

# ESPON project 1.3.2 - Territorial trends of the Management of the Natural Heritage

## PART 1: SUMMARY



*Royal Haskoning*





**ESPON project 1.3.2  
Territorial Trends in the  
Management of Natural Heritage**

This report represents the final results of a research project conducted within the framework of the ESPON 2000-2006 programme, partly financed through the INTERREG programme.

The partnership behind the ESPON programme consists of the EU Commission and the Member States of the EU25, plus Norway and Switzerland. Each partner is represented in the ESPON Monitoring Committee.

This report does not necessarily reflect the opinion of the members of the Monitoring Committee.

Information on the ESPON programme and projects can be found on [www.espon.lu](http://www.espon.lu)

The web site provides the possibility to download and examine the most recent document produced by finalised and ongoing ESPON projects.

ISBN number 90-74718-12-4

This basic report exists only in an electronic version.

© The ESPON Monitoring Committee and the partners of the projects mentioned.

Printing, reproduction or quotation is authorized provided the source is acknowledged and a copy is forwarded to the ESPON Coordination Unit in Luxembourg”.

## Foreword

This publication represents the final results of an European-wide (EU27) research project concerning the management of the natural heritage. This report has been produced by the projects core group consisting of:

- EuroNet – Royal Haskoning (lead partner), Utrecht, Netherlands;
- European Centre for Nature Conservation (ECNC), Tilburg, Netherlands;
- EuroNet – Enviplan, Athens, Greece ;
- EuroNet – Land Use Consultants, London, UK ; and
- EuroNet – Territoires, Sites & Cités, Lumbres (Lille), France.

With contributions from:

- Accademia Italiana di Scienze Forestale (Italy);
- Eastern Norway Research Institute (Norway);
- EuroNet – Taller de Ideas (Spain);
- Peter Bassin (Slovenia);
- Institute of Environmental and Landscape Management, Szent Istvan University(KTI), (Hungary); and
- ACER, Jelka Hudoklin (Slovenia).

We would like to thank all respondents on the questionnaire for their contributions.

The report is split into three parts:

- Part One: Summary
- Part Two: Results of the project
- Part Three: Annexes

Contact:

Royal Haskoning Division Spatial Development, Mr Jan Vogelij, P.O. Box 19009, 3501 DA Utrecht, Tel: +31 30 230 8424,

E-mail: Jan.Vogelij@royalhaskoning.com



# Table of contents

<b>Foreword</b> .....	<b>3</b>
<b>Table of contents</b> .....	<b>5</b>
<b>Figures</b> .....	<b>5</b>
<b>Maps</b> .....	<b>5</b>
<b>Tables</b> .....	<b>5</b>
<b>Part 1: Summary</b> .....	<b>7</b>
1 Executive summary of main final results .....	7
1.1 Introduction .....	7
1.2 Physical Structure .....	7
1.3 Territorial trends .....	8
1.4 Natural Heritage .....	10
1.5 Management .....	12
1.6 Macro level .....	14
1.7 Meso level .....	18
1.8 Micro level .....	24
1.9 Nature as an asset for economic development .....	25
1.10 Recommended policy responses .....	28
2 Scientific summary .....	31
2.1 The scope .....	31
2.2 Theory and methodology .....	32
2.3 Indicators .....	34
2.4 Regional typology .....	35
3 Report on networking .....	37
4 Short report on further research issues and data gaps to overcome .....	39
4.1 Further research issues .....	39
4.2 Missing data .....	40
5 Evaluative reflections .....	41

## Figures

**Error! No table of contents entries found.**

## Maps

Map 1 Land cover and the large designated areas (the size of the circles represents the actual surface areas of designated sites) .....	16
Map 2 Percentage semi-natural area compared to urban pressure .....	20
Map 3 Map x comparison of flood risk to the percentage semi-natural area .....	22

## Tables

Table 1 IUCN categories of protection and agricultural land cover (in percentages) .....	14
Table 2 Findings of the analysis in DPSIR terms .....	27
Table 3 Different levels used .....	33





## **Part 1: Summary**

### **1 Executive summary of main final results**

#### **1.1 Introduction**

In the ESPON 2006 General programme, natural heritage has been described as an essential part of the environmental assets of each country. "The value of (bio) diversity has been largely recognised by EU policies. Such a heritage must certainly be preserved from hazards, but also creatively managed to reach a condition of sustainable development, for example by the recognition and valorisation of natural networks and individual natural assets in integrated development strategies. New developments must be found to assure synergy and co-existence of man's activities and action affecting natural heritage."

The landscape contributes to the formation of local culture and is a basic component of the European natural and cultural heritage, promoting the consolidation of the European identity. Landscape is an important part of the quality of life of different areas of the European continent.

#### **1.2 Physical Structure**

The European physical structure leads to geomorphologic, natural and cultural differences in the regions. The complex and fragmented geology has largely contributed to Europe's history and complexity both in a territorial and political sense. The Alpine ridge formed the divide for climate, history and trade in the continent, while the plains are home to most economic and social activities. The relative close presence of the sea, a distinctive characteristic of Europe, has strongly influenced the history, economy, landscapes and traditions.

Not only does Europe have a relatively long coast, it also has an extensive network of rivers and inland waterways. There is a coherent system transporting the water and nutrients and pollutants to the coastal deltas. Large concentrations of European natural heritage are connected through this system: natural areas in the mountain ranges are connected to the wetlands along rivers and in the coastal plains.

In terms of natural heritage the physical structure is of essential importance. When building a network of natural areas as sought through Natura 2000, the described physical structure needs should be taken into account. The location of specific natural areas should always be considered within the framework of the existing physical structure of Europe.

### **1.3 Territorial trends**

Territorial trends may cause a threat as well as a challenge to nature. Most important are the following trends:

- Agricultural intensification and extensification, and the abandonment of land. Agricultural production not only focussed on feeding the local population, it also became subject to trading and transportation thereby stimulating further development of roads and increase of agricultural area. At the same time, land has been taken out of production in the more remote and marginal areas in large parts of the continent;
- Forestry for the wood production. The forest has decreased dramatically in Europe. Forestry has impact on the diversity of and the bio diversity within the forest;
- Increase of the surface of urbanised land. Due to population growth, increase of average space used per person and facilities for services including mobility and economic activities;
- Growing tourism inducing urbanisation, large traffic flows and rural pressures.

### **Agriculture**

Agricultural activity is carried out under different intensities. Intensively used pasture or arable mono-cultures make up the most intensive forms. At the other end of the scale is extensive grazing in uphill moor land and mountain pasture. It is therefore not always easy to draw a clear line between agricultural habitats and natural habitats. A landscape is usually made up of a mosaic of exploited and unexploited elements.

Increased large scale mono-culture often replaces small scale mixed farming, as the used machinery need large fields, impacting the existence of for example hedgerows. This process of increased scale and mono-culture is a threat to the structure of landscapes naturalness and in general makes the

landscapes more uniform. This not only affects the natural heritage, but also the cultural heritage of our landscapes.

Abandonment is the result of marginalisation in the agriculture. The impact of abandonment depends upon the natural values, the biodiversity or generally speaking the quality of the abandonment land and the new use of the land. The area may gain or lose qualities.

## **Forestry**

Europe has lost two-thirds of its original forest cover, mainly through clearance to make way for human settlements and agriculture and, felling for use in the production of iron, coal and salt and as timber for ship building. Only 2% of the total European forest cover is regarded as natural. Threats for forests are: fragmentation by road construction, atmospheric pollution such as acidification and eutrophication, climate change, human induced forest fires.

This trend of the decrease of forests has been reversed in recent decades: the growing stock and the area of European forests are expanding and efficient instruments for controlling conversion of forests to other land uses are in place (ECNC). Landscapes will completely change and species that are now common will become rare (EEB).

## **Urbanisation**

Throughout Europe, the recent rapid drop in the rate of population growth is remarkable. In the period 1950-1975 the average annual rate of growth was 8.3 per 1000 population. In the most recent quarter century this index had fallen to 2.9 per 1000.

Increases in population, the use of space per family as well as the use of use of space per individual, especially in areas with high prosperity, all lead to ongoing growth of residential areas. Together with space needed for economic activities, services, infrastructure and tourism and recreational facilities this results in continuous urbanisation and enhanced pressure on natural heritage.

Between 1992 and 2000, US GDP grew by 36% in real terms, compared to 19% for the combined EU countries. The ability to compete and prosper in the global economy goes beyond trade in goods and services and flows of capital and investment. The creative economy has grown considerable over the past century with the most rapid and punctuated growth occurring over the past two decades or so.

Positive development of economic activities affects natural heritage in different ways: land take for business areas, infrastructure causing fragmentation, prosperity of the population results in increased space per capita.

## **Tourism**

Tourism is now an important part of the world economy, and Europe's largest single industry, with continuing prospects for increasing employment. Its development depends particularly on transport as an essential facilitator, and related policies. Since 1980 the tourism boom has seen international arrivals in European destinations double.

The scenery (49%) and the climate (45%) are the two determining factors when a destination is selected.

## **Environment, climate change and hazards**

Changes in land use and spatial patterns have, in their turn, influenced the environment of Europe significantly. Effects of climatic change in the European territory will involve both losses and gains to the natural resources. Current and future pressures on water resources in Europe are likely to be escalated by climate change. Flood hazard as well as water shortages, are trends that are likely to increase, particularly in southern and central Europe. The risk of flooding, erosion and wetland loss is likely to be increased, especially along the rivers and in the coastal areas of the continent which represent a valuable element of the European natural heritage.

### **1.4 Natural Heritage**

It is important to understand that the natural heritage of Europe includes all natural habitats and species in existence throughout Europe, within and outside recognised natural areas. The general state of the European environment is therefore an important precondition for the more specific natural qualities within protected semi natural areas.

## **Landscapes**

The long term process of spatial developments of the European landscapes over centuries, resulting from agricultural activities, urbanisation and implementation of infrastructure in specific geomorphologic conditions have lead to different landscapes with a specific mix of cultural and natural values. One of the outcomes of that process is that undisturbed natural areas hardly exist in Europe.

## **Natural values**

The largest natural areas can clearly be identified in Finland, the Alps, the Cantabrian Mountains, the Pyrenees, the Carpathians, Greece and Scotland. Apart from Finland and Scandinavia with extensive forests, the dominance of mountainous regions is obvious. Apparently those geomorphologic features provide biotopes in the different climate zones that are of high natural values.

For the purpose of data gathering, a distinction between designated or protected areas and non-designated or non-protected areas is useful. Designated or protected natural areas are listed by IUCN (International Union of Conservation of Nature) in six categories.

## **Species diversity and species richness**

Until the nineteenth century, biological diversity, in terms of habitat types as well as number of species in general increased in Europe. During the last century, the trends reversed: natural habitats are becoming smaller and less diverse, more fragmented and less able to support wildlife. Nature is under threat as a result of the fact that the size of biotopes for individual species and the area hosting ecosystems for interdependent species is decreasing. As a result, biodiversity, representing the richness of species, diminishes and the existence of rare species also decreases. When areas decrease to a minimal size, allowing only the existence of a specific species, the exchange of genetic material is under threat and as a consequence, the health of future generations is at stake.

A strong relation exists between biodiversity and the size and spatial configuration of natural areas. In general, large natural areas suffer less from detrimental external influences such as disturbance by human presence, water and air pollution, and local drainage.

## **Fragmentation**

Fragmentation of natural heritage is the result of the ongoing incremental process of spatial developments for agriculture, urbanisation and infrastructure, which has left Europe with a natural heritage consisting of many small disconnected islands surrounded by other land use types. In recent decades a range of initiatives to protect the natural heritage, at the national and European level, have been implemented.

## **1.5 Management**

The IUCN has developed a classification system for areas that are given a protection status: the IUCN Protected Areas Categories. These are:

- Strict Nature Reserve/Wilderness Area: protected area managed mainly for science of wilderness protection;
- National Park: protected area managed mainly for ecosystem protection and recreation;
- Natural Monument: protected area managed mainly for conservation of specific natural features;
- Habitat/Species Management Area: protected area managed mainly for conservation through management intervention;
- Protected Landscape/Seascape: protected area managed mainly for landscape/seascape protection and recreation; and
- Managed Resource Protected Area: protected area managed mainly for the sustainable use of natural ecosystems.

## **Natura 2000**

Natura 2000 is the principal EU policy instrument for the protection of flora and fauna and habitats. Natura 2000 encompasses more than 20,000 sites which have been either designated or proposed. These cover almost 15% of the total land area of the EU15 and the number of sites will increase with enlargement.

At the present time the Regional Structural Funds and Cohesion Funds have a far greater impact on land use than Natura 2000, as these funds determine the extent of infrastructure and entrepreneurial investments receiving financial support from the EU. The scale of spending is incommensurate with what is / will be available through Natura 2000. With

regard to the level of spending for agri-environment and rural development support through CAP, it has been suggested that funds from CAP be used to implement Natura 2000. This proposal however, has not been decided on.

Natura 2000 incorporates the principle of a system of European protected areas already put down in the Birds Directive into an ecological network for the protection of species and their habitats.

The development of policies on natural heritage shows clear progress in relation to concern about conservation of natural heritage. This has evolved from strict protection as a defence against the extinction of species and habitats (reactive) to action involving local actors to the will of creating natural networks (with Natura 2000) and protecting given species such as birds, landscapes and peoples living environment.

## **ESDP**

The need to take account of environmental protection has become strongly embedded in European policy since the Amsterdam Treaty of 1997. Even beforehand, European agricultural policy has since 1985 encouraged Member States to identify and financially support the maintenance of Environmentally Sensitive Areas, where in particular traditional agricultural practice would maintain biodiversity and associated landscape character. The European Spatial Development Perspective fully integrates the development of a European ecological network, based upon Natura 2000 sites as designated through the Birds and Habitats Directives (see ESDP). In general, the ESDP indicates that large intact areas of biodiversity richness – such as are found in mountain areas, wetlands, coastal regions and islands - should be protected, as these undisturbed areas are becoming rare (see ESDP).

## **Third report on economic and social cohesion**

In the Third report on economic and social cohesion natural and geographical handicaps of the outermost areas are treated as threats for a harmonious development of the Union economy in future years. These regions with geographical handicaps within the EU encompass 25 islands (including Canaries, Madeira and Azores) plus Guyana, with a population of around 4 million. They 'suffer from an accumulation of natural handicaps, which make it difficult to improve economic and social conditions' (p. 30). Their remoteness is compounded by their natural features (many are archipelagos, small in terms of land area and population), difficult terrain and climate. The Canaries, moreover, are experiencing pressure from

population growth, have an overdependence on tourism and a lack of diversification into other activities.

Geographical handicaps do not always mean unfavourable economic circumstances. It is equally important that the economic development path, so called handicapped areas follow, respects their natural heritage and does not endanger the very geographical features which are, or can be, a key aspect of their comparative advantage as locations not only for people to live but also for businesses to operate.

## 1.6 Macro level

### Nature and protection

At the macro scale there are distinct differences between the Pentagon region and the rest of Europe when considering land cover. The Pentagon has clearly a relative low percentage of semi-natural are cover, while the built up area is significantly higher. There is no clear difference between EU15 and N10 when average figures of land cover are compared.

The numerous ways to protect the natural heritage are categorised by IUCN in classes of which I-IV can be regarded as the strictest classes of protection.

**Table 1 IUCN categories of protection and agricultural land cover (in percentages)**

Macro scale	coverage IUCN I-IV	coverage IUCN V-VI	agricultural cover
EU15	2	7	50
N10	4	11	57
EU25	2	8	53
N12	4	7	56
EU27	3	7	53
EU27 + 2	3	7	53
Pentagon	2	18	60
Alpine	12	9	16
Atlantic	1	8	69
Boreal	2	1	19
Coastal zone	2	6	54
Continental	1	11	61
Mediterranean	2	5	52
Pannonian	2	4	73
Steppic	16	0	77

Source: CORINE land cover 1990, IUCN



Table 1 shows that there are no or very small differences in the percentage of the strict management categories (IUCN I-IV) coverage between the EU15, the EU25, the N10 and the Pentagon. For the less strict management categories (IUCN V and VI) the differences are larger, varying between 7 % (EU15, N12, EU27, EU27+2) and 18 % for the Pentagon.

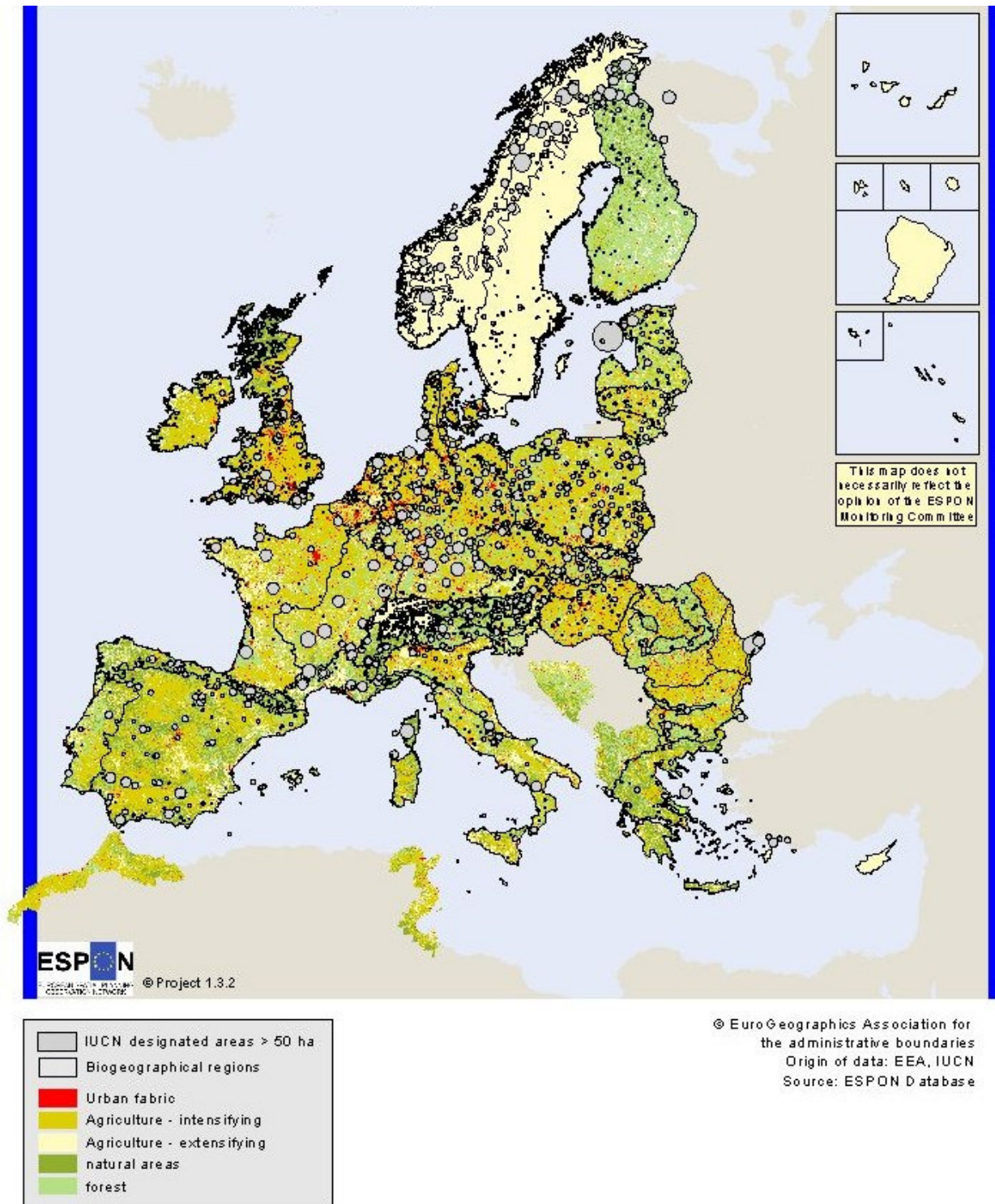
The percentage of IUCN categories I-IV is high in the Steppic and Alpine regions, the categories V and VI are high in the Continental region, the Alpine region and the Atlantic region.

In the Continental region, the total IUCN-protected areas are similar to that in the Atlantic region and the average size of the areas is larger (see map 1). There are many IUCN-protected areas in Switzerland, Germany and Poland, but the average size of the IUCN-protected areas is larger in France.

### **Potentials for nature**

Forestry in the Boreal region is one of the most extensive agricultural activities, especially in Finland where there is almost no intensification of agriculture. In the Baltic States, agriculture is decreasing in extent and intensity with an increase of semi-natural area. In the Baltic States, urbanisation will probably stabilise because population growth between 1995 and 2000 was below zero. The further south, the more likely is fragmentation. The semi-natural area in the Boreal region north of the Baltic Sea is hardly disturbed and it suffers from industry induced acid rain. Biodiversity in terms of species richness in these areas is not particularly high; the natural value in the Scandinavian Peninsula is more determined by the presence of rare species and the extent of semi-natural habitat than by species richness. In the Boreal region, north of the Baltic Sea, the population density is extremely low and urbanisation occurs wide spread, with slight concentration in accessible locations along the coastline. Towns are embedded in natural environments, surrounding them with forests and lakes.

**Map 1 Land cover and the large designated areas (the size of the circles represents the actual surface areas of designated sites)**



In some middle mountains in the Continental region, agriculture is more a marginal activity. River valleys in the appropriate altitudes in Germany, Austria, Hungary and Romania are used for vine farming. Absence of urban and agricultural pressures may result in opportunities for developing semi-natural areas.

In the southern bio geographic regions climate change influences the conditions of agriculture dramatically. Desertification in the Mediterranean region may marginalise agriculture. Irrigation increases production costs and land abandonment induces further desertification and probably ecological degradation and salinisation. Enhanced erosion may influence the risk of flooding in river valleys and along the coast. The Mediterranean and the Alpine region may have in common that the specialised production of regional tradition related agricultural products may be the basis of innovations. Exportation of high quality products and expansion of nature may be the result.

### **Threats to nature**

The Atlantic region shows a strong contrast with, for instance, the Boreal region. Here the largest cities of Europe are located, the coastal zone is heavily urbanised and the pentagon area covers a large part of this bio geographic region. The large cities as well as the coastal zone and the pentagon are extremely well accessible. The most important airports as well as harbours are located within this region. The largest proportion of Europe's economic activities is concentrated here.

Urbanisation in the Continental region is more widely spread. Most concentrations in larger cities are found along the rivers. The highly accessible Rhine Valley in particular shows a concentration of urbanised areas. Conditions for agriculture in the Continental region are generally good, but differ according to sub regions. Large plains and wide river valleys allow for intensive forms of crops.

Urbanisation in the Alpine regions is quite different; where development pressure occurs in relation to good accessibility (in the pentagon part of the Alps), urbanisation pressure is extremely high. In less accessible parts, the pressure is lower. One of the main components of the development pressure focussing on the valleys is the lack of buildable surface. Therefore, the contrast between built and non-built area is an important attractive characteristic of Alpine areas.

Urbanisation in the Pannonian region is spread out over the area in the lowland of the Danube valley. Urbanisation pressure is lower than in the

Atlantic region and population growth is around zero. Budapest is the centre of crossings with important highways and the river Danube. Further economic development in the corridor along the Danube from Belgrade to Budapest may be expected.

Urbanisation in the Macaronesian region is strongly related to the coastal zones where, near the beaches tourist facilities are concentrated.

In the Mediterranean region, urbanisation is influenced by the attractive climate, attractive landscape and the quality of existing cities. This area, being the world's most important tourism destination, offers attractive circumstances to settle for residential uses as well as for economic activities which are not strongly related to other locational conditions. The actual process of urbanisation takes place here at the coastal zone and around the larger cities.

The category potential MEGA's as distinguished by the ESPON project 1.1.1, is most likely to undergo development and will spatially expand. Pressure between these growing potential MEGA's and natural heritage is expected to be largest in regions that have a high percentage of natural and forest areas. This mainly concerns Scottish, Spanish and Alpine regions. It is in these locations that special attention should be paid to not only promoting the development of the potential MEGA's that are present, but also to the effect this development might have on the surrounding semi-natural and forest areas.

## **1.7 Meso level**

### **Nature and agriculture**

In spite of the decrease in agricultural land, the productivity index (net PIN) established by FAO has reflected an increase in productivity, a doubling in general, in the period 1961 to 1991. There is a marked downturn in productivity during the period 1991-2001, certainly attributable to the agri-environmental reform of the CAP in 1992 in the EU, and the transition from a socialist to a market economy in Eastern Europe.

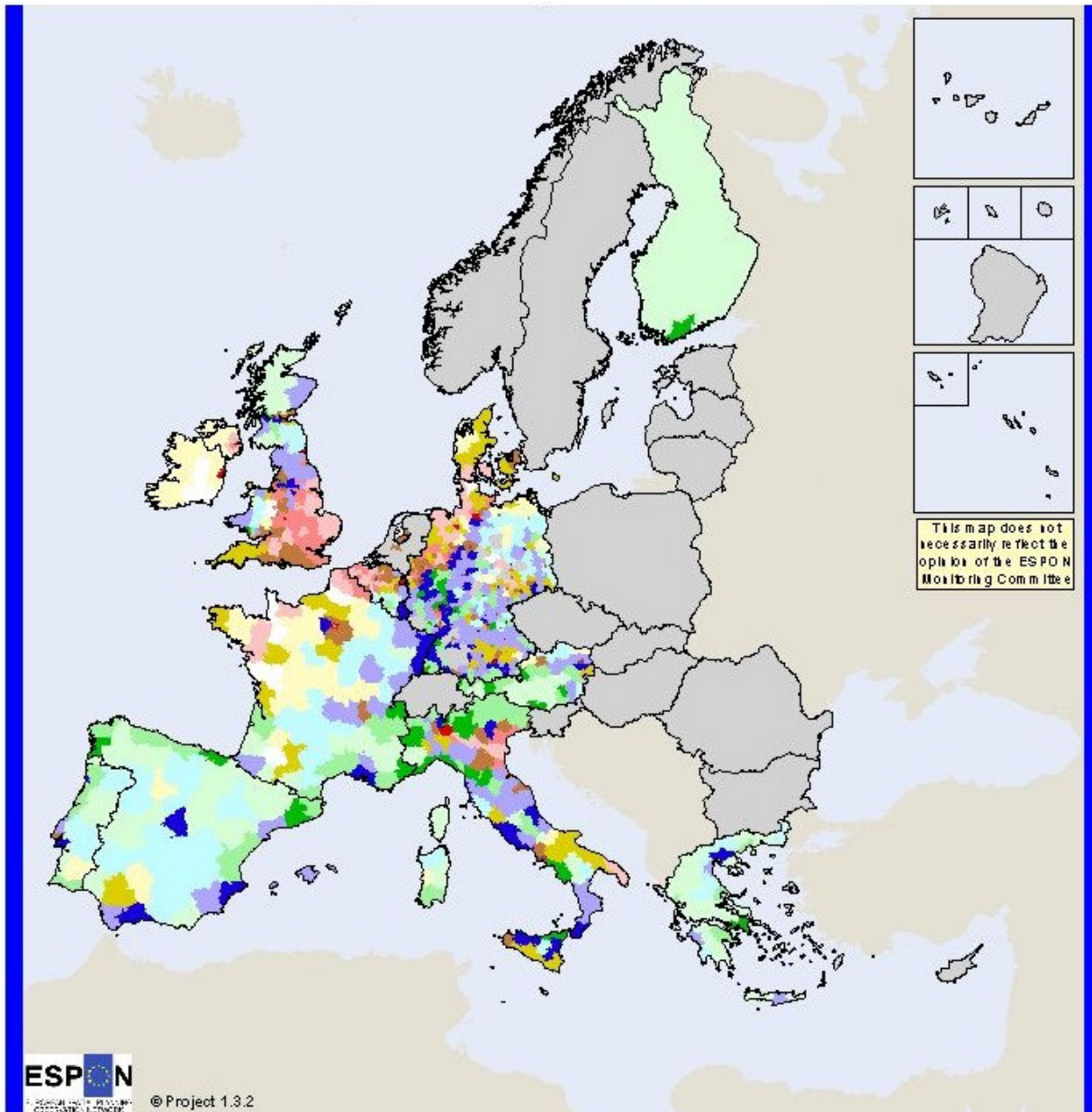
It is interesting to observe how this intensification of agriculture is distributed according to geography, which is far from equal. It is noteworthy that, in terms of European diversity, the southern countries of EU15, those most noted for their natural extent of species richness are probably also those that have suffered most from intensification during this period. For example, although Spain has witnessed a decrease of 10% in agricultural

land use, there has been a doubling of crop output and an increase of over 300% in that of livestock. The number of tractors has increased ten-fold, although starting from a very low level compared to northern European countries such as The Netherlands or the United Kingdom. The increase in fertilization has been 200%, but again, this use started from a low level. Nevertheless, the impact on biodiversity will have been significant, increasing the vulnerability of wildlife, polluting wetlands and producing large-scale monoculture in both agriculture and forestry mirroring the rest of Europe. A similar portrait can be made for Portugal and Greece. For these latter countries, however, attention should be brought to the increase in permanent crops, vineyards and olive groves, respectively. Agriculture has become progressively industrialised throughout Europe. The same could be said for forestry, considering the amount of planned forestry operations that can be detected in a number of countries, namely France, Italy, Hungary, The Netherlands, Norway, Poland, Portugal, Spain, Switzerland and the United Kingdom.

### **Nature and urban pressure**

In order to map the impact of socio-economic factors on the semi-natural area, the indicator of urban pressure is introduced. It combines four input indicators; population density, GDP 2000/area, road density and bed density, into a classification consisting of four classes. These classes include namely low-, medium-, high- and very high urban pressure.

**Map 2 Percentage semi-natural area compared to urban pressure**



		% Natural area			
		0-10 %	10-25 %	25-50 %	> 50 %
Urban pressure	low	11	21	31	41
	medium	12	22	32	42
	high	13	23	33	43
	very high	14	24	34	44
		no data			

© EuroGeographics Association for the administrative boundaries  
 Origin of data: EEA, Eurostat, IUCN  
 Source: ESPON Database

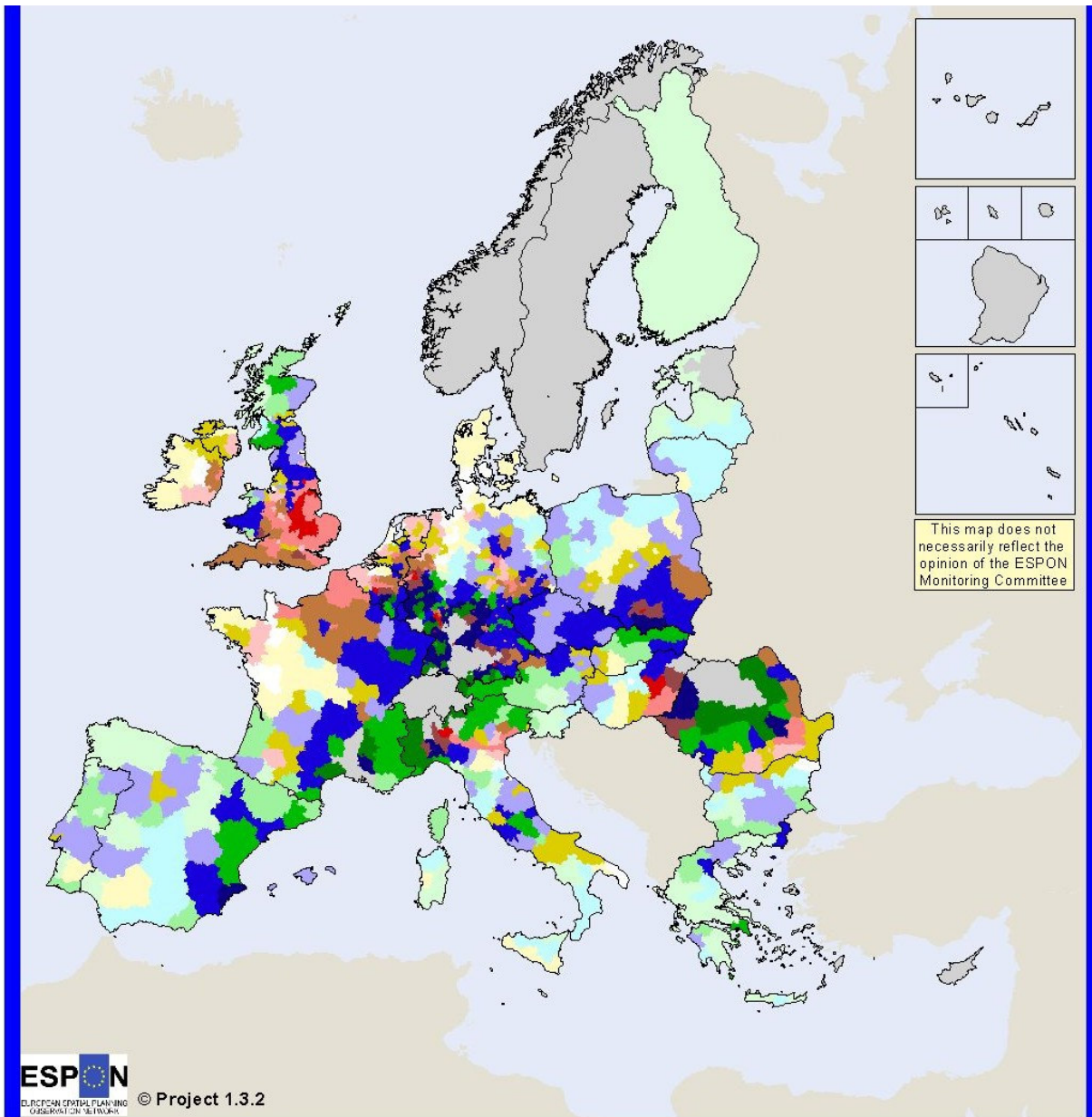
Map 2 illustrates urban pressure in relation to semi natural area land cover. The highest percentage of natural area is represented with the green colour, while the lowest coverage of natural area is represented by red. The tone of the colour gives the magnitude of urban pressure. For example the area dark red represents areas of low percentage of natural area and with high urban pressure. The light blue areas represent areas with relatively high percentage natural area cover, with minimum urban pressure.

Unfortunately the dataset is not complete for all countries, especially central European countries, mainly due to a lack of tourist data. Nevertheless, it can clearly be seen that most pressure exists in the Pentagon area and along coastal areas. The fact that relatively high percentages of natural area cover are combined with high urban pressures in for instance Greece, Portugal and Estonia is of great concern.

### **Nature and flood risks**

In the context of floods, as analysed in ESPON project 1.3.1, the concentration of urban activities as the location of MEGA's according the ESPON project 1.1.1. in riverine zones seems to require careful consideration. In NUTS3 areas of high flood occurrences, MEGA's are prone to relatively high risks. Map XX shows the flood risk versus the natural area land cover. The highest percentage of natural area is represented with the green colour, while the lowest coverage of natural area is represented by red. The tone of the colour gives the magnitude flood risk. For example the area dark red represents areas of low percentage of natural area, but with high flood risk. The light blue areas represent areas with relatively high percentage natural area cover, but with low flood risk.

**Map 3 Map x comparison of flood risk to the percentage semi-natural area.**



© EuroGeographics Association for the administrative boundaries  
Origin of data: ESPON project 1.3.1, EEA  
Source: ESPON Database



## Management

The following gives a summary of the questionnaire responses:

- The European territory contains considerable entities of natural heritage which combine rarity and high natural value judged by any standard.
- It is commonly agreed that there are ever increasing pressures from the combination of population change, increased GDP and their associated developmental consequences, infrastructure development as well as agriculture, tourism and recreation. Another important factor with detrimental effects for the natural heritage of Europe is the climatic changes of the last decades.
- Concerning the management of natural heritage, methodology tools and responsible agencies vary greatly.
- Certain countries with a long history in the management of natural heritage tend to have the edge on effectiveness.
- Inter-regional and inter-state cooperation has increased in recent years not only because the need for it is generally agreed but also because EU policies promote matters of development and the need for sustainable development. This need is actively supported both politically and financially. However a lot more has got to be done in this direction.
- For the accession countries of the present and recent past there appears to be a unique opportunity to benefit by means of aligning their practices as soon as possible with EU policies and guidelines as well as by the use of programme funds available through structural funds and sectoral programmes and/or the developing networks for cooperation in the fields of spatial planning and specific know how (ESDP, ESPON, etc.).
- There is still a lot to be desired with regard to public participation, enlightenment campaigns, the involvement of the private sector and NGOs and the devolution of the management of natural heritage at the local level.
- It has already been pointed out that the large number of differences concerning definitions, terminology, evaluation criteria, indicators, monitoring techniques and time aspects of data and information render a comparative analysis extremely difficult and at times risky.
- Furthermore on the basis of the ESDP, the objectives and policy options in the three areas of polycentric spatial planning, equality of access to infrastructure and knowledge and judicious management of natural and cultural heritage, allow a fresh step to be taken to enable spatial development to act as a frame of reference for implementation of the

Community Support Fund, management of the Structural Funds and promotion of Community Initiatives.

- After the year 2000, cohesion in the European space, with EU enlargement and a need for the formulation of a new structural policy after 2006, means that incorporation of the spatial dimension will play a crucial role in the shaping of European sectoral policies.

## **1.8 Micro level**

Considering the seven case study areas that have been selected partly for their diversity, allows for some conclusions. Acknowledging that representiveness was not a criterion for their selection, the information gathered in the case studies, anyhow refine the knowledge in an illustrative but anecdotic way.

- The case studies demonstrate the large variety of valued natural heritage, forces that threaten them, social-economic and cultural contexts in which the management has to be carried out and the variety of legal possibilities.
- The small number of case studies does not allow for an analysis on the effectiveness relating management aspects and the characteristics of the context.
- The importance of local mixes of relevant aspects requires regional specific approaches of the management of the natural heritage. Within given legislative frameworks, all relevant socio-economic and ecologic/environmental aspects should be balanced on the regional level, when preparing decisions on future developments.
- The protective orientation of the management of the natural heritage, is in many cases extended to the regional cultural heritage.

The protective orientation of the management of the natural heritage does not include the application of nature as an asset for economic developments. The case studies demonstrate that the management of natural heritage has a "defensive" orientation. All case studies are examples of the profusion of legal measures protecting natural heritage and landscapes. In fact, this diversity of protection mechanisms could provide an interesting source in building a "common culture" of natural heritage management, foundation for more harmonisation in natural heritage management, working towards management of natural heritage at EU scale. Today, the "common culture" seems the compliance to the EU regulations for EU members.

## **1.9 Nature as an asset for economic development**

The Lisbon and Göteborg strategies to make Europe the most competitive region for (sustainable) knowledge based economic activities promote economic innovation. Innovation not only includes activities with regard to high tech research and development but also the other economic sectors like agriculture and tourism. Tourism has developed into the most important economic activity of Europe. The activities related to leisure, travelling and long stay facilities are manifold and offering large quantities of jobs. Innovations in that sector consist of developing new activities, new experiences, new sites and new ways to enjoy them. The culture of experience and excitement is of growing importance.

Some types of innovative developments may be related to urban centres, some others can be very well related to more remote places of contemplation. Those may be located in the Mediterranean region on the islands or land inward in the mountainous regions. Also the Alpine region offers those attractive locations to settle. The objective of polycentricity of the ESDP argues for the promotion of those activities in regions outside the pentagon.

The question whether differences in urbanisation in the various bio geographic regions must be diagnosed as imbalances or disparities, can only be addressed if it is agreed what a balanced urban development would include. The example of the urbanisation in the Boreal region shows that low density urbanisation within a dominating natural environment are characteristics of the most innovative regions of Europe and part of the most creative societies. Therefore it cannot generally be argued that low density urbanisation in a dominating natural environment is a weakness of a region for economic development. The Swedish and Finnish regions are most promising for further development. It might be assumed that these spatial circumstances are at least not a barrier for the vitality of the regions.

The Mediterranean region is the world most important tourist destination. Its natural and cultural attractiveness are unequalled. These qualities also apply for attracting other economic activities since economy tends to be increasingly foot-loose. The coastal zone of the Mediterranean region may in some places be overloaded. Responsible planning must spread activities more inland, towards areas where agricultural abandonment occurs, as well as on the islands.

Some specific types of service economy may locate in those somewhat more remote areas: institutions for research and development, for education and permanent learning, cultural development, conferencing, that are not necessarily located in coastal zones or highly accessible locations.

In the Alpine region the good life may be connected some more with sportive and physical activities. But also research institutes related to food processing, conference centres of technological innovations may find the right spot in the mountains, a little bit aside of high densities.

**Table 2 Findings of the analysis in DPSIR terms**

	<b>Macro: EU</b>	<b>Meso: national</b>	<b>Micro: regional/local</b>
Driving forces and pressures <b>D&amp;P</b>			
Agriculture	Policy stimulates agricultural production. This result in large land take due to intensive agriculture and decreased semi-natural area and biodiversity. The Pillar 2 of CAP reform allows for rural development, including the development of natural heritage. This change in the CAP policy can perhaps stop or turn the negative process of the natural heritage	International policy influences the national policy	Influenced by international and national agricultural policies
Socio-economic and territorial development	No European spatial planning, except the first attempt of the ESDP	Few coherent national spatial plans	Concentrated in local and regional initiatives
Infrastructure	Wide spread accessibility as a prerequisite for economic development resulting in ongoing fragmentation	Facilitates mobility by following the urbanisation and enhancing further suburbanisation in national policies	Facilitates local accessibility. Tendency to improve accessibility regardless of natural values as silence and rest
States <b>S</b>	Natural heritage consists of remains of nature.		
Impacts <b>I</b>	During ages a decrease of species is taken place. The natural heritage is also very fragmented.		
Policy Response <b>R</b>	Environmental legislation safeguarding quality. Birds, Habitat directive, Natura 2000, ESDP aiming all at harmonisation and territorial coherence. Integration with spatial planning is too new to show results of these policies	Few integral national plans. Plans can stimulate coherence, territorial balance and harmonious development	Growing attention for integrated regional development strategies. Plans can facilitate initiative and stimulate coherence, territorial balance and harmonious development. Pro active planning instead of ad hoc decisions

## 1.10 Recommended policy responses

- **Balanced development in corridors.**  
In order to minimise conflicts and maximise synergy between natural heritage and economic activities, it is recommended to concentrate the polycentric urban development within the main corridors of infrastructure that will act as development axes. This type of spatial development distribute the development pressure away from the pentagon as is envisaged in the ESDP and at the same time it concentrates developments as nodes in linear zones.
- **Polycentric development in nodes**  
If these nodes are concentrated near the highway accesses and the high speed railway station, unnecessary fragmented (sub) urbanisation throughout the landscape as well as unnecessary mobility are avoided. These locations combine good accessibility with the probability to be well embedded in the landscape, thus supporting the synergy between economic activities and the natural (and cultural) heritage.
- **Selective accessibility**  
The decisions to locate access roads to new infrastructure (as part of the TEN or TINA) are to be balanced between improving the accessibility and competitiveness of existing towns and the strategic value for the ecological network of natural areas that may come under pressure of urbanisation.
- **Priority to old industrial areas**  
Although the community environmental policy aims at a general healthy quality of the environment, project to reconstruct and sanitise polluted old industrial areas should get priority because improved environmental conditions and images of those sites, that are often quite centrally located, support the economic revitalisation of the towns as well as the re-use of concentrated infrastructure. This minimises unnecessary land take for new developments.
- **Elaboration of ESDP**  
In order to better co-ordinate the community environmental policy with spatial policies, spatial policies on the European level, addressing the ecological (and hydrological) network as well as the urban (and infrastructure) network, should be integrated.

The European Spatial Development Strategy as has been adopted in 1999 is within this context a very relevant start. Actual developments like the accession of new member states, experiences with transborder co-operation and other Interreg results as well as the achievements of ESPON projects, demand for elaboration and revision of the ESDP. Regular revision will involve more national and regional representatives as well as other experts in the process and enhance the understanding for future oriented developments. The effect of involvement in the process as well as of the resulting documents will, as already could be noticed after the first ESDP attempt, be a more common orientation on Europe's future. Such an integrative approach will also improve the territorial orientation of the community environmental policy.

- **International co-ordination**  
Territorial cohesion within the Community will be strongly supported by the elaboration and implementation of ecologic and urban cross border networks. Especially the connections between national networks require co-ordination with national or regional spatial policies.
- **Vertical integration**  
It should be acknowledged that the decisions about areas to be included within the ecologic or urban networks must be taken at the regional level. The Commission should indicate where strategic connections between elements of the networks are desired. However, the actual decisions about designating specific areas within those networks should preferably be taken at the regional level, balancing all relevant regional interests.
- **Regional development vision**  
Decisions about designating specific areas at the regional scale should be taken on a basis of a common vision on the regions future development. Processes to prepare regional development visions or plans are helpful to identify the regional strengths and weaknesses and its threats and opportunities. Specific cultural and natural qualities must be identified in order to increase the awareness of potentials for (innovative) economic activities. Such processes will result in common recognition of the regions competitive edges which helps to specialise its spatial development in a more focussed way.
- **Regional variety as an asset**  
Such spatial development visions or plans result in differentiation between regions with regard to their cultural and natural characteristics. Every town or region contains its own specific mix of cultural and natural elements. The more specific these aspects are formulated, the closer fitting locational conditions for specific functions are offered. In that way

spatial variety is important for economic development and should be enhanced. Still, too often too general notions like "ITC, logistic, tourism" are regarded as base for economic development.

- Natural values as an asset

With regard to the natural heritage the fact that existing natural values are left-overs, remaining from century-long processes should be acknowledged. Natural values are a scarce resource that is to be increasingly appreciated. The importance for a locations image of a healthy, clean, quiet, undisturbed environment is expected to increase. Dedicated studies specifying this expectation should be carried out.

- Community Support

Regions organising integrative processes towards spatial development visions should be financially supported. Such processes, involving all relevant stakeholders will lead to a stronger common orientation on and support of future developments. They also may be helpful to discover the regions populations' creativity and to identify new innovative regions in the enlarged Europe.



## 2 Scientific summary

### 2.1 The scope

This project seeks for a diagnosis of the principal territorial trends of natural heritage at the EU scale, including a cartographic picture of the spatial and historic trends. Based on this diagnosis and further analyses, a number of territorial indicators and typologies are given that should support the process of prioritizing for a balanced and polycentric enlarged European territory.

The central question is: **What is the influence of the management of natural heritage on spatial development?** This question must be addressed on the European scale and a system of monitoring data must be developed for the whole area. This project is a first elaboration on this scale for this subject.

The central question can be described in terms of strands: management, natural heritage and spatial development or territorial trends. The interrelationships between the strands are central.

- **Natural heritage.** Natural heritage consists of many different elements and includes both the ordinary (or 'everyday') countryside and 'green' in cities and the outstanding or exceptional elements such as natural areas, areas with natural value, ecological networks, and biodiversity. Heritage does imply a certain qualitative assessment, but it does not only concern the best.
- **Territorial trends.** Territorial trends occur in many different ways. Urbanisation is a very obvious phenomenon of spatial development, but also slower incremental processes of sub-urbanisation are of great importance within the scope of this project. Many recreational and other economically induced land uses also gradually increase their territories. Agricultural intensification is another form of spatial development. Alongside these developments, which are leading to higher densities and increases in the paved area, are infrastructure developments such as new roads and railways, which are cutting through territorial entities and causing fragmentation of natural areas.
- **Management.** Management of the natural areas takes place at a range of levels; from day-to-day management up to higher level management where decisions are taken about the acquisition of new land in order to

extend the areas designated for their natural heritage value. Here an important relationship exists with the possibilities of spatial planning systems of the European countries and their legal possibilities for protecting the natural heritage.

## **2.2 Theory and methodology**

With regard to causal relations, spatial development processes can be expressed in terms of the DPSIR model (Driving Forces, Pressures, States, Impacts and Responses). The DPSIR framework shows a chain of causes and effects from Driving forces (activities) to Pressures, to changes on the State of the environment, to Impacts and Responses. DPSIR is based on the assumption that economic activities and society's behaviour affect environmental quality. The relationships between these phenomena can be complex. DPSIR highlights the connection between the causes of environmental problems, their impacts and society's response to them, in an integrated way.

The following methods are used for analyses and interpretation:

- Secondary source analyses, consisting of policy documents, reports of scientific research and existing statistical information. A significant quantity of documents on social, demographic and economic trends, agriculture, infrastructure, nature and landscape provides a useful information source;
- Indicators which represent the reality. Indicators are developed in chapters 4 and 5. These indicators lay a foundation for section II, the analysis;
- Correlations, Geographic Information System (GIS) analyses and map overlays;
- Time series. The analyses of long term and recent trends and the predictions of future circumstances which can be achieved through extrapolation of past trends, within the constraints of the data;
- Questionnaires on national policies relevant for better understanding of findings of the analysis is used;
- Analyses of case studies at the local level within variable bio geographical areas illustrating the local processes and trends for different locations.

The following levels are used in this project:

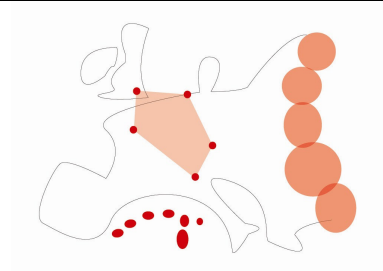

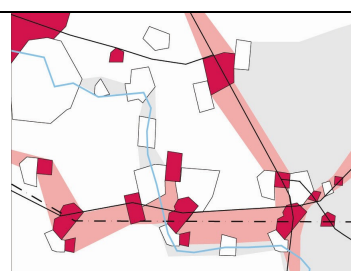

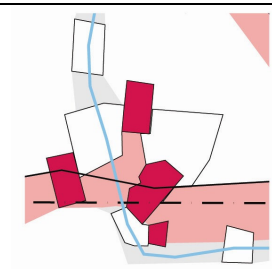
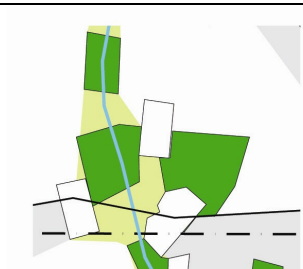
**Table 3 Different levels used**

<b>Levels</b>	<b>Represented by</b>
Macro	Bio geographic regions and coastal zones, administrative categories, such as EU15, N10, EU25, N12, EU27, EU27+2 and Pentagon
Meso	Questionnaire responses, NUTS0 and NUTS3
Micro	Case studies, NUTS3

## 2.3 Indicators

<b>Aspect</b>	<b>Criteria</b>	<b>Source</b>	<b>Comment</b>
Agricultural area	Size of agricultural area	CORINE 1990, FAO	CORINE Land Cover 2000 is not available for pan-Europe (only recently available for Ireland, Luxembourg, The Netherlands, Latvia, Estonia, Slovenia and Malta)
Population	Population density	EUROSTAT	Measure for population pressure
	Population change	EUROSTAT	Measure for changing pressure due to population density
Economic aspects	GDP per area	EUROSTAT	Measure for economic wealth
	GDP change	EUROSTAT	Measure for economic development
	Innovation	EC	Measure for potential economic development
Tourism	Bed density	EUROSTAT	Measure for pressure due to tourism
	Change nr of Beds	EUROSTAT	Measure for changing pressure due to tourism
Infrastructure	Road density	GISCO	Measure for fragmentation and barriers
Urban pressure	Population density, GDP per area, bed density, road density	EUROSTAT, GISCO	Qualitative measure for urbanisation
MEGA's	Potential MEGA's	ESPON 1.1.1	Location for potential development and pressure
Built up	Percentage cover	CORINE 1990	Measure for urbanisation
Hazard	Flood risk	ESPON 1.3.1	
Semi-natural area	Size of the semi-natural area	CORINE land cover 1990	CORINE Land Cover 2000 is not available for pan-Europe (only recently available for Ireland, Luxembourg, The Netherlands, Latvia, Estonia, Slovenia and Malta)
Fragmentation of nature	Fragmentation index		for NUTS3
IUCN protected areas	On list of protected area	List IUCN-WCPA and the UNEP - WCMC, 2003	Management categories I-IV and V-VI

## 2.4 Regional typology

	<b>Socio / econ. / urban</b>	<b>Nature / environ./cultural</b>
<b>MACRO</b>	Development pressure - Pentagon - Outside pentagon - In CEE - Island in periphery	Bio geographic region - Boreal - Continental - Atlantic - Alpine - Mediterranean - Pannonian - Macaronesian
	 <ul style="list-style-type: none"> <li><span style="color: red;">■</span> CEE countries</li> <li><span style="color: orange;">■</span> Pentagon</li> <li><span style="color: red;">●</span> Islands</li> </ul>	 <p>Biogeographic regions of Europe</p>
<b>MESO</b>	Urban network - In development axis - Outside development axis	Ecological network - In Natura 2000 / Emerald network - Outside ecological network (- Agricultural intensification) (- Agricultural extensification / abandonment)
	 <ul style="list-style-type: none"> <li><span style="color: red;">■</span> Town / City</li> <li><span style="color: orange;">■</span> Development Corridor</li> <li><span style="color: blue;">■</span> river</li> </ul>	 <ul style="list-style-type: none"> <li><span style="color: green;">■</span> (protected) Natural area</li> <li><span style="color: lightgreen;">■</span> National Park</li> <li><span style="color: yellowgreen;">■</span> Nature 2000 Corridor</li> <li><span style="color: blue;">■</span> river</li> </ul>
<b>MICRO</b>	Site related to urban area - In or close to MEGA - In or close to FUA - Rural area outside FUA - Old industrial site	Site related to nature / environment - (Protected) natural area or cultural landscape - Open space with low or mediocre natural value
	 <ul style="list-style-type: none"> <li><span style="color: red;">■</span> Town / City</li> <li><span style="color: orange;">■</span> Development Corridor</li> <li><span style="color: blue;">■</span> river</li> </ul>	 <ul style="list-style-type: none"> <li><span style="color: green;">■</span> (protected) Natural area</li> <li><span style="color: yellowgreen;">■</span> Nature 2000 Corridor</li> <li><span style="color: blue;">■</span> river</li> </ul>



### **3 Report on networking**

Like in many other TPG's, the tight time schedule in combination with the difficulties experienced with the availability of data, resulted in a situation in which main efforts were concentrated on the own subject. The work should first have a certain level of elaboration, before interrelations with other subjects could be focussed on.

Nevertheless contact with other TPG's works has been developed and was experienced as useful.

First we participated with 2 team members in the meetings organised for the lead partners, where progress on each of the studies was presented. These three meetings in Brussels (in February 2003, June 2003 and February 2004) were especially useful since the confrontation with the representatives of DG Regio lead to relevant discussions.

Secondly we participated in the ESPON conferences in Crete (May 2003) with two team members and in Lillehammer (May 2004) with two team members. Here also the exchange of information coming from the monitoring committee, from the Co-ordinating Unit and from the various projects was useful.

Especially the more focussed meetings about specific subjects in the work shops in Lillehammer enhanced the coherence between the different projects.

Our project about the management of the natural heritage is more specifically related to the subjects of ESPON projects about poly centricity (project 1.1.1), Hazards (1.3.1), Transport (2.1.1), Agriculture (2.1.3) and on Urban rural relations (project 1.1.2).

We had some personal discussions with representatives of those subjects, but mainly information was gathered by consulting the available reports of the other TPG's.

Information about polycentricity has been applied to discuss the confrontation of the natural-ecological network with the proposed system of MEGA's of which the category, potential MEGA's is especially relevant when focussing on the future developments.

Information from the Hazards project 1.3.1 was relevant, particularly with regard to river floodings. Acknowledging that regions that are flood prone, may have priority when actions with regard to the Water Framework Directive are planned, potential new natural areas may be identified in those

regions. The project on transport and the related infrastructure provided information which is applied to consider fragmentation of the natural heritage by road infrastructure.

The information provided by the ESPON project on agriculture and on urban rural relations ( projects 2.1.3 and 1.1.2) did not lead to explicit applications within our project.

The main reason being in the different focus of these two other projects. The effects of Community Agricultural Policy could not really be translated to territorial trends, although intensification and extensification of agriculture is found to be a crucial driver for territorial trends of the natural heritage. The interesting categorisation of the Urban-rural relations could not really be translated to the higher spatial scales, where territorial trends of the natural heritage are considered.



## **4 Short report on further research issues and data gaps to overcome**

### **4.1 Further research issues**

The presented maps consist of overlays and analyses. The overlay maps are used to support the line of reasoning of the report and to illustrate specific aspects. The analyses maps presented in chapter 8 describe the meso level and portray combinations of different data sets, in order to deduce spatial patterns. The way these maps should be interpreted is described in chapter 2.

Unfortunately some of the data is not complete. Based on expert judgement, these data gaps have been completed as much as possible. The expert judgement is not reflected in the maps and tables, but is used for the descriptions and interpretations. Also trend analyse has not been included, due to missing data. Although for some countries the new CORINE dataset is currently becoming available, a complete dataset would be necessary for trend analyses. Given the time span of the current project no time was left to carry such an analyses, also for part of the dataset. After comparison of both data sets, the observed changes in land cover will be an important indicator to relate the described threats to the process of changing semi-natural land cover and associated fragmentation. Such trend analyses can also be used to relate protection to changing land cover. The assumed process that fragmentation leads to further protection can possibly be verified. For future monitoring at the different levels, the used indicators should be completed and further improved upon. Trend analyses of statistical indicators would also be very useful to compare to changing land cover. It is expected that changes of spatial patterns related to the semi-natural area resulting from pressures can only be observed after long periods of time. Ideally, data since the 1950s should be available to explain certain trends in semi-natural area cover.

## 4.2 Missing data

These are:

- complete CORINE 2000 dataset;
- statistical data, such as bed density data complete for all EU27 and preferably since 1950;
- long term trends for indicators developed; and
- PEEN; ecological network for Central Europe.

## 5 Evaluative reflections

Hereunder a reflection is presented on the results of the first, second and third interim reports in comparison with the expectations as formulated in the terms of reference and repeated in the addendum to the contract of ESPON project 1.3.2.

1. The project is the first elaboration on this scale of territorial trends of the natural heritage as well as the management aspects of the natural heritage. Taking into account the broad objective, the large number of countries and the lack of data together with the tight time schedule and the limited budget, a high tension between high expectations and limited possibilities must be noticed. In retrospect the terms of reference may be considered to be rather optimistic, especially in terms of the availability of data.
2. This especially applies for the fact that the central issue of territorial trends to be diagnosed requires territorial data in time ranges. Data allowing analysing territorial trends for only 6 (small) countries were made available by CORINE 2000. CORINE 2000 applies a different land cover category than the previous version. Most assumed starting points of the project: indicators developed by EEA, Eurostat and JRC are not yet ready.
3. The required list of indicators of land use, land cover, landscapes was supposed to indicate dominant pressures and changes within and around protected areas and urban areas. Without consistent time ranges of land cover and without accepted definitions (landscape typology) essential data for analyses are still missing. The land cover changes and pressures are therefore described in the best possible way in general terms.
4. For the environmental quality it should be acknowledged that this project is not meant to be a study on the European environment. The EEA's Third Assessment Report of the European Environment, is used as a basis document.  
The TPG felt it to be too large and needed to be limited by critical

considerations of the relevance with regard to essential hypothesis.

5. Seven case studies have been carried out largely. Especially the questions focussing on creative management and experiences with nature as an asset will receive stronger attention. The fact that the case studies are carried out focussing on the management of natural areas created problems in answering questions about the role of natural heritage for more general spatial (and economic) developments.

