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Food and Agriculture Organization of the United Nations

GLOBAL FOREST RESOURCES ASSESSMENT

COUNTRY REPORTS

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The Forest Resources Assessment Programme

Sustainably managed forests have multiple environmental and socio-economic functions important at the global, national and local scales, and play a vital part in sustainable development. Reliable and up-to-date information on the state of forest resources - not only on area and area change, but also on such variables as growing stock, wood and non-wood products, carbon, protected areas, use of forests for recreation and other services, biological diversity and forests' contribution to national economies - is crucial to support decision-making for policies and programmes in forestry and sustainable development at all levels.

FAO, at the request of its member countries, regularly monitors the world's forests and their management and uses through the Forest Resources Assessment Programme. This country report forms part of the Global Forest Resources Assessment 2005 (FRA 2005), which is the most comprehensive assessment to date. More than 800 people have been involved, including 172 national correspondents and their colleagues, an Advisory Group, international experts, FAO staff, consultants and volunteers. Information has been collated from 229 countries and territories for three points in time: 1990, 2000 and 2005.

The reporting framework for FRA 2005 is based on the thematic elements of sustainable forest management acknowledged in intergovernmental forest-related fora and includes more than 40 variables related to the extent, condition, uses and values of forest resources. More information on the FRA 2005 process and the results - including all the country reports - is available on the FRA 2005 Web site (www.fao.org/forestry/fra2005).

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Contents

1 Table T1 – Extent of Forest and Other wooded land

1.1 FRA 2005 Categories and definitions

Category	Definition
Forest	Land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds *in situ*. It does not include land that is predominantly under agricultural or urban land use.
Other wooded land	Land not classified as "Forest", spanning more than 0.5 hectares; with trees higher than 5 meters and a canopy cover of 5-10 percent, or trees able to reach these thresholds *in situ*; or with a combined cover of shrubs, bushes and trees above 10 percent. It does not include land that is predominantly under agricultural or urban land use.
Other land	All land that is not classified as "Forest" or "Other wooded land".
Other land with tree cover (Subordinated to "Other land")	Land classified as "Other land", spanning more than 0.5 hectares with a canopy cover of more than 10 percent of trees able to reach a height of 5 meters at maturity.
Inland water bodies	Inland water bodies generally include major rivers, lakes and water reservoirs.

1.2 National data

1.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
NFI Switzerland	H	Forest, Shrub-forest	1983-1985; 1993-1995	
FAOSTAT	H	Inland Water Body, Area of Switzerland		

1.2.2 Classification and definitions

National class	Definition
Forest	The Forest Definition depends on three variables derived from thematic airphoto interpretation **Width:** The width of the stocked part of the interpretation area is at least 25m. The shortest distance across the sample plot center is measured between one forest boundary line to another forest boundary line. The forest boundary line separates the forest area from the non –forest area. It encompasses all stocking elements. **Crown coverage:** The crown coverage of the stocked part of the interpretation area has to be larger than or equal to 20%. Exceptions are afforestation, regeneration, burned, cut, or storm damaged areas **Dominant stand height:** The stocking has to have a dominant stand height of 3m. Exceptions to the Rule include: afforestation, regeneration, burned, cut, or storm damaged areas
Shrub-forest	Same conditions as forest, but the crown cover of the interpretation area consists of more or equal to 2/3 of shrub species
Non-forest	All areas that are not forest or shrub forest

Sources:

Eidg. Anstalt forstl. Versuchswes., Ber. (1988): Schweizerisches Landesforstinventar. Ergebnisse der Erstaufnahme 1982-1986.

Brassel, P: Brändli, U.-B. (Red.) 1999 : Schweizerisches Landesforstinventar. Ergebnisse der Zweitaufnahme 1993-1995. Birmensdorf, Eidgenössische Forschungsanstalt für Wald, Schnee und Landschaft. Bern, Stuttgart, Wien, Haupt. 442 S.

Brassel, P;Lischke, H (eds) 2001: Swiss National Forest Inventory: Methods and Models of the Second Assessment. Birmensdorf, Swiss Federal Research Institute WSL. 336 pp.

1.2.3 Original data

National classes	Area (1000 hectares)	
	1983-1985	**1993-1995**
Forest	1130	1173
Shrub forest	56	61
Non-Forest	2943	2895

1.3 Analysis and processing of national data

1.3.1 Calibration

Source	Total land area (1000 ha)
FAOSTAT	3955

The national class Non-Forest is divided in the FAO classes land and inland water. Since the estimated area of Switzerland from our NFI data matches the one from FAOSTAT, we simply split the National class Non-Forest into other land and inland water.
other land=Non-forest (National class)– inland water (FAOSTAT)

For the years 1983-1985 this means :
2943-174=2769=other land
For the years 1993-1995 this means :
2895-174=2721=other land

1.3.2 Estimation and forecasting

National classes	Area (1000 hectares)				
	1983-1985 (reference date 1984)	**1993-1995 (reference date 1994)**	**1990**	**2000**	**2005**
Forest	1130	1173	1155.086	1199.04	1220.741
Shrub forest	56	61	58.755	64.001	66.502

Data for the years 1990 was estimated using linear interpolation of the difference between data from reference date 1984 and reference date 1994. Similarly the data for the years 2000 and 2005 were forecasted using the same linear trend.

1.4 Reclassification into FRA 2005 classes

The class forest of the Swiss NFI is reported as forest. The class shrub forest of the Swiss NFI is reported as other wooded land. There is no information available about other land with tree cover.

1.5 Data for National reporting table T1

FRA 2005 Categories	Area (1000 hectares)		
	1990	2000	2005
Forest	1155	1199	1221
Other wooded land	59	64	67
Other land	2741	2692	2667
...of which with tree cover [1)]	ID	ID	ID
Inland water bodies	174	174	174
TOTAL	**4129**	**4129**	**4129**

1.6 Comments to National reporting table T1

In the third NFI information about other land with tree cover will be available

Forest: The figures of forest area refer to the forest area definition of the Swiss NFI. The application of the GFRA Definition with a minimum canopy cover of 10 percent will lead to an increase of about 20,000 ha (1.7%). This result was derived from a re-measured sample of 5’000 plots on the air photos interpreted for the second Swiss NFI. In the given statistics for Switzerland, it was decided not to consider this result because the reliability for smaller units than the total forest area of Switzerland is unknown.

2 Table T2 – Ownership of Forest and Other wooded land

2.1 FRA 2005 Categories and definitions

Category	Definition
Private ownership	Land owned by individuals, families, private co-operatives, corporations, industries, religious and educational institutions, pension or investment funds, and other private institutions.
Public ownership	Land owned by the State (national, state and regional governments) or government-owned institutions or corporations or other public bodies including cities, municipalities, villages and communes.
Other ownership	Land that is not classified either as "Public ownership" or as "Private ownership".

2.2 National data

2.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
NFI Switzerland	H	Public owned Forest, private owned forest	1983-1985; 1993-1995	

Sources:

Eidg. Anstalt forstl. Versuchswes., Ber. (1988): Schweizerisches Landesforstinventar. Ergebnisse der Erstaufnahme 1982-1986.

Brassel, P: Brändli, U.-B. (Red.) 1999 : Schweizerisches Landesforstinventar. Ergebnisse der Zweitaufnahme 1993-1995. Birmensdorf, Eidgenössische Forschungsanstalt für Wald, Schnee und Landschaft. Bern, Stuttgart, Wien, Haupt. 442 S.

2.2.2 Classification and definitions

National class	Definition
Public owned forest	Same as FRA…
Private owned forest	Same as FRA…

2.2.3 Original data

Analyses of data derived from the first and the second NFI of Switzerland shows that the proportion of public owned forest in Switzerland is only subject to small changes. The proportion of public owned forest in the first NFI was 31.5% and in the second NFI 32%. Therefore the already compiled data from reporting table 1 is used to calculate the area of public and private owned forest. There is no information about the ownership of other wooded land available in the second NFI. In The first NFI of Switzerland there was evidence, that the area of other wooded land is predominantly under public ownership (approximately 80%).

2.3 Analysis and processing of national data

2.3.1 Estimation and forecasting

Data from table 1.

