have been estimated following land use changes, resulting in a change of the total soil carbon content. The inventory time period has been established in 1 year.

# Land converted to Grassland: C stock change in *living biomass* and net C stock change in *soils*

Initial land use: *Cropland* (annual)

Final land use: *Grassland*



## Settlements and Land converting to Settlements: methodological issues

No estimates on C stocks changes for this category have been provided, due to a lack of data concerning urban tree formations.

Land use matrices have allowed to estimate average area of land undergoing a transition from *non-settlements* to *settlements* during each year, from 1990 to 2004. Only conversions from *grassland* and *cropland* to *settlements* have occurred in the investigated period.

For *land converted to settlements*, Tier 1 has been followed in the assessing carbon stocks change; default assumption is that carbon stocks in *living biomass* following conversion are equal to zero.

Concerning *grassland converted to settlements*, no change in carbon stocks has been computed, as in Tier 1 no change in carbon stocks in the *grassland living biomass* pool has been assumed. For what concerns *cropland* in transition to *settlements*, carbon stocks, for each year and for crops type (annual or perennial), have been estimated, using as default coefficients the factors:

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|                          | Biomass carbon stock    |
|--------------------------|-------------------------|
| Annual cropland          | 5 t C ha <sup>-1</sup>  |
| Perennial woody cropland | 63 t C ha <sup>-1</sup> |

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# Land converting to Settlements : C stock change in living biomass

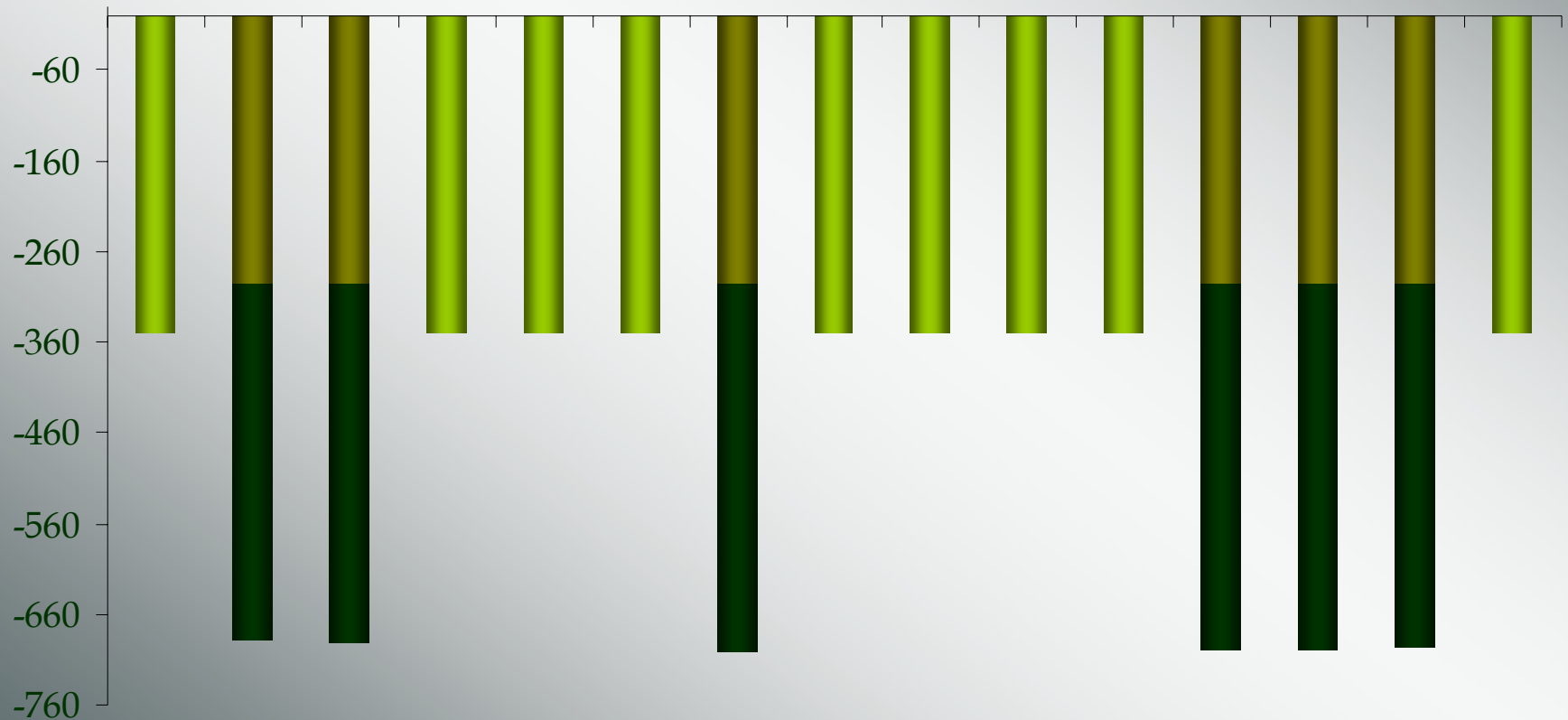
Initial land use: *Cropland, Grassland* [TIER 1]

