

Changes in European land cover from 2000 to 2006

Overview

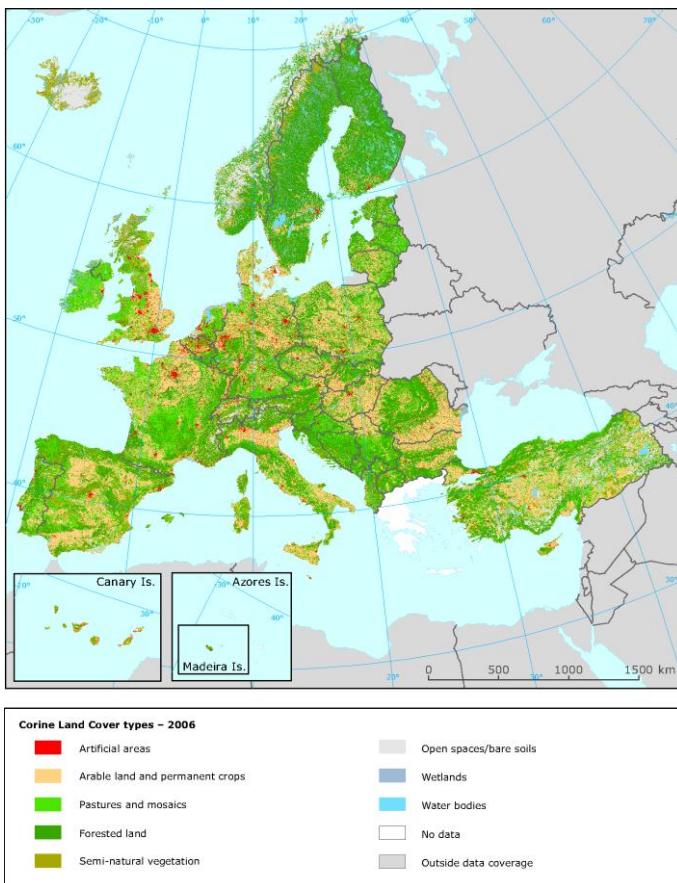
A growth in artificial surfaces and a positive change in the balance of water bodies and forested areas best summarises European land cover development during the period 2000 to 2006. A growth of almost 3 % of artificial surfaces between 2000 and 2006 took place. All other types of land cover had net growth with all of them having a consumption rate lower than 0,5 % of the initial area. Overall growth of particular land cover types is similar to the previous period, 1990 to 2000, with no change in development trends and only small modifications of formation/consumption intensity.

During the 2000 to 2006 period, there was a decrease in the annual land cover change compared to the period 1990 to 2000. However, this slow-down in changes to land cover is even more significant when comparing percentual change rates. Nevertheless, one must be aware of the effect on those new countries joining the Corine Land Cover (CLC) project during the period 2000 to 2006 (including countries with a very low overall change rate such as the Balkan countries, Finland, Norway, Sweden or Turkey).

Forest creation and management is the principle driver regarding changes to European land cover. However, most of this change is driven by internal conversion from transitional woodland to forest and also by issues related to felling and transition.

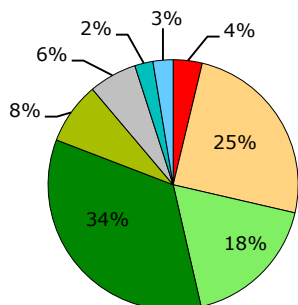
Changes to agricultural land remain the second most powerful driver of land cover change in Europe. However, after the year 2000, their intensity rapidly decreased compared to the previous period. The intensity of conversions from forest/nature areas to agriculture and from agriculture to forest or nature areas also slowed down from the year 2000.

Urbanisation has slowed down compared to the previous period. Diffuse residential sprawl together with construction are the main drivers of the creation of artificial land in Europe after the year 2000. More arable land and permanent crops and less pastures and mosaic farmland were lost to artificial development than in the period 1990-2000.

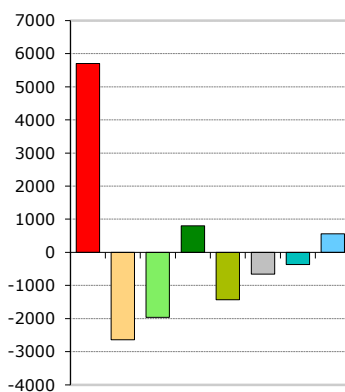


Note: For technical terms contained within this document, please refer to EEA report No. 11/2006. The results presented here are based on a change analysis of 44 land cover types mapped consistently on a 1:100.000 scale across Europe during the period 1990 to 2006 - see the CLC programme for details. In trend comparison figures, the reader should be aware that the total area described is considerably different for the 1990 to 2000 period (3 690 120 km²) and the 2000 to 2006 period (6 975 342 km² including class 523 "Sea and ocean")

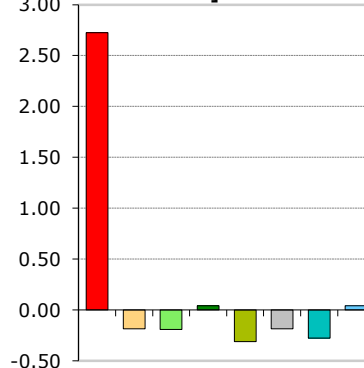
**1.1. Land cover 2006
[% of total]**



**1.2. Net change in land
cover 2000-2006 [km²]**



**1.3. Net change in land
cover [% of initial year
2000]**



■ Artificial areas
■ Semi-natural vegetation

■ Arable land & permanent crops
■ Open spaces/ bare soils

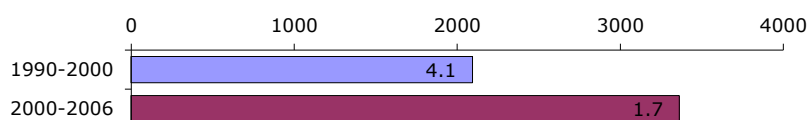
■ Pastures & mosaics
■ Wetlands

■ Forested land
■ Water bodies

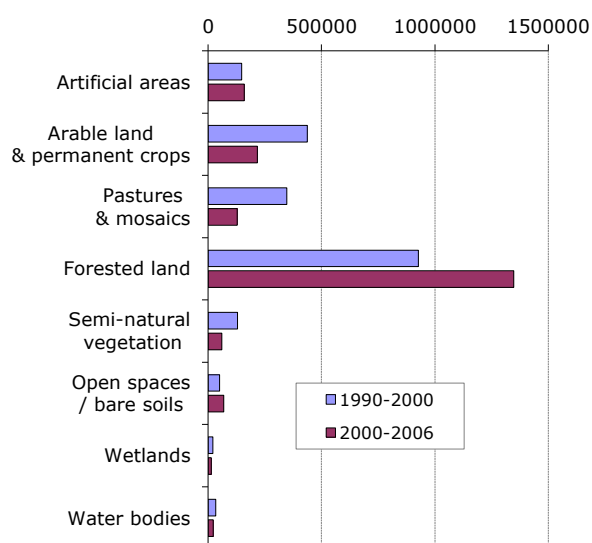
Summary balance table 2000-2006

	Artificial areas	Arable land and permanent crops	Pastures and mosaics	Forested land	Semi-natural vegetation	Open spaces/ bare soils	Wetlands	Water bodies	TOTAL [km2]
Land cover 2000	209248	1425705	1020670	1970267	459711	356298	135392	1398051	6975342
Consumption of initial LC	1913	7845	4806	40026	2547	2393	603	370	60504
Formation of new LC	7614	5207	2845	40823	1116	1738	230	931	60504
Net Formation of LC	5702	-2638	-1961	797	-1431	-655	-373	560	0
<i>Net formation as % of initial year</i>	<i>2.7</i>	<i>-0.2</i>	<i>-0.2</i>	<i>0.0</i>	<i>-0.3</i>	<i>-0.2</i>	<i>-0.3</i>	<i>0.0</i>	<i>0.0</i>
Total turnover of LC	9527	13052	7651	80850	3663	4131	833	1301	121008
<i>Total turnover as % of initial year</i>	<i>4.6</i>	<i>0.9</i>	<i>0.7</i>	<i>4.1</i>	<i>0.8</i>	<i>1.2</i>	<i>0.6</i>	<i>0.1</i>	<i>1.7</i>
Land cover 2006	214949	1423067	1018709	1971064	458280	355643	135018	1398612	6975342

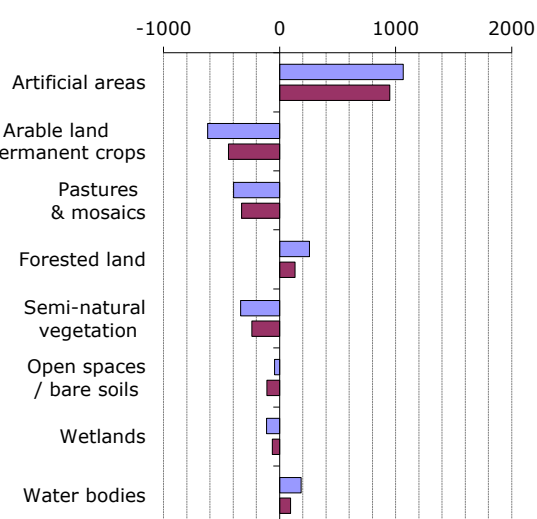
2.4. Annual land cover change [km2/year, % of total area]