FRA 2005 Categories	Area (1000 hectares)	
	1990	2000
Forest	1155	1199
Other wooded land	59	64

The proportion of public owned forest is approximately 68%. The proportion of private owned forest is 32%. The proportion of public owned other wooded land is about 80%. The proportion of private owned other wooded land is approximately 20%. The area of specific ownership is calculated by multiplying the areas of forest and other wooded land (table 1) with the according proportions.

2.4 Data for National reporting table T2

FRA 2005 Categories	Area (1000 hectares)			
	Forest		Other wooded land	
	1990	2000	1990	2000
Private ownership	370	384	12	13
Public ownership	785	815	47	51
Other ownership	-	-	-	-
TOTAL	**1155**	**1199**	**59**	**64**

3 Table T3 – Designated function of Forest and Other wooded land

3.1 FRA 2005 Categories and definitions

Types of designation

Category	Definition
Primary function	A designated function is considered to be primary when it is significantly more important than other functions. This includes areas that are legally or voluntarily set aside for specific purposes.
Total area with function	Total area where a specific function has been designated, regardless whether it is primary or not.

Designation categories

Category / Designated function	Definition
Production	Forest / Other wooded land designated for production and extraction of forest goods, including both wood and non-wood forest products.
Protection of soil and water	Forest / Other wooded land designated for protection of soil and water.
Conservation of biodiversity	Forest / Other wooded land designated for conservation of biological diversity.
Social services	Forest / Other wooded land designated for the provision of social services.
Multiple purpose	Forest / Other wooded land designated to any combination of: production of goods, protection of soil and water, conservation of biodiversity and provision of social services and where none of these alone can be considered as being significantly more important than the others.
No or unknown function	Forest / Other wooded land for which a specific function has not been designated or where designated function is unknown.

3.2 National data

3.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
SAEFL. Leaflets "Forest an wood in Switzerland"	H	Conservation of biodiversity	1995/1999	
SAEFL, Swiss forest report	H	Conservation of biodiversity	2005	In publishing process

SAEFL = Swiss Agency for the Environment, Forests and Landscape

3.2.2 Classification and definitions

The category "Conservation of biodiversity" is identical with Switzerland's natural forest reserves

3.2.3 Original data

1995:
100 % Forest area = 1204047 ha
0.5 % Natural forest reserves = 6020 ha

1999:
100 % Forest area = 1212570 ha
1.1 % Natural forest reserves = 13338 ha

2005:
Natural forest reserves cover an area of 286 square kilometres.

3.3 Analysis and processing of national data

3.3.1 Calibration

The area is taken from Chapter 1.3.2

3.3.2 Estimation and forecasting

The percentage of total forest area for protection of soil and water (35%) is based on the ”Swiss forest report” and has been applied to all 3 reporting years.
Conservation of biodiversity for 1990 and 2000 is estimated on the basis of the leaflet ”Forests and wood in Switzerland”

The total area with function has been determined as follows:

Production: Total forest area minus the area allocated for biodiversity conservation.
Protection of soil and water: Same area as under primary function.
Conservation of biodiversity: Same area as under primary function.

3.4 Data for National reporting table T3

FRA 2005 Categories / Designated function	Area (1000 hectares)					
	Primary function			Total area with function		
	1990	2000	2005	1990	2000	2005
Forest						
Production	745	766	765	1149	1186	1192
Protection of soil and water	404	420	427	404	420	427
Conservation of biodiversity	6	13	29	6	13	29
Social services	0	0	0	ID	ID	ID
Multiple purpose	0	0	0	not appl.	not appl.	not appl.
No or unknown function	0	0	0	not appl.	not appl.	not appl.
Total - Forest	**1155**	**1199**	**1221**	**not appl.**	**not appl.**	**not appl.**
Other wooded land						
Production	0	0	0	0	0	0
Protection of soil and water	21	22	23	21	22	23
Conservation of biodiversity	0	0	0	ID	ID	ID
Social services	0	0	0	ID	ID	ID
Multiple purpose	0	0	0	not appl.	not appl.	not appl.
No or unknown function	38	42	43	not appl.	not appl.	not appl.
Total – Other wooded land	**59**	**64**	**67**	**not appl.**	**not appl.**	**not appl.**

4 Table T4 – Characteristics of Forest and Other wooded land

4.1 FRA 2005 Categories and definitions

Category	Definition
Primary	Forest / Other wooded land of native species, where there are no clearly visible indications of human activities and the ecological processes are not significantly disturbed.
Modified natural	Forest / Other wooded land of naturally regenerated native species where there are clearly visible indications of human activities.
Semi-natural	Forest / Other wooded land of native species, established through planting, seeding or assisted natural regeneration.
Productive plantation	Forest / Other wooded land of introduced species, and in some cases native species, established through planting or seeding mainly for production of wood or non wood goods.
Protective plantation	Forest / Other wooded land of native or introduced species, established through planting or seeding mainly for provision of services.

4.2 National data

4.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
SAEFL. Leaflets "Forest an wood in Switzerland"	H	Primary, modified natural	1995/1999	
SAEFL, Swiss forest report	H	Primary, modified natural	2005	In publishing process
TBFRA 2000	M	Productive plantation	2000	

4.2.2 Original data

Area in hectares

	1990	2000	2005
Primary	2890	6402	13728
Modified natural	3130	6936	14872
TOTAL	6020	13338	28600

- Semi –natural: TOTAL area deducting other categories
- Productive plantation: 0.3 % is an estimation, no original data available

4.3 Analysis and processing of national data

The area is taken from chapter 1.3.2

4.4 Reclassification into FRA 2005 classes

- Primary = natural forest reserves without removals = 48% of the total natural forest reserves
- Modified natural = natural forest reserves with removals = 52% of the total natural forest reserves
- Semi-natural = TOTAL area deducting other categories
- Productive plantation = 0.3% (is an estimation, no original data available)

4.5 Data for National reporting table T4

FRA 2005 Categories	Area (1000 hectares)					
	Forest			Other wooded land		
	1990	2000	2005	1990	2000	2005
Primary	3	6	14	0	0	0
Modified natural	3	7	15	0	0	0
Semi-natural	1146	1182	1188	59	64	67
Productive plantation	3	4	4	0	0	0
Protective plantation	ID	ID	ID	0	0	0
TOTAL	**1155**	**1199**	**1221**	**59**	**64**	**67**

4.6 Comments to National reporting table T4

5 Table T5 – Growing stock

5.1 FRA 2005 Categories and definitions

Category	Definition
Growing stock	Volume over bark of all living trees more than X cm in diameter at breast height (or above buttress if these are higher). Includes the stem from ground level or stump height up to a top diameter of Y cm, and may also include branches to a minimum diameter of W cm.
Commercial growing stock	The part of the growing stock of species that are considered as commercial or potentially commercial under current market conditions, and with a diameter at breast height of Z cm or more.

5.2 National data

5.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
NFI Switzerland	H	Growing stock	1983-1985, 1993-1995	

Sources:

Eidg. Anstalt forstl. Versuchswes., Ber. (1988): Schweizerisches Landesforstinventar. Ergebnisse der Erstaufnahme 1982-1986.

Brassel, P: Brändli, U.-B. (Red.) 1999 : Schweizerisches Landesforstinventar. Ergebnisse der Zweitaufnahme 1993-1995. Birmensdorf, Eidgenössische Forschungsanstalt für Wald, Schnee und Landschaft. Bern, Stuttgart, Wien, Haupt. 442 S.

WSL, 2004: Schweizerisches Landesforstinventar LFI. Spezialauswertung der Erhebung 1993-95 vom 10. August 2004. Ulrich Ulmer. Eidg. Forschungsanstalt WSL, Birmensdorf.

