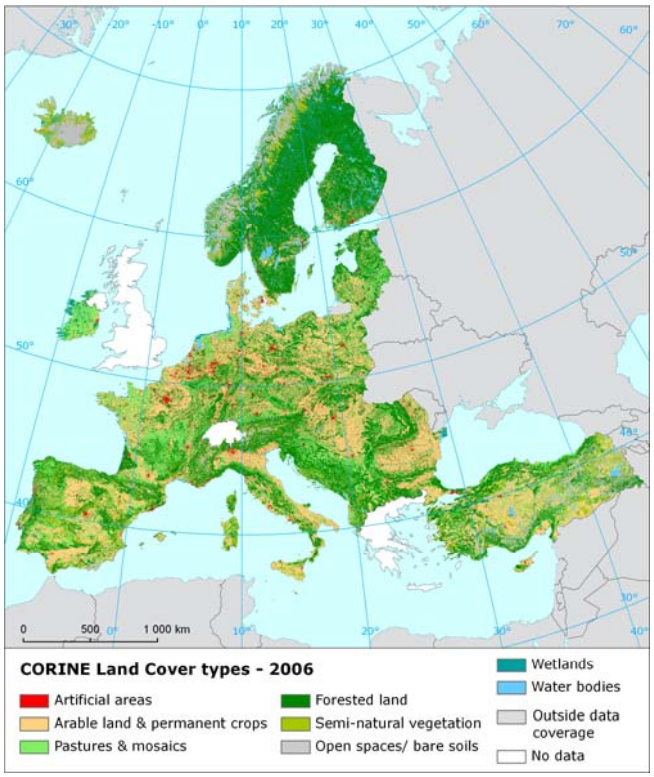
# Land cover 2006

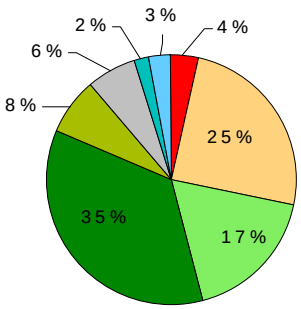
## Overview of land cover & change 2000-2006

The overall situation in European land cover development during 2000-2006 could be characterized by prevailing formation of artificial surfaces and also slightly positive net change balance of water bodies and forested areas. Percentual formation rate of artificial surfaces between 2000 and 2006 exceeds 3%. All other land cover types have negative net change balance, however, all of them having consumption rate lower than 0,5% of initial area. Overall net change balance of particular land cover types is similar to the previous period, with preserved development trends and only modifications of formation/consumption intensity.
The overall dynamic of land cover development, characterized by annual land cover change rate, decreased compared to the previous period. It is obvious already from total change area, which is slightly lower compared to period 1990-2000. However, this slowdown of changes intensity is even more significant when comparing percentual change rates. Actual percentage of change is even lower and the overall intensity of change decreased almost to a half of intensity from previous period 1990/2000. Nevertheless, one must be aware of the effect of the larger European coverage in 2000-2006 (as new countries joining the CLC programme) including mainly countries with very low overall change rate (e.g. Balkan countries, Finalnd, Norway, Sweden Turkey).
Concerning the structure of main change drivers in European landscape, highest share on total land cover exchange has forest creation and management. However, most of this turnover is driven by internal conversion from transitional woodland to forest (and also by opposite conversion “Recent felling and transition – LCF74” which is not included into basic accounts).
Agriculture internal conversions remain the second most powerful driver of land cover change in Europe. However, after year 2000, their intensity rapidly decreased compared to previous period. Intensity of both conversions from forested/natural land to agriculture and opposite withdrawal of farming has been also slowed down, after year 2000.
Artificial development has been characterized by acceleration of both sprawl of economic sites and infrastructures and urban land management. On the contrary, intensity of residential sprawl has decreasing tendency after year 2000. In the period 2000-2006, artificial development in Europe has been driven mostly by sprawl of economic sites and infrastructures. See also distribution of changes text on page 6.

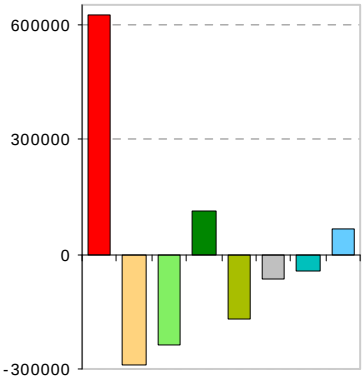
*Note: The results presented here are based on a change analysis of 44 land cover types mapped consistently on a 1:100.000 scale across Europe over almost two decades 1990-2006 - see Corine land cover (CLC) programme for details. In trend comparison figures, reader has to be aware that total area described is considerably different for 1990-2000 period (369 012 000 ha) and 2000-2006 period (542 417 100 ha).*



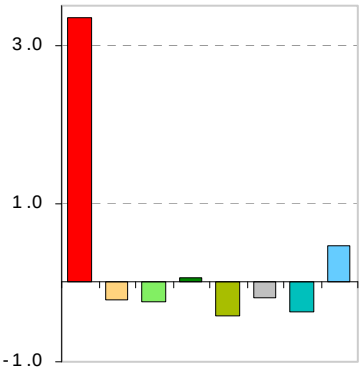

**1.1. Land cover 2006 [% of total]**




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




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



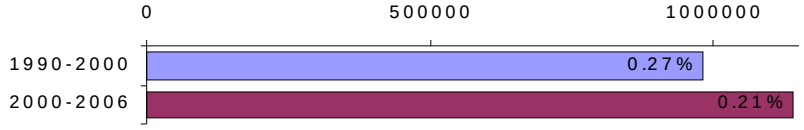

Artificial areas
Arable land & permanent crops
Pastures & mosaics
Forested land
Semi-natural vegetation
Open spaces/ bare soils
Wetlands
Water bodies

**Summary balance table 2000-2006**

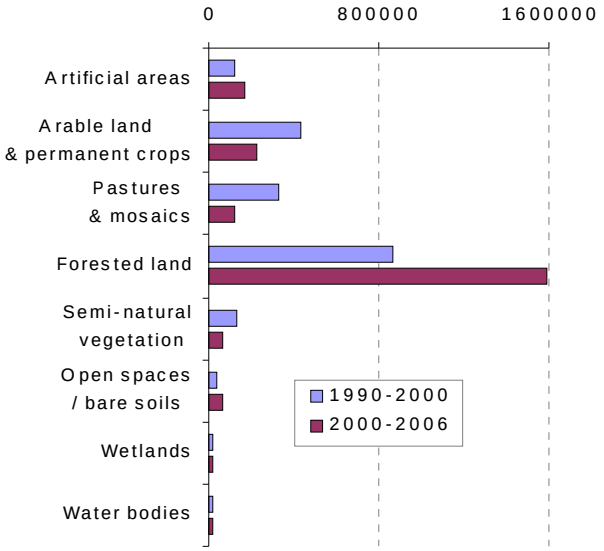
| | Artificial areas | Arable land & permanent crops | Pastures & mosaics | Forested land | Semi-natural vegetation | Open spaces / bare soils | Wetlands | Water bodies | TOTAL [hundreds ha] |
|---|---|---|---|---|---|---|---|---|---|
| **Land cover 2000** | **186528** | **1350193** | **942015** | **1929507** | **410883** | **342072** | **119968** | **143004** | **5424171** |
| Consumption of initial LC | 1853 | 8326 | 4855 | 47243 | 2693 | 2408 | 645 | 330 | 68353 |
| Formation of new LC | 8111 | 5410 | 2493 | 48357 | 1012 | 1763 | 211 | 997 | 68353 |
| **Net Formation of LC** | **6258** | **-2916** | **-2362** | **1114** | **-1681** | **-645** | **-434** | **667** | **0** |
| *Net formation as % of initial year* | *3.4* | *-0.2* | *-0.3* | *0.1* | *-0.4* | *-0.2* | *-0.4* | *0.5* | |
| **Total turnover of LC** | **9965** | **13735** | **7348** | **95599** | **3704** | **4171** | **856** | **1327** | **136707** |
| *Total turnover as % of initial year* | *5.3* | *1.0* | *0.8* | *5.0* | *0.9* | *1.2* | *0.7* | *0.9* | *2.5* |
| **Land cover 2006** | **192786** | **1347278** | **939653** | **1930622** | **409202** | **341427** | **119533** | **143671** | **5424171** |

# Land cover trends comparison 1990-2000 vs. 2000-2006

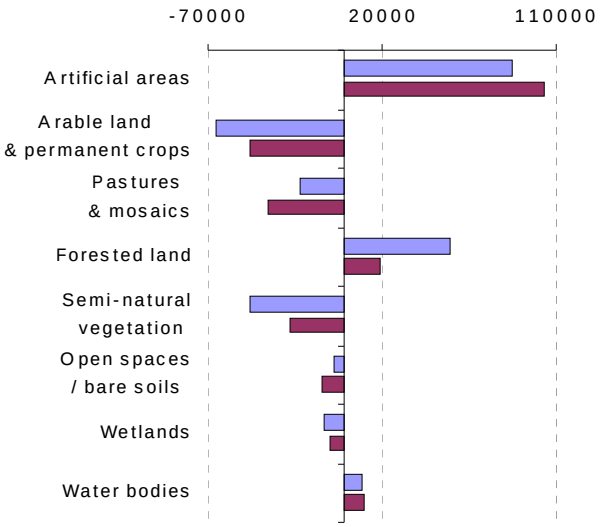
**2.4. Annual land cover change [ha/year, % of total area]**