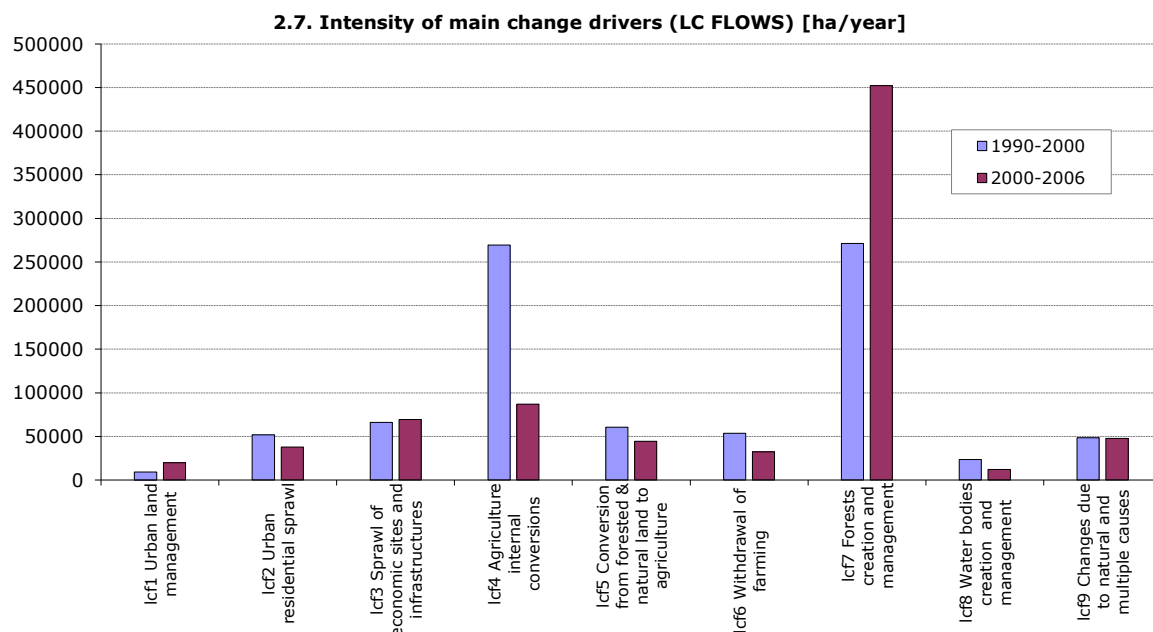
2.5. Annual turnover of LC types [ha/year]



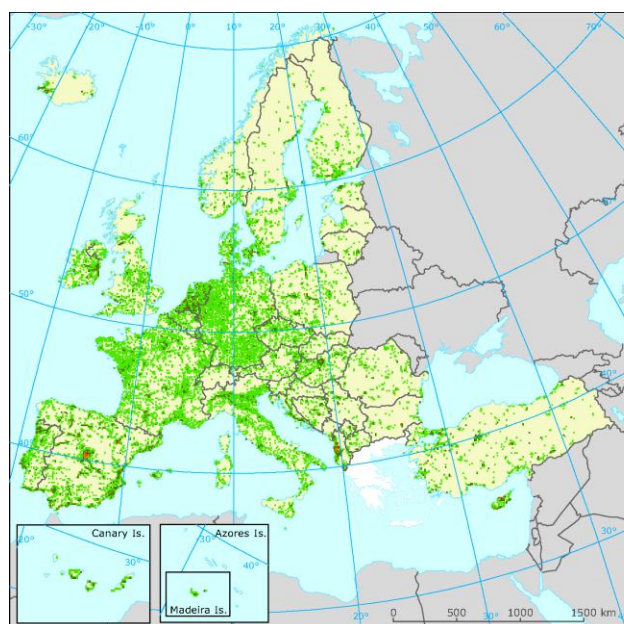
2.6. Net annual change of LC types [ha/year]



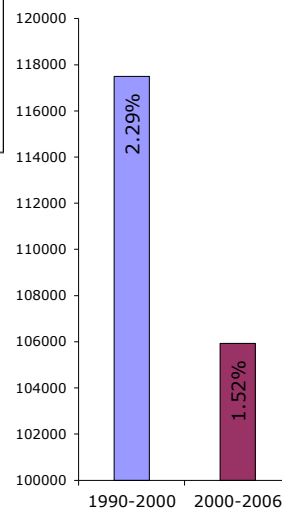
Summary trend figures	1990-2000	2000-2006
Annual land cover change [ha/year]	20928	20168
Annual land cover change as % of initial year	4.1	1.7
Land uptake by artificial development as mean annual change [ha/year]	117497	105925
Agricultural land uptake by urban and infrastructures development as mean annual change [ha/year]	109665	87635
Net uptake of forests and semi-natural land by agriculture as mean annual change [ha/year]	3525	7005
Net conversion from pasture to arable land and permanent crops as mean annual change [ha/year]	-103	4130
Forest & other woodland net formation as mean annual change [ha/year]	19497	-8990
Dry semi-natural land cover net formation as mean annual change [ha/year]	-28406	-27315
Wetlands & water bodies net formation as mean annual change [ha/year]	4342	4625



Artificial areas



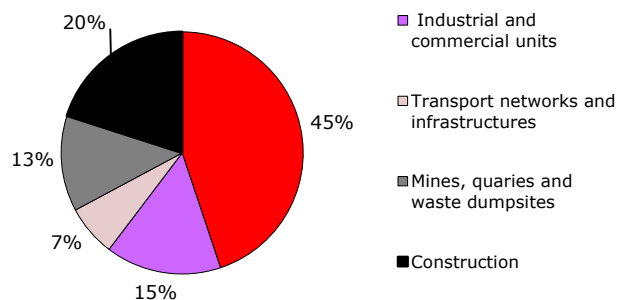
3.8. Artificial land take [ha/year, % of initial year]



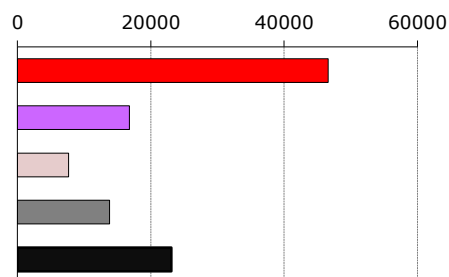
Urban sprawl slows down

Diffuse residential sprawl together with construction are the main drivers of the creation of artificial land in Europe after the year 2000. The creation of industrial/commercial sites, mines and quarrying areas and sport and leisure facilities have contributed significantly to this urban sprawl. More than $\frac{3}{4}$ of land uptake had previously consisted of agricultural areas with a prevailing share of arable and crop land. Beside such artificial land creation, the recycling of developed urban land (mostly conversion of construction sites into urban fabric, commercial or industrial units and transportation networks) is a significant part of total artificial development. Consumption of artificial land occurs to a lesser extent and is represented mainly by forested or agricultural land creation over former mineral extraction, dump or construction sites.

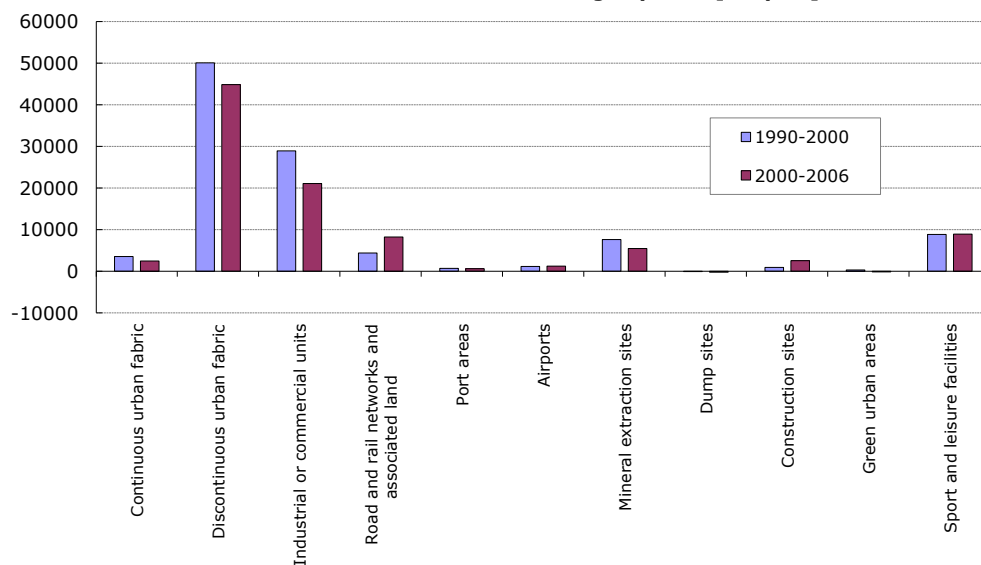
3.9. Artificial surfaces 2006
[% of total area]



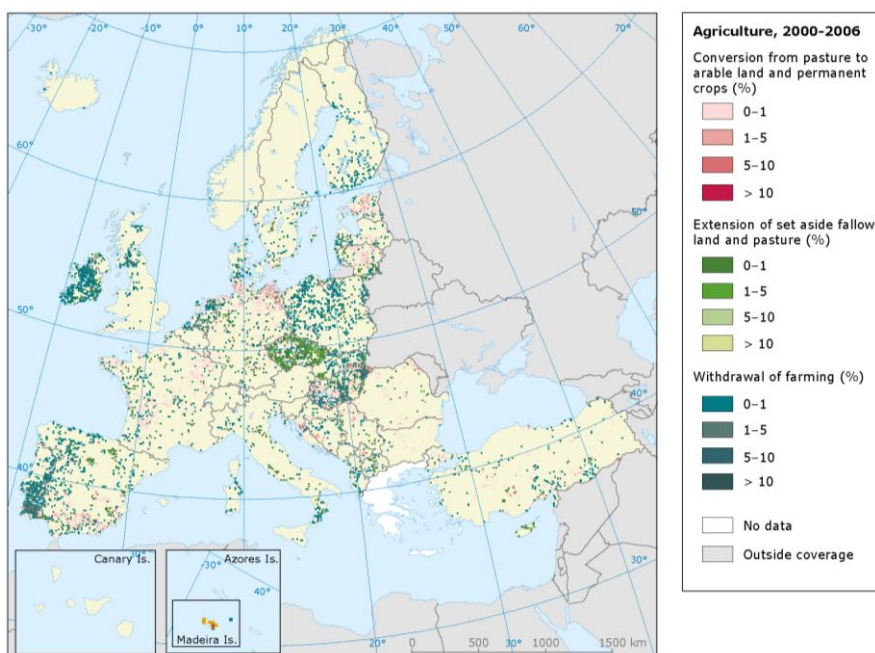
3.10. Artificial land take 2000-2006
[ha/year]