5.2.2 Classification and definitions

National class	Definition
Growing stock	Volume over bark of all living trees more than 12 cm in diameter at breast height. Includes the stem from ground level up to a top diameter of 0 cm. Branches are not included.
utilisable growing stock	Growing stock without bark and buttress up to a top end diameter of 7 cm and without loss due to mortality

5.2.3 Original data

National classes	Volume (million cubic meters over bark)	
	1983-1985	**1993-1995**
Growing stock (all living trees)	363 M m3	404 M m3
utilisable growing stock	301 M m3	334 M m3

5.3 Analysis and processing of national data

5.3.1 Estimation and forecasting

National classes	Volume (million cubic meters over bark)				
	1983-1985 (reference date 1984)	**1993-1995 (reference date 1994)**	**1990**	**2000**	**2005**
Growing stock	363	404	385	429	449
utilisable growing stock	301	334	319	354	370

Data for the years 1990 was estimated using linear interpolation of the difference between data from reference date 1984 and reference date 1994. Similarly the data for the years 2000 and 2005 were forecasted using the same linear trend.

5.4 Reclassification into FRA 2005 classes

The national class growing stock is reported as growing stock, the national class utilisable growing stock is reported as commercial growing stock. We consider this stock as potential for use.

5.5 Data for National reporting table T5

FRA 2005 Categories	Volume (million cubic meters over bark)					
	Forest			Other wooded land		
	1990	2000	2005	1990	2000	2005
Growing stock	385	429	449	ID	ID	ID
Commercial growing stock	319	354	370	ID	ID	ID

No information available about the growing stock on other wooded land.

Specification of country threshold values	Unit	Value	Complementary information
1. Minimum diameter at breast height of trees included in Growing stock (X)	cm	12	
2. Minimum diameter at the top end of stem (Y) for calculation of Growing stock	cm	0	
3. Minimum diameter of branches included in Growing stock (W)	cm	-	Not included
4. Minimum diameter at breast height of trees in Commercial growing stock (Z)	cm	12	Top end diameter for commercial growing stock is 7cm
5. Volume refers to “Above ground” (AG) or “Above stump” (AS)	AG / AS	AG	
6. Have any of the above thresholds (points 1 to 4) changed since 1990	Yes/No	No	
7. If yes, then attach a separate note giving details of the change	Attachment		

5.6 Comments to National reporting table T5

Generally the total forest area of Switzerland is available for wood supply if one follows the definition of FRA. However the estimate of the growing stock is based on the accessible forest area (approx. 97.5% of the forest area). Exceptions are protected areas which amount to about 15,000 ha in Switzerland, this is less than 2% of the forest area in Switzerland.

6 Table T6 – Biomass stock

6.1 FRA 2005 Categories and definitions

Category	Definition
Above-ground biomass	All living biomass above the soil including stem, stump, branches, bark, seeds, and foliage.
Below-ground biomass	All living biomass of live roots. Fine roots of less than 2mm diameter are excluded because these often cannot be distinguished empirically from soil organic matter or litter.
Dead wood biomass	All non-living woody biomass not contained in the litter, either standing, lying on the ground, or in the soil. Dead wood includes wood lying on the surface, dead roots, and stumps larger than or equal to 10 cm in diameter or any other diameter used by the country.

6.2 National data

6.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Swiss NFI	H	Growing stock	1983-1985, 1993-1995	
Swiss NFI	H	Volume of Dead Wood	1993-1995	
Perruchoud (1999)	H	Wood Density	1999	
GFRA 2005 Guideline for Country Reporting	H	BEF, R	2004	Values for BEF are derived from table 5.4, values for R are derived from table 5.5

Source:

Eidg. Anstalt forstl. Versuchswes., Ber. (1988): Schweizerisches Landesforstinventar. Ergebnisse der Erstaufnahme 1982-1986.

Brassel, P: Brändli, U.-B. (Red.) 1999 : Schweizerisches Landesforstinventar.

Ergebnisse der Zweitaufnahme 1993-1995. Birmensdorf, Eidgenössische Forschungsanstalt für Wald, Schnee und Landschaft. Bern, Stuttgart, Wien, Haupt. 442 S.

Perruchoud, D. et al. (1999): 20th Century Carbon Budget of Forest Soils in the Alps. Ecosystems 2: 320 – 337.

WSL, 2004: Schweizerisches Landesforstinventar LFI. Spezialauswertung der Erhebung 1993-95 vom 10. August 2004. Ulrich Ulmer. Eidg. Forschungsanstalt WSL, Birmensdorf.

6.2.2 Classification and definitions

National class	Definition
Growing stock	Volume over bark of all living trees more than 12 cm in diameter at breast height. Includes the stem from ground level up to a top diameter of 0 cm. Branches are not included. (data from table 10)
Volume of Dead wood	Volume over bark of all dead trees more than 12cm diameter at breast height either lying on the ground or standing

6.2.3 Original data

The basis for the calculation is the growing stock composition (table 10). We followed the proposed "Good Practice Guidance" to calculate biomass out of the growing stock.
Dead wood biomass: We only have dead wood measurements from the second NFI of Switzerland (1993-1995). To get a dead – life ratio between the dead wood biomass and AGB we estimated the dead wood volume from the NFI (1993-1995) data. We then followed again the "Good Practice Guidance" to calculate dead wood biomass out of the dead wood volume. We then considered the ratio between AGB and dead wood biomass as constant over the years and used the same ratio on the estimated AGB for the years 1990 and 2000. We assume that is a better approach then just using the default dead-live ratios from the IPCC Good Practice Guidance.

Data for year 1990 (AGB and BGB)

Species	**WD (t/m^3)**	**GS (Mio m^3)**	**SB (Mio t)**	**BEF**	**AGB (Mio t)**	**R**	**BGB (Mio t)**
Picea abies; Norway spruce	0.332	185.2	61.4864	1.3	79.93232	0.23	18.3844336
Abies alba; Fir	0.339	57.05	19.33995	1.3	25.141935	0.23	5.78264505
Pinus sylvestris; Pine	0.431	12.05	5.19355	1.3	6.751615	0.23	1.55287145
Larix deciduas; Larch	0.487	18.84	9.17508	1.3	11.927604	0.23	2.74334892
Fagus sylvatica; Beech	0.554	65.54	36.30916	1.4	50.832824	0.24	12.19988
Quercus robur; Common Oak	0.561	3.38	1.89618	1.4	2.654652	0.35	0.9291282
Quercus petrea; Sessile Oak	0.561	4.17	2.33937	1.4	3.275118	0.35	1.1462913
Acer pseudoplatanus; Sycamore	0.522	7.81	4.07682	1.4	5.707548	0.24	1.36981152
Fraxinus excelsior;Ash	0.564	10.32	5.82048	1.4	8.148672	0.24	1.95568128
Castanea sativa; Spanish chestnut	0.523	4.01	2.09723	1.4	2.936122	0.24	0.70466928
Remainder of species	0.4874	16.27	7.929998	1.35	10.7054973	0.26	2.783429298
TOTAL		**384.64**	**155.664218**		**208.013907**		**49.552189898**

Data for year 2000 (AGB and BGB)

Species	**WD (t/m^3)**	**GS (Mio m^3)**	**SB (Mio t)**	**BEF**	**AGB (Mio t)**	**R**	**BGB (1000 t)**
Picea abies; Norway spruce	0.332	199.31	66.17092	1.3	86.022196	0.23	19.7851051
Abies alba; Fir	0.339	61.9	20.9841	1.3	27.27933	0.23	6.2742459
Pinus sylvestris; Pine	0.431	12.63	5.44353	1.3	7.076589	0.23	1.62761547
Larix deciduas; Larch	0.487	21.51	10.47537	1.3	13.617981	0.23	3.13213563
Fagus sylvatica; Beech	0.554	77.31	42.82974	1.4	59.961636	0.24	14.39079264
Quercus robur; Common Oak	0.561	3.66	2.05326	1.4	2.874564	0.35	1.006097
Quercus petrea; Sessile Oak	0.561	4.57	2.56377	1.4	3.589278	0.35	1.256247
Acer pseudoplatanus; Sycamore	0.522	9.85	5.1417	1.4	7.19838	0.24	1.727611
Fraxinus excelsior;Ash	0.564	13.14	7.41096	1.4	10.375344	0.24	2.490083
Castanea sativa; Spanish chestnut	0.523	5.04	2.63592	1.4	3.690288	0.24	0.8856691
Remainder of species	0.4874	19.9	9.69926	1.35	13.094001	0.26	3.40444
TOTAL		**428.82**	**175.40853**		**234.779587**		**55.98004**

Data for Dead Wood Biomass (reference date 1994) and for the AGB (reference date 1994)

Year	AGB (Mio t)	Dead Wood Biomass (Mio t)
1994	**219.919**	**6.921**

Ratio Dead Wood Biomass/AGB = 6.921/219.919= 0.03147

6.3 Analysis and processing of national data

6.3.1 Calibration

6.3.2 Estimation and forecasting

Data from table 10 was taken as basis for the calculations of AGB and BGB. Therefore no estimation is necessary for the years 1990 and 2000. The year 2005 was forecasted using linear extrapolation based on 1990 and 2000 figures. The dead wood biomass is estimated assuming a fixed ratio between dead wood biomass and AGB of 0.031.