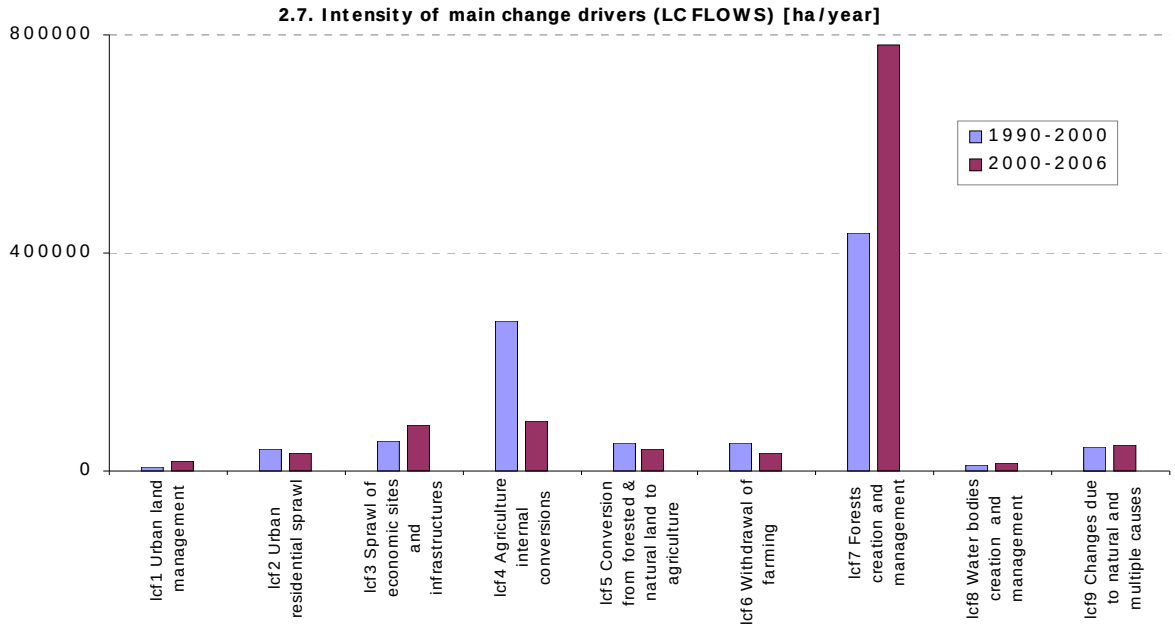

**2.5. Annual turnover of LC types [ha/year]**



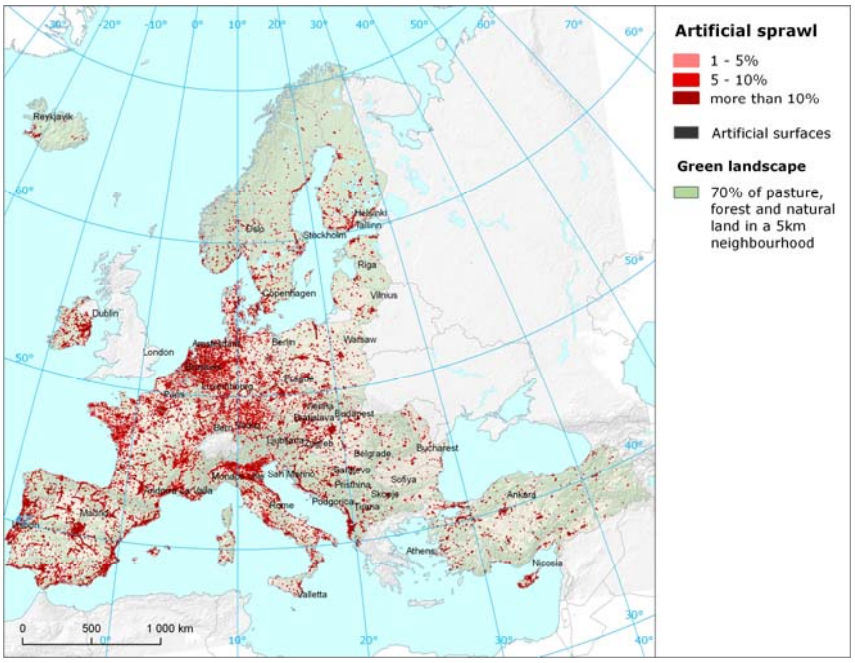

**2.6. Net annual change of LC types [ha/year]**

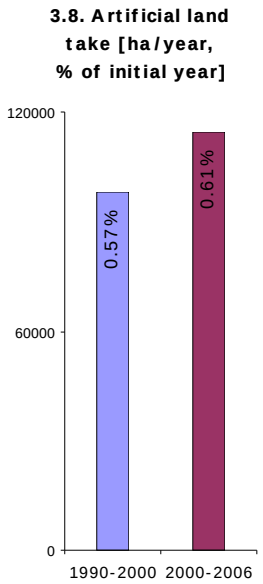



| Summary trend figures | 1990-2000 | 2000-2006 |
|---|---|---|
| **Annual land cover change [ha/year]** | **979495** | **1139222** |
| **Annual land cover change as % of initial year** | **0.27%** | **0.21%** |
| Land uptake by artificial development as mean annual change [ha/year] | 98062 | 114400 |
| Agricultural land uptake by urban and infrastructures development as mean annual change [ha/year] | 87374 | 93636 |
| Net uptake of forests and semi-natural land by agriculture as mean annual change [ha/year] | -4947 | 3712 |
| Net conversion from pasture to arable land and permanent crops as mean annual change [ha/year] | -9920 | 4045 |
| Forest & other woodland net formation as mean annual change [ha/year] | 54866 | 18567 |
| Dry semi-natural land cover net formation as mean annual change [ha/year] | -43757 | -30994 |
| Wetlands & water bodies net formation as mean annual change [ha/year] | -1049 | 3878 |




## *Artificial areas*

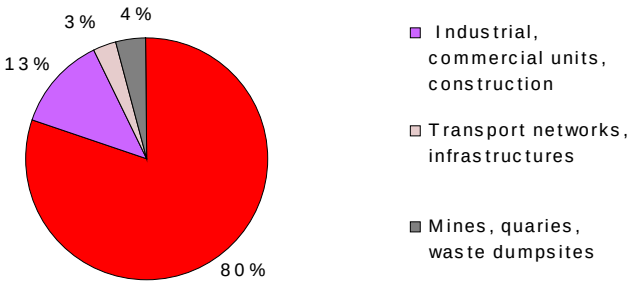


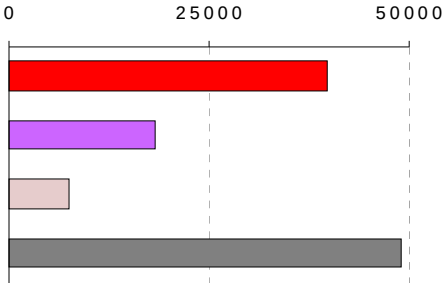

## Urban sprawl accelerates

Diffuse residential sprawl together with construction are the main drivers of artificial land take in Europe after year 2000. There also occurs significant sprawl of industrial/commercial sites, mines and quarrying areas and sport and leisure facilities. More than ¾ of uptaken land consists of agricultural areas with prevailing share of arable and crop land. Beside artificial sprawl, also recycling of developed urban land (mostly conversion of construction sites into urban fabric, commercial or industrial units and transportation networks) has significant share on 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.

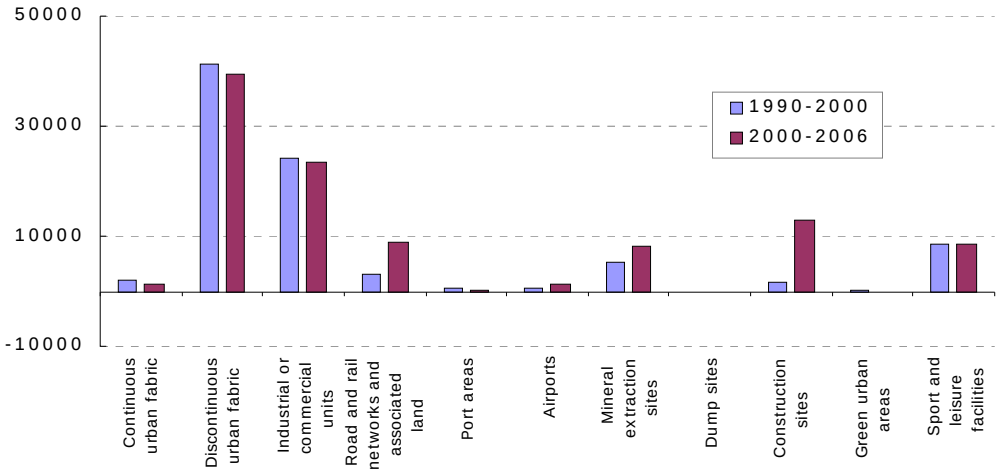
**3.9. Artificial surfaces 2006 [% of total area]**



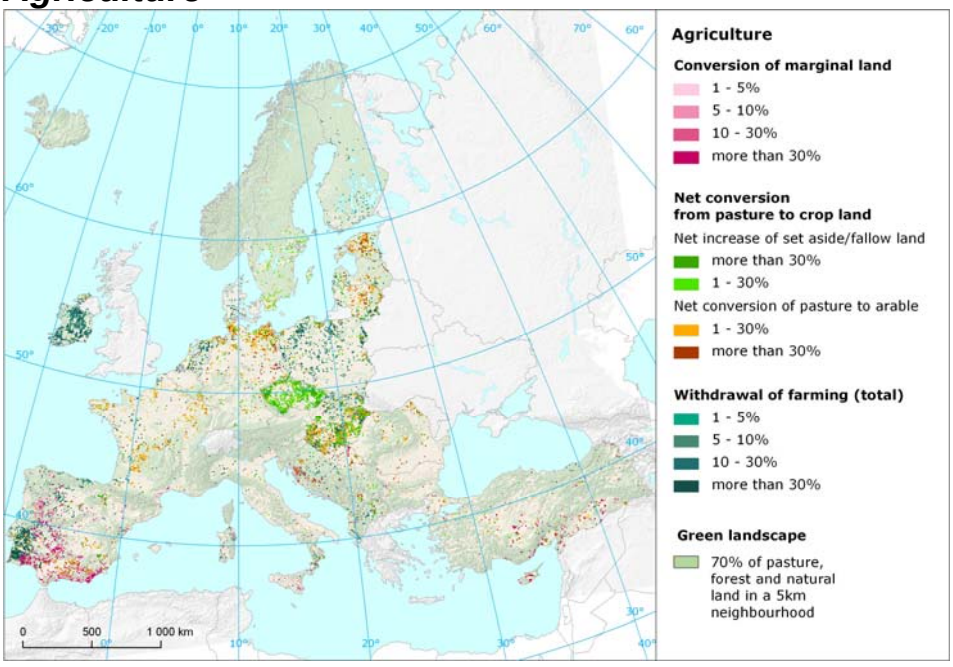

**3.10. Artificial land take 2000-2006 [ha/year]**




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




## *Agriculture*



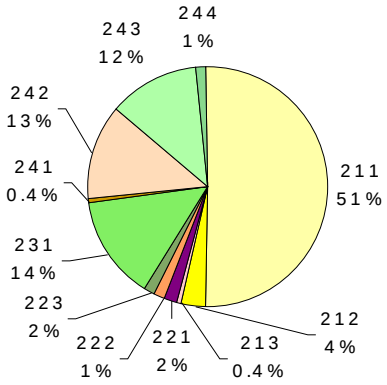

## Agricultural management stabilisation

Development of agricultural areas is characterized by prevailing consumption of both basic land cover types (arable/crop land and mosaics/pastures). This consumption is driven by two most significant flows: artificial land take (driven mainly by sprawl of economic sites and infrastructures) and withdrawal of farming (mostly with woodland creation). Non-irrigated arable land has almost ½ share on total agricultural area consumed, the rest consists mainly of pastures, complex cultivation patterns and agricultural land with significant areas of natural vegetation. Formation of new agricultural land through conversion from natural land cover to agriculture occurs to significantly lower extent compared to consumption of agricultural areas.

Main drivers of internal agriculture development are intensive conversion from pasture to non-irrigated arable land together with opposite uniform extension of set aside fallow land and pasture. However, the intensity of both these conversions rapidly decreased, compared to period 90/00. The other significant internal agricultural flows in Europe are conversion from non-irrigated arable land to permanently irrigated arable land and also conversions from arable land to vineyards, orchards or olive groves.

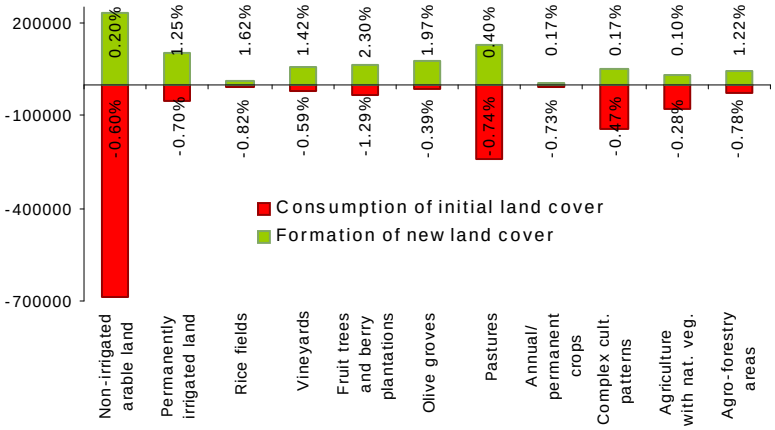
There are several concentrations of internal agriculture conversions over Europe. While extension of pasture occurs only in frontier regions of Czech Republic, in Hungary and (to a lesser extent) in southern Sweden, opposite conversion from pasture to arable land is typical for northern Germany, Hungary,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

**4.12. Agricultural areas 2006 [% of total area]**

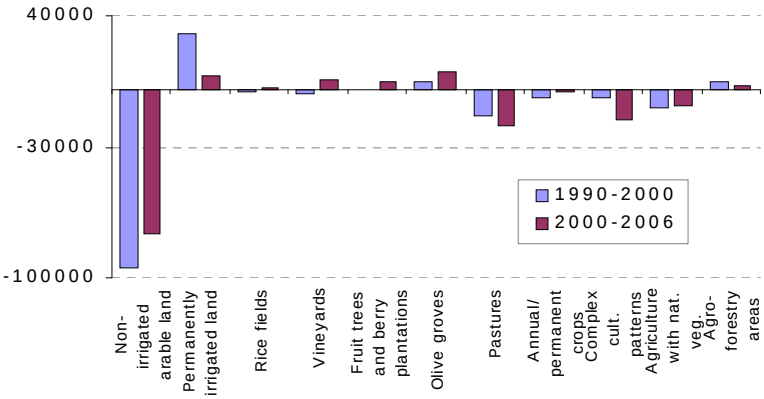



- 211 Non-irrigated arable land
- 212 Permanently irrigated land
- 213 Rice fields
- 221 Vineyards
- 222 Fruit trees and berry plantations
- 223 Olive groves
- 231 Pastures
- 241 Annual crops associated with permanent crops
- 242 Complex cultivation patterns
- 243 Agriculture land with significant areas of natural vegetation
- 244 Agro-forestry areas

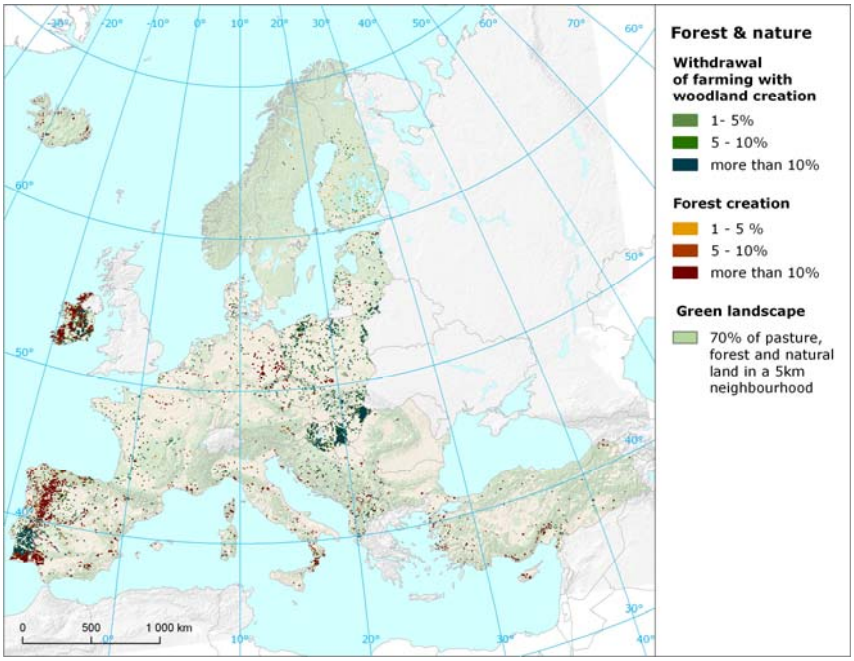
**4.13. Development of agricultural areas 2000-2006 – detailed balance [ha]**