3.11. Mean annual artificial change by class [ha/year]



Agriculture



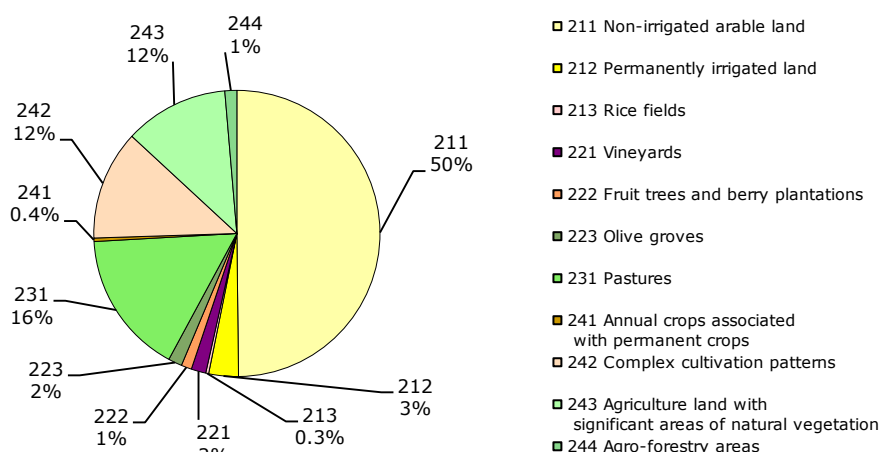
Stabilising agricultural management

The development of agricultural areas is characterised by prevailing consumption of both basic land cover types - arable/crop land and mosaics/pastures. This consumption is driven by two significant flows: artificial land take (driven mainly by the sprawl of economic sites and infrastructures) and the withdrawal of farming (mostly with woodland creation). Non-irrigated arable land has close to a 50 % share on the total agricultural area consumed, the rest consists predominantly of pastures, complex cultivation patterns and agricultural land with significant areas of natural vegetation. The formation of new agricultural land through the conversion from natural land cover to agriculture occurs to a significantly lower extent compared to the consumption of agricultural areas.

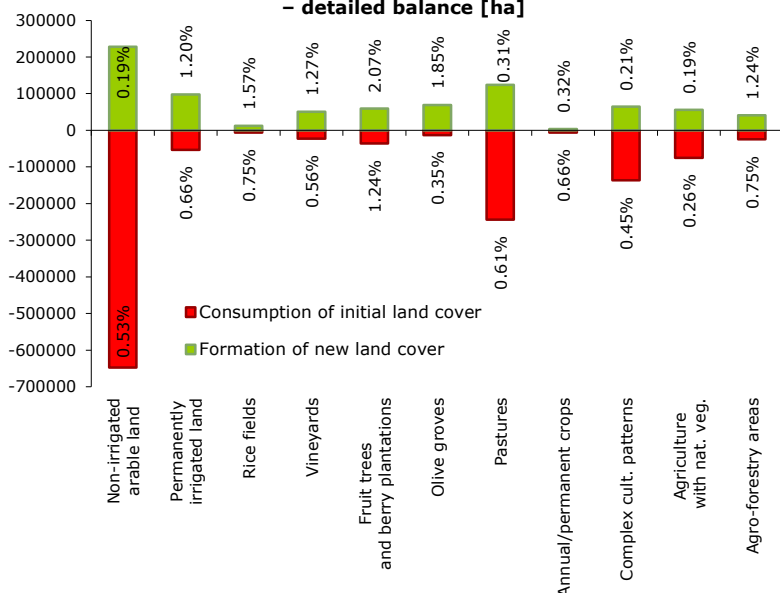
The main drivers of internal agriculture development are intensive conversion from pasture to non-irrigated arable land together and the growth of set aside fallow land and pasture. However, the intensity of both these conversions rapidly decreased compared to the period 1990 to 2000. The other significant internal agricultural flows in Europe are conversions from non-irrigated arable land to permanently irrigated arable land and from arable land to vineyards, orchards or olive groves.

There are several concentrations of internal agriculture conversions across Europe. While pasture extension occurs only in the border regions of the Czech Republic, in Hungary and (to a lesser extent) in southern Sweden, the conversion from pasture to arable land is typical for the Baltic countries (especially Estonia and Lithuania), Croatia, France, northern Germany, Hungary and the southern part of Spain. The formation of new agricultural areas through the conversion of natural and semi-natural land is concentrated mostly in the south-western half of Spain, in southern Turkey. Some areas with this conversion also occur in south-western Iceland. The consumption of agricultural land through the withdrawal of farming with or without woodland creation is typical for the Benelux countries, Hungary, Ireland, Poland, the southern half of Portugal, and Slovakia.

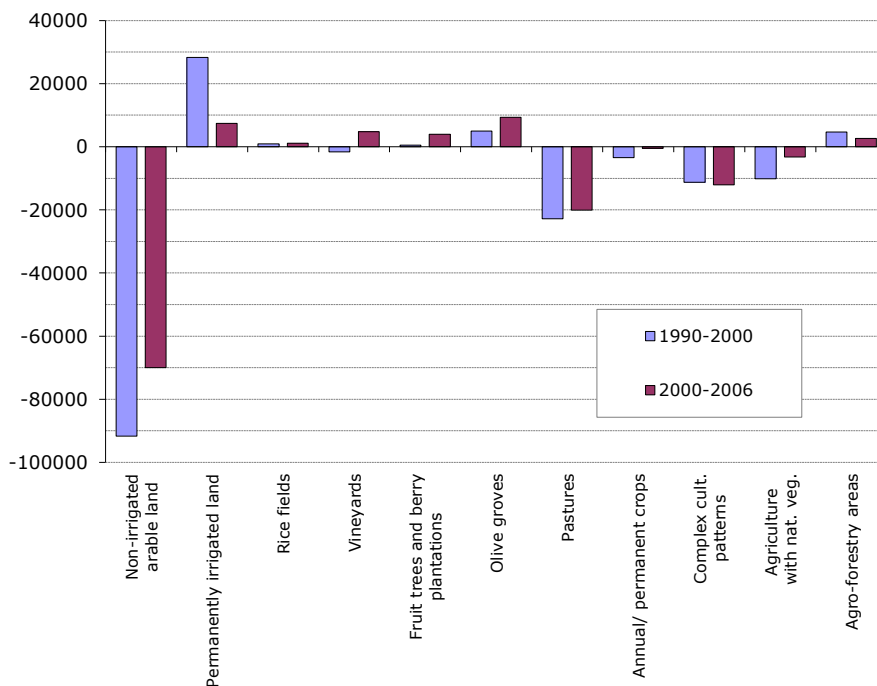
4.12. Agricultural areas 2006
[% of total area]



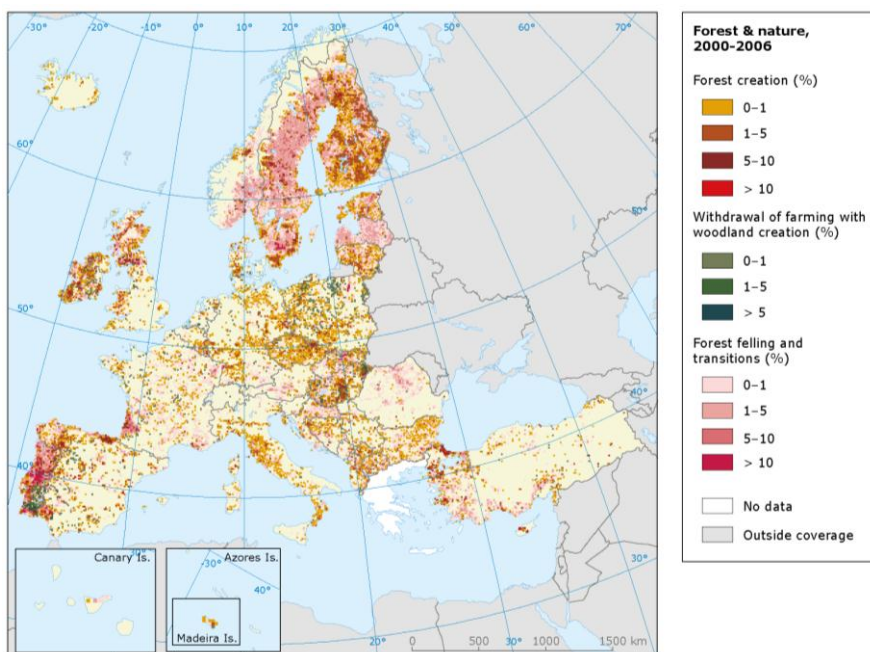
4.13. Development of agricultural areas 2000-2006
- detailed balance [ha]