Classes	**Biomass (million metric tonnes oven-dry weight)**		
	1990	**2000**	**2005**
AGB	**208.01**	**234.78**	**248.16**
BGB	**49.55**	**55.98**	**59.19**
Dead Wood Biomass (AGB * 0.03147)	**6.45**	**7.28**	**7.69**

6.4 Reclassification into FRA 2005 classes

Not done. We followed the "Good Practice Guidance", and calculated the FRA classes.

6.5 Data for National reporting table T6

FRA 2005 Categories	**Biomass (million metric tonnes oven-dry weight)**					
	Forest			**Other wooded land**		
	1990	**2000**	**2005**	**1990**	**2000**	**2005**
Above-ground biomass	208	235	248	ID	ID	ID
Below-ground biomass	50	56	60	ID	ID	ID
Dead wood biomass	6	7	8	ID	ID	ID
TOTAL	**264**	**298**	**316**	**ID**	**ID**	**ID**

7 Table T7 – Carbon stock

7.1 FRA 2005 Categories and definitions

Category	Definition
Carbon in above-ground biomass	Carbon in all living biomass above the soil, including stem, stump, branches, bark, seeds, and foliage.
Carbon in below-ground biomass	Carbon in all living biomass of live roots. Fine roots of less than 2 mm diameter are excluded, because these often cannot be distinguished empirically from soil organic matter or litter.
Carbon in dead wood biomass	Carbon in all non-living woody biomass not contained in the litter, either standing, lying on the ground, or in the soil. Dead wood includes wood lying on the surface, dead roots, and stumps larger than or equal to 10 cm in diameter or any other diameter used by the country.
Carbon in litter	Carbon in all non-living biomass with a diameter less than a minimum diameter chose by the country for lying dead (for example 10 cm), in various states of decomposition above the mineral or organic soil. This includes the litter, fumic, and humic layers.
Soil carbon	Organic carbon in mineral and organic soils (including peat) to a specified depth chosen by the country and applied consistently through the time series.

7.2 National data

7.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
NFI Switzerland	H	Growing stock	1983-1985; 1993-1995	
NFI Switzerland	H	Volume of dead wood	1993-1995	
Jens Paulsen " Der biologische Kohlenstoffvorrat der Schweiz"	H	Carbon in litter	1994	
Daniel Perruchoud: „ Contemporary carbon stocks of mineral soils in the Swiss Alps "	H	soil carbon	1993	

Sources:

Perruchoud, D., Walthert, L., Zimmermann, S. and Lüscher, P. (2000): Contemporary carbon stocks of mineral soils in the Swiss Alps. Biogeochemistry 50: 111-136, 2000.

Paulsen, J. (1995): Der biologische Kohlenstoffvorrat der Schweiz. Verlag Rüegger, Chur/Zürich, 136 S.

Paulsen, J. (1994): Der biologische Kohlenstoffvorrat der Schweiz und eine spezielle Analyse der Streuvorräte im Schweizer Wald. 230 S., Diss. Univ. Basel.

Eidg. Anstalt forstl. Versuchswes., Ber. (1988): Schweizerisches Landesforstinventar. Ergebnisse der Erstaufnahme 1982-1986.

Brassel, P: Brändli, U.-B. (Red.) 1999 : Schweizerisches Landesforstinventar. Ergebnisse der Zweitaufnahme 1993-1995. Birmensdorf, Eidgenössische Forschungsanstalt für Wald, Schnee und Landschaft. Bern, Stuttgart, Wien, Haupt. 442 S.

WSL, 2004: Schweizerisches Landesforstinventar LFI. Spezialauswertung der Erhebung 1993-95 vom 10. August 2004. Ulrich Ulmer. Eidg. Forschungsanstalt WSL, Birmensdorf.

7.2.2 Classification and definitions

National class	Definition
Carbon in above-ground biomass	Calculated from the biomass stock following the good practice guidance
Carbon in below-ground biomass	Calculated from the biomass stock following the good practice guidance
Carbon in dead wood biomass	Derived from NFI data
Carbon in litter	Carbon in all non-living biomass with a diameter less than 2cm. This includes the litter, fumic, and humic layers.
Soil carbon	Carbon in 0-30cm topsoil

7.2.3 Original data

Data from table 6:

FRA 2005 Categories	Biomass (million metric tonnes oven-dry weight)		
	Forest		
	1990	2000	2005
Above-ground biomass	208	235	248
Below-ground biomass	50	56	60
Dead wood biomass	6	7	8

7.3 Analysis and processing of national data

Following the IPCC Good Practice Guidance, we calculated the Carbon Stock of AGB, BGB and dead wood biomass by multiplying with 0.5.

FRA 2005 Categories	Carbon (Million metric tonnes)		
	Forest		
	1990	2000	2005
Carbon in above-ground biomass	104	117.5	124
Carbon in below-ground biomass	25	28	30
Carbon in dead wood	3	3.5	4

Soil Carbon:
The data is derived from forest soils that have been sampled in 1993 in the context of the Swiss forest damage inventory. See Perruchod and others (2000) for details. The mean soil carbon in the topsoil from 0-30cm was estimated as 76tC/ha for Swiss forest soils. We calculated the soil carbon by multiplying the estimated value with the forest area data from table 1.

FRA 2005 Categories	Carbon (Million metric tonnes)		
	Forest		
	1990	2000	2005
Soil carbon	87.78	91.124	92.796

Carbon in litter:
The data is derived from litter measurements that have been collected on more than 230 samples in Switzerland and which averaged 13 tonnes per hectare. See Paulsen (1994) and Paulsen (1995) for details. Organic material with less than 2cm in diameter is not included.

FRA 2005 Categories	Carbon (Million metric tonnes)		
	Forest		
	1990	2000	2005
Carbon in litter	15.015	15.587	15.873

7.4 Data for National reporting table T7

FRA 2005 Categories	Carbon (Million metric tonnes)					
	Forest			Other wooded land		
	1990	2000	2005	1990	2000	2005
Carbon in above-ground biomass	104	118	124	ID	ID	ID
Carbon in below-ground biomass	25	28	30	ID	ID	ID
Sub-total: Carbon in living biomass	**129**	**146**	**154**			
Carbon in dead wood	3	4	4	ID	ID	ID
Carbon in litter	15	16	16	ID	ID	ID
Sub-total: Carbon in dead wood and litter	**18**	**20**	**20**			
Soil carbon to a depth of 30cm	88	91	93	ID	ID	ID
TOTAL CARBON	**235**	**257**	**267**	**ID**	**ID**	**ID**

7.5 Comments to National reporting table T7

The FRA class “carbon in litter“ might be misunderstood, because the fumic and humic layers are included. We normally add the carbon of these layers to the soil carbon.

The soil carbon should include the carbon in the whole soil and not only the upper horizon.

The increase of the soil carbon from 1990 to 2005 is due to the bigger forest area. There is no information about any increase of the soil carbon per ha.

8 Table T8 – Disturbances affecting health and vitality

8.1 FRA 2005 Categories and definitions

Category	Definition
Disturbance by fire	Disturbance caused by wildfire, independently whether it broke out inside or outside the forest/OWL.
Disturbance by insects	Disturbance caused by insect pests that are detrimental to tree health.
Disturbance by diseases	Disturbance caused by diseases attributable to pathogens, such as a bacteria, fungi, phytoplasma or virus.
Other disturbance	Disturbance caused by other factors than fire, insects or diseases.