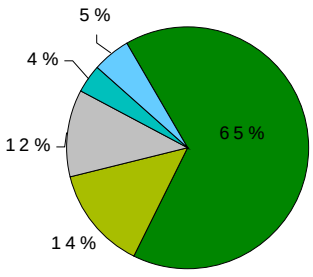

**4.14. Mean annual agricultural change by class [ha/year]**




## *Forest & nature*




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

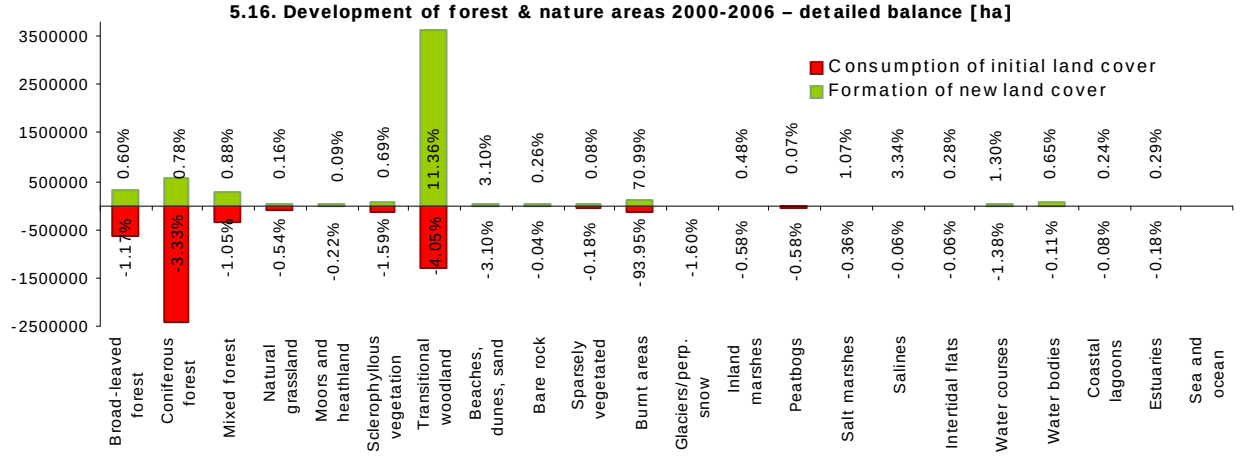



- Forest
- Semi-natural vegetation
- Open spaces/ bare soils
- Wetlands
- Water bodies

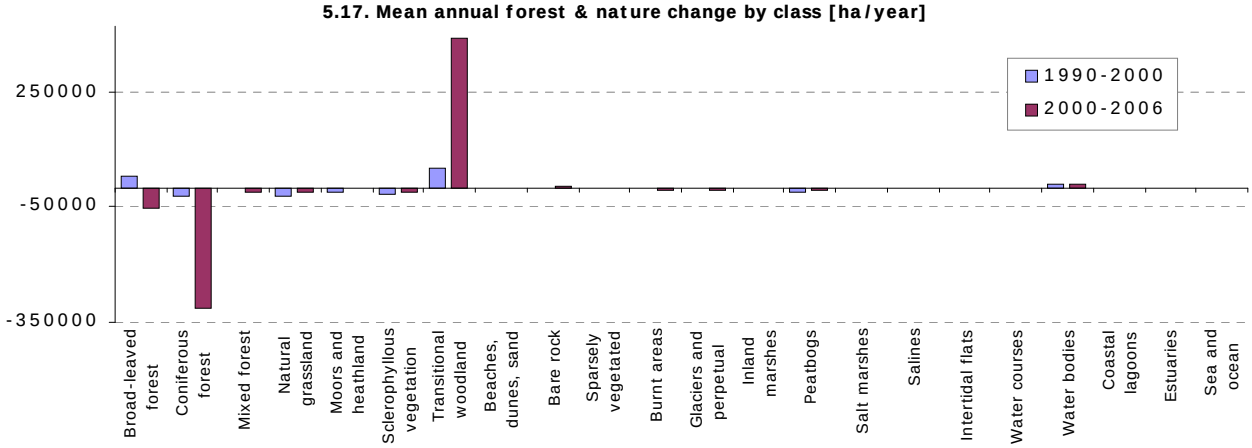
# Forest land formation slow down

Conversions between transitional woodland and standing forests are the most significant flow of natural landscape development in Europe. Beside these internal forest conversions, there also occurs other intensive exchange between particular 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. Development of natural 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. External exchange of natural land cover has been represented mainly by formation of transitional woodlands and water bodies over agricultural areas (withdrawal of farming) or former mineral extraction and construction sites. On the other hand, natural land cover has been consumed by conversion to agriculture and also by artificial sprawl (mostly sprawl of economic sites and infrastructures). Geographically, withdrawal of farming with woodland creation occurs mostly in Hungary, southern part of Portugal, in Ireland and also in central Europe (mainly over Poland, Slovakia, Czech Republic) or Baltic countries. Other forest creation is typical for Ireland, western part of Pyrenean peninsula, eastern Germany, Calabria, Turkey and also for Iceland.

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



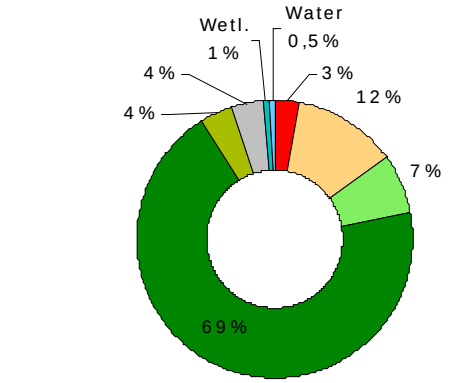

**5.17. Mean annual forest & nature change by class [ha/year]**



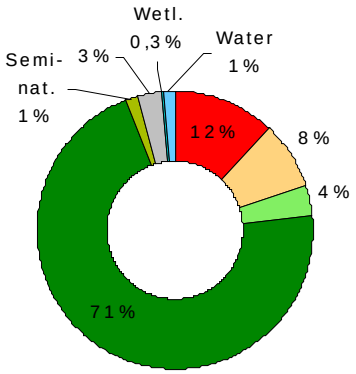
# Annex: Land cover flows and trends

## *Land cover flows 2000-2006*

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

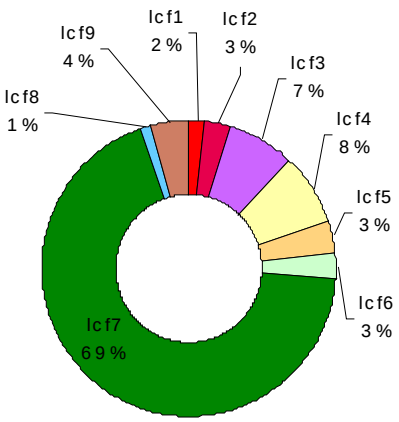



**6.19. Formation of land cover 2000-2006 [% of total change area]**




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]**




- lcf1 Urban land management
- lcf2 Urban residential sprawl
- lcf3 Sprawl of economic sites and infrastructures
- lcf4 Agriculture internal conversions
- lcf5 Conversion from forested & natural land to agriculture
- lcf6 Withdrawal of farming
- lcf7 Forests creation and management
- lcf8 Water bodies creation and management
- lcf9 Changes due to natural and multiple causes

### Distribution of changes

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

Exchange of forested landscape is concentrated mostly in woodland landscape of northern Europe, especially in Finland and Norway. Beside it, there are other significant concentrations of forest conversions in Ireland, Portugal, south-western France and northern Spain, in Toscany and also over central European countries like Czech Republic, Hungary or Slovakia and in the surrounding of Bospor strait in Turkey.

Agricultural conversions occur mostly in Spain, especially in the southern half of the country (both conversion from forested and natural landscape to agriculture and internal agriculture conversion). Beside it, conversions from natural land cover to agriculture occur also in Finland. There are several concentrations of internal agricultural conversion over Europe, situated in northern Germany, central Europe (especially Czech Republic and Hungary) and also in southern part of Turkey. Withdrawal of farming occurs mostly in southern half of Portugal, in Ireland and also in Hungary.

Sprawl of economic sites and infrastructures is concentrated mostly in Western Europe. There are dense concentrations of commercial/industrial sprawl covering whole Netherlands and Po lowland in northern Italy, along Mediterranean coast in Spain and also in surroundings of major western European cities like Madrid, Paris, Dublin, Toulouse or Rome and also in Portugal. In Turkey, sprawl of economic sites and infrastructures is situated in the region of Bospor strait and around capital city Ankara.

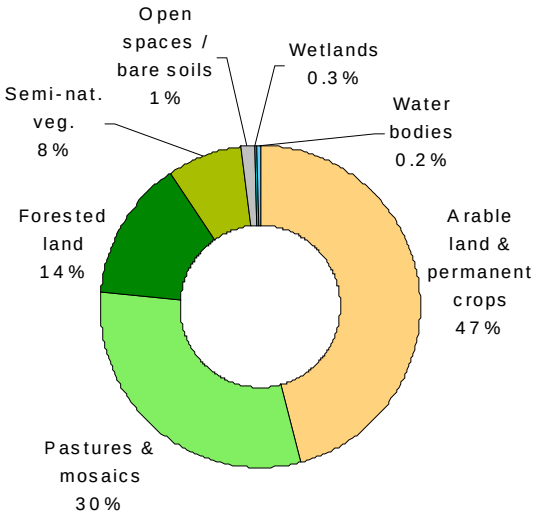
Residential sprawl is typical especially for Germany and France. In Germany, areas representing residential sprawl are scattered over whole western part of the country. In France, sprawl of residential areas is situated mostly in western part of the country (especially in Bretagne), along Mediterranean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

Significant linear features of artificial sprawl representing highway construction occur mainly in Spain, Poland or Croatia.

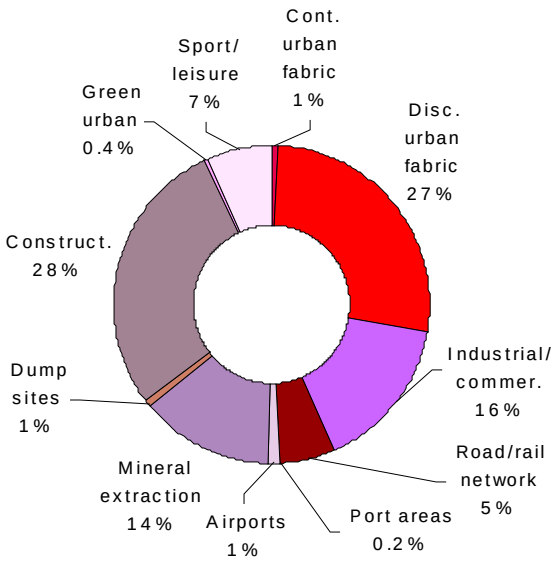
Changes of land cover due to natural and multiple causes are represented by glaciers area decrease in Alps and also in Icelandic mountains. There are also large concentrations of changes connected with conversions of natural landscape, which are caused by forest and shrub fires, situated mostly in Mediterranean (in Portugal, Spain, Sardinia, Corsica, Croatia or southern Bosnia).