# Table of contents

	page
Foreword	
Table of contents .....	1
Figures .....	5
Maps .....	6
Tables .....	7
<b>1 Introduction .....</b>	<b>9</b>
1.1 Background.....	9
1.2 Objectives and aims.....	10
1.3 Nature, territory and management.....	12
1.3.1 Natural heritage .....	12
1.3.2 Territorial trends.....	13
1.3.3 Management .....	13
1.4 Reading guide .....	13
<b>Section I: Strands .....</b>	<b>15</b>
<b>2 Methodology .....</b>	<b>17</b>
2.1 Introduction.....	17
2.2 Complex processes .....	17
2.3 Theoretical model: DPSIR .....	18
2.4 Methods .....	21
2.4.1 Secondary sources analyses.....	22
2.4.2 Indicators .....	22
2.4.3 GIS analyses and map overlays.....	22
2.4.4 Time series and trend extrapolation .....	22
2.4.5 Management questionnaire .....	23
2.4.6 Case studies .....	24
2.5 Scale levels.....	25
2.5.1 Macro-level .....	25
2.5.2 Meso level .....	30
2.5.3 Micro level .....	31
2.6 Resume .....	32
<b>3 Physical structure.....</b>	<b>35</b>
3.1 Introduction.....	35
3.2 Physical diversity .....	35
3.3 Geo morphological features and biodiversity .....	38
3.4 Hydrological system .....	40
3.5 Conclusions.....	41

<b>4</b>	<b>Social-economic and territorial trends .....</b>	<b>43</b>
4.1	Introduction.....	43
4.2	Past evolution: long-term .....	43
4.3	Current situation .....	47
4.4	Agriculture and forestry .....	53
4.4.1	Intensification and extensification of agricultural land use .....	53
4.4.2	The abandonment of agricultural land .....	55
4.4.3	Forestry .....	57
4.4.4	Strategy and management measures related to agriculture .....	58
4.4.5	Indicator .....	59
4.5	Urbanisation .....	59
4.5.1	Population .....	60
4.5.2	Economic aspects .....	65
4.5.3	Tourism .....	69
4.5.4	Infrastructure .....	72
4.5.5	Functional nodes, MEGA's en FUA's.....	74
4.5.6	Indicators.....	76
4.6	Environment and climate change.....	79
4.6.1	Influences on the environment.....	79
4.6.2	Water .....	82
4.6.3	Indicator .....	84
4.7	Conclusions and discussion .....	84
<b>5</b>	<b>Natural heritage .....</b>	<b>86</b>
5.1	Introduction.....	86
5.2	Semi-natural areas.....	86
5.3	Species diversity and species richness .....	90
5.4	Landscapes.....	94
5.5	Fragmentation .....	96
5.6	Conclusions and discussion .....	100
5.7	Indicators for analysis.....	100
<b>6</b>	<b>Management.....</b>	<b>103</b>
6.1	Justification of protection .....	103
6.2	Key policies on nature.....	105
6.3	Other EU policies.....	106
6.3.1	Water Framework Directive (Directive 2000/60/EC).....	106
6.3.2	Environmentally Sensitive Areas.....	107
6.4	Protection of nature.....	108
6.4.1	IUCN Protected Areas List.....	108
6.4.2	Ramsar sites.....	112
6.4.3	Natura 2000 .....	112
6.5	Policy shift.....	117
6.6	Designated semi-natural areas and.....	119
6.7	ESDP .....	121
6.7.1	Natural heritage and polycentricity .....	123
6.7.2	Natural heritage and balanced competitive development .....	123
6.7.3	Natural heritage and sustainable development .....	124
6.8	EU Structural and Cohesion Funds.....	126
6.9	Third report on economic and social cohesion .....	126
6.10	Other policies and instruments.....	127
6.11	Indicator .....	128

<b>Section II: Analysis.....</b>	<b>131</b>
<b>7 The macro level .....</b>	<b>133</b>
7.1 Introduction .....	133
7.2 Nature and agriculture .....	133
7.2.1 Land cover.....	133
7.2.2 Protected semi-natural areas and agriculture .....	138
7.2.3 Nature and agricultural developments .....	139
7.2.4 Fragmentation related to agriculture .....	144
7.2.5 Potentials for nature.....	146
7.3 Nature and urbanisation .....	147
7.3.1 Nature and population change.....	147
7.3.2 Differentiated urbanisation in the bio geographic regions .....	148
7.3.3 Protected semi-natural areas and urbanisation .....	153
7.3.4 Threats to nature.....	154
7.3.5 Future urbanisation.....	155
7.4 Environment and climate change .....	157
7.5 Conclusions.....	158
7.5.1 Spatial patterns.....	158
7.5.2 Management.....	159
7.5.3 ESPON monitoring system .....	160
<b>8 The meso level.....</b>	<b>161</b>
8.1 Introduction .....	161
8.2 Agriculture .....	161
8.3 Urbanisation .....	164
8.3.1 Urban pressure.....	164
8.3.2 Built-up .....	167
8.3.3 Population .....	169
8.3.4 GDP .....	171
8.3.5 Tourism.....	175
8.3.6 Infrastructure.....	178
8.4 Water.....	183
8.5 Legislative framework & management of natural heritage applied by national governments .....	187
8.6 Conclusions.....	198
8.6.1 Spatial patterns.....	198
8.6.2 Management.....	199
8.6.3 Monitoring .....	201

<b>9</b>	<b>The micro level.....</b>	<b>203</b>
9.1	Introduction.....	203
9.2	Territorial diversity .....	203
9.3	DPSIR in case studies .....	206
9.3.1	Borsodi Mezőség area .....	206
9.3.2	The Vallombrosa Forest.....	207
9.3.3	The Ljubljana marshland .....	208
9.3.4	Thames basin potential Special Protected area .....	210
9.3.5	The North Pas de Calais Region .....	214
9.3.6	Lanzarote island .....	217
9.3.7	The Rondane region.....	219
9.4	Findings per case study .....	222
9.5	Findings per topic.....	223
9.5.1	Agriculture .....	223
9.5.2	Urbanisation .....	224
9.6	Nature: an asset for development .....	226
9.7	Conclusions .....	227
9.7.1	Spatial patterns .....	227
9.7.2	Management.....	228
9.7.3	Monitoring .....	229
<b>10</b>	<b>Nature as an asset for economic development .....</b>	<b>231</b>
10.1	Introduction.....	231
10.2	Economic values of landscapes.....	232
10.3	Socio economic benefits of Natura 2000 .....	233
10.4	American experiences .....	234
10.5	Innovations and location .....	236
10.6	Limitations to nature as an asset.....	239
10.7	Conclusions .....	240
 <b>Section III: Recommendations and conclusions .....</b>		<b>240</b>
<b>11</b>	<b>Recommendations.....</b>	<b>242</b>
11.1	Introduction.....	242
11.2	Integrating natural heritage and spatial planning.....	244
11.3	General recommendations .....	247
11.4	Recommendations on management .....	248
11.5	Recommendations, macro level.....	249
11.6	Recommendations, meso level .....	252
11.7	Recommendations, micro level.....	253
11.8	Recommended policy responses .....	256
<b>12</b>	<b>Regional typology.....</b>	<b>259</b>
12.1	Introduction.....	259
12.2	Role of typologies.....	260
12.3	Typologies.....	260



## Figures

Figure 1	An example of the process in DPSIR terms .....	19
Figure 2	Application of DPSIR, including management aspects.....	20
Figure 3	Illustrating the structure of the meso scale maps.....	31
Figure 4	Illustrating the legend in case of a qualitative indicator .....	31
Figure 5	DPSIR and agriculture .....	58
Figure 6	DPSIR and population .....	64
Figure 7	DPSIR and economy(GDP).....	69
Figure 8	DPSIR and tourism .....	72
Figure 9	DPSIR and infrastructure .....	74
Figure 10	Number of species in relationship to the evolution of agricultural practice .....	93
Figure 11	State of proposals for protected sites under the EC Habitats Directive (as of November 2003) .....	115
Figure 12	State of proposals of protected sites under the Habitats Directive by bio geographic region (as of November 2003) .....	116
Figure 13	Development in number of holdings and land use by agriculture, EU15.....	144
Figure 14	Regional typology at the macro level.....	159
Figure 15	Average size of non-fragmented land parcels .....	181
Figure 16	Diagram: Environmental and Spatial Planning legislative framework in relation to EU's framework .....	187
Figure 17	Diagram: Countries with central government responsibility for the protection of natural heritage .....	192
Figure 18	Diagram: Countries with decentralised responsibilities at regional or local levels for the protection of natural heritage .....	194
Figure 19	Regional typology at the meso level.....	199
Figure 20	Regional typology at the micro scale .....	228
Figure 21	Regional typologies.....	264

# Maps

	<b>Page</b>
Map 1	Bio geographical regions with the most important threats .....27
Map 2	Topography of Europe.....36
Map 3	Potential natural vegetation of Europe .....38
Map 4	Simplified European hydrological system.....41
Map 5	Percentage built-up area for NUTS3.....50
Map 6	Percentage semi-natural areas for NUTS3 .....51
Map 7	Average size of holding in ESU for 1997 .....56
Map 8	Population density for NUTS3.....62
Map 9	Population changes between 1995 and 2000 for NUTS3 .....63
Map 10	Innovation index .....68
Map 11	Fragmentation index for NUTS3 .....98
Map 12	Fragmentation in land cover of Vlaanderen (Belgium) and the south part of The Netherlands .....99
Map 13	Natura 2000 network..... 114
Map 14	Year of designation..... 120
Map 15	CORINE land cover and the bio geographical regions, including a 20 km coastal zone..... 135
Map 16	Land cover and the large designated areas (the size of the circles represents the actual surface areas of designated sites) ..... 140
Map 17	Livestock units per hectare of utilised agricultural area in the EU in 1995..... 142
Map 18	Location of MEGA's ..... 156
Map 19	Percentage semi-natural area compared to urban pressure ..... 165
Map 20	Percentage semi-natural area compared to population density (2000) ..... 170
Map 21	Percentage semi-natural area compared to changes in GDP (1995-2000)..... 173
Map 22	Percentage semi-natural area compared to GDP 2000 (relative to surface area) ..... 174
Map 23	Percentage semi-natural area compared to innovation ..... 176
Map 24	Semi-natural area compared to bed density ..... 177
Map 25	Partitioning of land by transport infrastructure..... 181
Map 26	Percentage semi-natural area related to road density ..... 182
Map 27	Semi-natural area, main hydrology and the MEGA's ..... 185
Map 28	Comparison of flood risk to the percentage semi natural area ..... 186
Map 29	Europe and location of the case studies..... 204
Map 30	Potentials and threats in EU based on networks ..... 246

# Tables

	<b>page</b>
Table 1	Different levels used ..... 25
Table 2	Short description of case studies ..... 32
Table 3	Land cover for each bio geographic region and 20 km coastal zone (in percentages) ..... 47
Table 4	Land cover per country (in percentages) ..... 52
Table 5	Land cover with natural values, for bio geographic regions (in percentages) ..... 88
Table 6	Semi-natural, agriculture, forest and water body land cover with natural value per country (in percentages) ..... 89
Table 7	Indicators ..... 102
Table 8	Conventions and legal instruments ..... 105
Table 9	Policies and Strategies ..... 106
Table 10	Funds ..... 106
Table 11	IUCN Management Categories ..... 110
Table 12	Total protected area (IUCN) for each country ..... 111
Table 13	Land cover at the macro level (in percentages) ..... 134
Table 14	IUCN categories of protection and agricultural land cover (in percentages) ..... 138
Table 15	Agricultural land cover in terms of extensive and intensive use (in percentages) ..... 141
Table 16	Population density, population change 1995-2000, and the percentage built-up land cover at the macro level ..... 147
Table 17	FAO increase/decrease agricultural area (in percentages) ..... 162
Table 18	Indicators for urban pressure at NUTS0 level ..... 167
Table 19	Protection compared to cover built up area (in percentages) ..... 168
Table 20	Legal Framework related to natural heritage ..... 190
Table 21	Centralised or Decentralised agencies responsible for protection and management of natural heritage ..... 193
Table 22	Diagram: Spatial Planning Systems and Protection of natural heritage ..... 197
Table 23	Bio geographic regions and landscapes for the case studies ..... 204
Table 24	Rural territories ..... 205
Table 25	Urban related territories ..... 205
Table 26	Ultra peripheral territories ..... 205
Table 27	The Euro-Creativity Index ..... 237
Table 28	Findings of the analysis in DPSIR terms ..... 243

# Table of contents

	page
Foreword	
Table of contents .....	1
Figures .....	5
Maps .....	6
Tables .....	7
<b>1 Introduction .....</b>	<b>9</b>
1.1 Background.....	9
1.2 Objectives and aims.....	10
1.3 Nature, territory and management.....	12
1.3.1 Natural heritage .....	12
1.3.2 Territorial trends.....	13
1.3.3 Management .....	13
1.4 Reading guide .....	13
<b>Section I: Strands .....</b>	<b>15</b>
<b>2 Methodology .....</b>	<b>17</b>
2.1 Introduction.....	17
2.2 Complex processes .....	17
2.3 Theoretical model: DPSIR .....	18
2.4 Methods .....	21
2.4.1 Secondary sources analyses.....	22
2.4.2 Indicators .....	22
2.4.3 GIS analyses and map overlays.....	22
2.4.4 Time series and trend extrapolation .....	22
2.4.5 Management questionnaire .....	23
2.4.6 Case studies .....	24
2.5 Scale levels.....	25
2.5.1 Macro-level .....	25
2.5.2 Meso level .....	30
2.5.3 Micro level .....	31
2.6 Resume .....	32
<b>3 Physical structure .....</b>	<b>35</b>
3.1 Introduction.....	35
3.2 Physical diversity .....	35
3.3 Geo morphological features and biodiversity .....	38
3.4 Hydrological system .....	40
3.5 Conclusions.....	41

<b>4</b>	<b>Social-economic and territorial trends .....</b>	<b>43</b>
4.1	Introduction.....	43
4.2	Past evolution: long-term .....	43
4.3	Current situation .....	47
4.4	Agriculture and forestry .....	53
4.4.1	Intensification and extensification of agricultural land use .....	53
4.4.2	The abandonment of agricultural land .....	55
4.4.3	Forestry .....	57
4.4.4	Strategy and management measures related to agriculture .....	58
4.4.5	Indicator .....	59
4.5	Urbanisation .....	59
4.5.1	Population .....	60
4.5.2	Economic aspects .....	65
4.5.3	Tourism .....	69
4.5.4	Infrastructure .....	72
4.5.5	Functional nodes, MEGA's en FUA's.....	74
4.5.6	Indicators.....	76
4.6	Environment and climate change.....	79
4.6.1	Influences on the environment.....	79
4.6.2	Water .....	82
4.6.3	Indicator .....	84
4.7	Conclusions and discussion .....	84
<b>5</b>	<b>Natural heritage .....</b>	<b>86</b>
5.1	Introduction.....	86
5.2	Semi-natural areas.....	86
5.3	Species diversity and species richness .....	90
5.4	Landscapes.....	94
5.5	Fragmentation .....	96
5.6	Conclusions and discussion .....	100
5.7	Indicators for analysis.....	100
<b>6</b>	<b>Management.....</b>	<b>103</b>
6.1	Justification of protection .....	103
6.2	Key policies on nature.....	105
6.3	Other EU policies.....	106
6.3.1	Water Framework Directive (Directive 2000/60/EC).....	106
6.3.2	Environmentally Sensitive Areas.....	107
6.4	Protection of nature.....	108
6.4.1	IUCN Protected Areas List.....	108
6.4.2	Ramsar sites.....	112
6.4.3	Natura 2000 .....	112
6.5	Policy shift.....	117
6.6	Designated semi-natural areas and.....	119
6.7	ESDP .....	121
6.7.1	Natural heritage and polycentricity .....	123
6.7.2	Natural heritage and balanced competitive development .....	123
6.7.3	Natural heritage and sustainable development .....	124
6.8	EU Structural and Cohesion Funds.....	126
6.9	Third report on economic and social cohesion .....	126
6.10	Other policies and instruments.....	127
6.11	Indicator .....	128

<b>Section II: Analysis</b> .....	<b>131</b>
<b>7 The macro level</b> .....	<b>133</b>
7.1 Introduction .....	133
7.2 Nature and agriculture .....	133
7.2.1 Land cover.....	133
7.2.2 Protected semi-natural areas and agriculture .....	138
7.2.3 Nature and agricultural developments .....	139
7.2.4 Fragmentation related to agriculture .....	144
7.2.5 Potentials for nature.....	146
7.3 Nature and urbanisation .....	147
7.3.1 Nature and population change.....	147
7.3.2 Differentiated urbanisation in the bio geographic regions .....	148
7.3.3 Protected semi-natural areas and urbanisation .....	153
7.3.4 Threats to nature.....	154
7.3.5 Future urbanisation.....	155
7.4 Environment and climate change .....	157
7.5 Conclusions.....	158
7.5.1 Spatial patterns.....	158
7.5.2 Management.....	159
7.5.3 ESPON monitoring system .....	160
<b>8 The meso level</b> .....	<b>161</b>
8.1 Introduction .....	161
8.2 Agriculture .....	161
8.3 Urbanisation .....	164
8.3.1 Urban pressure.....	164
8.3.2 Built-up .....	167
8.3.3 Population .....	169
8.3.4 GDP .....	171
8.3.5 Tourism.....	175
8.3.6 Infrastructure.....	178
8.4 Water.....	183
8.5 Legislative framework & management of natural heritage applied by national governments .....	187
8.6 Conclusions.....	198
8.6.1 Spatial patterns.....	198
8.6.2 Management.....	199
8.6.3 Monitoring .....	201

<b>9</b>	<b>The micro level.....</b>	<b>203</b>
9.1	Introduction.....	203
9.2	Territorial diversity .....	203
9.3	DPSIR in case studies .....	206
9.3.1	Borsodi Mezőség area .....	206
9.3.2	The Vallombrosa Forest.....	207
9.3.3	The Ljubljana marshland .....	208
9.3.4	Thames basin potential Special Protected area .....	210
9.3.5	The North Pas de Calais Region .....	214
9.3.6	Lanzarote island .....	217
9.3.7	The Rondane region.....	219
9.4	Findings per case study .....	222
9.5	Findings per topic.....	223
9.5.1	Agriculture .....	223
9.5.2	Urbanisation .....	224
9.6	Nature: an asset for development .....	226
9.7	Conclusions .....	227
9.7.1	Spatial patterns .....	227
9.7.2	Management.....	228
9.7.3	Monitoring .....	229
<b>10</b>	<b>Nature as an asset for economic development .....</b>	<b>231</b>
10.1	Introduction.....	231
10.2	Economic values of landscapes.....	232
10.3	Socio economic benefits of Natura 2000 .....	233
10.4	American experiences .....	234
10.5	Innovations and location .....	236
10.6	Limitations to nature as an asset.....	239
10.7	Conclusions .....	240
 <b>Section III: Recommendations and conclusions .....</b>		<b>240</b>
<b>11</b>	<b>Recommendations.....</b>	<b>242</b>
11.1	Introduction.....	242
11.2	Integrating natural heritage and spatial planning.....	244
11.3	General recommendations .....	247
11.4	Recommendations on management .....	248
11.5	Recommendations, macro level.....	249
11.6	Recommendations, meso level .....	252
11.7	Recommendations, micro level.....	253
11.8	Recommended policy responses .....	256
<b>12</b>	<b>Regional typology.....</b>	<b>259</b>
12.1	Introduction.....	259
12.2	Role of typologies.....	260
12.3	Typologies.....	260

## Figures

Figure 1	An example of the process in DPSIR terms .....	19
Figure 2	Application of DPSIR, including management aspects.....	20
Figure 3	Illustrating the structure of the meso scale maps.....	31
Figure 4	Illustrating the legend in case of a qualitative indicator .....	31
Figure 5	DPSIR and agriculture .....	58
Figure 6	DPSIR and population .....	64
Figure 7	DPSIR and economy(GDP).....	69
Figure 8	DPSIR and tourism .....	72
Figure 9	DPSIR and infrastructure .....	74
Figure 10	Number of species in relationship to the evolution of agricultural practice .....	93
Figure 11	State of proposals for protected sites under the EC Habitats Directive (as of November 2003) .....	115
Figure 12	State of proposals of protected sites under the Habitats Directive by bio geographic region (as of November 2003) .....	116
Figure 13	Development in number of holdings and land use by agriculture, EU15.....	144
Figure 14	Regional typology at the macro level.....	159
Figure 15	Average size of non-fragmented land parcels .....	181
Figure 16	Diagram: Environmental and Spatial Planning legislative framework in relation to EU's framework .....	187
Figure 17	Diagram: Countries with central government responsibility for the protection of natural heritage .....	192
Figure 18	Diagram: Countries with decentralised responsibilities at regional or local levels for the protection of natural heritage .....	194
Figure 19	Regional typology at the meso level.....	199
Figure 20	Regional typology at the micro scale .....	228
Figure 21	Regional typologies.....	264



# Maps

	<b>Page</b>
Map 1	Bio geographical regions with the most important threats .....27
Map 2	Topography of Europe.....36
Map 3	Potential natural vegetation of Europe .....38
Map 4	Simplified European hydrological system.....41
Map 5	Percentage built-up area for NUTS3.....50
Map 6	Percentage semi-natural areas for NUTS3 .....51
Map 7	Average size of holding in ESU for 1997 .....56
Map 8	Population density for NUTS3.....62
Map 9	Population changes between 1995 and 2000 for NUTS3 .....63
Map 10	Innovation index .....68
Map 11	Fragmentation index for NUTS3 .....98
Map 12	Fragmentation in land cover of Vlaanderen (Belgium) and the south part of The Netherlands .....99
Map 13	Natura 2000 network..... 114
Map 14	Year of designation..... 120
Map 15	CORINE land cover and the bio geographical regions, including a 20 km coastal zone..... 135
Map 16	Land cover and the large designated areas (the size of the circles represents the actual surface areas of designated sites) ..... 140
Map 17	Livestock units per hectare of utilised agricultural area in the EU in 1995..... 142
Map 18	Location of MEGA's..... 156
Map 19	Percentage semi-natural area compared to urban pressure ..... 165
Map 20	Percentage semi-natural area compared to population density (2000) ..... 170
Map 21	Percentage semi-natural area compared to changes in GDP (1995-2000)..... 173
Map 22	Percentage semi-natural area compared to GDP 2000 (relative to surface area) ..... 174
Map 23	Percentage semi-natural area compared to innovation ..... 176
Map 24	Semi-natural area compared to bed density ..... 177
Map 25	Partitioning of land by transport infrastructure..... 181
Map 26	Percentage semi-natural area related to road density ..... 182
Map 27	Semi-natural area, main hydrology and the MEGA's ..... 185
Map 28	Comparison of flood risk to the percentage semi natural area ..... 186
Map 29	Europe and location of the case studies..... 204
Map 30	Potentials and threats in EU based on networks ..... 246

# Tables

	<b>page</b>
Table 1	Different levels used ..... 25
Table 2	Short description of case studies ..... 32
Table 3	Land cover for each bio geographic region and 20 km coastal zone (in percentages) ..... 47
Table 4	Land cover per country (in percentages) ..... 52
Table 5	Land cover with natural values, for bio geographic regions (in percentages) ..... 88
Table 6	Semi-natural, agriculture, forest and water body land cover with natural value per country (in percentages) ..... 89
Table 7	Indicators ..... 102
Table 8	Conventions and legal instruments ..... 105
Table 9	Policies and Strategies ..... 106
Table 10	Funds ..... 106
Table 11	IUCN Management Categories ..... 110
Table 12	Total protected area (IUCN) for each country ..... 111
Table 13	Land cover at the macro level (in percentages) ..... 134
Table 14	IUCN categories of protection and agricultural land cover (in percentages) ..... 138
Table 15	Agricultural land cover in terms of extensive and intensive use (in percentages) ..... 141
Table 16	Population density, population change 1995-2000, and the percentage built-up land cover at the macro level ..... 147
Table 17	FAO increase/decrease agricultural area (in percentages) ..... 162
Table 18	Indicators for urban pressure at NUTS0 level ..... 167
Table 19	Protection compared to cover built up area (in percentages) ..... 168
Table 20	Legal Framework related to natural heritage ..... 190
Table 21	Centralised or Decentralised agencies responsible for protection and management of natural heritage ..... 193
Table 22	Diagram: Spatial Planning Systems and Protection of natural heritage ..... 197
Table 23	Bio geographic regions and landscapes for the case studies ..... 204
Table 24	Rural territories ..... 205
Table 25	Urban related territories ..... 205
Table 26	Ultra peripheral territories ..... 205
Table 27	The Euro-Creativity Index ..... 237
Table 28	Findings of the analysis in DPSIR terms ..... 243

# ESPON project 1.3.2 - Territorial trends of the Management of the Natural Heritage

## PART 2 Section I



*Royal Haskoning*





**ESPON project 1.3.2  
Territorial Trends of the  
Management of Natural Heritage**

**PART 2      Section I**

This report represents the final results of a research project conducted within the framework of the ESPON 2000-2006 programme, partly financed through the INTERREG programme.

The partnership behind the ESPON programme consists of the EU Commission and the Member States of the EU25, plus Norway and Switzerland. Each partner is represented in the ESPON Monitoring Committee.

This report does not necessarily reflect the opinion of the members of the Monitoring Committee.

Information on the ESPON programme and projects can be found on [www.espon.lu](http://www.espon.lu)

The web side provides the possibility to download and examine the most recent document produced by finalised and ongoing ESPON projects.

ISBN number 90-74718-12-4

This basic report exists only in an electronic version.

© The ESPON Monitoring Committee and the partners of the projects mentioned.

Printing, reproduction or quotation is authorized provided the source is acknowledged and a copy is forwarded to the ESPON Coordination Unit in Luxembourg'.

## Foreword

This publication represents the final results of an European-wide (EU27) research project concerning the management of the natural heritage. This report has been produced by the projects core group consisting of:

- EuroNet – Royal Haskoning (lead partner), Utrecht, Netherlands;
- European Centre for Nature Conservation (ECNC), Tilburg, Netherlands;
- EuroNet – Enviplan, Athens, Greece ;
- EuroNet – Land Use Consultants, London, UK ; and
- EuroNet – Territoires, Sites & Cités, Lumbres (Lille), France.

With contributions from:

- Accademia Italiana di Scienze Forestale (Italy);
- Eastern Norway Research Institute (Norway);
- EuroNet – Taller de Ideas (Spain);
- Peter Bassin (Slovenia);
- Institute of Environmental and Landscape Management, Szent Istvan University(KTI), (Hungary); and
- ACER, Jelka Hudoklin (Slovenia).

We would also like to thank all respondents on the questionnaire for their contributions.

**Part 2** of this report is split into three **sections**:

- Section I, Strands, provides details on each of the three strands – management, natural heritage and spatial development/territorial strands (Chapters 1-6);
- Section II gives an analysis of the relationship between these strands and looks at future scenarios (Chapters 7-10); and
- Section III sets out a number of recommendations and conclusions as well as a draft regional typology (Chapters 11-12).

Contact:

Royal Haskoning Division Spatial Development, Mr Jan Vogelij, P.O. Box 19009, 3501 DA Utrecht, Tel: +31 30 230 8424, E-mail: Jan.Vogelij@royalhaskoning.com





# Table of contents

<b>Foreword</b> .....	<b>3</b>
<b>Table of contents</b> .....	<b>5</b>
<b>Figures</b> .....	<b>6</b>
<b>Maps</b> .....	<b>7</b>
<b>Tables</b> .....	<b>7</b>
1 Introduction .....	8
1.1 Background .....	8
1.2 Objectives and aims .....	9
1.3 Nature, territory and management .....	11
1.3.1 Natural heritage .....	11
1.3.2 Territorial trends .....	12
1.3.3 Management .....	12
1.4 Reading guide .....	12
Section I: Strands .....	15
2 Methodology .....	17
2.1 Introduction .....	17
2.2 Complex processes .....	17
2.3 Theoretical model: DPSIR .....	18
2.4 Methods .....	21
2.4.1 Secondary sources analyses .....	22
2.4.2 Indicators .....	22
2.4.3 GIS analyses and map overlays .....	22
2.4.4 Time series and trend extrapolation .....	22
2.4.5 Management questionnaire .....	23
2.4.6 Case studies .....	24
2.5 Scale levels .....	25
2.5.1 Macro-level .....	25
2.5.2 Meso level .....	30
2.5.3 Micro level .....	31
2.6 Resume .....	32
3 Physical structure .....	35
3.1 Introduction .....	35
3.2 Physical diversity .....	35
3.3 Geo morphological features and biodiversity .....	38
3.4 Hydrological system .....	40
3.5 Conclusions .....	41
4 Social-economic and territorial trends .....	43
4.1 Introduction .....	43
4.2 Past evolution: long-term .....	43
4.3 Current situation .....	47
4.4 Agriculture and forestry .....	53
4.4.1 Intensification and extensification of agricultural land use .....	53
4.4.2 The abandonment of agricultural land .....	55
4.4.3 Forestry .....	57
4.4.4 Strategy and management measures related to agriculture .....	58
4.4.5 Indicator .....	59
4.5 Urbanisation .....	59
4.5.1 Population .....	60
4.5.2 Economic aspects .....	65
4.5.3 Tourism .....	69
4.5.4 Infrastructure .....	72
4.5.5 Functional nodes, MEGA's en FUA's .....	74
4.5.6 Indicators .....	76
4.6 Environment and climate change .....	79
4.6.1 Influences on the environment .....	79

4.6.2	Water.....	82
4.6.3	Indicator.....	84
4.7	Conclusions and discussion.....	84
5	Natural heritage .....	86
5.1	Introduction.....	86
5.2	Semi-natural areas .....	86
5.3	Species diversity and species richness.....	90
5.4	Landscapes .....	94
5.5	Fragmentation .....	96
5.6	Conclusions and discussion.....	100
5.7	Indicators for analysis.....	100
6	Management .....	103
6.1	Justification of protection.....	103
6.2	Key policies on nature .....	105
6.3	Other EU policies .....	106
6.3.1	Water Framework Directive (Directive 2000/60/EC) .....	106
6.3.2	Environmentally Sensitive Areas.....	107
6.4	Protection of nature .....	108
6.4.1	IUCN Protected Areas List .....	108
6.4.2	Ramsar sites.....	112
6.4.3	Natura 2000.....	112
6.5	Policy shift .....	117
6.6	Designated semi-natural areas and .....	119
6.7	ESDP .....	121
6.7.1	Natural heritage and polycentricity.....	123
6.7.2	Natural heritage and balanced competitive development .....	123
6.7.3	Natural heritage and sustainable development.....	124
6.8	EU Structural and Cohesion Funds.....	126
6.9	Third report on economic and social cohesion.....	126
6.10	Other policies and instruments.....	127
6.11	Indicator.....	128
<b>Section II: Analysis .....</b>		<b>131</b>

## Figures

Figure 1	An example of the process in DPSIR terms.....	19
Figure 2	Application of DPSIR, including management aspects .....	20
Figure 3	Illustrating the structure of the meso scale maps.....	31
Figure 4	Illustrating the legend in case of a qualitative indicator .....	31
Figure 5	DPSIR and agriculture .....	58
Figure 6	DPSIR and population.....	64
Figure 7	DPSIR and economy(GDP) .....	69
Figure 8	DPSIR and tourism.....	72
Figure 9	DPSIR and infrastructure .....	74
Figure 10	Number of species in relationship to the evolution of agricultural practice .....	93
Figure 11	State of proposals for protected sites under the EC Habitats Directive (as of November 2003) .....	115
Figure 12	State of proposals of protected sites under the habitats Directive by bio geographic region (as of November 2003).....	116

## Maps

Map 1	Bio geographical regions with the most important threats .....	27
Map 2	Topography of Europe .....	36
Map 3	Potential natural vegetation of Europe .....	38
Map 4	Simplified European hydrological system.....	41
Map 5	Percentage built-up area for NUTS3 .....	50
Map 6	Percentage semi-natural areas for NUTS3 .....	51
Map 7	Average size of holding in ESU for 1997.....	56
Map 8	Population density for NUTS3 .....	62
Map 9	Population changes between 1995 and 2000 for NUTS3 .....	63
Map 10	Innovation index.....	68
Map 11	Fragmentation index for NUTS3 .....	98
Map 12	Fragmentation in land cover of Vlaanderen (Belgium) and the south part of The Netherlands.....	99
Map 13	Natura 2000 network.....	114
Map 14	Year of designation .....	120

## Tables

Table 1	Different levels used.....	25
Table 2	Short description of case studies.....	32
Table 3	Land cover for each bio geographic region and 20 km coastal zone (in percentages) .....	47
Table 4	Land cover per country (in percentages).....	52
Table 5	Land cover with natural values, for bio geographic regions (in percentages) .....	88
Table 6	Semi-natural, agriculture, forest and water body land cover with natural value per country (in percentages).....	89
Table 7	Indicators .....	102
Table 8	Conventions and legal instruments.....	105
Table 9	Policies and Strategies.....	106
Table 10	Funds .....	106
Table 11	IUCN Management Categories .....	110
Table 12	Total protected area (IUCN) for each country .....	111

# 1 Introduction

## 1.1 Background

In the ESPON 2006 Programme, natural heritage has been described as an essential part of the environmental assets of each country. "The value of (bio) diversity has been largely recognised by EU policies. Such a heritage must certainly be preserved from hazards, but also creatively managed to reach a condition of sustainable development, for example by the recognition and valorisation of natural networks and individual natural assets in integrated development strategies. New developments must be found to assure synergy and co-existence of man's activities and action affecting natural heritage."<sup>1</sup>

According to the European Landscape Convention, adopted on 20 October 2000 in co-operation with the Council of Europe, the landscape contributes to the formation of local culture and is a basic component of the European natural and cultural heritage, promoting the consolidation of the European identity.<sup>2</sup> Landscape is an important part of the quality of life of different areas of the European continent. However, development within many sectors of activity accelerates the transformation of landscapes.

At the same time, natural heritage is increasingly considered an asset and a development potential in the economic development of cities and larger territories. The location of new investments is progressively taking factors of qualities in the surrounding areas into account, such as access to beautiful landscapes and sites during leisure times. This brings extra focus as potential synergy to the management of the natural heritage. By-and-large, it also calls for a management approach that integrates the natural heritage as an important part of the development of larger territories, cities and regions.

Territorial cohesion has become an issue in the Third Report on Economic and Social Cohesion.<sup>3</sup> This report describes the concept of territorial cohesion extending beyond the notion of economic and social cohesion,

---

<sup>1</sup> ESPON, The ESPON 2006 programme, Interreg III Community initiative – Art. 53, Luxembourg, 2002

<sup>2</sup> Council of Europe, European Landscape Convention, 20 Oct. 2000

<sup>3</sup> EC, Third Report on Economic and Social Cohesion, 2004

whereby territorial balance and harmonious development of the Union are the key issues. Natural heritage, nature and biodiversity are sparsely mentioned in the text, but there is still a significant shift in comparison to previous Cohesion reports.<sup>4</sup> Nature as an asset is identified as an opportunity and a challenge for regions. It is recognised that even the EU-termed 'handicapped areas' have potential due to their geographical characteristics and peripheral locations. The Third Cohesion Report<sup>5</sup> has had the following impacts on this project:

- Emphasis on nature as an asset; and
- One of the case study projects is a handicapped area: the island of Lanzarote.

This project focuses on the relationship between spatial development and natural heritage for the territory of Europe, including the accession countries and the islands (in total 29 countries). The seas, which also certain natural value, are not included because their biodiversity, scale of development and governing policies differ strongly to that on land. In addition, this would have widened the study too much. The report identifies the principal territorial trends of natural heritage at the EU scale, including a cartographic picture of the spatial and historic trends. Based on this identification and further analysis, a number of territorial indicators and typologies are given that should support the process of prioritising for a balanced and polycentrically enlarged European territory.

## **1.2 Objectives and aims**

The following general objectives of the ESPON programme influence the objective and aims of this project:

- To contribute to the European Spatial Development Perspective's (ESDP) fundamental objectives: economic and social cohesion, the conservation of natural resources and cultural heritage and more balanced competitiveness of the European territory;
- To contribute to the identification of the existing spatial structure of the EU territory, in particular the degree and diversity of physical and functional polycentrism at different geographical scales, and to gain

---

<sup>4</sup> EC, First Report on Economic and Social Cohesion, 1996; EC, Second Report on Economic and Social Cohesion, 2001

<sup>5</sup> EC, Third Report on Economic and Social Cohesion, 2004

concrete and applicable information on the EU-wide effects of spatially relevant development trends and their underlying determinates; and

- To define concepts and to find appropriate territorial indicators, typologies and instruments as well as new methodologies to consider territorial information linked to polycentrism. To detect territories most negatively and positively affected by the identified trends with special reference to regions in terms of accessibility, polycentric development, environment, urban areas, territorial impact assessment, with particular attention being paid to areas exposed to extreme geographical positions and natural handicaps such as mountain areas, islands and ultra-peripheral regions.

The central question of the ESPON project 1.3.2 is:

***What is the influence of the management of natural heritage on spatial development?***

This question covers a wide range of issues and is very broad in scope. Therefore, the limits of the scope of this study must be clearly defined. These issues can be described in terms of strands: management, natural heritage and spatial development/territorial trends.

The central question must be addressed at the European scale and a system of monitoring data must be developed for the whole area. Moreover, this project is a first elaboration at this scale for this subject and is planned to be finished within 1.5 years. Taking into account the broad objective, the large number of countries and the current lack of data together with the relatively short period that is available for this project, answering the central question require a precise, careful and robust definition of the scope.

The interrelationships between the strands are central and can be described in terms of the following key questions:

- Key question 1: What is the influence of the management of protected natural areas on the patterns of urbanisation at the micro, meso and macro level?
- Key question 2: What is the influence of the management of the natural and semi-natural habitats on urbanisation at the micro, meso and macro level?
- Key question 3: What has been the influence of social economic and agricultural trends on the natural heritage?

This project intended to develop indicators for the following themes:

- Land cover, land use, landscapes;
- Ecosystem diversity;
- Biodiversity
- Natural resources, mainly including water and soil.<sup>6</sup>

In chapter 5, the selected indicators for nature are described.

The indicators are used for analysis and interpretation as described in section II of this report. The analysis and interpretation concentrate on:

- a diagnosis, at European level, for each of the four themes mentioned above. This diagnosis should focus on two points and take into account the spatial structure of the European territory. It should also make reference to the typologies of regions developed within all ESPON projects in particular in project 1.1.1. (polycentrism) and 1.1.2. (urban-rural relation);
- a description of the current situation, the past evolution (long-term and recent);
- future perspectives in relation to economic developments and 'ecologically sensitive areas' or areas under pressure.

### **1.3 Nature, territory and management**

#### **1.3.1 Natural heritage**

Many types of natural heritage areas are identified in a functional manner – how areas are intended to be used or why they are to be protected from (certain types of) use. Some of these generic manners of differentiating between types of natural heritage areas are reviewed.

Natural heritage consists of many different elements and includes both the ordinary (or 'everyday') countryside and 'green' in cities and the outstanding or exceptional elements such as natural areas, areas with natural value, ecological networks, and biodiversity. Heritage implies a certain qualitative assessment, but does not only concern the best. It refers to outstanding physical, biological and geological formations, habitats of threatened species of animals and plants and areas with scientific, conservation or aesthetic value. This definition is embodied in the international treaty Convention

---

<sup>6</sup> ESPON, 2002

Concerning the Protection of the World Cultural and Natural Heritage, adopted by UNESCO in 1972. All Member States of the European Union (EU) have ratified this 'World Heritage' convention.

### **1.3.2 Territorial trends**

Territorial trends occur in many different ways. Urbanisation is an obvious phenomenon of spatial development, but slower incremental processes of sub-urbanisation are also of great importance within the scope of this project. Many recreational and other economically induced land uses also gradually increase their territories. Agricultural intensification is another form of spatial development (see ESPON project 2.1.3 on the Common Agricultural Policy (CAP)). Alongside these developments, which are leading to higher densities and increases in the paved area, are infrastructure developments such as new roads and railways, which are cutting through territorial entities.

### **1.3.3 Management**

Management of the natural areas takes place at a range of levels; from day-to-day management up to higher-level management where decisions are taken about the acquisition of new land in order to extend the areas designated for their natural heritage value. Here an important relationship exists between the possibilities of the spatial planning systems of individual European countries and their legal frameworks for protecting the natural heritage.

Protection refers to the intentional action to maintain the existing condition of the natural heritage and of actual biodiversity specifically. The principle of 'protection' can be extended to the notion of 'enhancement' in which the potential biodiversity is encouraged, in whole or in part, according to a pre-determined ambition to improve the conditions for more species.

## **1.4 Reading guide**

The report is split into three parts:

- Section I provides detail on each of the three strands management, natural heritage and spatial development/territorial strands (chapters 2-6);



- Section II gives an analysis of the relationship between these strands (chapters 7-10); and
- Section III sets out a number of recommendations and conclusions as well as a regional typology (chapters 11-12).

Chapter 2 sets out the methodology of this project. In order to understand the occurrence of flora and fauna and their relation to the characteristics of the territories, Chapter 3 gives a description of the physical structure of the territory of Europe. Chapters 4, 5 and 6 outline the different strands in terms of the long term and recent past, status quo and future perspectives within the constraints of the data. Indicators are developed which deal with, at a minimum, land use, landscapes, natural areas and biodiversity. These indicators lay a foundation for section II of the report, the analysis.

Section II reports the analyses and presents an interpretation and understanding of the findings. The questions asked in section I and the variables based upon the indicators identified in chapters 4, 5 and 6 are combined in this second section of the report.

Chapter 7 deals with analysis at the macro level, chapter 8 addresses the meso level and chapter 9 focuses on the micro level. In chapter 10 nature as an asset is highlighted specifically.

Finally, in section III we reflect on the findings. In chapter 11 conclusions are drawn and recommendations are presented. Chapter 12 focuses on the regional typologies.



## **Section I: Strands**



## **2 Methodology**

### **2.1 Introduction**

The methodological and technical objectives of the ESPON projects are:

- to define concepts;
- to find appropriate territorial indicators, typologies and instruments;
- to develop new methodologies to consider territorial information linked to polycentrism;
- to detect territories most negatively and positively affected by the identified trends; and
- to apply the DPSIR model (see 2.3) on causes and effects.

### **2.2 Complex processes**

For analysis and interpretations of trends as complex as spatial development, data availability and usefulness are major factors to be considered. For spatial development, indicators are interlinked at different scales. Hence, the indicators cannot be considered separately and should be deduced from interpretations of spatial trends and indirect factors.

Relations are seldom causal and one should be cautious with expected relations. For example, eco-farming does not automatically have a positive influence on fauna. The current project is based on a combination of inductive and deductive approaches. By trial and error, verification and falsification of assumptions can be made. Gathering observations and data through case studies and questionnaires in order to draw general conclusions describes the inductive approach. However, the two approaches are complementary; when data is missing, the deductive approach cannot be followed, but inductively gathered information may help to refine the understanding of underlying mechanisms and explanations. The complexity of the real processes makes it difficult or perhaps impossible to find explanatory or influencing factors. In general, a cluster of factors should give a sufficient explanation for certain facts or trends. The correlations between the different social economic and nature indicators (variables) are statistically not significant.

## 2.3 Theoretical model: DPSIR

With regard to causal relations, spatial development processes can be expressed in terms of the DPSIR model (Driving Forces, Pressures, States, Impacts and Responses). The DPSIR framework shows a chain of causes and effects from **D**Driving forces (activities) to **P**Pressures, to changes on the **S**State of the environment, to **I**Impacts and **R**Responses. DPSIR is based on the assumption that economic activities and society's behaviour affect environmental quality. The relationships between these phenomena can be complex. DPSIR highlights the connection between the causes of environmental problems, their impacts and society's response to them, in an integrated way.

This model is derived from other models developed in recent years. The Pressure - State - Response model was first used by Environment Canada to assess threats to the environment. It was later adopted by OECD and further developed in their core set of indicators to be used in environmental performance reviews. The model has been extended by EEA to include the causes (driving forces) and the impacts on the environment. The DPSIR framework is now used by Eurostat for the organisation of environmental statistics. Within this context, the role of the EEA is to provide information on the DPSIR elements, their interconnections, and on the effectiveness of Responses<sup>7</sup>.

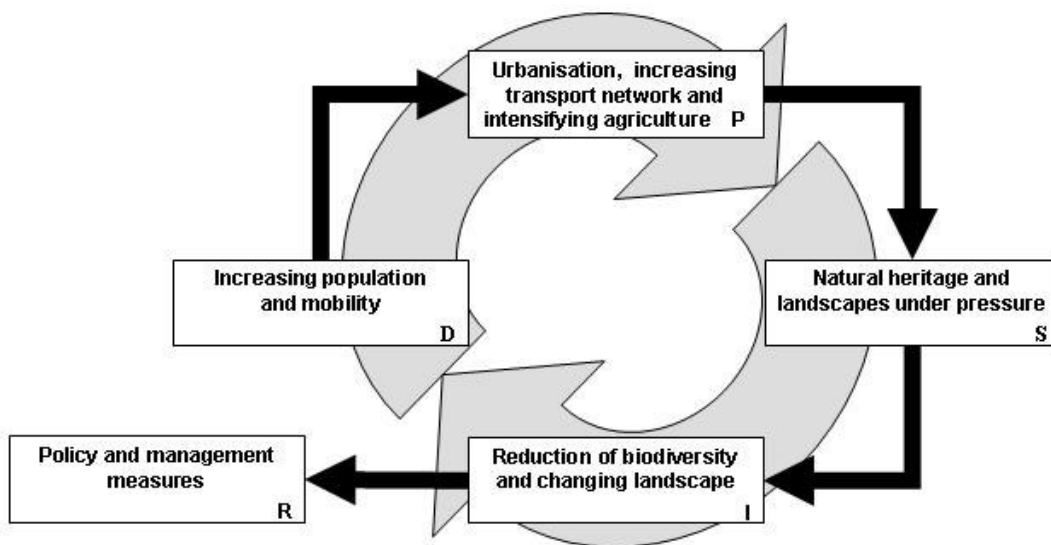
Starting from this project's key question 'What is the influence of the management of natural heritage on territorial trends?' one can identify the components of the DPSIR framework from two different perspectives both of which are linked through responses from policy makers and society.

In the first perspective, the urban and transport infrastructure is the central component on which driving forces and pressures have an impact. In the second perspective, the natural heritage has a central position and drivers and pressures are impacting upon it (for example through increase of urban density). Figure 1 provides a schematic presentation of the relationship between these two perspectives, which are linked via the responses from society and policy. These management responses are pro-active in terms of spatial development objectives (as included in the ESDP, left side of figure 1) and re-active in terms of defensive management actions protecting the natural heritage (right-hand side of the figure).

---

<sup>7</sup> EEA, 1997 A.R. Gentile, From national monitoring to European reporting: the EEA framework for policy relevant environmental indicators.

**Figure 1 An example of the process in DPSIR terms**

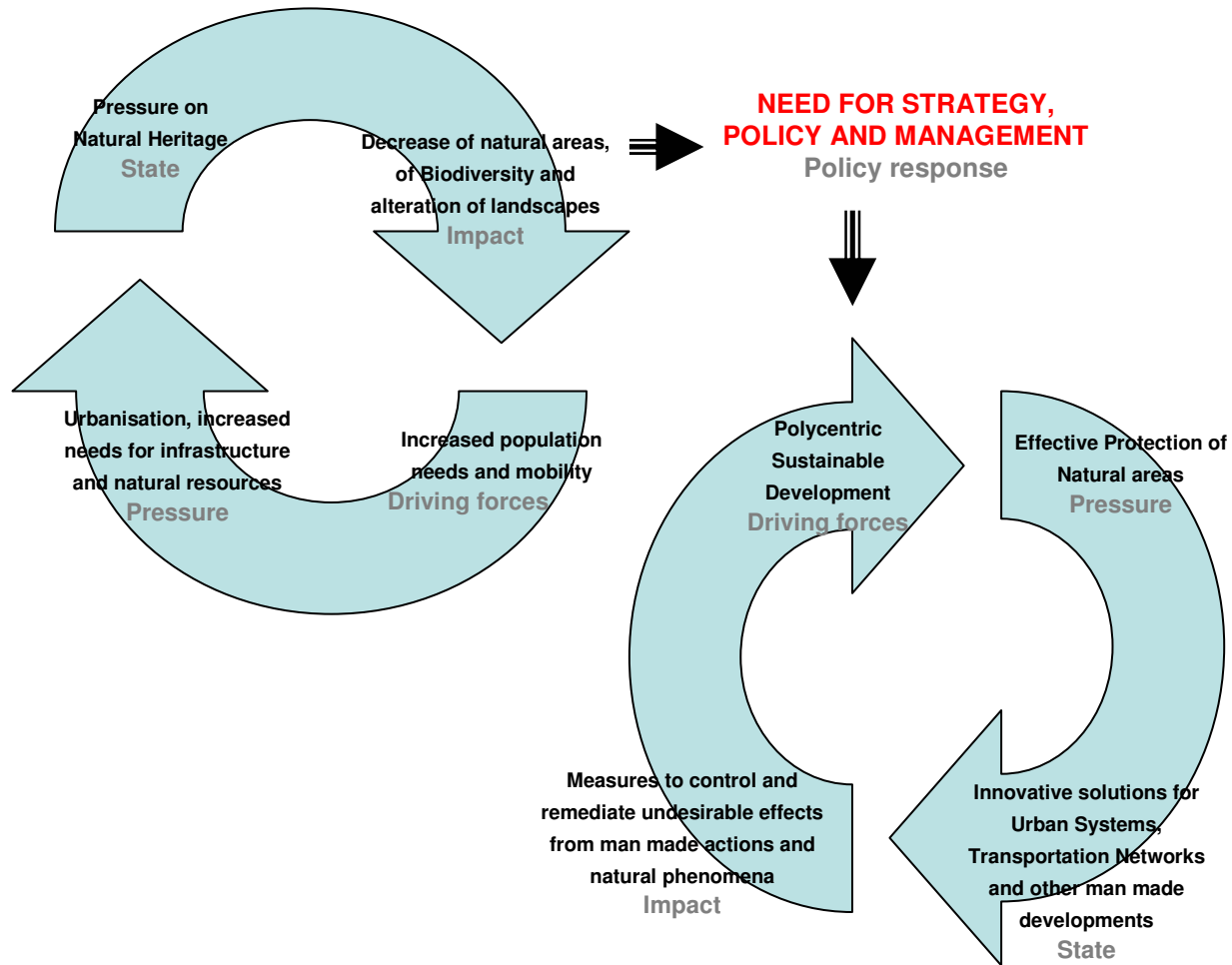


Driving forces	<i>geo physical processes:</i> environmental and climate changes <i>socio economic development:</i> population change gentrification increase of mobility of persons and goods
Pressures	<i>geo physical pressures:</i> river flooding desertification <i>socio economic pressures:</i> urbanisation and tourism increase of infrastructure changes in agriculture
States	<i>natural heritage:</i> biodiversity landscape
Impacts	<i>reduction of natural areas:</i> decrease of biodiversity landscape change
Policy Response	<i>sustainable development:</i> conservation of biodiversity Natura 2000 spatial planning

In order to identify the required policy responses, the DPSIR model was extended. Unquestionably, human developments, activities and interventions create tremendous pressure on the physical environment. Man made structures on land, water and air in combination with human activities driven

primarily by economic motives alter natural systems and introduce detrimental substances to the environment.

**Figure 2 Application of DPSIR, including management aspects**



It is obvious that a strategic approach is required supported by relevant policies and management methods. This important response should promote polycentric sustainable development as a positive proactive 'Driving Force' for a balanced development in Europe, paying particular attention to issues concerning natural heritage in the continent.

In order to more specifically identify the driving forces that affect Natural heritage, as well as their actual impacts, a more detailed model is applied highlighting the relationship with the five driving forces which have been identified as the most important parameters influencing Natural heritage.



population, Gross Domestic Product (GDP), tourism, infrastructure and agriculture, are considered to be the basic Driving Forces in the process which largely influences Natural heritage in Europe.

It is evident that population changes (increases and decreases, concentration and de-concentration, mobility, etc.) are interrelated with GDP, Tourism and Infrastructure. Therefore, changes in GDP, population and infrastructure are closely interlinked so that changes in any one of these parameters will affect the other. Tourism is also closely linked with GDP and infrastructure. Finally agriculture is being identified world-wide as one of the most important consumers of natural resources, and space. Hence, it represents a major driving force which influences Natural heritage.

In chapter 4, these aspects are described and the paragraphs conclude with geared DPSIR models for all of these aspects.

## **2.4 Methods**

The following methods are used for analyses and interpretation:

- Secondary source analyses, consisting of policy documents, reports of scientific research and existing statistical information. A significant quantity of documents on social, demographic and economic trends, agriculture, infrastructure, nature and landscape provides a useful information source;
- Indicators which represent the reality. Indicators are developed in chapters 4 and 5. These indicators lay a foundation for section II, the analysis;
- Correlations, Geographic Information System (GIS) analyses and map overlays;
- Time series. The analyses of long term and recent trends and the predictions of future circumstances which can be achieved through extrapolation of past trends, within the constraints of the data;
- Questionnaires on national policies relevant for better understanding of findings of the analysis is used;
- Analyses of case studies at the local level within variable bio geographical areas illustrating the local processes and trends for different locations.

### **2.4.1 Secondary sources analyses**

Document analyses of socio-economic sources (chapter 4), nature (chapter 5) and management aspects (chapter 6) have taken place. The three strands that form the pillars of this project require analyses of reliable and independent information. Sources from general and specialised institutions in Europe (including Eurostat, EEA and ECNC), national institutions, ministries and universities were consulted. The bibliography gives full information on sources that were used.

### **2.4.2 Indicators**

Indicators are developed in chapters 4 and 5. These indicators lay a foundation for section II, the analysis. They are tools for the creation of a database and a Geographic Information System (GIS), in order to provide a consistent, homogeneous, reliable, and easily up-dated information source.

### **2.4.3 GIS analyses and map overlays**

As territorial trends are the central focus of this project, the application of GIS tools is pertinent. In this project, GIS is used as more than just a cartographic system that allows the presentation of data on maps. It is also used as an analytical instrument which combines information on nature and socio-economic information within a specific geographical or administrative area.

This project aims to identify spatial patterns and, if data availability allows for time series, on spatial development. The differentiation and diversity between and within geographical and administrative categories are looked at, because this provides information on territorial balance and the harmonisation of development.

### **2.4.4 Time series and trend extrapolation**

Initially, this project aimed to analyse data on historic trends in nature, socio-economic aspects and spatial patterns. Although information on socio-economic aspects is available for different points in time for many parts of Europe, digital information for time ranges on nature and spatial patterns is missing. Consequently, time series for many of the socio-economic aspects could be made, but this was not possible for nature and spatial aspects. Trends can be drawn for issues such as population growth and the development of GDP, but data is not available for spatial issues with regard

to natural heritage. Also, data describing the current situation or status quo is available for different time periods. For instance, the CORINE land cover information is gathered approximately for every 20 year time period. In general, there is a problem in the completeness of data and information compatibility.

The aim to combine nature, socio-economic and spatial aspects for different points in time is not currently feasible. In the future, it would be useful to gather data for these indicators and perform the relevant analyses.

#### **2.4.5 Management questionnaire**

A questionnaire was carried out to refine the understanding of individual law making processes and the translation of European legislation to the national level. Representatives of national governments and of non-governmental-organisations (NGO's) were approached to respond to a set of questions with regard to the management of the natural heritage. This information is complementary to the results from the data analyses and the case studies.

The scope of the project is to identify key issues and/or pressures, which affect in a positive and/or detrimental way Europe's natural heritage. The 29 countries constituting ESPON territory in the European continent encompass a huge variety of environmental priorities, natural areas, as well as of policies and management practices.

This scope inevitably requires the knowledge of the relationship between the protection of nature and the means by which this is carried out. In other words, it is very important to understand how natural heritage is managed. Any form of intervention, either formal (e.g. legislation, regulations, etc) or informal (e.g. traditional practices, etc) by public (e.g. central government, local authorities, etc) or the private sector (e.g. NGO's, etc) should be explored.

Moreover, since management can be applied either directly or indirectly in relation to matters of natural heritage (e.g. enhancement or protection can be achieved by spatial planning directives as well as, in a more direct form, by specific regulation regarding natural resources), the effectiveness of this management has to be investigated.

In order to understand and research the process of management and its relation with spatial development, the questionnaire has been designed to cover all the aforementioned issues.

More information on the questionnaire is presented in annex 1.

### **2.4.6 Case studies**

In order to develop a good understanding of the mechanisms of designation, the 'lower' scales of policy was considered by carrying out case studies. These studies provide detailed information about the management, the implementation of management and the territorial local context to explain effectiveness of management of the natural heritage at the micro level.

The case studies were analysed using a harmonised checklist, designed to fit with different territorial scales, types of management, different territorial contexts and encompassing the following issues at the local scale:

- Exploration of the territorial context;
- State of the natural heritage;
- Assessment of the spatial interrelations (the local or regional context and relations to urban areas, infrastructure and to other natural areas);
- Assessment of the effectiveness of management; and
- Assessment of the extent to which the case study supports ESDP objectives.

For each case study, the full report is included in the annex 2. In addition, the case studies are included in the overall study framework to:

- Evaluate the database analysis (maps and overlays);
- Support the project with local scale information; and
- Provide evidence to develop long-term evolution scenarios.

In addition to covering as much of the territorial diversity of the EU in relation to geography (from coastal to mountain areas) and the urban/rural system as possible, the criteria for selection were:

- The area affected by International and/or European protection legislation;
- The existence of management over a sufficient period allowing for evaluation;
- The availability of data at the local level showing evidence of management processes; and
- The accessibility of the data to the contributor (in order to make the study program efficient).

Case studies differ or according to their scale, location and productive land use context and the state of their natural heritage and management systems. The cases are spread across the enlarged European territory and relate to a large range of territorial contexts found through this territory. They vary from coastal regions to mountains, cover both rural and urban territories and are either under development pressure or experiencing depression.

## 2.5 Scale levels

In this project, a distinction is made between the macro (global, European), meso (national, transnational) and micro levels (local and regional). In terms of the macro level, bio geographical regions, coastal zones (20km) and administrative categories are predominantly considered (see table below). For the meso level, data at the NUTS0 and NUTS3 scale in addition to questionnaire responses are used. In the case of the micro level, the majority of information and data originates from case studies and data collected at the NUTS3 scale.

**Table 1 Different levels used**

<b>Levels</b>	<b>Represented by</b>
Macro	Bio geographic regions and coastal zones, administrative categories, such as EU15, N10, EU25, N12, EU27, EU27+2 and Pentagon
Meso	Questionnaire responses, NUTS0 and NUTS3
Micro	Case studies, NUTS3

This information is elaborated in the following subparagraphs.



### 2.5.1 Macro level

The macro level in this study is represented by bio geographic regions, Europe, data at the EU15/N10 scale and the Pentagon.

### ***Bio geographical regions***

It is important to consider geomorphologic features, including the hydrological system, when evaluating ecological networks (see chapter 3). In this context, it is pertinent to consider the bio geographical regions, when defining typologies as these regions are based on climatic, botanic and typological factors (see map 1).

## Map 1 Bio geographical regions with the most important threats

	Biogeographic region	Main threats to biodiversity
	Arctic region	Climate change may change conditions for plant and animal communities Ozone depletion
	Boreal region	Intensive forestry practices Exploitation for hydroelectric power Freshwater acidification
	Atlantic region	High degree of habitat fragmentation by transport and urban infrastructures Intensive agriculture Eutrophication with massive algal blooms Invasive alien species
	Continental	High degree of habitat fragmentation by transport and urban infrastructures Industry and mining Atmospheric pollution Intensive agriculture Intensive use of rivers
	Alpine (Alps, Pyrenees, Carpathians, Dinaric Alps, Balkans and Rhodopes, Scandes, Urals and Caucasia).	Climate change may change conditions for plant and animal communities Transport infrastructures Tourism Dams
	Pannonian	Intensification of agriculture Drainage of wetlands Irrigation combined with evaporation leads to salinisation and alkalinisation Eutrophication of large lakes Mining industry with heavy metals pollution of some rivers
	Mediterranean	The world's most important tourism destination High pressures from urbanisation in coastal areas Intensification of agriculture in plains, land-abandonment in mid-mountains Desertification in some areas Invasive alien species
	Macaronesian (Includes Azores, Madeira, Canary islands)	Invasive alien species Tourism Forest fires and uncontrolled tree-felling Intensification of agriculture with large greenhouses
	Steppic	Intensification of agriculture, e.g. abandonment of nomadic pastoral activities Desertification
	Black Sea	Large mining and industrial settlements, with pollution problems Intensification of agriculture: irrigation, salinisation Waterlogging Tourism
	Anatolian	Intensification of agriculture : conversion of steppes into arable lands, irrigation, drainage of wetlands, overgrazing Building of dams



Source: EEA, 2002A

The bio geographical units describe relatively homogenous ecological conditions within each unit that allow meaningful comparisons to be made between units in terms of their differing ecological potential. Combined with land cover data and species distribution data, these units offer a valid way to benchmark biodiversity conditions within an area, and to follow the improvement or deterioration trends of natural heritage over time. However, it is expected that climate change will gradually alter the boundaries of the bio geographic regions. Despite this change, however, it is expected to be measurable and for the ecological conditions within the boundaries to remain constant.

The bio geographic regions dataset is based on the official delineations used in the Habitats Directive (92/43/EEC) and the EMERALD Network set up under the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention).

The following bio geographical regions represent the ESPON area:

- Alpine region;
- Atlantic region;
- Boreal region;
- Continental region;
- Mediterranean region;
- Pannonian region;
- Steppic region.

The Macaronesian region is also part of the ESPON area, but CORINE data is missing for this region. Only a small part of The Black Sea region is located within the ESPON area. To present data for this whole region would give a distorted impression and so it is not included in the tables. The coastal region is added as a separate region.

## **Coastal zones**

Due to the specific characteristics of the coastal area (being very susceptible to human induced threats and climate change), it is relevant to consider this region separate from the other bio geographical regions. The Coastal Zone represents the space in which terrestrial environments influence marine (or lacustrine) environments and vice versa. This zone is of variable width and may also change over time. Delimitation of zonal boundaries is not normally possible as they are often marked by an environmental gradient or



transition. At any one location, the coastal zone must be determined according to local or regional physical, biological and cultural criteria. These need not, and in fact rarely do, coincide.

With regard to the natural heritage, the importance of Integrated Coastal Zone Management (ICZM) must be stressed. It concerns an integrated approach involving all relevant interests and actors. The elaboration of Natura 2000 and other management options with regard to the natural heritage should, in coastal zones, be harmonised with the ICZM activities. A zone of 20 km has been applied arbitrarily to the coastal zone, for analytical reasons. This does not mean that 20 km is the width of coastal zones according to the ICZM policy.

### **Administrative division**

The following administrative division is used:

- EU15: Belgium, Denmark, Germany, Greece, Spain, France, Ireland, Italy, Luxembourg, the Netherlands, Austria, Portugal, Finland, Sweden and the UK;
- N10: Cyprus, Czech republic, Estonia, Hungary, Latvia, Malta, Poland, Slovenia, Slovenes republic;
- EU25: EU15 and the N10;
- N12: N10 including Bulgaria and Romania;
- EU27: EU15 and the N12;
- EU27+2: EU27 including Norwegian and Switzerland.

### **Pentagon**

The Pentagon is defined as the core area component of the core-periphery model outlined in the ESDP. The pentagon consists of the area between London, Paris, Milan, Munich and Hamburg. This includes the area previously identified to be the zone in which most of the economic activities were developed: the blue banana including England, Belgium, the Netherlands, the Rhine Ruhr, and the Rhine Main development zone connecting Switzerland with Milan. The information presented for the Pentagon is based on aggregated data collected at the NUTS3 scale.

## 2.5.2 Meso level

The meso level represents the individual countries.

Eurostat defined the administrative classification of the EU, NUTS (Nomenclature of Territorial Units for Statistics), to provide a single uniform breakdown of territorial units for the production of regional statistics for the EU. The NUTS classification has been used since 1988. NUTS0 are the countries.

At the meso scale, both NUTS0 and NUTS3 data are relevant for analysis, interpretations and presentation. Most statistical data is also available at these two levels. The main indicators used are given in tables for the NUTS0 level, and maps and overlays for the NUTS3 level.

CORINE land cover data is missing for Sweden, Cyprus, Malta, Norway and Switzerland.

At the meso scale, no significant correlations were found between natural area cover or protection and the identified indicators. However, in order to recognize and describe spatial trends, indicators were mapped at the NUTS3 level. Although these NUTS3 regions are not equal in size, most data is only available at that organizational level. Recalculation of these statistical indicators to a fixed grid introduces a larger error than qualitative descriptions of the spatial trends based on the NUTS3 regions.

As stated above, mapping at the meso scale is meant to recognize and describe patterns in qualitative terms. For each combination of indicators, a 4\*4 matrix was used; the horizontal axis describes the percentage of nature or level of protection in 4 different classes, and the y-axis outlines indicators, again in four different classes. The classification into four classes was based on approximate equal shares of data, in order to maximize the occurrence of all 16 classes.

Figure 3 gives an example of the legend of a meso scale map. In this case the highest percentage of natural area is represented with a green colour, while the lowest coverage of natural area is represented by red. The tone of the colour indicates the amount of GDP change. For example, dark red represents areas with a low percentage of natural areas with a high percentage of GDP change. Light blue represents areas with a relatively high percentage of natural area cover with a negative GDP change. Figure 3 gives an example of the legend of a meso scale map. In this case the highest percentage of natural area is represented with a green colour, while the lowest coverage of natural area is represented by red. The tone of the colour

indicates the amount of GDP change. For example, dark red represents areas with a low percentage of natural areas with a high percentage of GDP change. Light blue represents areas with a relatively high percentage of natural area cover with a negative GDP change.

**Figure 3 Illustrating the structure of the meso scale maps.**

		% Natural area			
		0-10%	10-25 %	25-50%	> 50%
GDP change 1995-2000	< 0 %	11	21	31	41
	0 - 25 %	12	22	32	42
	25 - 50 %	13	23	33	43
	> 50 %	14	24	34	44
		no data			

For some maps the indicators are described in qualitative terms. Figure 4 gives an example of the indicator urban pressure that is represented by four different indicators which cannot be quantitatively measured.