8.2 National data

8.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
OFEFP, Annuaire 2003, La forêt et le bois	H	Fire	2003	1988-1992 average 1998-2002 average
OFEFP, Dégâts provoqués par la tempête de 1990 dans les forêts en Suisse	H	Other disturbance : storm	1994	1988-1992 average
OFEFP, Lothar. Der Orkan 1999. Ereignisanalyse	H	Other disturbance : storm	2001	1998-2002 average

OFEFP = Office fédéral de l'environnement, des forêts et du paysage (=SAEFL)

8.2.2 Classification and definitions

National class	Definition
Storm damaged area	80% or more of standing volume is damaged on areas exceeding 0,2 hectares

8.2.3 Original data

The original data, collected by SAEFL (Swiss Agency for the Environment, Forests and Landscape) and published in "Annuaire 2004, La forêt et le bois" are listed below

Year	Fire (ha)	Storm (ha)
1988	183	0
1989	213	0
1990	1102	5000
1991	148	0
1992	52	0
Average	340	1000

Year	Fire (ha)	Storm (ha)
1998	249	0
1999	9	20000
2000	36	0
2001	37	0
2002	410	0
Average	148	4000

8.3 Data for National reporting table T8

FRA-2005 Categories	**Average annual area affected (1000 hectares)**			
	Forests		**Other wooded land**	
	1990	**2000**	**1990**	**2000**
Disturbance by fire	0.3	0.1	ID	ID
Disturbance by insects	ID	ID	ID	ID
Disturbance by diseases	ID	ID	ID	ID
Other disturbance (storm)	1.0	4.0	0	0

8.4 Comments to National reporting table T8

Year 1990 and 2000: the average of five year periods (1988-1992 / 1998-2002) where taken into account to calculate the "Disturbance by fire" and "Other disturbance (storm)"

9 Table T9 – Diversity of tree species

9.1 FRA 2005 Categories and definitions

Category	Definition
Number of native tree species	The total number of native tree species that have been identified within the country.
Number of critically endangered tree species	The number of native tree species that are classified as "Critically endangered" in the IUCN red list.
Number of endangered tree species	The number of native tree species that are classified as "Endangered" in the IUCN red list.
Number of vulnerable tree species	The number of native tree species that are classified as "Vulnerable" in the IUCN red list.

9.2 National data

9.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
NFI Switzerland	H	Tree species found in NFI Switzerland	1983-1985,1993-1995	
Red List Switzerland	H	CR,EN,VU	2002	
Species list Marcet	H	Native tree species in switzerland	1980	
IUCN Red List	H	Number of critically endangered tree species, number of endangered tree species, number of vulnerable tree species	2004	

Sources:

Eidg. Anstalt forstl. Versuchswes., Ber. (1988): Schweizerisches Landesforstinventar. Ergebnisse der Erstaufnahme 1982-1986.

Brassel, P: Brändli, U.-B. (Red.) 1999 : Schweizerisches Landesforstinventar. Ergebnisse der Zweitaufnahme 1993-1995. Birmensdorf, Eidgenössische Forschungsanstalt für Wald, Schnee und Landschaft. Bern, Stuttgart, Wien, Haupt. 442 S.

Moser, D., A. Gygax, B. Bäumler, N. Wyler und R. Palese (2002): Rote Liste der gefährdeten Farn- und Blütenpflanzen der Schweiz. Hrsg. Bundesamt für Umwelt, Wald und Landschaft, Bern; Zentrum des Datenverbundnetzes der Schweizer Flora, Chambésy; Conservatoire et

Jardin botaniques de la Ville de Genève, Chambésy. BUWAL-Reihe „Vollzug-Umwelt“. 118 S.

Marcet, E. (1980): Dendrologie Vorlesung ETHZ, Unterichtsbeilage

9.2.2 Classification and definitions

National class	Definition
Native tree species	Tree species that have been introduced in Switzerland before 1500 A.D.

9.2.3 Original data

Species	type	Red List Switzerland (2002)
Abies alba Mill.	Coniferous	LC
Acer campestre L.	Broadleaf	LC
Acer opalus Mill.	Broadleaf	LC
Acer platanoides L.	Broadleaf	LC
Acer pseudoplatanus L.	Broadleaf	LC
Alnus glutinosa Gaertn.	Broadleaf	LC
Alnus incana Moench.	Broadleaf	LC
Betula pendula Roth	Broadleaf	LC
Betula pubescens Ehrh.	Broadleaf	LC
Carpinus betulus L.	Broadleaf	LC
Castanea sativa L.	Broadleaf	LC
Celtis australis L.	Broadleaf	NT
Fagus sylvatica L.	Broadleaf	LC
Fraxinus excelsior L.	Broadleaf	LC
Fraxinus ornus L.	Broadleaf	LC
Juglans regia L.	Broadleaf	LC
Larix deciduas	Coniferous	LC
Malus sylvestris Mill.	Broadleaf	NT
Ostrya carpinifolia Scop.	Broadleaf	no data
Picea abies Karst.	Coniferous	LC
Pinus cembra L.	Coniferous	LC
Pinus mugo Turra subsp. uncinata	Coniferous	LC
Pinus sylvestris L.	Coniferous	LC
Populus alba L.	Broadleaf	LC
Populus canescens	Broadleaf	DD
Populus tremula L.	Broadleaf	LC
Prunus avium L.	Broadleaf	LC
Pyrus communis L. / P. pyraster (L.) Burgsdorff	Broadleaf	LC
Quercus cerris L.	Broadleaf	NT
Quercus petraea Liebl.	Broadleaf	LC
Quercus pubescens Willd.	Broadleaf	LC
Quercus robur L.	Broadleaf	LC
Salix alba L.	Broadleaf	LC
Salix caprea	Broadleaf	LC
Salix cinerea	Broadleaf	LC

Salix daphnoides	Broadleaf	LC
Salix eleaegnos	Broadleaf	LC
Salix fragilis	Broadleaf	LC
Salix pendantra	Broadleaf	NT
Salix viminalis	Broadleaf	LC
Sorbus aria Crantz	Broadleaf	LC
Sorbus aucuparia L.	Broadleaf	LC
Sorbus domestica L.	Broadleaf	EN
Sorbus latifolia s.l.	Broadleaf	VU
Sorbus mougeotii	Broadleaf	LC
Sorbus torminalis Crantz	Broadleaf	LC
Taxus baccata L.	Coniferous	LC
Tilia cordata Mill.	Broadleaf	LC
Tilia platyphyllos Scop.	Broadleaf	LC
Ulmus glabra Huds.	Broadleaf	LC
Ulmus laevis Pall.	Broadleaf	EN
Ulmus minor Mill. (U. carpinifolia)	Broadleaf	NT

9.3 Data for National reporting table T9

FRA 2005 Categories	**Number of species (year 2000)**
Native tree species	52
Critically endangered tree species	0
Endangered tree species	0
Vulnerable tree species	0

9.4 Comments to National reporting table T9

The IUCN Red List 2002 stated no critically endangered, endangered or vulnerable tree species in Switzerland. However, the national Red List listed 2 endangered and 1 vulnerable tree species as follows:

Endangered trees species: *Sorbus domestica* and *Ulmus laevis*.
Vulnerable species: *Sorbus latifolia*

For informative purpose we added the last column in 7.2.3, which shows the data from the Red List Switzerland.

10 Table T10 – Growing stock composition

10.1 FRA 2005 Categories and definitions

List of species names (scientific and common names) of the ten most common species.

10.2 National data

10.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
NFI Switzerland	H	Growing stock per species	1983-1985;1993-1995	

10.2.2 Original data

FRA 2005 Categories / Species name (Scientific name and common name)	Growing Stock in Forests (million cubic meters)	
	1983-1985 (refernce year 1984)	1993-1995 (refernce year 1994)
Picea abies; Norway spruce	177.65	191.19
Fagus sylvatica; Beech	60.06	70.84
Abies alba; Fir	54.48	59.12
Larix deciduas; Larch	17.53	20.02
Pinus sylvestris; Pine	11.72	12.29
Fraxinus excelsior;Ash	9.14	11.64
Acer pseudoplatanus; Sycamore	6.94	8.76
Quercus petrea; Sessile Oak	3.96	4.34
Quercus robur; Common Oak	3.24	3.50
Castanea sativa; Spanish chestnut	3.57	4.49
Remainder of species	14.67	17.94
TOTAL	**363**	**404**

Sources:

Eidg. Anstalt forstl. Versuchswes., Ber. (1988): Schweizerisches Landesforstinventar. Ergebnisse der Erstaufnahme 1982-1986.