# *Artificial areas*

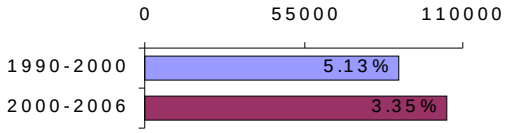
**7.21. Consumption by artificial land take 2000-2006 [% of total]**



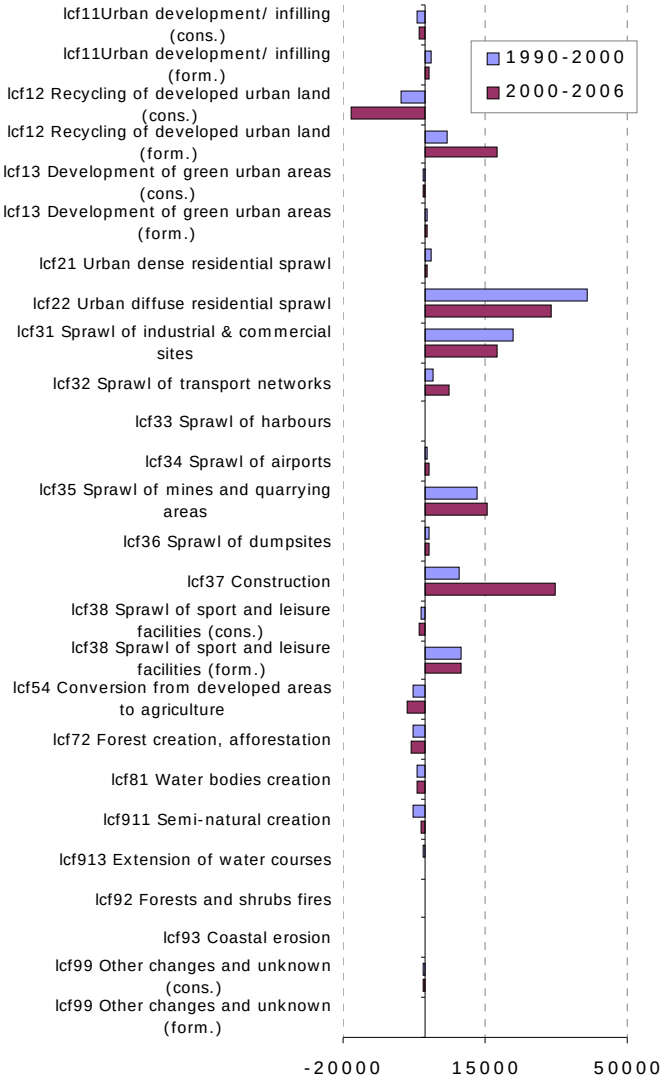

**7.22. Formation by artificial land take 2000-2006 [% of total]**




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

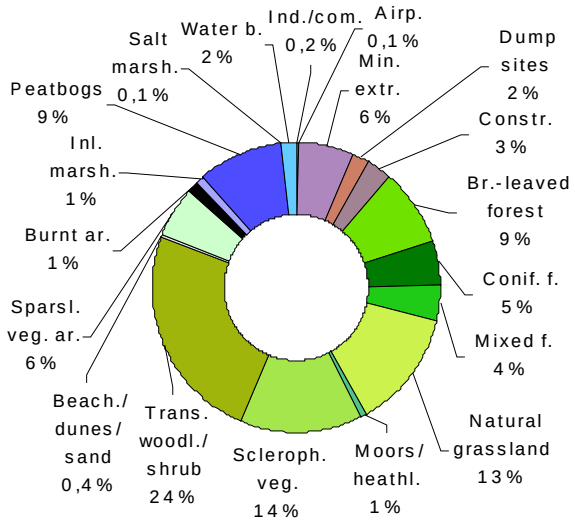



**7.24. Artificial development by change drivers (LC FLOWS) [ha/year]**

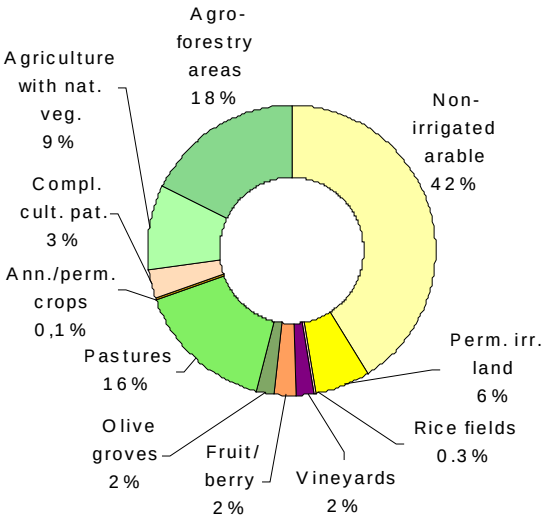


# Agriculture

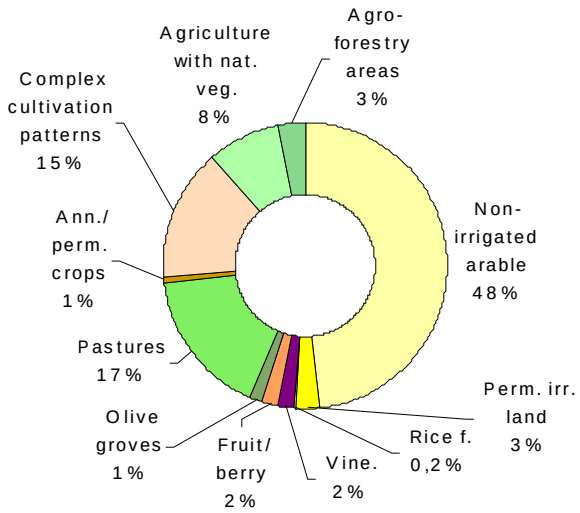
**8.25. LC consumed by agriculture 2000-2006 [% of total]**