**Figure 4 Illustrating the legend in case of a qualitative indicator**

		% Natural area			
		0-10%	10-25 %	25-50%	> 50%
Urban pressure	low	11	21	31	41
	medium	12	22	32	42
	high	13	23	33	43
	very hig	14	24	34	44
		no data			

### 2.5.3 Micro level

The present NUTS nomenclature divides the 15 countries of the EU, the EFTA countries and the 10 CEC countries into five levels - three regional and two local.

The three regional levels are digitised into three map layers: NUTS3, consisting of 1324 regions, NUTS 2, consisting of 276 regions and NUTS 1, consisting of 91 regions.

At the micro scale, the results from the meso level (using NUTS3) are further explored by case-studies, from 7 regions: Borsodi Mezőség (Hungary), Lanzarote (Spain), Ljubljana (Slovenia), Nord Pas de Calais (France), Rondane (Norway), Thames Basin (UK) and Vallombrosa (Italy).

**Table 2 Short description of case studies**

<b>Case study:</b>	<b>NUTS level:</b>	<b>Short description:</b>
Borsodi mezoseg	NUTS 4	<ul style="list-style-type: none"> <li>• Rural area</li> <li>• Saline marshlands and steps</li> </ul>
Vallombrosa	NUTS 4	<ul style="list-style-type: none"> <li>• Semi-urban to rural area</li> <li>• Forest under ecological management</li> </ul>
Ljubljana	NUTS 4	<ul style="list-style-type: none"> <li>• Urban and semi-urban area of Ljubljana</li> <li>• Marshland and forests surrounded by Ljubljana and 5 small scale cities</li> </ul>
Thames Basin	NUTS 4	<ul style="list-style-type: none"> <li>• Urban and semi-urban area</li> <li>• Fragmented heath lands surrounded by open spaces and urban areas</li> </ul>
Nord pas de Calais	NUTS 2	<ul style="list-style-type: none"> <li>• Urban, semi-urban and rural areas</li> <li>• Fragmented semi-natural and natural areas (coastline, valleys, marshlands...)</li> </ul>
Rondane region	NUTS 2	<ul style="list-style-type: none"> <li>• Northern peripheral area</li> <li>• Large, mountainous and low density territory, Northern wilderness area</li> </ul>
Lanzarote	NUTS 4	<ul style="list-style-type: none"> <li>• Diversified, mainly located along the coastline</li> <li>• Endemic ecosystems</li> </ul>

## 2.6 Resume

Referring to the objectives introduced in paragraph 2.1, the following can be concluded:

- Definition of concepts. The concepts used in this project are developed and described in this chapter (scales) and in chapters 4 (in relation to social economic aspects), chapter 5 (in relation to nature) and chapter 6 (in relation to management). A glossary and list of abbreviations is available in Part 3 of this report in the annexes.
- Territorial indicators, typologies and instruments. In this chapter typologies and instruments have been presented. In section II of this report the typologies and instruments are further described and applied. The indicators are identified and defined in chapters 4 (social economic indicators) and 5 (nature). Typologies in relation to the indicators are

presented in chapters 4 and 5. A regional typology is developed and presented in chapter 12.

- New methodologies to link territorial information to polycentrism. The use of indicators and GIS overlays provide a method to link territorial information to polycentrism or, more precisely, to the urban/rural division. Nature is linked mainly to the rural area. The pattern of settlements and the size of the urban area determine the structure of polycentrism.
- Chances and threats to territories. The result of the analyses is an overview of territories which suffer from urbanisation pressure or agricultural expansion or intensification in addition to areas that have potential for natural development. The scale on which this information is presented is important. Chances for economic developments possibly related to natural qualities seem significant only at the micro level.
- The DPSIR model for causes and effects. The DPSIR model is used as a theoretical model throughout this report. The model is elaborated in chapter 4 and in the second section at the micro level this model is applied to and developed from the case studies.



## **3 Physical structure**

### **3.1 Introduction**

The occurrence of flora and fauna is strongly related to the characteristics of their territory. Specific combinations of soil types, hydrological conditions and climatic variations, determine the habitats of species. This variety of physical conditions, in turn influences the variety of species. It is therefore important to consider the physical structure of the territory of Europe, when analysing and monitoring the territorial trends of the natural heritage.

Geomorphologic features, sometimes with striking scenic qualities, such as mountains, coastlines, islands or lakes are also considered to be part of the natural heritage. During times of human settlement, some of these features such as natural harbours, fjords and strategic rocks, offered conditions that enhanced the attractiveness of the area, in addition to potentially providing conditions advantageous for agriculture, mining or tourism. Geomorphologic structure should therefore be taken into consideration, not only whilst analysing natural heritage, but also in considering their potential contribution to future developments.

### **3.2 Physical diversity**

The physical structure of Europe leads to geomorphological, natural and cultural differences. The complex and fragmented geology has largely contributed to Europe's history and intricacy, both in a territorial and political sense. For example, the alpine ridge and Pyrenees form a permanent divide for climate, history and trade on the continent, while the plains are home to most economic and social activities. In addition, proximity to the sea has strongly influenced the history, economy, landscapes and individual traditions.

As natural qualities of an area are strongly related to its physical structure, the existing physical structure of Europe should be used as a basis, when considering its natural heritage.

## Map 2 Topography of Europe



Source: Royal Haskoning, 2003

Large parts of the European continent have been shaped during the Quaternary Period and especially during the last glacial period, which ended approximately 10,000 years ago.

The western border of Europe is distinct, whereas the eastern border is less well-defined. A striking characteristic of European geomorphology is the important role of the coast. The European coastlines of the Mediterranean, Atlantic, North Sea and Baltic Sea are extremely strongly profiled and carved out. In comparison with other continents its ratio of coastline to total surface area is significantly higher. Europe has by far the greatest length of coastline per inhabitant and a large percentage of Europeans live in coastal areas. Coastlines are dynamic systems, continually changing through natural variations in sea level, storm events, wetlands, and other habitat changes. The coasts also have cultural significance, providing locations for ports, fjords and seaside resorts. Climate is also connected to coastal zones, for example the Gulf Stream to North West Europe, especially the British Isles. Thus, in many ways the vicinity of the coasts is a specific European characteristic important to consider in this study.



The physical form of Europe is fragmented, clearly reflected in the rich diversity of landscapes. The European mainland consists of numerous peninsulas, with a large diversity of landscapes and natural qualities. The physical structure is strongly characterised by high mountain ranges in the southern part of Europe and Scandinavia and smaller mountain ranges and plains between the Alps and the coastal zones of the north and the west of Europe. The major west to east oriented mountain range, including the Cantabrian Mountains, the Pyrenees, the Alps and the Carpathian mountains forms the 'backbone' of mainland Europe. The Scandinavian and Scottish mountains are more or less disconnected additions to this system.

Physical structure varies along this 'backbone'. For example, the mountain range abruptly borders the sea at the North Spanish and Mediterranean coasts, whereas large low-lying plains gradually reach sea level along the Atlantic, North and Baltic Sea. These low lying zones to the west and the north cover large areas of France, the Netherlands, Belgium, northern Germany, Denmark, Poland and the Baltic countries. These coastal zones in addition to the central range of high mountains in the south are connected by large European rivers, forming one European-wide hydrological coherent system.

Map 3 gives a view of the potential natural vegetation in case of no human interference.

### Map 3 Potential natural vegetation of Europe



Source: Federal Agency for Nature Conservation

### 3.3 Geo morphological features and biodiversity

Certain geo morphological features have a specific relation to biodiversity that give them special value in terms of natural heritage. Three are considered, being part of the hydrological structure of the continent: mountain ranges (as main source areas), rivers and their associated river basins, and coastal (deposit) areas:

- Owing to their size, mountain ranges inhibit intensive human land uses, encouraging extensive land use supporting the development of species richness and diversity. Their altitudinal range increases the range of species located in any given geographical zone.
- The linear character of rivers operates differently to the 'refuge' quality of mountain ranges, providing connectivity between biodiversity hotspots such as wetlands. The rivers also act as corridors for aquatic and terrestrial species of flora and fauna, and flyways for avifauna.
- The relationship between coastal zones and biodiversity is difficult to define, because the gradient of biodiversity is functional and is to some extent physically imperceptible apart from the presence of indicative species or species communities, with the exception of some specific formations such as dunes.

Without human interference, land-cover would be determined by prevailing climatic conditions, soil, altitude and geomorphology, resulting in natural vegetation cover different from that found today (see map3). Currently, the remaining natural vegetation is largely found in the remote less densely populated areas, such as in discrete parts of Poland. Most existing semi-natural areas and landscapes, although artificial, are often rich in biodiversity, strongly affected by environmental factors such as air, soil and water quantity and quality, which in turn are influenced by increasing population density. Coastal areas and wetlands are particularly vulnerable to these pressures, while eutrophication and contamination may also lead to a loss of biodiversity.

Climate change is also an important aspect affecting biodiversity. Although still difficult to exactly forecast, it is more than likely to result in major impacts. Native plant distributions will change considerably, with a potential retreat northward of specific types. Aquatic ecosystems, such as coastal areas, are very susceptible to changes in expected sea level rises, flooding and erosion.

The range of biodiversity found in Europe, is therefore both normative, on the one hand, and human induced, on the other. For example, extreme climatic conditions of northern boreal forests will only allow the presence of a few species of plants. In addition, mankind's intensive use of land through agriculture and forestry is diminishing the 'normal' range of species in lowlands and the flanks of uplands. When human land use is of moderate intensity and the climatic conditions are warm and temperate, such as in the western Mediterranean area, the presence of biodiversity is both varied

(species diversity) and relatively important (species richness) compared to the other regions of Europe.<sup>8</sup>

### **3.4 Hydrological system**

Europe has both a relatively long coast and an extensive network of rivers and inland waterways. There is a coherent system of rivers transporting water, nutrients and pollutants to coastal deltas. Large concentrations of European natural heritage are connected through this system; semi-natural areas in the mountain ranges are connected to the wetlands along rivers and through the coastal plains.

Freshwater ecosystems like rivers and lakes form essential life support systems for a wide range of wetland habitats within their catchment areas. Being valuable habitats themselves, lakes and rivers in particular perform a unique ecological and environmental function within the landscape by linking different ecosystem types. Riparian corridors can extend over considerable distances and provide habitats for many species of plants and animals, whilst also facilitating the movement and survival of populations. Lakes, on the other hand, have important transitional and seasonal functions, such as resting areas for species during long-term migrations. Freshwater ecosystems are vulnerable to external pressures resulting from human land use activities, namely water pollution and hydrologic modifications. Lakes, as well as rivers, do not end at their shores or banks and cannot be seen as isolated from the land around them. An especially close link exists between freshwater systems and wetland habitats such as bogs, fens and marshes. All wetlands are profoundly affected by their local environment and by changes taking place on land, even at great distances.

---

<sup>8</sup> Stanners and Bourdeau, 1995

**Map 4 Simplified European hydrological system**



Source: Royal Haskoning, 2004

### 3.5 Conclusions

In terms of natural heritage the physical structure is of essential importance. When building a network of semi-natural areas, which is the ambition of Natura 2000, the context of their physical structure needs to be considered.

The location of specific semi-natural areas should always be considered within the existing physical structure of Europe.

Environmental factors such as water quality and quantity, air quality and climate change have a major impact on trends of European biodiversity in combination with human pressures like habitat loss, hunting, management practices and disturbance.

At the continental scale, Europe is divided into a number of bio geographical areas with similar qualities in terms of climate, soil and vegetation type. These are described further in Chapter 5 and operationalised for the analysis in section II.

## **4 Social-economic and territorial trends**

### **4.1 Introduction**

This chapter considers the diversity in Europe in terms of functional and territorial development. Before elaborating on the trends and their impacts, an overview of the past evolution and the current state of land use in Europe is presented. The current state should be seen as the result of centuries long processes of spatial development with regard to the natural heritage.

This chapter describes the long-term general spatial development of the European continent in paragraph 4.2, followed by the actual state of European land use. The territorial trends and diversity within Europe for most important land use types are described thereafter. We identify the existing spatial structure in paragraph 4.3 that focuses on agriculture and forestry (the non-built up or rural areas), while paragraph 4.4 on the urbanised and the built up areas presents the diversity of the territorial and functional polycentricity. The effects of environment and climate change are described in paragraph 4.5. In paragraph 4.6 conclusions are given while paragraph 4.7 gives an overview of the related indicators.

### **4.2 Past evolution: long-term**

When man arrived in Europe, they encountered a natural, untouched landscape which was determined by prevailing geophysical and climatic conditions. Small nomadic groups, hunting and gathering food, found shelter in caves or built temporary shelters during less harsh climatic conditions. Their influence on the landscape was limited.

Around 10.000 B.C. in the Middle East, awareness grew that nature could be harnessed and influenced in a way which was advantageous to man. Seeds were planted, crops were grown and cattle were bred and kept. This Neolithic revolution spread across Europe from 5500 B.C. from the Balkans to the Middle and West European forests zones and up to South Scandinavia at approximately 3500 B.C.

Some 10.000 years ago, at the end of the last ice-age, average temperatures rose and the habitable area of Europe expanded. Ice sheets,

glaciers and tundra previously limited this area. For example, in the northern part of Europe, Alpine and Scandinavian glaciers restricted habitable locations to an area roughly between Hamburg and Munich.

From that time on, farmers exploited nature in primitive ways. In areas where land was fertile, they settled and formed the first simple social structures and economies. Food production increased and resulted in population growth.

Due to climate changes, fir-dominated forest landscapes gradually changed into a more mixed vegetation type. Deforestation for agriculture resulted, following abandonment, in mainly shrub vegetated areas. Valleys of large rivers, which offer fertile soils and water supplies, became attractive locations for settlements. Thus, soil and water conditions largely determined locations for settlements, resulting in a polycentric structure of settlements consisting of a few small buildings, disconnected from each other, and spread throughout the landscape. Although these activities influenced nature at a small local scale, by exhausting fertile grounds prior to their abandonment the landscape easily regenerated. As human populations increased, agricultural production became more effective and efficient.

Exchange of information between tribes, resulted in innovations, improved tools for agricultural and domestic purposes and an overall enhanced living environment. Tribal migrations, in addition to the expansion of the Roman Empire, would have had a large influence, on both the dynamics of settling and on the development of local and regional cultures.

The infrastructure of the Roman Empire connected strategic points throughout Europe. Increased populations and agricultural production enabled trading activities and the development of markets. Their location was influenced more by the existence and accessibility of populations than by physical production factors.

Nevertheless, Europe was still scarcely populated and dominated by natural landscapes. Populations were largely dependent on nature and natural events. For example forest fires and flooding due to sea level rise or extreme rainfall were disasters affecting small groups of people. Human activities remained almost completely related to local geophysical characteristics, with specific attributes affecting the locations of agriculture, fishery and mining activities. The production and trading of salt, which conserves meat and fish, was an important activity that spread contacts throughout Europe, with for example, producers of Mediterranean Sea salt, salt miners in mountainous regions, and peat salt producers in low land areas. Improved opportunities to conserve (and trade) fish enhanced the development of fishery ports in coastal areas.



Seasonal migration of shepherds over the Pyrenees connected France with the Moorish culture in Spain after the 6th century, bringing Arabian sciences to Europe.

Although the European population grew, its estimated growth of 1.5 % per century did not result in significant negative impacts on the natural environment. Despite low population growth in the Middle Ages, towns developed around markets, located on road crossings or other strategic locations. In some areas, capital accumulated from local cultural systems, which were based on inheritance rights. In these systems, rich farmers became noblemen, who could exploit large areas with numerous farms and workers. These larger units were organised from the barons' houses that developed into strongholds. However, in other areas, inheritance rights lead to fragmentation of goods into ever smaller units and an increasingly poor population.

The long-term process of increasing the area under agricultural exploitation was sometimes disturbed by natural disasters, such as flooding events and periods of the plague. Similarly, man-made factors affected agricultural practices, such as wars causing populations to abandon dangerous areas, leaving land previously used for farming. During these periods, the average size of farm units increased in places.

Up to the industrial revolution, mining activities had been scarce and small in scale. However, during this revolution, industrial activity required large quantities of coal and iron, and mining became a major activity. Factories, settling near mines, attracted workers and industrial cities grew. The disturbance of the natural environment from large scale mining activities became more significant. Industries became large polluters of the environment and living conditions around those industries became unhealthy. This largely occurred in areas where coal and iron ore were easily accessible. Industrialisation formed the basis of the increasing economic power of Europe, first in the Midlands of the UK, and then in Northern France, the Ruhr valley, Southern Poland, Southern Belgium, the Basque country and Northern Italy. In other areas, agricultural/natural synergy was still viable and certain crops and cattle were farmed in mixed farms where conditions were favourable.

During every stage of these historic developments, nature was exploited and applied as an asset for economic activities. Rich industrial entrepreneurs migrated out of the cities, choosing attractive sites for residential settling in natural environments. First forms of sub-urbanisation appeared throughout Europe in attractive landscapes.

The growing population demanded increased food production, resulting in the specialisation and intensification of agriculture. Since the 19th century fertilisation of arable land became less reliant on natural systems and in the 20th century chemicals were increasingly used. Farming became a more economy-oriented method of large-scale production. Farm units became larger, (semi-) natural elements like hedges and ditches were destroyed. New farmland was created through the reclamation of previous natural areas and improved water management, which affected existing natural features in the surroundings. This age-long spatial development resulted in an incremental growth of agricultural area to almost 60% of the total European territory at the cost of previously undisturbed nature. Urbanisation was strongly developing and space per capita increased. Growing prosperity of the population resulted in city expansions and gradual sub-urbanisation of the landscapes.

In addition, infrastructure developments led to territorial fragmentation. Before the industrial revolution, roads were relatively minor elements in the landscape enabling transportation by environmentally friendly means. The invention of steam engines in the 18th century facilitated the development of the railway system, which did not represent a strong disturbance to the territorial coherence of the area crossed. After the Second World War, a network of motorways developed, facilitating the significantly increased demand for transportation and connections between cities with short travel times. These developments of infrastructure resulted in separation of the crossed area. Together with the modern system of speed trains, this infrastructure fragments the territory into pieces in which liveability for certain species became problematic.

Infrastructure facilitating easy commuting enhanced further sub-urbanisation. Mass transportation also facilitated longer travel distances resulting in mass-tourism. Urbanisation of tourist areas based on increased demand for facilities was an apparent consequence, jeopardising the natural values in the attractive landscapes.

The long-term spatial development, as described above, provides a number of conclusions:

- Actual land use in Europe is the result of a century long process of land occupation by an increasing population demanding an increasing area for agriculture.
- Understanding historic spatial development processes to consider future developments, requires a comprehensive understanding of the influences of space requiring activities like agriculture, urbanisation, tourism, infrastructure and the natural heritage.

- The existing natural heritage consists to a large extent of coincidental leftovers of European nature.
- The question of the territorial trends of the management of the natural heritage may be specified to: how can management (policy) stop or even turn around this long-term process of ever decreasing natural areas?

### 4.3 Current situation

Based on the CORINE land cover data, the current land cover at the macro level, represented by the bio geographical regions is given in Table 3 below.

**Table 3 Land cover for each bio geographic region and 20 km coastal zone (in percentages)**

	<b>Built-up</b>	<b>Agri- culture</b>	<b>Semi- natural area (incl. Forest)</b>	<b>Water bodies</b>
Alpine region	2	16	80	1
Atlantic region	6	69	23	2
Boreal region	1	19	70	10
Coastal region	5	54	37	4
Continental region	5	62	32	1
Mediterranean	1	52	46	1
Pannonian region	6	73	19	2
Steppic region	5	77	13	5

Source: CORINE land cover 1990.

Note: Built-up represents Artificial surfaces (CORINE level 1), Agriculture represents Agricultural areas (CORINE level 1), Semi-natural area represents Scrubs, open spaces and wetlands (CORINE level 2, 26-39), Forest represents Forest (CORINE level 2, 23-25), Water bodies represent Water bodies (CORINE level 1)

## CORINE land cover

Next to the actual situation of the natural heritage, as revealed through land cover analysis, the potentialities must be considered to restore and enhance natural values in accordance with agricultural, urban, tourism and infrastructural development policies.

In 1985 the CORINE programme was initiated in the EU. CORINE means 'coordination of information on the environment' and it was a prototype project working on many different environmental issues. The CORINE databases and several of its programmes have been taken over by the EEA.

One of the major tasks undertaken in the framework of the CORINE Programme has been the establishment of a computerized inventory on Europe's land cover. Data on land cover is necessary for the environment policy as well as for other policies such as regional development and agriculture. At the same time it provides one of the basic inputs for the production of more complex information on other themes (soil erosion, pollutant emission into the air by the vegetation, etc.). The CORINE land cover database provides a pan-European inventory of biophysical land cover, using a nomenclature of 44 land cover types. It is made available on a 250m by 250m grid database that has been aggregated from the original vector data at 1:100 000. CORINE land cover is a key database for integrated environmental assessment, as the land cover types are systematized and also grouped into classes. This permits a reliable differentiation between urban and other intensively used areas – such as for some forms of agriculture – with less intensive land uses and semi-natural areas.

This database is operationally available for most areas of Europe. Original inventories, based on and interpreted from satellite imagery as well as ancillary information sources, are stored within national institutions. The European reference database is owned by GISCO, the European Commission geographical information system, which is a part of the European statistic agency, Eurostat. The European Topic Centre / Terrestrial Environment (ETC/TE) manages the CORINE database (the production database) on behalf of EEA and delivers the updated database to GISCO every 12 months.

The significant utility of the CORINE land cover programme is to provide those responsible for and interested in the European policy on the environment with quantitative data on land cover that is consistent and comparable across Europe.

There exists no European wide inventory of land use changes, in terms of dimension, rate and trends. It is therefore difficult to give a comprehensive overview of spatial development in relation to nature. However, datasets such as the CORINE land cover dataset can be used to give a description. Currently an updated dataset, the CORINE 2000 database is being released. By comparing both databases, a comprehensive picture of spatial development can be computed for the last decennia.

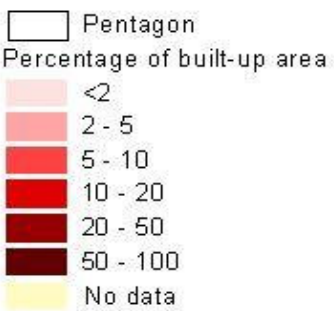
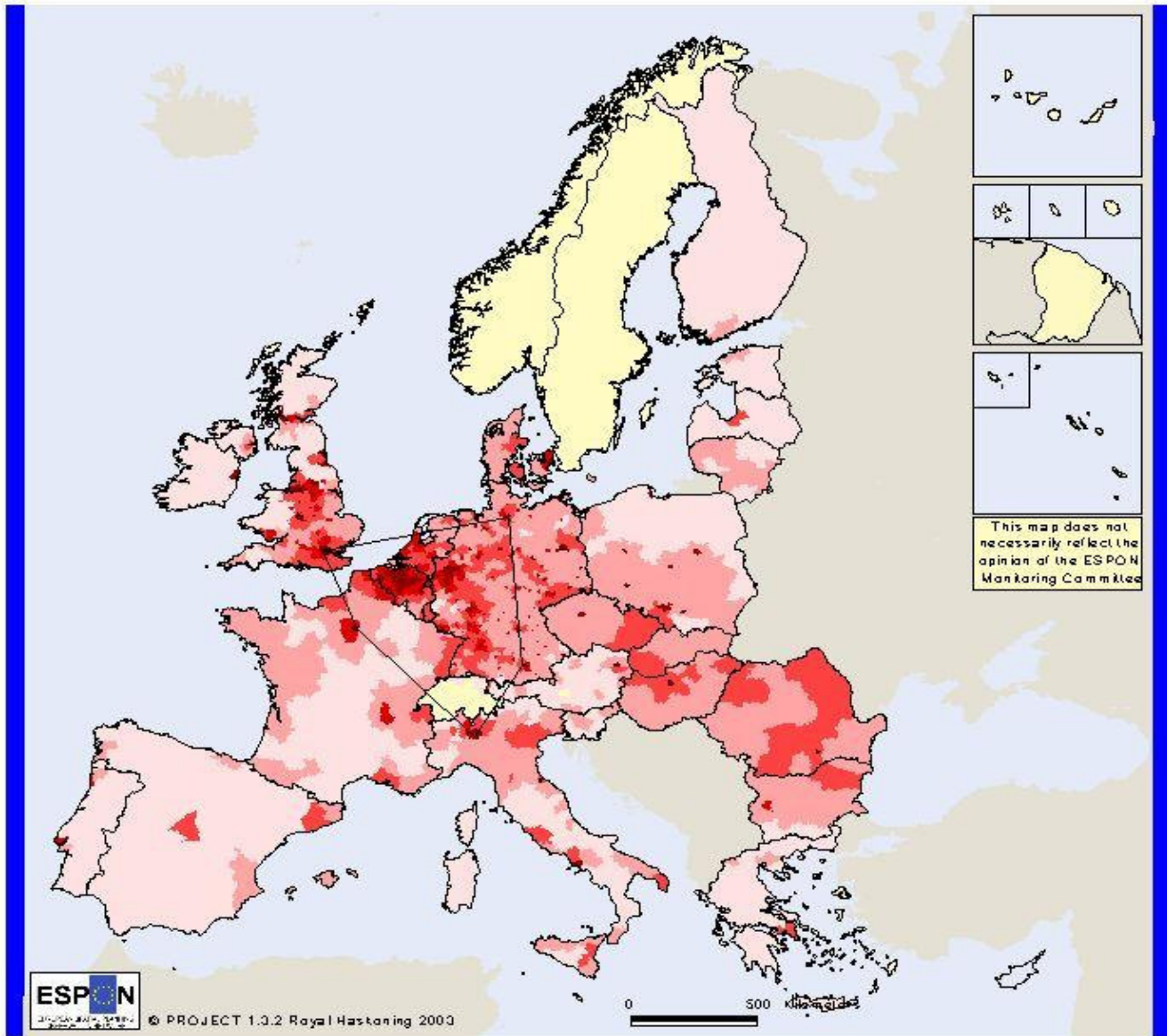
Table 3 shows that the regions with most agriculture are: the Steppic region, Pannonian region and Atlantic region. In the Boreal and Alpine regions forestry is the dominant land cover. Most urbanised are the Pannonian, Atlantic, Steppic and Continental regions and the coastal zone.

Map 5 gives an overview of the state of the built-up area in Europe, while Map 6 represents the area covered by semi natural<sup>9</sup> area. This land cover data is also illustrated in table 4, which gives the percentage built-up, agriculture, semi natural area, forest and waterbodies for each country.

---

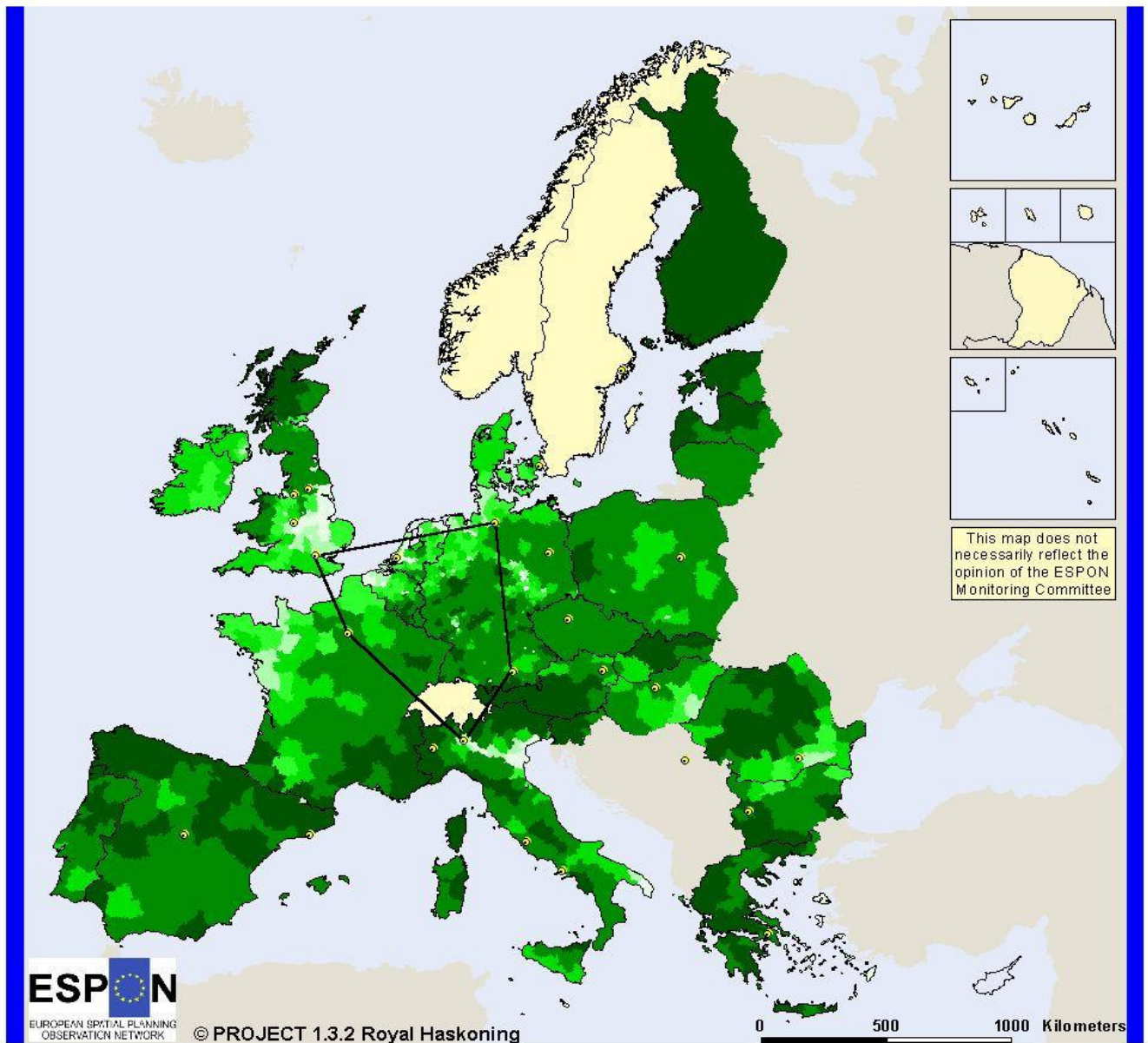
<sup>9</sup> Semi natural areas can be defined as natural areas with a specific mix of cultural and natural values. Undisturbed natural areas hardly exist in Europe.

**Map 5 Percentage built-up area for NUTS3**



© EuroGeographics Association for the administrative boundaries  
Sources: IUCN, Eurostat, ESPON Data Base, EEA

**Map 6 Percentage semi-natural areas for NUTS3**



- Main cities
- Pentagon
- % natural areas NUTS3 regions
- 0 - 2
- 2 - 5
- 5 - 10
- 10 - 20
- 20 - 50
- 50 - 100
- no data

© EuroGeographics Association for the administrative boundaries  
Sources: IUCN, Eurostat, ESPON Data Base, EEA

**Table 4 Land cover per country (in percentages)**

		<b>Built up</b>	<b>Agri-culture</b>	<b>Semi-natural areas</b>	<b>Forest</b>	<b>Water bodies</b>
<b>BE</b>	Belgique-België	19	59	1	20	1
<b>DK</b>	Danmark	6	77	2	9	2
<b>DE</b>	Deutschland	7	61	1	29	1
<b>GR</b>	Ellada	1	35	37	15	1
<b>ES</b>	España	2	32	9	47	9
<b>FR</b>	France	4	62	7	25	1
<b>IE</b>	Ireland	1	67	9	4	16
<b>IT</b>	Italia	4	54	16	24	1
<b>LU</b>	Luxembourg (Grand Duché)	7	55	0	37	0
<b>NL</b>	Nederland	10	75	2	9	3
<b>AT</b>	Österreich	2	36	17	44	1
<b>PT</b>	Portugal	1	52	18	28	1
<b>FI</b>	Suomi/Finland	1	7	17	64	11
<b>SE</b>	Sverige	no data	no data	no data	no data	no data
<b>UK</b>	United Kingdom	6	58	24	7	3
<b>CY</b>	Kypros	no data	no data	no data	no data	no data
<b>CZ</b>	Ceska Republica	5	59	3	31	1
<b>EE</b>	Eesti	1	51	29	17	1
<b>HU</b>	Magyarország	6	72	2	18	2
<b>LT</b>	Lietuva	3	62	2	29	3
<b>LV</b>	Latvija	1	44	7	43	4
<b>MT</b>	Malta	no data	no data	no data	no data	no data
<b>PL</b>	Polska	3	65	1	29	2
<b>SI</b>	Slovenija	3	34	6	57	0
<b>SK</b>	Slovenská Republika	5	51	4	40	0
<b>BG</b>	Balgaria	5	54	10	30	1
<b>RO</b>	România	5	52	13	28	2
<b>NO</b>	Norge	no data	no data	no data	no data	no data
<b>CH</b>	Schweiz	no data	no data	no data	no data	no data

Source: CORINE land cover 1990

Note: Built-up represents Artificial surfaces (CORINE level 1), Agriculture represents Agricultural areas (CORINE level 1), Semi-natural area represents Scrubs, open spaces and wetlands (CORINE level 2, 26-39), Forest represents Forest (CORINE level 2, 23-25), Water bodies represent Water bodies (CORINE level 1)



In Denmark, Hungary and the Netherlands more than 70% of the land is for agricultural purposes. Belgium has the highest percentage of built up areas, and is almost twice as high as the percentage for the Netherlands. Over 50% is forest in Finland and Slovenia.

Territorial trends may cause a threat as well as a challenge to nature. Most important are the following trends:

- Agricultural intensification and extensification, and the abandonment of land. Agricultural production not only focussed on feeding the local population, it also became subject to trading and transportation thereby stimulating further development of roads and increase of agricultural area. At the same time, land has been taken out of production in the more remote and marginal areas in large parts of the continent;
- Increase of the surface of urbanised land and infrastructure;
- Due to population sprawl, increase of average space used per person and facilities for services inclusive mobility and for economic activity;
- Growing tourism inducing urbanisation, large traffic growth and rural pressures.

The following paragraphs give an overview of major trends, their territorial impacts and their potential impact on nature.

#### **4.4 Agriculture and forestry**

Agricultural activity is carried out under different intensities. Intensively used pasture or arable monocultures make up the most intensive forms. In contrast, grazing in uphill moorland and mountain pasture form the least intensive type. It is therefore not always easy to draw a clear line between agricultural habitats and semi-natural habitats. A landscape is usually made up of a mosaic of exploited and unexploited elements.

##### **4.4.1 Intensification and extensification of agricultural land use**

The question of the intensification and extensification of agricultural land use has to take into account two parameters: the amount of land designated to agricultural activity and the total productivity.

In almost every country, agricultural land use has decreased in a linear fashion dramatically over the 40-year period from 1961-2001, with the shift predominantly to forestry but also to other land uses, such as urbanisation and transport infrastructure. The average decrease is in the order of 20% with any increase that has occurred being only a few percentage points. Malta and Switzerland have witnessed a substantial decrease in agricultural land of more than 20% in the period 1991-2001. The average increase in forested lands in many countries has been on the order of 25%.

Despite this decrease in agricultural land, the productivity index (net PIN) established by FAO has reflected an increase in productivity, in general a doubling, during the period 1961 to 1991. This increase is seen in tangible increases in production factors, such as the number of tractors and the amount of fertilisation used. There is a marked downturn in productivity during 1991-2001, certainly attributable to the agri-environmental reform of the CAP in 1992 in the EU, and the transition from a socialist to a market economy in Eastern Europe. The influence of the CAP reform on encouraging extensification will be progressively felt throughout Europe, if the recent orientations of the Rural Development Regulation 1783/2003 are confirmed in the EU agricultural programme 2007-2013.

Having witnessed a general increase in productivity, largely attributable to the intensification of agriculture, it is interesting to observe the unequal distribution of this intensification according to geography. It is notable that, in terms of European biodiversity, the southern countries of EU15, are the most renowned for their natural extent of species richness, but are probably also those that have suffered most from intensification during this period. For example despite a decrease of 10% in agricultural land use in Spain, there has been an increase in crop output of nearly 250% and an augmentation of over 300% in that of livestock. The number of tractors has increased ten-fold, although starting from a very low level compared to northern European countries such as The Netherlands or the United Kingdom. The increase in fertilization has been 200%, but again, this level started from a low level. Nevertheless, the impact on biodiversity will have been significant, increasing the vulnerability of wildlife, polluting wetlands and producing large-scale monoculture in both agriculture and forestry mirroring the rest of Europe. A similar portrait can be made for Portugal and Greece. For these latter countries, however, attention should be brought to the increase in permanent crops; vineyards and olive groves, respectively. Agriculture and forestry have become progressively industrialised throughout Europe; considering, for example, the amount of planned forestry operations in a number of countries, namely France, Italy, Hungary,

The Netherlands, Norway, Poland, Portugal, Spain, Switzerland and the United Kingdom.

Map 7 illustrates the average agricultural holding size.

#### **4.4.2 The abandonment of agricultural land**

Abandonment is the result of marginalisation in agriculture. This marginalisation process is driven by a combination of social, economic, political and environmental factors which, in certain areas do not make farming viable under the existing land use and socio-economic structures.<sup>10</sup>

Abandonment is a major problem in the Less Favoured Areas (areas with poor soil and/or climate conditions), which are found mainly in the Mediterranean region, Slovenia, Ireland, Scotland and the Nordic countries.<sup>11</sup> Agricultural land in regions that, in the past, were farmed less intensively because of climate, soil or economic conditions, is now being abandoned. In some regions, such as mountains, this leads to reduced biodiversity, the impacts being more pronounced in areas where small-scale traditional farming methods predominate.<sup>12</sup>

Utilized agricultural area is decreasing throughout Europe, as a result of urbanisation, afforestation and land abandonment. Land abandonment is a dominant process in Central and Eastern Europe. In Estonia, for example, approximately 30% of the 1.5 million hectares of farmland has been abandoned recently. Among semi-natural grasslands of medium or high natural value (37.000 ha) only 40% is still under management.<sup>13</sup> The Council for Pan-European Biological and Landscape Diversity Strategy stated that extensive farmland, important to biodiversity, is more severely affected by land abandonment than the overall land abandonment figures suggest. In Central and Eastern Europe, arable land accounts for the biggest area losses. Pasture is more stable but within this area, significant management changes have occurred. The reduction of extensively managed and species-rich habitats that has certainly occurred within the agricultural landscape is not apparent in the general statistics (Council for Pan-European Biological and Landscape Diversity Strategy, 2002:14).

---

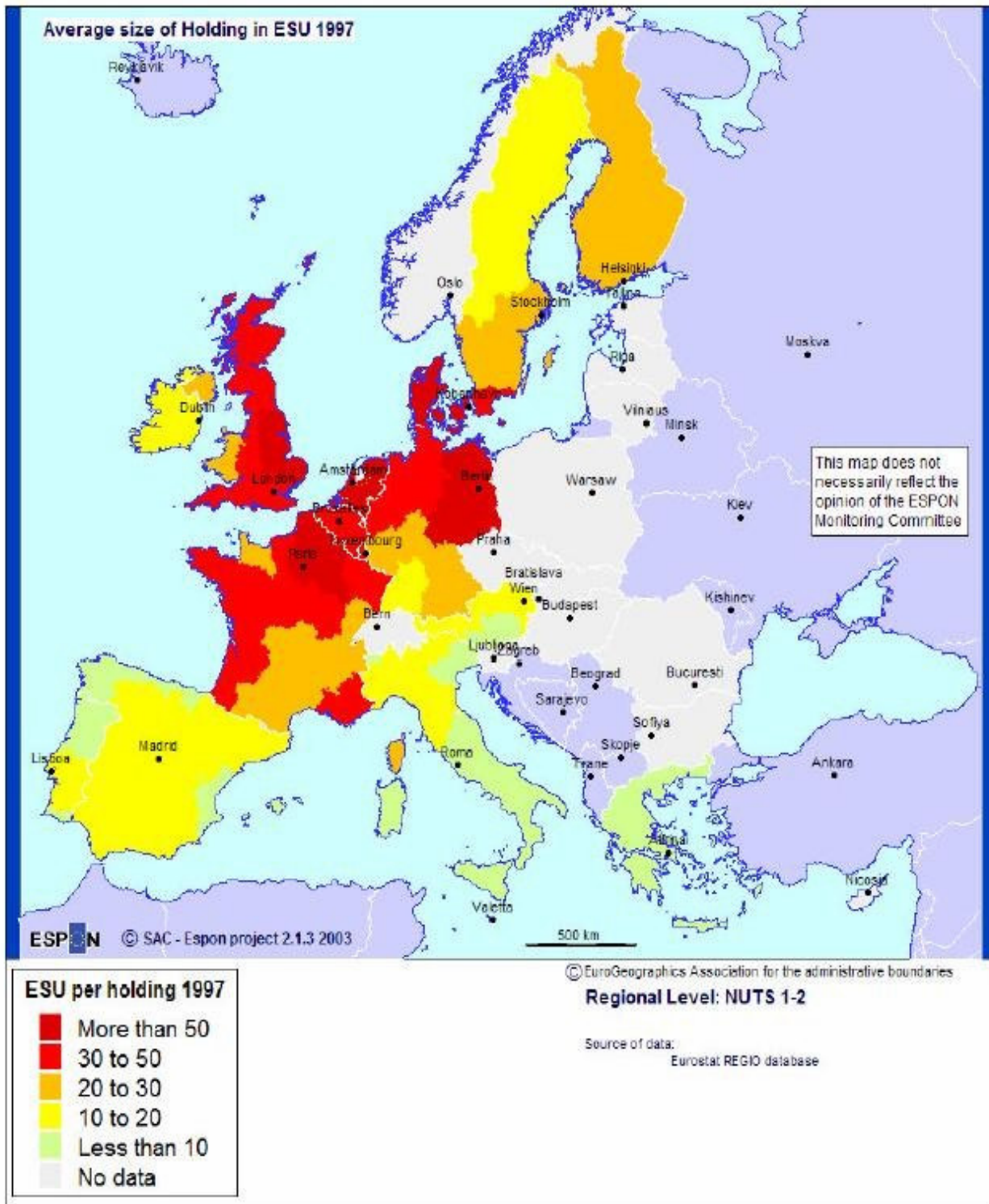
<sup>10</sup> Baldock et al., 1996

<sup>11</sup> Baldock et al., 1996

<sup>12</sup> Delbaere, 1998

<sup>13</sup> Mägi and Lutsar, 2001

**Map 7 Average size of holding in ESU for 1997**



The impact of abandonment depends upon natural values, biodiversity or, more generally, the quality of the abandoned land and the new use of the land. The area may gain or lose qualities.

The strict nature conservation rules in Central and Eastern Europe at the local level can be very demanding and may result in marginalisation agriculture ending in abandonment.<sup>14</sup>

### **4.4.3 Forestry**

For the last three thousand years, the history of European forests has been one of severe destruction, followed by a slow recovery in forest cover during the last century. More recently, there have been increasing efforts towards sustainable forest management techniques. Europe has lost two-thirds of its original forest cover, mainly through clearance to make way for human settlements and agriculture and for use in the production of iron, coal and salt, and as timber for shipbuilding. The forest area in Europe has decreased to 5.65 million km<sup>2</sup> today, of which only 2% is regarded as semi-natural. Threats for forests include fragmentation for road construction, atmospheric pollution such as acidification and eutrophication, climate change, and human induced forest fires.

At the end of the 19th century, broadleaved woods were extensively replaced by coniferous plantations, especially in Germany. At this time in the Netherlands, large open heather dominated landscapes were forested with conifers and beeches. As result there was a significant loss of diversity and the landscape changed enormously. The diffused management of European forests caused an overall simplification of forest structures and composition. The effects of those replacements are today still remarkable.

The trend of the decrease in forest cover has been reversed in recent decades: the stock and area of European forests are expanding and efficient instruments for controlling conversion of forests to other land uses are in place.<sup>15</sup>This policy shift has, especially in Central and Eastern Europe, resulted in the transformation of biodiversity-rich meadows into forest on a large scale. In the Czech Republic alone, hundreds of thousands of hectares are at stake. The Czech population does not want large-scale afforestation; landscapes will completely change and species that are now common will become rare.<sup>16</sup>

---

<sup>14</sup> EEB, 2003

<sup>15</sup> Delbaere, 1998

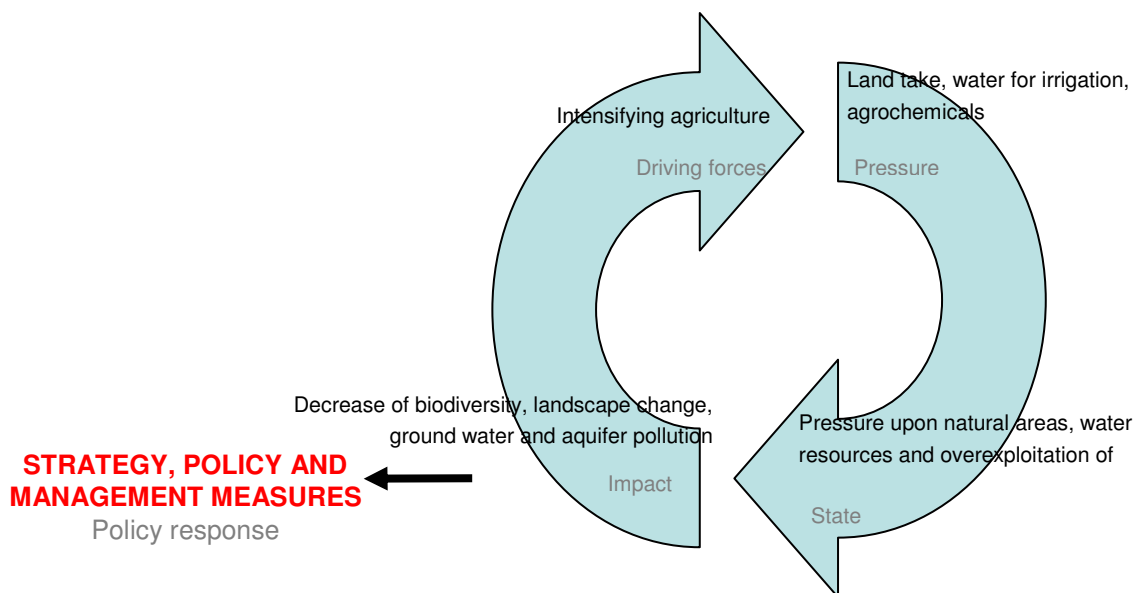
<sup>16</sup> EEB, 2003

Fortunately, in some countries, like Slovenia, sustainable forestry is common practice. As a result of these sustainable practices, Slovenian forests are characterized by high biodiversity. Some Slovenian forests even serve as habitats to wolves, bears and lynxes, species that are not as common in Europe as they used to be. There has also been a policy shift in Germany and the Netherlands over the last two decades, in which more attention is given to the semi-natural and biological characteristics of forests instead of just its productive characteristics.

#### 4.4.4 Strategy and management measures related to agriculture

Population increase if not at European level but world wide, along with the abandonment of the traditional life style and the consequent abandonment of more rural areas and the concentration of many people in cities and towns, has resulted in the intensification of agricultural production. Owing to agriculture intensification and the need for more goods, more land is needed as well as more chemical inputs. Pressure upon semi-natural areas then is apparent, along with pressure on water resources and overexploitation of natural resources. It is inevitable that the biodiversity is being decreased and that landscape elements are being changed or destroyed.

**Figure 5 DPSIR and agriculture**



- D** - **Agriculture**
- P** - Land take / irrigation water management / Agrochemical inputs
- S** - Pressure upon semi-natural areas/pressure upon water resources/overexploitation of natural resources (e.g. soil, water)

- I** - Decrease of biodiversity / landscape change / Pollution  
**R** - Planning / management

Apart from the negative impact of agriculture, some agricultural areas contain high ecological value or are important for the landscape quality or the openness of areas.

#### 4.4.5 Indicator

Agriculture	Criteria	Source	Comment
Agricultural area	Size of agricultural area	CORINE 1990, FAO	CORINE Land Cover 2000 is not available for pan-Europe (only recently available for Ireland, Luxembourg, The Netherlands, Latvia, Estonia, Slovenia and Malta)

Other agricultural indicators, such as average holding size and agricultural production cannot be associated to natural value. For example, holding size can both have positive or negative effects on natural value, as natural value is more related to bio geographical factors.

It might be expected that natural value is related to the process of extensification and intensification. In order to map this process, no data is available. However, using the CORINE database, those area used for intensive or extensive agriculture can be mapped (see Section II).

#### 4.5 Urbanisation

The process of urbanisation results in built up areas has the following driving forces:

- population;
- economic aspects;
- tourism; and

- infrastructure.

In order to identify in more details the driving forces that affect natural heritage, as well as their actual impacts, a more detailed model is applied highlighting the relationship with the five driving forces which have been identified as the most important parameters regarding influencing natural heritage.

Population, Gross Domestic Product, Tourism, Infrastructure, Agriculture and economic innovation are considered to be the basic Driving Forces in the process which influence natural heritage in Europe at large.

It is evident that population changes (increases of the past expansion, concentration and de-concentration, mobility, etc.) are interrelated with GDP, Tourism and Infrastructure. Therefore, changes in GDP and Population changes, and infrastructure are closely linked together and any changes in any of these parameters, affects the other. Tourism too, is closely linked with GDP and infrastructure.

#### **4.5.1 Population**

Throughout Europe, the recent drop in the rate of population growth has been remarkable. In the period 1950-1975, the average annual rate of growth was 8.3 per 1000 of the population. In the most recent quarter century, this index fell to 2.9 per 1000. More specifically, the annual population growth rate in Europe declined from 0.44% to 0.03% between 1985 and 2000. Around the turn of the century a negative population growth rate appeared in 17 European countries: Bulgaria, Croatia, the Czech Republic, Estonia, Germany, Greece, Hungary, Italy, Latvia, Lithuania, Romania, Slovenia and Sweden. At the same time, a close to zero natural growth rate existed for Austria, Poland, Slovakia and Spain.<sup>17</sup>

Low fertility levels have played an important part in this negative population growth. From the late 1960s to the early 1980s, fertility fell well below the replacement level (circa 2.1) in most European countries. This led to a decline in population growth and an ageing population structure. However, this pattern of decline and level of fertility varied substantially between European countries, indicating differences in potential demographic prospects in the years to come.<sup>18</sup>

---

<sup>17</sup> ESPON Project 1.1.4

<sup>18</sup> ESPON Project 1.1.4



Another important factor influencing population growth in some countries is out-migration of young people.<sup>19</sup>

Eurostat compiled regional population scenarios at NUTS2 level in 1997, covering the period 1995-2025. According to the baseline scenario (described as a continuation of current trends), the EU15 population as a whole will continue to grow at a very low rate and start declining at around 2020. In the period 2020-2025 this rate is expected to decline to -0.24%. The number of regions with a negative rate of population change is expected to have tripled by the year 2025 (by comparison, in the latter half of the 1990s approximately thirty NUTS2 regions - mostly concentrated to the former eastern Germany and southern Europe - faced a declining population). Regions experiencing population decline will be widely spread across the EU territory, comprising around half of the EU population.<sup>20</sup>

A general increase in population size and use of space per family and individual, especially in areas with high prosperity, all lead to an ongoing growth of residential areas and increased space requirements for economic activities, services, infrastructure, and tourism and recreational facilities. The social, or societal, effect of this is a decline of rural populations and a corresponding increase in urban populations. The spatial effect is a relatively dense network of cities, towns, roads and railways that lead to an enhanced pressure on natural heritage. Over the last fifty years, urban expansion and intensification of agriculture has resulted in radical changes of rural landscapes, including semi-natural areas. As more land is urbanised and population growth is stabilizing, trends of declining population densities can be observed in large parts of Europe.

Map 8 shows the population density in Europe for NUTS3 level in 1999 and map 9 shows the population growth and decline from 1995-2000.

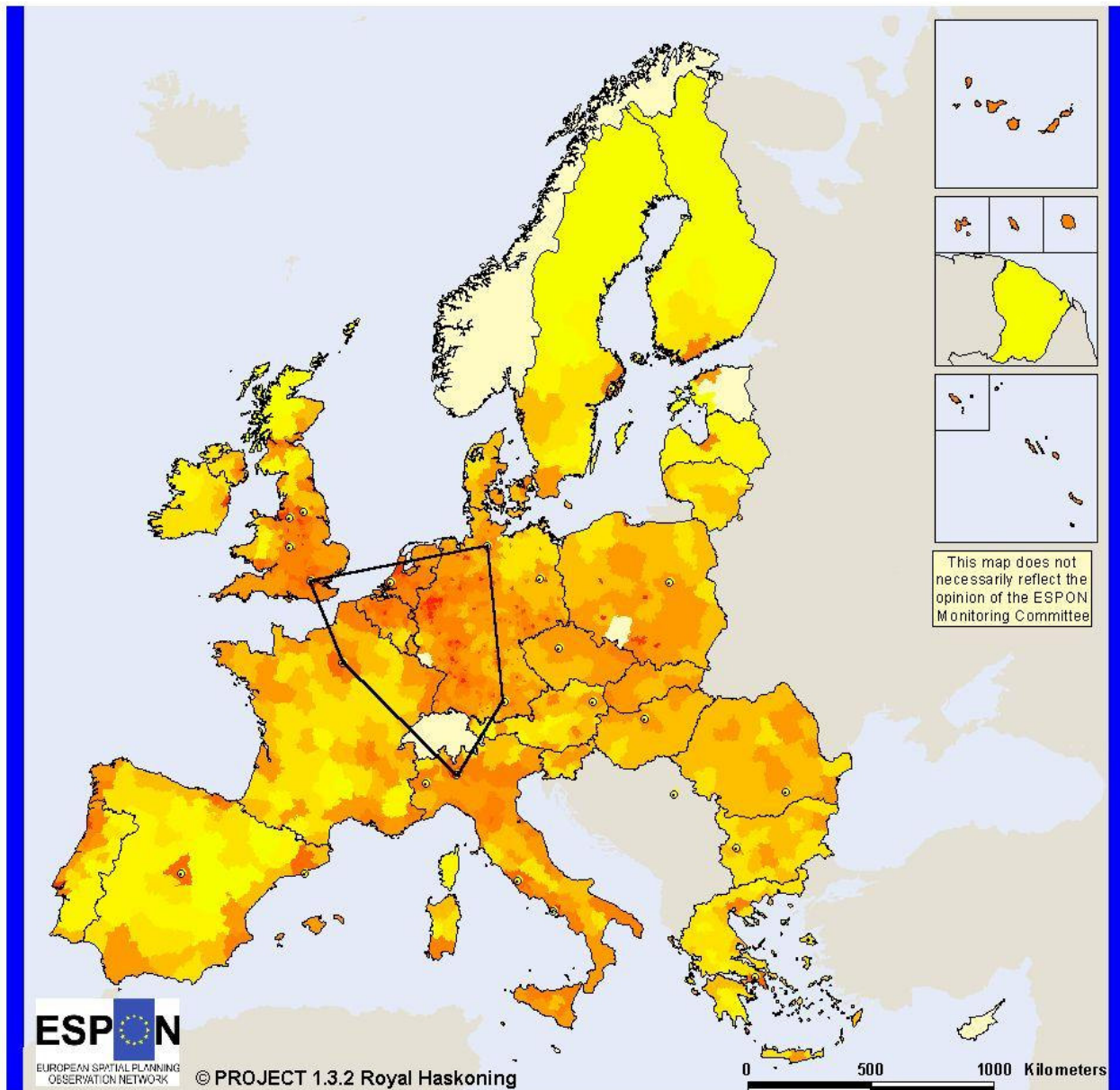
Development pressures determine the speed of urbanisation of rural areas, urban fringes and semi-natural areas. This incremental process of urbanisation may be rapid or slow depending on the rate of economic development. As a proxy for determining development pressure, the level of population growth or decline can be applied. For example, areas experiencing a declining population will require less additional land for urbanisation than areas experiencing an increasing population.

---

<sup>19</sup> ESPON Project 1.1.4

<sup>20</sup> ESPON Project 1.1.4

**Map 8 Population density for NUTS3**

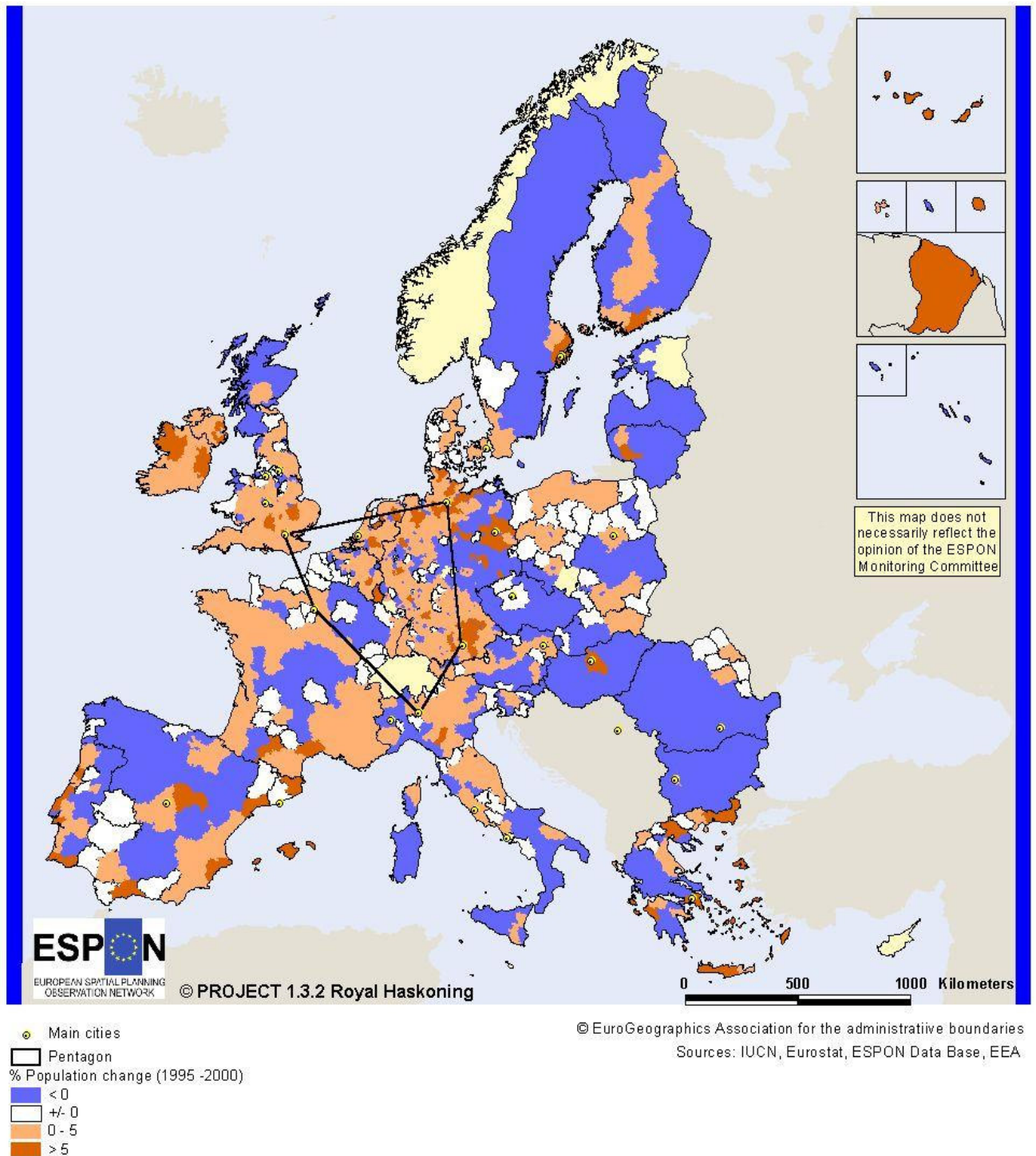


This map does not necessarily reflect the opinion of the ESPON Monitoring Committee

- Pentagon
  - Main cities
- Population density (inhabitants per km<sup>2</sup> in 1999)
- 0 - 15
  - 30
  - 30 - 60
  - 60 - 100
  - 100 - 200
  - 200 - 500
  - 500 - 1000
  - 1000 - 2000
  - 2000 - 10000
  - 10000 - 100000
  - No data

© EuroGeographics Association for the administrative boundaries  
Sources: IUCN, Eurostat, ESPON Data Base, EEA

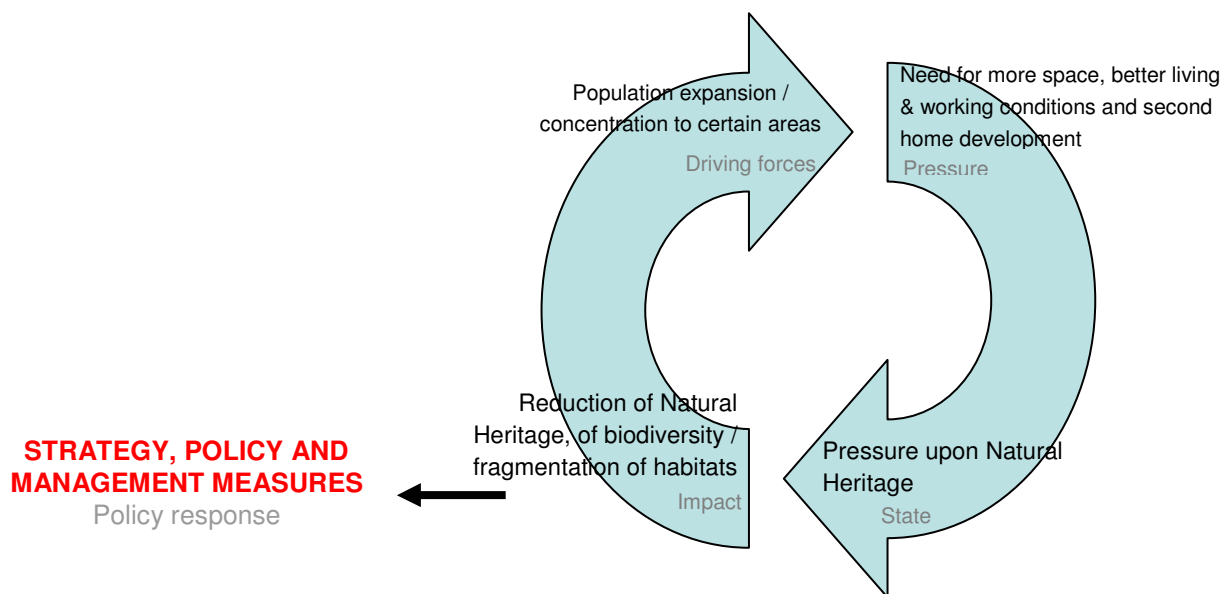
**Map 9 Population changes between 1995 and 2000 for NUTS3**



Population changes are inevitably a driving force affecting natural heritage. Population dispersion and/or concentration to certain areas, mainly due to high levels of infrastructure, or due to high quality nature, acted as driving forces for a series of phenomena, in the last decades. As more population is gathered in certain areas, more infrastructure is needed and consequently

more land is occupied. Unavoidably a reduction of natural and semi-natural areas took place, since they were taken over by man made structures. In the European continent, characterised mainly by a declining or static population, population is influencing natural heritage in different ways. There is an increasing need for more space per capita, for better living, working and recreation conditions, which led to considerable increases of space occupied by settlements of all types. Additionally, the increased need for a second home also affects natural heritage. These processes also alter the landscape of an area, leading to fragmentation of habitats reduction of biodiversity, among other. Since these processes have obvious adverse effects on nature, a need for an innovative and more balanced development is long overdue. Thus, strategy, policy and management should form the solution and necessary response, in order that a more sustainable model of development takes place within the European space.