Brassel, P: Brändli, U.-B. (Red.) 1999 : Schweizerisches Landesforstinventar. Ergebnisse der Zweitaufnahme 1993-1995. Birmensdorf, Eidgenössische Forschungsanstalt für Wald, Schnee und Landschaft. Bern, Stuttgart, Wien, Haupt. 442 S.

WSL, 2004: Schweizerisches Landesforstinventar LFI. Spezialauswertung der Erhebung 1993-95 vom 10. August 2004. Ulrich Ulmer. Eidg. Forschungsanstalt WSL, Birmensdorf.

10.3 Analysis and processing of national data

10.3.1 Estimation and forecasting

FRA 2005 Categories / Species name (Scientific name and common name)	Growing Stock in Forests (million cubic meters)			
	1983-1985 (refernce year 1984)	1993-1995 (refernce year 1994)	1990	2000
Picea abies; Norway spruce	177.65	191.19	185.20	199.31
Fagus sylvatica; Beech	60.06	70.84	65.54	77.31
Abies alba; Fir	54.48	59.12	57.05	61.90
Larix deciduas; Larch	17.53	20.02	18.84	21.51
Pinus sylvestris; Pine	11.72	12.29	12.05	12.63
Fraxinus excelsior;Ash	9.14	11.64	10.32	13.14
Acer pseudoplatanus; Sycamore	6.94	8.76	7.81	9.85
Quercus petrea; Sessile Oak	3.96	4.34	4.17	4.57
Quercus robur; Common Oak	3.24	3.50	3.38	3.66
Castanea sativa; Spanish chestnut	3.57	4.49	4.01	5.04
Remainder of species	14.67	17.94	16.27	19.90
TOTAL	**363**	**404**	**385**	**429**

Data for the years 1990 was estimated using linear interpolation of the difference between data from reference date 1984 and reference date 1994. Similarly the data for the year 2000 was forecasted using the same linear trend.

10.4 Data for National reporting table T10

FRA 2005 Categories / Species name (Scientific name and common name)	Growing Stock in Forests (million cubic meters)	
	1990	2000
Picea abies; Norway spruce	185.20	199.31
Fagus sylvatica; Beech	65.54	77.31
Abies alba; Fir	57.05	61.90
Larix deciduas; Larch	18.84	21.51
Fraxinus excelsior;Ash	10.32	13.14
Pinus sylvestris; Pine	12.05	12.63
Acer pseudoplatanus; Sycamore	7.81	9.85
Castanea sativa; Spanish chestnut	4.01	5.04
Quercus petrea; Sessile Oak	4.17	4.57
Quercus robur; Common Oak	3.38	3.66
Remainder of species	16.27	19.90
TOTAL	**385**	**429**

11 Table T11 – Wood removal

11.1 FRA 2005 Categories and definitions

Category	Definition
Industrial wood removal	The wood removed (volume of roundwood over bark) for production of goods and services other than energy production (woodfuel).
Woodfuel removal	The wood removed for energy production purposes, regardless whether for industrial, commercial or domestic use.

11.2 National data

11.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Schweizerische Forststatistik	H	logs, pulp wood, firewood	Yearly data available	

Source:

Bundesamt für Statistik (BFS) / Bundesamt für Umwelt, Wald und Landschaft (BUWAL) (2003): Wald und Holz in der Schweiz, Jahrbuch 2003

11.2.2 Classification and definitions

National class	Definition
Logs	Wood for processing in saw mills; Volume under bark
Pulp wood	Wood for mechanical or chemical processing; Volume over bark
Firewood	Wood for energy production purposes; Volume over bark

11.2.3 Original data

Year	Logs (1000 m^3)	Mean of 5 year period	Pulpwood (1000 m^3)	Mean of 5 year period	Firewood (1000 m^3)	Mean of 5 year period
1988	2793	3214.4	809	806.2	893	843.2
1989	2887		842		813	
1990	4488		895		879	
1991	2987		764		786	
1992	2917		721		845	
1998	3386	4089.4	460	574.4	1000	1144
1999	3294		462		981	
2000	6801		811		1626	
2001	3920		619		1122	
2002	3046		520		991	

11.3 Analysis and processing of national data

11.3.1 Estimation and forecasting

1990			2000			2005		
Logs (1000 m^3)	Pulpwood (1000 m^3)	Firewood (1000 m^3)	Logs (1000 m^3)	Pulpwood (1000 m^3)	Firewood (1000 m^3)	Logs (1000 m^3)	Pulpwood (1000 m^3)	Firewood (1000 m^3)
3214.4	806.2	843.2	4089.4	574.4	1144	4526.9	458.5	1294.4

Year 1990 and 2000: the means of five year periods where taken into account to calculate the volume of logs, pulpwood and firewood. The data for the year 2005 was forecasted using linear interpolation.

11.4 Reclassification into FRA 2005 classes

Industrial Wood removal = Logs *1.15 (conversion to over bark volume)+ pulpwood removal
Woodfuel removal = firewood removal

11.5 Data for National reporting table T11

FRA 2005 Categories	Volume in 1000 cubic meters of roundwood over bark					
	Forest			Other wooded land		
	1990	2000	2005	1990	2000	2005
Industrial roundwood	4502	5277	5664	NA	NA	NA
Woodfuel	843	1144	1294	NA	NA	NA
TOTAL for Country	**5345**	**6421**	**6958**	**NA**	**NA**	**NA**

12 Table T12 – Value of wood removal

12.1 FRA 2005 Categories and definitions

Category	Definition
Value of industrial wood removal	Value of the wood removed for production of goods and services other than energy production (woodfuel).
Value of woodfuel removal	Value of the wood removed for energy production purposes, regardless whether for industrial, commercial or domestic use.

12.2 National data

12.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
OFEFP, Annuaire 1988 - 2002 , La forêt et le bois	H	Receipts from sale of wood		

OFEFP = Office fédéral de l'environnement, des forêts et du paysage SAEFL

12.2.2 Classification and definitions

National class	Definition
Logs	Logs include sawlogs and veneer logs

12.2.3 Original data

Original data on the quantity of removals are from the data source mentioned above, because only the receipts from sale of wood of public forest are known.

	Removals			Receipts from sale of wood			Receipts from sale of wood		
	Public forest			Public forest					
	Logs	Pulpwood	Firewood	Logs	Pulpwood	Firewood	Logs	Pulpwood	Firewood
Year	m3	m3	m3	Fr.	Fr.	Fr.	Fr./m3	Fr./m3	Fr./m3
2002	2096015	430022	594651	148831057	14582694	23860635	71	34	40
2001	2650827	512005	671325	159968591	17256884	24390074	60	34	36
2000	4063648	549617	742601	233732618	19529142	24541436	58	36	33
1999	2313364	386267	601421	214853819	14470167	24634335	93	37	41
1998	2406144	383983	624598	224181604	15384231	25302831	93	40	41
Average 1998-2002							**75**	**36**	**38**
1992	2096144	579525	528370	225517320	29752186	26827347	108	51	51
1991	2327110	644085	522187	237037059	34280341	25440351	102	53	49
1990	3268363	703590	524828	344850206	39710382	23556795	106	56	45
1989	2096430	629165	486325	250559818	38661904	25187907	120	61	52
1988	2067081	651620	559122	232118098	42306699	29348744	112	65	52
Average 1988-1992							**110**	**57**	**50**

12.3 Analysis and processing of national data

Original data on the quantity of removals are in table 11.2.3 and 11.3.1
The prices per m3 are in table 12.2.3

1990	1000 m3	Fr. per m3	1000 Fr.	Exchange rate	1000 USD
Logs m3	3214.4	110	353584	0.7716	272825
Pulpwood m3	806.2	57	45953	0.7716	35457
Firewood m3	843.2	50	42160	0.7716	32531
Total	4863.8		441697	0.7716	340813

2000	1000 m3	Fr. per m3	1000 Fr.	Exchange rate	1000 USD
Logs m3	4089.4	75	306705	0.6112	187458
Pulpwood m3	574.4	36	20678	0.6112	12638
Firewood m3	1144.0	38	43472	0.6112	26570
Total	5807.8		370855	0.6112	226666

2005	1000 m3	Fr. per m3	1000 Fr.	Exchange rate	1000 USD
Logs m3	4526.9	75	339518	0.8084	274466
Pulpwood m3	458.5	36	16506	0.8084	13343
Firewood m3	1294.4	38	49187	0.8084	39762
Total			405211	0.8084	327571

Year 1990 and 2000: the average of five year periods (1988-1992 / 1998-2002) where taken into account to calculate the volume of logs (sawlogs and veneer logs), pulpwood and firewood. The data for the year 2005 is an estimation.