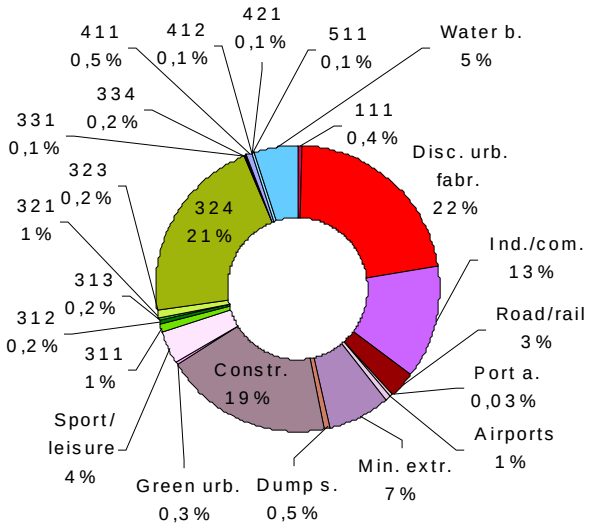

**8.26. Formation of agricultural land from non-agriculture 2000-2006 [% of total]**



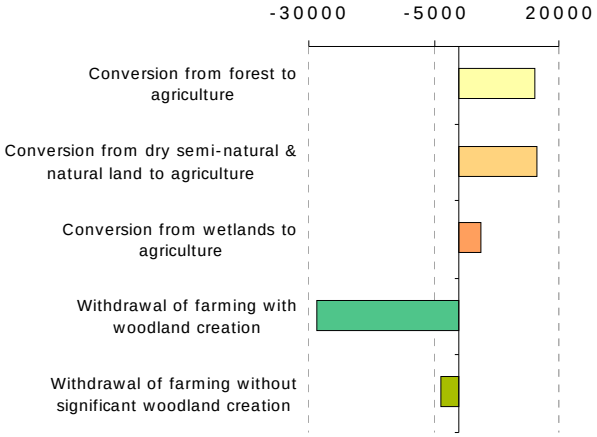

**8.27. Consumption of agricultural land by non-agriculture 2000-2006 [% of total]**



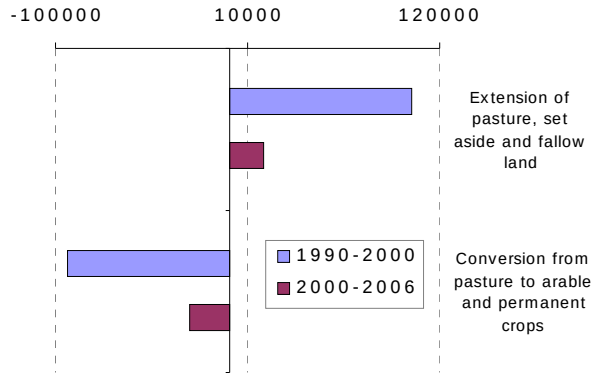

**8.28. Formation of non-agricultural land from agriculture 2000-2006 [% of total]**



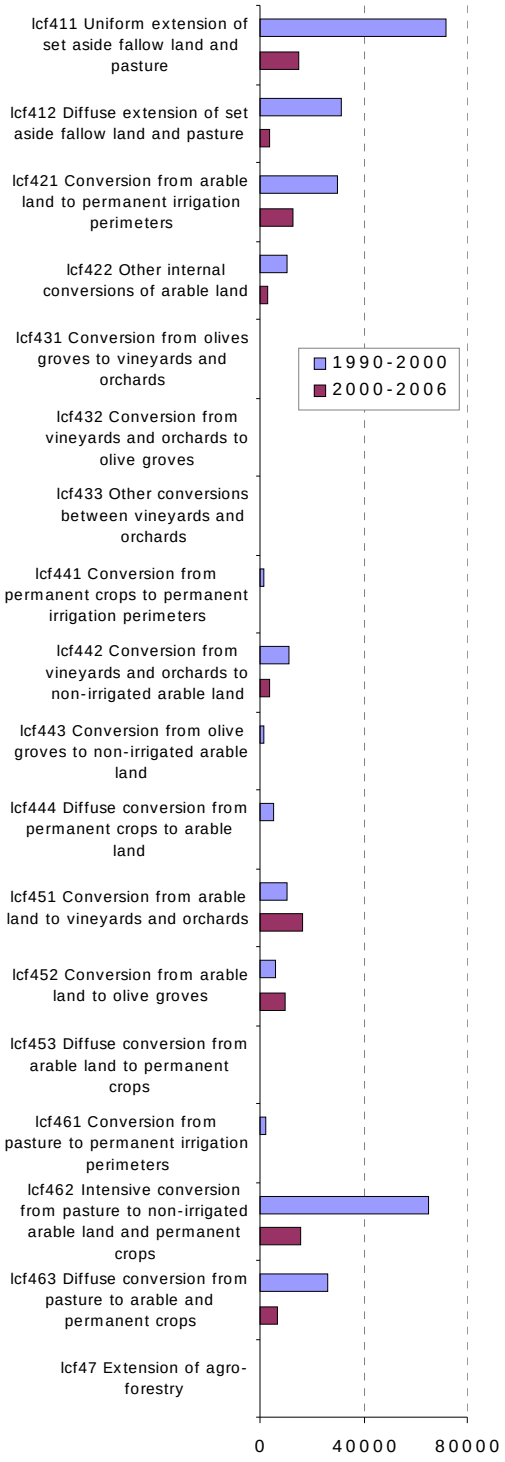

**8.29. Main annual conversions between agriculture and forests & semi-natural land 2000-2006 [ha/year]**



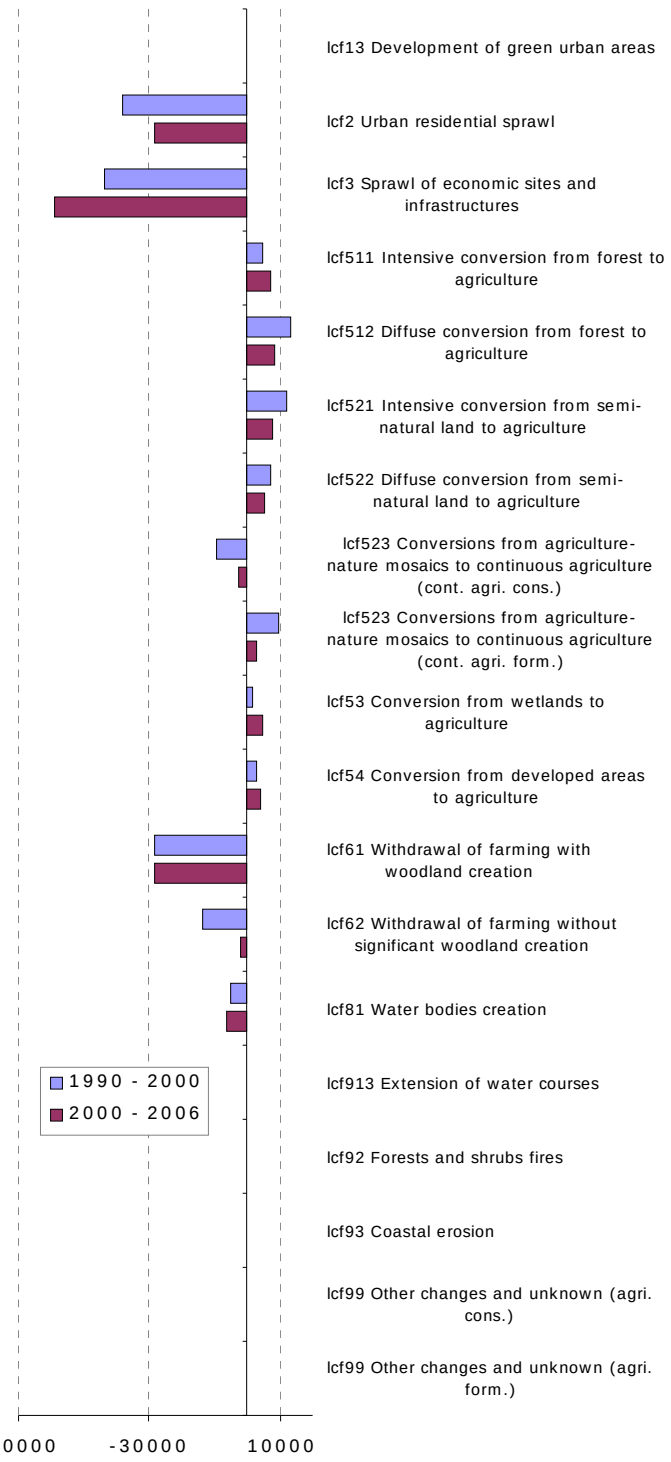

**8.30. Mean annual conversion between arable land and pasture [ha/year]**



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

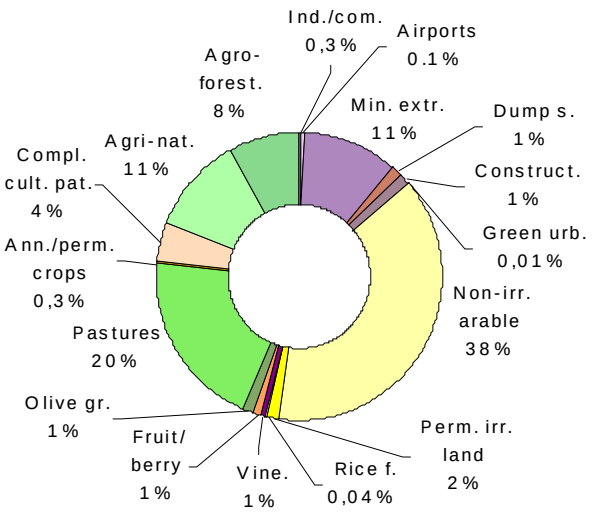



**9.32. Mean annual conversions between agriculture and other LC types [ha/year]**

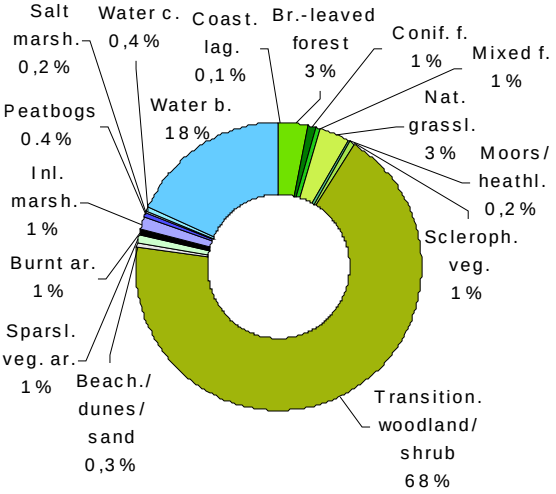


# *Forest & nature*

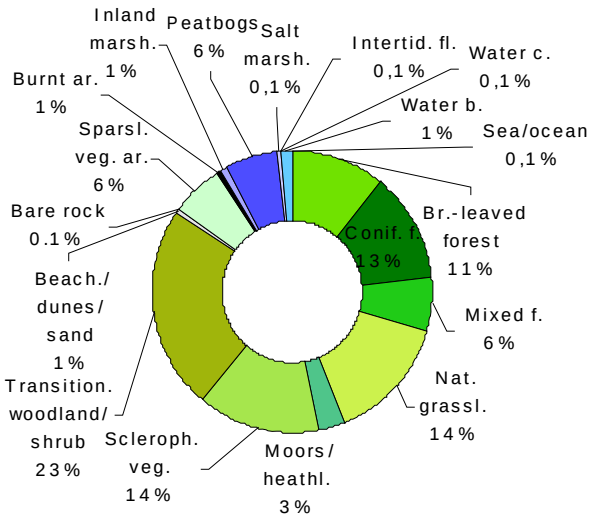
**10.33. LC consumed by forest & nature 2000-2006 [% of total]**



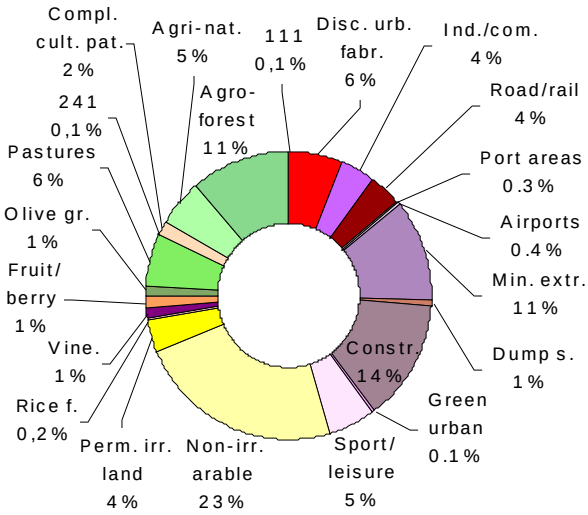

**10.34. Formation of forest & nature land from non-forest /nature 2000-2006 [% of total]**



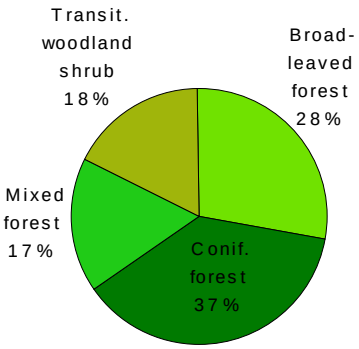

**10.35. Consumption of forest & nature land by non-forest /nature 2000-2006 [% of total]**



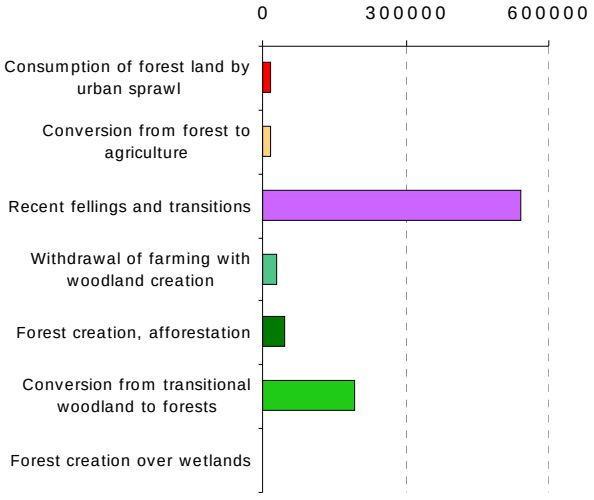

**10.36. Formation of non-forest /nature land from forest & nature 2000-2006 [% of total]**



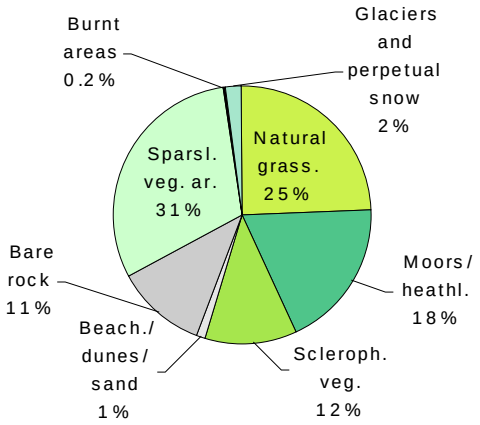

**10.37. Forested land 2006 [% of total area]**



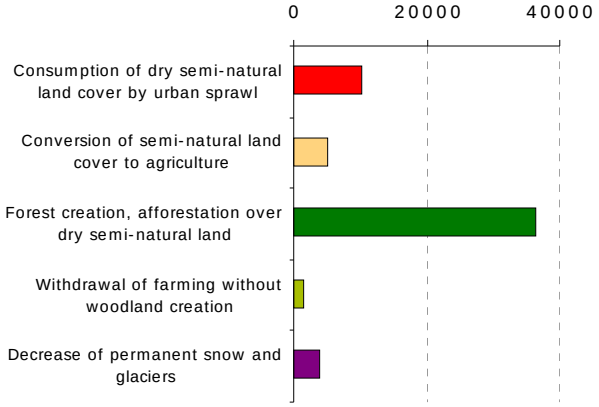

**10.38. Main trends in woodland & forests consumption/formation 2000-2006 [ha/year]**



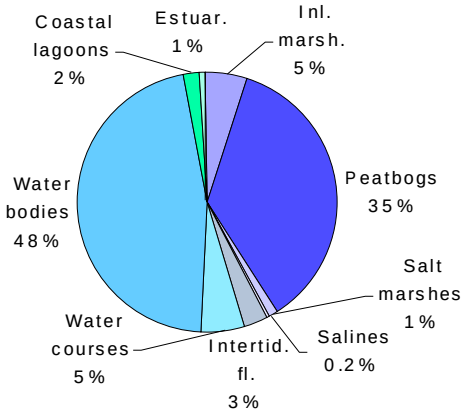
**11.39. Dry semi-natural areas 2006 [% of total area]**