4.14. Mean annual agricultural change by class [ha/year]



Forest and nature areas

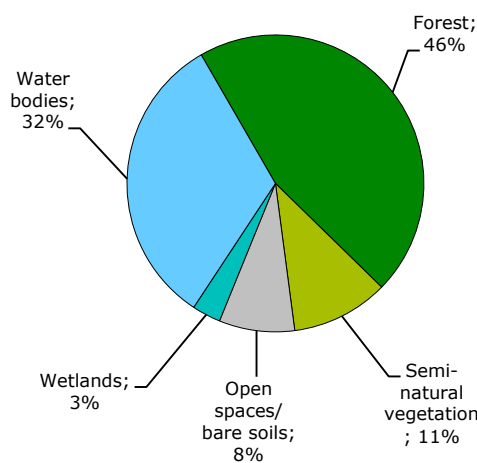


Forest and semi-natural land is shrinking

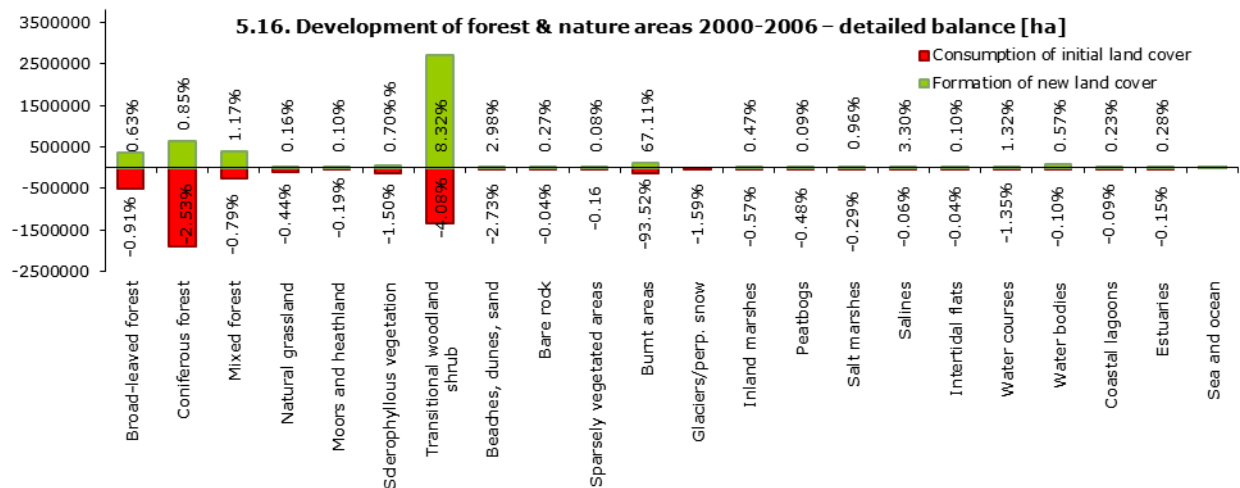
Conversions between transitional woodland and standing forests are the most significant flow of forest and semi-natural landscape development in Europe. Other intensive exchanges between forest and particular semi-natural land cover classes, represented by forest creation over semi-natural vegetation areas or wetlands, semi-natural rotation and water bodies creation over semi-natural vegetation, occur. The development of nature areas is also significantly influenced by forest and shrub fires, which drives both forest/natural land cover consumption as well as forest formation over burnt areas. New forest and nature areas were created mainly by the formation of transitional woodlands and water bodies over agricultural areas (withdrawal of farming) or former mineral extraction and construction sites. On the other hand, forest and nature areas have been consumed by conversion to agriculture and also by artificial urban sprawl (mostly sprawl of economic sites and infrastructures). Geographically, the withdrawal of farming due to woodland creation occurs mostly in the Baltic countries, in central Europe (mainly over the Czech

Republic, Poland and Slovakia), Hungary, Ireland and the southern part of Portugal. Other forest creation is typical for eastern Germany, Iceland, Ireland, Italy (Calabria), the western part of the Pyrenean peninsula and also Turkey.

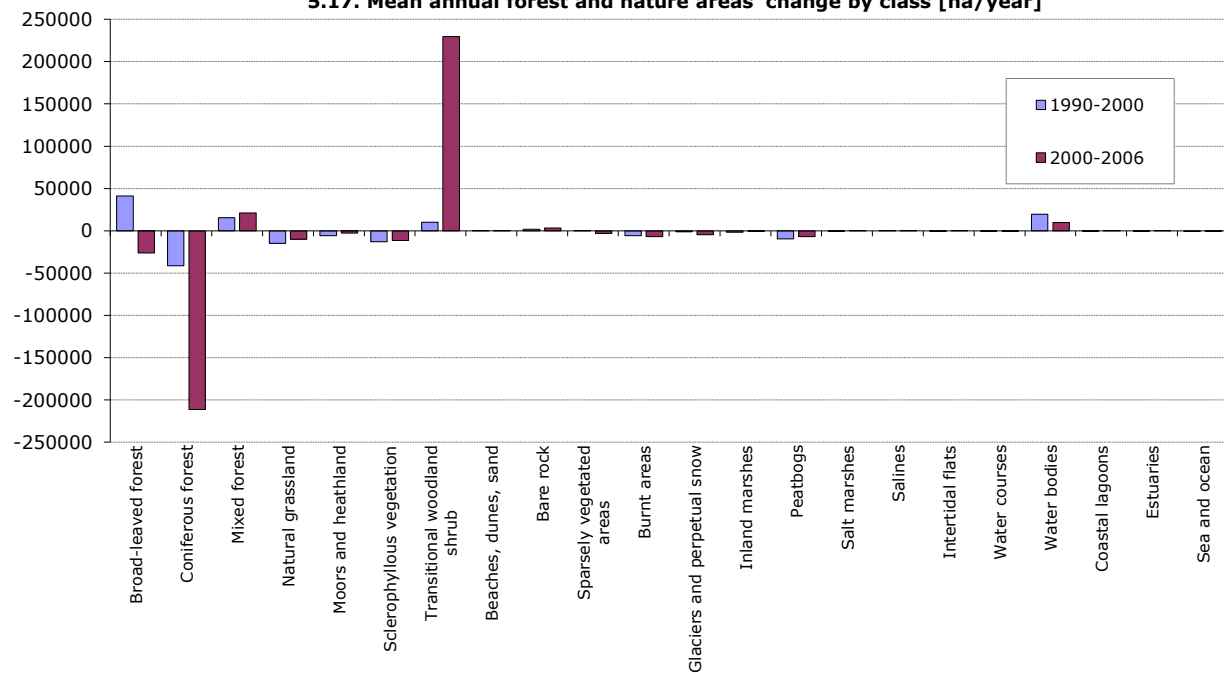
5.15. Forest & nature areas 2006
[% of total area]



5.16. Development of forest & nature areas 2000-2006 – detailed balance [ha]

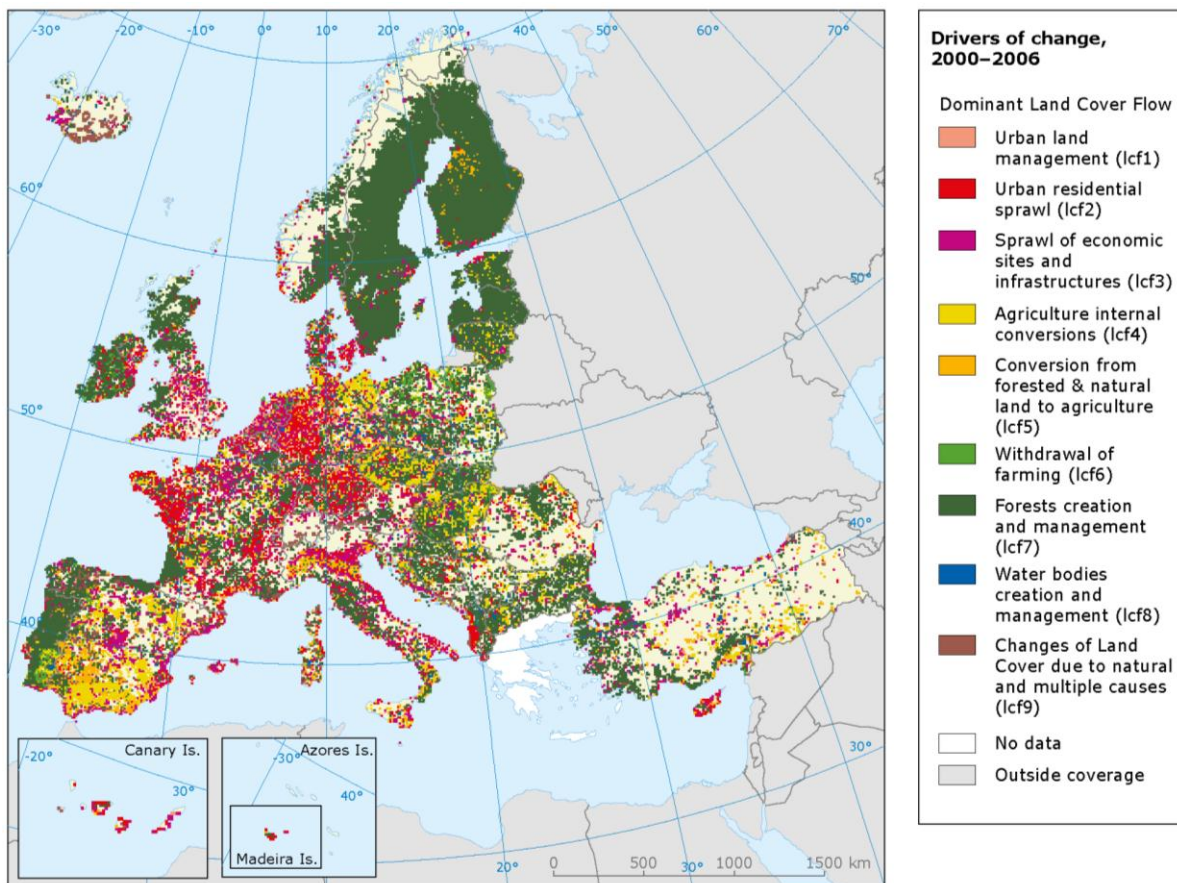


5.17. Mean annual forest and nature areas' change by class [ha/year]



Annex: Land cover flows and trends

Land cover flows 2000-2006



Distribution of changes

Concerning the geographical distribution of changes, the highest density of change can be seen in northern Europe (Finland and Sweden), Hungary, Ireland and Portugal. In contrast, the most stable landscape is represented by the mountainous areas of the Alps, Pyrenees and mountains in Norway and Romania.