The Exchange rates are as follows: (Appendix 4)

1990 1 CHF = 0.7716 USD // 1 USD = 1.296 CHF
2000 1 CHF = 0.6112 USD // 1 USD = 1.636 CHF
2005 1 CHF = 0.8084 USD // 1 USD = 1.237 CHF (rate for 2003 used)

12.4 Data for National reporting table T12

FRA 2005 Categories	**Value of roundwood removal (1000 USD)**					
	Forest			**Other wooded land**		
	1990	**2000**	**2005**	**1990**	**2000**	**2005**
Industrial roundwood	308282	200096	287809	0	0	0
Woodfuel	32531	26570	39762	0	0	0
TOTAL for Country	**340813**	**226666**	**327571**	**0**	**0**	**0**

13 Table T13 – Non-wood forest product removal

13.1 FRA 2005 Categories and definitions

The following categories of non-wood forest products have been defined:

Category
Plant products / raw material
1. Food
2. Fodder
3. Raw material for medicine and aromatic products
4. Raw material for colorants and dyes
5. Raw material for utensils, handicrafts & construction
6. Ornamental plants
7. Exudates
8. Other plant products
Animal products / raw material
9. Living animals
10. Hides, skins and trophies
11. Wild honey and bee-wax
12. Bush meat
13. Raw material for medicine
14. Raw material for colorants
15. Other edible animal products
16. Other non-edible animal products

13.2 National data

13.2.1 Data sources

References to sources of information	**Quality (H/M/L)**	**Variable(s)**	**Year(s)**	**Additional comments**
Pierre Alfter, Biens non-bois et services de la forêt suisse	M	Food (Chestnuts, mushrooms) Ornamental plants (Christmas Trees) Other plant products (seed) Forest honey Bush meat (Game)	2004	Report for SAEFL
Pierre Alfter, Projet NWGS, Quantification et valorisation des biens et services non-bois de la forêt suisse faisant l'objet d'une utilisation, Rapport final 1996	M	Food (Chestnut, mushrooms, fruits) Fodder (for domestic animals, for wildlife), Christmas trees Ornamental usage of herbs, moss, lichen, leaves, fruits and flowers Other plant products(Shaving/chips, Seed,young plants, compost) Hides, skins and trophies Forest honey and bee-	1996	Report for SAEFL

		wax Skins Bush meat (Game)		
Swiss Federal Statistical Office/SAEFL, annuaires 1975-2001	H	Wildlife, seed	1975-2001	
Swiss Federal Office of Public Health SFOPH "Pilzsicherheit für Alle"	M	Mushrooms	2002	

13.2.2 Classification and definitions

National class	**Definition**
Food	Chestnuts for commercial use. Mushrooms for individual and commercial use and fruits and berries for commercial use
Fodder	For domestic animals and for wildlife
Raw material for medicine and aromatic products	The dry weight of herbs, lichen, fruits and flowers
Raw material for utensils, handicrafts and construction	Flowers, herbs, roots, fruits, berries, leaves, cones, holly, mistletoe, needle branches, moss for commercial use
Ornamental plants	Christmas trees for commercial use
Other plant products	Seed for production of young plants in forests and young plants produced in forest for commercial use. Compost for commercial use and shaving or chips for commercial use
Hides, skins and trophies	Skins and trophies
Wild honey and bee-wax	Forest honey and bee-wax for individual collection and for commercialisation
Bush meat	Game (*cervus elaphus, rupicapra rupicapra, capreolus capreolus, capra ibex, sus scrofa, marmota marmota, lepus europaeus and timidus, oryctolagus cuniculus, phasianus colchicus, anas* spp.)

13.2.3 Original data

FRA 2005 Categories	**Scale factor**	**Unit**	**NWFP removal**		
			1990	**1996**	**2004**
Plant products / raw material			-		
1. Food (mushrooms)		t	-	735	450
1. Food (chestnut)		t	-	12	12
2. Fodder (for domestic animals)		t	-	42	
2. Fodder (for wildlife)		t	-	115	
3. Raw material for medicine and aromatic products		t		26	
5. Raw material for utensils, handicrafts & construction (moss)		m3	-	350	
5. Raw material for utensils, handicrafts & construction (dry leaves)		m3	-	3200	
5. Raw material for utensils, handicrafts & construction (green leaves)		m3	-	8000	
5. Raw material for utensils, handicrafts & construction (needle branches		t	-	60	
6. Ornamental plants (Christmas trees)		t	-	2800	
8. Other plant products (seed)		t	-	4	2
8. Other plant products (young plants)		t	-	300	

8. Other plant products (compost)		t	-	162000	
8. Other plant products (shaving/chips)		t	-	245000	
Animal products / raw material			-		
10. Skins and trophies		skins	-	45000	
11. Wild honey		t	-	500	550
11. Bee-wax		t	-	13	
12. Bush meat		t	-	1597	1700

In Switzerland we estimate that 1 Christmass tree has an average weight of about 7 kg (information from Josef Brägger, IG Suisse Christbaum). The 400'000 Christmas trees from forested area weigh 2800 t.

We estimate that 1 m3 of needle branches has an average weight of 300 kg (information from Josef Brägger, IG Suisse Christbaum), for 200 m3 it makes 60 t.

We estimate that the average weight of a young plant in Switzerland is about 200 g (estimation from Mr. Hochuli, Walder AG, Riehen) for 1500000 plants it makes 300 t.

We estimate that 1 m3 of compost has an average weight of 600 kg (information from Mr. Suter, Ricoter AG, Aarberg), for 270000 m3 it makes 162000 t

We estimate that 1 m3 of shaving/chips has an average weight of 350 kg (information from Mr. Suter, Ricoter AG, Aarberg), for 700000 m3 it makes 245000 t.

13.3 Analysis and processing of national data

13.3.1 Estimation and forecasting

Non-timber-forest products have been estimated and published in 1996 and 2004. In Switzerland non-timber-services will become more important than non-timber-products. Recently the monetary value of recreation in the Swiss Forest has been determined. The functional value of forest recreation has the value of CHF 10 thousand million or 9 thousand million USD. There is a trend over the last decades that forest services will increase: CO2, sequestration, erosion prevention, hydrological regulation and quality, biodiversity preservation.

Only few products are of a certain importance, and they will not become more important in Switzerland, principally because of the legal system. Due to globalisation even Swiss Christmas trees get less relevant because of the concurrence from abroad. As the public has access to all Swiss forests, gathering of forest products is allowed to everybody in a local custom way and quantity, so these products get difficult to be commercialised. Due to the little quantity allowed of gathered products and the high salaries, the commercialisation of non-timber-products is not relevant to Swiss forestry. So for the mushrooms. Wild animals (hunting regale) are owned by the cantons and not by the forest owners. Skins are even burned actually because there is no demand. The results of hunting are difficult to be estimated because lots of the animals live and are hunted also outside of the forests.

The 1996 figures were used to report the 2000 FRA reporting, the 2004 figures are used to report the 2005 reporting. For 1990 there existed no figures, there is no extrapolation possible – we do not know how the development was since the differences depend more on the methodology than the real development of non-timber-products.