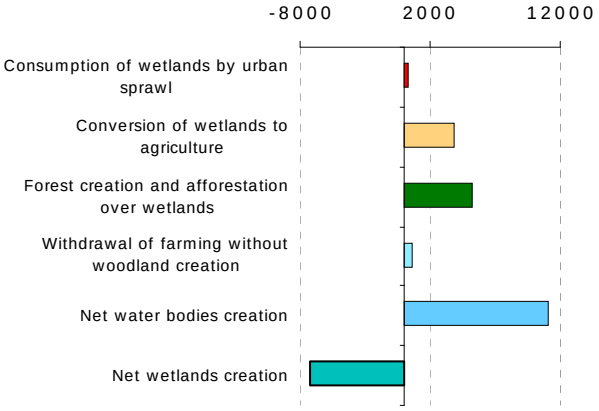

**11.40. Main trends in dry semi-natural land consumption/formation 2000-2006 [ha/year]**



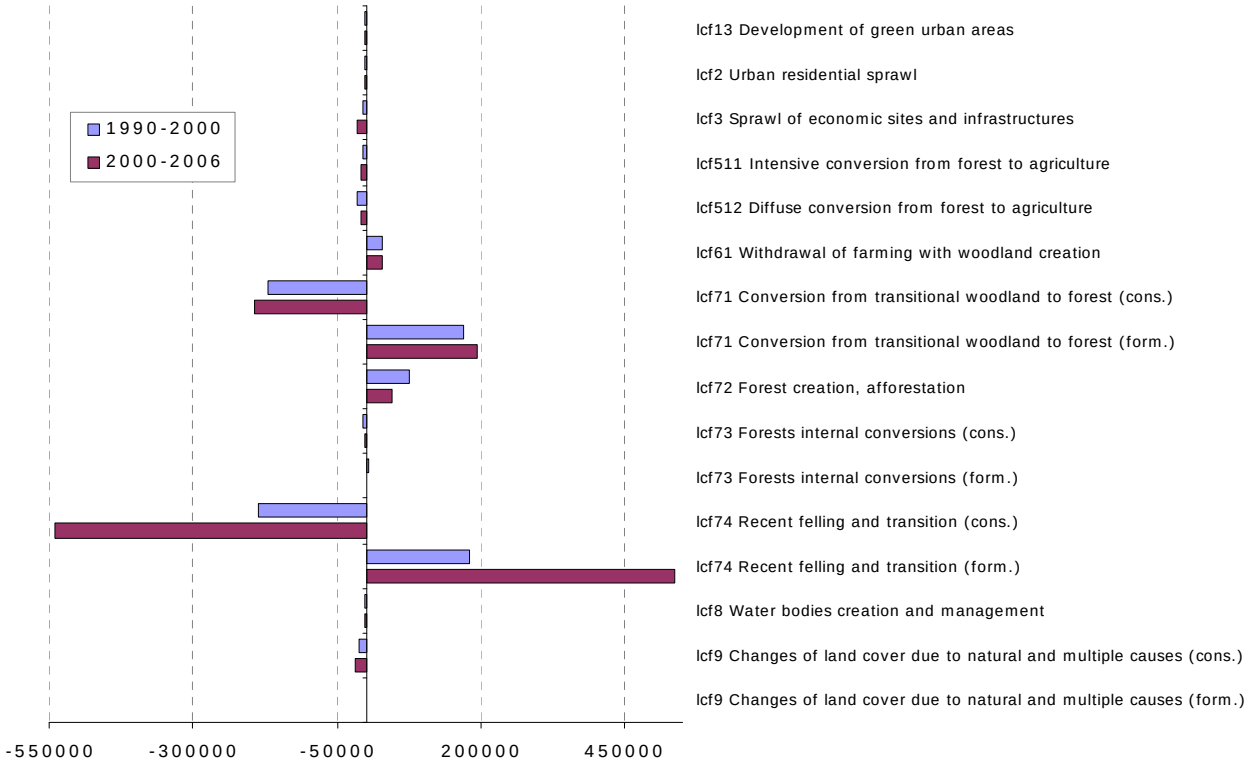

**11.41. Wetlands & water 2006 [% of total area]**



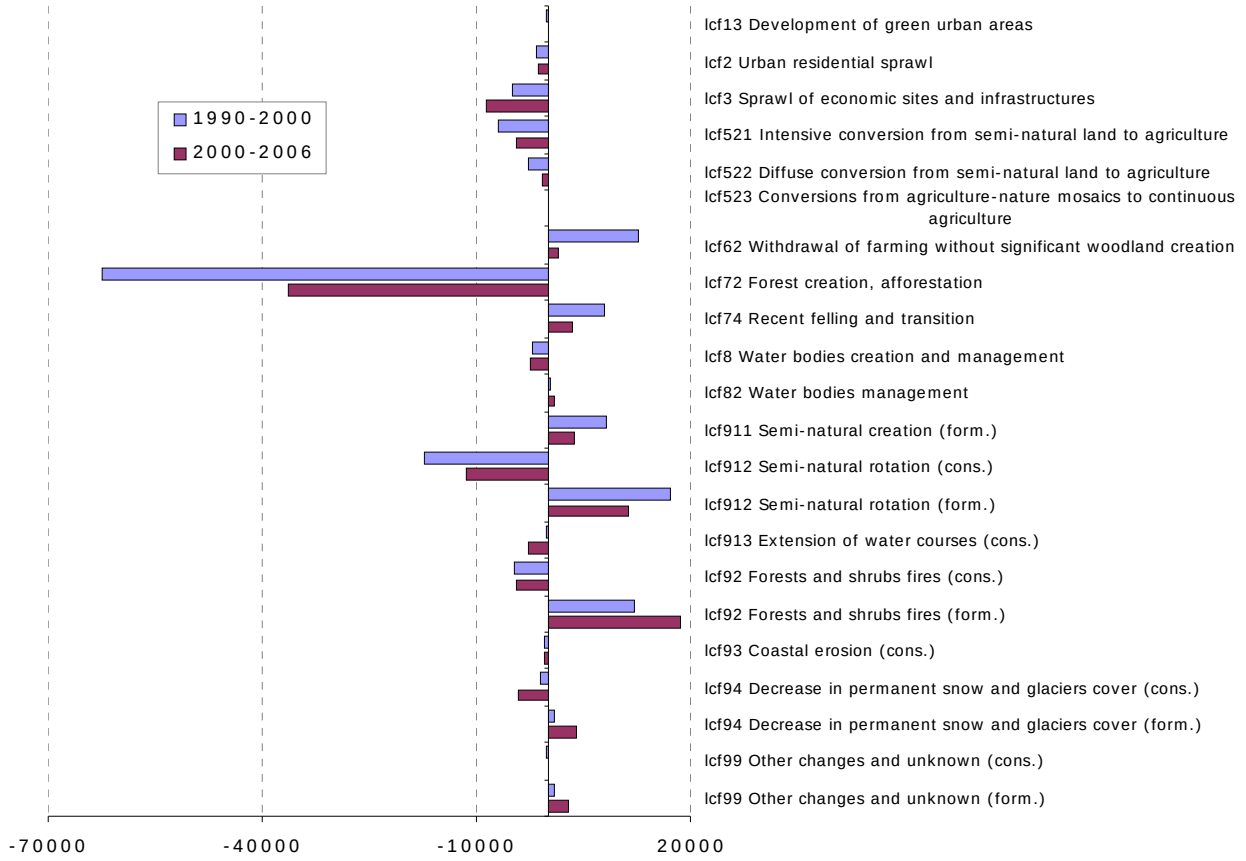

**11.42. Main trends in wetlands & water consumption/formation 2000-2006 [ha/year]**



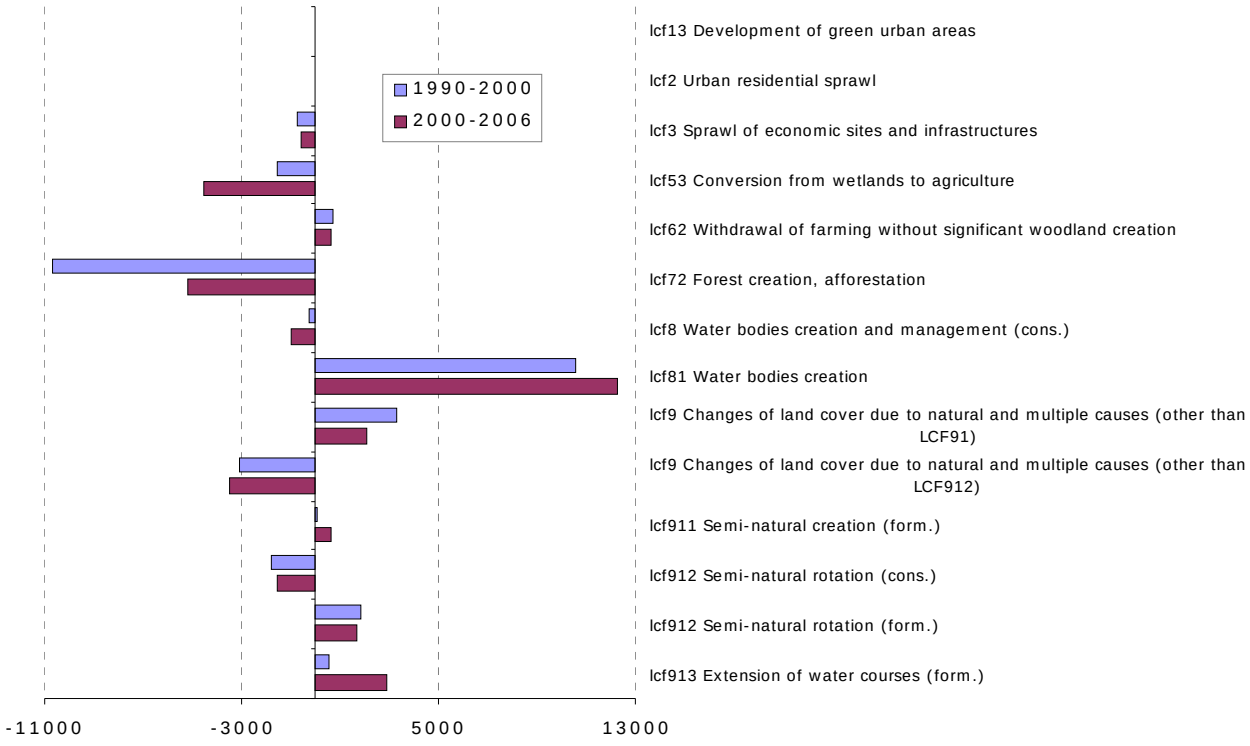

**11.43. Mean annual conversions of forest & other woodland [ha/year]**



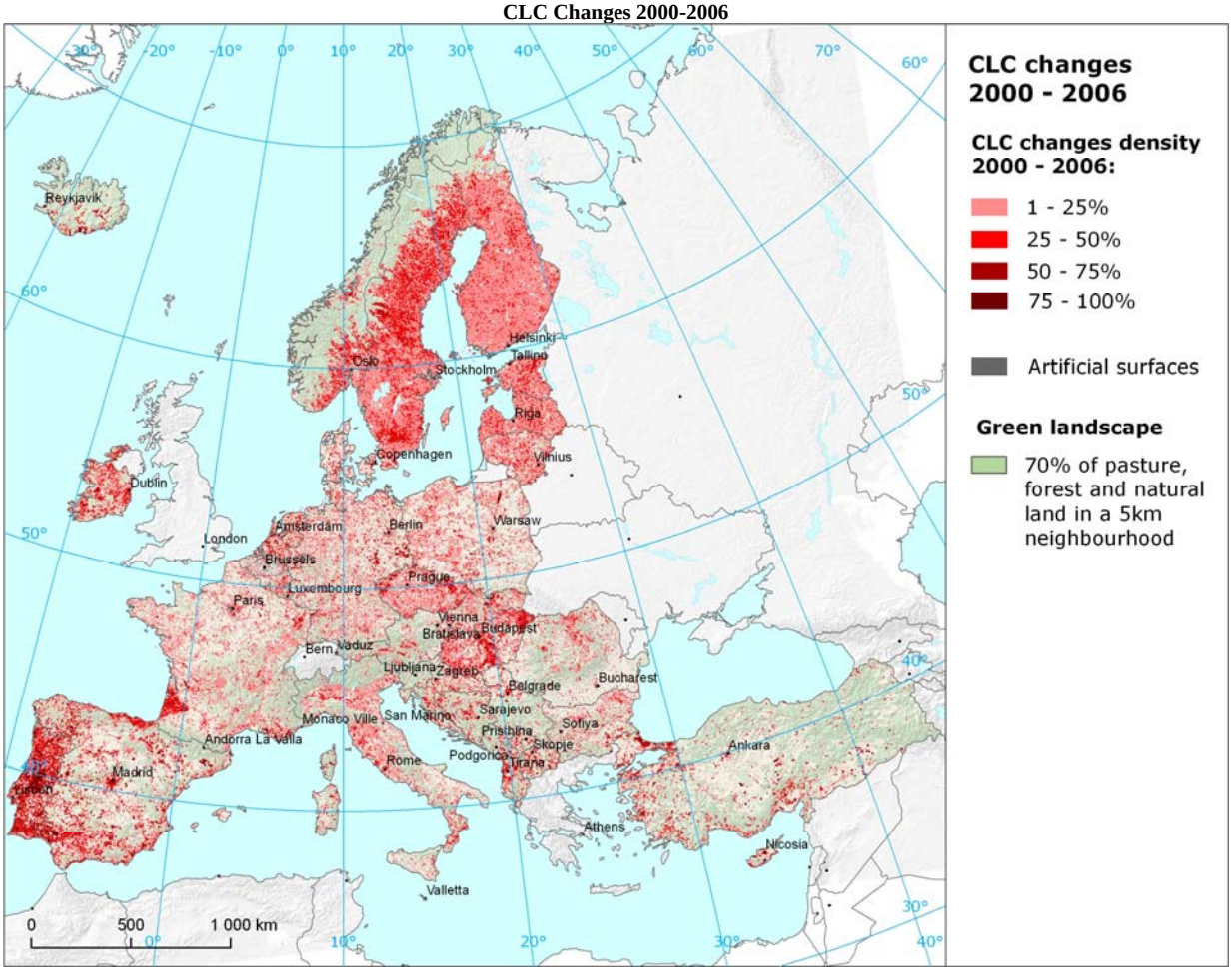
**12.44. Mean annual conversions of dry semi-natural LC [ha/year]**