Final land use: *Settlements*

Gg C

- soils
- living biomass - grassland to settlements
- living biomass - annual and woody crops to settlement

1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004



## Wetlands, Other Land: methodological issues

Lands covered or saturated by water, all or part of year, which harmonize with the definitions of the Ramsar Convention on Wetlands have been included in *wetlands* category. No data were available on flooded lands, therefore reservoirs or water bodies regulated by human activities have not been considered. Concerning *land converted to wetlands*, during the period 1990-2004, no land has been in transition to *wetlands*.

*Other land*: this category includes bare soil, rock, ice, and all unmanaged land areas that do not fall into any of the other five categories. No change in *Other land* area and, consequently, no change in C stocks have occurred in this category, in the 1990 - 2004 period.

# Archiving: files and references

| Inventory References   |  |                 |   |
|--|--|-----------------|---|
| SELECT RECORDS BY: Sector <input type="text" value="5.LULUCF"/> AND: Submission_year <input type="text" value="2006"/> |  |                 |   |
| FREE SEARCH BY SELECTED FIELDS <input type="button" value="🔍"/>  |  |                 |   |
| <input type="button" value="SET ALL RECORDS"/>   |  |                 |   |
| <b>Sector</b>  | <input type="text" value="5.LULUCF"/>  | <b>Position</b> | <input type="text"/>  |
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| <b>Author</b>  | <input type="text" value="Cutini A."/>   | <b>Link_2</b>   | <input type="text"/>  |
| <b>Publication_year</b>  | <input type="text" value="2002"/>  | <b>Link_3</b>   | <input type="text"/>  |
| <b>Title</b>   | <input type="text" value="Litterfall and Leaf Area Index in the CONECCOPOR Permanent monitoring Plots"/>                               |                 |   |
| <b>Editor</b>  | <input type="text" value="Mosello R. et al.(Guest Editors) - Long-term ecological research in Italian forest ecosystems, J. Linnol."/> |                 |   |
|  |  | <b>NOTE</b>     | <input type="text"/>  |

Record:   8   32 (Fibrati)