13.4 Data for National reporting table T13

FRA 2005 Categories	Scale factor	Unit	NWFP removal		
			1990	2000	2005
Plant products / raw material					
1. Food		t		747	462
2. Fodder		t		157	
3. Raw material for medicine and aromatic products		t		26	
4. Raw material for colorants and dyes					
5. Raw material for utensils, handicrafts & construction		t		60	
6. Ornamental plants		t		2800	
7. Exudates					
8. Other plant products		t		407304	2
Animal products / raw material					
9. Living animals					
10. Hides, skins and trophies		skins		45000	
11. Wild honey and bee-wax		t		513	550
12. Bush meat		T		1597	1700
13. Raw material for medicine					
14. Raw material for colorants					
15. Other edible animal products					
16. Other non-edible animal products					

13.5 Comments to National reporting table T14

The 1996 figures were used to report the 2000 FRA reporting, the 2004 figures are used to report the 2005 reporting. For 1990 there existed no figures, there is no extrapolation possible – we do not know how the development was since the differences depend more on the methodology than the real development of non-timber-products.

14 Table T14 – Value of non-wood forest product removal

14.1 FRA 2005 Categories and definitions

The following categories of non-wood forest products have been defined:

Category
Plant products / raw material
1. Food
2. Fodder
3. Raw material for medicine and aromatic products
4. Raw material for colorants and dyes
5. Raw material for utensils, handicrafts & construction
6. Ornamental plants
7. Exudates
8. Other plant products
Animal products / raw material
9. Living animals
10. Hides, skins and trophies
11. Wild honey and bee-wax
12. Bush meat
13. Raw material for medicine
14. Raw material for colorants
15. Other edible animal products
16. Other non-edible animal products

14.2 National data

14.2.1 Data sources

References to sources of information	**Quality (H/M/L)**	**Variable(s)**	**Year(s)**	**Additional comments**
Pierre Alfter	M		2004	Report for SAEFL
Pierre Alfter	M		1996	Report for SAEFL
Swiss Federal Statistical Office/SAEFL, annuaires 1975-2001	H	Wildlife, seed	1975-2001	
Swiss Federal Office of Public Health SFOPH "Pilzsicherheit für Alle"	H	Mushrooms	2002	

14.2.2 Classification and definitions

National class	**Definition**
Food – Chestnut	Chestnuts for commercial use and Mushrooms for individual and commercial use and fruits and berries for commercial use
Fodder	For domestic animals and for wildlife
Raw material for medicine and aromatic products	The dry weight of herbs, lichen, fruits and flowers
Raw material for utensils, handicrafts and construction	Flowers, herbs, roots, fruits, berries

Ornamental plants	Christmas trees for commercial use
Other plant products	Seed for production of young plants in forests and young plants produced in forest for commercial use.Compost for commercial use and shaving or chips for commercial use
Hides, skins and trophies	Skins
Wild honey and bee-wax	Forest honey for commercialisation
Bush meat	Game (cervus elaphus, rupicapra rupicapra, capreolus capreolus, capra ibex, sus scrofa, marmota marmota, lepus europaeus and timidus, oryctolagus cuniculus, phasianus colchicus, anas spec..)

14.2.3 Original data

FRA 2005 Categories	**Value of the of NWFP removed (1000 CHF)**	
	1996	**2004**
Plant products / raw material		
1. Food (mushrooms)	8100	9000
1. Food (chestnut)	56	25
2. Fodder (for domestic animals)	15700	
2. Fodder (for wildlife)	31200	
3. Raw material for medicine and aromatic products	335	
6. Ornamental plants (Christmas trees)	5300	4500
8. Other plant products (seed)	178	90
8. Other plant products (young plants)	2250	
8. Other plant products (compost)	2160	
8. Other plant products (shaving/chips)	24500	
Animal products / raw material		
10. Skins	300	
11. Wild honey	7800	10500
11. Bee wax	75	
12. Bush meat	14000	17000
TOTAL	**111 954**	**41 115**

14.3 Analysis and processing of national data

14.3.1 Estimation and forecasting

Non-timber-forest products are not important for the forest owners because there is public access to forests and the possibility to collect non-timber-forest products. The value is a pure estimation because there are very few prices for the products. As well the importance of the products are decreasing like in the case of seed, because in Switzerland the regeneration gets since the last 10 years more and more naturally. For the future non-timber forest services will make more remarkable profits for forest owners than non-timber-forest products.

The 1996 figures were used to report the 2000 FRA reporting, the 2004 figures are used to report the 2005 reporting. For 1990 there existed no figures, there is no extrapolation possible – we do not know how the development was since the differences depend more on the methodology than the real development of non-timber-products.

The Exchange rates are as follows: (Appendix 4)
2000 1 CHF = 0.6112 USD // 1 USD = 1.636 CHF
2005 1 CHF = 0.9090 USD // 1 USD = 1.10 CHF (estimation)

14.4 Data for National reporting table T14

FRA 2005 Categories	Value of the of NWFP removed (1000 USD)		
	1990	2000	2005
Plant products / raw material			
1. Food		4985	8204
2. Fodder		28665	
3. Raw material for medicine and aromatic products			
4. Raw material for colorants and dyes			
5. Raw material for utensils, handicrafts & construction		205	
6. Ornamental plants		3238	4091
7. Exudates			
8. Other plant products		17773	82
Animal products / raw material			
9. Living animals			
10. Hides, skins and trophies		183	
11. Wild honey and bee-wax		4812	9545
12. Bush meat		8554	15453
13. Raw material for medicine			
14. Raw material for colorants			
15. Other edible animal products			
16. Other non-edible animal products			
TOTAL		**68415**	**37 375**

14.5 Comments to National reporting table T14

To 8) The category “other plant products” contains only seed in 2005, which has a little monetarian value compared to young plants, compost and shaving,
To 11) There does not exist data for bee wax in 2005

The total sum does not really make sense, because Switzerland is not able to collect data for all the suggested products as these products are not economically important and very difficult to be assessed.

Switzerland cannot provide data for 1990 because there are no figures available. To make an extrapolation is very difficult on this very roughly estimated data.

15 Table T15 – Employment in forestry

15.1 FRA 2005 Categories and definitions

Category	Definition
Primary production of goods	Employment in activities related to primary production of goods, like industrial roundwood, woodfuel and non-wood forest products.
Provision of services	Employment in activities directly related to services from forests and woodlands.
Unspecified forestry activities	Employment in unspecified forestry activities.

15.2 National data

15.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Schweizerische Forststatistik	H	Employees in forest enterprises, independent contractors in forestry	1985, 1995,2000	

Source: Bundesamt für Statistik (BFS) / Bundesamt für Umwelt, Wald und Landschaft (BUWAL) (2003): Wald und Holz in der Schweiz, Jahrbuch 2003

15.2.2 Classification and definitions

National class	Definition
Employees in forest enterprises	
Independent contractors in forestry	

It is assumed, that the national class independent contractors matches the category “provision of services” and that the national class employment in forest enterprises the category “primary production of goods”.

15.2.3 Original data

National class	Employment (person-years)		
	1985	1995	2000
Employees in forest enterprises	6899	6354	5321
Independent contractors in forestry	2405	1874	1956
TOTAL	9304	8228	7277

15.3 Analysis and processing of national data

15.3.1 Estimation and forecasting

National class	Employment (person-years)			
	1985	**1995**	**2000**	**1990**
Employees in forest enterprises	6899	6354	5321	6626
Independent contractors in forestry	2405	1874	1956	2139
TOTAL	**9304**	**8228**	**7277**	**8765**

Data for the years 1990 was estimated using linear interpolation of the difference between data from 1985 and 1995. The data for the year 2000 was directly used.

15.4 Reclassification into FRA 2005 classes

It is assumed, that the national class employees in forest enterprises matches the FRA class primary production of goods and the national class independent contractors in forestry matches the FRA class Provision of services.

15.5 Data for National reporting table T15

FRA 2005 Categories	Employment (1000 person-years)	
	1990	**2000**
Primary production of goods	8.765	7.277
Provision of services		
Unspecified forestry activities	NA	NA
TOTAL	**8.765**	**7.277**