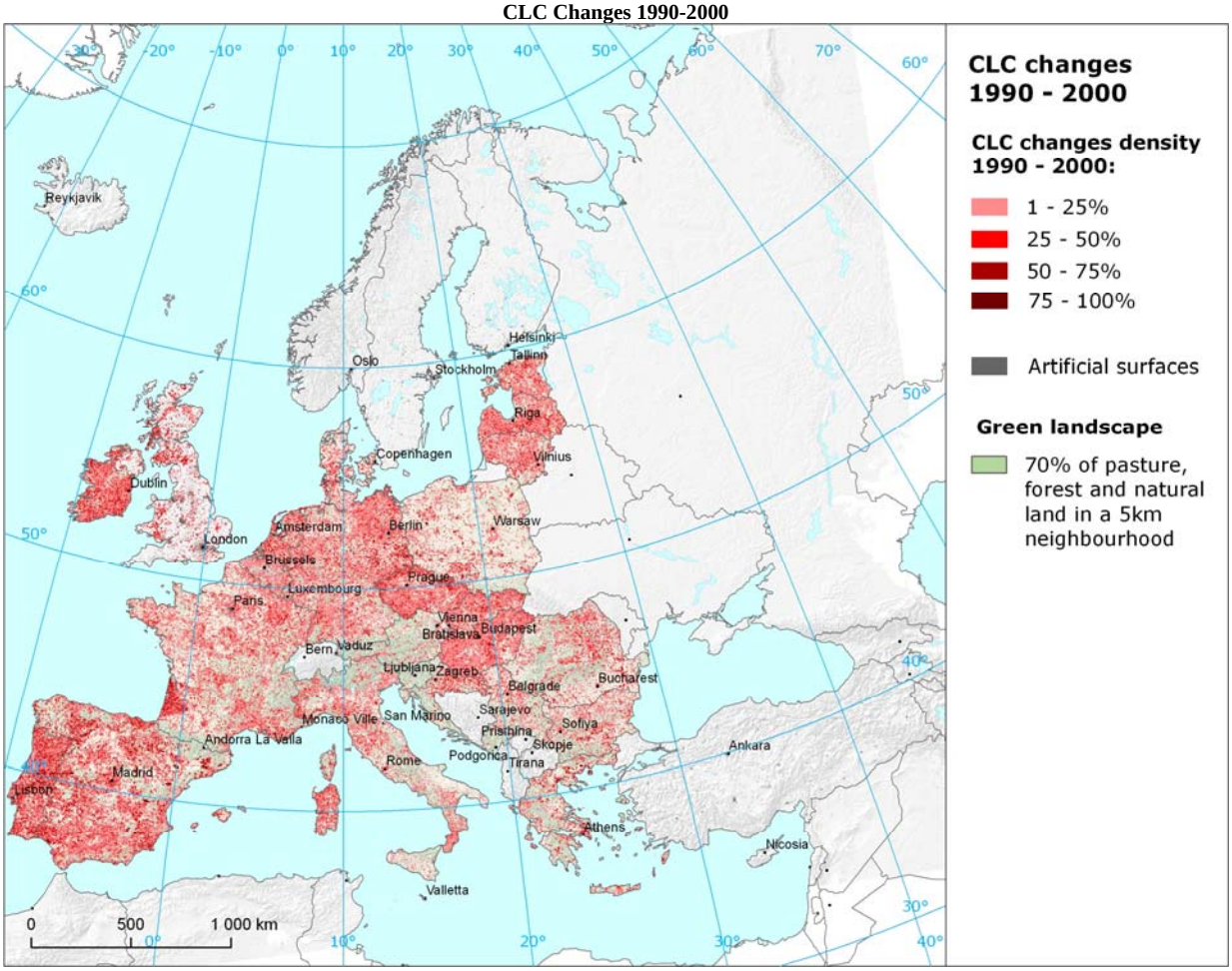

**12.45. Mean annual conversions of wetlands and water LC [ha/year]**



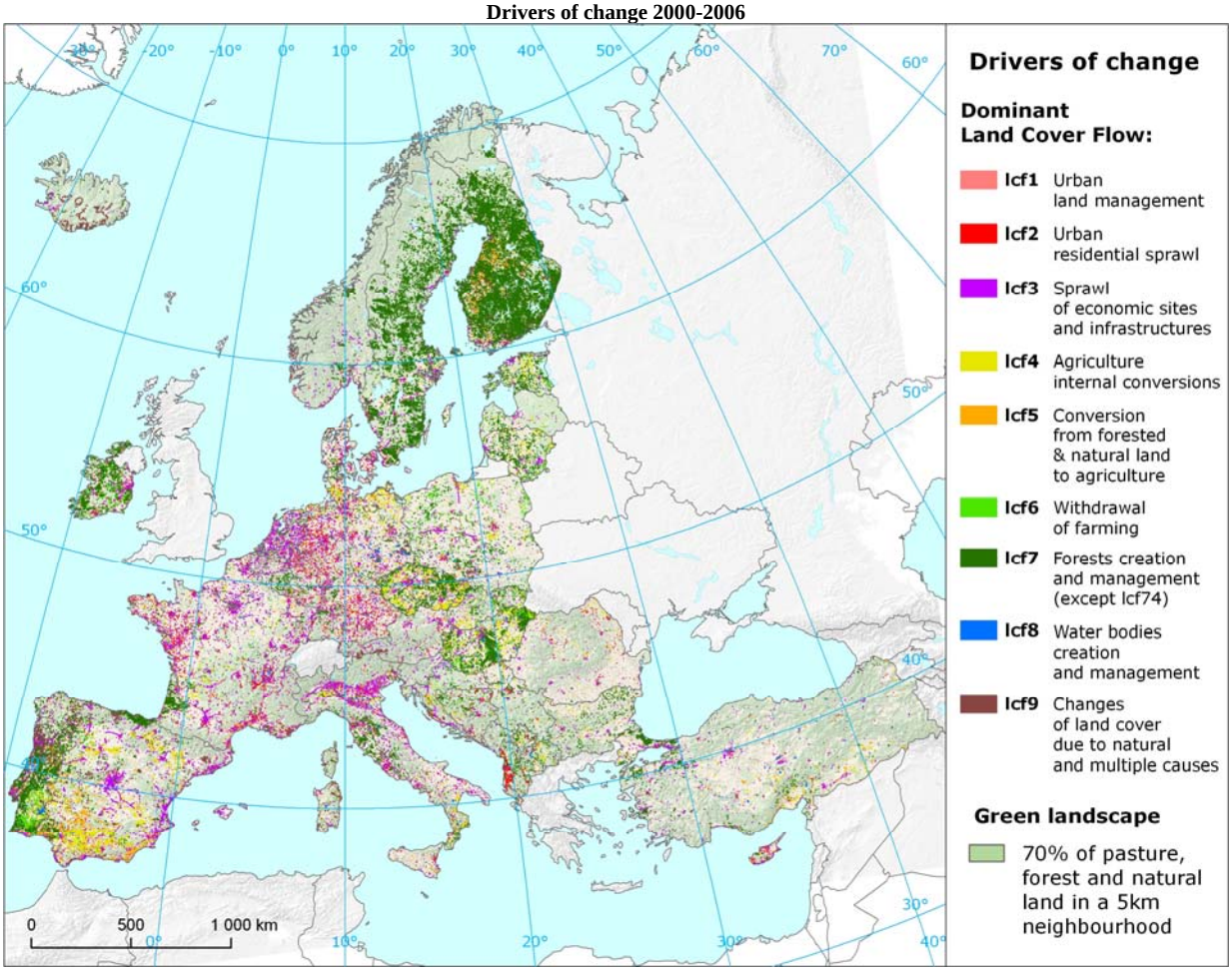
**CLC Changes 2000-2006**



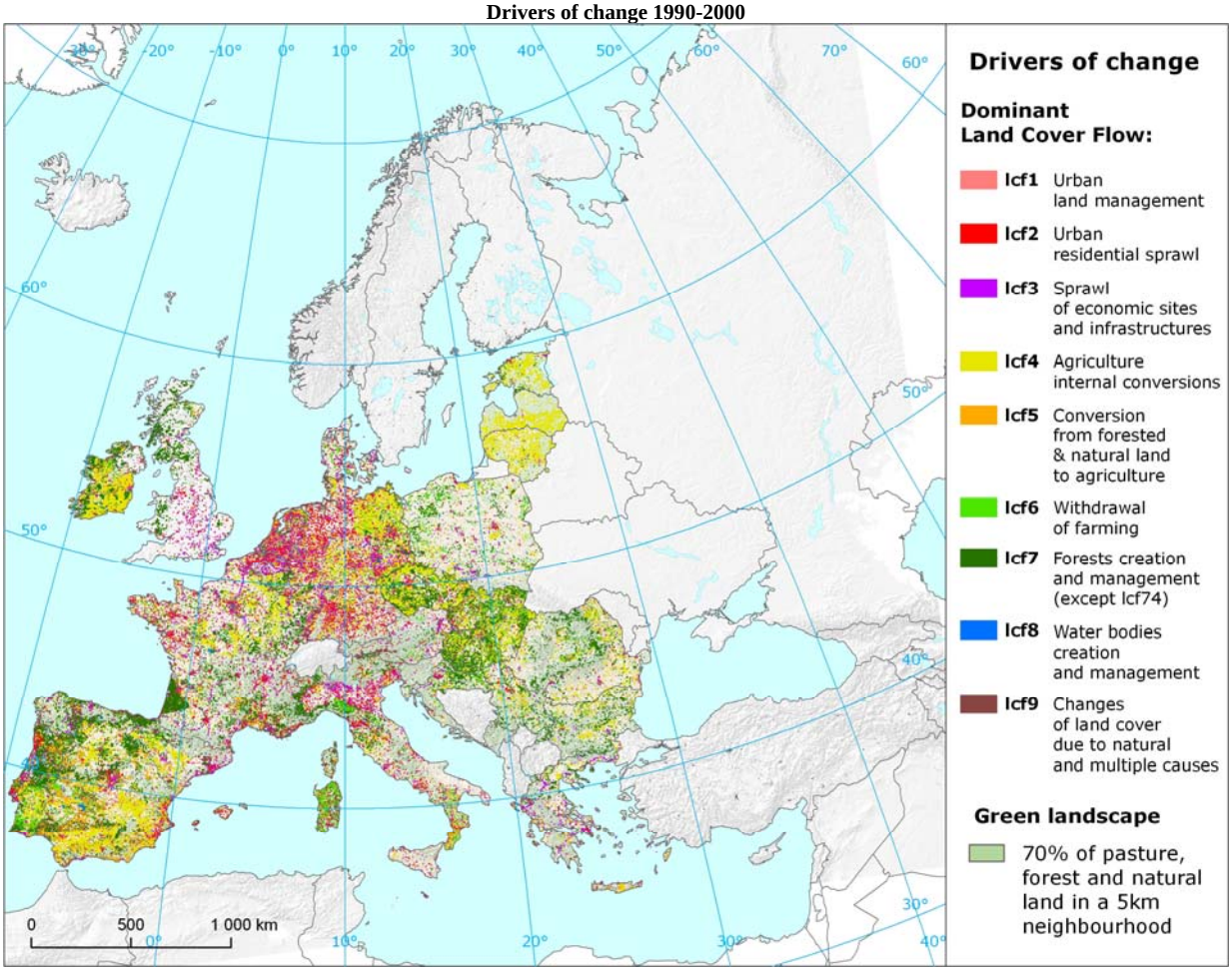

**CLC Changes 1990-2000**



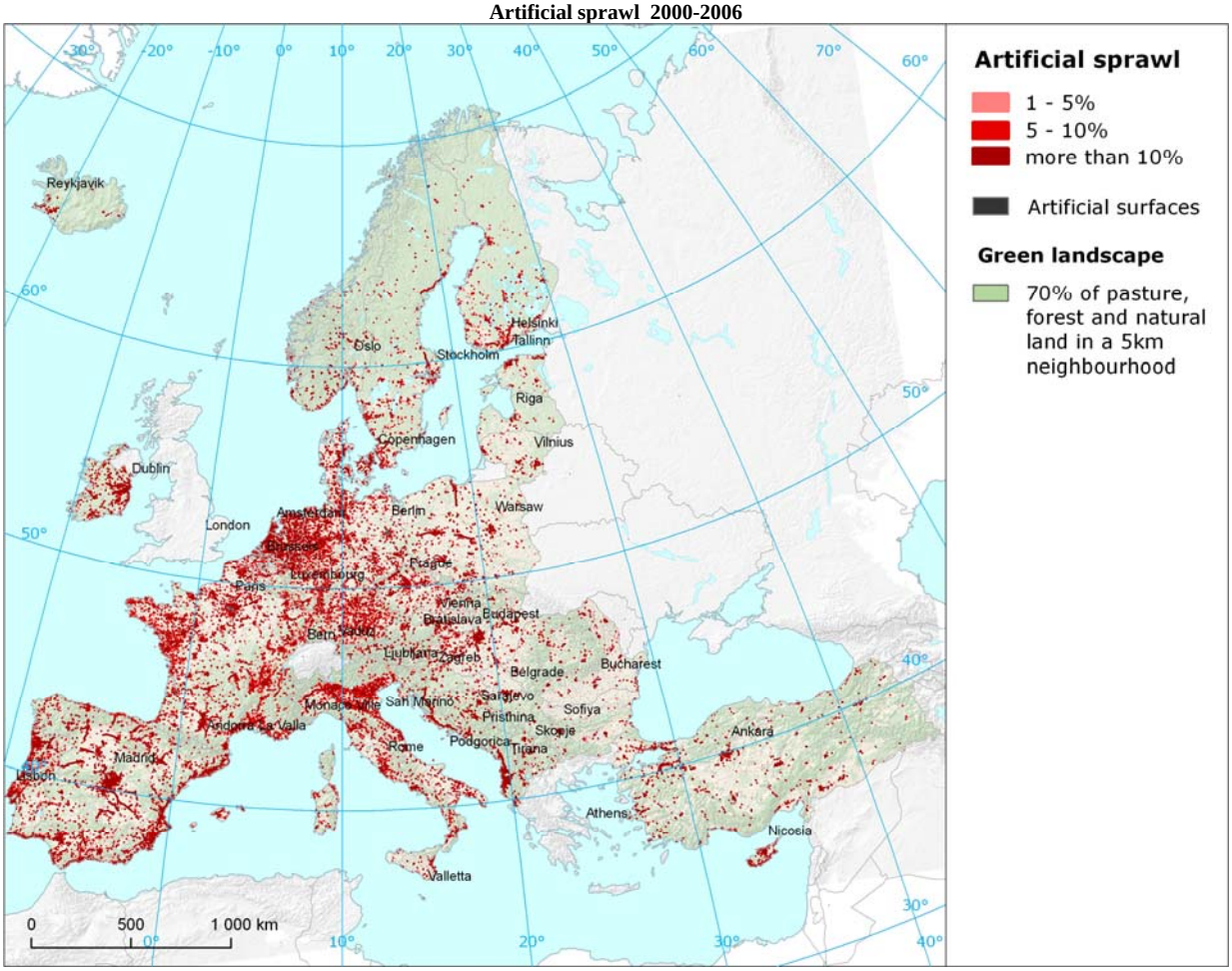
**Drivers of change 2000-2006**



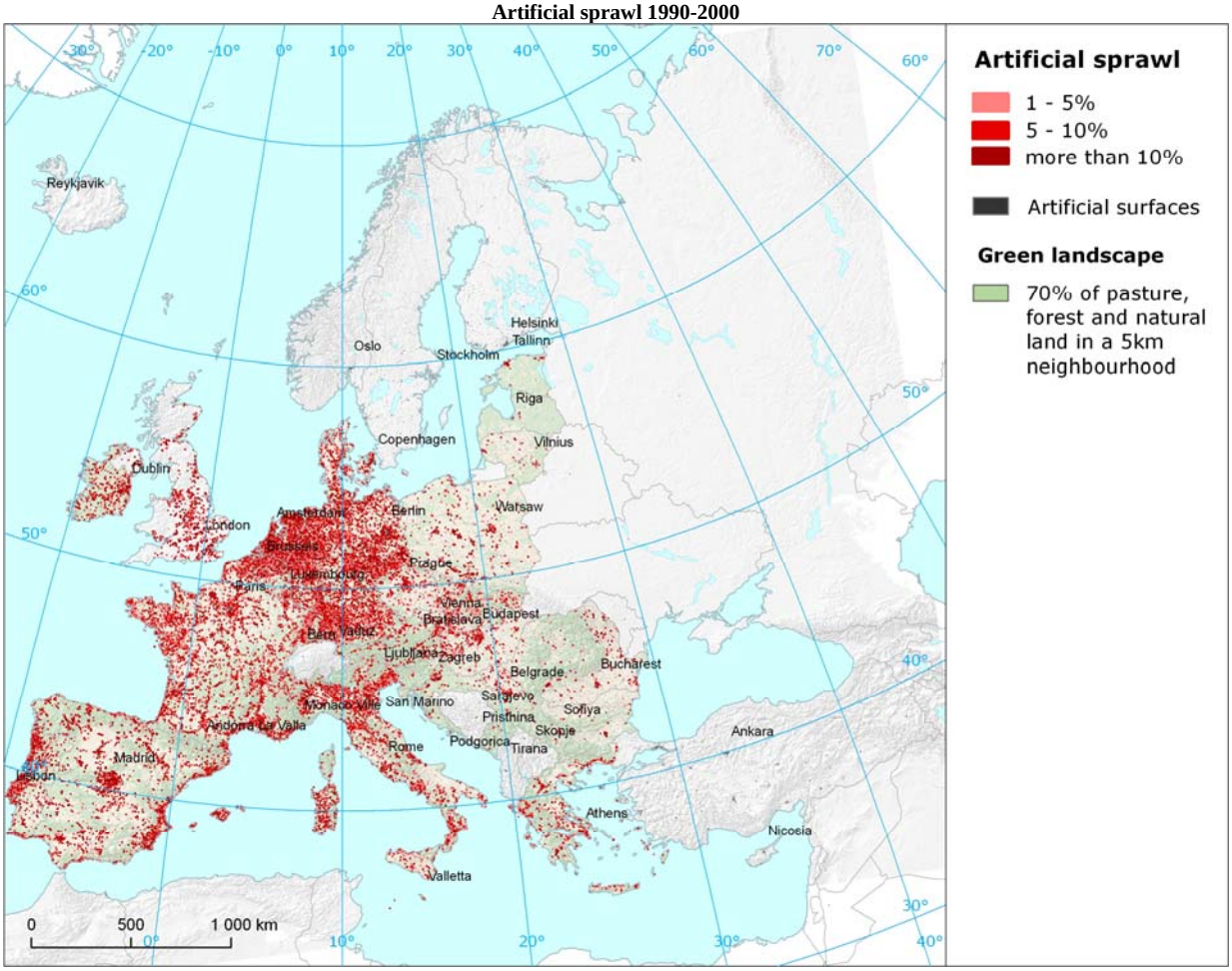