**Figure 6 DPSIR and population**



- D** - **Population** dispersion / concentration to certain areas
- P** - Need for extra infrastructure / need for more land
- S** - Pressure upon natural heritage
- I** - Reduction of natural heritage / reduction of biodiversity / fragmentation of habitats
- R** - Planning / management

#### 4.5.2 Economic aspects

As stated in the previous paragraph, the incremental process of urbanisation may be rapid or slow depending on the rate of economic development. The Gross Domestic Product (GDP) is the generally accepted indicator of economic development. The European countries with the highest GDP's are, in rank order, Germany, the UK and France. World rankings of these countries are third, fourth and fifth respectively, with the USA and Japan leading, the rankings table.

Between 1992 and 2000, the GDP of the US grew by 36% in real terms, compared to 19% for the combined EU countries. Despite enormous structural changes undertaken in Europe in the last twenty years, including the integration and liberalization of key EU markets, the birth of the Euro, the accession of ten new countries, Germany's reunification and the adoption of a growth and stability pact limiting national budget deficits, economic growth has been sluggish in comparison to US performance.<sup>21</sup>

A large positive change in GDP in 1995-2000 has taken place in Finland, Northern UK, Ireland, Lithuania, Poland, Czech Republic, Slovak Republic, Hungary, Bulgaria and Italy. Portugal and Spain also score relatively high.

An important factor behind Europe's relative small growth goes beyond trade in goods and services and flows of capital and investment.

The European Commission (Directorate-General for Economic and Financial Affairs) developed competitiveness rankings. The European countries area ranks as follows, with the most competitive country first: Finland, Sweden, Denmark, Switzerland, Iceland, Norway, Netherlands, Germany, UK, Austria, Malta, Luxembourg, Estonia, Spain, Portugal, France, Belgium, Ireland, Slovenia, Hungary, Greece, Latvia, Czech Republic, Lithuania, Italy, Slovak Republic, Poland, Bulgaria.

The strong competitive position of Northwest Europe is also reflected in this table. The Scandinavian countries are all in the top 6. Interesting is that Ireland, Italy and the Eastern European countries play minor roles in the competitiveness index.

Regional Summary Innovation Index (RSII): rank absolute innovative performance of regions in Europe. National innovative capabilities tend to be concentrated in a few regions in the EU are Stockholm and Vastsverige (SE), Uusimaa (FI), Oberbayern and Stuttgart (DE) and Noord-Brabant (NL)

For Finland and the UK the innovative milieu might play a role in the GDP-change between 1995 and 2000. Interesting is that Ireland, Italy and the

---

<sup>21</sup> EUROSTAT, 2002

Eastern European countries, which also showed a positive change in GDP, do not have high scores on innovation.

Six innovative profiles can be distinguished:

- Cluster 1: the highest per capita GDP, the best-educated workforce and more service oriented with a relative employment share in high-tech services more than twice than in medium high and high-tech manufacturing. This happens in Finland and Sweden.
- Cluster 2: a high per capita GDP, the best patent performance, a strong focus on manufacturing and a strong educational performance are characteristics of the economic structure in Germany (Oberbayern and Stuttgart) and in Noord Brabant in the Netherlands
- Cluster 3: an above EU average per capita GDP, strong R&D and patent performance, strong educational performance and a high employment. Most of the regions with these characteristics are located in Germany, Finland, France, the Netherlands and Sweden
- Cluster 4: above EU average per capita GDP, have a strong educational performance, but a less than average R&D and patent performance, mainly in UK and the Netherlands
- Cluster 5: per capita GDP close to the EU average, but below EU average R&D and patent performance. Weak education, especially in life-long learning in Germany, France and Austria
- Cluster 6: lowest share of people working in high-tech sectors, lowest business R&D-intensity, almost no patent activity, lowest educational performances and lowest per capita GDP in the Southern EU countries and France

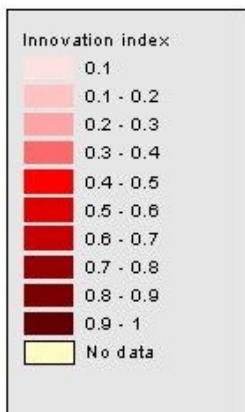
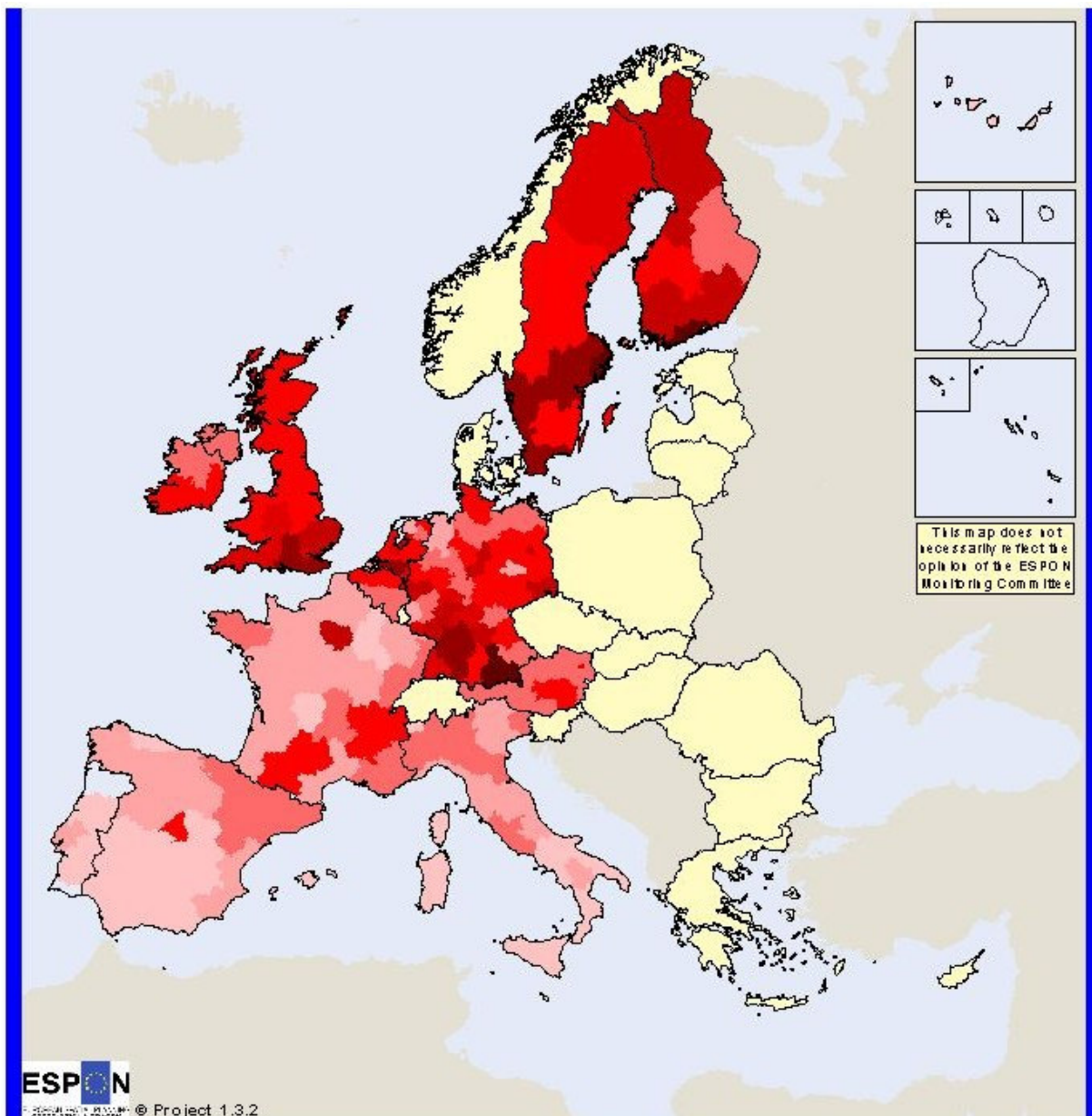
It is often the case, that population changes and needs evolve according to changes of economic and technical parameters. Novelty of the development strategy is the discovery of territory by economists, who formerly considered space as a neutral category. Territory is not interchangeable and neutral, it has a history, particular inhabitants and spatial relations are not producible and constitute an immobile resource<sup>22</sup>. GDP increase, leads to the need for more space, more leisure demands, and higher quality infrastructure and nature. Suburbanisation is then more likely to occur. The relationship of GDP to Population habits affecting nature in several ways is very clear here. Therefore, more natural resources are being utilised, and overexploited, and in the end more money has to be spent in order to maintain the environmental quality. The need for second home development and

---

<sup>22</sup> Espon project 1.1.1

suburban housing means that open spaces and semi-natural areas are turned into development sites. The situation is further accentuated by the need for more space for commerce in urban fringe areas for the development of shopping malls and warehousing facilities to take advantage of the higher spending capacity. These sites have to be in relatively close distance to main cities and to have high nature quality. The concentration of development in a certain area is directly related to its size. When the optimal size has been surpassed, due to high economic, social and environmental costs, development curbs or halts and investors search for other attractive places. Hence a high cost for the rehabilitation of the area is generated, as well as a probable second cost from the loss of a new semi-natural area.

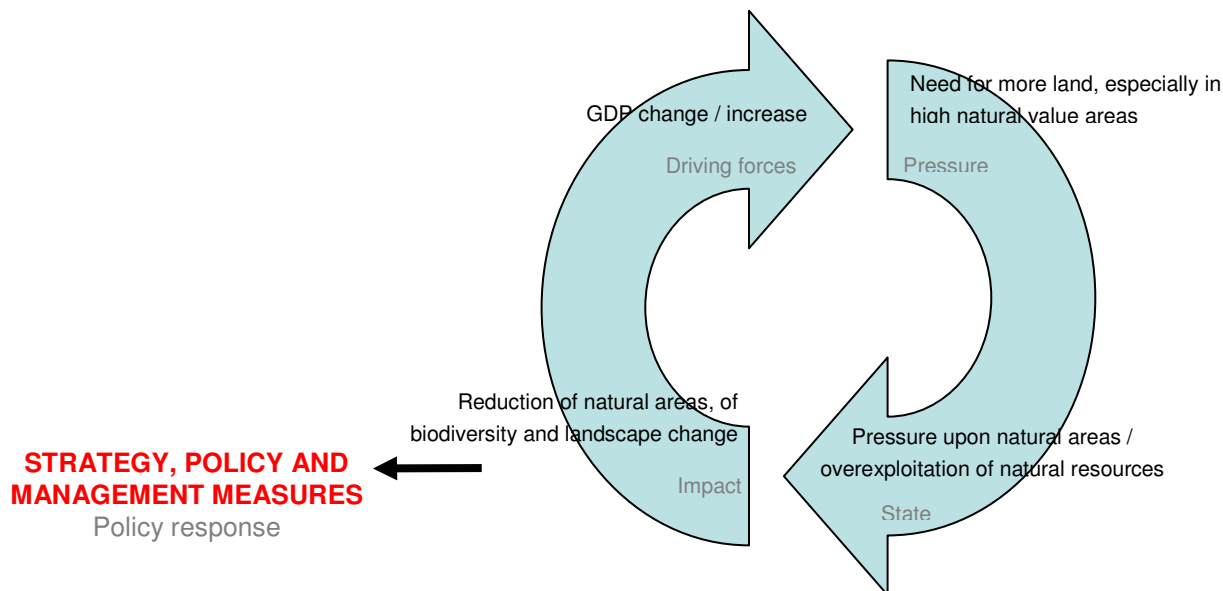
**Map 10 Innovation index**



© EuroGeographics Association for the administrative boundaries  
Origin of data: EC  
Source: ESPON Database



**Figure 7 DPSIR and economy(GDP)**



- D** - **GDP** change / increase
- P** - Need for more land, especially in high natural value areas
- S** - Pressure upon natural areas / overexploitation of natural resources
- I** - Reduction of natural areas / reduction of biodiversity / landscape change
- R** - Planning / management

GDP increase also gives the opportunity of higher investments in natural heritage which may result in more protected or better protected areas.

### 4.5.3 Tourism

Europe is the most visited tourist region in the world, representing nearly 60% of worldwide international tourism activity. Since 1980, the tourism sector has seen international arrivals in European destinations double, and signs are that growth is set to continue. The World Tourism Organization foresees an increase of 3% per year in tourism arrivals in Europe in the next two decades. This projected growth will have major effects on jobs in and income from the tourism sector. Currently in the EU, two million tourism-related enterprises are employing 7.7 million people, a figure expected to rise by approximately 15% over the next ten years. In 2001, the tourism industry delivered about 5% of EU GDP which rises to over 12% when the

wider tourism economy is taken into account. Tourism is, and will continue to be, an important sector of the European economy.<sup>23</sup>

Demographic changes play an important role in tourism growth. The current demographic shift towards an older population (the proportion of people over the age of 60 in developed countries is expected to grow from 20 to 33 percent over the next 50 years) will have a major impact on tourism trends and demand. Emphasis on pleasant living conditions and a healthy environment also has an impact on tourism. Next to that, tourism is influenced by transport and mobility. For instance low-cost flights are growing in number and rail travel is expected to increase as result of road congestion.<sup>24</sup>

Scenery (49%) and climate (45%) are the two principal determining factors when a tourist destination is selected. The cost of travel (35%) and the cost of accommodation (33%) follow.<sup>25</sup> The favourite country for 6 EU15 countries is France and for another 7 European countries Spain is the favourite tourist destination. The most popular types of destinations include the coast (63%), mountains (25%), cities (25%) and the countryside (23%). Neither gender nor age make any difference in the selection of this type of destination.

With over 60 million tourist arrivals per year the Alps are among the most heavily visited tourist destinations in Europe. The coasts of the Mediterranean have come under significant tourism pressure on a scale not previously experienced. The tourism industry, especially accessibility to specific sites, has considerable impacts in Alpine and coastal regions (especially the coastal areas of Spain, France, Italy and the Greek islands). Other European regions, such as Eastern Europe, are currently being harmed by direct and indirect impacts of the tourism industry, including construction of infrastructure, increased consumption of natural resources, increased pollution and high levels of disturbance.

Fortunately, major international tourist organisations are increasingly aware of their responsibilities and promote ecotourism and other methods of sustainable tourism. In various regions they are also actively involved in implementing projects to balance the needs of tourism and nature conservation.

The emphasis on the sustainability of tourist organisations attunes with the general growth of environmental consciousness. This will result in more

---

<sup>23</sup> EC, Structure, performance and competitiveness at European tourism and its enterprises, Luxembourg, 2003; Bos, 2003

<sup>24</sup> EUROSTAT, 2002

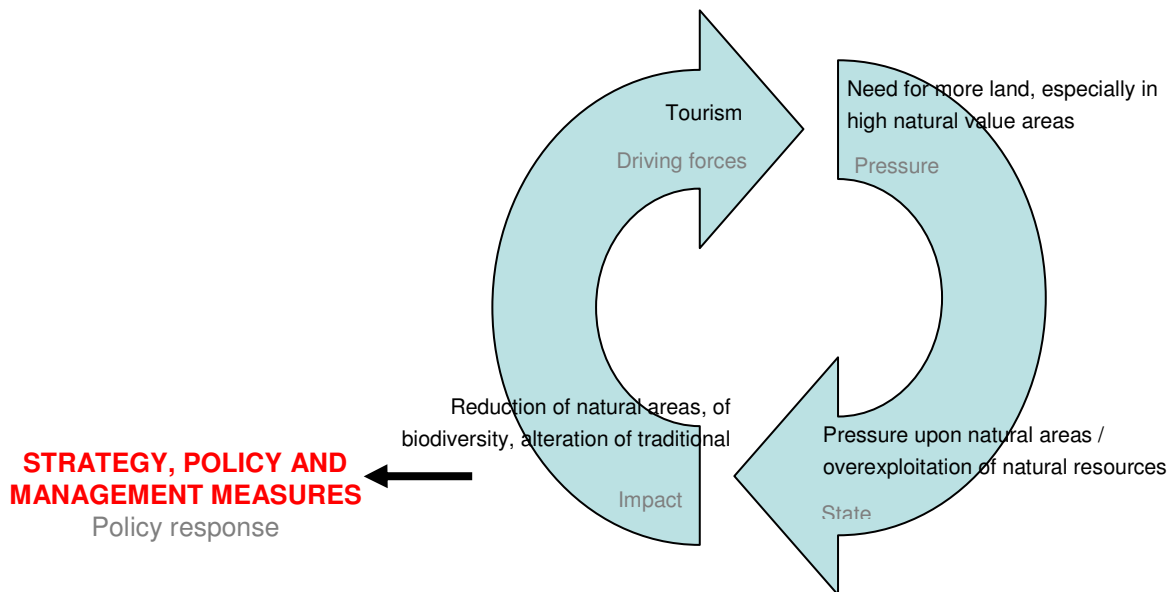
<sup>25</sup> EU DG XXIII, An Euro-barometer survey, 1998

demand for sustainable destinations, in which nature and population will play an increasingly prominent role.

Another type of tourism currently growing is rural tourism. Although this is not a new phenomenon in Europe, the market has become increasingly sophisticated, now being viewed as a valuable vehicle for much needed diversification of the rural economy. The relationship between tourism, agriculture and other sectors in the local rural economy is increasingly important. Natural resources, cultural traditions and transport services all affect the tourism potential of the rural economy.

Tourism as well as certain forms of recreation are included unquestionably amongst the economic drivers. As long as higher concentrations of activities and population are taking place in certain areas, the need for vacations in areas of high natural value is increased. Consequently more land is needed for more tourism infrastructure. Additionally, the improvement of existing infrastructure is required. Hence, pressure upon semi-natural areas, especially on those with the higher quality values, is occurring, as well as overexploitation of natural resources. Furthermore, reduction of biodiversity and disturbance of habitats are also impacts of tourism.

**Figure 8 DPSIR and tourism**



- D** - **Tourism** (mass)
- P** - Need for more land, especially in high natural value areas
- S** - Pressure upon semi-natural areas / overexploitation of natural resources
- I** - Reduction of semi-natural areas/reduction of biodiversity / alteration of traditional landscapes / disturbance
- R** - Planning / management

The other side of the same medal is of course that areas with natural qualities or bio geographic regions, such as the coastal zones and the mountainous areas attract tourists. This attractiveness is for some European regions the most important economic factor.

#### **4.5.4 Infrastructure**

Infrastructure is very closely linked to population changes, GDP and tourism. Networks for the transportation of energy, information, people and goods are expanding constantly due to increasing demands. The need for better and safer networks coupled with the need of the creation of Pan European networks, result to an increase of network construction. Pressure upon Natural heritage occurs mainly through attraction and simultaneously dispersion of economic activities and urbanisation. It could be said that infrastructure might act as one of the determinants of the actual location of pressure. Land take, reduction of semi-natural areas with consequent

biodiversity reduction, as well as habitat fragmentation and landscape alteration, are some of the impacts from the expansion of infrastructure.

There is a clear decline in motorway density from the most central north-western regions in Europe to the peripheral regions. For example, Portugal, Ireland, northern England, Scotland, northern Sweden, Finland and Northern Greece currently have comparatively few motorways. However, almost all parts of the candidate countries are lacking motorways altogether, with few isolated links around capital cities in for example, Latvia, Romania and Bulgaria.<sup>26</sup>

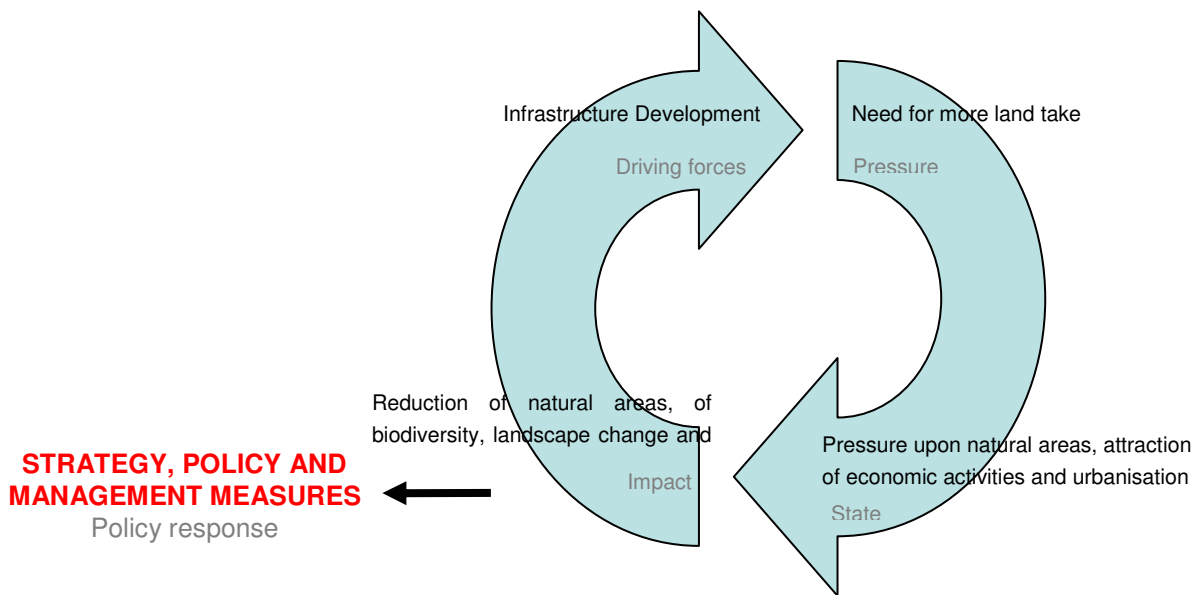
It can be seen that the ten CEC countries occupy about 25 % of the combined territory of the EU and CEC countries and contain about 21% of the population. However, their GDP is only about 10% of the total GDP. This imbalance is reflected in the provision of transport infrastructure. CEC countries only have 5% of the kilometres of motorways in the EU and CEC countries together. Moreover, this imbalance in motorway infrastructure is increasing; in the EU more than 1,000 km of motorway are added each year, whereas in the CEC countries less than 100 km are added each year. However, the CEC countries do have an over proportional share of rail infrastructure. This is quite positive with regard to nature, as motorways are a more significant barrier for nature (especially fauna) than railways.<sup>27</sup> However, the danger of barriers does exist in the CEC, as motorway development, like in the EU countries, usually cuts across nature conservation habitats.

---

<sup>26</sup> ESPON Project 2.1.1

<sup>27</sup> ESPON Project 2.1.1

**Figure 9 DPSIR and infrastructure**



- D** - **Infrastructure development**
- P** - Need for more land
- S** - Pressure upon semi-natural areas/attraction of economic activities and urbanisation
- I** - Reduction of semi-natural areas / reduction of biodiversity / landscape change / fragmentation
- R** - Planning / management /

The absence of infrastructure and poor accessibility of an area may offer opportunities to conserve or develop natural qualities.

#### **4.5.5 Functional nodes, MEGA's en FUA's**

In ESPON project 1.1.1. a classification of Functional Urban Areas (FUAs) is developed. All FUAs are obviously not of the same importance in the national or European urban system. Some are larger than others, and do therefore display a greater variety of functions and services.

Some are of national and/or European significance based on the strengths of their manufacturing or service industries; others are the location of regional, national and/or European administrations.

The FUAs are based upon:

- Size of the urban region Population;

- Transport function - airport (passengers), ports (container traffic);
- Tourism function - number of beds in hotels (and similar);
- Industrial function - gross value added in manufacturing (industry);
- Knowledge functions - location of university and number of university students;
- Decision-making centre - location of headquarters for the largest companies;
- Administrative functions - administrative status of FUA.

Each FUA has been ranked according to its importance for each variable. The 64 FUAs with the highest average score have been labelled Metropolitan European Growth Areas (MEGAs).

Based on a function of each city's population and the distances between them, 149 groups of FUAs are identified. The largest in terms of population are Amsterdam-Brussels (17 mill. inhabitants), Paris (13 mill.), Stuttgart-Frankfurt (12 mill.), Köln-Düsseldorf (11 mill.), London (11 mill.), Manchester-Sheffield (11 mill.) and Milan (8 mill.).

The strongest potentials for polycentrism based on proximity are in the central parts of Europe, in the Pentagon and the FUAs closest to it. Outside these areas, we find only a limited number of polycentric regions with several FUAs of equal size. The largest of these is Ostrava in the Czech Republic. Several others are located in Italy, like Venezia-Padova, Bologna and Firenze. Basel-Mulhouse is an example of a trans-national region where cities of similar size are located in close proximity to each other.

Of the 1,595 FUAs, the 64 with the highest average score on the FUA indicators have been labelled Metropolitan European Growth Areas (MEGAs). These MEGAs are identified on the basis of their functions (not only population and distance as above) and are important for polycentricity that, in future, can act as a balance to the Pentagon at the European level. All country capitals are included as MEGAs, except for Nicosia in Cyprus. Only the six largest countries, in terms of population, have more than three MEGAs, and as many as 17 have only one. Of the 64 MEGAs, 17 are located within the Pentagon.

Population is concentrated in the Pentagon, but there are three extensions, one reaching down to the east coast of Spain, one the southern Italy and

one to central Eastern Europe. In the more peripheral Europe most of the large urban agglomerations are more insular.<sup>28</sup>

#### 4.5.6 Indicators

<b>Socio-economic aspects</b>	<b>Criteria</b>	<b>Source</b>	<b>Comment</b>
Population	Population density	EUROSTAT	Measure for population pressure
	Population change	EUROSTAT	Measure for changing pressure due to population density
Economic aspects	GDP per area	EUROSTAT	Measure for economic wealth
	GDP change	EUROSTAT	Measure for economic development
	Innovation	EC	Measure for potential economic development
Tourism	Bed density	EUROSTAT	Measure for pressure due to tourism
	Change nr of Beds	EUROSTAT	Measure for changing pressure due to tourism
Infrastructure	Road density	GISCO	Measure for fragmentation and barriers
Urban pressure	Population density, GDP per area, bed density, road density	EUROSTAT, GISCO	Qualitative measure for urbanisation
MEGA's	Potential MEGA's	ESPON 1.1.1	Location for potential development and pressure
Built up	Percentage cover	CORINE 1990	Measure for urbanisation

<sup>28</sup> ESPON project 1.1.1



## **Population**

The indicator population has been split up into population density and population change. Population density is defined as the number of inhabitants per km<sup>2</sup> in the year 2000. Population change is defined as the increase or decrease in number of inhabitants per km<sup>2</sup> between 1995 and 2000. Population density is used to define the pressure of the population on land and natural heritage; population change is used to provide an insight in trends that have taken or will take place in the pressure of population on land and natural heritage. Statistic information that was used to measure these indicators stems from Eurostat.

## **GDP**

The indicator GDP has been split up into GDP 2000 and GDP change. GDP 2000 is defined as the Gross Domestic Product for that region in the year 2000. GDP change is defined as the increase or decrease in the Gross Domestic Product between 1995 and 2000. GDP 2000 is used to define the amount of economic activity, thereby assuming that a high GDP 2000 means that more land has been used for economic activities. GDP change is used to provide an insight in trends that have taken or will take place in the pressure of economic activities and their spatial effects. Statistic information that was used to measure these indicators stems from Eurostat.

## **Innovation**

The indicator innovation was defined by using the Regional Summary Innovation Index (RSII). This index ranks absolute innovative performance of regions in Europe.

## **Tourism**

Bed density and change in number of beds was used to measure the effects of the indicator tourism. Bed density is defined as the number of tourist beds per km<sup>2</sup>. Change in number of beds was used to provide an insight in trends that have taken or will take place in tourism and their spatial effects. Bed density was chosen as a parameter as it is the only parameter that provides numerical data on tourism and is available for the majority of the NUTS3 regions. Statistic information that was used to measure this indicator stems from Eurostat.

## **Infrastructure**

The indicator infrastructure was made concrete by measuring road density. Road density is defined as meters of motor- and railway per km<sup>2</sup>. Road density was chosen as a parameter as information about road density is available for the majority of the NUTS3 regions and is very suitable for combined analyses. Statistic information that was used to measure these indicators stems from the Trans European Network.

## **Urban pressure**

None of the above mentioned indicators can provide full insight into urbanisation on their own. Therefore an indicator was developed that combined the four most important indicators (population density, GDP 2000, road density and bed density) in one: urban pressure. This indicator is also more valuable than the indicator on built-up land as it says more on the dynamic of the type of land cover and activities that take place in that regard.

The actual score of a region on urban pressure is defined as followed: 5 classes were set up for each indicator; each region can score differently on each indicator and can thereby end up in a different class for each indicator. After all indicators had been scored for the specific region, the total score per region was measured by adding up the points per indicator (a score in class 1 means 1 point, a score in class 2 means 2 points etc...). For example, Region A has a high population density (class 4, 4 points), an average GDP (class 3, 3 points), an average road density (class 3, 3 points) and a high bed density (class 4, 4 points). The total score for urban pressure will be  $4 + 3 + 3 + 4 = 14$ . Statistical information that was used to measure these indicators stems from Eurostat.

## **Built-up**

No combination was made between percentage of built-up land and percentage of nature and forest land, as this information stems from the same dataset. Percentage of built-up land is defined as land that is used for urban structures, urban development and/or infrastructure. Statistic information that was used to measure these indicators stems from the CORINE database (1990).

## 4.6 Environment and climate change

### 4.6.1 Influences on the environment

During the last decades a wide range of demographic, social and economic trends, such as the switch from an agricultural and manufacturing economic base towards a more service oriented society and increasing levels of individualisation, have influenced land use and spatial patterns. These changes have, in turn, influenced the environment of Europe significantly. For example:

- rapid growth of transport and infrastructure has directly affected greenhouse gas concentrations, noise levels and habitat fragmentation and indirectly affected the quality of vegetation and forests;
- increases in tourism has resulted in the growing use of transportation media and has brought an increasing burden on the environment through, for example, the use of water, development of infrastructure and buildings, creation of wastes and land fragmentation; and
- over-exploitation of resources, such as freshwater for irrigation, in agriculture induced by higher consumption levels, government support for drainage and land consolidation.

However, total energy consumption and related pressures on the environment fell in Europe in the 1990s. This is mainly due to direct improvements in industrial, manufacturing and construction processes leading to a more efficient use of energy and to an increase in the use of renewable resources (mainly hydropower and biomass). In addition, governments are increasingly active and effective in lowering emission rates caused by (car) traffic. All regions of Europe are currently on track to achieve their 2010 emissions targets for pollutants. Despite this progress, a much faster growth in renewable energy, such as wind and solar power, is required (EEA, Europe's environment: the third assessment<sup>29</sup>).

Owing to the influences listed above, the environment will continue to change. This is especially apparent for the following aspects of the environment: climate (change), greenhouse gas (emissions), air quality and pollution, water resources (quantitative and qualitative), health of humans and ecosystems, soil resources, soil contamination and biodiversity.

---

<sup>29</sup> EEA, Environmental assessment report No 10, 2003

One of the most important indicators of this change is climate change. The average temperature is projected to increase between 1.4 and 5.8 °C between 1990 and 2100 and global precipitation is projected to increase 1 to 2 % per decade for the coming century. This will result in extremes in temperature and precipitation rates, which, in turn, will increase the risk of flooding in some areas and drought in others.

Projections based on existing domestic and EU policies and measures indicate that greenhouse gas emissions in the EU will have fallen by only 4.7% in 2010. Implementing all proposed but not yet adopted additional policies and measures should result in a reduction of 12.4 %, well in line with the Kyoto target. These will also result in a gradual fall in the concentration of ozone depleting substances in the troposphere.

Air pollution by sulphur dioxide (SO<sub>2</sub>) and to a lesser extent nitrogen oxides (NO<sub>x</sub>) has been reduced significantly in Western Europe but is still an area of concern in EEC countries. In general ground-level ozone and particulate matter (PM) are, however, still issues for concern for human health and effects on ecosystems.

In many areas of Europe water resources are both quantitatively and qualitatively under threat from a range of human activities. Many countries suffer from high water stress, where water demand is high while water supply is low. 31 % of Europe's population live in countries that use more than 20 % of their annual water resource, this being indicative of high water stress. Water shortages also continue to occur in parts of southern Europe where there is a combination of low water availability and high demand, particularly from agriculture.<sup>30</sup>

In addition water resources are contaminated by organic and inorganic pollutants, such as pesticides and heavy metals. In Western Europe and the accession countries, river, lake and coastal water quality, in terms of phosphorus and organic matter, is generally improving. This largely reflects reductions in discharges, resulting from improved wastewater treatment. Nitrate levels have remained relatively constant, but significantly lower in accession countries reflecting their less intensive agricultural production compared to the EU. Concentrations of nutrients are much higher than natural or background levels. Eutrophication, indicated by high phytoplankton levels in coastal areas, is highest near river mouths and urban areas. Heavy metal concentrations in western European rivers, and their direct discharges and atmospheric deposition into the North East Atlantic Ocean and the Baltic Sea, have all fallen as a result of emission reduction policies. Existing information on the state of waters in EEC countries

---

<sup>30</sup> EEA, Environmental assessment report No 10, 2003

shows that many rivers, lakes, groundwater and coastal waters are polluted, often with hazardous substances including heavy metals and oil. The pollution tends to be concentrated in localized hot spots downstream of urban, industrialised, agricultural and mining areas.<sup>31</sup>

This is of particular concern, when it affects drinking water. In Eastern Europe, drinking water is suffering significant microbiological contamination whereas in central Europe drinking water is suffering contamination by salts.

This contamination threatens human health and ecosystem integrity. Over 10% of EU citizens are potentially exposed to microbiological and other contaminants that exceed the maximum allowable concentrations laid down in standards by the EU and other international organizations. Even though there has been significant progress in management of water resources and quality across Europe, it is clear that problems still persist.<sup>32</sup>

Soil contamination will continue to take place, caused principally by cultivation systems used in agriculture. The abandonment of marginal land with very low vegetation cover in addition to increases in forest fire frequencies have also had strong impacts on soil resources. In the most extreme cases, soil erosion, coupled with other forms of land degradation, has led to desertification in areas of the Mediterranean region and Eastern Europe.

Despite specific actions to conserve biodiversity, many European livestock breeds are, and will remain, at risk of extinction. European trends in farm structure, farm management and farmland species have resulted in species-rich agricultural habitats declining considerably during recent decades, a trend which is set to continue (EEA, Europe's environment: the third assessment<sup>33</sup>).

Climate change as an important driving force, is specifically mentioned in the Sixth Environment Action Programme<sup>34</sup>: 'In addition to the mitigation of climate change, the Community should prepare measures aimed at adaptation in the consequences of climate change, by 1) reviewing community policies, in particular those relevant to climate change, so that adaptation is addressed adequately in investment decisions; 2) encouraging regional climate modeling and assessment both to prepare regional adaptation measures such as water resources management, conservation of

---

<sup>31</sup> EEA, Environmental assessment report No 10, 2003

<sup>32</sup> EEA, Environmental assessment report No 10, 2003

<sup>33</sup> EEA, Environmental assessment report No 10, 2003

<sup>34</sup> Sixth Environment Action Programme, EC, 2001

bio diversity, desertification and flooding preventions and to support awareness rising among citizens and business'.<sup>35</sup>

#### **4.6.2 Water**

Only one element of the environment will be focused upon: water. Other environmental elements are, of course, interesting, but the aim of this project is not to produce a complete environmental report, but to look at those specific elements of the environment that have a strong relationship with nature and natural heritage. This is especially true for the water element, which concerns both water quality and water quantity.

##### **Water quality**

Water quality is important for natural heritage as it plays a vital role in defining the ecological value of water bodies and thereby biodiversity.

Problems concerning water quality are generally highest near pollution hot-spots resulting from a range of industrial and other activities. This situation is generally of greatest concern in some Eastern European countries, reflecting poor economic conditions and, in several countries, the deterioration of, or lack of infrastructure for improving, water quality.

In Western Europe and the accession countries, river, lake and coastal water quality, in terms of phosphorus and organic matter, is generally improving, mainly as a result of improved wastewater treatment. Nitrate levels have remained relatively constant, but significantly lower in accession countries reflecting their less intensive agricultural production compared to the EU15 countries. Concentrations of nutrients on average are much higher than natural or background levels.

Eutrophication, indicated by high phytoplankton levels in coastal areas, is highest near river mouths or urban areas. Heavy metal concentrations in western European rivers, and their direct discharges and associated atmospheric depositions into the North-East Atlantic Ocean and Baltic Sea, have all fallen as a result of emission reduction policies. Existing information on the state of waters in Eastern Europe shows that many rivers, lakes, groundwater and coastal waters are polluted, often with hazardous substances including heavy metals and oil. The pollution tends to be concentrated in localised hotspots downstream of urban, industrialised,

---

<sup>35</sup> ESPON project 1.3.1

agricultural and mining areas. Away from these hot-spots, river and lake water quality appears to be relatively good.

Oil pollution caused by discharges from coastal refineries and offshore installations is decreasing in Western Europe. However, illegal discharges, mainly from ships, are still a problem, especially in the North Sea and Baltic Sea. Oil pollution in general, from several sources, is of major concern in the Black Sea, the Caspian Sea, and the Mediterranean. The recent disaster involving the oil-tanker Prestige, off the coast of Northern Spain, highlighted the need to reduce risks from similar accidents in the future.

### **Water quantity**

With regard to water quantity it is particularly interesting to focus on flooding and water shortages. The consequences of flooding and water shortages, in addition to the probability of their occurrence, may be augmented as a result of various human activities such as agriculture and forestry, and human-induced factors such as climate change. For example, as a result of climate change more excessive rainfalls and droughts will appear in the European territory, which will result in both losses and gains to natural resources.

Other natural resources such as soil will also be affected under warmer and drier climatic conditions. Such changes could impair soil functions, potentially extending the area prone to desertification to northern territories, endangering areas currently not at risk. Moreover, the rate of desertification would increase due to increased erosion, salinisation, impairment of soil quality and increased fire hazards. These processes could result in a desertification process that may become irreversible.

The risk of flooding, erosion and wetland loss is likely to increase in particular in coastal areas of Europe.

Issues surrounding soil sealing, dried out land resulting from lowering ground water levels, excessive droughts and rainfalls, erosion, contaminated sites, water use and quality, are not specifically addressed in this report. The focus will be on flood risk in relation to natural heritage.

Although large uncertainties exist about the specificity of climate changes and its speed, a more or less probable effect may be a northward shift of biogeographic regions, due to desertification in the south and milder climatic conditions in the north part.

### 4.6.3 Indicator

Environment	Criteria	Source	Comment
Hazard	Flood risk	ESPON 1.3.1	

The indicator flood risk is a measure for environmental pressure on the natural value, although this relation is not unambiguous.<sup>36</sup>

## 4.7 Conclusions and discussion

It can be concluded that the many centuries of Europe's spatial development have resulted in a continuous decrease in the area of natural heritage. In times of high prosperity and strong population growth this process has been more pronounced. Since the start of the industrial revolution the process of spatial development has been extremely strong, in terms of land take for agriculture, agricultural intensification, development of towns and industries, such as mining and tourism, and infrastructure developments.

Many current and historical human activities have polluting effects on the environment. These activities affect the ecological quality of semi-natural areas, resulting in a loss of species and a decrease in biodiversity. For example air and water pollution or the overexploitation of groundwater, may have an impact on nature by damaging woodland or reducing the area of wetland.

Increasing urbanisation and its associated infrastructure, changes in agriculture and the development of the tourism industry are affecting the quality of the environment in a number of ways<sup>37</sup>:

- small ecological network structures are decreasing;
- natural qualities are disappearing;
- wetlands and water bodies are decreasing as groundwater tables are lowered;

---

<sup>36</sup> There is no general agreement on how best to define environmental vulnerability or on how to calculate indicators. So, hazards do not measure ecological vulnerability (Espon project 1.3.1).

<sup>37</sup> It must be emphasised that these conclusions stem from literature research; cartographic data are not sufficient enough to make these conclusions.



- substitute landscapes are often more uniform in physical and biological character; and
- remaining habitats are smaller and more fragmented (see chapter 5).

Despite these findings, territorial trends may also create opportunities for nature, such as the abandonment of agricultural land. Chapter 5 deals with trends of semi-natural areas and biodiversity.

Reflecting on the themes, mentioned in paragraph 1.4, for the development of indicators:

- land cover and land use are measured with the CORINE land cover database and data on social economic aspects as presented in subparagraph 4.5.6;
- natural resources in total is beyond the scope of this project, except the criterium of flood risks. The other environmental aspects are if relevant presented in a qualitative way.

## **5 Natural heritage**

### **5.1 Introduction**

Natural heritage covers aspects of biological as well as landscape diversity, including diversity within and between species and diversity between habitats or ecosystems.

It is important to stress that the natural heritage of Europe includes all semi-natural habitats and species that occur in Europe, both within and outside protected areas. The general state of the European environment is an important precondition for the survival of these habitats and species. Neither the wider countryside, nor protected semi-natural areas can be considered separately from their environmental context.

The quality of air, water and soil is not the only prerequisite for the occurrence of certain species within any given habitat. Landscape-ecological relations between habitats and their species are also important, especially when considering natural heritage in a territorial context. Such landscape-ecological relations include for example the exchange of individuals between populations of a species, the connection of habitats supporting migrations and interactions, and hydrological connections between infiltration areas and seepage zones along with the network of brooks and rivers. Therefore, this project focussed on territorially delineated features of natural heritage, namely ecosystems and land cover units.

Keeping these considerations in mind, this chapter describes natural heritage with a focus on landscapes and semi-natural areas. This is followed by a discussion on fragmentation and then species diversity and richness. Finally, indicators for analysis and further monitoring are considered.

### **5.2 Semi-natural areas**

As indicated above, the distribution and extent of land cover provides a good way to carry out rough spatial assessments of natural heritage at the European level.

It should be noted though that, for a proper assessment of natural heritage spatial information on species (such as distribution, patterns of diversity, areas of high endemism or rarity, occurrence of large populations of selected species, migration routes) is required. For the purpose of this project, however, this data has not been readily available. Previous studies have shown that species richness is highest in mountainous regions and that hot spots of plant, bird and mammal diversity based on richness and narrow endemism are concentrated in the southern part of Europe.<sup>38</sup> Other studies, taking into account species threat status and protection requirements, have led to the identification of areas of relatively higher importance in terms of natural value, such as Important Bird Areas (Heath & Evans, 2000) and Prime Butterfly Areas.<sup>39</sup>

Semi-natural areas and forests are not evenly distributed throughout Europe. Map 7 (in paragraph 4.3) shows the percentage coverage of semi-natural area at NUTS3 level in most of Europe. Regardless of differences in resolution between countries, a number of regions stand out. For example, the western part of Flanders (Belgium) and The Netherlands and the Po delta in Italy have a very low share of semi-natural areas. On the other hand, Finland, the Baltic States and mountain regions have high percentages of semi-natural areas or forest.

When looking at the differences between bio geographic regions, table 5 shows that the Steppic and Pannonian regions have the lowest share of forests and semi-natural areas (less than 20%) as they are dominated by agricultural land cover (which in itself might have high natural value because of the often extensive agricultural land use). On the other hand the Alpine and Boreal regions have over 70% semi-natural area.

The reason for this variation follows from the long-term processes that have been described in chapter 4. The regions with the lowest shares of semi-natural areas have either favourable conditions for agricultural use (fertile soils, no or modest slopes, no extreme climate conditions) or have historically been developed into major cities, urban areas or transportation routes (alongside coasts and rivers, in plains). Naturally this means that most of the semi-natural areas are situated in mountainous regions, such as the Alps, the Cantabrian Mountains, the Pyrenees, the Carpathians, Greece and Scotland.

It is worth repeating here that the extent of forests and semi-natural land cover alone does not present the full picture. Within these areas there might be forms of land use that are not favourable for biodiversity (e.g. intensive

---

<sup>38</sup> Delbaere, 1998; Williams, 1998

<sup>39</sup> van Swaay & Warren, 2003

forestry) and, by the same token, locations outside these areas may support high biodiversity (e.g. extensive agriculture or urban nature). Species information would highlight more subtle differences in this respect.

**Table 5 Land cover with natural values, for bio geographical regions (in percentages)**

<b>Bio geographical region</b>	<b>Semi-natural areas</b>	<b>Agri-culture</b>	<b>Forest</b>
Alpine region	30	16	50
Atlantic region	9	69	14
Boreal region	12	19	58
Coastal zone	18	54	19
Continental region	3	61	29
Mediterranean	26	52	20
Pannonian region	2	73	17
Steppic region	7	77	6

Source CORINE 1990

Note 1: Semi-natural area represents Scrubs, open spaces and wetlands (CORINE level 2, 26-39), Agriculture represents Agricultural areas (CORINE level 1), Forest represents Forest (CORINE level 2, 23-25).

Note 2: It should be noted that both agriculture and forest also contain natural values.

**Table 6 Semi-natural, agriculture, forest and water body land cover with natural value per country (in percentages)**

		<b>Semi-natural areas</b>	<b>Agri-culture</b>	<b>Forest</b>
<b>BE</b>	Belgique-België	1	59	20
<b>DK</b>	Danmark	2	77	9
<b>DE</b>	Deutschland	1	61	29
<b>GR</b>	Ellada	37	35	15
<b>ES</b>	España	9	32	47
<b>FR</b>	France	7	62	25
<b>IE</b>	Ireland	9	67	4
<b>IT</b>	Italia	16	54	24
<b>LU</b>	Luxembourg (Grand Duché)	0	55	37
<b>NL</b>	Nederland	2	75	9
<b>AT</b>	Österreich	17	36	44
<b>PT</b>	Portugal	18	52	28
<b>FI</b>	Suomi/Finland	17	7	64
<b>SE</b>	Sverige	no data	no data	no data
<b>UK</b>	United Kingdom	24	58	7
<b>CY</b>	Kypros	no data	no data	no data
<b>CZ</b>	Ceska Republica	3	59	31
<b>EE</b>	Eesti	29	51	17
<b>HU</b>	Magyarország	2	72	18
<b>LT</b>	Lietuva	2	62	29
<b>LV</b>	Latvija	7	44	43
<b>MT</b>	Malta	no data	no data	no data
<b>PL</b>	Polska	1	65	29
<b>SI</b>	Slovenija	6	34	57
<b>SK</b>	Slovenská Republika	4	51	40
<b>BG</b>	Balgaria	10	54	30
<b>RO</b>	România	13	52	28
<b>NO</b>	Norge	no data	no data	no data
<b>CH</b>	Schweiz	no data	no data	no data

Source CORINE 1990

Note 1: Semi-natural area represents Scrubs, open spaces and wetlands (CORINE level 2, 26-39), Agriculture represents Agricultural areas (CORINE level 1), Forest represents Forest (CORINE level 2, 23-25).

Note 2: It should be noted that both agriculture and forest also contain natural values.

Nature, as a proportion of total land cover, varies significantly between countries, with the highest extreme being Greece and the lowest being Luxembourg.

Over 50 percent of Finland and Slovenia contain forest cover. However, the lowest forest cover occurs in Ireland, the UK, the Netherlands and Denmark.

The fact that Finland, Latvia and Estonia, all not mountainous countries, show such high levels of semi-natural areas, demonstrates the importance of relative isolation for the occurrence of semi-natural areas.

### **5.3 Species diversity and species richness**

'Biological diversity' (biodiversity) means the variability among living organisms from all media sources, including, terrestrial, marine and other aquatic ecosystems in addition to the ecological complexes of which they are part. This includes diversity within species, between species and of ecosystems. The definition is found in Article 2 of the Convention on Biological Diversity, adopted in Rio de Janeiro, Brazil, in 1992. Most States of the regions under review in this current ESPON project, as well as within the European Community as a whole, are Party to the 'biodiversity' convention<sup>40</sup>. In describing 'potential biodiversity', one is referring to what is the possible manifestation of biodiversity over and above what exists in an area at a given moment in time, known as the 'actual biodiversity'.

Until the nineteenth century, biological diversity, in terms of habitat types and number of species in general increased in Europe. During the last century, these trends reversed; semi-natural habitats are becoming smaller and less diverse, more fragmented and less able to support wildlife. One crucial phenomenon is the isolation of small populations which are unable to maintain the biologically necessary links to larger gene-pools of the original ecosystem. Hence, the number of endangered species of flora and fauna has increased in many European regions.

Around two-thirds of the European wetlands that existed 100 years ago, have been lost.<sup>41</sup>

---

<sup>40</sup> Exceptions are Albania, Andorra, Bosnia and Herzegovina, Holy See and the Former Yugoslav Republic of Macedonia.

<sup>41</sup> EU, Third Report on Economic and Social Cohesion, 2004

Biodiversity is in a continuous state of flux. Natural movements occur, as species colonise areas that have been 'prepared' for them by the presence of other species. This is demonstrated by the succession stages of vegetation where one species progressively alters the ecological conditions so that the place becomes appropriate for another species to inhabit. Species may arrive in an area through the transport of seed by wind or the movement of animals, either through the seeds in digestive tracts or attached to fur.

'Normal' change in climate may eliminate species, such as in periods of glaciations, or, to the contrary, may make areas more hospitable. Significant shifts in climate, such as those the earth may currently be experiencing through global warming, will lead to altitudinal shifts in belts of flora that may result in the elimination of the highest, 'nival' zone.<sup>42</sup> Altitudinal belts found in mountains also correspond to latitudinal belts from the equator to the poles. The matrix of these belts along with other determining influences on climate, such as the moderating influence of oceans upon temperature that lessens with distance from the sea, all result in the variability of flora and associated fauna.

Human activities, notably agriculture, may also disrupt and exclude the presence of potential species diversity over large areas of Europe.

The range of biodiversity found in Europe is therefore both normative, on the one hand, and human induced, on the other. For example, it is a natural phenomenon that the extreme climatic conditions of northern boreal forests or alpine conditions found at high altitudes will allow the presence of only a few species of flora (considering the influence of latitude on 'normal' climatic conditions). In contrast, it is man's intensive use of land through agriculture and forestry that will diminish the 'normal' range of species in lowlands and the flanks of uplands. When human land-use is of moderate intensity, and the climatic conditions are warm and temperate, such as in the western Mediterranean area, the presence of biodiversity is both varied (species diversity) and relatively important (species richness) compared to the other regions of Europe.<sup>43</sup>

A strong relation exists between biodiversity and the size and spatial configuration of semi-natural areas. In general, large semi-natural areas suffer less from detrimental external influences such as disturbance by human presence, water and air pollution, and local drainage. Natural processes such as sedimentation (and erosion), succession of the vegetation and cycles of nutrients are more likely to occur in a balanced way in large semi-natural areas than in smaller ones. As a result, larger semi-natural

---

<sup>42</sup> EEA, 1999: 383

<sup>43</sup> Stanners and Bourdeau, 1995, Chapter 9

areas are more likely to be self-regulating, and thus self-sustaining to a greater degree.

In addition, larger semi-natural areas provide habitats for species that have a large 'home range', the area an individual animal needs for daily survival. Larger predators like bears and wolves usually have the largest home range. The size of a population of animals or plants is an important factor in their sustainability over longer periods of time. Large semi-natural areas provide resources for large populations and consist of combinations of different ecotypes. These complexes of patches with different structures and different natural characteristics provide habitats for a variety of species on which other species depend.

Apart from the size of semi-natural areas, their spatial configuration is also important. In fragmented landscapes in particular, where semi-natural patches are small and separated by other types of land-use, the connectivity of the individual patches is an important factor in meta-population survival. Populations in small semi-natural areas have a higher risk of elimination than those in larger areas. Re-colonisation of deserted patches is necessary for the survival of the population on a larger scale: a changing network of occupied and deserted habitat-patches provides a matrix for the population. At the same time, migration between persisting populations prevents detrimental genetic effects like inbreeding.

Many species rely on seasonal migration for their survival. Winter and summer habitats have to be at a distance that animals can bridge. For birds and other airborne migrators the landscape in between is of little importance. For migratory mammals, amphibians and other species, the connectivity of the landscape is an essential factor in this seasonal migration. A similar process works at a smaller scale in highly fragmented landscapes. The home range of many animals consists of scattered patches of semi-natural areas, surrounded by agricultural and built-up zones.

There is, therefore, an important ecological interest in checking the reduction and fragmentation of semi-natural areas. In fact, the reverse process should be encouraged, to increase the semi-natural area and enhance the territorial coherence between separated semi-natural areas. This last measure is of particular importance as the objective is to develop a network of semi-natural areas as opposed to a single large area. Therefore, the selection of sites where land use is to encourage semi-natural areas should be done carefully, considering its strategic contribution to the development of a network of semi-natural areas. In order to meet this objective, sites that may provide corridor and stepping stone functions

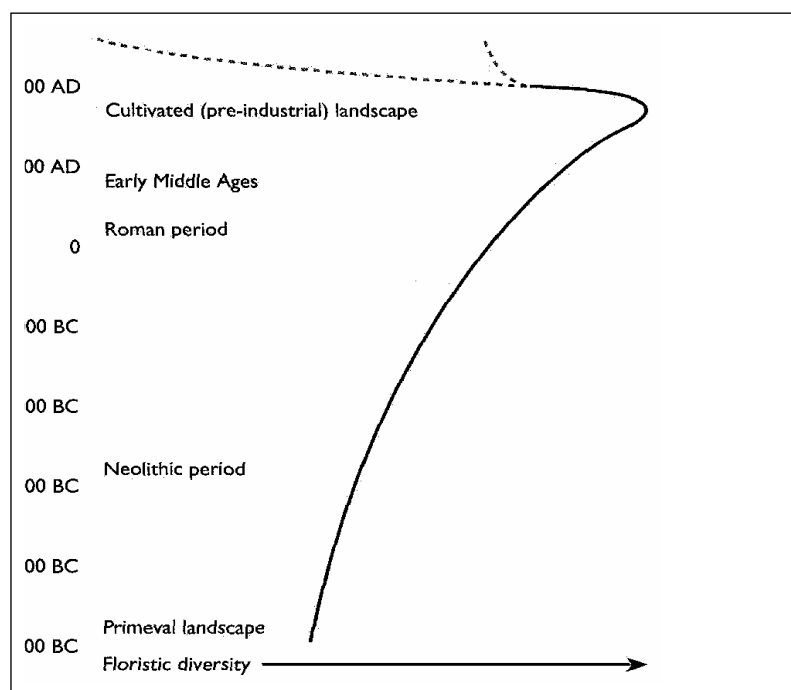


within a network of semi-natural areas should be designated, as well as sites of special biological value.

Biodiversity is characterized by genetic diversity, species diversity and habitat diversity. Population size and distance between populations are indicators of the conservation status of a particular species. Species richness is the number of different species living in an area. Species diversity indicates the relative importance of the number of species, either in comparison to the range of species potentially present in a given area or to the same relative value in different geographical areas.

Species diversity	Species richness
Measures the distribution of species in reference to some more inclusive measure. Estimates the spatial patterns of species distribution. Always a ratio. Not scale dependent.	Counts the number of species. Provides an absolute figure. Is scale dependent. Is particularly meaningful when used relative to habitats and potential richness.

**Figure 10 Number of species in relationship to the evolution of agricultural practice**



Source: Stanners & Bourdeau (1995)

An assessment of species richness and species diversity has been made at the European scale by the Natural History Museum, London, in 1999 ('Mapping Europe's Biodiversity') (see figure 10), which gives an indication of the distribution of biodiversity from four perspectives. Although surveying biodiversity results in practical problems, such as the difficulty of counting all species, there are several atlases<sup>44</sup> that have been compiled in Europe that give the available information on amphibians and reptiles, flora, birds and mammals. By transferring this information onto a common grid, it has been possible to map species distribution according to significant groups, and these can be added together as an estimate of their combined species richness. The same databases were further used to examine 'narrow endemism' (species richness in just the most narrowly restricted species that are found only within Europe), 'hotspots' (that are areas with the highest scores for particular measures, such as richness, narrow endemism, or rich and narrow endemism taken together) and hotspots of complementary richness (which indicates the 5% of the European territory that together represent the greatest species richness).

## 5.4 Landscapes

Landscape is defined as an area, perceived by people, whose character is the result of the action and interaction of natural and/or human factors.<sup>45</sup> The long-term process described in paragraph 3.1 considers spatial developments of the European landscapes over centuries, resulting from agricultural activities, urbanisation and the positioning of infrastructure in specific geomorphologic conditions.

The term 'landscape' in this report is regarded as encompassing the whole of open spaces excluding artificial land use types such as urban areas for residential and industrial land uses. However, it is recognised that for other purposes cities may be included as part of the landscape. Open space designations, being the non-urbanised landscape, include agricultural areas and semi-natural areas.

The way agricultural and other human activities have been carried out over time and the way these are reflected in the geomorphologic structure of the region are strongly influenced by regional culture<sup>46</sup>.

---

<sup>44</sup> The atlases have been produced by Atlas Florae Europaeae, European Bird Census Council, Societas Europaea Herpetologica and Societas Europaea Mammologica.

<sup>45</sup> Article 1.a. of the European Landscape Convention, adopted 19 July 2000

<sup>46</sup> This conclusion is underpinned by Mùcher et al, 2003a

As a result, synergies of particular farming method and physical conditions have developed into specific regional cultural characteristics. For instance culture in the hilly northern French rural area differs from that in the Tuscany hills, flat Dutch polders or Danish meadows. Less extensive forms of rural land use also add to a rich cultural diversity. For example, grazing sheep and cattle of alpine pasture and mountain hay meadows, heather moorland and semi-natural grassland can be regarded as cultural as well as biotope features. Resulting from dynamics in agricultural activities, hay meadows, often rich in botanical interest, became rare and, in southern Europe maquis and garrigue were affected. The large Spanish *dehesas* and Portuguese *montados* devoted to wood pasture with scattered tree cover are under changing conditions. Other examples of specific landscape types with characteristic natural values are the 500,000 ha of *puszta*, salt-rich grassland in Hungary, 2 million ha of semi-improved and unimproved grassland and more than 950,000 ha of Czech grassland.

Special small-scale features of agricultural landscapes such as dry stone walls, field margins, verges, hedgerows and rocky outcrops are important cultural characteristics as well as small-scale ecological habitats. Typical landscape features which are regionally distinctive are common grounds for villagers. In the UK for instance the remnant of medieval life has long remained undisturbed. In total the UK contains 1.3 million acres of commons in England and Wales, registered in 9,000 separate units covering moors, fells, mountains and heathland. Many commons have common rights registered on them for grazing animals, collecting wood, digging peat or allowing pigs to eat fallen acorns. These rights have been codified in the UK in the Countryside and Rights of Way act 2000.

It is clear that European rural areas contain a large variety of Europe's cultural and natural wealth. It is also clear that European natural heritage cannot be considered in its entirety if agricultural or rural areas are not taken into account. Environmental (see paragraph 4.6) aspects should also be taken into consideration.

To date, no commonly accepted map or classification of Europe's landscapes exists, although various attempts have been made since the early nineties. A consortium of landscape research institutes assembled in a network called 'Landscape Europe' recently made important progress. A draft map for most of Europe has been produced, with pan-Europe coverage to be finished in September 2004 that classifies each part of Europe's territory into one of 202 landscape types with a unique combination of topography, parent material and land cover.<sup>47</sup> Once this classification has gone through a

---

<sup>47</sup> Múcher *et al.*, 2003b

consultation process the finalized version will provide an indispensable information source for assessments of impacts on landscapes. Until that time the CORINE land cover database probably provides the best proxy.

## 5.5 Fragmentation

Fragmentation of natural heritage is the result of an ongoing incremental process, which has left Europe with a natural heritage consisting of many small disconnected islands surrounded by other – mostly non-favourable – land use types. These fragments of semi-natural habitats are often not able to support the survival of species populations in the long run, depending on their size, isolation and the species' ecological characteristics.

In recent decades a range of initiatives to protect the natural heritage, at the national and European level, have been implemented. For example, EEA reporting notes that most countries have guidelines for road and rail construction that involve measures for reducing the risks of accidents involving animals. Such measures include fences, reflectors, smell signals and fences for guiding wandering animals towards under and over passages. Many countries are creating fauna passages, initially in connection with infrastructure crossing rivers and streams in order to facilitate the passage of animals. Fauna bridges are being constructed in several countries for deer and other large mammals, and enlarged culverts are increasingly put in place for amphibians such as frogs and small mammals such as badgers. At the national or regional spatial planning level, an increasing number of countries are developing and implementing ecological networks of core areas, buffer zones, corridors and restoration areas.<sup>48</sup> Other more wide-ranging policies, such as the development of Natura 2000 and the Pan-European Ecological Network, are discussed in chapter 6.