# Archiving: files and references

| File name   | Author              | Partition  | to of most recent dr. | Main topic  | Year/Time series | Corresponding CRF to    | Linked files                                   |
|---|---------------------|--|-----------------------|---|------------------|-------------------------|--|
| 1 Caltivazioni  | u. vitella          | CSIDRS\LULUCP\Italia - referenza\file\42006          | 11/10/2006            | Woody crops and grassland statistics                                    | 1990-2004        | Table 5.B, Table 5.C    |  |
| 2 Canfranzarozorio storico CH4, N2O, NOx, CO              | u. vitella          | CSIDRS\LULUCP\Italia - referenza\file\42006          | 30/03/2006            | Biomass burning emissions time series comparison                        | 1990-2004        |                         |  |
| 3 Crapland  | u. vitella          | CSIDRS\LULUCP\Italia - referenza\file\42006          | 21/10/2006            | Removal/Emissions from Crapland and conversion to Crapland              | 1990-2004        | Table 5.B; Table 5(III) | Land use (calcola); Sailr2002                  |
| 4 emissioni removale                                      | u. vitella          | CSIDRS\LULUCP\Italia - referenza\file\42006          | 19/10/2006            | Removal/Emissions far categoric   | 1990-2004        |                         |  |
| 5 FAO - land use  | u. vitella          | CSIDRS\LULUCP\Italia - referenza\file\42006          | 11/10/2006            | FAOSTAT Land use  | 1990-2004        |                         |  |
| 6 farcort-harvest-firo 2006                               | u. vitella          | CSIDRS\LULUCP\Italia - referenza\file\42006          | 25/05/2007            | Lazzer in aboveground carbon by firoz and by harvest                    | 1990-2004        |                         | farcort[Italia.xlsx]; farcort[Harvest farcort] |
| 7 Grazland  | u. vitella          | CSIDRS\LULUCP\Italia - referenza\file\42006          | 21/10/2006            | Removal/Emissions from Grazland and conversion to Grazland              | 1990-2004        | Table 5.C               | Land use (calcola); Sailr2002                  |
| 8 incertezza 2006   | u. vitella          | CSIDRS\LULUCP\Italia - referenza\file\42006          | 25/05/2006            | Uncertainty estimate  | 1990-2004        |                         |  |
| 9 land use (calcola)                                      | u. vitella          | CSIDRS\LULUCP\Italia - referenza\file\42006          | 21/10/2006            | Land use matrices   | 1990-2004        | CRF tablar              | Italia-UNFCCC model; emissioni per categoria   |
| 10 percentuali emissioni per categoria 2006 - Irubmizian  | u. vitella          | CSIDRS\LULUCP\Italia - referenza\file\42006          | 19/10/2006            | Emission/removal far categoric  | 1990-2004        |                         | Sailr2002; Italia-UNFCCC model                 |
| 11 percentuali emissioni per categoria 2006 - rorubmizian | u. vitella          | CSIDRS\LULUCP\Italia - referenza\file\42006          | 03/05/2007            | Emission/removal far categoric  | 1990-2005        |                         | CRF submitted tablar                           |
| 12 recalculation 2006                                     | u. vitella          | CSIDRS\LULUCP\Italia - referenza\file\42006          | 16/10/2006            | Recalculation   | 1990-2004        |                         | farcort[Fire2001-modificata.xlsx]; perco       |
| 13 Settlementz  | u. vitella          | CSIDRS\LULUCP\Italia - referenza\file\42006          | 21/10/2006            | Removal/Emissions from Settlementz and conversion to Settlementz        | 1990-2004        | Table 5.E               | Land use (calcola)                             |
| 14 Sailr2002  | u. vitella          | CSIDRS\LULUCP\Italia - referenza\file\42006          | 11/10/2006            | Time series and crapland/grazland/railr removalz                        | 1990-2004        | Table 5.B, Table 5.C    |  |
| 15 ruzmary  | u. vitella          | CSIDRS\LULUCP\Italia - referenza\file\42006          | 08/05/2007            | Crtack changer in the different pairz, far FL and land converted to FL  | 1990-2004        |                         | farcort[SINTESI FINALE.xlsx]; [C from lan-     |
| 16 Surface farcort  | u. vitella          | CSIDRS\LULUCP\Italia - referenza\file\42006          | 30/03/2006            | Farcort arcar   | 1990-2004        | Table 5.A               | Italia-UNFCCC model                            |
| 17 Utilizzazioni farcortali                               | u. vitella          | CSIDRS\LULUCP\Italia - referenza\file\42006          | 11/10/2006            | Harvesting time series  | 1990-2004        |                         |  |
| 18 Wetlandz   | u. vitella          | CSIDRS\LULUCP\Italia - referenza\file\42006          | 28/11/2005            | Wetlandz activity data  |                  | Table 5.D               |  |
| 19  |                     |  |                       |   |                  |                         |  |
| 20  |                     |  |                       |   |                  |                         |  |
| 21  |                     |  |                       |   |                  |                         |  |
| 22  |                     |  |                       |   |                  |                         |  |
| 23  |                     |  |                       |   |                  |                         |  |
| File name   | Author              | Partition  | to of most recent dr. | Main topic  | Year/Time series | Corresponding CRF to    | Linked files                                   |
| 24 abruzzo  | u. vitella-federali | CSIDRS\LULUCP\Italia - referenza\file\42006-federali | 10/01/2006            | Grauingrtack and current increment calculation                          | 1985-2012        |                         |  |
| 25 alta adige   | u. vitella-federali | CSIDRS\LULUCP\Italia - referenza\file\42006-federali | 07/02/2006            | Grauingrtack and current increment calculation                          | 1985-2012        |                         |  |
| 26 bariccate  | u. vitella-federali | CSIDRS\LULUCP\Italia - referenza\file\42006-federali | 10/01/2006            | Grauingrtack and current increment calculation                          | 1985-2012        |                         |  |
| 27 C from land converting to farcort                      | u. vitella          | CSIDRS\LULUCP\Italia - referenza\file\42006-federali | 19/01/2006            | Crtack from land converted to farcort land - living biomass, DOM, railr | 1990-2005        | Table 5.A               | land use (calcola); Sailr2002; farcort 2006    |