The exchange of forested landscape is concentrated mostly in woodland areas of northern Europe, especially in Finland and Norway. There are also significant concentrations of forest conversions in south-western France, Ireland, Italy (Tuscany), Portugal and northern Spain, as well as in central European countries such as the Czech Republic, Hungary or Slovakia and in the area adjoining the Bosphorus in Turkey.

Conversions of agricultural land occur mostly in Spain, especially in the southern half of the country and include both conversions from forested and semi-natural landscape to agriculture as well as internal agriculture conversion. Conversions from forest and nature areas to agriculture also occur in Finland. There are several concentrations of internal agricultural conversion in central Europe (especially the Czech Republic and Hungary), northern Germany and in the southern part of Turkey. Withdrawal of farming occurs mostly in Hungary, Ireland and the southern half of Portugal.

Urban sprawl, resulting from the extension of economic sites and infrastructure, is concentrated mostly in Western Europe. There are dense concentrations of commercial/industrial sprawl covering the Po lowland in northern Italy and the Netherlands, in Portugal, along the Mediterranean coast in Spain and also in the outskirts of major western European cities such as Dublin, Madrid, Paris, Rome or Toulouse. In Turkey, sprawl resulting from the extension of economic sites and infrastructures is situated around Ankara and in the Bosphorus region.

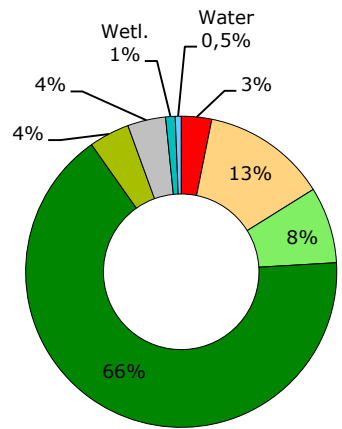
Residential sprawl is typical especially for France and Germany. In Germany, areas with notable residential sprawl are scattered over the whole western part of the country. In France, residential sprawl can be found mostly in the western part of the country (especially in Bretagne), in the surroundings of Lyon in the eastern part of the country and along the Mediterranean coast in the south (Côte d'Azur, around Marseille). There is also a very dense concentration of residential sprawl in Albania, especially along the Adriatic coast.

Despite land cover mapping being able to capture only the most significant linear features of artificial sprawl, the data shows highway construction in Croatia, Poland or Spain.

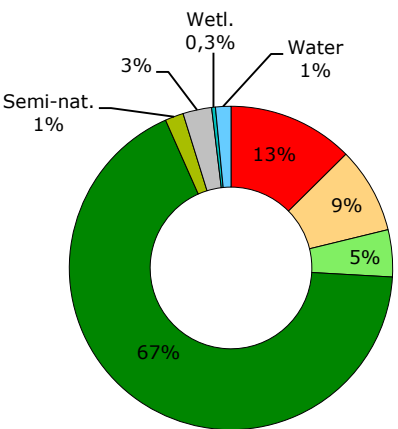
Changes of land cover due to natural and multiple causes are represented by a decrease in glaciers in the Alps and also in Iceland. There are also large concentrations of changes connected with conversions of forest and semi-natural

landscapes, which are caused by forest and shrub fires, situated mostly in the Mediterranean (in southern Bosnia, Corsica, Croatia, Portugal, Sardinia or Spain).

**6.18. Consumption of land cover
2000-2006 [% of total change area]**

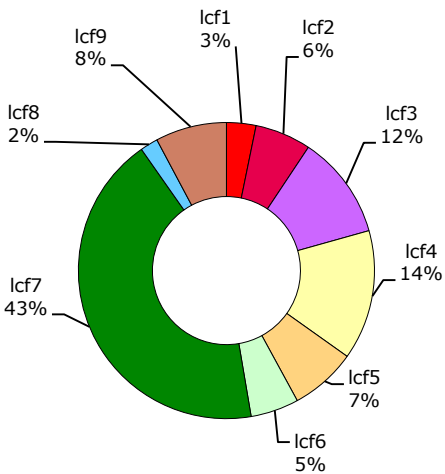


**6.19. Formation of land cover
2000-2006 [% of total change area]**



- | | | | |
|---------------------------|---------------------------------|----------------------|-----------------|
| ■ Artificial areas | ■ Arable land & permanent crops | ■ Pastures & mosaics | ■ Forested land |
| ■ Semi-natural vegetation | ■ Open spaces/ bare soils | ■ Wetlands | ■ Water bodies |

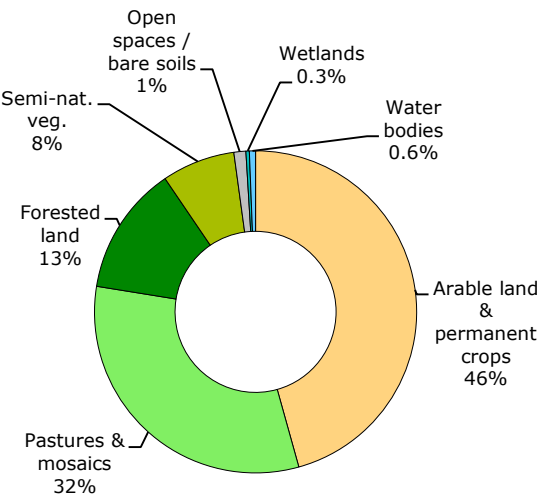
**6.20. Drivers of change (LC flows)
2000-2006 [% of total change area]**



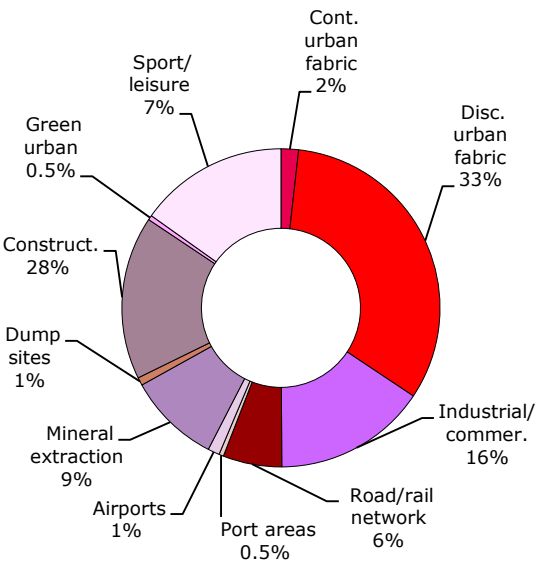
- | |
|---|
| ■ Icf1 Urban land management |
| ■ Icf2 Urban residential sprawl |
| ■ Icf3 Sprawl of economic sites and infrastructures |
| ■ Icf4 Agriculture internal conversions |
| ■ Icf5 Conversion from forested & natural land to agriculture |
| ■ Icf6 Withdrawal of farming |
| ■ Icf7 Forests creation and management |
| ■ Icf8 Water bodies creation and management |
| ■ Icf9 Changes due to natural and multiple causes |

Artificial areas

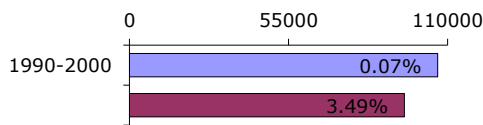
7.21. Consumption by artificial land take
2000-2006 [% of total]



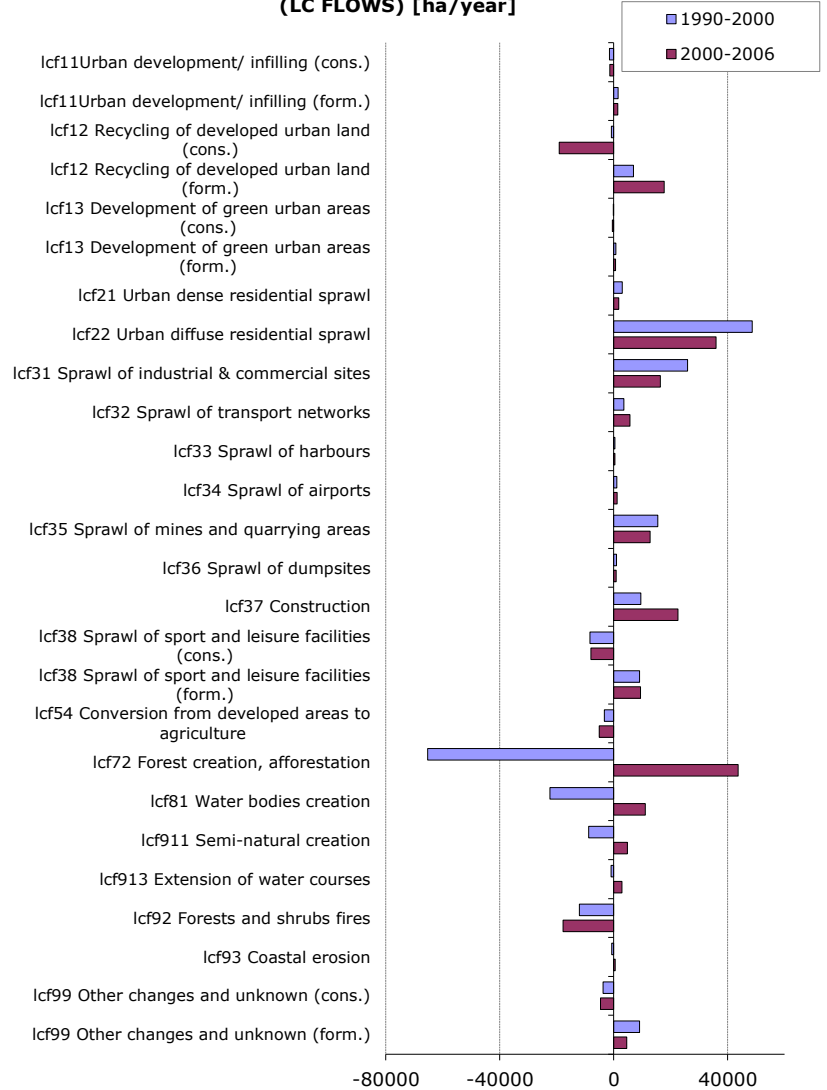
7.22. Formation by artificial land take
2000-2006 [% of total]