Monitoring and measuring the results of interventions to counteract the process will require long periods of time. The EEA defined a fragmentation index and compiles an indicator on the 'average size of non-fragmented land parcels', noting that 'fragmentation of land, due to the expansion of transport infrastructure networks and the continuous growth of traffic in the ACs and the EU, poses an important threat to biodiversity from direct impacts from proximity and disturbance, and by fragmenting and isolating habitats and creating barriers to the wandering and spreading of animals

---

<sup>48</sup> Nowicki *et al.*, 1996; Delbaere, 1998; Jongman & Pungetti, 2004

and animal populations. The average size of contiguous land units in seven former and current accession countries not cut through by major transport infrastructure (175 km<sup>2</sup>) is 40 % above the average of that of the EU15 (121 km<sup>2</sup>).<sup>49</sup>

Another indication for the fragmentation of habitats is the distance between sites, regardless of the cause fragmenting them. A study in 10 European countries has shown that the average distance between CORINE biotope sites varies between 13 and 32 km.<sup>50</sup>

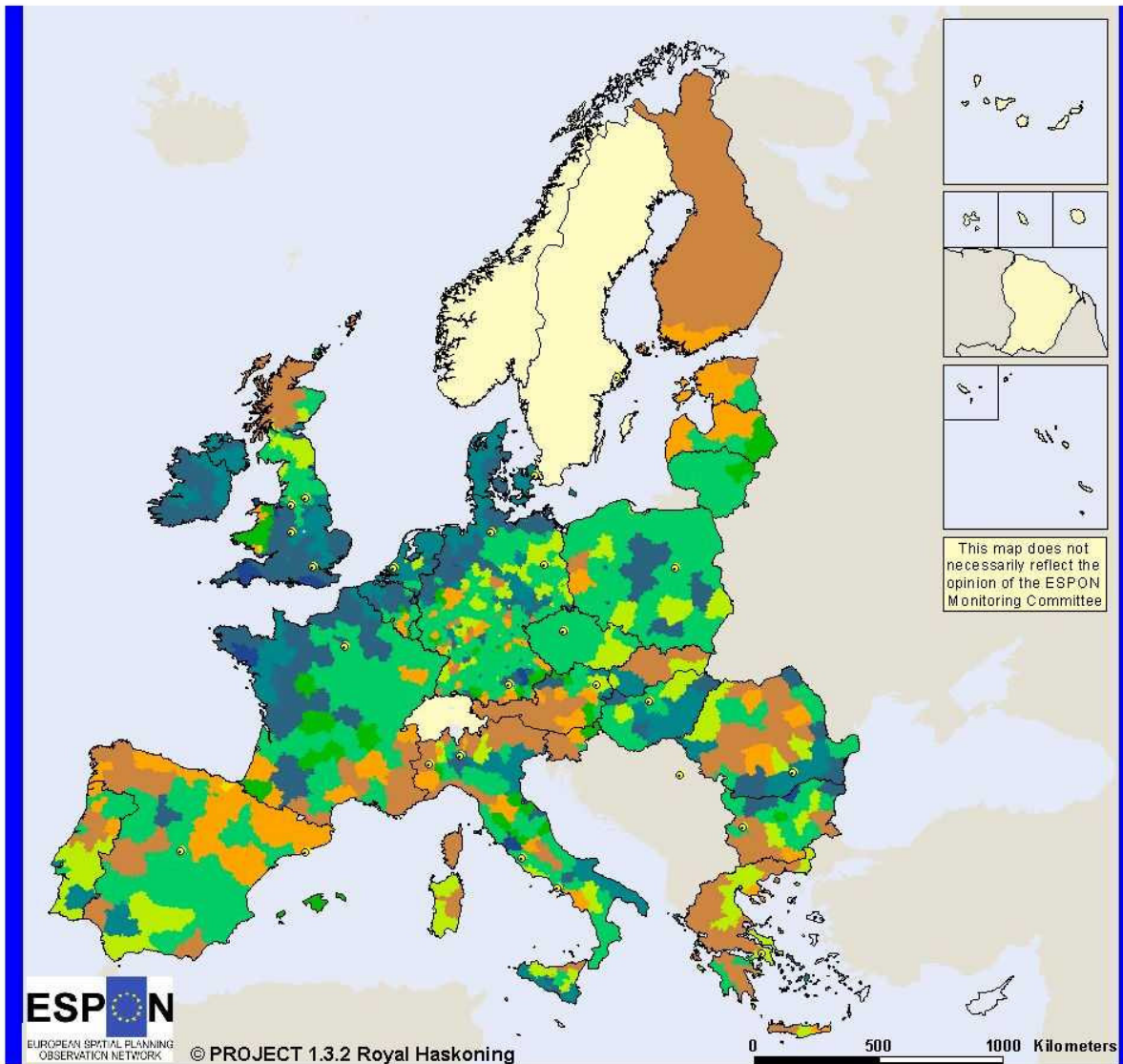
The fragmentation of semi-natural areas is illustrated in map 11, showing the number of semi-natural area patches and the average size of the patches for each NUTS3 region. This fragmentation does not include agriculture and forest, although these land cover types might have high natural value. This map only illustrates the fragmentation of the semi-natural areas, including wetlands. Although the sizes of these regions are not similar (see also paragraph 2.5.2), the map gives an impression of the degree of fragmentation of forests and semi-natural areas. Most extensive fragmentation is in the coastal zones of France, Ireland, England, Germany, Belgium, the Netherlands, Denmark, but also along the rivers Loire, Seine, Po, Elbe and Danube. In those areas there is a relatively high development pressure as a result of a combination of intensive agriculture land use in Ireland, England, France, Belgium, Netherlands and Denmark with strong urbanisation in England, Belgium and the Netherlands and along the rivers.

---

<sup>49</sup> EEA, 2002C

<sup>50</sup> Bouwma *et al.*, 2004

**Map 11 Fragmentation index for NUTS3**



● Main cities

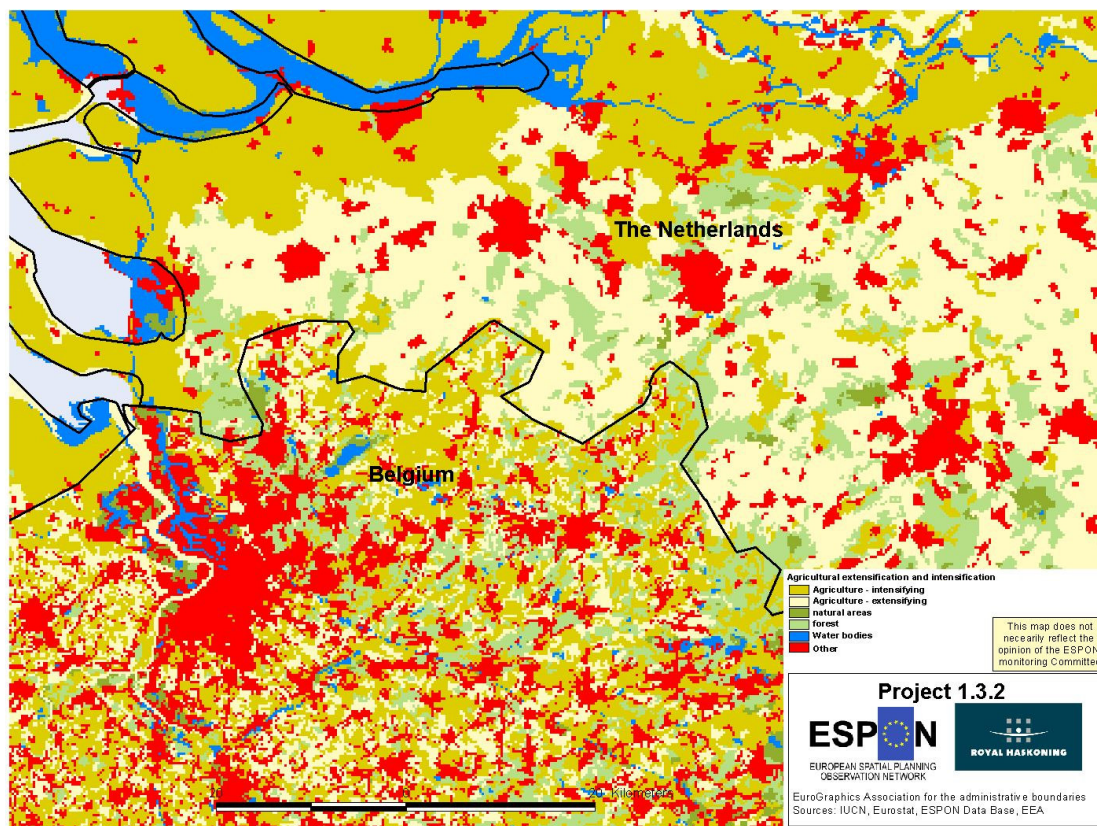
Fragmentation

- > 50 % natural area and < 10 patches / 10km<sup>2</sup>
- > 50 % natural area and 10 - 30 patches / 10km<sup>2</sup>
- > 50 % natural area and >30 10 patches / 10km<sup>2</sup>
- 20 - 50 % natural area and < 10 patches / 10km<sup>2</sup>
- 20 - 50 % natural area and 10 - 30 patches / 10km<sup>2</sup>
- 20 - 50 % natural area and >30 10 patches / 10km<sup>2</sup>
- < 20 % natural area and < 10 patches / 10km<sup>2</sup>
- < 20 % natural area and 10 - 30 patches / 10km<sup>2</sup>
- < 20 % natural area and >30 10 patches / 10km<sup>2</sup>
- No data

© EuroGeographics Association for the administrative boundaries

Sources: IUCN, Eurostat, ESPON Data Base, EEA

**Map 12** Fragmentation in land cover of Vlaanderen (Belgium) and the south part of The Netherlands



Map 12 gives a more detailed view of fragmentation in a boundary region of Belgium and the Netherlands. The map shows that land use in the selected part of Belgium is much more fragmented than land use in the selected part of the Netherlands. This is mainly caused by different urbanisation and agricultural patterns. For example, urbanisation in the selected part of Belgium is quite dispersed whilst agriculture is intensifying. Both of these developments are leading to a very fragmented landscape. In the Netherlands, however, urbanisation has taken place in a more concentrated manner and agriculture is extensifying. Both of these developments are leading to a less fragmented landscape.

## 5.6 Conclusions and discussion

The continual erosion of semi-natural areas by agriculture, urbanisation and other related processes has led to the ongoing fragmentation of semi-natural areas. In fact, the actual natural heritage consists of leftover area, untouched by the age-long processes of urbanisation, infrastructure development and agricultural cultivations.

In addition, the further expansion and modernisation of the European infrastructure has strongly affected European landscapes, where roads and railways are particular elements that have led to ecological disruptions. This continuing fragmentation of existing nature leads to a lack of connectivity between semi-natural areas.

Both the decrease in the number of semi-natural areas and the average size of those areas pose a threat to the natural value. Many of Europe's most important habitats are especially vulnerable to pressures because they are often already small and fragmented. Only through an increase of the semi-natural area and coherence between the separated areas, can the current biodiversity and value of the European continent be maintained or improved. Other environmental factors, such as water and air quality are of course factors that should also be considered.

## 5.7 Indicators for analysis

In its first published briefing for 2004<sup>51</sup>, the EEA analysed the availability of information regarding biodiversity, underlining the fact that information based on indicators and monitoring is urgent. In its assessment of the current situation, the EEA stated that:

“...Information is limited and inconsistent across Europe on the state and trends of biodiversity. This situation is unlikely to change quickly since biodiversity monitoring is quite time consuming, costly and difficult to prioritise and hence has received little attention for funding. Action is urgent now.”

---

<sup>51</sup> [http://reports.eea.eu.int/briefing\\_2004\\_1/en](http://reports.eea.eu.int/briefing_2004_1/en)



Even among the indicators that the EEA is committed to work on<sup>52</sup>, there is a problem of scale for the understanding of the spatial evolution of biodiversity. Most indicators that are scheduled to be available in the short-term (2003/2004) are at the EU15 (25) level or at the national level, with only the number of threatened taxa likely to be at the NUTS2 level (Indicator BDIV3a).

Other initiatives already exist, such as the 50x50 km sq grid mapping of species richness ('Worldmap' of the Natural History Museum, London), or are currently planned, such as the Natural Capital Index (NCI) being prepared by the UNEP-WCMC (United Nations Environment Programme - World Conservation Monitoring Centre, Cambridge). The NCI will compare habitat types – in terms of both quantity and quality – with their associated fauna species. In many ways it will cover much of the subject matter that has been requested of the Parties to the CBD, including the extent of ecosystems, abundance and distribution of selected species, threatened species, agro-genetic diversity, and area protected. Both of these initiatives, however, have the same shortcoming of being composite indices, that is, the presence / absence of particular components of the indices (the individual species or habitats) is not spatially specific.

Some spatially relevant indicators with regard to species do however exist, but the precision of the information is limited because of aggregation, which is in contrast to the reporting carried out for specific species (as in the pan-European atlases). The correspondence between atlas information and particular areas of habitat is of course by inference.

A proxy for species specific information has been habitat type, and here there is also aggregation, as witnessed by the 10 main EUNIS (European Nature Information System of the EEA) habitats types prepared by the EEA Topic Centre on Nature Protection and Biodiversity. However, the scale of reporting is not exact enough for understanding or mapping spatial phenomena: the EEA reporting on the main threats to biodiversity are recorded according to only 11 bio-geographic regions. In order to obtain further breakdown of the bio-geographic regions, an ecological region analysis has been carried out, but this is not, as yet, officially accepted as a standard reference for reporting. The ecological units proposed, however, do not correspond to the NUTS administrative boundary breakdown, but instead to the presence / absence of ecological qualities in relation to the geomorphological character of the land.

---

<sup>52</sup> EEA Core Set of Indicators, approved February 2004 and EEA, 2002B

The only spatially-specific and methodologically consistent units available for environmental reporting are land areas that are distinguished either by their land cover type (CORINE land cover) or by their protection or designation status (IUCN).<sup>53</sup> The only spatially-specific, European record of sites with both habitat and species information is the Natura 2000 network data, including its proximate extension eastwards to the members of the Council of Europe that are not part of the EU, the Emerald network.

Unfortunately, there is not a broadly accepted database on biodiversity for the 25 EU member states. Therefore, biodiversity will not be treated as an indicator itself, but the focus will be on land cover and designated areas. This policy on the protection of semi-natural areas is set out in chapter 6.

In order to analyse and monitor the developments of nature; the indicators listed in the following table are used:

**Table 7 Indicators**

<b>Natural heritage</b>	<b>Criteria</b>	<b>Source</b>	<b>Comment</b>
Semi-natural area	Size of the semi-natural area	CORINE land cover 1990	CORINE Land Cover 2000 is not available for pan-Europe (only recently available for Ireland, Luxembourg, The Netherlands, Latvia, Estonia, Slovenia and Malta)
Fragmentation of nature	Fragmentation index		for NUTS3

In paragraph 1.2 it is mentioned that this project intended to develop indicators on ecosystem diversity and biodiversity. Because of the limited availability of date, the CORINE land cover database is used for the size of the semi natural area. Also IUCN information is used (see chapter 6).

---

<sup>53</sup> Not all designated sites, such as many of the Natura 2000 areas, have a protection status.

## **6 Management**

### **6.1 Justification of protection**

In general the conservation of nature and biodiversity is regarded as very important for human society. Whether a lack of or an irresponsible protection of nature will in the short term have a negative impact on the well being of mankind is disputable. However, shortages of raw materials and food might occur in the long-term. With ongoing large-scale deforestation, effects on climate and erosion processes will be significant but difficult to predict. Global warming, temperature rises, unpredictable rainfall and consequent flooding may be future reality. As these processes are often irreversible, nature protection is vital for sustainable development and for the conservation of the world's natural and cultural resources. Nevertheless, when it comes to concrete policy decisions, the interests of natural heritage often appear to be less important than the shorter-term economic or social interests of society. To secure conservation goals, biodiversity need to be better incorporated into other policy areas. This issue remains a major obstacle, but is now receiving increasing attention in policy development.

There is an ever increasing concern in the last decade for the need for preservation and protection of the European natural heritage. The EU already consists of 25 member states; this calls for a balanced common policy and strategy for the achievement of sustainability, in social, economic and environmental terms. It is clear enough that the main pressures, difficulties and threats that affect the natural heritage of the Continent, are more or less common throughout Europe.

Undoubtedly, the management of natural heritage in Europe should go beyond national boundaries and the jurisdiction of member states; therefore it requires a comprehensive approach which ought to be supported by other EU policies, since cohesion is one of the major quests for the unification of Europe. Effectiveness of relevant policies for the protection, conservation and management of natural heritage should be another major quest. This vast area, with different biological, geographical, geological and climatic conditions, along with differences in economic and cultural features, have led to a variety of protection efforts.

It can be stated that the need for a common policy should begin with the first and more practical steps. The development of commonly accepted

categories of protected areas should be one of the goals for the immediate future. Cooperation between states and between regions is of paramount importance for the protection and preservation of European natural heritage that does not recognise borders.

While pursuing the ambition to protect nature, one of the key questions concerns the justification for protection. Different motives connected to the function of nature can be used to justify protection. For example:

- Economics and production. Nature protection is necessary, as it performs a range of functions, including food-production, providing building materials and providing a source of employment. Natural and green areas contribute to an attractive working and living environment;
- Natural balance. Nature is important for regulating and stabilising processes due natural phenomenon and human activities. Examples include the regulating function of oceans on the climate, forests on soils and the neutralizing capacities of alkaline with regard to acid rain;
- Perception. This aspect includes the appreciation of nature as a source of beauty, space, inspiration and art;
- Recreation and tourism. Nature has an important function in terms of leisure and welfare and is in this sense an economic trigger;
- Science. Nature is an important source of scientific information, including biological, archaeological, and geological information. This motive also includes the so-called signal or monitoring function. The presence or absence of certain species can indicate signs of a changing environment;
- Ethics or intrinsic value of nature. Nature also has a value which is not directly related to the welfare or well being of people. Man has a moral obligation to secure and protect nature; and
- Politics. Protection of a common good like the natural environment could enhance the feeling of solidarity of a community.

After the quantitative analyses in section II, chapters 7 and 8 and the qualitative analyses at micro level in chapter 9, a qualitative reflection is given in chapter 10 on nature as an asset. Issues related to the value of nature for mankind and for economic development, is mentioned briefly in the following chapter and elaborated and concluded in chapter 10.

## 6.2 Key policies on nature

In Europe many conservation strategies exist alongside each other (see table 8).

**Table 8 Conventions and legal instruments**

	<b>Protection of</b>	<b>Implementation in EU policy</b>
Ramsar convention	Fauna Sites: wetlands	Ramsar sites are directly incorporated into the Birds Directive as category 'c' of special protection areas
World Heritage Convention	Sites Habitats	Individual EU Member States are Parties
Bern Convention	Fauna and flora Habitats	Implemented through the Habitats Directive
Bonn Convention	Fauna Habitats	Signed, but not ratified by the EU
Convention of Biological Diversity	Fauna and flora	EU is a signatory Party; CBD is implemented through EU Biodiversity Action Plans on Conservation of Natural Resources, Agriculture, Fisheries and on Economic Development co-operation.
European Landscapes Convention	Landscapes	No legal link to EU policy. Some individual EU members are party.
Birds Directive	Fauna Habitats	Natura 2000
Habitats Directive	Fauna and flora Habitats	Natura 2000

Note 1: The conventions regarding natural heritage have an influence over European and national policy orientation (World Heritage, Bern, Bonn, European Landscapes); and the Pan-European Biological and Landscape Diversity Strategy guides the setting of objectives for natural heritage, without having the status of a legal instrument.

Note 2: The European Birds and Habitats Directives are implemented through national legislation, whereas the terms of the Regulations that structure Environmentally Sensitive Areas have been implemented directly as national statutes.

The instruments to preserve and enhance the natural heritage in Europe are varied in their operational mode. Their overall influence on the spatial

organisation of the natural heritage could gain immensely from a concerted policy for definition of objectives and their implementation.

Tables 9 and 10 present the policies and strategies and the funds.

**Table 9 Policies and Strategies**

	<b>Orientation of EU policy</b>
Common Agricultural Policy (CAP)	Promotes agri-environment and sustainable rural development
Agenda 2000	General, but particularly in agricultural and rural development
Environmentally Sensitive Area	Special agri-environment grant to farmers for managing natural farmers in specific rural areas.
Pan-European Biological and Landscape Diversity Strategy	Recognized by EC and all its member states
European Community Biodiversity Strategy	Agriculture, Fisheries, Natural Resources and Transportation, as related to Biodiversity

**Table 10 Funds**

	<b>Implementation in EU policy</b>
EU Structural and Cohesion Funds	Can apply to project in EU with a nature conservation and sustainable rural development component
PHARE and TACIS	Can apply to projects in CEE and NIS countries with a nature conservation and sustainable rural development component
Common Agricultural Policy (CAP)	Grants to farmers for managing landscape and nature

## **6.3 Other EU policies**

This section highlights relevant EU-policies that are not specifically related to natural heritage but that have an influence on nature and landscape in spatial terms.

### **6.3.1 Water Framework Directive (Directive 2000/60/EC)**

The Water Framework Directive establishes a framework for the protection of inland surface waters (rivers and lakes), transitional waters (mostly estuaries), coastal waters and groundwater to prevent further deterioration and to protect and enhance the status of aquatic ecosystems. The Directive aims to enhance protection and improvement, by putting into place specific

measures to cease or phase out discharges, emissions and losses of priority hazardous substances, with the ultimate aim of achieving concentrations in the marine environment near background values for naturally occurring substances and close to zero for man-made synthetic substances. The implementation of the framework will also contribute to a reduction of threats to biodiversity.

### **6.3.2 Environmentally Sensitive Areas**

The provision of Environmentally Sensitive Areas (ESAs) as a recognised designation status for land was legally formulated for the EU by Council Regulation (EEC) No. 2328/91<sup>54</sup> on improving the efficiency of agricultural structures. The technical implication is that certain measures to manage the land to protect or enhance the natural heritage – in particular specific aspects of biodiversity – can be undertaken by the land manager according to negotiated specifications and in view of monetary compensation if executed correctly.

By extension, the phrase has come to include other areas in which the natural heritage is deemed to merit protection because it is relatively more vulnerable to negative impacts from human pressures, although this may not yet be provided for by a specific designation status, legally applicable or otherwise.

The principle of ESAs has been reaffirmed in succeeding reformulations of EU agricultural policy,

- first as part of the MacSharry Reform<sup>55</sup> on agricultural production methods compatible with the requirements of protection of the environment and the maintenance of the countryside which superseded Council Regulation (EEC) No. 2328/91 and
- second within the strategy for rural development (Council Regulation (EC) No 1257/1999 of 17 May 1999<sup>56</sup> on support for rural development from the European Agricultural Guidance and Guarantee Fund (EAGGF) and amending and repealing certain Regulations) that elaborates upon Agenda 2000.

---

<sup>54</sup> OJ No. L218, 6.8.91, p.1

<sup>55</sup> Council Regulation (EEC) No. 2078/92 (OJ No. L215, 30.7.92, p.85

<sup>56</sup> OJ No. L160, 26.6.99, p.80

## **6.4 Protection of nature**

The ambition to 'protect' biodiversity means creating awareness of its special value and geographically identifying – and sometimes limiting land use upon – areas in which particular value is found, as a way of ensuring the conservation of biodiversity. Within Europe there have been several systems for the identification of areas of biodiversity conservation value, two of which have been retained; the Ramsar Convention and the Natura 2000 ecological network. Next to that, categorisations of nature have been set up, the most extensive of which is the one set up by the IUCN. Finally, in many countries nature is also protected by law.

### **6.4.1 IUCN Protected Areas List**

The IUCN is an international association of governmental and civil society bodies that have an interest in the preservation of the world's natural resources. Assisted by a group of volunteer scientists, the IUCN has compiled a widely respected listing of species that are vulnerable, threatened or endangered (the 'Red Books'), and has developed a classification system for areas that are given a protection status either by law having an influence on land-use or a special form of long-term management. These internationally applied categories permit a comparative assessment of the degree and extent of biodiversity protection in spatial terms.

The categories set up by IUCN (see below table 11) show that the designation of terrestrial and aquatic sites as 'protected' areas occurs for several different specific purposes. They all have the regulation of land use in common. In some cases, such as for strict nature reserves (IUCN category 1), the intention is to impede human access of any sort, except when permitted by the authority responsible for the site, and only then for a limited number of reasons. These reasons are often stipulated in the official act instituting the nature reserve, and need to be formally amended. For national parks (IUCN category 2), many land uses that have taken place before designation occurred are allowed to remain, and are foreseen in the management plan for the park. These are often 'extensive' in nature, such as upland grazing where the number of animals per hectare respects the natural regenerative capacity of the vegetation. For special landscape areas (IUCN category 5), density of housing, for example, may be limited, and housing itself restricted. Such restrictions may be in the number of units that may be built, or may concern the materials to be used and / or the



architectural style to be respected. As long as the reason for designating a site as being protected concerns the management of the natural heritage in some way (protection of species, preservation of landscape amenity), all sites are equally important.

When building a network of protected areas, the ecological criteria should be considered rather broadly. 'Landscape amenity', for example, is less tangible than the number of species or the population of a specific species. But it is a quality that is dependent upon the unique combination of biotic and abiotic factors that directly reflect the local ecology. For this reason, there is a value to conserve landscape character for the same ecological motivation as protecting a site where a rare species is found. The ecological processes, including the influence of climate and soil (important abiotic factors), are always unique at whatever scale they are considered to be functioning. Human appreciation of ecological processes is always subjective, for there are no strictly determined boundaries to ecosystems. To designate a site is an approximate exercise, which tries to identify all of an area that is relevant to the feature that is to be preserved. So in any case the protection afforded to the natural heritage through designation of protected areas has to be understood in a non-restrictive manner. Because the ecological value of a site is always functionally more robust where it has greater connectivity to other sites, the sustainable status of a network of sites depends as much on the strict nature reserve as it does on the special landscape area.

**Table 11 IUCN Management Categories**

<b>CATEGORY Ia</b>	Strict Nature Reserve: protected area managed mainly for science.
	Area of land and/or sea possessing some outstanding or representative ecosystems, geological or physiological features and/or species, available primarily for scientific research and/or environmental monitoring.
<b>CATEGORY Ib</b>	Wilderness Area: protected area managed mainly for wilderness protection
	Large area of unmodified or slightly modified land, and/or sea, retaining its natural character and influence, without permanent or significant habitation, which is protected and managed so as to preserve its natural condition.
<b>CATEGORY II</b>	National Park: protected area managed mainly for ecosystem protection and recreation.
	Natural area of land and/or sea, designated to (a) protect the ecological integrity of one or more ecosystems for present and future generations, (b) exclude exploitation or occupation inimical to the purposes of designation of the area and (c) provide a foundation for spiritual, scientific, educational, recreational and visitor opportunities, all of which must be environmentally and culturally compatible.
<b>CATEGORY III</b>	Natural Monument: protected area managed mainly for conservation of specific natural features.
	Area containing one, or more, specific natural or natural/cultural feature which is of outstanding or unique value because of its inherent rarity, representative or aesthetic qualities or cultural significance.
<b>CATEGORY IV</b>	Habitat/Species Management Area: protected area managed mainly for conservation through management intervention.
	Area of land and/or sea subject to active intervention for management purposes so as to ensure the maintenance of habitats and/or to meet the requirements of specific species.
<b>CATEGORY V</b>	Protected Landscape/Seascape: protected area managed mainly for landscape/seascape conservation and recreation.
	Area of land, with coast and sea as appropriate, where the interaction of people and nature over time has produced an area of distinct character with significant aesthetic, ecological and/or cultural value, and often with high biological diversity. Safeguarding the integrity of this traditional interaction is vital to the protection, maintenance and evolution of such an area.
<b>CATEGORY VI</b>	Managed Resource Protected Area: protected area managed mainly for the sustainable use of natural ecosystems.
	Area containing predominantly unmodified natural systems, managed to ensure long term protection and maintenance of biological diversity, while providing at the same time a sustainable flow of natural products and services to meet community needs.

These categories are defined in detail in the *Guidelines for Protected Areas Management Categories* published by IUCN in 1994. ([http://www.unep-wcmc.org/protected\\_areas/categories](http://www.unep-wcmc.org/protected_areas/categories))

Table 12 shows these protected areas as distributed over 29 countries.

The IUCN database on protected areas is used to demonstrate the methodology. However, at the NUTSO level, and for the bio geographical regions it does give an indication of protection and the associated management categories. This project does not intend to deliver a complete database on designated sites.

**Table 12 Total protected area (IUCN) for each country**

	<b>Area IUCN I-IV sites (km<sup>2</sup>)</b>	<b>% Coverage</b>	<b>Area IUCN V-VI sites (km<sup>2</sup>)</b>	<b>% Coverage</b>
<b>BE</b>	26	0	5	2
<b>DK</b>	240	9	74	1
<b>DE</b>	2335	2	166	22
<b>GR</b>	45	3	22	0
<b>ES</b>	54	7	125	3
<b>FR</b>	1104	1	37	10
<b>IE</b>	54	1		0
<b>IT</b>	266	2	84	5
<b>LU</b>	15	0	1	14
<b>NL</b>	50	4	11	1
<b>AT</b>	325	7	257	21
<b>PT</b>	18	1	13	5
<b>FI</b>	238	4		0
<b>SE</b>	149	4	125	1
<b>UK</b>	361	1	134	19
<b>CY</b>	7	8	3	0
<b>CZ</b>	1736	2	26	14
<b>EE</b>	132	4	90	4
<b>HU</b>	122	2	60	5
<b>LT</b>	24	3	30	6
<b>LV</b>	126	2	26	4
<b>MT</b>	4	0	1	1
<b>PL</b>	393	1	119	10
<b>SI</b>	3	4	29	2
<b>SK</b>	36	5	14	12
<b>BG</b>	17	2	2	1
<b>RO</b>	36	3	1	0
<b>NO</b>	40	4	35	1
<b>CH</b>	1897	7	249	21

Source: IUCN database on protected sites

### **6.4.2 Ramsar sites**

The Ramsar Convention has had an enormous impact on the designation and protection of many wetlands in Europe, often large in size because of the requirement to serve the needs (migration, breeding, wintering) of at least 10,000 birds of a designated species. By means of comparison, the size of a habitat needed to ensure the safeguarding of a plant or small fauna species under Natura 2000 could be tens of square meters or hectares. To protect an Environmentally Sensitive Area, an area would be needed of tens of square kilometres. Ramsar sites are designated under the Convention on Wetlands, signed in Ramsar, Iran, in 1971, which is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. There are presently 136 Contracting Parties to the Convention, with 1289 wetland sites, totalling 109 million hectares, designated for inclusion in the Ramsar List of Wetlands of International Importance. The importance of these sites is recognised within the EU by a specific category of site classification ('c') within the text of the Council Directive 79/409/EEC of 2 April 1979 on the conservation of wild birds (the 'Birds Directive'). Ramsar sites are an excellent indication of the highest level of importance of areas for avifauna, as among the criteria for designation is the presence of a significant quantity of aquatic birdlife:

Criterion 5: A wetland should be considered internationally important if it regularly supports 20,000 or more water birds;

Criterion 6: A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of water bird.

There are currently 459 areas designated as Ramsar sites. The total size of the area is 3995 thousand hectares, 36% is situated in the Coastal zone; 197 areas are protected, with a total surface of 1446 thousand hectares.

### **6.4.3 Natura 2000**

Natura 2000 symbolises the conservation of natural resources in the EU for the year 2000 and beyond. The creation of this ecological network of protected areas is the most important priority at the EU level in the field of nature protection. Comprising Special Protection Areas (SPAs) designated under the Birds Directive and Special Areas of Conservation (SAC's) under the Habitats Directive, Natura 2000 represents the EU's contribution to the Pan-European Ecological Network (see text box below).

### **The Pan-European Ecological Network**

Since the endorsement of the Pan-European Biological and Landscape Diversity Strategy (Council of Europe *et al.*, 1995) countries in the pan-European region cooperate towards the development of a Pan-European Ecological Network (PEEN).

According to van Opstal (2001), the Pan European Ecological Network will contribute to achieving the main goals of the Strategy by ensuring that a full range of ecosystems, habitats, species and their genetic diversity, and landscapes of European importance are conserved; habitats are large enough to give species a favourable conservation status; there are sufficient opportunities for the dispersal and migration of species; damaged elements of the key systems are restored and the systems are buffered from potential threats.

In other words, the Pan-European Ecological Network has, by creating an European ecological network, the following objectives:

- to maintain characteristic ecosystems and species across their natural ranges;
- to support ecological processes across Europe;
- to restore in a sufficient degree natural ecosystems and processes;
- to conserve semi-natural and other ecosystems, especially where these are indispensable as substitutes for natural habitats; and
- to adopt sustainability as a guiding principle for decisions and actions.

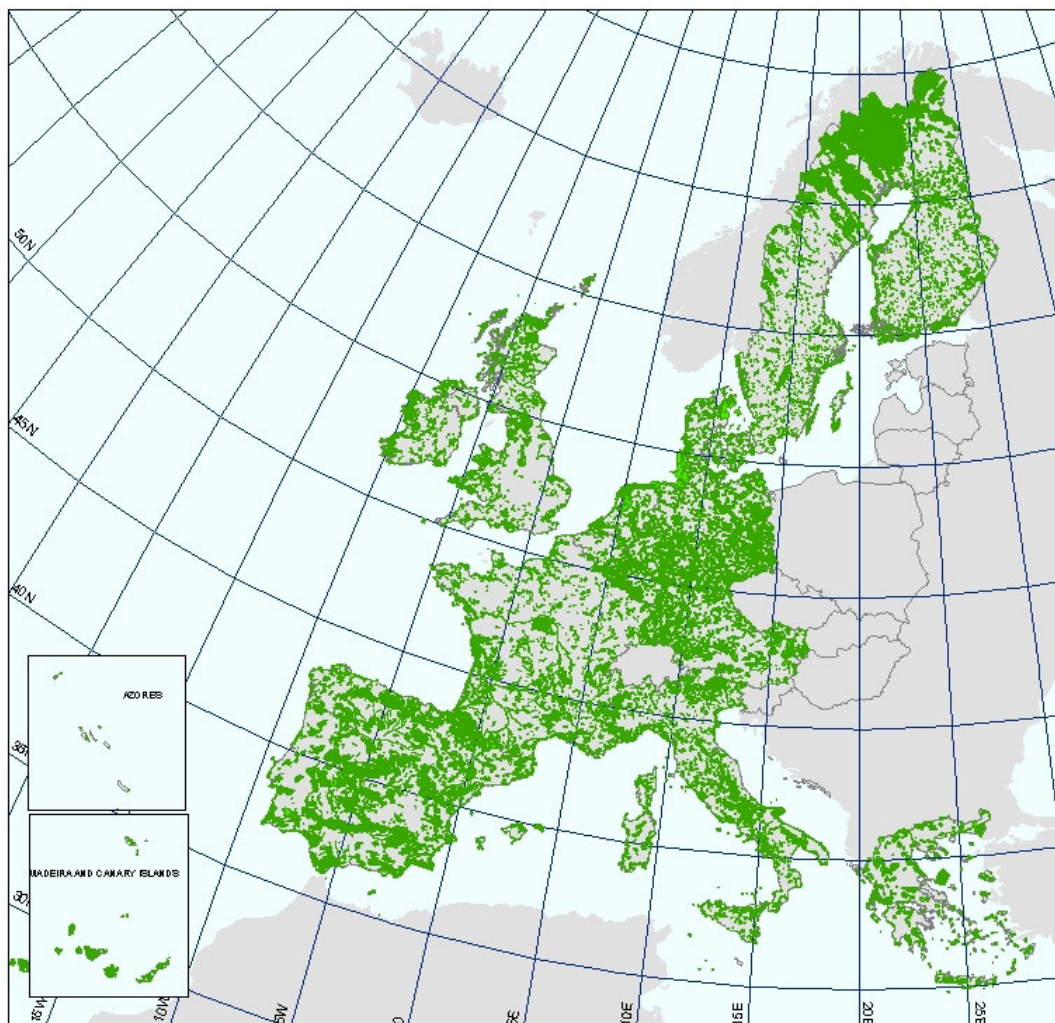
Currently PEEN is in a stage of development, with an indicative map produced for Central and Eastern Europe (Bouwma *et al.*, 2002) and is in process for South-eastern Europe.

Source: ECNC, 2002

What are the features of Natura 2000? It creates an EU network of protected sites under a common approach and with uniform standards across the EU member states. The identification of areas to be included in the network is a scientific exercise that makes use of criteria specially developed for the purpose. But Natura 2000 is not just a few strictly protected core areas. Sites may also include restoration areas and buffer zones; it is for the member states to decide on the best mechanism to achieve the conservation objectives.

The Habitats Directive provides a clear mechanism for balancing ecological and economic interests affecting Natura 2000 sites. Article 8 of the Habitats Directive envisages co-financing the Natura 2000 network by the EU, which uses the LIFE regulation as a strategic tool to help establish the network. The Natura 2000 network is built around the principle of integration and so, at the European level, the aim is to incorporate its requirements into other policies and the Community financing mechanisms.

### Map 13 Natura 2000 network



**The Natura 2000 Network**  
**Sites designated under the Birds Directive and proposed under the Habitats Directive**  
*Note: for Germany only site centre co-ordinates are available for proposed sites*

ETRS\_LA  
1:22 500 000

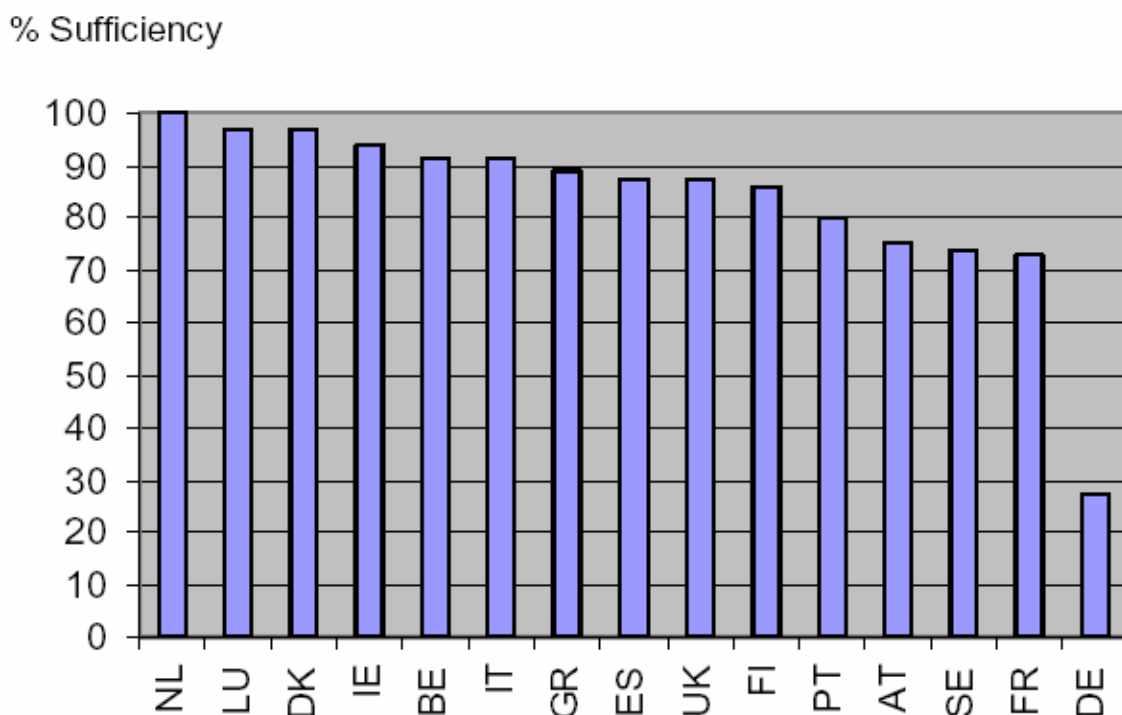
Source: ETC/NPB August 2004

The establishment of the Habitats Directive component of Natura 2000 involves three steps: preparation of national lists of sites, the selection of sites at the EU level, followed by their progressive destination. Already over

12% of the territory of the EU has been proposed by the member states for protection, although the task of finalizing a Community list of sites is being greatly frustrated by incomplete national lists. Certain lobbies (including farmers, foresters and hunters) have resisted Natura 2000 strongly. One of the great challenges, therefore, is to communicate the goals of Natura 2000 and to make local actors and stakeholders confident that the sustainable land use and management objectives of Natura 2000 are also in their interest.

The network of sites proposed under the Habitats Directive and contributing to the Natura 2000 network has been completed by more than 80 %. Only the Netherlands has completed its site proposals for protecting all relevant habitats and species mentioned in the Directive (Marine species and habitats are not considered).<sup>57</sup>

**Figure 11 State of proposals for protected sites under the EC Habitats Directive (as of November 2003)**

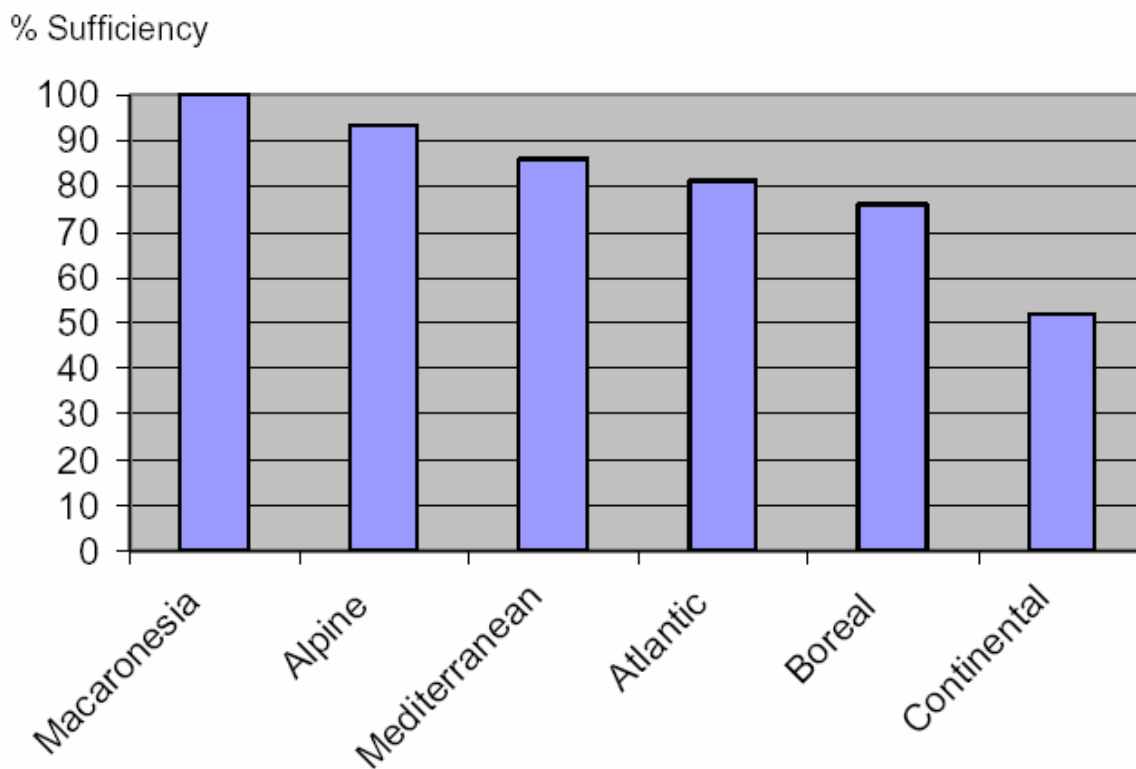


Source: EEA-ETC/Nature protection and biodiversity: Natura 2000 database

Notes: Bars show the degree to which Member States have proposed sites that are considered sufficient to protect the habitats and species mentioned in Habitats Directive Annex I and II (situation November 2003) (marine species and habitats are not considered).

<sup>57</sup> EEA, Indicator fact sheet (BDIV10e) EU Habitats Directive: sufficiency of Member State proposals for protected sites, June 2004

**Figure 12 State of proposals of protected sites under the habitats Directive by bio geographic region (as of November 2003)**



Sources: EEA- ETC/Nature protection and biodiversity.

Notes: Bars show the degree by bio geographic region in which Member States have proposed sites that are considered sufficient to protect the habitats and species mentioned in Habitats Directive Annex I and II (situation November 2003).

The implementation process of the Habitat Directive is based on conclusions from meetings on the six bio geographical regions of the EU. One or several of the bio geographical regions may cover a Member State (see figure). The Macaronesian region (Azores and Canary Islands) has reached 100 % sufficiency. Within this region Spain has 23 targeted habitats and 72 targeted species and Portugal 28 and 85, respectively. Both countries have proposed sufficient sites for protection of all relevant habitats and species. The Continental region has the lowest progress. It is composed of eight Member States, all of which still need to propose additional sites for protection of habitats and species of the Habitats Directive.<sup>58</sup>

<sup>58</sup> EEA, Indicator fact sheet (BDIV10e) EU Habitats Directive: sufficiency of Member State proposals for protected sites, June 2004



The EU has from the outset made clear its willingness to share its experiences in developing Natura 2000 with its European partners. This is why the EU supports the Council of Europe's Emerald Network (see text box below) which is based on the same principles and is developing similar methodologies and approaches.<sup>59</sup>

### **The Emerald Network of Areas of Special Conservation Interest**

In June 1989 the Standing Committee of the Bern Convention held a meeting exclusively devoted to habitat conservation within the Convention. At the meeting, the Committee adopted an interpretative resolution on the provisions relating to the conservation of habitats and three operative recommendations aimed at the development of a network of areas under the Convention. The adoption of the resolution and the recommendations marked the start of the process for the establishment of a Network of Areas of Special Conservation Interest, currently known as the Emerald Network. The designation criteria point clearly to areas of great ecological value for both threatened and endemic species listed in the Appendices of the Bern Convention and to endangered habitat types to be identified by the Standing Committee as 'requiring specific conservation measures'.

Although the Emerald Network was formally established before the EU Natura 2000 Network, it can be considered as a de facto extension of the latter network to the whole of the European space. The main differences between the networks is legal: Natura 2000 was established in 1992 by an EC Directive, while the Emerald network uses a 'soft law' approach to better define the obligations of Bern Convention Parties regarding the protection of habitats. The Emerald Network is also due to be open to voluntary participation of states that are observers to the Convention.

To date, the Bern Convention has been working mainly on the practical arrangements and other technical details related to the database and software for the establishment of the Emerald Network, on its relationship with other initiatives – particularly the CORINE Biotopes and the Natura 2000 Network – and on the political decisions that need to be taken to enable and facilitate its establishment and maintenance. From this technical work, the Standing Committee to the Convention has adopted a list of habitats that require special protection in Europe, has enlarged the EC map of bio geographical regions to cover the whole of Europe, and has created a Bern Convention group of experts to set up the Network and assure its compatibility with Natura 2000.

The interest of all European countries in the development of the Emerald network stems from the fact that it will provide a homogeneous system of habitat protection for Europe.

Source: Eladio Fernandez-Galiano, Council of Europe

## **6.5 Policy shift**

Conservation takes into account the sustainable use of the natural resources in an area to be conserved. Protection refers to the intentional action to maintain the existing condition of the natural heritage, and of actual biodiversity specifically. The principle of 'protection' can be extended to the notion of biodiversity 'enhancement'.

---

<sup>59</sup> Information was contributed by Mr. B, Julien, European Commission DG XI

Although the first international conference on bird protection was held in Paris as long ago as 1891, the European inter-governmental approach towards nature conservation is relatively young – about 35 years. The awakening of nature conservation in continental Europe began with the establishment of the first national parks in Sweden in 1909 and Switzerland in 1914. The first nature reserve in the UK (Wicken Fen) was established in 1899.<sup>60</sup>

Historically, nature conservation policy has focused on the conservation of species and/or habitat types, which can be described as a sectoral approach. The European Diploma, an 'award scheme' introduced by the Council of Europe in 1965 and their later concept on the 'European Network of Biogenetic Reserves' (1976) were intended to stimulate governments and NGO's to start thinking about the European dimension of nature.

Further, the first European Conservation Year (1970) as implemented by the Council of Europe and the Bern convention on the Conservation of European Wildlife and Natural Habitats were very important steps in this sectoral phase of the European process.

Public interest became more significant in this period, leading to powerful NGO's, such as the IUCN (International Union for Conservation of Nature and Natural Resources, now the World Conservation Union). From then on a number of major conventions were drawn up, as described later on in this chapter.

Since 1979, the year in which the Birds Directive was adopted, the EU has played an increasingly direct role in developing Europe's nature conservation policy. Although the conservation of species and habitat sites was still very much at the heart of nature conservation policy in the early 1990's, it was recognised that to truly conserve Europe's natural heritage a set of protected areas was not enough. Gradually, the concept of establishing ecological networks, in which the protected areas would be connected and buffered, took shape and was introduced by the Habitats Directive (1992).

Natura 2000, described above, incorporates the Special Areas designated by the Habitat Directive as well as those designated by the Birds Directive to develop a more extensive framework for the development of a coherent European ecological network.

The development of policies on natural heritage shows clear progress in relation to concern about conservation of natural heritage. This has evolved from strict protection as a defence against the extinction of species and habitats (reactive) to action involving local actors and subsequently to the

---

<sup>60</sup> Marren, 1994

will of creating natural networks (with Natura 2000) and protecting given species such as birds, landscapes and people's living environments.

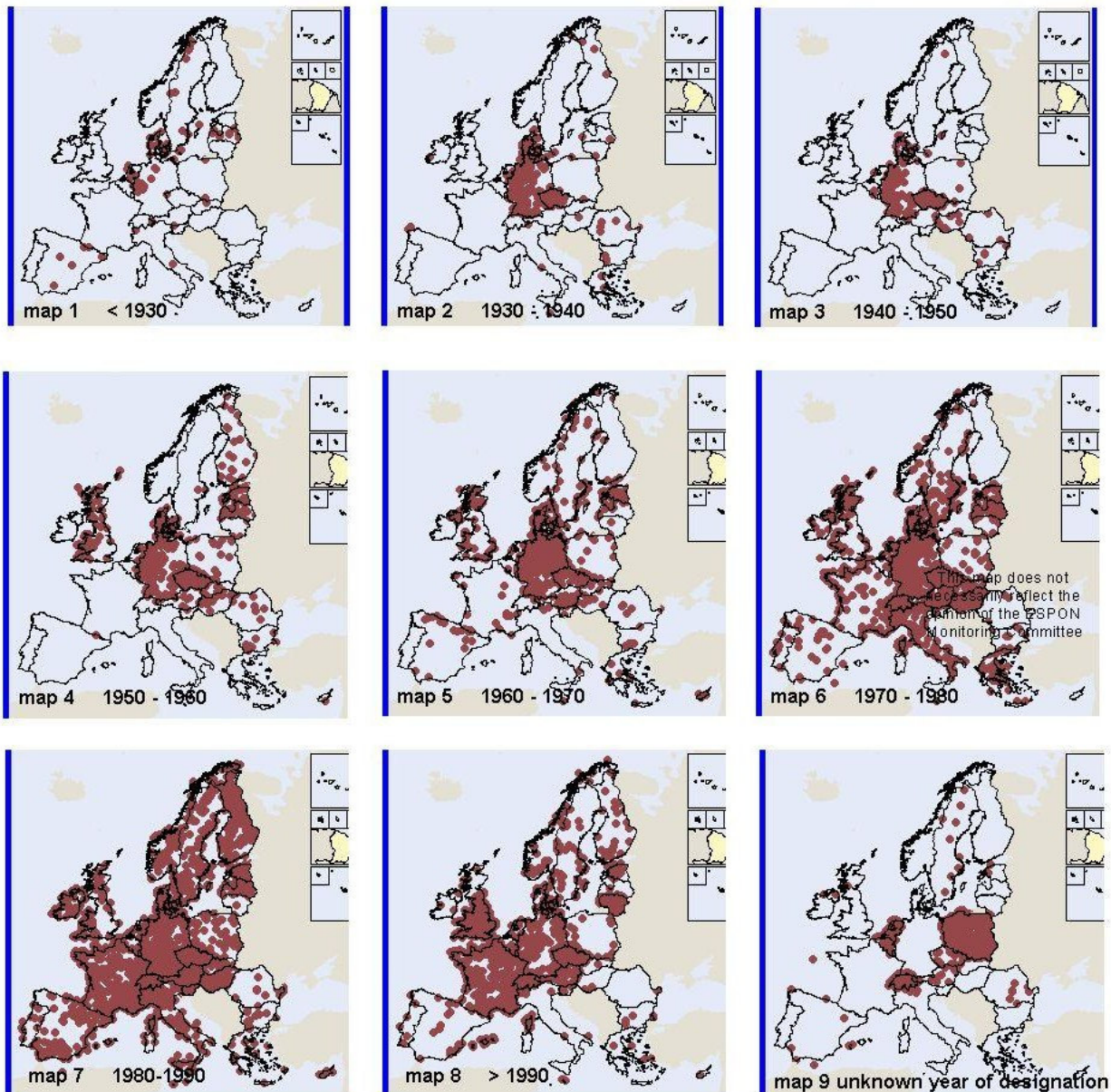
## **6.6 Designated semi-natural areas and**

Map 14 shows the distribution of designated areas per time period. The maps are not cumulative, which means that each map shows only the areas that have been designated during that period of time.

The different time periods show that often designation of many areas in a country took place during specific periods of time. In Italy, for example, most areas have been designated in the period 1970-1990. The same is for Greece and Hungary. In Spain and Ireland most designations have taken place in the period 1980-1990 and in Slovenia in the period 1980-2000. In the Czech Republic and Germany, designations have continually taken place from 1930 onwards and in Denmark before then.

This suggests that designation is not so much dependent on local physical circumstances or the natural values of an area, but more on the legislative phase the country is in.

## Map 14 Year of designation



Differences in legislative, institutional and financial support do have an effect on the number and rate of designations in an area. After implementation of legislation on natural heritage protection there is a clear increase in designation. Also in times of economic prosperity more budget will be available for purchases of semi-natural areas and / or implementation of management measures and hence designations.

It can also be concluded that some countries, such as Denmark, the Czech Republic and Germany, have a long history of protection of the natural heritage, as sites were designated relatively early compared to some other European countries.

The differences between countries can be explained by differences in priorities and motives. In Germany cultivated landscapes had priority, whereas in France the aesthetic and hunting motives were regarded as more important. For example the first protected area in France was designated for its natural (scenic) beauty.

Regarding the mean size of designated areas, figure 5.3 shows that they are generally largest in Finland, the Alps, Scotland, Sardinia and Greece. Large mean sizes of designated areas are also found in Spain, southern France, Corsica, the Carpatians and are slightly smaller in the lower mountain ranges. The mean size is smallest in the flat coastal areas in North West Europe, Ireland, parts of East Europe and parts of Italy.

It can be concluded from map 14 that protection has taken place for diverse reasons, such as the uniqueness of a habitat/species or due to it being endangered with extinction. On the other hand, designation is largely dependent on the legislative phase of the country, and also on local circumstances and values (such as economics and common ideas on the importance and values of nature). As the majority have largely been designated for the protection of species, the types of areas (the biotopes) are of very different types.

This means that different protective measures have been taken on areas which are widely spread located, without adding to their coherence. The presence / absence of natural values is predominantly related to the historical development of urban areas (including the density of population and the size of towns and cities) and the progressive intensification of farming fertile soils in between urban areas. Where economic activity is less intensive, such as in peripheral zones, there has been less disruption of natural values.

## **6.7 ESDP**

The need to take account of environmental protection has become strongly embedded in European policy since the Amsterdam Treaty of 1997. Even beforehand, European agricultural policy has, since 1985, encouraged Member States to identify and financially support the maintenance of

Environmentally Sensitive Areas, in particular where traditional agricultural practice would maintain biodiversity and associated landscape character. The European Spatial Development Perspective (ESDP) fully integrates the development of a European ecological network, based upon Natura 2000 sites as designated through the Birds and Habitats Directives.<sup>61</sup> In general, the ESDP indicates that large intact areas of biodiversity richness – such as those found in mountain areas, wetlands, coastal regions and islands - should be protected, as these undisturbed areas are becoming rare.<sup>62</sup>

The specific policy options proposed by ESDP that are particularly relevant to project 1.3.2 include:

(40) Continued development of European ecological networks, as proposed by Natura 2000, including the necessary links between nature sites and protected areas of regional, national, transnational and EU-wide importance.

(41) Integration of biodiversity considerations into sectoral policies (agriculture, regional policies, transport, fisheries, etc) as included in the Community Biodiversity Strategy.

(42) Preparation of integrated spatial development strategies for protected areas, environmentally sensitive areas and areas of high biodiversity, balancing protection and development on the basis of territorial impact assessments and involving partners concerned.

One of the explicit questions to be answered in the ESPON programme is the effect of existing policies on ESDP goals. Within ESPON priority for this project, this means more specifically to answer the question 'to what extent do current policies, with regard to natural heritage, support the objectives of the ESDP?'.

The protection and enhancement of natural heritage may be well served by the concept of territorial cohesion and by forming ecological networks. In the following section, we consider how the main objectives of the ESDP fit with the effects of protecting natural heritage, and what the expected effects of successful implementation of Natura 2000 might be.

The main objectives of the ESDP are:

- polycentric urban development;
- balanced competitive development; and
- sustainable development.

---

<sup>61</sup> see ESDP: pg 136

<sup>62</sup> see ESDP: pg 137

### **6.7.1 Natural heritage and polycentricity**

One of the main spatial objectives of the ESDP is to develop or support a Europe-wide polycentric urban system. In section 5.2 policies with regard to natural heritage were discussed and it was concluded that they tend to address dispersed semi-natural areas. In fact, most of them focus on specific natural values, only Natura 2000 aims at a spatial pattern.

Although Natura 2000 is an accepted policy, it has not been in operation long enough to measure its effect on polycentric urban development. Natura 2000 will not have had an influence on the spatial distribution of urban areas, since this distribution is the result of long-term processes. If, after a period of several decades, Natura 2000 is implemented successfully, resulting in a large network of protected semi-natural areas, then this network will be expected to have influenced spatial patterns in two possible ways. Firstly by prohibiting urbanisation and the related infrastructure at protected sites and secondly by adding attractiveness near valuable sites for settling new economic activities. Sites located in proximity to elements of the nature network and good infrastructure may become nodal points for potential future polycentric developments. In that way, Natura 2000 may be expected to have a supportive influence when developing a more polycentric urban system.

### **6.7.2 Natural heritage and balanced competitive development**

The ESDP promotes balanced social and economic development in order to avoid additional concentration of economic activities and population in the core area in Northwest Europe. The distinction in core-periphery has been made in the ESDP by defining the core area as the Pentagon area.

Balanced development should promote economic developments and investments outside these parts of Europe. The EU Structural- and Cohesion funding through Objective 1 is already strongly enhancing development in the periphery. Ireland, Portugal, Spain, southern Italy and Greece have received substantial support for development. In addition, the new member states in Central Europe are also eligible for substantial funding.

Policies for natural heritage do not seem to have had any influence on balancing development. It is also likely that they did not have the opposite effect. On the other hand, if Natura 2000 policies eventually result in an Europe-wide network of semi-natural areas, this network may offer high quality environments that add to the attractiveness for locating activities

outside the core. So, eventually Natura 2000 may support a more balanced development away from Europe's Pentagon.

### **6.7.3 Natural heritage and sustainable development**

Sustainable development requires equal consideration of social, economic and environmental factors. However, in practice, economic considerations are often given priority in local decisions. In cases where there is significant local support for retaining an area of open space, more priority may be given to social and environmental factors. Such a strong interest may be the case where biodiversity or a rare species is clearly threatened but also where historical, cultural and emotional considerations are at stake. The value that is attributed to a specific semi-natural area by society can be increased if more information is available about its qualities. The value of a specific area can also be increased when it is a strategic part of a larger network situated in a key location to connect important areas.

Policies for nature conservation and the protection of species have clearly served to strengthen ecological aspects. Nature under threat is defended and this should be continued. There is no doubt that in general these policies support the sustainable development of Europe.

It may be expected that when Natura 2000 has been fully implemented and a large European network of semi-natural areas has been realised, the value of specific areas is recognised as being a part of a wider network. As a result it also may be expected that threats to specific elements of the network will evoke resistance, because it disrupts the coherence of the network. It may be concluded that Natura 2000 forms an important policy enhancing sustainable development. Continued implementation should be strongly recommended.



### Natural heritage within ESDP

The ESDP<sup>63</sup> gives attention to the loss of biological diversity and natural heritage and to increasing pressure on landscapes. Threats have been formulated as follows in the ESDP:

- (310)<sup>64</sup> The diversity as well as the preservation of the natural and cultural heritage in the EU is threatened. The increasing threat to this heritage appears to be negating the progress which has been achieved in recent years in the fields of nature conservation and protection of historical monuments. It is important to realize that the wide diversity of Europe's natural and cultural heritage presents both risks and opportunities. The main types of endangered area, such as coastal areas, mountain ranges, mud-flats, reservoirs, woodlands and cultural landscapes, are at great risk throughout the whole of Europe.
- (311) Coasts with their great diversity of sensitive biotopes are of major importance for human living space, for tourism and transport, for industry and energy production and for agriculture and fishing. They are generally threatened by urban construction, mass tourism, the excessive use of fertilizers and pollution. Mountains provide habitats for wild animals and plants and are the source of fresh spring water. They are not only important natural areas, but frequently also significant economic and living areas. Mountain areas in the EU are in many cases threatened by growing mass tourism, dams and new transport routes and by overgrazing, erosion and non-cultivation. Mudflats, rivers and lakes have vital ecological functions and are unique repositories for archaeological finds. The number, size and territorial integrity of mudflats is being severely reduced through drainage, cultivation, sinking of the ground water level, reduced water flow and new transit routes. Rivers are being straightened, their flood patterns are being restricted and dams are being built. Woods and forests, as the 'green lungs' of Europe, contribute to the conservation of water and land resources and generally to the beauty of the landscape. They are also an important habitat for flora and fauna and provide recreation areas for people. The main hazards for the woodlands are air pollution, insect and fungus infestation and forest fires. It should not be forgotten that almost all areas which are regarded as endangered are areas with cities, residential locations and infrastructure, in which people live and work.
- (312) (...) The diversity of soil types and their natural functions are, however, greatly threatened by human activity in many areas.
- (313) Moreover, climate is a part of the environment, of the natural resources, suffering more than ever from the negative impacts of human activities. Increases of gas responsible for the greenhouse effect, caused by humans, modify temperature and the distribution of rainfall. This leads to shifts of arable areas, endangers flora growth and increases both periodicity and intensity of bad weather.
- (323) The threat to cultural landscapes in the EU is closely related to the rationalization and intensification of agricultural production and the objective of agricultural 'extensification' in some areas. In other parts of the EU, marginalization tendencies are evident. In addition, the expansion of cities and isolated settlements, consisting primarily of second homes, threaten cultural landscapes.

---

<sup>63</sup> ESDP, European Spatial Development Perspective. Agreed at the Informal council of Ministers responsible for Spatial Planning in Potsdam, May 1999, Published by the European Commission, Luxembourg, 1999) ISBN 92-828-7658-6

<sup>64</sup> (...) Paragraph number ESDP (Luxembourg, 1999), page 72

## 6.8 EU Structural and Cohesion Funds

The EU Structural and Cohesion Funds – as well as PHARE and TACIS – refer to financial funds that are associated with investment programmes whose primary aim is to improve infrastructure and entrepreneurial activity, so as to lessen the disparities of competitive advantage within the Common Market. Some of this structural funding is also associated with governance issues, including the improvement of institutional capacity for the conservation of the natural heritage. This concerns mainly ‘in situ’ conservation by means of the establishment of protected areas.

## 6.9 Third report on economic and social cohesion

Territorial cohesion is a section in the Third report<sup>65</sup> on economic and social cohesion. A central aim of the EU, as set out in the Treaty (Article 2) is ‘to promote economic and social progress and a high level of employment and to achieve balanced and sustainable development ...’. This implies that people should not be disadvantaged by wherever they happen to live or work in the EU. Natural and geographical handicaps of the outermost areas are treated as threats for a harmonious development of the Union economy in future years. These regions with geographical handicaps within the EU encompass 25 islands (including the Canaries, Madeira and Azores) plus Guyana, with a population of around 4 million. They ‘suffer from an accumulation of natural handicaps, which make it difficult to improve economic and social conditions’ (p. 30). Their remoteness is compounded by their natural features (many are archipelagos, small in terms of land area and population), difficult terrain and climate. The Canaries, moreover, are experiencing pressure from population growth, have an overdependence on tourism and a lack of diversification into other activities.

In the section on ‘development priorities’ (p.34) the other side of the handicapped areas are set out.