| 28 calabria   | u. vitella-federali | CSIDRS\LULUCP\Italia - referenza\file\42006-federali | 10/01/2006            | Grauingrtack and current increment calculation                          | 1985-2012        |                         |  |
| 29 compania   | u. vitella-federali | CSIDRS\LULUCP\Italia - referenza\file\42006-federali | 10/01/2006            | Grauingrtack and current increment calculation                          | 1985-2012        |                         |  |
| 30 CONECOFOR-CANIF slab                                   | u. vitella-federali | CSIDRS\LULUCP\Italia - referenza\file\42006-federali | 17/05/2006            | railr and litter data; uncertainty estimator                            |                  |                         |  |
| 31 emilia-romagna   | u. vitella-federali | CSIDRS\LULUCP\Italia - referenza\file\42006-federali | 10/01/2006            | Grauingrtack and current increment calculation                          | 1985-2012        |                         |  |
| 32 fire2001-modificata                                    | u. vitella          | CSIDRS\LULUCP\Italia - referenza\file\42006-federali | 07/02/2006            | Biomass burning emissions - CH4, H2O, NOx, CO; VOC                      | 1990-2005        |                         |  |
| 33 fire releaz farcort                                    | u. vitella          | CSIDRS\LULUCP\Italia - referenza\file\42006-federali | 05/06/2006            | Estimator of C releaz by fire   | 1990-2005        |                         | farcort 2006[Fire2001-modificata.xlsx]; f      |
| 34 friuli venezia giulia                                  | u. vitella-federali | CSIDRS\LULUCP\Italia - referenza\file\42006-federali | 10/01/2006            | Grauingrtack and current increment calculation                          | 1985-2012        |                         |  |
| 35 harvest farcort  | u. vitella          | CSIDRS\LULUCP\Italia - referenza\file\42006-federali | 06/06/2006            | Estimator of C releaz by harvest  | 1990-2005        |                         | farcort model filar                            |
| 36 italia   | u. vitella-federali | CSIDRS\LULUCP\Italia - referenza\file\42006-federali | 15/05/2006            | Grauingrtack and current increment calculation                          | 1985-2012        |                         | farcort model filar                            |
| 37 lazio  | u. vitella-federali | CSIDRS\LULUCP\Italia - referenza\file\42006-federali | 10/01/2006            | Grauingrtack and current increment calculation                          | 1985-2012        |                         |  |
| 38 liguria  | u. vitella-federali | CSIDRS\LULUCP\Italia - referenza\file\42006-federali | 10/01/2006            | Grauingrtack and current increment calculation                          | 1985-2012        |                         |  |
| 39 lombardia  | u. vitella-federali | CSIDRS\LULUCP\Italia - referenza\file\42006-federali | 11/01/2006            | Grauingrtack and current increment calculation                          | 1985-2012        |                         |  |
| 40 march  | u. vitella-federali | CSIDRS\LULUCP\Italia - referenza\file\42006-federali | 11/01/2006            | Grauingrtack and current increment calculation                          | 1985-2012        |                         |  |
| 41 malino   | u. vitella-federali | CSIDRS\LULUCP\Italia - referenza\file\42006-federali | 11/01/2006            | Grauingrtack and current increment calculation                          | 1985-2012        |                         |  |
| 42 parametroz   | u. vitella          | CSIDRS\LULUCP\Italia - referenza\file\42006-federali | 20/06/2005            | Richardz functionz parameterz   |                  |                         |  |
| 43 piemonte   | u. vitella-federali | CSIDRS\LULUCP\Italia - referenza\file\42006-federali | 11/01/2006            | Grauingrtack and current increment calculation                          | 1985-2012        |                         |  |
| 44 puglia   | u. vitella-federali | CSIDRS\LULUCP\Italia - referenza\file\42006-federali | 11/01/2006            | Grauingrtack and current increment calculation                          | 1985-2012        |                         |  |
| 45 risultati provvizi ufficiali                           | u. vitella          | CSIDRS\LULUCP\Italia - referenza\file\42006-federali | 20/06/2005            | Preliminary resultz of NFI (I phase)                                    |                  |                         |  |
| 46 sardegn  | u. vitella-federali | CSIDRS\LULUCP\Italia - referenza\file\42006-federali | 11/01/2006            | Grauingrtack and current increment calculation                          | 1985-2012        |                         |  |
| 47 sicilia  | u. vitella          | CSIDRS\LULUCP\Italia - referenza\file\42006-federali | 10/01/2006            | Grauingrtack and current increment calculation                          | 1985-2012        |                         |  |
| 48 Sinteri finale   | u. vitella          | CSIDRS\LULUCP\Italia - referenza\file\42006-federali | 06/04/2006            | Increase and decrease far FL and land converted to FL                   | 1990-2005        | Table 5.A               | farcort 2006[Italia.xlsx]                      |
| 49 rinzori italia   | u. vitella          | CSIDRS\LULUCP\Italia - referenza\file\42006-federali | 06/04/2006            | Paulz Crtack, per year, far typologiaz                                  | 1990-2005        | Table 5.A               | farcort 2006[Italia.xlsx]                      |
| 50 tarcono  | u. vitella-federali | CSIDRS\LULUCP\Italia - referenza\file\42006-federali | 10/01/2006            | Grauingrtack and current increment calculation                          | 1985-2012        |                         |  |
| 51 trentino   | u. vitella-federali | CSIDRS\LULUCP\Italia - referenza\file\42006-federali | 15/03/2006            | Grauingrtack and current increment calculation                          | 1985-2012        |                         |  |
| 52 tronta balzana   | u. vitella-federali | CSIDRS\LULUCP\Italia - referenza\file\42006-federali | 11/01/2006            | Grauingrtack and current increment calculation                          | 1985-2012        |                         |  |
| 53 umbria   | u. vitella-federali | CSIDRS\LULUCP\Italia - referenza\file\42006-federali | 10/01/2006            | Grauingrtack and current increment calculation                          | 1985-2012        |                         |  |
| 54 vallo d'arce   | u. vitella-federali | CSIDRS\LULUCP\Italia - referenza\file\42006-federali | 10/01/2006            | Grauingrtack and current increment calculation                          | 1985-2012        |                         |  |