7.23. Net formation of artificial area
[ha/year, % of initial year]

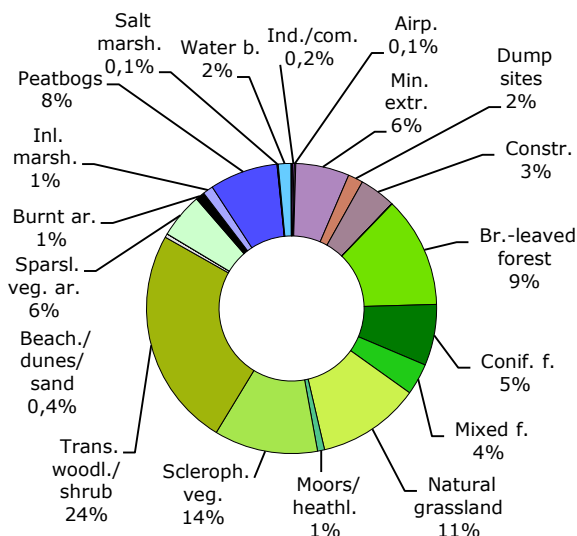


7.24. Artificial development by change drivers
(LC FLOWS) [ha/year]

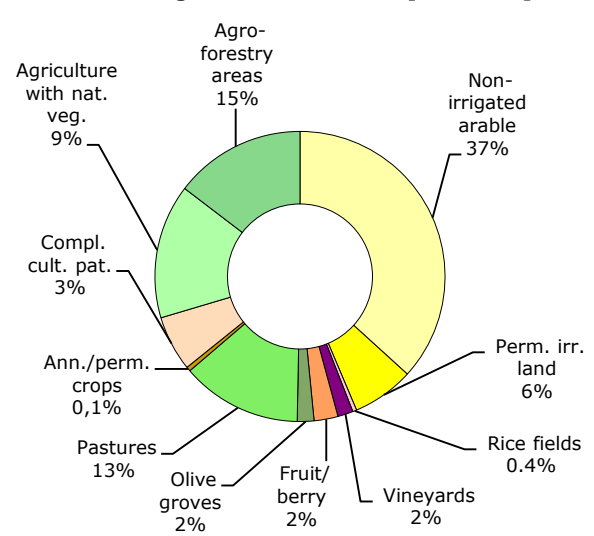


Agriculture

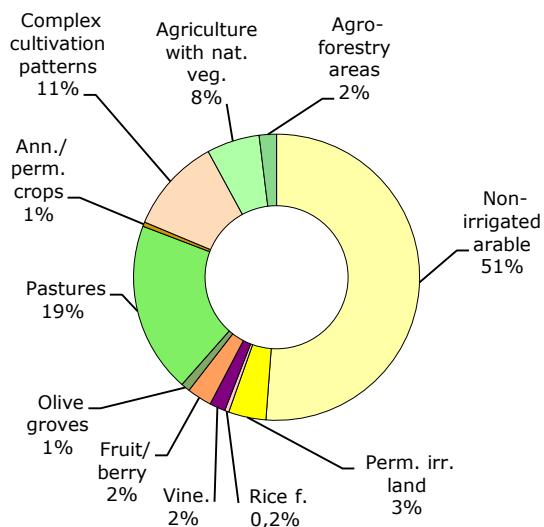
8.25. LC consumed by agriculture 2000-2006
[% of total]



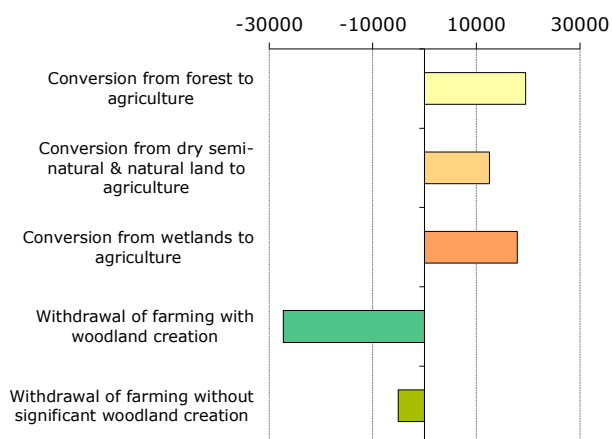
8.26. Formation of agricultural land from non-agriculture 2000-2006
[% of total]



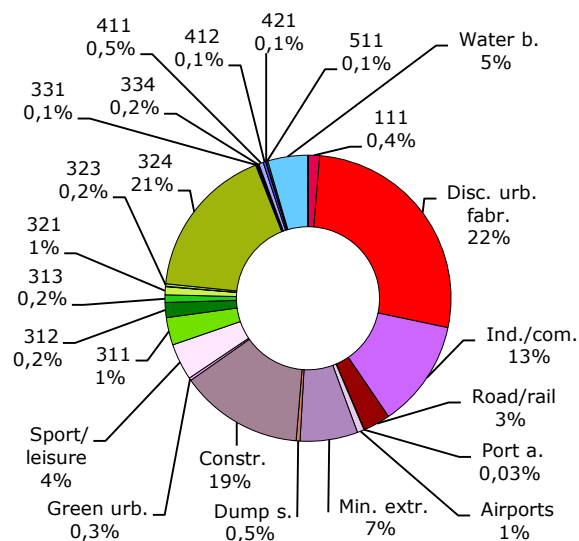
8.27. Consumption of agricultural land by non-agriculture 2000-2006 [% of total]



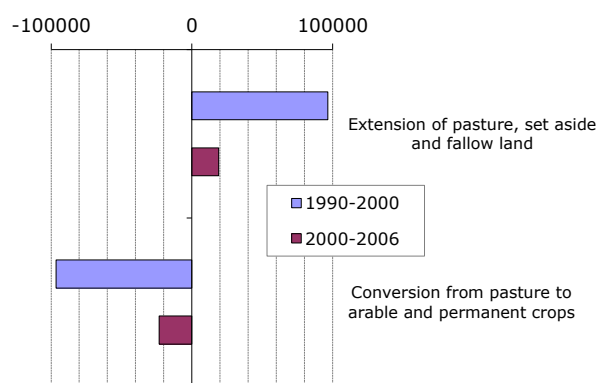
8.29. Main annual conversions between agriculture and forests and semi-natural land 2000-2006 [ha/year]



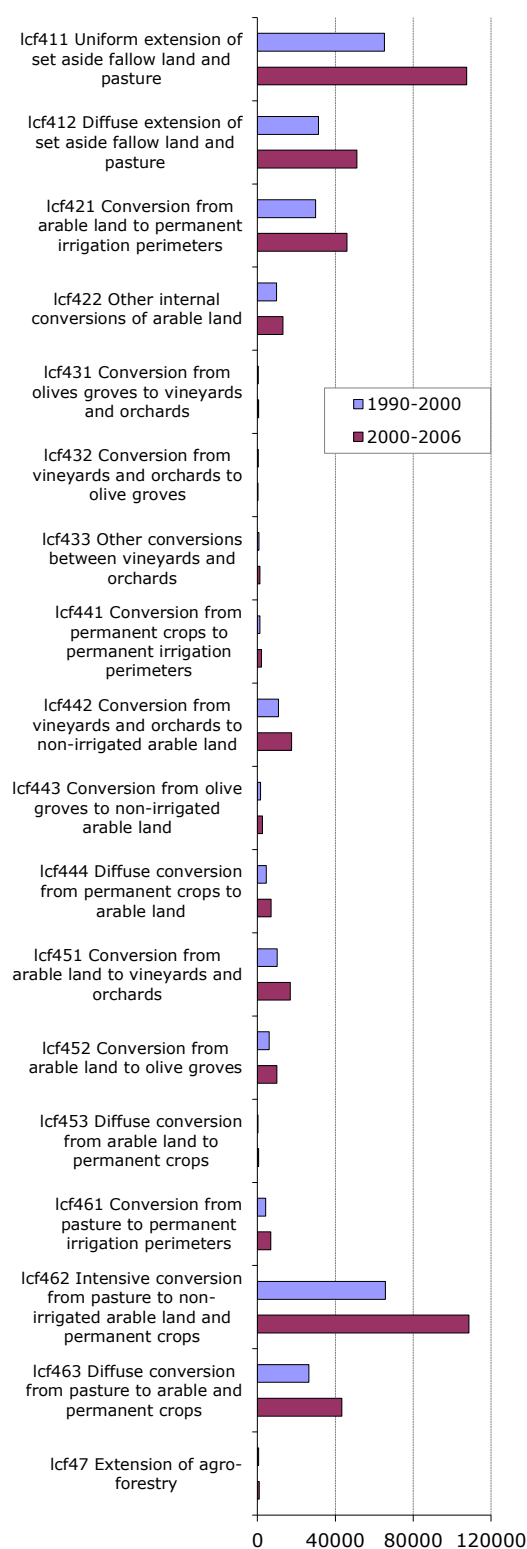
8.28. Formation of non-agricultural land from agriculture 2000-2006 [% of total]