**Drivers of change 1990-2000**



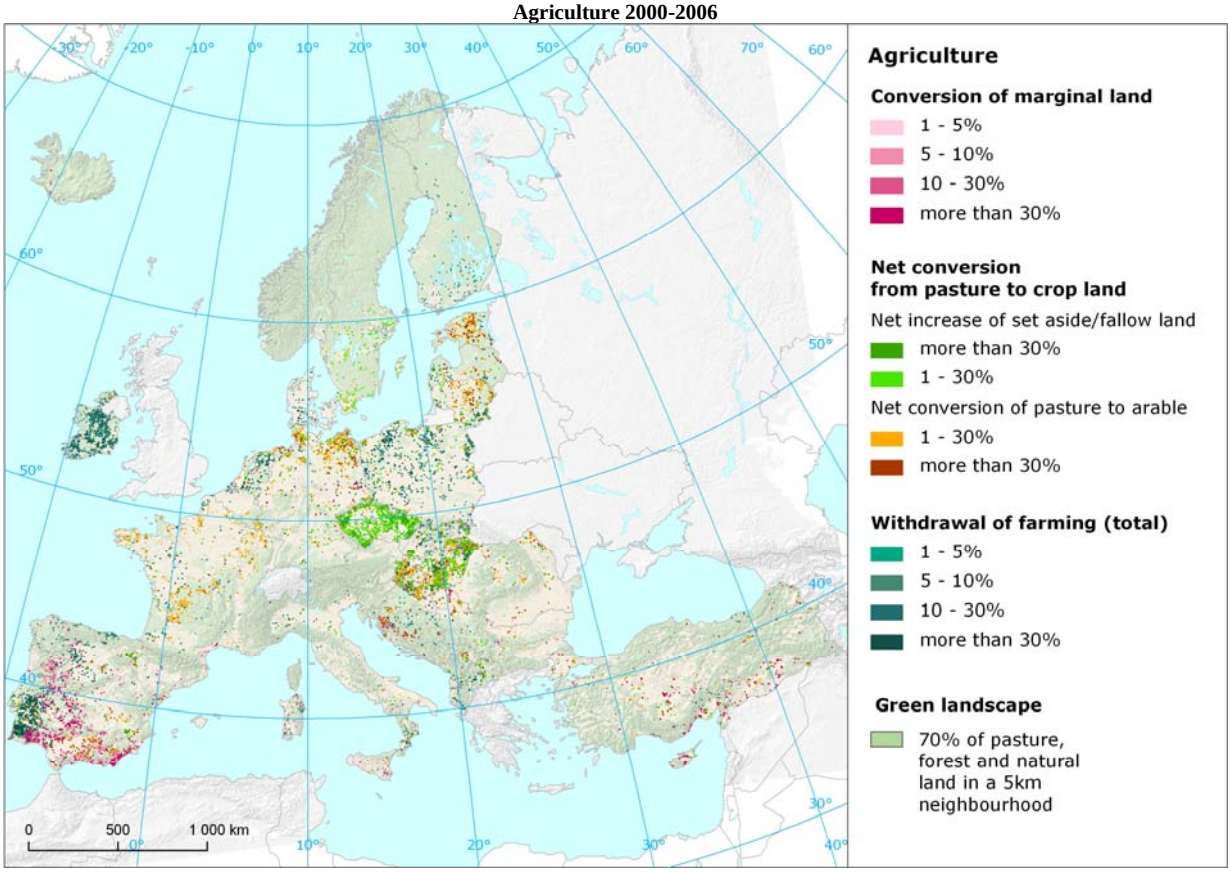
**Artificial sprawl 2000-2006**



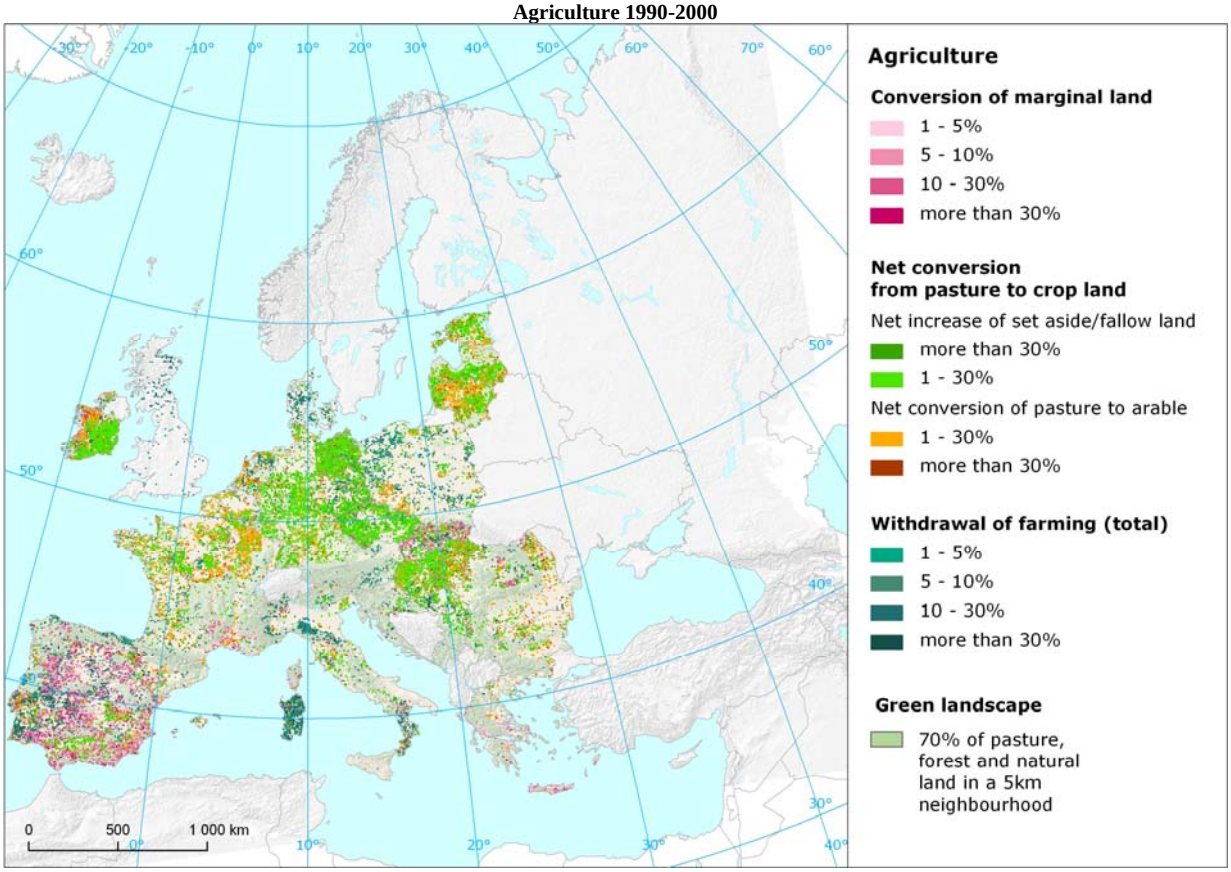

**Artificial sprawl 1990-2000**



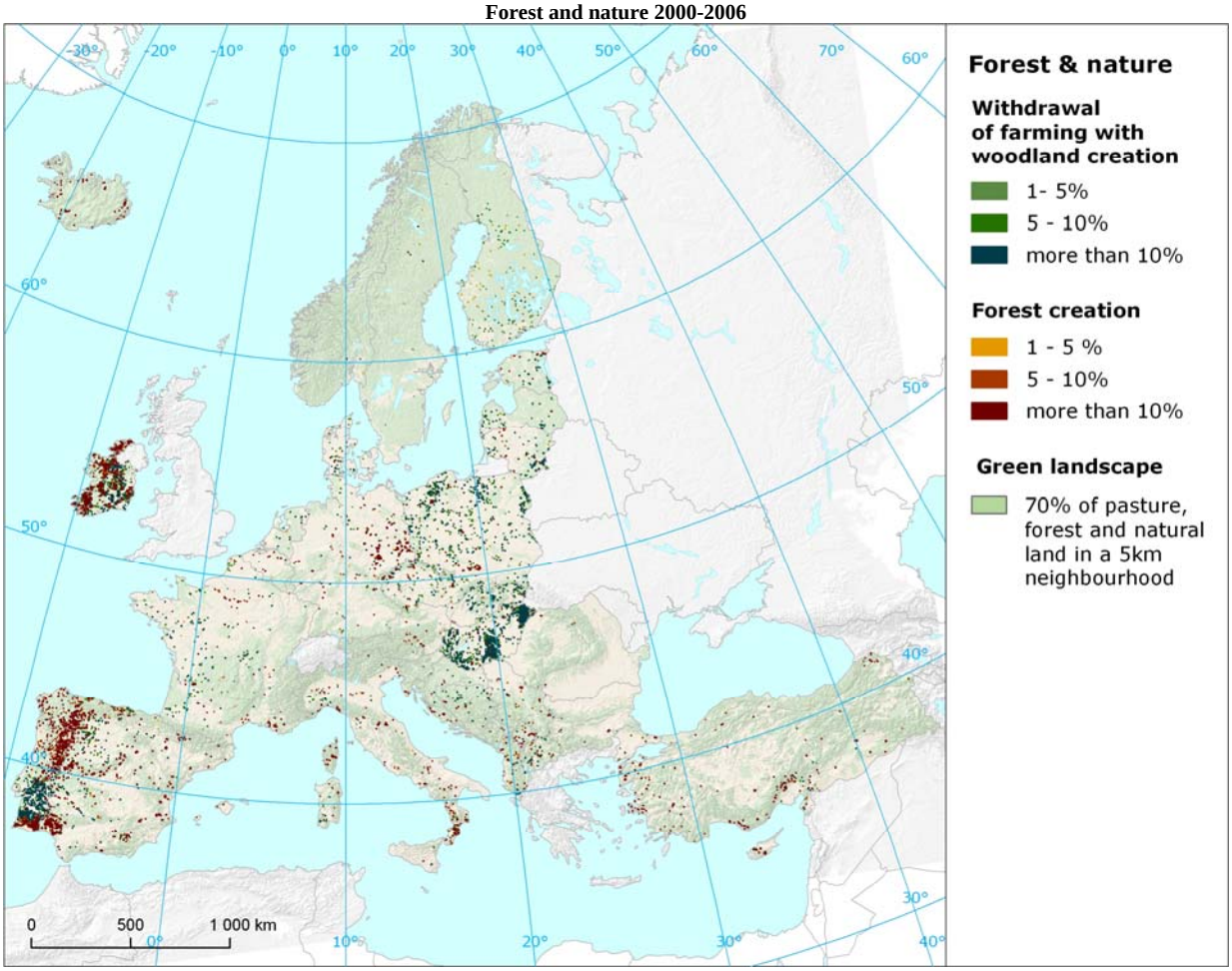
**Agriculture 2000-2006**




**Agriculture 1990-2000**



**Forest and nature 2000-2006**




**Forest and nature 1990-2000**