## Italy: art. 3.3 – 3.4 reporting

Italy has elected *Forest Management* as an activity under Article 3.4 of Kyoto Protocol, while has not elect *Cropland Management*, *Grazing Land Management* or *Revegetation*, mainly because of the lack of data concerning land area subject to different management practices.

The forest definition adopted by Italy agrees with the FAO-FRA definitions. Italy's forest area is the total eligible area under forest management activity, since the entire Italian forest area has to be considered managed forest lands.

Under SBSTA conclusion FCCC/SBSTA/2006/L.6 and related draft COP/MOP2 decision (FCCC/SBSTA/2006/L.6/Add.1), credits from forest management are capped, in the first commitment period, to 2,78 Mt C per year, times fives.

## Italy: art. 3.3 – 3.4 reporting

Italy will submit KP LULUCF Tables, reporting on Articles 3.3 – 3.4.

The submission will be based on data of the GHG inventory under Convention; data will refer to the national boundaries as a single unit; the Reporting Method 1 will be implemented.

The following values for tree crown cover, land area and tree height have been chosen:

- a minimum area of land of 0.5 hectares;
- tree crown cover of 10 per cent;
- minimum tree height of 5 meters.

Deforestation data will be derived from administrative records, inventory data and mapping information. In the 2007 submission no data on deforestation have been supplied.

Italy intends to account for Article 3.3 and 3.4 LULUCF activities at the end of the commitment period, rather than annually.