‘Geographical handicaps do not always mean unfavourable economic circumstances ... It is equally important that the economic development path they follow respects their natural heritage and does not endanger the very geographical features which are, or can be, a key aspect of their comparative advantage as locations not only for people to live but also for businesses to operate. As the knowledge

---

<sup>65</sup> EC, Third Report on Social and Economic Cohesion, 2004

based economy develops, therefore, proximity to raw material or even to large markets is becoming a less significant determinant of location and the attractiveness of natural and physical surroundings of increasing importance ... The economic development of these sensitive areas, therefore, even more than elsewhere, must take account of the need to safeguard the environment, which means not only integrating this priority into the investment decision-making process, but also, wherever possible, searching for options which both improve the environment and strengthen regional competitiveness ... to prevent any further deterioration of the environment in natural or semi-natural areas, where human activity is progressively encroaching or which are being abandoned and, becoming either increasingly fragmented or lacking protection for their natural resources. These aims, in consequence, need to be an integral part of economic development strategy across the EU to ensure that development is sustainable.'(p. 34-36).

The Cohesion report states that special attention needs to be given to sustainable development by, among other things:

- Helping regions most exposed to natural hazards to develop preventative measures;
- Stimulating investment for promoting biodiversity and nature protection; and
- Ensuring adequate water and waste management in areas with geographical handicaps and ensuring sufficient protection of their natural resources, so improving their attractiveness for business expansion and inward investment (p.63).

## **6.10 Other policies and instruments**

The European Parliament and the Council adopted the 6th Environmental Action Programme: Our Future – Our Choice (6th EAP). This places the environment in a broad perspective, taking into account the economic and social conditions emphasised in the Lisbon and Gothenburg objectives. The Programme singles out four areas for action, of which, nature and biodiversity is one.

The CAP also provides structural funding, principally for the improvement of agricultural efficiency and the encouragement of entrepreneurial activity to transform agricultural produce and for the market penetration of goods

coming from the agricultural sector. This policy has been reformed, aiming to provide farmers with opportunities/incentives to undertake more environmentally sustainable agricultural practices, for example through participating in agri-environment schemes.

Agenda 2000 is a very broad policy instrument seeking to define policy principles for all EU programmes to be applied in the period 2000-2006. It makes clear that reinforcement of the agri-environmental policy, combined with a rural development programme, is the main strategy for integrating the environment into the CAP.

## **6.11 Indicator**

From this chapter it can be concluded that policies on natural heritage have mainly been focused on the conservation of specific species, gradually enlarging the scope towards conservation of habitats. This policy shift acknowledged that many species are under threat, because of problems, originating from the size or environmental conditions in their habitats. Addressing the origin of ecological problems now focus on safeguarding the space and quality providing health habitats for species. Natura 2000 in fact aims to enhancing habitats by creating a network of semi-natural areas.

As discussed, many different systems of protecting areas exist, depending on specific priorities. Legislative and institutional systems are diverse and local management objectives of areas differ. As a result, it is difficult to compare or categorise the designated areas.

To overcome these differences and to create a common platform for protection, the IUCN came up with a single definitive list of protected areas classified by management categories, defined by the IUCN World Commission on Protected Areas (WCPA). Currently the list is maintained jointly by the IUCN-WCPA and the UNEP - World Conservation Monitoring Centre (WCMC); the latest list was published in 2003.

The official EU policy on enhancing the natural heritage, Natura 2000, is potentially the most adequate policy in response to threats to natural heritage. However, spatial impacts of this promising policy can not yet be measured.

As the ESDP extensively recognises, it is not only the decrease of semi-natural area that causes major threats to the natural heritage. An important threat involves fragmentation of semi-natural areas. The effects of infrastructure in particular have resulted in fragmented remnants. In general

it seems that economic and social values are important incentives or disincentives in this regard. Due to specific economic and social values, there is rarely a consideration of natural values in spatial development procedures, in addition to a lack of timely information, education on environmental and natural heritage issues and awareness of people (especially the agricultural sector) about environmental and natural heritage.

In order to analyse and monitor management, the indicator mentioned in the following table is used.

<b>Management</b>	<b>Criteria</b>	<b>Source</b>	<b>Comment</b>
IUCN protected areas	On list of protected area	List IUCN-WCPA and the UNEP - WCMC, 2003	Management categories I-IV and V-VI

Regarding the four themes presented in paragraph 1.2, IUCN-protected areas with the categories I-IV and V-VI are used for landscape, the ecosystem diversity and bio diversity. These internationally applied categories, compiled by IUCN, permit a comparative assessment of the degree and extent of landscape, ecosystem diversity and bio diversity protection in spatial terms.



## **Section II: Analysis**

# ESPON project 1.3.2 - Territorial trends of the Management of the Natural Heritage

## PART 2 Section II



*Royal Haskoning*



european centre for nature conservation





**ESPON project 1.3.2  
Territorial Trends in the  
Management of Natural Heritage**

**PART 2      Section II   Analysis**

This report represents the final results of a research project conducted within the framework of the ESPON 2000-2006 programme, partly financed through the INTERREG programme.

The partnership behind the ESPON programme consists of the EU Commission and the Member States of the EU25, plus Norway and Switzerland. Each partner is represented in the ESPON Monitoring Committee.

This report does not necessarily reflect the opinion of the members of the Monitoring Committee.

Information on the ESPON programme and projects can be found on [www.espon.lu](http://www.espon.lu)

The web site provides the possibility to download and examine the most recent document produced by finalised and ongoing ESPON projects.

ISBN number 90-74718-12-4

This basic report exists only in an electronic version.

© The ESPON Monitoring Committee and the partners of the projects mentioned.

Printing, reproduction or quotation is authorized provided the source is acknowledged and a copy is forwarded to the ESPON Coordination Unit in Luxembourg'.

# Table of contents

<b>Table of contents</b> .....	<b>129</b>
<b>Figures</b> .....	<b>129</b>
<b>Maps</b> .....	<b>130</b>
<b>Tables</b> .....	<b>130</b>
<b>Section II: Analysis</b> .....	<b>131</b>
7 The macro level .....	133
7.1 Introduction .....	133
7.2 Nature and agriculture .....	133
7.2.1 Land cover .....	133
7.2.2 Protected semi-natural areas and agriculture .....	138
7.2.3 Nature and agricultural developments .....	139
7.2.4 Fragmentation related to agriculture .....	144
7.2.5 Potentials for nature .....	146
7.3 Nature and urbanisation .....	147
7.3.1 Nature and population change .....	147
7.3.2 Differentiated urbanisation in the bio geographic regions .....	148
7.3.3 Protected semi-natural areas and urbanisation .....	153
7.3.4 Threats to nature .....	154
7.3.5 Future urbanisation .....	155
7.4 Environment and climate change .....	157
7.5 Conclusions .....	158
7.5.1 Spatial patterns .....	158
7.5.2 Management .....	159
7.5.3 ESPON monitoring system .....	160
8 The meso level .....	161
8.1 Introduction .....	161
8.2 Agriculture .....	161
8.3 Urbanisation .....	164
8.3.1 Urban pressure .....	164
8.3.2 Built-up .....	167
8.3.3 Population .....	169
8.3.4 GDP .....	171
8.3.5 Tourism .....	175
8.3.6 Infrastructure .....	178
8.4 Water .....	183
8.5 Legislative framework & management of natural heritage applied by national governments .....	187
8.6 Conclusions .....	198
8.6.1 Spatial patterns .....	198
8.6.2 Management .....	199
8.6.3 Monitoring .....	201

## Figures

Figure 13 Development in number of holdings and land use by agriculture, EU15 .....	144
Figure 14 Regional typology at the macro level .....	159
Figure 15 Average size of non-fragmented land parcels .....	181
Figure 16 Diagram: Environmental and Spatial Planning legislative framework in relation to EU's framework .....	187
Figure 17 Diagram: Countries with central government responsibility for the protection of natural heritage .....	192

Figure 18 Diagram: Countries with decentralised responsibilities at regional or local levels for the protection of natural heritage .....	194
Figure 19 Regional typology at the meso level .....	199

## Maps

Map 15 CORINE land cover and the bio geographical regions, including a 20 km coastal zone.....	135
Map 16 Land cover and the large designated areas (the size of the circles represents the actual surface areas of designated sites) .....	140
Map 17 Livestock units per hectare of utilised agricultural area in the EU in 1995.....	142
Map 18 Location of MEGA's .....	156
Map 19 Percentage semi-natural area compared to urban pressure .....	165
Map 20 Percentage semi-natural area compared to population density (2000).....	170
Map 21 Percentage semi-natural area compared to changes in GDP (1995-2000).....	173
Map 22 Percentage semi-natural area compared to GDP 2000 (relative to surface area) .....	174
Map 23 Percentage semi-natural area compared to innovation .....	176
Map 24 Semi-natural area compared to bed density .....	177
Map 25 Partitioning of land by transport infrastructure .....	181
Map 26 Percentage semi-natural area related to road density.....	182
Map 27 Semi-natural area, main hydrology and the MEGA's .....	185
Map 28 Comparison of flood risk to the percentage semi-natural area .....	186

## Tables

Table 13 Land cover at the macro level (in percentages) .....	134
Table 14 IUCN categories of protection and agricultural land cover (in percentages).....	138
Table 15 Agricultural land cover in terms of extensive and intensive use (in percentages).....	141
Table 16 Population density, population change 1995-2000, and the percentage built-up land cover at the macro level .....	147
Table 17 FAO increase/decrease agricultural area (in percentages) .....	162
Table 18 Indicators for urban pressure at NUTS0 level .....	167
Table 19 Protection compared to cover built up area (in percentages) .....	168
Table 20 Legal Framework related to natural heritage .....	190
Table 21 Centralised or Decentralised agencies responsible for protection and management of natural heritage.....	193
Table 22 Diagram: Spatial Planning Systems and Protection of natural heritage .....	197

# Table of contents

<b>Table of contents</b> .....	<b>197</b>
<b>Figures</b> .....	<b>197</b>
<b>Maps</b> .....	<b>197</b>
<b>Tables</b> .....	<b>197</b>
9 The micro level .....	203
9.1 Introduction .....	203
9.2 Territorial diversity.....	203
9.3 DPSIR in case studies .....	206
9.3.1 Borsodi Mezőség area .....	206
9.3.2 The Vallombrosa Forest.....	207
9.3.3 The Ljubljana marshland.....	208
9.3.4 Thames basin potential Special Protected area .....	210
9.3.5 The North Pas de Calais Region .....	214
9.3.6 Lanzarote island.....	217
9.3.7 The Rondane region .....	219
9.4 Findings per case study .....	222
9.5 Findings per topic.....	223
9.5.1 Agriculture .....	223
9.5.2 Urbanisation .....	224
9.6 Nature: an asset for development.....	226
9.7 Conclusions.....	227
9.7.1 Spatial patterns .....	227
9.7.2 Management .....	228
9.7.3 Monitoring .....	229
10 Nature as an asset for economic development .....	231
10.1 Introduction .....	231
10.2 Economic values of landscapes .....	232
10.3 Socio economic benefits of Natura 2000 .....	233
10.4 American experiences .....	234
10.5 Innovations and location .....	236
10.6 Limitations to nature as an asset .....	239
10.7 Conclusions.....	240

## Figures

Figure 20 Regional typology at the micro scale .....	228
--	-----

## Maps

Map 29 Europe and location of the case studies .....	204
--	-----

## Tables

Table 23 Bio geographic regions and landscapes for the case studies .....	204
Table 24 Rural territories .....	205
Table 25 Urban related territories .....	205
Table 26 Ultra peripheral territories.....	205
Table 27 The Euro-Creativity Index .....	237



## **Section II: Analysis**





## **7 The macro level**

### **7.1 Introduction**

This chapter focuses on the relationship between the natural heritage, and agriculture and socio-economic aspects at the macro level. The following questions are addressed:

- What is the mutual relation between natural heritage and agriculture at the macro level in terms of spatial patterns?
- What is the mutual relation between natural heritage and population development, GDP and other socio-economic aspects of urbanisation at the macro level in terms of spatial patterns?
- What was the role of management at the macro level of natural heritage for the spatial patterns?

In this project, the macro level is represented by the bio geographical regions, Europe, the EU15/N10 and the Pentagon (for definitions see chapter 2). This scale results in a more qualitative description than the meso level presented in chapter 8. However there are some significant differences between the different regions.

### **7.2 Nature and agriculture**

#### **7.2.1 Land cover**

Table 13 and map 15 show the land-cover types for the different bio geographical regions, where the map also illustrates the intensive and extensive agriculture. Although the regions at the macro scale are large, with considerable sub-regional differences, the table and map clearly illustrate that large differences in land cover exists between the different regions.

**Table 13 Land cover at the macro level (in percentages)**

<b>Macro scale</b>	<b>Built up</b>	<b>Agri- culture</b>	<b>Semi- natural areas</b>	<b>Forest</b>	<b>Water bodies</b>
<b>EU15</b>	4	50	13	29	3
<b>N10</b>	3	57	14	25	1
<b>EU25</b>	4	53	13	28	3
<b>N12</b>	3	56	13	26	1
<b>EU27</b>	4	53	13	28	3
<b>EU27 + 2</b>	4	53	13	28	3
<b>Pentagon</b>	9	60	2	28	0
<b>Alpine region</b>	2	16	30	50	1
<b>Atlantic region</b>	6	69	9	14	2
<b>Boreal region</b>	1	19	12	58	10
<b>Coastal zone</b>	5	54	18	19	4
<b>Continental region</b>	5	61	3	29	1
<b>Mediterranean</b>	1	52	26	20	1
<b>Pannonian region</b>	6	73	2	17	2
<b>Steppic region</b>	5	77	7	6	5

Source: CORINE land cover and ESPON Project 1.3.2.

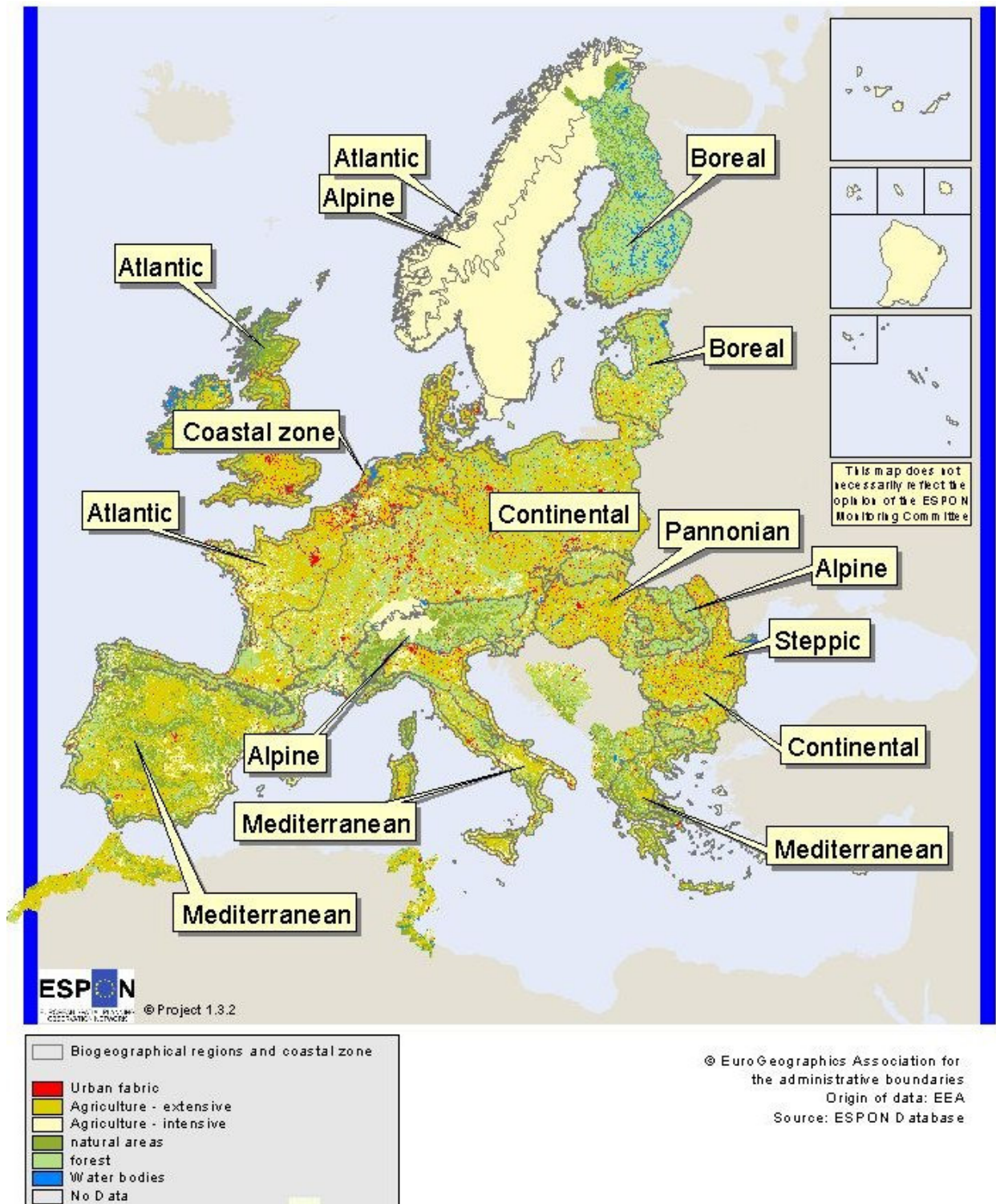
Note: Built-up represents Artificial surfaces (CORINE level 1), Agriculture represents Agricultural areas (CORINE level 1), Semi-natural area represents Scrubs, open spaces and wetlands (CORINE level 2, 26-39), Forest represents Forest (CORINE level 2, 23-25), Water bodies represent Water bodies (CORINE level 1)

At the macro scale there are distinct differences between the Pentagon region and the rest of Europe when considering land cover. The Pentagon has clearly a relative low percentage of semi-natural area cover, while the built up area is significantly higher. There is no clear difference between EU15 and N10 when average figures of land cover are compared.

Agriculture is by far the most dominant land use in Europe, with an average exceeding 50%. In the Boreal region the dominant land cover is forest, while for obvious reasons the dominant land cover in the Alpine regions consists of semi-natural area.

Dynamics in agriculture, in terms of extending or abandoning agricultural land, influences the size of natural areas (see also chapter 3). At the same time, acknowledging that a large proportion of the natural heritage is located in agricultural areas, the quality and size of the natural heritage is influenced by agricultural land cover.

**Map 15 CORINE land cover and the bio geographical regions, including a 20 km coastal zone**



The following text gives specific information on the bio geographic regions.

### **Alpine and Boreal region**

The semi-natural land cover types (nature, forests and wetlands) dominate the Alpine and Boreal regions. Both of these areas are characterised by extremes; the mountains and the Nordic, less accessible forests.

In the Alpine region, only 16% of the area is in agricultural use. Climatic conditions in different parts of the Alpine region differ significantly. The Norwegian mountains are largely used for the grazing of domesticated animals whereas the mountains of Southern Norway are used for the grazing of sheep and also goat and reindeer. The remaining parts of the Alpine region are used for extensive forms of farming, such as summer pastures and hay meadows located at high altitudes which are under snow in winter.

Abandonment of agricultural areas in the Alpine region is one of the threats to nature, as biodiversity related to low-tech farming practices is endangered. European agricultural policies supporting farming activities in the Alpine region are helpful to limit this impact on the excessive values of nature. At the same time, the natural values in the Alpine regions, especially in the south of Europe are assets for agricultural development.

The Boreal region north of the Baltic Sea is predominantly characterised by forest (58% of the total area). This includes large pine forests used for timber production. An additional 12% of the total area is nature and 10% is waterbody. This percentage of waterbody is relatively high as only Finland is included in the analyses of the Boreal region.

One of the main threats in the Boreal region is intensive forestry practices. Another threat is the consequences of the exploitation of hydroelectric power which, on the one hand creates dams and areas for artificial lakes and on the other disrupts water flows.<sup>66</sup>

### **Atlantic region**

The dominant land cover in the Atlantic region is agriculture (69%). Agriculture in the Atlantic region is, according to map 15,

---

<sup>66</sup> Europe's environment: the third assessment, EEA, 2003

concentrated in Ireland, England the lowlands in France, the Low Countries and the north-western part of Germany. Middle mountains are located in the Cantabrian coast and Scotland, where semi-natural areas are concentrated, such as in the coastal area of France, south of the Gironde estuary, where forestry is predominant.

In the agricultural areas of the Atlantic region, conditions are optimal for intensive farming owing to its appropriate soil types and sufficient rainfall.

Nature and forest cover, estimated at 9 and 14% respectively, is much lower in the Atlantic region than in other regions such as the Alpine, Boreal, coastal and Mediterranean regions.

The effects of agricultural pressure on nature and natural values result in a decrease in the semi-natural area, which is already less, especially in Belgium, Ireland, Denmark and the Netherlands. Coupled with this decrease in area, remaining semi-natural areas suffer from increased fragmentation. The semi-natural areas bordering areas of intensifying agriculture may also be under pressure.

### **Coastal zone**

The coastal zone is not a bio geographical region as such, but the region is very relevant to the current study, because from a nature perspective it has a very high value and the region is under a lot of pressure. The coastal zone is represented by a 20 km corridor along the European coast. Agriculture takes up 54% of the area, while also semi-natural areas are important (18%)

### **Mediterranean region**

Semi-nature/forest and agriculture cover more or less equal land in the Mediterranean region. In this region, agricultural activities are characterised by two processes: intensification in the plains and extensification and even abandonment in the middle mountains.

### **Pannonian and Steppic region**

Both the Pannonian and Steppic region that consist of accessible flat plains, show similar land cover. More than 70% of the land cover is

used for agriculture. The percentage semi-natural land cover and forest are for both regions relatively low.

## 7.2.2 Protected semi-natural areas and agriculture

Nature, which is under pressure from other land cover types like agriculture, is protected by specific actions. The numerous ways to protect the natural heritage are categorised by IUCN in classes of which I-IV can be regarded as the strictest classes of protection (IUCN is described in paragraph 6.4.1).

**Table 14 IUCN categories of protection and agricultural land cover (in percentages)**

Macro scale	coverage IUCN I-IV	coverage IUCN V-VI	agricultural cover
<b>EU15</b>	2	7	50
<b>N10</b>	4	11	57
<b>EU25</b>	2	8	53
<b>N12</b>	4	7	56
<b>EU27</b>	3	7	53
<b>EU27 + 2</b>	3	7	53
<b>Pentagon</b>	2	18	60
<b>Alpine</b>	12	9	16
<b>Atlantic</b>	1	8	69
<b>Boreal</b>	2	1	19
<b>Coastal zone</b>	2	6	54
<b>Continental</b>	1	11	61
<b>Mediterranean</b>	2	5	52
<b>Pannonian</b>	2	4	73
<b>Steppic</b>	16	0	77

Source: CORINE land cover 1990, IUCN

Note: Agriculture represents Agricultural areas (CORINE level 1)

Table 14 shows that there are no or very small differences in the percentage of the strict management categories (IUCN I-IV) coverage between the EU15 (2%), the EU25 (2%), the N10 (4%) and the Pentagon (2%). For the less strict management categories (IUCN V and VI) the differences are larger, varying between 7% (EU15, N12, EU27, EU27+2) and 18% for the Pentagon.

The percentage of IUCN categories I-IV is high in the Steppic (16%) and Alpine (12%) regions. For the IUCN categories V and VI,

percentages of 11% for the Continental region, 9% for the Alpine region and 8% for the Atlantic region are the highest.

In the Continental region, the total IUCN-protected areas are similar to that in the Atlantic region and the average size of the areas is larger (see map16). There are many IUCN-protected areas in Switzerland, Germany and Poland, but the average size of the IUCN-protected areas is larger in France.

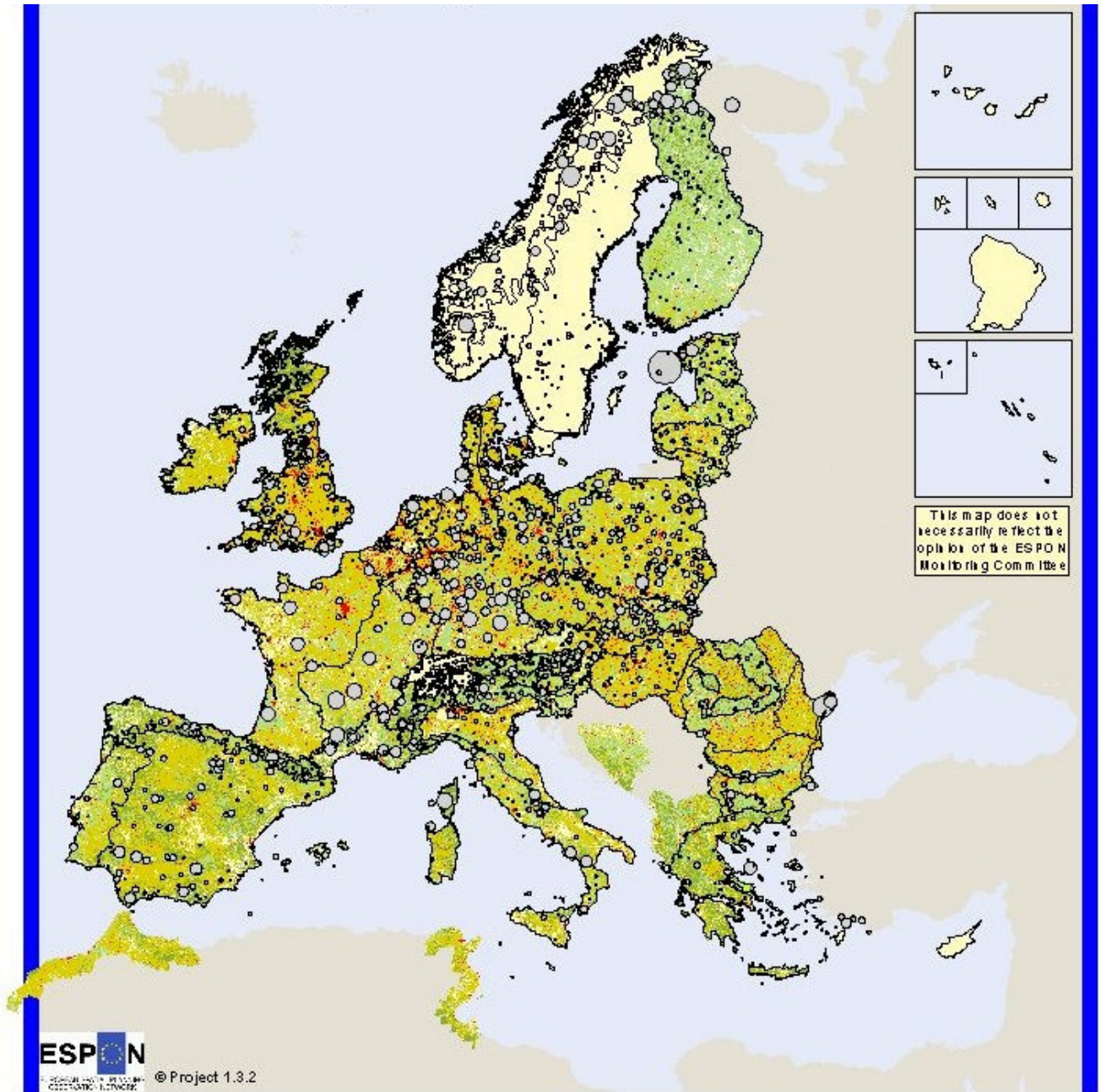
### **7.2.3 Nature and agricultural developments**

The organization of agricultural activity in Europe has over time resulted in a polarization; small, relatively more extensive farming units at the peripheries of Europe; and larger, more intensive units both within and surrounding the Pentagon (see maps in chapter 4).

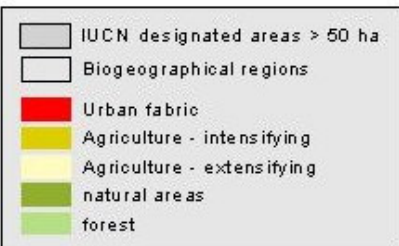
It might be expected that agricultural activities in the ten new EU entrant countries will develop in a way that is more similar to that in EU15, but to what extent and in what location this may happen, can not be predicted. Table 15 shows that in the EU15 almost all protected agricultural areas are extensively used. For the N10 the pattern is different. A large part is protected and used for intensive agriculture. Intensification takes a high speed in the accession countries as a result of the policy to sell out the properties of former co-operative agricultural entities. More in-depth considerations of the impact of such processes with regard to spatial effects of intensification of agriculture should be the subject of further research.



**Map 16 Land cover and the large designated areas (the size of the circles represents the actual surface areas of designated sites)**



ESPON  
 EUROPEAN SPATIAL DEVELOPMENT OBSERVATORY  
 © Project 1.3.2



© EuroGeographics Association for the administrative boundaries  
 Origin of data: EEA, IUCN  
 Source: ESPON Database

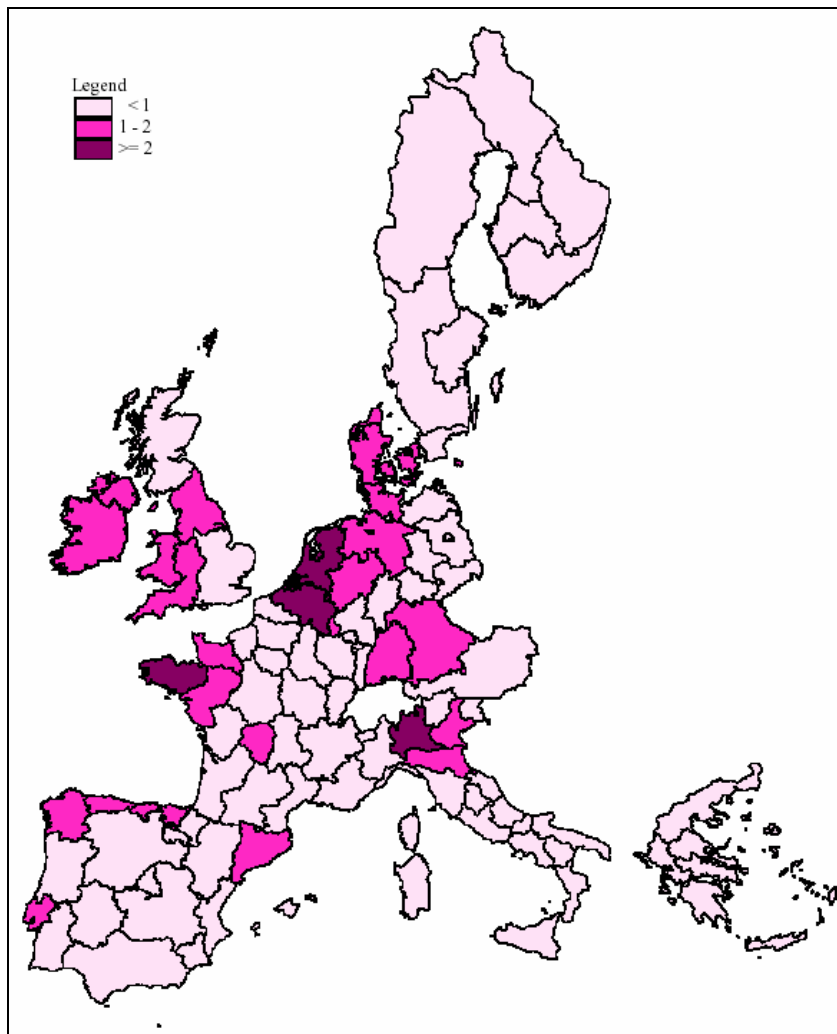
**Table 15 Agricultural land cover in terms of extensive and intensive use (in percentages)**

<b>Macro scale</b>	<b>Extensive agriculture</b>	<b>Intensive agriculture</b>
<b>EU15</b>	98	2
<b>N10</b>	57	43
<b>EU25</b>	83	17
<b>N12</b>	64	36
<b>EU27</b>	83	17
<b>EU27 + 2</b>	83	17
<b>Pentagon</b>	50	50
<b>Alpine</b>	90	10
<b>Atlantic</b>	83	17
<b>Boreal</b>	87	13
<b>Coastal zone</b>	78	22
<b>Continental</b>	80	20
<b>Mediterranean</b>	80	20
<b>Pannonian</b>	99	1
<b>Steppic</b>	67	33

Source: CORINE land cover 1990

Note: Agriculture represents Agricultural areas (CORINE level 1)

**Map 17 Livestock units per hectare of utilised agricultural area in the EU in 1995**



Source: EUROSTAT (Farm Structure Survey); adaptation LEI. (EEA, Indicator Fact Sheet Signals 2001 – Chapter Agriculture).

Key message: Between 1975 and 1995, more than 3 million holdings in the EU12 (31% of the 1975 total) disappeared. Together with a 10% reduction in agricultural land, a slight reduction in the number of cattle, but a sharp increase in the number of pigs, this has led to a considerable intensification of livestock production, which is highly concentrated along the Atlantic coasts. During the same period the area of permanent pasture in the EU15 fell by 12%.

EEA concludes that intensification, greater specialisation and unit-enlargement can have environmental consequences, which need to be controlled to ensure the sustainability of agriculture. High-yield

fodder crops reduce the amount of land needed for grazing animals, which can result in the loss of permanent pastures. Specialisation in livestock farms, with increasing numbers of animals per holding, can result in higher stocking densities and problems of surplus manure in regions with high livestock concentration.

At the same time, agricultural marginalisation can occur, from the field to the regional scale: difficult areas within a farm or whole farms may be abandoned. Regions with extensive systems or small-scale agriculture are especially vulnerable. Abandonment can have serious consequences for the natural environment including the growth of scrub and then forest, and loss of the species associated with agricultural land.

One of the objectives of the agri-environmental measures introduced in 1992 is to stop the decline in permanent grassland and pastures, which are generally farmed less intensively than cropland and produce less nutrient surpluses. Another objective is to reduce the environmental pressures of intensive agriculture.

Intensification, greater specialisation and unit-enlargement are all long-term trends. The number of holdings in the EU12 fell from more than 10 million in 1975 to 6.96 million in 1997. During the same period agricultural production generally increased, with gross value added increasing by about 18%, from a slightly shrinking area. All this resulted in a significant intensification and concentration of production.

The livestock sector is also becoming more intensive. The number of farms in the EU12 with livestock nearly halved from 1980 to 1997 (47%). Between 1980 and 1997 the number of cattle fell by 5%. In the same period, milk production was largely stable, but the number of dairy cows fell by 20%. Pig numbers and production have been increasing for many years; the number of pigs in the EU12 increased from 88 million to 108 million between 1980 and 1997.

The distribution of livestock across Europe is very uneven, with the highest densities in the north-western coastal areas (see Map Livestock). In a number of EU countries, especially The Netherlands and Belgium, and some areas of France, Germany, Italy and the United Kingdom, intensive animal husbandry has been concentrated in particular regions. A considerable amount of animal feedstuff is imported into these regions, much of which is from overseas. The amount of animal manure produced locally or regionally bears no relation to the area of land farmed, and may be far greater than can

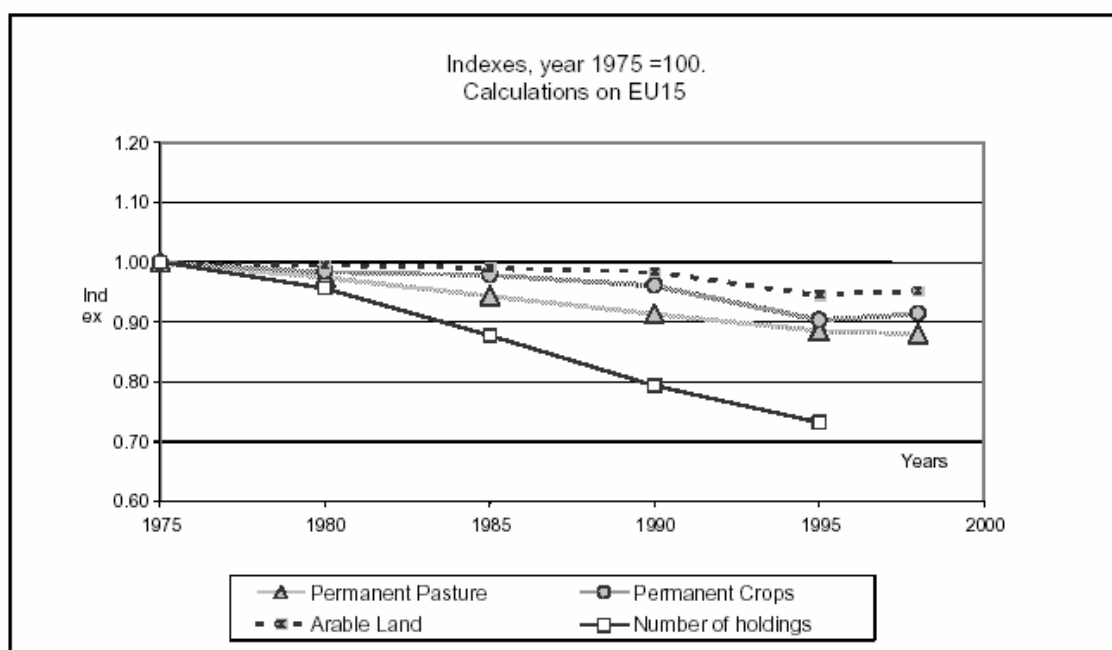
be utilised by the crops or absorbed by the soil, hence generating nutrient surpluses.

### 7.2.4 Fragmentation related to agriculture

Fragmentation of natural heritage is the result of the ongoing incremental process, which has left Europe with a natural heritage consisting of many small disconnected islands surrounded by other – mostly non-favourable - land use types. These fragments of semi-natural habitats are often not able to support the survival of species populations in the long run, depending on their size, isolation and the species' ecological characteristics.

Expansion of agricultural areas enhances the fragmentation of semi-natural areas. EEA considered the relevance of agricultural intensification for describing developments in the environment (Development in number of holdings and land use by agriculture, EU15) in its indicator fact sheet signals 2001 (Chapter on agriculture).

**Figure 13** Development in number of holdings and land use by agriculture, EU15<sup>67</sup>



<sup>67</sup> Source: FAO and EUROSTAT (EEA, Indicator Fact sheet signals 2001 – Chapter Agriculture)

Monitoring and measuring the results of interventions to counteract the process of fragmentation will require long periods of time.

The fragmentation of semi-natural areas is illustrated in map 11 (Chapter 5), showing the fragmentation of semi-natural areas. The map gives an impression of the degree of fragmentation of forests and semi-natural areas. Most fragmentation is in the coastal zones of France, Ireland, England, Germany, Belgium, the Netherlands, Denmark, but also along the rivers Loire, Seine, Po, Elbe and Danube. In those areas, there is a relatively high development pressure as a result of a combination of intensive agriculture land use in Ireland, England, France, Belgium, Netherlands and Denmark with strong urbanisation in England, Belgium and the Netherlands and along the rivers.

Apart from specific locations in the east of France, Germany and Poland, the continental region consists on average of 20-50% of highly fragmented semi-natural areas. This fragmentation of nature is exclusive of urbanisation and the related infrastructure due to the large areas of intensive agriculture. Ongoing intensification of agriculture is one of the main threats of the large Continental regions.

The fragmentation index applied and presented here is composed of two components. Firstly, the percentage of semi-natural area land cover in the NUTS3-regions, subdivided into three classes and secondly the number of patches per 10 km<sup>2</sup> in the three classes.

The map shows the occurrence of less fragmented semi-natural areas in Finland and in the European mountainous regions in Spain, the Alps, the Carpathians, Greece and Scotland. At the same time, most fragmented nature is located in Ireland, South England and the north western coastal zones of France, Belgium, the Netherlands, Germany and Denmark. It is quite noticeable that these most fragmented semi-natural areas stretch from coastal zones inward along the main rivers.

The relationship between the concentration of human activities, in the sense of intensive agriculture and urbanisation, and the flat plains of coastal zones and along rivers is obvious.

### **7.2.5 Potentials for nature**

Forestry in the Boreal region is one of the most extensive agricultural activities, especially in Finland where there is almost no intensification of agriculture. In the Baltic States, agriculture is decreasing in extent and intensity with an increase of semi-natural area. In the Baltic States, urbanisation will probably stabilise because population growth between 1995 and 2000 was below zero. The further south, the more likely is fragmentation. The semi-natural area in the Boreal region north of the Baltic Sea is hardly disturbed and it suffers from industry induced acid rain. Biodiversity in terms of species richness in these areas is not particularly high; the natural value in the Scandinavian Peninsula is more determined by the presence of rare species and the extent of semi-natural habitat than by species richness. In the Boreal region, north of the Baltic Sea, the population density is extremely low and urbanisation occurs wide spread, with slight concentration in accessible locations along the coastline. Towns are embedded in natural environments, surrounding them with forests and lakes.

In some middle mountains in the Continental region, agriculture is more a marginal activity. River valleys in the appropriate altitudes in Germany, Austria, Hungary and Romania are used for vine farming. Absence of urban and agricultural pressures may result in opportunities for developing semi-natural areas.

In the southern bio geographic regions climate change influences the conditions of agriculture dramatically. Desertification in the Mediterranean region may marginalise agriculture. Irrigation increases production costs and land abandonment induces further desertification and probably ecological degradation and salinisation. Enhanced erosion may influence the risk of flooding in river valleys and along the coast. The Mediterranean and the Alpine region may have in common that the specialised production of regional tradition related agricultural products may be the basis of innovations. Exportation of high quality products and expansion of nature may be the result.

## 7.3 Nature and urbanisation

### 7.3.1 Nature and population change

To define values and changes in urbanisation, the most robust indicator, available for the macro level is population change.

Of course there are more indicators for urbanisation (Chapter 4), but many of these have less spatial relevance, are hard to measure or there is no sufficient database or source of information available to compare different territorial units at different levels.

In chapter 8, about the meso level, a richer variety of indicators for urbanisation has been applied.

**Table 16 Population density, population change 1995-2000, and the percentage built-up land cover at the macro level**

	<b>Population density 2000</b>	<b>% Population change (1995-2000)</b>	<b>% Built up</b>
EU15	114	2	4
N10	100	-2	3
EU25	113	1	4
N12	96	-2	3
EU27	109	1	4
EU27 + 2	103	1	4
Pentagon	266	2	9
Alpine	124	1	2
Atlantic	241	2	6
Boreal	17	-1	1
Coastal zone	170	2	5
Continental	98	0	5
Mediterranean	26	1	1
Pannonian	60	-2	6
Steppic	11	-1	5

Source: CORINE land cover and EUROSTAT

Note: Built-up represents artificial surfaces (CORINE level 1)

Table 16 shows that the population density differs strongly within Europe with the Pentagon (266 inhabitants/km<sup>2</sup>) and the N12 (96 inhabitants/ km<sup>2</sup>) as extremes. The population decreases between 1995 and 2000 in the N12, while the Pentagon population increases



in numbers. The percentage built up area is at least twice as high as in the rest of Europe.

Population increase is highest in the Atlantic region (2%) and the Coastal zone. These are the regions with the highest built up rates which, in turn, become more inhabited.

Decrease of population is apparent in the Boreal and the Steppic and Pannonian regions, all in the periphery of Europe. This reflects the concentration of population in the Pentagon, partly at the cost of more peripheral regions in the period 1995-2000.

Population growth is concentrated in the bio geographic regions with relatively low nature/forest land cover (Coastal and Atlantic). This may mean that the few semi-natural areas that are left, require extra protection, unless agricultural lands become available. There is also growth in the Continental region, where nature land cover is relatively low (32%) and in the Alpine region with 81% nature land cover.

So, relatively large tensions between urbanisation and the natural heritage are apparent in the Coastal zones, the Atlantic and the Alpine regions, requiring special attention when aiming at a coherent ecological network.

The dynamics in the Boreal region is characterised by a decrease in the population areas. This may offer space for developing nature. The same applies to a lower extent in the Mediterranean and the Pannonian regions.

### **7.3.2 Differentiated urbanisation in the bio geographic regions**

#### **Boreal Region**

In the Boreal region, the southern parts of Norway and Sweden and the Baltic countries must be distinguished from Finland and the larger, northern parts of Sweden and Norway. In the southern part of the area urbanisation is relatively higher than in the rest of the Boreal region. In general, the depopulation of the rural areas leads to concentrations in the cities in that part of the region.

In the larger parts of the Boreal region with low population density, nature is not largely affected by urbanisation. The large entities of

European semi-natural areas are located here. However, the urbanisation and industrialisation that took place in the Atlantic region, south-west of Scandinavia, has impacted on water quality in the Boreal region. Acidification is a real ecological problem especially in the Swedish lakes.

The relationship between the natural environment and urbanisation including industry in the Boreal region is quite specific. Urban and industrial areas are a minor land use in comparison to the substantial land cover of nature. The overwhelming dominance of nature over small and medium sized settlements in the Scandinavian countries contributes to the image of quietness and a healthy environment. That environment seems favourable for innovative economic activities. Three of the most innovative regions in Europe are located here: one in Finland and two in South Sweden. In addition, the two countries in the Boreal region that have more than 50% semi-natural areas, Sweden and Finland, are qualified by Florida as highest in Europe's creativity index (14 countries only). See also Chapter 11 on Recommendations.

### **Atlantic region**

The Atlantic region includes the British Isles and the coastal zone from North Portugal up to the North of Denmark. The northern part of this coastal zone is strongly urbanised stretching from the Gironde to the north of Denmark, England and the east coast of Ireland. Particularly high densities of urban and industrialised areas have developed in the Midlands, around and south east of London, the Randstad, Flanders, North Pas de Calais and the Ruhr area.

Part of the Atlantic region north of the Paris-London line belongs to the core Pentagon of Europe. The concentration of Europe's largest urban areas: London, Paris, Brussels, Randstad combined with its extremely good accessibility makes it to the motor of Europe's economy. The presence here of the ports of Rotterdam, Antwerp, Dunkerque and the airports of London, Paris, Amsterdam and Brussels makes this part of the Atlantic region the most important concentration of economic activity. Urbanisation south of the Paris-London line may add to the polycentricity of Europe's urban development.

The coastal zone of the Atlantic region is highly urbanised. An effect of this concentration of urban areas on nature is a high degree of

fragmentation - less than 20% of that area consists of semi-natural areas. Pollution of river water, partly from urbanised areas upstream, depositing in the coastal zone affects the quality of nature in the Atlantic region. Urbanisation in the Atlantic region further south of the Gironde estuary may threaten the coherence of the semi-natural areas in the southwest of France and the north coast of Spain. The Basque country with a high concentration of urban and industrialised zones interrupts the large natural zones along Spain's Cantabrian coast.

In the highly urbanised areas of the Atlantic region, the Midlands, London, Northern France, Belgium and the Ruhr area where old industrial sites connected to mining, steel and textile activities were concentrated, pollution of the environment still takes place. Many projects financially supported by objective 2 subsidies are implemented or envisaged.

### **Continental region**

The Continental region is an enormous zone stretching from south central France to the east border of EU27(+2). This zone containing middle mountains and the north European continental plains, is situated north of the Alps and the Carpathians. Parts of the Balkan Peninsula and North Italy also qualify as part of the Continental region.

The diversity of this huge area makes it difficult to characterise. It contains landscapes where the water is transported from the mountain ranges by Europe's largest rivers; the Danube, Rhine, Meuse, Rhone, Elbe, Wisla. Due to the rather flat character of the region, urbanisation is widely distributed and suburbanisation easily takes place.

Concentrations of urban and industrial areas are in the valleys of the rivers in the middle mountains and in the plains along the transportation corridors of highways and rivers. The effects of urbanisation on the natural heritage are a decrease in semi-natural areas as well as a strong fragmentation. Atmospheric pollution also forms a main threat to the natural values of this zone. This is due to industry and the extended networks of roads as well as to the suburbanisation of this easy accessible area. Large industry and mining areas developed in these continental zones where coal, ores and other natural resources were accessible, especially in the middle

mountains. The effect of nature on urbanisation was therefore obvious: the natural assets were determinants for starting economic activities at those sites, being the drivers for urbanisation.

The western part of the continental region contains a part of the EU27(+2) core area, the Pentagon. The largest concentration of activities here follows the Rhine Valley, where one of the main European trade routes developed.

The combination of the natural assets for mining and the river itself used as an inland waterway, was conditional for the development of this central zone in Europe's core; at the same time these strong natural incentives to economic developments in the past form a threat to actual, remaining natural values.

Within the continental zone at rather small distances from high density concentrations of activities, like in the Rhine valley, areas are situated where development pressure is of a far lower level.

### **Alpine region**

The overall land cover of urban areas in the four, disconnected Alpine regions is low, nevertheless, the density is felt to be high in the Alps. Urban areas, residential and economic zones as well as most of the infrastructure are concentrated in the valleys. There, in many cases, space is really scarce and land prices are high. This especially applies where development pressure induced by high accessibility is high: in the Pentagon part of the Alps, in Switzerland, west Austria and north of Italy.

Pollution and fragmentation in the valleys are apparent and urbanisation tends to be denser. Nevertheless as a whole, the limited urban area within a large, poorly accessible open space, results in an environmental quality that generally is perceived as attractive and healthy.

The relative inaccessibility of the steep Alpine slopes protects this region against urbanisation from residential and economic uses (apart from tourism) as far as development pressure is not too high. Thus, nature, together with spatial planning, is setting clear limitations to ongoing (sub)urbanisation.

In other Alpine areas where no development pressure occurs, where no easy access has been facilitated by expensive road and railway

infrastructure, isolation is apparent. Disadvantaged regions with hardly any urban centre and at a distance from urban services are the result.

In large parts of the Alpine region depopulation and gentrification characterises the demography.

The natural environment together with the image of a healthy atmosphere makes Alpine regions attractive for settling and further urbanisation, especially at accessible locations. Many regions and municipalities adopted sustainable spatial development policies, protecting the landscape and limiting the possibilities for urbanisation.

Additional limitations to further urbanisation will follow from policies limiting the risks of flooding. Following the Water Framework Directive, integrated policies addressing these natural hazards caused by climate change, must be prepared. It is likely that the effect will be limitations to further urbanisation in the valleys.

### **Pannonian region**

The Pannonian region consists largely of the Hungarian lowlands. The Hungarian central landscape covers specific areas characterised by puszta, lakes and old rivers.

### **Mediterranean region**

This region consisting of Portugal, most of Spain (except the Cantabrian coast), the French Mediterranean coast, the southern and western sides of Italy, the Dalmatic coast, Greece, and including Cyprus and the Greek, Italian, French and Spanish Islands.

Climate change affects this area, along with desertification in some areas and flooding in river valleys.

Urban pressure in this Mediterranean region is extremely strong along almost the whole coastline, where high densities have been developing in recent decades. In the Spanish, Italian and Greek non-coastal areas however urbanisation concentrates in the larger cities. The smaller cities and the rural areas suffer from depopulation. Almost all of the areas, but especially the coastal zones, are attractive for second homes of Europeans.

The attractiveness of the region is largely due to the characteristics of this bio geographic region: the sunny climate, the attractive

landscapes and the presence of the sea. This attractiveness together with European structural funding resulted in booming cities in the Mediterranean region like Lisbon at the Atlantic coast, Seville, Valencia, Barcelona, Madrid, Genova and Athens. The natural assets here are important factors adding to the decisions for foot-loose economic activities for which quality of life conditions are increasingly gaining importance. The example of Barcelona illustrates this attractiveness.

### **7.3.3 Protected semi-natural areas and urbanisation**

Pressure on nature is expected to be largest in areas that have a high percentage of built-up and a low percentage of protected area. This is especially the case in the Benelux countries, Germany, Rumania, Bulgaria and parts of Italy. The reasons behind a lack of protection can vary enormously. Designation is largely dependent on the legislative phase of the country and on the local circumstances.

The Alpine region and the Mediterranean coastlines of Spain, France and Italy are home to many tourist amenities and thereby score high on bed density. Tourist activities are expected to grow even more in these regions and as a result population and GDP are also expected to grow. It is in these regions that nature and forest are subject to the most urban pressure.

The process of continuous decreases in areas of natural heritage is the strongest in times of high prosperity and strong population growth. The most vulnerable areas in this regard, are those areas that score high on both urban pressure and percentage of nature and forest. Based on these observations, one would expect the highest levels of protection. However, the level of protection that is taking place largely depends on specific political ideals and the political importance of natural heritage. The situation is most critical for those smaller, unprotected or poorly protected areas in regions that are characterized by high urban pressure. It is in those regions that the danger of semi-natural areas decreasing in size or of connections between semi-natural areas getting lost, is largest. Management activities should specifically focus on these areas.

### **7.3.4 Threats to nature**

The Atlantic region shows a strong contrast with, for instance, the Boreal region. Here the largest cities of Europe are located, the coastal zone is heavily urbanised and the Pentagon area covers a large part of this bio geographic region. The large cities as well as the coastal zone and the Pentagon are extremely well accessible. The most important airports as well as harbours are located within this region. The largest proportion of Europe's economic activities are concentrated here.

Urbanisation in the Continental region is more widely spread. Most concentrations in larger cities are found along the rivers. The highly accessible Rhine Valley in particular shows a concentration of urbanised areas. Conditions for agriculture in the Continental region are generally good, but differ according to sub regions. Large plains and wide river valleys allow for intensive forms of crops.

Urbanisation in the Alpine regions is quite different; where development pressure occurs in relation to good accessibility (in the Pentagon part of the Alps), urbanisation pressure is extremely high. In less accessible parts, the pressure is lower. One of the main components of the development pressure focussing on the valleys is the lack of buildable surface. Therefore, the contrast between built and non-built area is an important attractive characteristic of Alpine areas.

Urbanisation in the Pannonian region is spread out over the area in the lowland of the Danube valley. Urbanisation pressure is lower than in the Atlantic region and population growth is around zero. Budapest is the centre of crossings with important highways and the river Danube. Further economic development in the corridor along the Danube from Belgrado to Budapest may be expected.

Urbanisation in the Macaronesian region is strongly related to the coastal zones where, near the beaches tourist facilities are concentrated.

In the Mediterranean region, urbanisation is influenced by the attractive climate, attractive landscape and the quality of existing cities. This area, being the world's most important tourism destination, offers attractive circumstances to settle for residential uses as well as for economic activities which are not strongly related to other locational conditions. The actual process of urbanisation takes place here at the coastal zone and around the larger cities.

### **7.3.5 Future urbanisation**

Map 18 shows the urban nodes of Europe that have been categorised in ESPON project 1.1.1 about polycentric development.

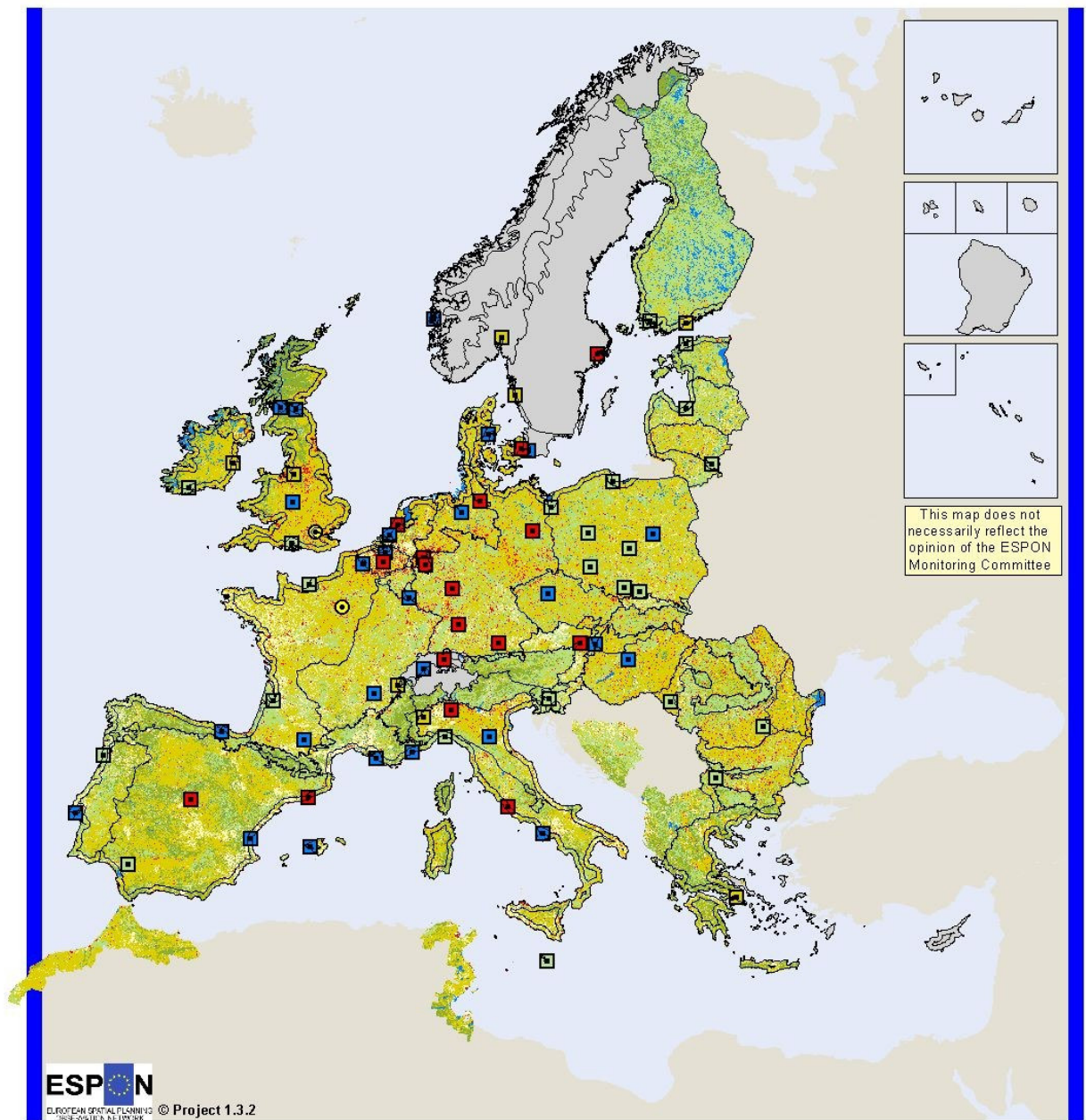
ESPON project 1.1.1 distinguishes Functional Urban Areas (FUA's) of which the most important one on the scale of Europe are identified as Metropolitan European Growth Areas (MEGA's). The three types of MEGA's (strong, potential, weak) are completed by the urban areas called European engine and the two global cities London and Paris.

The map on the location of MEGA's shows, that those urban areas are widely distributed over the European territory in a polycentric way. The map does not show a clear pattern that relates land cover type and the existence or development of MEGA's in some way. Other factors, like location along infrastructure (water, road, rail), political ideals and cultural characteristics, are equally or even more important in defining why a certain type of MEGA exists at a certain location.

However, it is interesting to look at the location of 'Potential MEGA's' in relation to semi-natural areas. The category potential MEGA's as distinguished by ESPON 1.1.1, is most likely to undergo development and will spatially expand. Pressure between these growing potential MEGA's and natural heritage is expected to be largest in regions that have a high percentage of natural and forest areas. This mainly concerns Scottish, Spanish and Alpine regions. It is in these locations that special attention should be paid to not only promoting the development of the potential MEGA's that are present, but also to the effect this development might have on the surrounding semi-natural and forest areas.



**Map 18 Location of MEGA's**



	Global city		Urban fabric
	European engine		Agriculture - intensifying
	Strong MEGA		Agriculture - extensifying
	Potential MEGA		natural areas
	Weak MEGA		forest
			Water bodies
			No Data

© EuroGeographics Association for the administrative boundaries  
 Origin of data: EEA, ESPON 1.1.1  
 Source: ESPON Database

## 7.4 Environment and climate change

At the macro level, long-term developments of the climate may affect the location of the bio geographic regions, the sea level as well as the climatic conditions in different parts of the continent in different ways.

Ongoing sea level rise seems to be an established fact. This will affect the hydrological conditions in coastal zones and in river deltas, enlarging wetlands and coastal lakes. The concentration of human activities and investments, agricultural as well as urban, in coastal plains and along rivers may be seriously affected. These processes of sea level rise and the activities in coastal plains and along rivers are elaborated at the meso level in chapter 8.

Next to that EEA reports that<sup>68</sup>:

- Climate change over the past three decades has resulted in decreases in populations of plant species in various parts of Europe.
- Plant species diversity has increased in northwestern Europe due to a northward movement of southern thermophilic species, whereas the effect on cold tolerant species is still limited.
- Projections predict a further northward movement of many plant species. By 2050, species distribution is projected to become substantially affected in many parts of Europe.
- Globally a large number of species might become extinct under future climate change. Due to non-climate related factors, such as the fragmentation of habitats, extinction rates are likely to increase. These factors will limit the migration and adaptation capabilities needed by species to respond to climate change.

---

<sup>68</sup> EEA, 2004

## **7.5 Conclusions**

### **7.5.1 Spatial patterns**

Urbanisation is present in different spatial patterns, more or less concentrated, in linear or dispersed patterns. Although urbanisation represents the strongest modification of land use, impacting semi-natural areas by soil sealing, the influence of agriculture on natural heritage should not be underestimated.

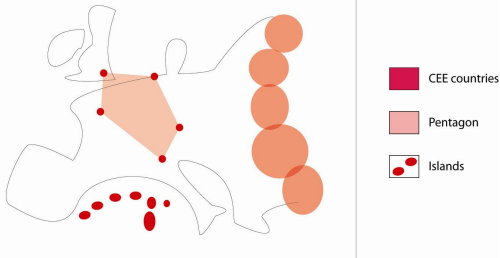

Agriculture takes many different forms, from high intensive horticulture, pig farming, tree nursing and vine yards to less intensive forms of arable crops and dairy related pasture to extensive forms like upland grazing, olive growing and shepherding. Extensive land uses must not be confused in general with environmental friendly practice: olive growing for instance is among the intensive crops in terms of pesticide use and soil erosion.

Apart from some artificial intensive forms, the main determinants on agricultural activities are natural conditions, climate soil types and precipitation. Next to that, agro-economic developments are influenced by global market prices. The strong interrelation of natural characteristics like soil type, climate and altitude, makes it difficult to draw conclusions about regional imbalances and disparities with regard to agriculture: it should be well recognised that certain areas contain natural assets that fit better than other to certain agricultural production requirements.

Optimisation of food production with regard to the natural conditions in a region, together with subvention of activities of farmers to enhance and maintain landscape qualities may be appropriate. An important reason for subvention then is to sustain natural heritage, cultural heritage and to maintain the attractiveness of the landscape for human activities.

The above leads to a regional typology at the macro scale as depicted in figure 14.

**Figure 14 Regional typology at the macro level**

<b>Socio-economic / urbanisation</b>	<b>Nature / environment / cultural</b>
Development pressure - Pentagon - Outside Pentagon - In CEE - Island in periphery	Bio geographic region - Boreal - Continental - Atlantic - Alpine - Mediterranean - Pannonian - Macaronesian
	

### 7.5.2 Management

Close harmonisation of policies regarding the natural heritage and agriculture is essential. With regard to future development of the natural heritage, Europe’s spatial development in the rural areas requires an integrated approach, combining agricultural and natural land uses. This applies with a focus on agricultural developments in the Atlantic and Continental and less in the Mediterranean, Pannonian and Boreal region.

Policies with regard to forest areas that can partly be regarded as forestry (timber production) and as semi-natural areas should be an integrated part in rural development programs in the Boreal and the Pannonian regions, but also in the Alpine and Mediterranean regions.