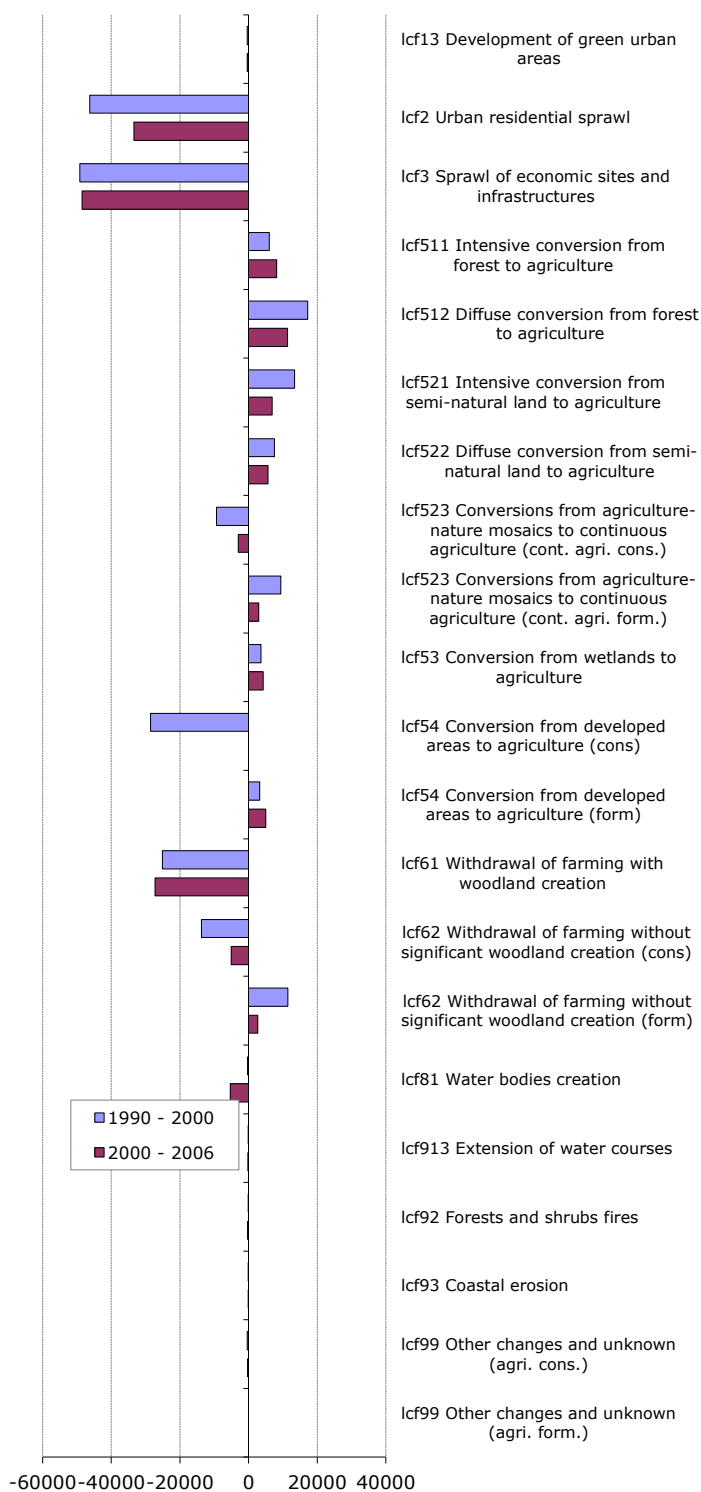
8.30. Mean annual conversion between arable land and pasture [ha/year]



9.31. Mean annual agriculture internal conversions [ha/year]

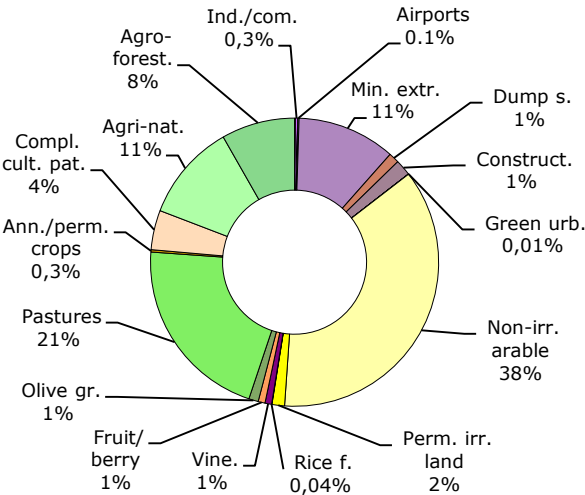


9.32. Mean annual conversions between agriculture and other LC types [ha/year]

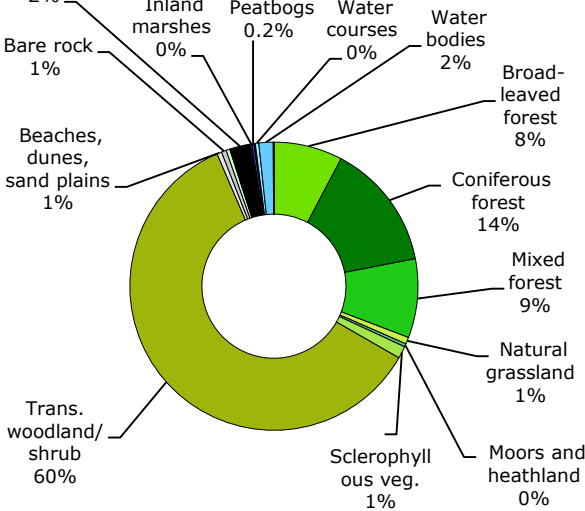


Forest and nature areas

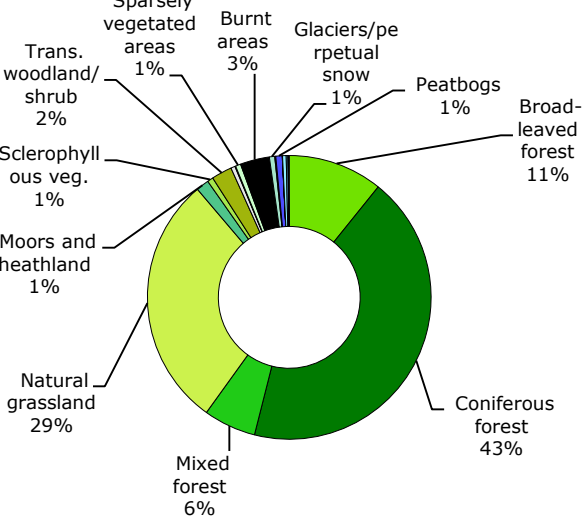
10.33. LC consumed by forest & nature areas 2000-2006 [% of total]



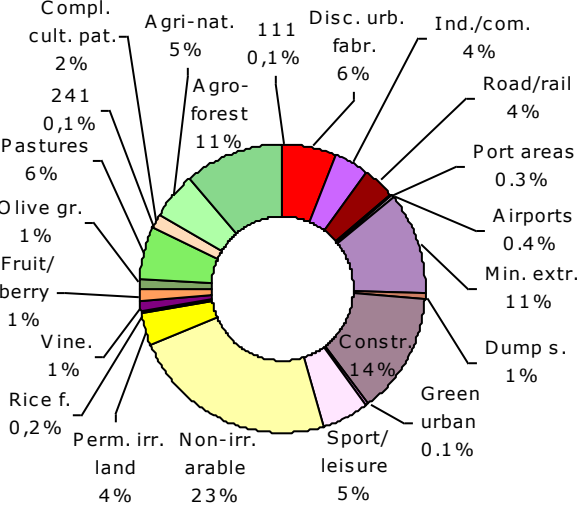
10.34. Formation of forest & nature areas from non-forest /nature 2000-2006 [% of total]



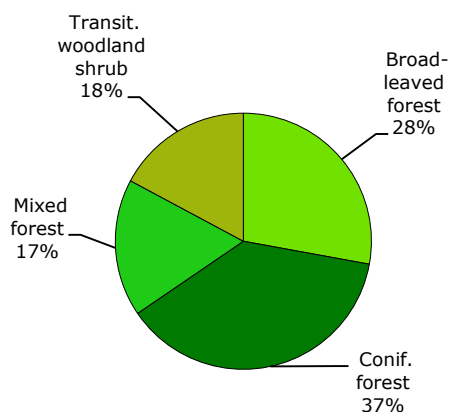
10.35. Consumption of forest & nature land by non-forest/nature 2000-2006 [% of total]



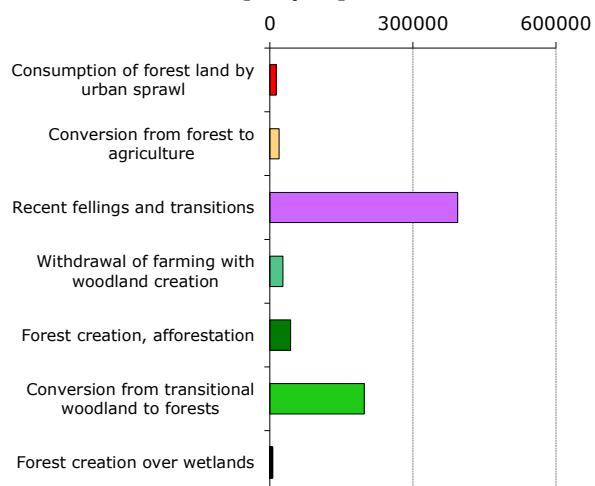
10.36. Formation of non-forest/nature land from forest & nature 2000-2006 [% of total]



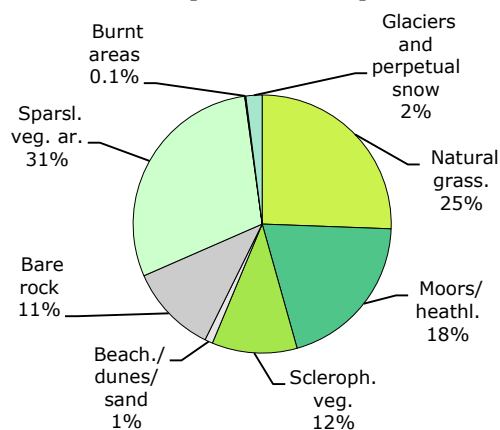
10.37. Forested land 2006
[% of total area]