In the near future special attention should go out to protecting areas that are close to growing urban areas. When change in population, GDP and tourism are looked at, it appears that many of the areas that contain only small percentages of protected land will most likely urbanize even further.

European management policies and measures should take into account characteristics of bio geographic features and try to protect

these features, 'guide' urbanisation and the development of infrastructure in such a way that most vulnerable and sensitive areas can be kept free from urban development. Related to this is the assumption that in legally protected areas urbanisation will not take place.

### **7.5.3 ESPON monitoring system**

With regard to constructing a monitoring system, it should be noticed that:

- Data showing time ranges, needed to discuss developments, are missing for nature and for some of the social economic aspects;
- analyses on trends may show relations between nature development and the social economic developments; and
- the influence or effectiveness of management can then be measured.

## **8 The meso level**

### **8.1 Introduction**

This chapter focuses on the relationship between agriculture and urbanisation on the one hand and natural heritage on the other hand at the meso level. The following questions will be addressed:

- What is the mutual relation between natural heritage and agriculture at the meso level in terms of spatial patterns?
- What is the mutual relation between natural heritage and urbanisation and urban pressure at the meso level in terms of spatial patterns?
- What has been the effect of national management of natural heritage on the spatial patterns?

The analyses presented in this chapter rely mainly on variables and indicators discussed in section I.

The spatial view of the meso level focuses on the scale between that of Europe as a whole and the NUTS3 level regions. Parallel to the macro level, physical and socio-economic aspects are also addressed. The data used for the analyses in this chapter derive mainly from NUTS3 level and the interpretation and conclusions drawn are at the meso level. This level, distinguishing national administrative boundaries, is especially relevant to consider differences in policies with regard to natural heritage.

### **8.2 Agriculture**

It could be expected that a relation exists between individual dynamics of the total national agricultural area, in a sense that an increase of area might result in pressures on natural values thereby evoking defensive actions such as protection. Table 17 presents an

increase and decrease of agricultural area according to FAO, comparing a time range from 1961 to 1991 to 2001.

**Table 17** FAO increase/decrease agricultural area (in percentages)

	agriculture (FAO, 1961)	agriculture (FAO, 1991)	agriculture (FAO, 2001)	change 1961- 1991	change 1991- 2001
<b>BE</b>	57	45	47	-21	4
<b>DK</b>	75	65	63	-13	-3
<b>DE</b>	56	49	49	-13	0
<b>GR</b>	69	71	66	3	-7
<b>ES</b>	67	61	60	-9	-2
<b>FR</b>	63	55	54	-13	-2
<b>IE</b>	82	65	64	-21	-2
<b>IT</b>	70	55	53	-21	-4
<b>LU</b>	no data	no data	no data	no data	no data
<b>NL</b>	68	59	57	-13	-3
<b>AT</b>	49	43	41	-12	-5
<b>PT</b>	42	43	45	2	5
<b>FI</b>	9	8	7	-11	-13
<b>SE</b>	10	8	8	-20	0
<b>UK</b>	82	75	70	-9	-7
<b>CY</b>	no data	no data	no data	no data	no data
<b>CZ</b>	no data	no data	no data	no data	no data
<b>EE</b>	no data	no data	no data	no data	no data
<b>HU</b>	77	70	64	-9	-9
<b>LT</b>	no data	no data	no data	no data	no data
<b>LV</b>	no data	no data	no data	no data	no data
<b>MT</b>	56	41	31	-27	-24
<b>PL</b>	67	62	60	-7	-3
<b>SI</b>	no data	no data	no data	no data	no data
<b>SK</b>	no data	no data	no data	no data	no data
<b>BG</b>	51	56	50	10	-11
<b>RO</b>	63	64	65	2	2
<b>NO</b>	3	3	3	0	0
<b>CH</b>	55	51	39	-7	-24

Land cover per country varies due to different socio-economic and political developments. Data on long-term ranges of agricultural land use are available through FAO statistics. They allow for considerations with regard to dynamics in agricultural land use at the country level.

The level to which agricultural land is intensively- extensively- managed depends on two parameters: the amount of land designated

to agricultural activity and total productivity. In almost every country, agricultural land use has decreased in a linear fashion dramatically in the 40 year period 1961-2001, with the shift principally to forestry but also to other land uses (urbanisation and transport infrastructure). The average decrease is of the order of 20%, and any increase that has occurred has been only a few percentage points. Malta and Switzerland have witnessed, in addition, a substantial decrease in agricultural land of more than 20% in the period 1991-2001. The average increase in forested lands in many countries has been on the order of 25%.

In spite of this decrease in agricultural land, the productivity index (net PIN) established by FAO has reflected an increase in productivity, a doubling in general, in the period 1961 to 1991. This increase is seen in tangible increases in production factors, such as the number of tractors and the amount of fertilisation. There is a marked downturn in productivity during the period 1991-2001, certainly attributable to the agri-environmental reform of the CAP in 1992 in the EU, and the transition from a socialist to a market economy in Eastern Europe. The influence of the CAP reform on encouraging extensification will be progressively felt throughout Europe, if the recent orientations of the Rural Development Regulation 1783/2003 are confirmed in the EU agricultural programme 2007-2013.

Having witnessed a general increase in productivity, and hence an intensification of agriculture, it is interesting to observe how this intensification is distributed according to geography, which is far from equal. It is noteworthy that, in terms of European diversity, the southern countries of EU15, those most noted for their natural extent of species richness are probably also those that have suffered most from intensification during this period. For example, although Spain has witnessed a decrease of 10% in agricultural land use, there has been a doubling of crop output and an increase of over 300% in that of livestock. The number of tractors has increased ten-fold, although starting from a very low level compared to northern European countries such as The Netherlands or the United Kingdom. The increase in fertilization has been 200%, but again, this use started from a low level. Nevertheless, the impact on biodiversity will have been significant, increasing the vulnerability of wildlife, polluting wetlands and producing large-scale monoculture in both agriculture and forestry mirroring the rest of Europe. A similar portrait can be made for Portugal and Greece. For these latter countries, however,



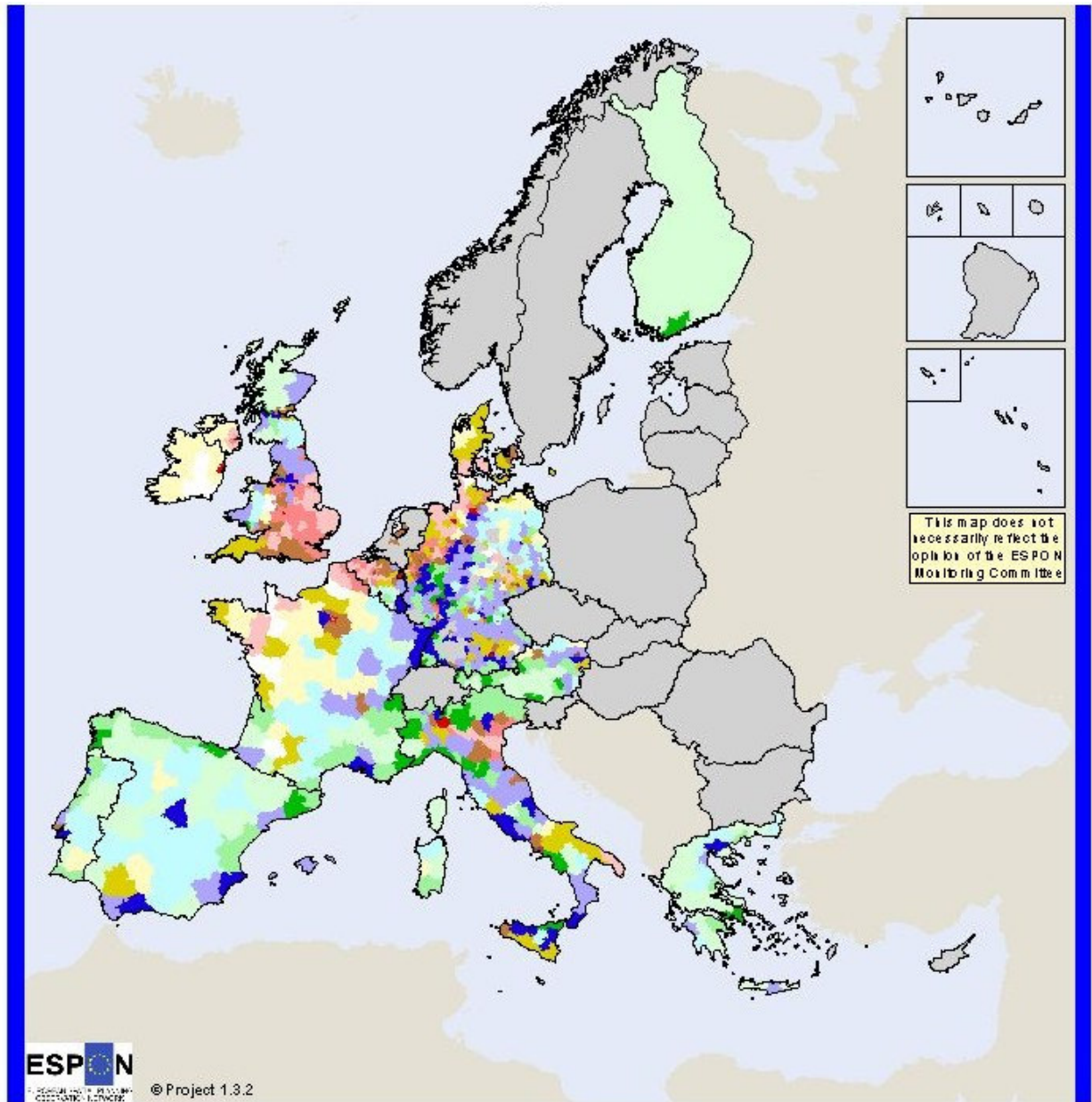
attention should be brought to the increase in permanent crops, vineyards and olive groves, respectively. Agriculture has become progressively industrialised throughout Europe. The same could be said for forestry, considering the amount of planned forestry operations that can be detected in a number of countries, namely France, Italy, Hungary, The Netherlands, Norway, Poland, Portugal, Spain, Switzerland and the United Kingdom.

## **8.3 Urbanisation**

### **8.3.1 Urban pressure**

In order to map the impact of socio-economic factors on the semi-natural area, the indicator of urban pressure is introduced. It combines four input indicators; population density, GDP 2000/area, road density and bed density, into a classification consisting of four classes. These classes include namely low-, medium-, high- and very high urban pressure.

**Map 19 Percentage semi-natural area compared to urban pressure**



**ESPON**  
EUROPEAN SPATIAL PROGRAMME  
 COOPERATION

© Project 1.3.2

		% Natural area			
		0-10 %	10-25 %	25-50 %	> 50 %
Urban pressure	low	11	21	31	41
	medium	12	22	32	42
	high	13	23	33	43
	very high	14	24	34	44
		no data			

© EuroGeographics Association for the administrative boundaries  
 Origin of data: EEA, Eurostat, IUCN  
 Source: ESPON Database

Map 19 and table 18 illustrate urban pressure in relation to semi-natural area land cover. The highest percentage of semi-natural area is represented with the green colour, while the lowest coverage of semi-natural area is represented by red. The tone of the colour gives the magnitude of urban pressure. For example the area dark red represents areas of low percentage of semi-natural area and with high urban pressure. The light blue areas represent areas with relatively high percentage semi-natural area cover, with minimum urban pressure.

Unfortunately the dataset is not complete for all countries, especially central European countries, mainly due to a lack of tourist data. Nevertheless, it can clearly be seen that most pressure exists in the Pentagon area and along coastal areas. The fact that relatively high percentages of semi-natural area cover are combined with high urban pressures in for instance Greece and Portugal is of great concern. In order to draw more accurate and detailed conclusions, the concept of urban pressure should be elaborated and the data set should be more complete.

**Table 18 Indicators for urban pressure at NUTS0 level**

	Popu- lation density (nr/km <sup>2</sup> )	GDP (*1000) /area (km <sup>2</sup> )	Bed Density (nr /km <sup>2</sup> )	Road- density (km/km <sup>2</sup> *1000)	% Semi- natural areas	Cover- age IUCN I-IV	Cover- age IUCN V-VI
<b>BE</b>	330	8145	4.0	51	1	0	2
<b>DK</b>	124	4111	1.5	31	2	9	1
<b>DE</b>	230	5684	4.2	32	1	2	22
<b>GR</b>	80	936	4.6	18	37	3	0
<b>ES</b>	78	1204	2.9	17	9	7	3
<b>FR</b>	109	2206	1.9	20	7	1	10
<b>IE</b>	54	1477	2.0	22	9	1	0
<b>IT</b>	192	3878	6.3	33	16	2	5
<b>LU</b>	145	8123	5.5	27	0	0	14
<b>NL</b>	467	11503	4.9	62	2	4	1
<b>AT</b>	96	2447	7.0	22	17	7	21
<b>PT</b>	109	1257	2.5	15	18	1	5
<b>FI</b>	17	393	0.4	18	17	4	0
<b>SE</b>	22	552	0.4	15	no data	4	1
<b>UK</b>	244	6348	4.9	27	24	1	19
<b>CY</b>	86	1031	no data	0	no data	8	0
<b>CZ</b>	130	710	no data	23	3	2	14
<b>EE</b>	15	86	no data	10	29	4	4
<b>HU</b>	108	544	no data	17	2	2	5
<b>LT</b>	57	189	no data	11	2	3	6
<b>LV</b>	37	121	no data	8	7	2	4
<b>MT</b>	1.234	22152	no data	0	no data	0	1
<b>PL</b>	121	537	no data	15	1	1	10
<b>SI</b>	10	979	no data	22	6	4	2
<b>SK</b>	110	437	no data	17	4	5	12
<b>BG</b>	74	124	no data	16	10	2	1
<b>RO</b>	95	134	no data	12	13	3	0
<b>NO</b>	15	546	0.4	11	no data	4	1
<b>CH</b>	179	6299	2.1	40	no data	7	21

Source EUROSTAT, EC, CORINE 1990, IUCN

Note 1: Semi-natural area represents Scrubs, open spaces and wetlands (CORINE level 2, 26-39)

### 8.3.2 Built-up

Another indicator for the urbanisation is the built-up area (preferably, the change in the site of the built-up area).

To find out whether there is a relation between urban area and protection, Table 19 compares the IUCN protection and the

percentage built up. There is clearly no direct correlation between built up land cover and protection.<sup>69</sup>

**Table 19 Protection compared to cover built up area (in percentages)**

	<b>coverage IUCN I-IV</b>	<b>coverage IUCN V-VI</b>	<b>Built up</b>
<b>BE</b>	0	2	19
<b>DK</b>	9	1	6
<b>DE</b>	2	22	7
<b>GR</b>	3	0	1
<b>ES</b>	7	3	2
<b>FR</b>	1	10	4
<b>IE</b>	1	0	1
<b>IT</b>	2	5	4
<b>LU</b>	0	14	7
<b>NL</b>	4	1	10
<b>AT</b>	7	21	2
<b>PT</b>	1	5	1
<b>FI</b>	4	0	1
<b>SE</b>	4	1	
<b>UK</b>	1	19	6
<b>CY</b>	8	0	
<b>CZ</b>	2	14	5
<b>EE</b>	4	4	1
<b>HU</b>	2	5	6
<b>LT</b>	3	6	3
<b>LV</b>	2	4	1
<b>MT</b>	0	1	
<b>PL</b>	1	10	3
<b>SI</b>	4	2	3
<b>SK</b>	5	12	5
<b>BG</b>	2	1	5
<b>RO</b>	3	0	6
<b>NO</b>	4	1	
<b>CH</b>	7	21	

Source: IUCN, CORINE land cover 1990

Note: Built-up represents artificial surfaces (CORINE level 1)

69

<b>Correlation coefficient</b>	<b>of % semi-natural land cover</b>	<b>IUCN I-IV</b>
population density	0,14	0.08
population change	0,01	0,01
GDP/area	0,17	0,06
GDP change	0,01	0,01
bed density	0,01	0,01
road density	0,01	0.00
Innovation	0,00	0,03

It is assumed that areas that are protected will not be subject to urbanisation as easily as areas that are not protected. This means for example in Belgium with a very high percentage of built-up area, combined with a low percentage of protected nature the chance for further urbanisation and loss of natural heritage is big. It is expected that especially in Denmark, Hungary, the Netherlands and Romania, tension could occur between urbanisation and natural heritage, because the amount of protected nature in these countries is relatively small compared to the percentage of built-up land. Threats for nature appear in countries where the GDP is already quite high (especially in Germany and France) and is expected to grow (meaning that economic activity and economic expansion are more likely to happen) and population densities and increases are also relatively high (especially in Denmark and the Netherlands). Natural heritage in Austria and Estonia is expected to be safeguarded quite well, as percentages of protected area in these countries are relatively high and the percentage of built-up land is relatively low. This of course does not mean that nothing more has to be done to protect nature.

As stated earlier, the area protected is the result of a combination of socio-economic and cultural factors.

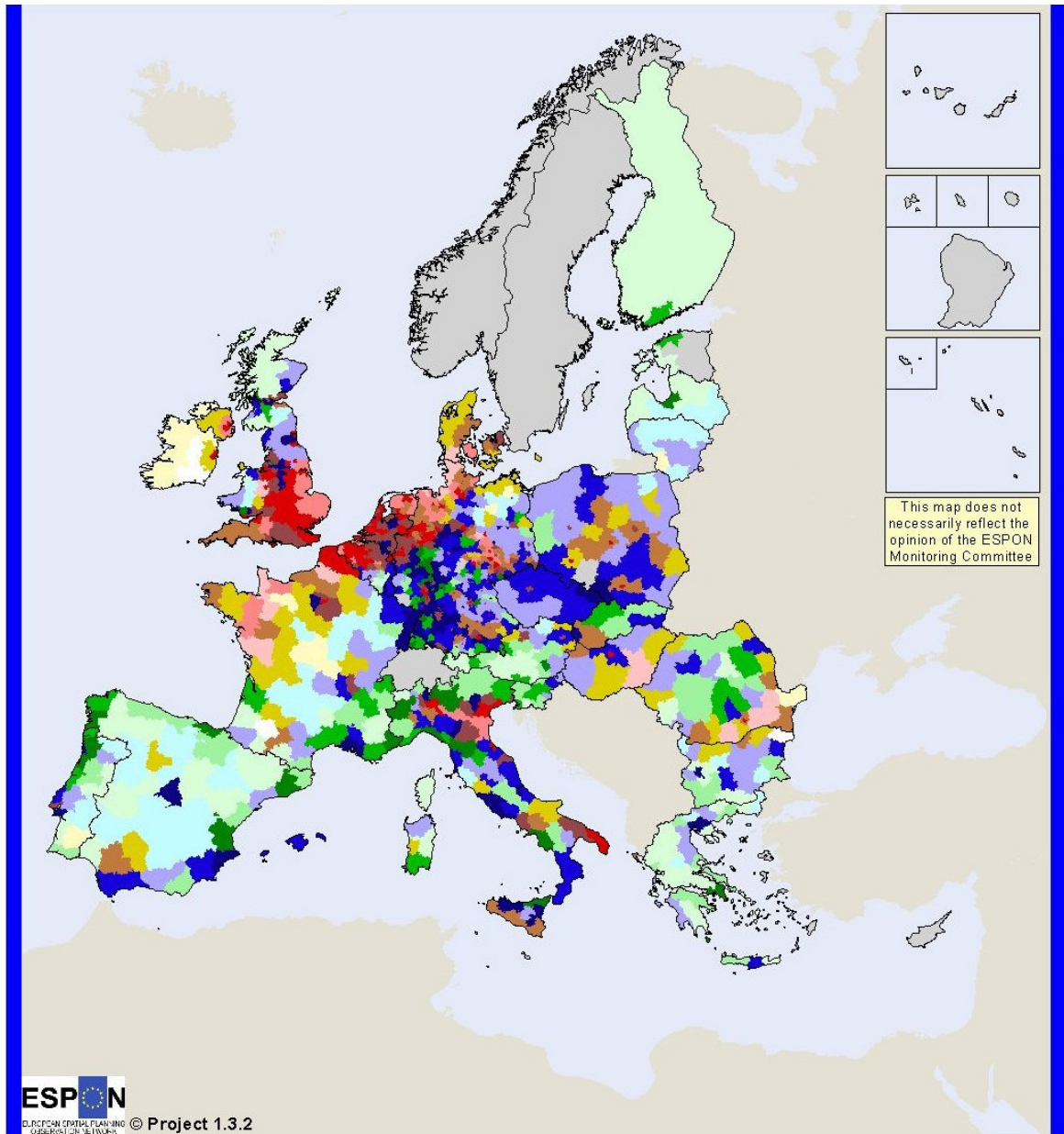
### **8.3.3 Population**

One of the components of the indicator urban pressure is population density. In this paragraph the findings are shown for the parameter population.

As far as population growth does not result in higher densities, it more probably results in the population growth of residential areas. The most detrimental effects to nature are expected to occur in those regions that already show a high population density.

Map 20 illustrates population density in relation to semi-natural area land cover. The highest percentage of semi-natural area is represented with the green colour, while the lowest coverage of semi-natural area is represented by red. The tone of the colour gives the magnitude of population density. For example the area dark red represents areas of low percentage of semi-natural area, but with high population densities. The light blue areas represent areas with relatively high percentage semi-natural area cover, but with minimum population densities

**Map 20 Percentage semi-natural area compared to population density (2000)**



Population density (/km <sup>2</sup> )	% Natural area			
	0-10%	10-25 %	25-50%	< 50%
0-50	11	21	31	41
50-100	12	22	32	42
100-200	13	23	33	43
> 200	14	24	34	44
	no data			

© EuroGeographics Association for the administrative boundaries  
 Origin of data: EEA, Eurostat  
 Source: ESPON Database

Population pressures are most likely to be high in countries in the Pentagon region (Germany, Netherlands, Luxembourg, Denmark, the UK and Italy). In these countries, high population densities are combined with increases in population over the last decade.

Countries in which tension is expected to rise in the future are mostly concentrated around the Mediterranean (Portugal, Spain, France and Italy) or at the edges of Europe (Ireland, Poland, Slovenia and Slovakia). In these countries, populations have grown significantly during the last decade and will continue to do so as these countries are expected to attract more tourists and related economic activities or expected to receive economic impulses as a result of their accession.

Population pressure on nature is of particular concern for Italy and the Netherlands as these countries contain a relatively little amount of protected nature.

However, a positive aspect of the above-listed countries is that since their level of wealth is relatively high, there is more time and money available for leisure activities and to support green environments. The natural heritage may play an important role in environments accommodating these leisure activities and the provision of green residential environments. It is therefore more probable that even though little land is legally protected in these countries, the natural values will be safeguarded in a more informal way.

#### **8.3.4 GDP**

GDP size and growth, like population density and growth, are also indicators for an increase in urbanisation and as a result, potentially resulting in a decrease in natural heritage.

Map 21 illustrates changes in GDP in relation to semi-natural area land cover, while map 22 illustrates semi-natural area versus GDP relative to surface area. For both maps the highest percentage of semi-natural area is represented with the green colour, while the lowest coverage of semi-natural area is represented by red. The tone of the colour gives the magnitude of GDP change over a period of five years and GDP respectively. For example the area dark red represents areas of low percentage of semi-natural area, but with a large change in GDP or relative GDP. The light blue areas represent



areas with relatively high percentage semi-natural area cover, but with a low change in GDP or low GDP respectively.

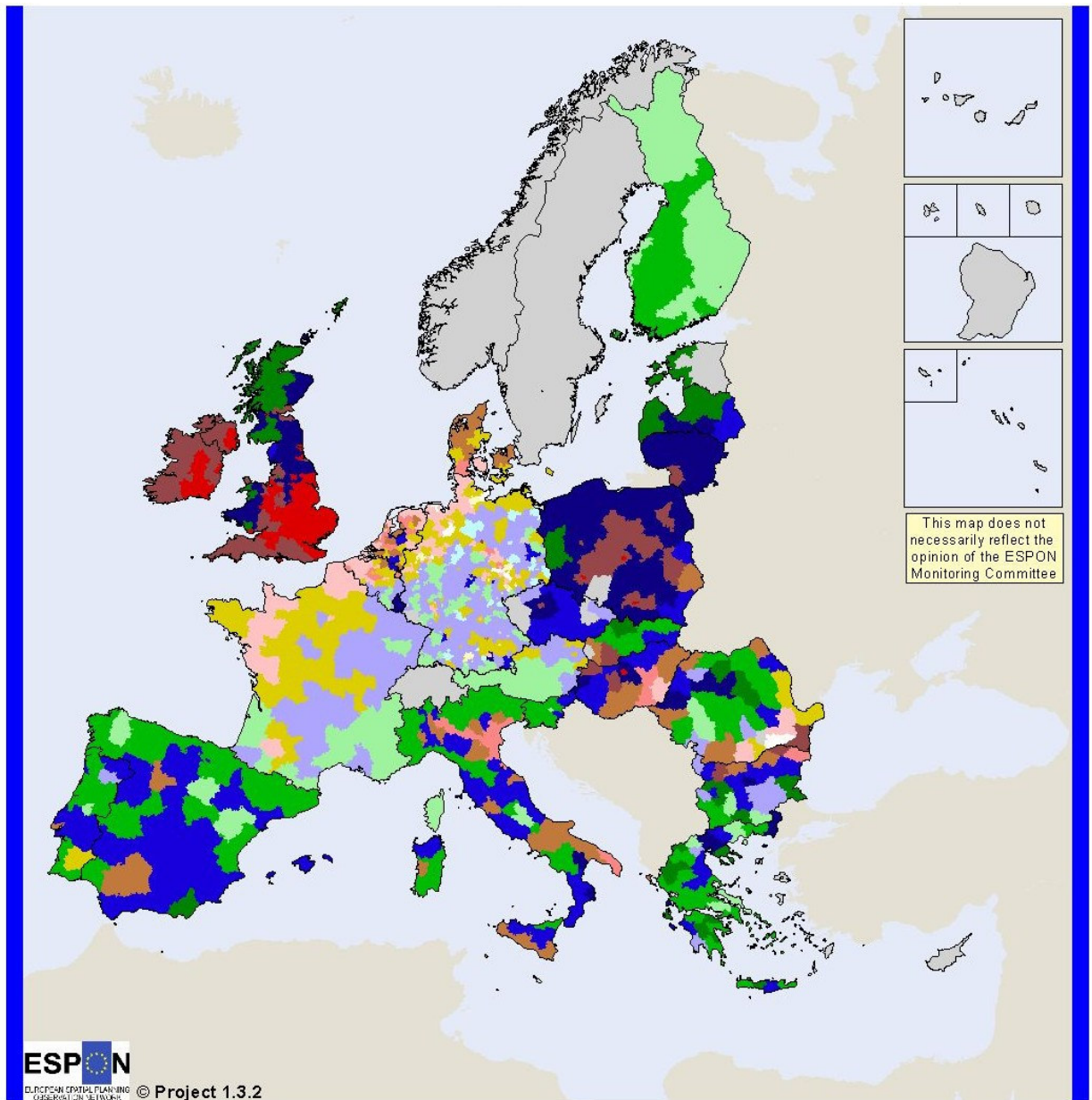
Both the maps 20, 21 and 22 illustrate that, consistent with population density and growth, pressures on natural heritage that are related to GDP and GDP change is expected to be high in Germany, Italy, UK and France. Countries in which tensions are expected to rise in the near future are mainly located on the edges of Europe (Ireland, Estonia, Lithuania and Latvia). These countries have showed an enormous increase in their GDP over the last decade and are most likely to attract more economic impulses and economic activities that have spatial effects.

It is clear that the national administrative units (the countries) determine factors for GDP change, dominating over the influence of NUTS3 level. Countries under pressure, namely Germany, Italy and the UK, all have relatively small areas of protected nature.

Map 17 illustrates the change in GDP between 1995 and 2000 related to the percentage of semi-natural area at the NUTS3 level. It is clear that the pattern of national administrative boundaries is determining factors for GDP change, dominating over the influence of NUTS3 level. Countries under pressure, namely Germany, Italy and the UK, all have relatively small areas of protected nature.

Map 23 illustrates the innovation index related to the percentage of semi-natural area at the NUTS3 level. The highest percentage of semi-natural area is represented with the green colour, while the lowest coverage of semi-natural area is represented by red. The tone of the colour gives a measure for innovation. For example the dark red area represents a low percentage of semi-natural area, but with a high innovation index. The light blue areas represent areas with relatively high percentage semi-natural area cover, but with a very low innovation index.

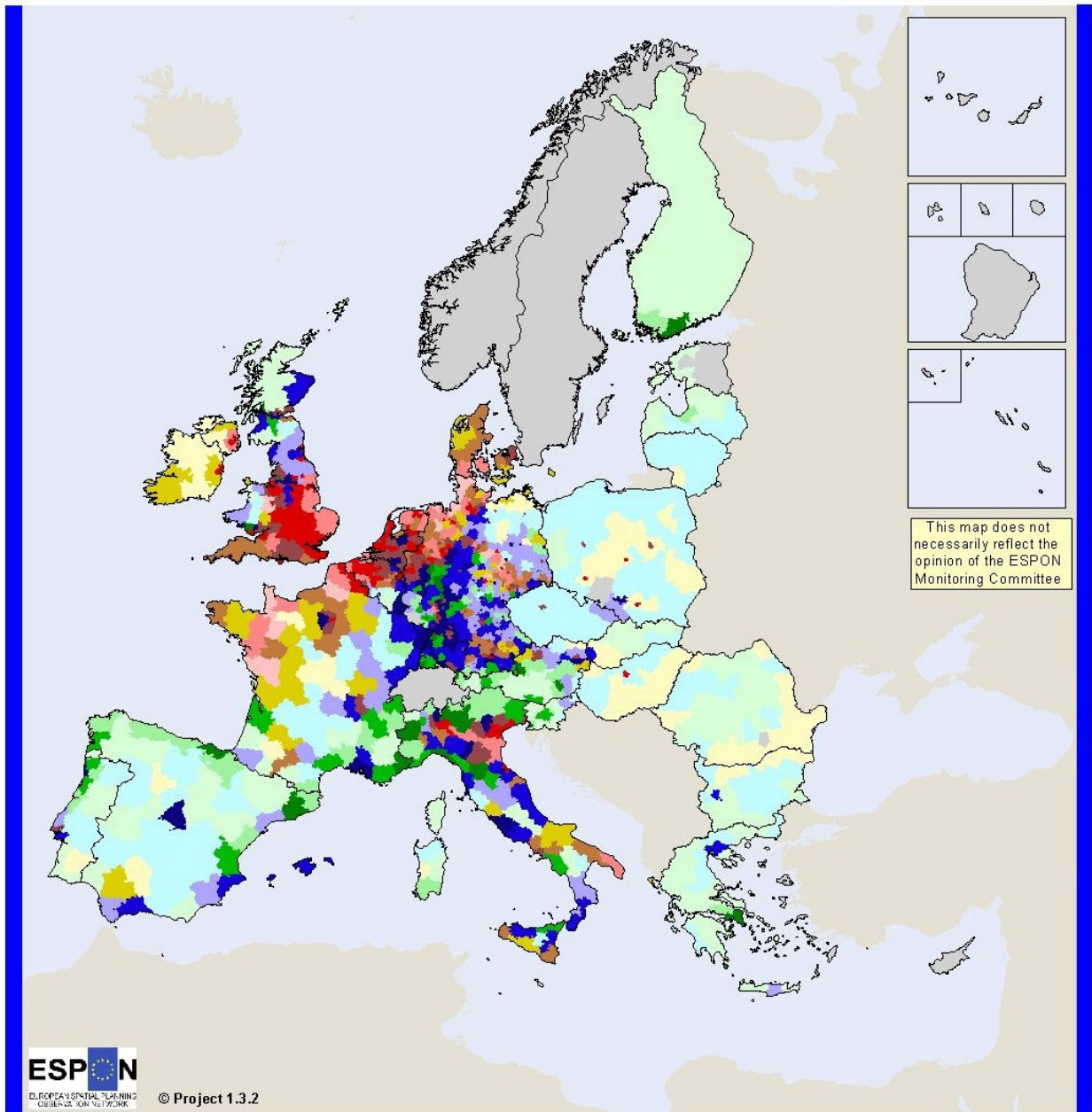
**Map 21 Percentage semi-natural area compared to changes in GDP (1995-2000)**



GDP change 1995-2000	% Natural area			
	0-10%	10-25 %	25-50%	> 50%
< 0 %	11	21	31	41
0 - 25 %	12	22	32	42
25 - 50 %	13	23	33	43
> 50 %	14	24	34	44
	no data			

© EuroGeographics Association for the administrative boundaries  
 Origin of data: EEA, Eurostat  
 Source: ESPON Database

**Map 22 Percentage semi-natural area compared to GDP 2000 (relative to surface area)**



GDP relative to surface area	% Natural area			
	0-10%	10-25 %	25-50%	> 50%
small	11	21	31	41
medium	12	22	32	42
high	13	23	33	43
major	14	24	34	44
	no data			

© EuroGeographics Association for the administrative boundaries  
Origin of data: EEA, Eurostat  
Source: ESPON Database

The level of innovation is clearly higher in EU15 when compared to N10. A high level of innovation is combined with a relatively high percentage of semi-natural area in the Alps and Finland. One would expect that such presence of semi-natural area would have a positive effect on the level of innovation. Although probably true at the micro level, such phenomenon can not be seen at the meso scale.

### **8.3.5 Tourism**

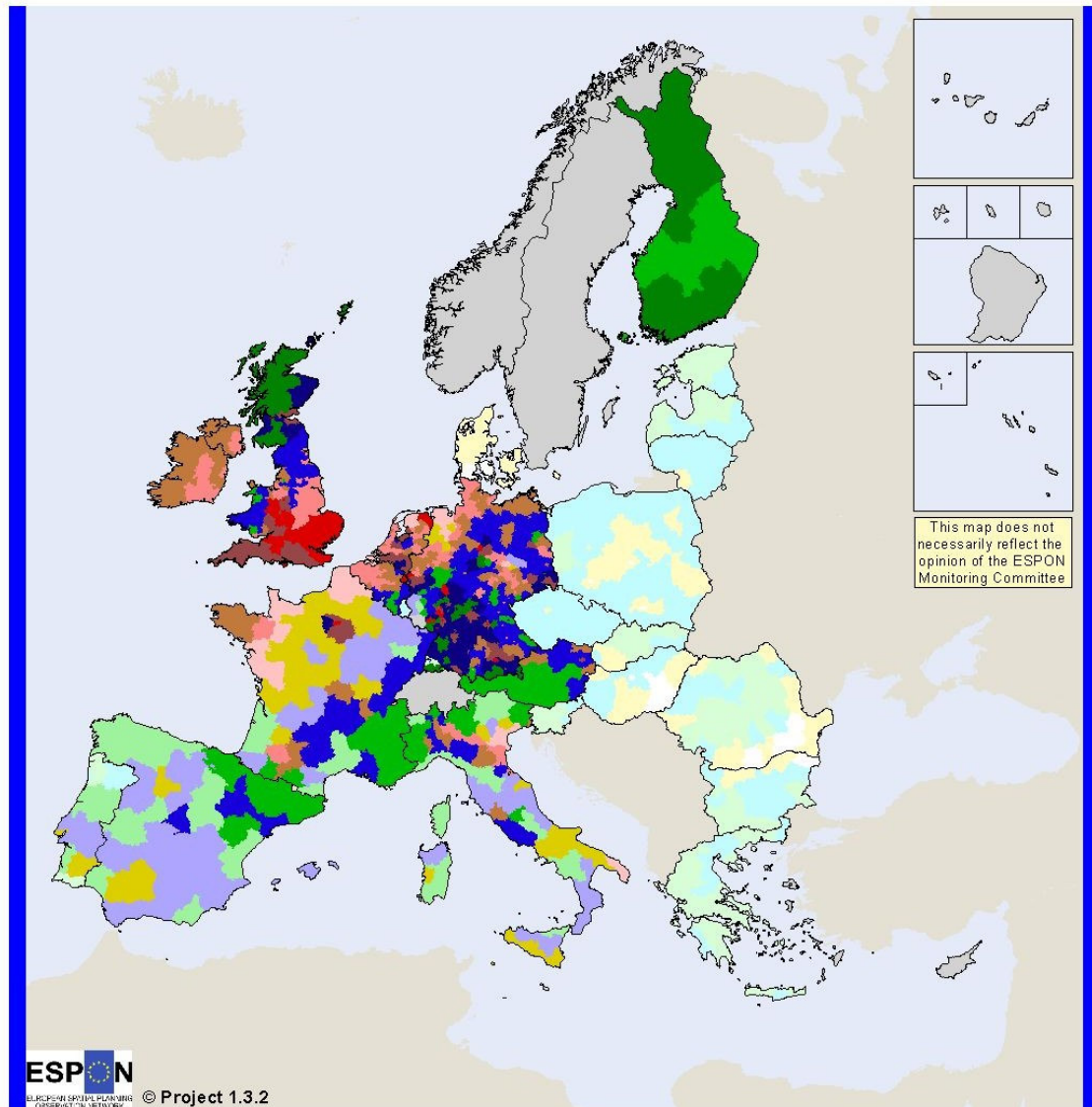
When tourism is examined at the NUTS0 level a slightly different picture appears than when it is studied at the micro level (see paragraph 8.4). As discussed in chapter 3, tourism activities tend to concentrate in coastal or mountainous areas.

Countries that are known for their tourist attractions such as Portugal, Spain, France and Switzerland score lower on the indicator bed density than countries that are not important tourist attractions, like Germany, Belgium, Luxembourg and the Netherlands. Other countries in Southern Europe (like Italy and Greece) do score as expected.

When related to natural heritage, tension is expected in Germany, Greece, Italy, the Netherlands and the UK. In these countries a high bed density is combined with a relatively small amount of protected nature. The actual relation is of course more complicated than that; it also depends on the actual focus of tourism (beach resorts, cities or indeed nature) and other ways in which the government and other organisations might or might not try to steer or (re)direct tourism in areas of high natural value.

Map 24 illustrates bed density in relation to semi-natural area land cover. The highest percentage of semi-natural area is represented with the green colour, while the lowest coverage of semi-natural area is represented by red. The tone of the colour gives the magnitude of bed density. For example the area dark red represents areas of low percentage of semi-natural area, but with high bed density. The light blue areas represent areas with relatively high percentage semi-natural area cover, but with low bed density.

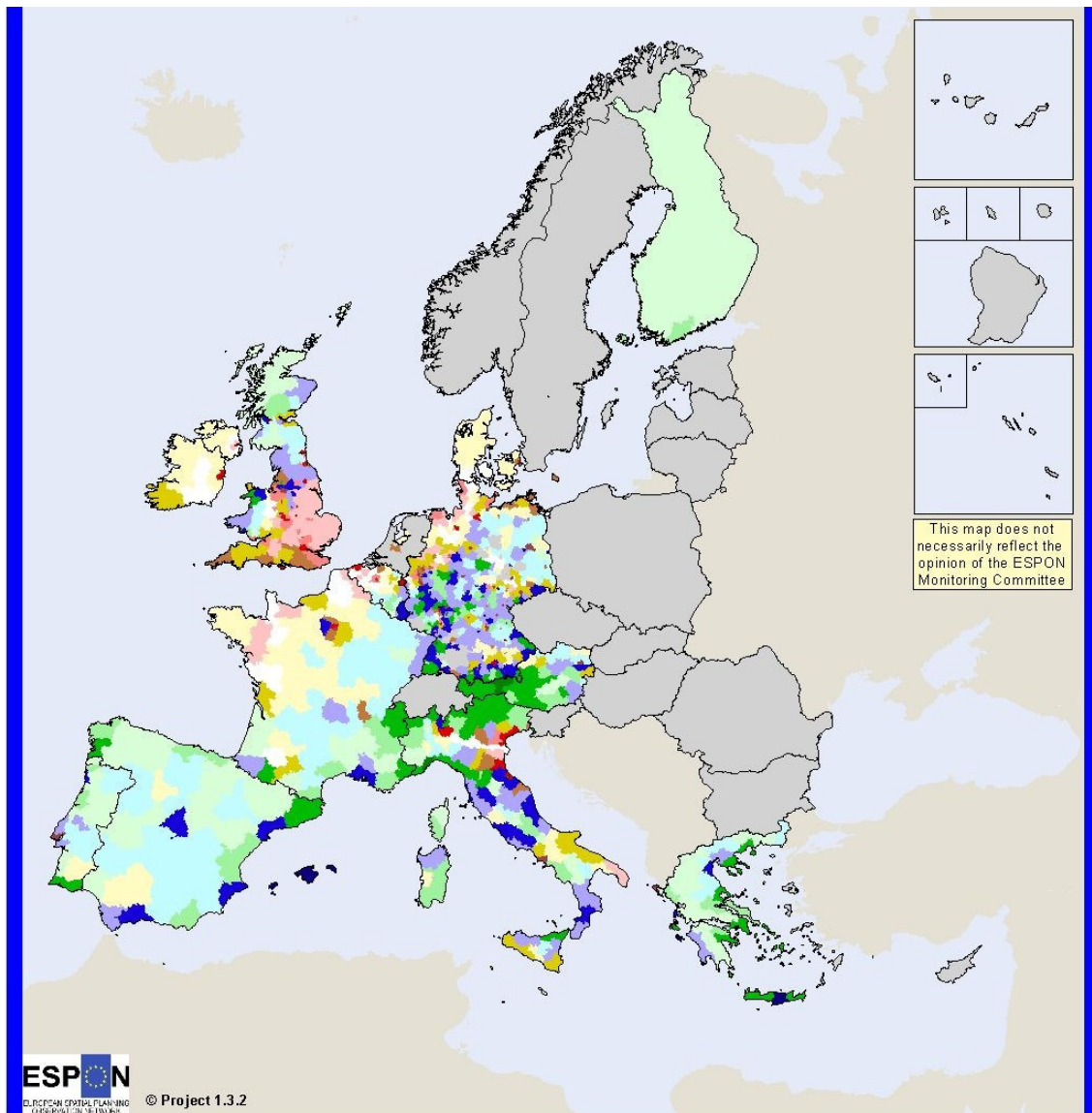
**Map 23 Percentage semi-natural area compared to innovation**



Innovation index	% Natural area			
	0-10%	10-25 %	25-50%	< 50%
< 0.1	11	21	31	41
0.1-0.4	12	22	32	42
0.4 - 0.5	13	23	33	43
> 0.5	14	24	34	44

© EuroGeographics Association for the administrative boundaries  
Origin of data: EEA, CORDIS  
Source: ESPON Database

**Map 24 Semi-natural area compared to bed density**



		% Natural area			
		0-10%	10-25 %	25-50%	< 50%
Bed density	0-2%	11	21	31	41
	2-5%	12	22	32	42
	5-20%	13	23	33	43
	>20%	14	24	34	44
		no data			

© EuroGeographics Association for the administrative boundaries  
 Origin of data: EEA, Eurostat  
 Source: ESPON Database

Table 19 does not allow for a specific pattern to be drawn from countries that experienced a relative large growth in the number of beds during the last decade: Spain, Finland, Sweden and the UK. However, these countries do have one thing in common, that is that they contain, on average, a small amount of protected land. As above, the actual threat depends on a culmination of factors, including for example, the focus of tourism and other means of government/institutional intervention).

### **8.3.6 Infrastructure**

Infrastructure cannot be considered in isolation. Infrastructure development is closely related to economic development, population growth and therefore urbanisation. It is assumed that infrastructure is both a driving force and a resultant factor in the increase in GDP and population. Therefore, it is not surprising that most of the countries that are part of the Pentagon area have a relatively high road density. In contrast, many of the new accession countries have a relatively low road density, which is closely related to the fact that these countries have relatively low GDPs, indicating their relatively small or local economic activity. The need for a dense road network is therefore not present. This might change when the economic growth that has taken place in many of these countries during the last decade continues (see sub paragraph above).

Tension is also expected to exist in countries that neighbour or are partially part of the Pentagon, like Germany, Denmark, the UK and Italy. The road density in these countries is less than that in the Pentagon countries, but similar to that of the Netherlands and Switzerland.

Map 26 illustrates road density (main highways) in relation to semi-natural area land cover. The highest percentage of semi-natural area is represented with the green colour, while the lowest coverage of semi-natural area is represented by red. The tone of the colour gives the magnitude of road density. For example the area dark red represents areas of low percentage of semi-natural area, but with high urban pressure. The light blue areas represent areas with relatively high percentage semi-natural area cover, but with a relative low road density.

The principal impacts are the creation of barriers to the movement of natural species, on the one hand, and to facilitate urbanisation, on the other. Aside from the direct land take for infrastructure, the potentially induced urban development results in indirect land take. So in addition to a barrier effect, and the inherent fragmentation of semi-natural areas, roads will also result in habitat loss.

The data provided demonstrate that the barrier and fragmentation impacts have indeed occurred. The association of roads with induced urban development requires a time series that would correlate the progression of road building with increasing urban density and the development of new urban centres.

Because semi-natural areas have existed prior to the building of infrastructure and urban areas, there is no necessary inverse correlation between the protection of semi-natural areas and the increased presence of roads. The map on the % protection compared to road density is a mirror of the fact that roadways are built in areas where natural values may also exist. Comparison with the map on the fragmentation index (consisting of % semi-natural area and number of patches) demonstrates the fact that fragmentation does indeed take place because of road building. In some areas (especially along the Atlantic coast of mainland Europe and southern Britain), the presence of highly structured farming (the Map on ESU per holding) may mean that the effect of fragmentation and loss of natural habitat is jointly the fact of intensive agriculture as well. In other areas (as an example, the Po Valley and Venetian coast, the southern part of the Adriatic coast and part of the shoreline of Sicily in Italy), road density has much less influence compared to urbanisation (which may occur in association with tourism) on the fragmentation of semi-natural areas.

Road building is a ubiquitous phenomenon associated with social demands for increased mobility. The direct impact upon fragmentation can be curtailed by sensitively locating major arteries away from semi-natural areas that are not already fragmented (at the level of Strategic Environmental Assessment for TENs, as an example), or the impact can be attenuated by compensatory measures locally, such as fauna passages across roadways. The indirect impact – induced urbanisation – can only be offset by local zoning or other legal protection measures, so that particularly valuable semi-natural areas are not taken for urban land use.



Research on the fragmentation of land and of forest for the EU15 has been carried out by the EEA (2001). The following is concluded:

The expansion of transport infrastructure Networks and the continuous growth in traffic in the EU pose an important threat to biodiversity, from direct impacts from proximity and disturbance, and by fragmenting and isolating habitats and creating barriers to wandering and spreading of animals and animal populations. The average size of nature conservation areas is decreasing and the average distance between areas of the same type or function is increasing. Nature's infrastructures conflict more and more with human infrastructures.

Most areas in the EU are highly fragmented by transport infrastructure. The average size of continuous land units that are not cut through by major transport infrastructure ranges from about 20 km<sup>2</sup> in Belgium to nearly 600 km<sup>2</sup> in Finland, with an EU average of about 130 km<sup>2</sup>.<sup>70</sup>

The average size of non fragmented forest habitat areas (undisturbed or not cut through by roads) in the EU is expected to fall by 13% (from 22 to 19 km<sup>2</sup>) by 210 if all planned major roads are constructed.<sup>71</sup>

Fragmentation of land, due to the expansion of transport infrastructure networks and the continuous growth in traffic in the ACs and the EU, poses an important threat to biodiversity from direct impacts from proximity and disturbance, and by fragmenting and isolating habitats and creating barriers to the wandering and spreading of animals and animal populations. The average size of non-fragmented land in the ACs (174 km<sup>2</sup>) is still above the average of that of the EU (121 km<sup>2</sup>).<sup>72</sup>

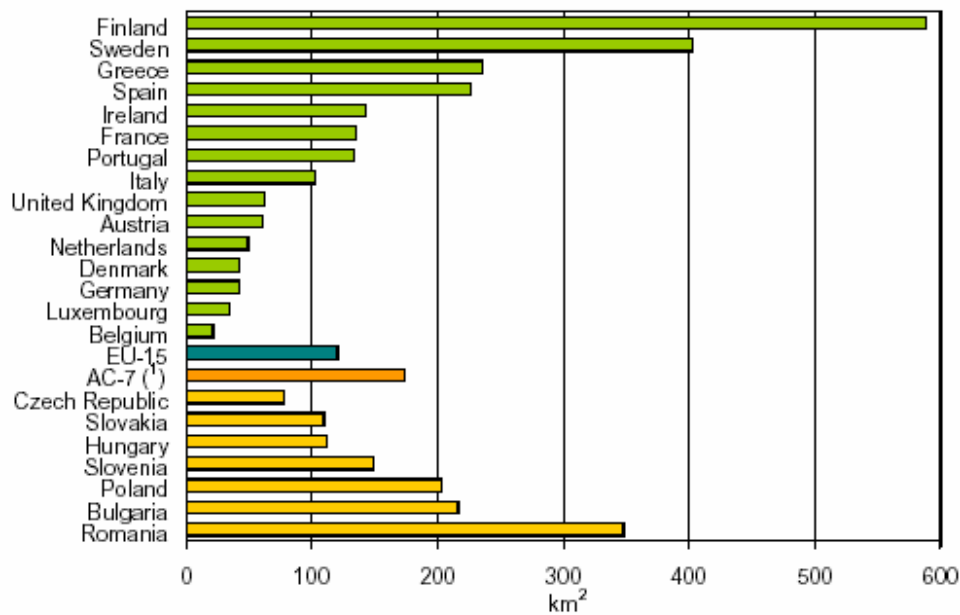
---

<sup>70</sup> EEA: Fragmentation of land and of forests, Aug. 2001

<sup>71</sup> EEA: Fragmentation of land and of forests, Aug. 2001

<sup>72</sup> EEA indicator fact sheet, TERM 2002 06 EU+AC – fragmentation of ecosystems and habitats by transport infrastructure, April, 2003

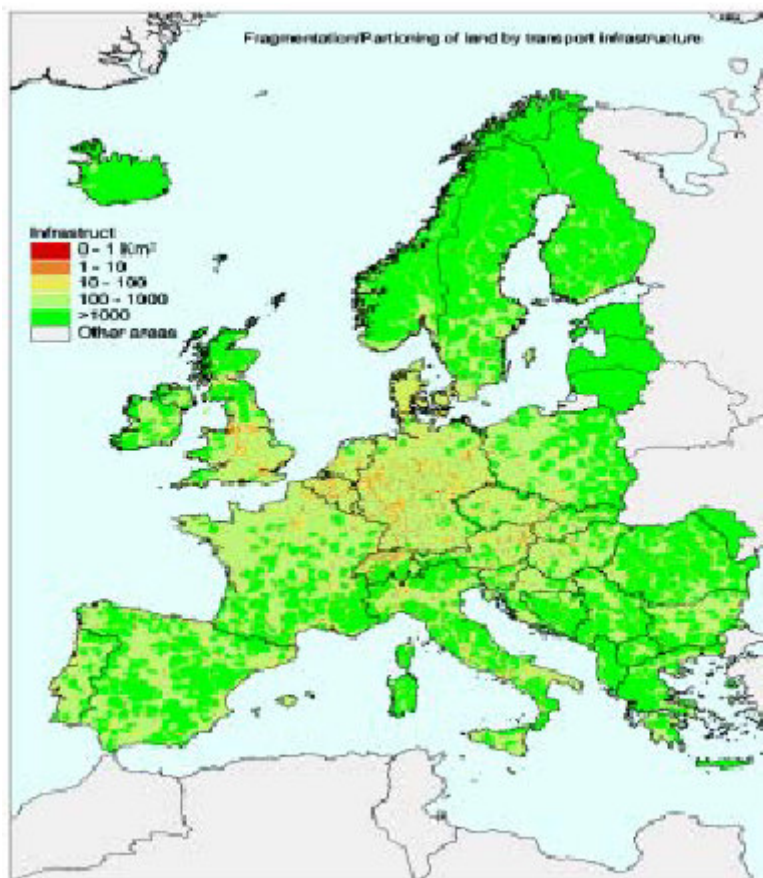
**Figure 15 Average size of non-fragmented land parcels**



Source: EEA-ETC/TE, 2002

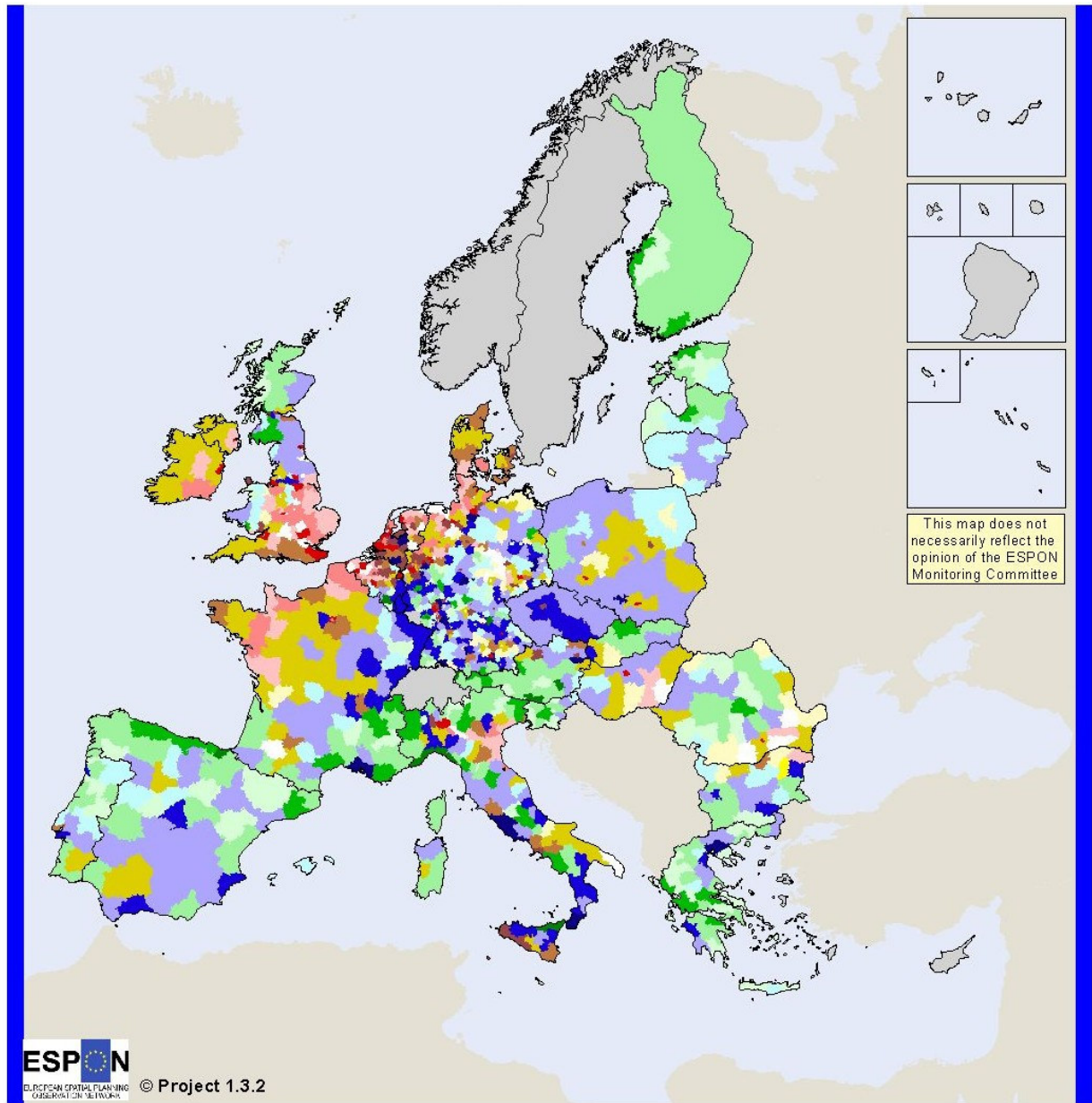
Note: AC-7 refers to the ACs shown in the graph. Data on EU and AC infrastructure refer to 1998

**Map 25 Partitioning of land by transport infrastructure**



Source:  
EEA-ETC/LC, 2000.  
NB:  
Data on EU and AC  
infrastructure refer to  
1998.

**Map 26 Percentage semi-natural area related to road density**



**ESPON**  
 EUROPEAN SPATIAL PLANNING  
 OBSERVATION NETWORK  
 © Project 1.3.2

This map does not necessarily reflect the opinion of the ESPON Monitoring Committee

		% Natural area			
		0-10%	10-25 %	25-50%	> 50%
Road density	low	11	21	31	41
	medium	12	22	32	42
	high	13	23	33	43
	very high	14	24	34	44
		no data			

© EuroGeographics Association for the administrative boundaries  
 Origin of data: EEA, Eurostat  
 Source: ESPON Database

## 8.4 Water

The influence on Europe's hydrological system, being an essential component of the ecological network, for example connecting mountainous semi-natural areas with wetlands in the coastal zones, will not only be quantitative one but also qualitative. In periods of relative draughts, the quantity of water flow will be minimised and the pollution will be intensified by higher concentrations.

The impact of flooding on human settlements is quite different. In chapter 7 the polycentric urban system as envisaged in Espo 1.1.1. has been considered in relation to the macro regions.

What appear to be abrupt changes in weather patterns occurring, the phenomenon of flooding has become an issue of widespread public concern. In terms of working with Europe's natural heritage, the incidence and severity of flooding is an indication of whether human society respects natural dynamics or not. Flooding would be of little consequence if land use occurred in such a way that – when there is heavy rainfall – no flooding of houses and other urban land takes place, no bridges and roadways are washed away and no soil is lost through massive erosion. When this occurs, it means that the natural capacities to absorb heavy rainfall have been altered or removed and that people have simply put themselves in the wrong place ... a floodplain is a place where floods are naturally likely to occur! Three data sources can be called upon from which to draw observations, the maps on flooding, fragmentation, road density and ESU per agricultural holding. Other useful information would have been the risk of soil erosion in map form and the limits of river basins (catchment areas).

Beginning with areas least likely to experience flooding, these are generally in areas where there is little infrastructure development – therefore minor urbanisation – even if they may be areas that are under highly structured agriculture. In this case, the fact that there is a low percentage of semi-natural areas does not seem to be directly correlated with flooding potential, but the number of patches does: the lower the number of patches, the higher the flooding potential. From another perspective, areas with low road density and high percentage of semi-natural areas are also less likely to experience flooding.

Turning to areas that are most likely to be flooded, road density (used as a proxy for urbanisation) seems to be directly related to flooding. There seems to be no other factor that is directly correlated

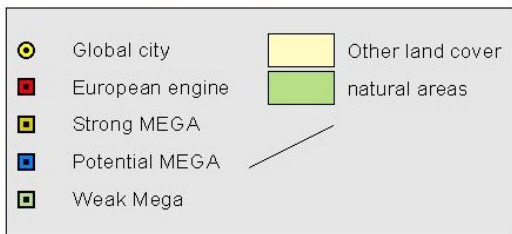
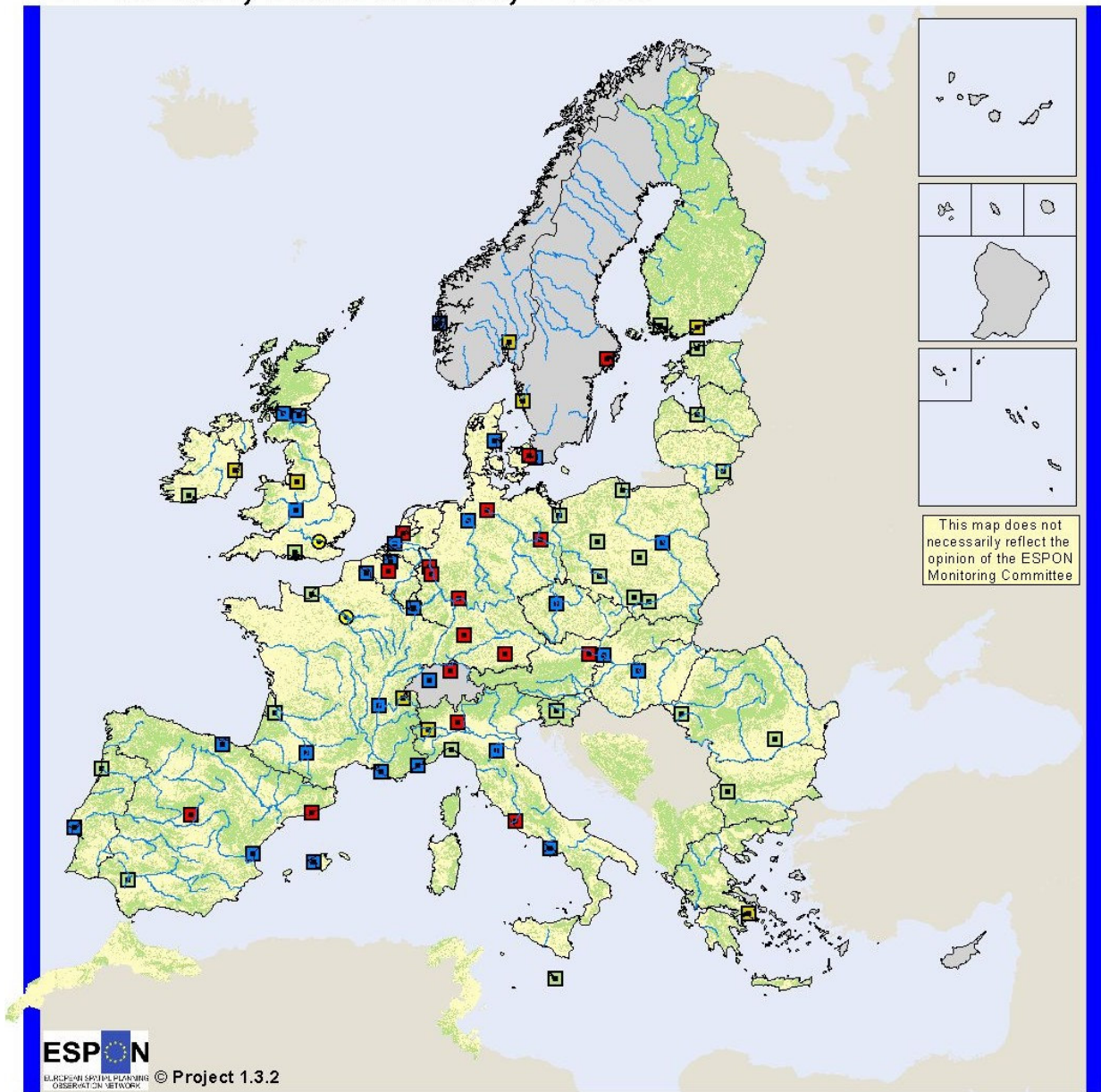
with the likelihood of flooding, except perhaps the percentage of semi-natural areas (in an inverse relationship: the lower the percentage of semi-natural areas, the greater the likelihood of flooding).