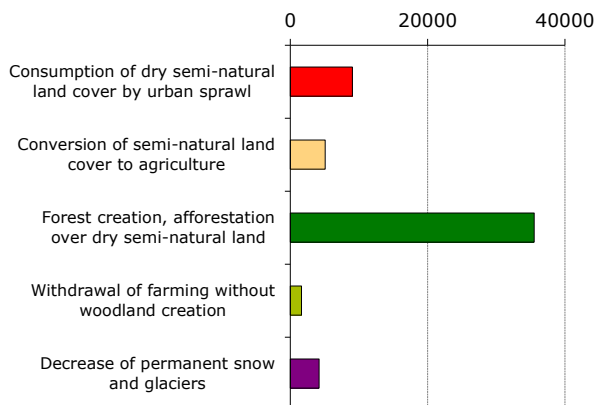
10.38. Main trends in woodland & forests consumption/formation 2000-2006
[ha/year]



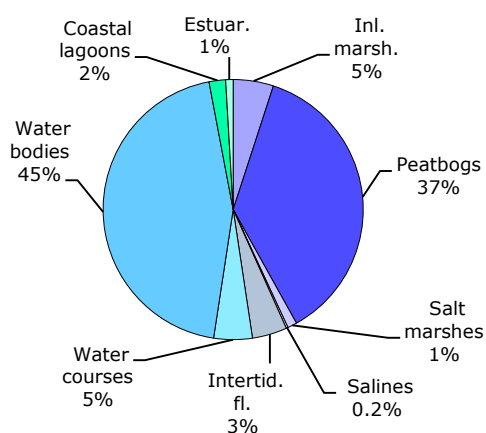
11.39. Dry semi-natural areas 2006
[% of total area]



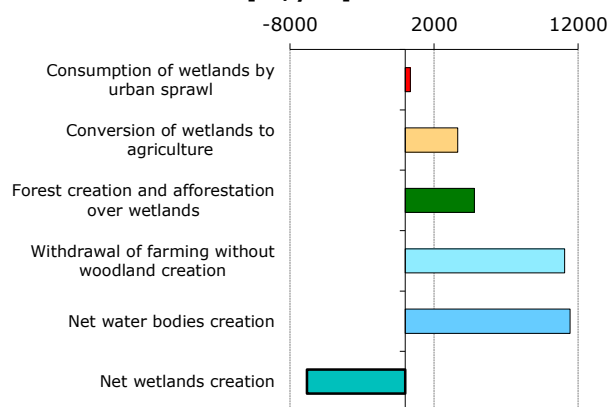
11.40. Main trends in dry semi-natural land consumption/formation 2000-2006
[ha/year]



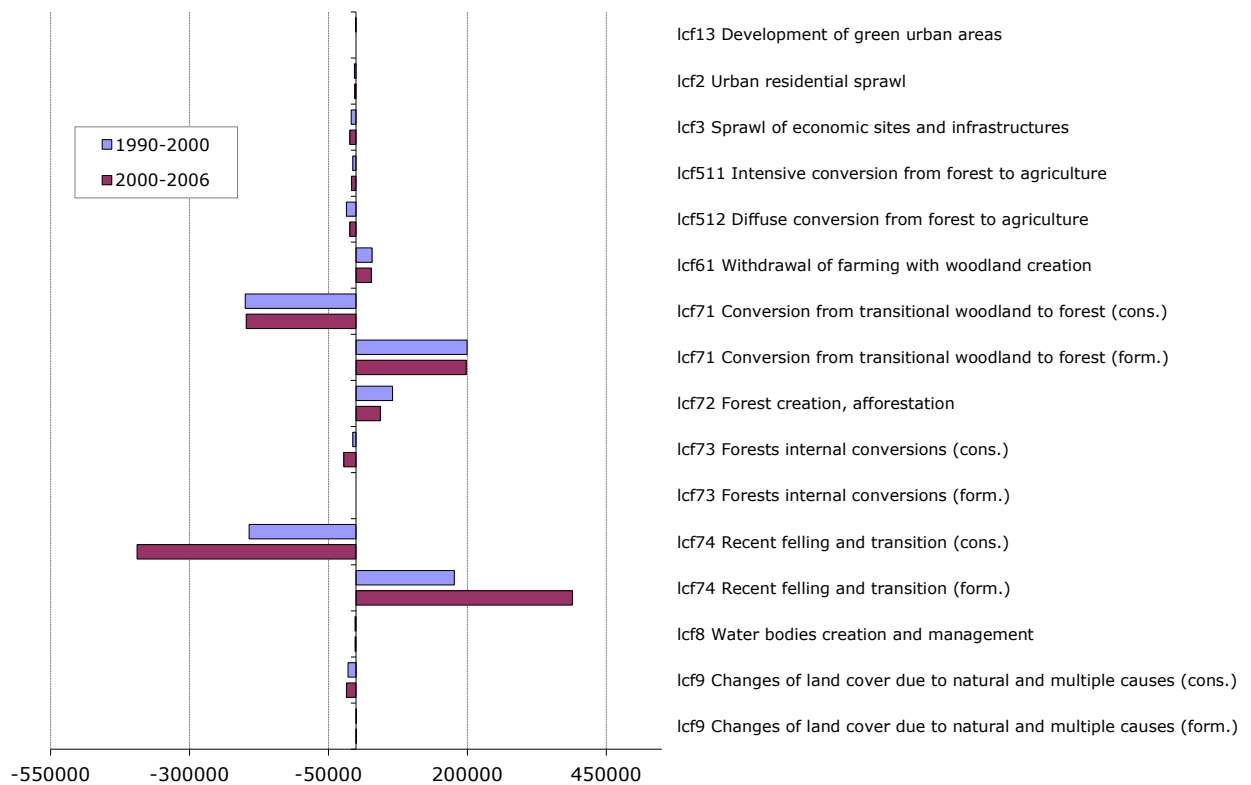
11.41. Wetlands & water 2006
[% of total area]



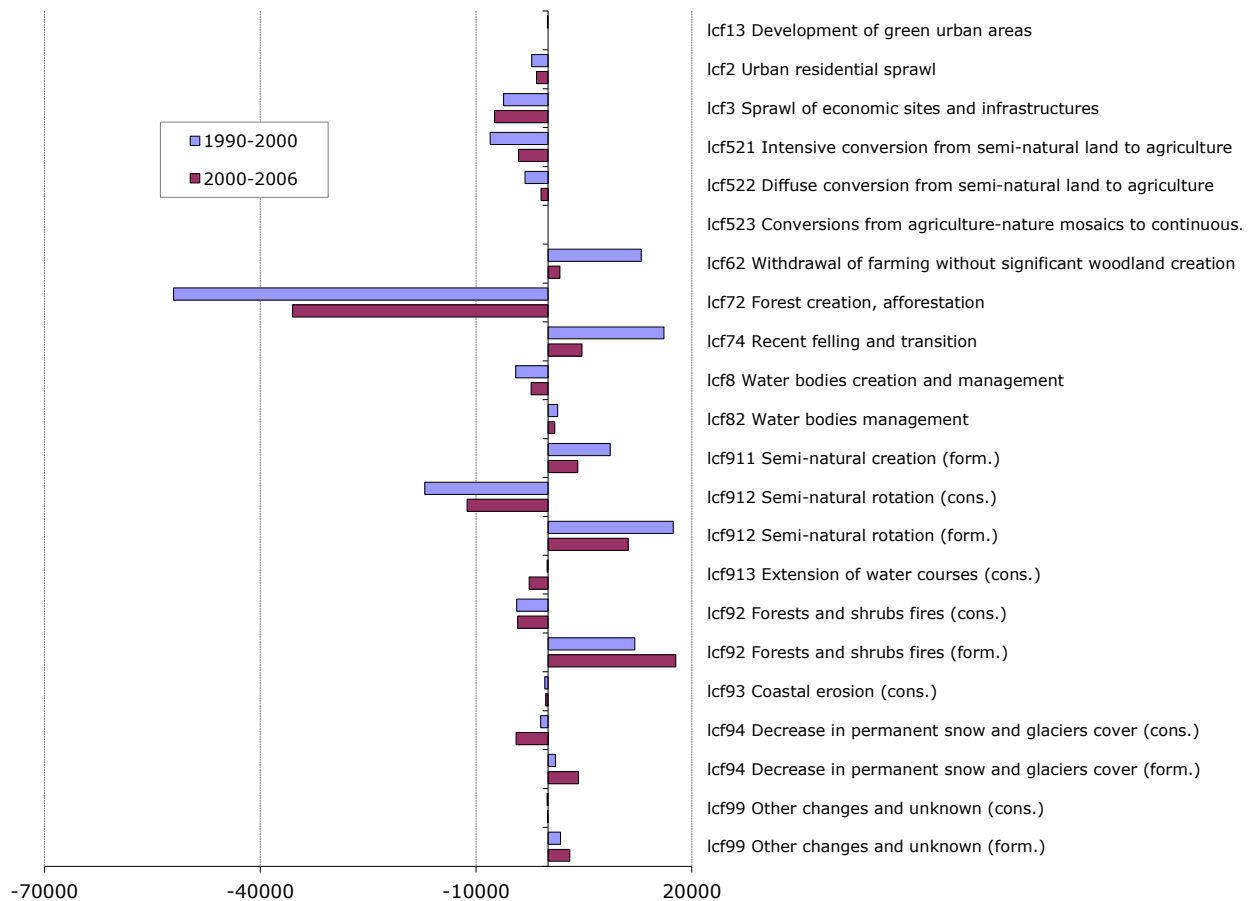
11.42. Main trends in wetlands & water consumption/formation 2000-2006
[ha/year]



11.43. Mean annual conversions of forest & other woodland [ha/year]



12.44. Mean annual conversions of dry semi-natural LC [ha/year]



12.45. Mean annual conversions of wetlands and water LC [ha/year]