It would seem that the strategy to adopt is double: avoid urbanisation in areas that are likely to be flooded and to encourage the development of semi-natural areas in and around zones that already are located in flood plains. The action of semi-natural area management to control flooding only makes sense in relationship to the structure of river basins, and should begin as far upstream from urban areas as possible.

Map 27 gives an overview of the main rivers, semi-natural areas and MEGA's. Although also smaller rivers are relevant and have similar relation to the semi-natural areas as the main rivers, map 27 simplifies a concentration of semi-natural areas along major rivers. At the same time, the MEGA's are also related to riverine zones. This means that along rivers, natural and urban influences are concentrated. At the one hand, actions following on from the Water Management Framework Directive are increasing the space for allocated water flows, by flow fields and retention areas. These areas may be used for extensive agriculture or as semi-natural areas. At the other hand, the many urban nodes those are concentrated along rivers for which additional economic activities and residential uses will be required. This conflict between spatial developments leads to development pressures requiring extra attention and harmonisation. This is significant since the potential of enhancing the cohesion of Europe's ecological network are largely located in the river valleys.

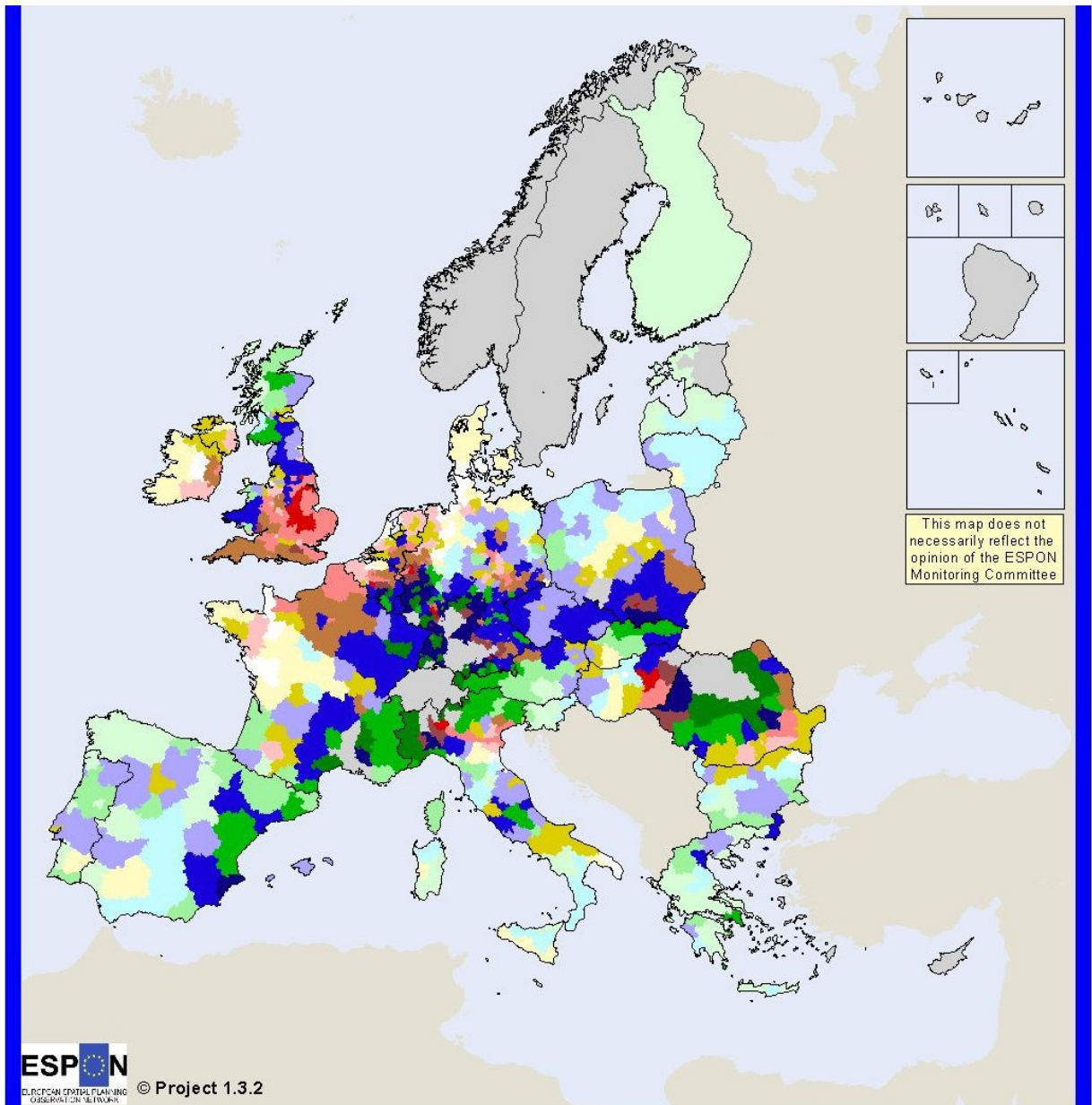
In the context of floods, as analysed in ESPON project 1.3.1, the concentration of urban activities as the location of MEGA's according the ESPON project 1.1.1. in riverine zones seems to require careful consideration. In NUTS3 areas of high flood occurrences, MEGA's are prone to relatively high risks. Map 28 shows the flood risk versus the semi-natural area land cover. The highest percentage of semi-natural area is represented with the green colour, while the lowest coverage of semi-natural area is represented by red. The tone of the colour gives the magnitude flood risk. For example the area dark red represents areas of low percentage of semi-natural area, but with high flood risk. The light blue areas represent areas with relatively high percentage semi-natural area cover, but with low flood risk.

**Map 27 Semi-natural area, main hydrology and the MEGA's**



© EuroGeographics Association for the administrative boundaries  
 Origin of data: EEA, ESPON 1.1.1  
 Source: ESPON Database

**Map 28 Comparison of flood risk to the percentage semi-natural area**



		% Natural area			
		0-10%	10-25 %	25-50%	> 50%
Flood risk	1	11	21	31	41
	2	12	22	32	42
	3	13	23	33	43
	4	14	24	34	44
		no data			

© EuroGeographics Association for the administrative boundaries  
Origin of data: ESPON project 1.3.1, EEA  
Source: ESPON Database

## 8.5 Legislative framework & management of natural heritage applied by national governments

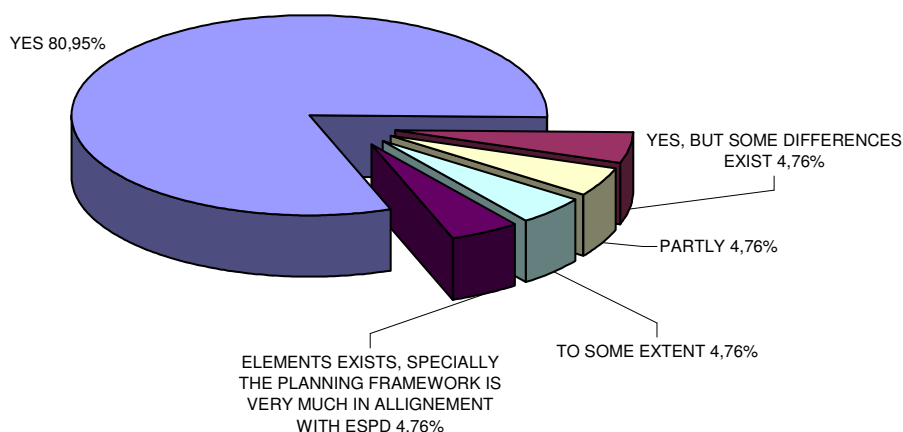
It is important to understand that European territory comprises a variety of countries with different socio-economic and cultural backgrounds. Furthermore, there are differences in the 'status' of different countries within the EU. Thus, measures adopted by the various countries for protection and management inevitably differ. The information described in this paragraph are the results of the response on the questionnaire (see also Annex 1).

It is evident that a large proportion of countries have their environmental legislative framework aligned with EU's corresponding framework.

The following diagram presents in a quantitative manner, the responses given in relation to the alignment of their environmental legislative framework with EU's corresponding framework.

**Figure 16 Diagram: Environmental and Spatial Planning legislative framework in relation to EU's framework**

Is your environmental and spatial planning legislative framework aligned with EU's corresponding framework?



However, it also seems that a number of countries have an environmental legislative framework that goes further than that of the EU. Countries with a history of environmental protection have advanced strategies and regulations for achieving sustainability and



nature protection. Sweden and Switzerland are typical examples of countries with such an approach.

The legal framework regarding protection and/or management of Natural heritage throughout the European continent can be divided into three main categories, with the following subcategories: A) legislation relevant to the protection and management of nature and landscape, a1) Sites, Habitats, a2) Fauna, Flora, a3) Landscape, a4) Hunting, and a5) Fishing, B) legislation regarding spatial planning, b1) Regional planning, and b2) urban planning, and finally C) any relevant sectoral legislation, such as c1) Water, c2) Air, c3) Forests, c4) Coastal areas, c5) Soil ,c6) Construction, and c7) Wastes. The following table presents the legislative regime concerning the protection and management of natural heritage, per country, as identified from the responses of the management questionnaire.

It is important to state that wherever a lack of relevant legislation appears for a country, this does not necessarily mean that this type of provision does not exist. Responses to the question 'What constitutes the legislative framework for the protection of semi-natural areas?' could be interpreted in different ways since it is affected by the respondents' view of what actually constitutes nature protection. Therefore, they may indeed be absent from National or regional legislative framework, or there may be some indirect relationship with other general or sectoral legislation. For example, Acts relevant to construction, or to urban planning, may be perceived as linked to or distinct from nature protection. In addition, there are acts that are not applicable to certain countries; for example acts for coastal protection in landlocked countries.

It is apparent that all countries have a relevant legislative framework for the protection and management of nature and landscapes.

It appears that the existence of a comprehensive legislative framework of a country does not necessarily guarantee effectiveness of protection. Other factors also play a vital role. Financial provisions made for law enforcement, the implementation of various acts and citizens' education and participation are important parts in the process of nature protection and management. In some countries for example, even though protected areas ought to have management plans and management authorities, such provisions do not exist due to fund shortages. Therefore, an attempt has been made through the management questionnaire to investigate financial issues, as they are considered to be of great importance to natural heritage protection. Other important information that was sought concerned resource allocation and funding sources for nature conservation, land rehabilitation and land acquisition for protection, especially expressed in time series. Unfortunately this type of information was very difficult to obtain, despite the fact that every possible effort was made.

Regarding the historical protection and management of nature, the most characteristic example is that of France that has acts for the protection of sites and habitats since 1930, as well as acts for the protection of water resources since 1964. Greece and Slovak Republic had their first National Park established in 1948 and 1949 respectively.

In general, it appears that in recent years all countries consider aspects relating to the environment as major issues, irrespective of their socio-economic and cultural status. This is very important since it shows that the environment and natural heritage have at least engaged the attention of all European countries.

Responsibility for the protection and/or management of nature varies. It is either a central responsibility solely of governmental ministries and/or agencies, or it is decentralised at regional and local levels in combination with central government or by individual agencies. Public participation and NGO involvement in the process of protection and management constitute another example of different practices of nature protection.

Table 21 summarises the categorisation of administrative systems in relation to natural heritage. Questionnaire responses in addition to information downloaded from all relevant Government and agency internet sites have been used to compile table 21. It could be

Table 20

## Legal Framework related to natural heritage

		Bulgaria	Denmark	Finland	France	Greece	Hungary	Ireland	Italy	Lithuania	Luxembourg	Netherlands	Norway
<b>Protection and Management of Nature &amp; Landscape</b>	<b>Sites - Habitats</b>	√ 1998	√	√	√ 1930	√ 1969	√	√ 1976	√	√	√ 1982	√	√
	<b>Flora - Fauna</b>	√ 2002	√	√	√	√ 1980		√ 1976	√	√	√ 1986	√	
	<b>Landscape</b>		√			√ 1969							
	<b>Hunting</b>	√ 2000	√		√ 2000	√ 1969					√		
	<b>Fishing</b>	√ 2001			√ 1984	√ 1969					√		
<b>Spatial Planning</b>	<b>Urban Planning</b>			√		√ 1923							
	<b>Regional Planning</b>		√	√	√ 1995	√ 1976				√	√	√	
<b>Sectoral</b>	<b>Water</b>				√ 1964	√ 1987					√	√	
	<b>Air</b>					√ 1986					√		
	<b>Forests</b>		√	√	√ 2001	√ 1969					√		
	<b>Coastal</b>				√ 1975	√ 1940	-				-		
	<b>Soil - Mining</b>			√		√ 1986							
	<b>Constructions</b>					√ 1973				√			
	<b>Waste</b>					√ 1986							

**Table 20 (cont.)**

		Poland	Portugal	Romania	Slovak Republic	Slovenia	Spain	Sweden	Switzerland	U.K.		
										England	Scotland	N. Ireland
<b>Protection and Management of Nature &amp; Landscape</b>	<b>Sites - Habitats</b>	√ 1991	√ 1993	√ 2000	√ N.P. since 1949	√ 1999	√ 1989	√	√ 1966	√ 1981	√ 1949	√ 1985
	<b>Flora - Fauna</b>		√ 1995	√ 2001	√ 1958	√	√ 1989		√ 1966	√ 1994		
	<b>Landscape</b>				√ 1994	√			√ 1966		√ 2000	
	<b>Hunting</b>		√ 1986						√ 1986			
	<b>Fishing</b>		√ 1970						√ 1991			
<b>Spatial Planning</b>	<b>Urban Planning</b>				√ 1976					√ 1990		
	<b>Regional Planning</b>				√ 1976				√ 1979	√ 1990		
<b>Sectoral</b>	<b>Water</b>	√ 2001	√ 1994		√ 1973			√	√ 1991		√ 2003	
	<b>Air</b>				√ 1992							
	<b>Forests</b>		√ 1996					√	√ 1991			
	<b>Coastal</b>				-		√ 1995		-			
	<b>Soil - Mining</b>	√ 1994	√ 1996		√ 1986			√	√ 1991			
	<b>Constructions</b>				√ 1976							
<b>Waste</b>				√ 1991								

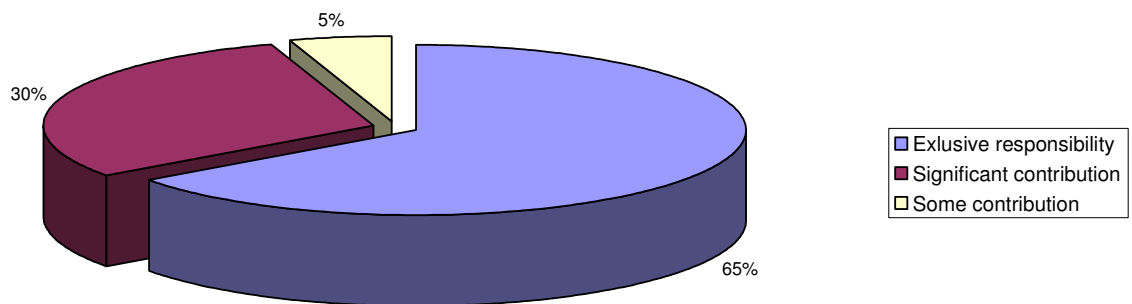
Source: Management Questionnaire

\* From the specific dates in the table it cannot be assumed safely that relevant legislation did not exist prior to that date, since it was not clarified by the respondents whether or not these dates indicate the most recent legislation.

concluded that three basic categories of administration are currently applied in European territory. Central administration, through ministries, organisations and institutes is adopted by the majority of countries. A smaller percentage of countries have administration that is responsible for the regional or local level. Where regional and/or local authorities are responsible for the protection and management of nature, it is evident that these authorities have the necessary means for that task, including financial as well as human resources. In these cases, central government has overall responsibility for coordination. Finally, the involvement of citizens through NGOs that contribute to the protection and management of nature represents the other end of the spectrum.

**Figure 17 Diagram: Countries with central government responsibility for the protection of natural heritage**

**Diagram 3.2 Countries with central government responsibility for the protection of Natural Heritage**



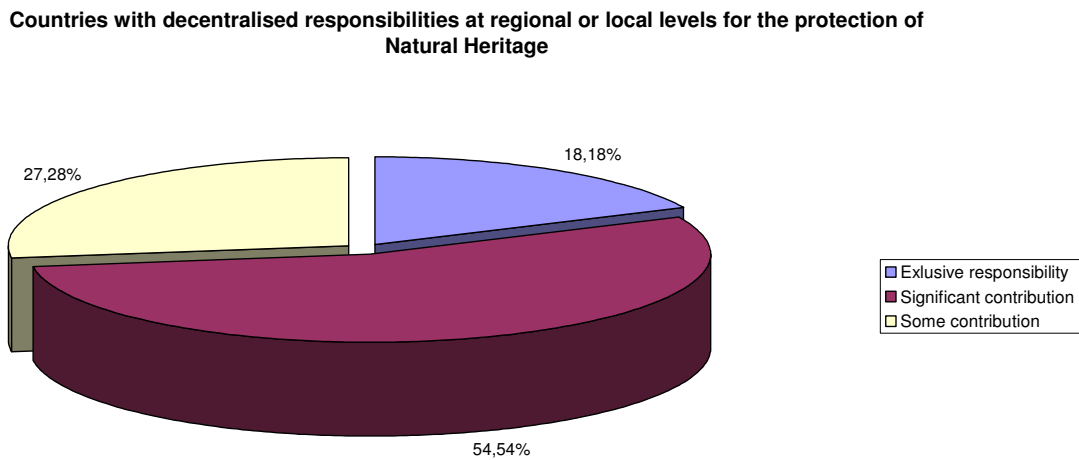
**Table 21 Centralised or Decentralised agencies responsible for protection and management of natural heritage**

Bodies responsible for the protection & management of natural heritage	Belgium	Bulgaria	Denmark	Finland	France	Greece	Hungary	Ireland	Italy	Lithuania	Luxembourg	Netherlands	Norway	Poland	Portugal	Romania	Slovak Republic	Slovenia	Spain	Sweden	Switzerland	United Kingdom
Central Governmental / Political management (ministries, organisations, institutes)		▲			▲	▲	▲	▲		▲	▲	▲		▲	▲	▲	▲	▲				
Regional / Local range	▲																				▲	
NGOs																						

- ▲ Exclusive responsibility
- Significant contribution
- Some contribution

Source: Management Questionnaire

**Figure 18 Diagram: Countries with decentralised responsibilities at regional or local levels for the protection of natural heritage**



The main conclusions that can be derived from the diagram in figure 17 are that:

- In 95% of the countries, central administration is mainly responsible for management issues. For over 65% of those that responded, central administration is solely responsible for management.
- The majority of countries that have relevant responsibilities at a regional or local level are located in northern Europe.
- All eastern European countries have central administrative systems for the protection of nature.
- A very small number of countries have NGO participation in nature protection management.

It was attempted to correlate GDP per capita with centralised or devolved responsibility, but there was no evidence for a clear relationship. There are countries with high GDP per capita where the responsibility for the protection of nature is centralised, such as in Luxembourg and France, whereas there are countries with low GDP per capita where the responsibility for the protection of nature has reached the local level, such as Portugal.

A second correlation between the level centralisation of responsibility for nature protection and the extent of semi-natural areas within specific countries has also been attempted. Again, a clear relation could not be established. The whole range of the spectrum exists, including countries with

a high percentage of semi-natural areas, having mainly central administration, like Greece, or countries with a high percentage of semi-natural areas, where the regional and local authorities have a major role to play, as in Norway. Similarly, there were countries such as The Netherlands with a relatively low percentage of semi-natural area where the central administration collaborates with regional and local authorities, but there were also countries with a low percentage of semi-natural area, that only have central administration, such as Ireland.

The number of agencies that are involved in the process of protecting natural heritage and in the management of protected areas, is an important factor which influences the effectiveness of protection. It was presumed that the fewer agencies that are involved, the higher the effectiveness. The majority of European countries have allocated these responsibilities to various agencies. Additionally, countries with an advanced environmental approach and with environmental protection extending back many years, such as Finland and Switzerland have implemented the task of nature protection and management through various agencies and organisations. This means that other factors influence the effectiveness more than the number of agencies involved.

In some countries, such as the Netherlands, Greece, Bulgaria and Switzerland, NGOs are also actively involved in the management of semi-natural areas. This is an important aspect for the protection of natural heritage, since it involves voluntary action by organisations and citizens. This is a radical approach and an example of creative management, which moves towards the involvement and participation of people, for the protection of significant natural and environmental characteristics.

The nature of management for protection and preservation in Europe as expected takes several forms and encompasses a plethora of methods, concerning technical, organisational, and other matters, including issues of finance and enlightenment.

It has been attempted to combine some of the data and information in order to illustrate any differences from official European data which have been used for the current project such as the CORINE data base. However, there are considerable differences observed between official databases and those obtained from our survey. It is suspected that one of the reasons for this is the time which has lapsed between reviews.

Although many semi-natural areas are being protected within Europe, they do not necessarily have management plans and management authorities. It seems that management plans have already been established for only a



portion of protected areas. These are usually older and smaller areas that have been established as protected sites prior to the legislative demands for management plans. At the moment, management plans are under preparation in many countries (especially in Eastern Europe). The basic type of protected area, throughout the continent, that has established management plans and management authorities are the National parks.

Apart from the conventional means of protection, incentives and grants are also being utilised. However, it appears that this approach to nature protection is currently applied in a limited way. Apart from EU funding, this type of tool is being used by countries such as Sweden and Switzerland.

Land acquisition is rarely used as an instrument for nature protection and therefore represents only a small fraction of protected areas. In those instances where land acquisition has been tried both the private and public sector have been involved. There are some countries with objectives for land acquisition, which have also formulated time schedules for such activities. The Netherlands for instance has plans to acquire 1.700 km<sup>2</sup> by 2018, having already acquired 750 km<sup>2</sup> in 2003. Ireland has acquired almost 765 km<sup>2</sup>, Sweden 200 km<sup>2</sup>, Finland 927 km<sup>2</sup>, and Greece approximately 0.350 km<sup>2</sup>.

Protection of natural heritage is integrated to a great extent in the spatial planning systems of all countries. In one way or another, all nations take into account environmental aspects in the strategies of their national plans.

Since there is no formal legislative framework in the EU for spatial planning that binds member state to adhere to specific planning practises, it is the ESDP perspective that provides guidelines for those aspects. The main objectives of ESDP include polycentric urban development, balanced competitive development and sustainable development.

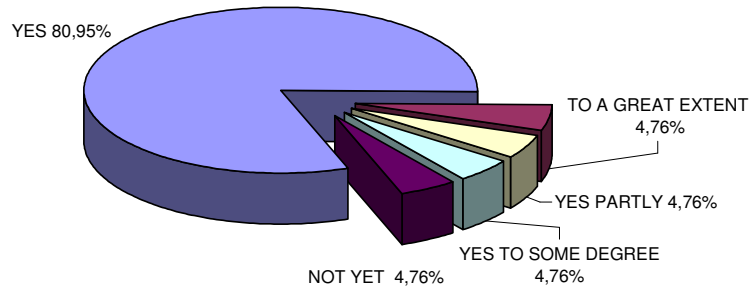
ESDP indicates that protection of semi-natural areas, and the integration of sustainable development into spatial development, as well as the integration of biodiversity aspects into sectoral policies, ought to be the step towards more territorial cohesion and more balanced development.

It is also evident that European natural heritage is under threat; ESDP guidelines, although not mandatory can assist in the development of comprehensive planning and management.

Table 22 presents, in a quantitative manner, the responses which countries have given regarding the integration of environmental protection into their spatial planning system in the management questionnaire.

**Table 22 Diagram: Spatial Planning Systems and Protection of natural heritage**

Is the protection of your country's natural heritage integrated into the spatial planning system of your country?



It is important to state that the main goals in the planning systems of the various countries of Europe contain specific environmental protection and natural heritage aspects.

The main goals of the National Planning Systems of European countries include the protection and/or rehabilitation of water resources, habitats, fauna and flora, landscapes and agricultural land. The protection of marine and coastal zones, are also important goals. Finally, the prevention of urban sprawl, along with the preservation of ecological corridors between protected areas, are goals that exists in many Planning Systems.

For the successful implementation of the strategies and goals that have been set in relation to natural heritage, National authorities have employed a series of instruments.

Monitoring of the aforementioned goals is being achieved mainly by the use of environmental quality standards or monitoring indicators. Annual surveys, along with the systematic registration of changes in land use are also being utilised by various countries. Implementation of specific management plans by particular authorities is also being carried out. Review of spatial plans at certain time periods assures the correct implementation of the strategy and the monitoring of goals. Finally, environmental protection agencies that have been established have the responsibility for the monitoring, at regional and/or national level.

## **8.6 Conclusions**

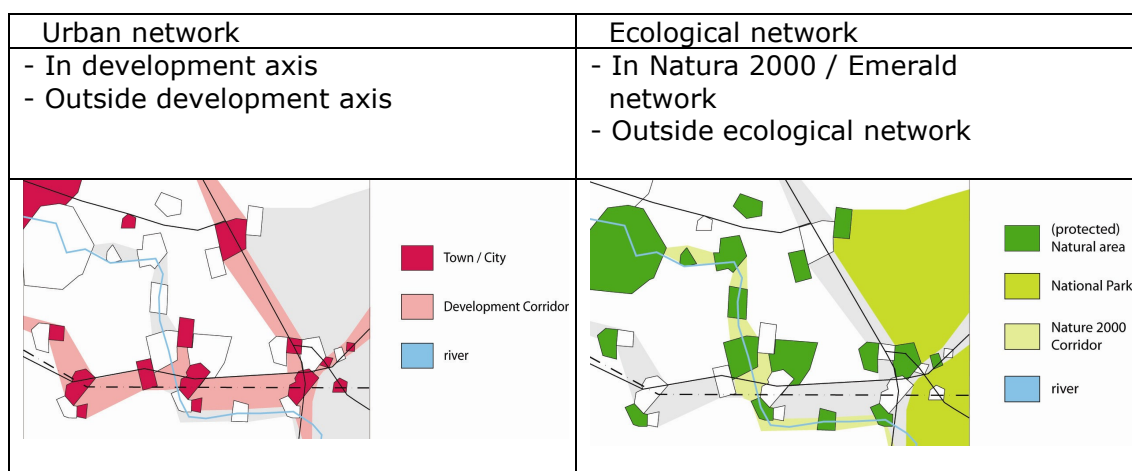
### **8.6.1 Spatial patterns**

The urban pressure is high in the Pentagon, the major European cities and some coastal areas. Tension could occur between urbanisation and natural heritage, because of the small amount of protected nature, compared to the high percentage built up land.

At the physical side of the meso level, infrastructure and river basins are considered to be of high relevance. The infrastructure is the backbone for economic development. Throughout Europe and within countries, economic corridors cross rural areas and result in fragmentation of patches of semi-natural areas and forest. It may be noticed that riverine zones contain concentrations of urban activities and that these areas offer attractive sites for residential and economic settling. At the same time, the potential role of riverine zones as part of the ecological network on the European scale, together with actions following from the integrative water management directive may enhance the concentration of semi-natural areas and protected areas along the rivers. Harmonised spatial development, balancing urban and natural developments within the riverine zones, requires special attention.

The above leads to a regional typology at the meso scale as depicted in the figure 19 below.

**Figure 19 Regional typology at the meso level**



### 8.6.2 Management

In terms of management, the spatial polarisation of intensive / extensive land use will probably continue, but it will be possible to attenuate the disruptive impacts of intensive agriculture and forestry on biodiversity by local land management plans. These plans can promote biodiversity richness (such as through agro-forestry).

Considering the various potential relations between the natural heritage and agricultural and socio-economic indicators, national boundaries still play an important role.

Conflicts of interest along rivers, which are largely area-specific, pose dedicated spatial development tasks to the regional authorities.

- The European territory contains considerable entities of natural heritage which combine rarity and high natural value judged by any standard.
- However, it is commonly agreed that there are ever increasing pressures applied upon it stemming from the combination of population change (not necessarily increase), increased GDP and their associated developmental consequences, infrastructure development as well as agriculture, tourism and recreation. Another important factor with detrimental effects for the natural heritage of Europe is the climatic changes of the last decades.
- Concerning the management of natural heritage, methodology tools and responsible agencies vary greatly. Whether decentralised or devolved to

local authorities and agencies it would appear that this has little importance in terms of efficiency and effectiveness.

- Certain countries with a long history in the management of natural heritage tend to have the edge on effectiveness.
- Inter regional and inter-state cooperation has increased in recent years not only because the need for it is generally agreed but also because EU policies promote matters of development and the need for sustainable development. This need is actively supported both politically and financially. However a lot more has got to be done in this direction.
- There are few national coherent spatial plans.
- For the accession countries of the present and recent past there appears to be a unique opportunity to benefit by means of aligning their practices as soon as possible with EU policies and guidelines as well as by the use of programme funds available through structural funds and sectoral programmes and/or the developing networks for cooperation in the fields of spatial planning and specific know how (ESDP, ESPON, etc.).
- There is almost no European spatial planning, besides the first attempts with ESDP objectives.
- There is still a lot to be desired with regard to public participation, enlightenment campaigns, the involvement of the private sector and NGOs and the devolution of the management of natural heritage at the local level. Nevertheless there are a few bright and successful examples at smaller scales; these experiences should be communicated and taken further.
- National initiatives and legislation result in very many different ways of protecting dispersed fragments of natural heritage. It has already been pointed out that the large number of differences concerning definitions, terminology, evaluation criteria, indicators, monitoring techniques and time aspects of data and information render a comparative analysis extremely difficult and at times risky. Since the above are extremely important for the management of natural heritage and its subsequent development, a special effort should be made to produce commonly accepted definitions, evaluation and monitoring techniques, unitary standards and specific and frequent times for the updating of information and databases.
- Further development of EU networks and more funding for the implementation of the above should be pursued in the near future. Different administrative structures and allocation of responsibilities are expected to continue to be the case; however it is expected that practical

encouragement of cooperation and the development of a common language of communication will contribute greatly to the alleviation and solution of problems and the prevention of potentially dangerous developments.

- Within the framework of the EU's *acquis communautaire*, that is, the Strategic Development of Community Space (SDCS) and supporting programmes (INTERREG, ESPON, etc.), the intention is thought to go beyond the usual exchange of experiences amongst individuals regarding each separate cooperation activity, and to seek instead development strategies of an operational nature; this should also be the case for the management of natural heritage.
- Furthermore on the basis of the European Spatial Development Perspective, the objectives and policy options in the three areas of polycentric spatial planning, equality of access to infrastructure and knowledge and judicious management of natural and cultural heritage, allow a fresh step to be taken to enable spatial development to act as a frame of reference for implementation of the Community Support Fund, management of the Structural Funds and promotion of Community Initiatives.
- After the year 2000, cohesion in the European space, with EU enlargement and a need for the formulation of a new structural policy after 2006, means that – as the EU commissioner responsible for Regional Policy, Michel Barnier, has repeatedly stated – “incorporation of the spatial dimension will play a crucial role in the shaping of European sectoral policies”. The environment in general and natural heritage in particular constitute in their own right a very important sector.

### **8.6.3 Monitoring**

On the one hand it is important to assess the changing status of natural heritage as a result of socio-economic factors, such as urban pressure, and on the other hand it is important to assess the performance of programs, strategies and policies. The status of the natural heritage, and the associated indicators should be monitored on an intermediate and long-term based. Such assessment can then be used to evaluate the effectiveness and appropriateness of national and European policies.

For proper monitoring and in order to measure an agreed outcome, it is required to decide on a core set of indicators. The current study puts forward suggestions for such a set.

For the European scale, monitoring at NUTS3 level is suitable. Most socio-economic parameters relevant are collected at this level. Data on trends in land cover are currently becoming available and should be part of a monitoring system at this scale. The current management practices are predominantly dictated by the national systems, and does therefore not allow for cross border monitoring of management practices.

## **9 The micro level**

### **9.1 Introduction**

In order to refine the understanding of spatial patterns at the European and national level, case studies are carried out at the micro level.

More specifically, the case studies aim to provide a better understanding of designation and management and to find out what mechanisms play a role at the scale at which implementation takes place in reality.

By understanding individual case studies, the conclusions gained from the analysis of management policies on natural heritage at the macro and meso level can be specified. These studies will also provide more information about the implementation of management and the territorial local context in which the effectiveness of management of natural heritage must be considered.

### **9.2 Territorial diversity**

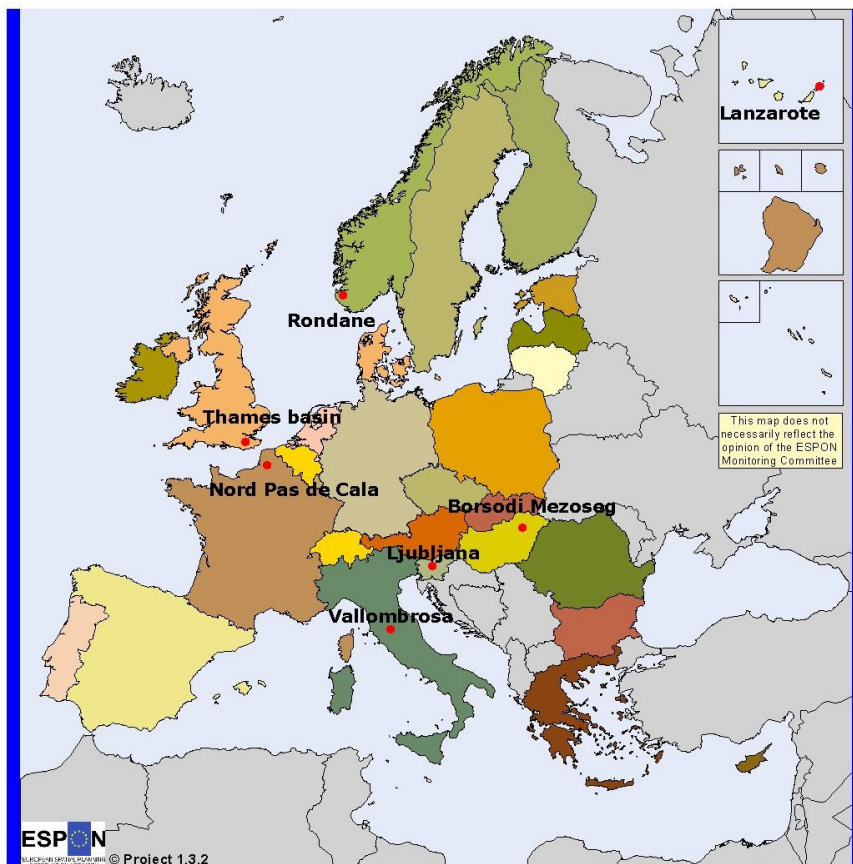
Case studies differ or converge according to their scale, settlement type and productive land use context in addition to the state of their natural heritage and management systems.

They are spread over the enlarged European territory and relate to various territorial contexts found through this area. They vary from coastal regions to mountains, cover both rural and urban territories and are either under development pressure or experiencing depression.

The case studies are distributed over the bio geographic regions in different member states and they consist of different landscapes (see map 29 and table 23).



**Map 29 Europe and location of the case studies**



© EuroGeographics Association for the administrative boundaries  
Source: ESPON Database

**Table 23 Bio geographic regions and landscapes for the case studies**

	State	Bio geographic region	Landscape
Nord Pas de Calais	France	Atlantic	Heterogeneous, coastal, urban, "bocage" plain
Borsodi Mezőség	Hungary	Pannonian	Puszta steppe
Vallombrosa	Italy	Continental	Forested hills
Ljubljana	Slovenia	Continental	Marshland
Thames basin	United Kingdom	Atlantic	River / heather landscape
Rondane	Norway	Alpine	Scandinavian mountainous
Lanzarote	Spain	Macaronesian	Island

They relate to three basic territorial contexts:

- rural territories;
- territories under development pressure; and
- ultra-peripheral territories.

The tables 24, 25 and 26 below present some characteristics, scale, settlement context, and information on farming or forestry, information on the national heritage and on the management system of the case studies.

**Table 24 Rural territories**

	<b>Borsodi mezoseg</b>	<b>Vallombrosa</b>
<b>Scale</b>	NUTS 4	NUTS 4
<b>Settlement context</b>	Rural area	Peri urban to rural area
<b>Productive landscapes (farming and forestry)</b>	Decline of traditional practices and emergence of intensive systems	Forestry
<b>State of the natural heritage</b>	Saline marshlands and steps	Forest under ecological management
<b>Management system</b>	Pilot area for conservation	Nature reserve since 1977

**Table 25 Urban related territories**

	<b>Ljubljana</b>	<b>Thames basin</b>	<b>Nord pas de Calais</b>
<b>Scale</b>	NUTS 4	NUTS 4	NUTS 2
<b>Settlement context</b>	Urban and peri urban area of Ljubljana	Urban and peri urban area	Urban, peri urban and rural areas
<b>Productive landscapes (farming and forestry)</b>	Declining extensive farming and arable lands conversion	Surrounding farming countryside	Dominating Intensive farming
<b>State of the natural heritage</b>	Marshland and forests surrounded by Ljubljana and 5 small scale cities	Fragmented heath lands surrounded by open spaces and urban areas	Fragmented semi-natural and semi-natural areas (coastline, valleys, marshlands...)
<b>Management system</b>	Nature reserve	Fragmented protected areas	Fragmented protected areas and protected landscapes

**Table 26 Ultra peripheral territories**

	<b>Rondane region</b>	<b>Lanzarote</b>
<b>Scale</b>	NUTS 2	NUTS 4
<b>Settlement context</b>	Northern peripheral area: large, mountainous and low density territory	Coastal resort places
<b>Productive landscapes (farming and forestry)</b>	Extensive livestock	Diversified, mainly located in the coastline
<b>State of the natural heritage</b>	Northern wilderness area	Endemic ecosystems
<b>Management system</b>	Large National Park surrounded by protected landscapes	Biosphere reserve Network of protected areas

### **9.3 DPSIR in case studies**

The case studies will now be summarised in relation to the following DPSIR categories:

- Territorial context;
- State of natural heritage;
- Driving forces of natural heritage evolution;
- State of the management;
- Assessment of the management; and
- Scenarios (provisional).

Full descriptions of the case studies are presented in Annex 2.

#### **9.3.1 Borsodi Mezőség area**

##### **Territorial context**

The Borsodi Mezőség is a 32,000 ha sediment plain in North-east Hungary. More than 100 streams and rivers converge there. Following water management and farming developments (which primarily took place between 1950 and 1970), it has been included in the Bükk National Park, which was established in 1976. From the 1990s serious economic changes resulted in landscape changes.

##### **State of the natural heritage**

The area is a diverse and complex grassland habitat scattered with wetlands and arable lands, which, in recent centuries, has been shaped by agricultural practices. During the 1960s and 1970s, the area was largely drained and as a result, wetlands were reduced to a fraction. Only a few remaining streams ensure a water supply. However, bio diverse habitats are still found and the area is suitable for large space demanding species. Several Red Book species are inventoried in the area.

##### **Driving forces**

Land abandonment and farming intensification (corn and sunflower) are both negative processes when considering the natural heritage.

There is currently an increasing demand for both traditional farming practices and nature conservation.

## **Management**

25000 ha are under the Pilot Area delineation.

The Bükk National Park Directorate implements management of the area.

Agri-environment schemes offer suitable solutions to overcome the problem of land abandonment and intensification.

## **Assessment of the management**

No results at this stage.

### **9.3.2 The Vallombrosa Forest**

#### **Territorial context**

Situated approximately 30 km south of Florence, in a sparsely populated mid-mountain rural context, the forest of Vallombrosa is subject to heavy tourism and recreational use pressures. The surrounding areas are occupied by privately owned forest (managed by local forest plans) and agricultural land.

#### **State of Natural Heritage**

The Vallombrosa forest forms one entity of over 1200 ha composed of conifer (old plantation) and broad-leaved species. The area forms a pSIC Nature 2000 site.

The regional Plan (PSR) integrates the conservation of the forest areas and adopts a protection strategy.

#### **Driving forces**

Climate change clearly appears to be an important driving force of the future evolution of the area. Specific studies and research are in progress.

In the short term, unmanaged faunal growth could lead to slower forest regeneration.

The main threatening driving forces are uncontrolled tourism and recreational developments.

## **Management**

The first management plan was adopted in 1876, following the National Forest Law of 1866, which made management plans compulsory for all

publicly owned forests. At that time, management practices supported wood production. Since 1977, it has been designated as a biogenetic reserve.

The last general multi-criteria plan was introduced in 2000. The main objectives are forest diversity conservation and enhancement, natural heritage conservation, and traditional forest work culture conservation and rehabilitation. Although these objectives are outlined in regional and local plans, the plans also encourage tourism.

### **Assessment**

Due to the specificity of the management plans (for example, outlining the multi-criteria approach), individual needs are accurately pinpointed and thus the objectives, in addition to adopted measures and actions, are highly relevant.

Furthermore, owing to the legally binding nature of the plan, every proposed action is due to be implemented.

Finally, a revision of the plan is to be completed every ten years. This process implies a post evaluation of the planned operations with potential readjustments to be made of the strategies.

However, insufficient finance to deliver the technical aspects of the planned actions represents a weakness in the effectiveness of management process. In addition, management faces difficulties from differences between the legal approach and implementation at technical level and administrative/bureaucratic constraints.

### **9.3.3 The Ljubljana marshland**

#### **Territorial context**

The marshland is a 163 km<sup>2</sup> area surrounded by the city of Ljubljana and small rural communities.

#### **State of the natural heritage**

Over the total area, 107 km<sup>2</sup> comprise marshland and marshy meadows, 40 km<sup>2</sup> of arable lands and 11 km<sup>2</sup> of forests.

This pattern partly results from a century-long process of cultivation, breeding and flood prevention. The marshland is a breeding place for more than 100 bird species

## **Driving forces**

### *Urban developments*

The marshlands were previously dedicated to city expansions, industries, infrastructures, waste and tailing disposals. Peat digging also played a role on the evolution of the area. However, this time is over now; it is relatively well protected and respected by the local community. For example, aggressive developments over the marshland are encountering local community oppositions. Urbanisation pressures occur on the urban fringes and along transport routes. Some settlements are illegal.

### *Farming*

Farming practices have tended to decline, largely due to a decrease of the rural population. Traditional practice is replaced by intensive corn monocultures. Spontaneous forest redevelopments are considered as secondary natural environment (with regard to the migratory birds).

### *Recreation*

Increasing recreational uses of this area are considered an opportunity.

## **Management**

Protection of the area resulted from a process instigated in the 1990s by farmers and nature associations, coincidental with an awareness of the recreational value of the area. It is now designated as a nature reserve (the Natural Park of Ljubljana) in the local land use planning schemes. An application for a Natura 2000 designation has been proposed recently.

The local administration is in charge of the implementation of the management, sustained by private and NGO proposals.

## **Assessment of the management**

Management seems to have had a positive effect on biodiversity maintenance, especially in the last decade.

Conservation is an effective management instrument to avoid urban developments. Farming developments and illegal settlements however are not as highly regulated.

## **Scenarios**

The sustainable scenario would stop the one-sided interventions and would aim to preserve the area for wildlife and unobtrusive human activities. It would also maintain the overall situation with an objective of slowly

increases biodiversity. Maintaining farming practices is of tremendous importance.

### **9.3.4 Thames basin potential Special Protected area**

#### **Territorial context**

The Thames Basin Heaths proposed Special Protected Area (pSPA), covers an area of 8,377 ha stretching across the three counties of Berkshire, Hampshire and Surrey in the South East of England.

The pSPA consists of a composite group of blocks of heath lands and conifer plantations. The surrounding land is predominantly made up of a mixture of pony paddocks and residential developments. It is bordered to the south by the A3 and A31 and intercepted by a number of B road links to Woking, Bracknell and Aldershot. There are also a number of river valleys cutting through the area including the Rivers Blackwater, Wey and Bourne.

A number of land use development plans apply to the area, the Regional Planning Guidance for the South East (RPG9), the Hampshire Structure Plan, the Berkshire Structure Plan and the Surrey Structure Plan, the latter of which is currently being produced. These plans propose 35,400 new dwellings in the mid term. Other strategic plans cover the area at county and local level, including waste and mineral plans, economic and transport plans, and rural strategies.

#### **State of Natural Heritage**

Over the past hundred years, the area has evolved from one composite block of open heath land to become a group of fragmented habitats inter-dispersed by residential development and associated infrastructure. Over one hundred years ago, the vast majority of the Thames Basin Heaths area was open heath land. The area was used for extensive forms of agriculture, such as low density grazing, which was slowly in filled by trees. Over the past fifty years pressure for residential development has increased which has resulted in a fragmentation of the heath land habitat.

The area is under a significant amount of development pressure due to its location within a number of urban centres such as Guildford, Woking and Bracknell and, in the wider context, from substantial demand for housing in the South East region.

The area is covered by a number of international and national designations.

Sites of international importance include the Thames Basin Heaths pSPA, two Candidate Special Areas for Conservation (cSAC), and two RAMSAR sites which exist towards the north east boundary of Surrey.

The Thames Basin Heaths pSPA is proposed for designation under the European Commission Directive 79/409 on the Conservation of Wild Birds (the Birds Directive). Planning Policy Guidance note 9 (PPG9) on Nature Conservation clarifies that for the purpose of considering development proposals affecting them, potential SPAs and candidate SACs should be treated in the same way as classified SPAs and designated SACs. National designations covering the area include a total of 13 individual Sites of Special Scientific Interest (SSSIs) and three National Nature Reserves (NNRs). PPG9, paragraph 13, clarifies that all NNRs, terrestrial RAMSAR sites, SPAs and SACs are also SSSIs under UK national legislation. PPG9 states that policies to be applied to key sites of nature conservation importance, such as SSSIs and SPAs, should reflect their relative significance, and place particular emphasis on the protection of internationally important sites. The site was formally confirmed as a pSPA in October 2000 because of its ornithological importance.

These species are characteristic of heath land habitats. The site also supports a wide range of other species associated with open habitats including Hobby, Little Ringed Plover, Woodcock, Redstart, Skylark, Stonechat, Tree Pipit and Yellowhammer.

## **Driving forces**

### *Urbanisation*

Residential developments and associated access and recreation infrastructures represent the main driving forces on natural heritage. Considering the provision for dwellings outlined in the regional and local plans, residential development will continue. Clearly residential setting is enhanced by the attractive landscape. The pSPA status with its very high protection results in settlement development restricted to the peripheries of the designated sites.

### *Economic development*

The designation restricts all forms of hard developments. In addition, land prices (which pSPA designation is likely to increase) restrain the development of economic areas, although economic development is likely to pose less of an indirect threat to the pSPA than residential. This is due to the fact that employment uses tend not to bring the pressures for access and recreation. For this reason, planning decisions may view certain forms of



economic development (e.g. knowledge-based) more favourably than residential use.

#### *Forestry and agriculture*

Management of the pSPA is increasingly affecting forestry through seeking rotational felling regimes. These practices are beneficial to species by ensuring the sustained availability of heath land habitats rather than being interrupted by continuous forestry systems.

The re-introduction of grazing is a target in SSSIs; it stimulates heath land re-growth and hence is beneficial to nesting birds.

#### **State of management**

Management of the Thames Basin pSPA includes protection through the planning system and working with landowners and/or occupiers. English Nature is the principal Agency involved.

#### *Protection through the planning system:*

The regional plan (RPG9) requires that local planning authorities take into account nature conservation interests when considering development proposals. English Nature is a statutory consultee in the planning process and provides advice to ensure supportive land use and sustainable development policies, but also on individual planning applications.

Regulation 48 of the Conservation Regulations 1994 provides a primary mechanism for safeguarding nature interest, requiring that any plan or project likely to have an effect on an European site is subject to an appropriate assessment to ascertain that it would not adversely affect the integrity of the site.

#### *Working with landowners and occupiers.*

Whilst there is no overall management strategy of the areas, there is an overarching objective for the pSPA which is consistent with its status as a European designation and with the PPG9 Nature conservation orientations. SSSIs were established under the National Parks and Access to the Countryside Act 1949 and have received strengthened protection through subsequent legislation, including the Wildlife and Countryside Acts 1981 and 1985, and the Countryside and Rights of Way (CROW) Act 2000, which places a general duty on public bodies to take reasonable steps to further the conservation and enhancement of the features for which a SSSI has been notified.

This legislation provides a legal duty for all owners and occupiers of SSSIs to maintain sites in a favourable condition. Each land unit is formally monitored by English Nature every 6 years. Management agreements are increasingly established by English Nature with site owners and/or occupiers. The agency is able to provide a 50% (and in special cases 100%) grant to assist with management practices necessary to bring land into a favourable condition.

'Soft mitigation' involves developing wider partnerships to bring a 'joined-up' solution to problems of conflicting land uses.

Finally, if the SSSIs are suffering from inappropriate management and a voluntary solution cannot be reached, English Nature is able to employ more formal legal methods which include management schemes, management notices, and voluntary or compulsory purchases of land.

### **Assessment**

The assessment of management is to be put in the context of the difficulty to appreciate the effects of the recent measures. Yet, evidence that bird numbers are holding over time suggests that management of pSPA is moving in the right direction. The strengthening of public bodies' obligations under the CROW Act, the increasing working partnerships undertaken by English Nature with landowners and occupiers resulting in developing forestry practices which provide time for species to populate an area, and the development of "soft mitigation" approaches certainly assist conservation and restoration of healthy habitats.

Furthermore, the existence of European designations, underpinned by powerful legislation, has provided an effective basis for English Nature's intervention in the planning system; yet, it tends to take place on a site by site basis rather than at the strategic planning level.

In addition, natural heritage management is weakened by difficulties in promoting a general understanding and commitment of common management objectives and practices to all relevant developers and planners.

However, the major limitation to ensuring effective and appropriate management focuses on resources. Unless costs are minimal, management practices will not be done.

### **9.3.5 The North Pas de Calais Region**

#### **Territorial context**

The North – Pas de Calais is at the crossroad of major communication infrastructures (Highways, HST) interlinking core-areas of the North-West European Region, one of the most densely occupied and wealthy regions of Europe in terms of core-areas sharing economic command functions and global gateways. Dominant land uses are urban areas and farming productions. Natural heritage is mostly remnant, concentrating on poor soils or slopes. The North/Pas de Calais territory is heterogeneous in terms of urban patterns and open space structures with areas under strong pressure and others depressed.

In the early 1970's, an integrated territorial development plan (OREAM), was produced which mainly focused on economic issues, but also enhanced, as an objective, the "protection of natural equilibrium, natural spaces and landscapes" as an economic asset.

A new plan covering the whole Region (the SRADT) is presently under elaboration. It will guide local policies, and ensure local decisions are in-line with the plan orientations. At this stage, the priorities and objectives have been defined. Environment enhancement is a major concern, and the orientations for Natural Heritage policies are set up in one framework called "Trame Verte Régionale" (The region's "green" network).

#### **State of Natural Heritage**

The Region's natural heritage is composed of semi-natural and natural land use classes: meadows and "bocages", heath land, cliffs, sand dunes and rocks, woodlands, wetlands.

The region has 318 areas have been defined as natural areas of ecological, floral and faunal interest (ZNIEFF) corresponding to high biodiversity value ecosystems: coastal, wetlands, rivers, meadows and "bocages" and slag heap ecosystems. The Natura 2000 sites under study would likely to overlap the ZNIEFFs but are much reduced at this time with only 19 sites.

The ecosystems are mostly remnants, highly fragmented and under severe pollutions and development pressures. There are a few true natural ecosystems without management or significative use (spontaneous woodlands, wet and maritime ecosystems): most of the natural heritage is maintained by farming practices or site management. High biodiversity value ecosystems often relate to extensive breeding.

## **Driving forces**

### *Urbanisation*

The region presents a diversity of urban patterns from highly agglomerated urban areas to dispersed rural settlements and from a compact polycentric small cities pattern to a polycentric linear cities pattern. The urban structures result from the combination of the following factors: initial settlement pattern and past industrial development, present economic development dynamism and position as regard to growth centres and infrastructures, development in farming and level of protection of open spaces and landscapes.

Yet, the current spatial trends are urban sprawl polarising around 23 centre towns and a significant difference in growth from one polarised urban area to another, in relation to the attractiveness of the centre towns in terms of accessibility and services to the population. From 1990 to 1998 new urban extensions (urbanisation of semi-natural land use classes) appear in the metropolis region and in southern direction towards Paris, in the rural east of the region (with probable concentration around an area with forest due to its attractiveness) and along the coast (mainly retro-littoral due to legal natural constraints).

The national statistical institute perspectives up to 2030 show a concentration of the population in major cities; to examine Lille, where urban sprawl will continue to meet housing and economic development requirements. In addition, a more intense recreational use of the open spaces is anticipated.

### *Infrastructures*

In the 1970's, new infrastructures (highways, waterways, ports) were developed in order to stimulate economic developments. Thirty years later, the post-evaluation of the OREAM vision underlines that in terms of infrastructure only highways were achieved and their positive impact on economic development quite uncertain a surely non equal over the territory, whilst impact on natural heritage is high in terms of destruction, spatial fragmentation and pollutions.

For various reasons, such as a reactive response to congestion on roads and improvement of the accessibility of major cities, the current trend is to continue developing road infrastructures.

### *Agriculture*

Farming systems are predominantly intensive and industrial with simplified landscapes (open fields), although the Region counts two territories with extensive farming. Intensive farming practices widely occupy lands, degrade soils and cause severe diffuse nitrogen and biocides contaminations. There is a reduction of the number of farms and growth in size with intensification, while non profitable estates are abandoned. These trends will probably intensify in a global open market, in spite of efforts focused on financially sustaining organic farming, habitat management and water management. It is non probable that public funding will cope with market trends in order to maintain all sensitive agro-dependant ecosystems and to ensure soils and water resources protection.

### **Management**

The management of natural heritage relies on various tools including statutory protections (resulting from Nature protection Laws and to some extent enforced by local planning schemes), public land purchase mechanisms and contractual protections. It is also integrated in territorial development strategies.

#### *Specific tools:*

Statutory protection concerns 18 700 ha; most of the concerned sites were designated after the 1970s as a result of increasing environmental concerns. The French legislation sets mechanisms allowing public authorities to purchase land in semi-natural areas for the purpose of their protection and valorisation, including pre-emptive. In the North Pas de Calais Region, the Sensitive natural areas policy and the coast protection policy of the Conservatoire du Littoral stimulated the purchase of land. In total 3200 ha have been purchased.

Contractual protection results from the will of regional authorities and the responsible municipalities to protect a large area with high natural qualities and to take measures to enhance them. These protected areas form the "Regional Natural Parks". The North/pas de Calais counts three regional parks covering 3600 km<sup>2</sup>.

#### *Territorial development strategies:*

At national level, natural management is part of the scope of the "Schema National de Services Collectifs Espaces Naturels et ruraux", which defines the objectives for all regional and local planning. Local strategies include

more and more measures (such as creation of a specific organisation, financial means), actions in favour of natural heritage conservation, valorisation and networking.

### **Assessment**

The management of high value natural heritage is effective, the targets are clearly defined and management measures, mainly protective, rest on legal obligations.

Management of "ordinary" natural heritage is less efficient, because it relies on local commitment to enhance protection and valorisation (through land use plans). At the local level, the strategies will depend very much on the economic and social needs. For example, in economically depressed areas, local strategies focus on economic development. Even if protection of the natural spaces and landscapes is integrated in the plans, it does not have priority to urban extensions. In areas densely inhabited, such as the Lille agglomeration, the concern is primarily to meet the recreational demand of the population. Protection, restoring, valorising and networking are secondary aims.

The management of farming impacts is very limited and there are today no solutions to control urban sprawl.

### **9.3.6 Lanzarote Island**

#### **Territorial context**

The Lanzarote Island (840 km<sup>2</sup>) is considered as an ultra peripheral territory of Europe. The canary island was an inhabited island with very limited resources before tourism and residential economy arose. It benefits from an integrated development strategy including spatial planning measures and a network of protected areas.

#### **State of natural heritage**

Due to its insular and volcanic nature, the island benefits from unique landscapes and unique endemic ecosystems. Today the island seems to reach the upper limits of its settlement and recreational capacity.

Landscapes are vastly evolving, especially on the coast where protections are weaker.

#### **State of the management**

Since 1974, 13 protected semi-natural areas have been designated at Spanish level. They represent more than 40% of the island. The entire island

has been then designated as a UNESCO Biosphere reserve under the Man and Biosphere programme. The island is concerned with the EU Habitat and Bird directives. All level designations are translated into the local planning schemes.

An observatory is dedicated to monitor the environmental quality of the island.

Significant conflicts appeared between residents and tourists, islanders and peninsular Spanish, African and Spanish.

There is an integrated development plan for the entire island. The Territorial Plan for Lanzarote promotes since 1991 a development based on the environmental carrying capacity of the island, what is unique in Spain. Beyond nature conservation programs, it tries to control urban and tourism developments, mainly through land use planning, conservation programmes and access control of the core natural zones.

It is implemented by the island authority (government of the autonomous community), by local authorities, by various administrations and to some extent by associations.

The high level of local participation and the carrying capacity development strategy can be considered as elements of best practice.

### **Driving forces of natural heritage evolution**

The island is under tremendous pressure of tourism and residential development. From 1986 to 2001, resident population grew from 57000 to 111000. About 2 million tourists annually visit the island.

In a few years, it has radically modified human/nature relationship, transformed the socioeconomic structure and the landscapes of the island.

Continued growth along this path is expected to be the major change factor over the next years.

As the island has very limited resources, the natural asset of the island is a keystone for the tourism-based local economy. Conservation is regarded as essential and the management can be considered as an important counter-driving force.

### *Interactions management/development*

Pressure and outstanding natural heritage have induced nature protections, once again illustrating the relationship between pressure and protection.

Farming practices have almost disappeared, but the role of nature protection schemes is unclear. Environmental quality labels have developed.

The protection has favoured in some way tourism growth because of the environmental recognition provided by the designations. Eco-tourism forms are being developed.

New roads design has taken into account ecological impacts. Protection seems to have concentrated urbanisation on the coast which are there of lesser ecological value. This is contradictory with integrated coastal management schemes.

### **Assessment of the management**

The Territorial Plan has been effective to some degree. It has been modified to raise upper limits on development capacity.

Management objectives confront strong economic interests and management measures are to some extent not corresponding to the objectives. Protection measures are insufficient: they do not act on the social and economic factors of degradations. The strategy alone cannot meet all the complex development issues.

European directives are implemented by 50% of the local authorities. The reason for the non implementation is not clear at this stage of the study.

The management are critical for achieving the ESDP objectives: sustainable and endogen development of the island.

### **Scenarios (provisional)**

Sustainable development does not depend so much on existing protections which are today respected, but rather on complement measures addressing socioeconomic dimensions.

The contributor provides an integrated scenario attempt. The interest is that development objectives are based on tangible set of quantitative indicators, what make current trends and sustainable scenarios comparable and what make possible to balance decision.

## **9.3.7 The Rondane region**

### **Territorial context**

The Rondane region is situated in between the 2 most populated areas of Norway: the south-eastern part of the country (46% of the total population) which includes the capital Oslo, and the Sor-Trondelag region. Good communication structures (railway, roads, and airport) make it easily accessible and particularly attractive to tourists.



The core of the region is inhabited alpine land. Extensive farming is found in the valleys and second homes develop at the fringe of the region.

### **State of the natural heritage**

The Rondane-Dovrefjell region bears a complete high mountain ecosystem, deciduous forest and summer farming landscapes in the lower valleys. The genetic conservation of the last remnants of the original wild European mountain reindeer was the reason for the establishment of national park.

### **Driving forces**

Farming decline due to lower prices on agricultural products and reductions in support to peripheral areas increase the pressure on farmers to find new ways of exploiting their land. Farmers have been selling plots for private cabins. A few commercial hunting packages have been set up. Cabins and hunting may cause more disturbances on the wild reindeer.

In the last decades the wild reindeer living area (defined as wilderness area) is gradually reduced and fragmented by outdoor recreation and infrastructures for tourism. It has caused the managers to reduce the herd in order to avoid over-grazing.

Keeping the migration routes free from developments is of major importance but complicated: due to the landscape and topography, trails often follows the same passages as migration routes.

Forestry practices (roads, management) are sometimes conflicting with nature conservation.

Climate changes have been observed (development of red fox populations, detrimental to the protected white fox).

### **Management**

The Nature Conservation Act provides the means for protecting semi-natural areas; the Rondane region is to a large extent protected as National Parks (The Rondane National Park, 1962, 963km<sup>2</sup>, and the Dovre National Park, 2002, 294km<sup>2</sup>), as protected landscapes (located at the fringe or between the national parks; major changes are not allowed) and as nature reserves (strict conservation; about 20km<sup>2</sup> are concerned). The Rondane National Park has been initiated by local community initiative.

The Planning and Building Act provides the framework for the management outside the protected areas; it rests on the municipalities who decide on legal binding land use plans. Local areas in the vicinity of urban settlements

allow for endogenous development. The Agriculture and Forests Acts may limit or steer agriculture and forestry.

The overall area is ruled by the Partial County Plan of the Rondane region, revised in 200, aiming at a balanced development.

Tourism is essential to the economy of the region. One aim of the Partial County Plan is to avoid disturbances by carefully designing tracks.

### **Assessment of the management**

The management is quite efficient, though it does not prevent all disturbances of outdoor recreation. The wild reindeer population is quite stable from the 1960s. In the last decade the wild reindeer seems to have re-established in an adjacent area. Local interest for the wild reindeer has been a major force for achieving these results.

### **Scenario**

Under current developments trends, the wilderness area progressively shorten and the mountainous ecosystems face a climatic evolution with uncertain results (warming in the short term and possible cooling in the mid to long term).

The lowering of farming products in an open world market is the major threat for the wilderness area (apparent paradox), as it forces farmers to look for other incomes (tourism and sale of plots for cabins).

The sustainable scenario is primarily based on the hypothesis that farming products prices sustain farming practices, notably by means of an inclusion of the social and ecological costs in the products prices. Second, tourism and secondary home economy are sustained but adapted: cabins development are stopped, effective means control the access by car and trails are redirected outside the wilderness area.

## 9.4 Findings per case study

Case studies	Reasons for protection		Management assessment	
	Protected quality	Threatening force	Effectiveness	Consistency with national and European regulations, ESDP objectives
<b>Nord-Pas de Calais</b>	Heterogeneous region under development pressure, with remnant nature and open landscape, wants to re-create natural features	Urbanisation in different forms in different sub-regions. Agricultural intensification and abandonment, pollution and fragmentation	Less natural heritage is consumed. Relation to agriculture is weak. Depending on local commitment.	Urban and economic policies integrate environmental issues, but local focus dominates. Less coherence with infrastructure and agriculture policies.
<b>Borsodi</b>	Puszta landscape with high biodiversity of flora and fauna under threat.	Agricultural extensification/abandonment , but also some intensification	Agri-environmental incentive schemes seem to offer suitable solution.	Consistent was national and European legislation.
<b>Vallombrosa</b>	Protection was historically legally obliged for state forests, aiming at wood production. Developed into bio genetic conservation and cultural heritage protection.	Actual pressure is from tourism. Unmanaged fauna development is considered to become a problem.	Effective, although tourist management and fauna management may give problems. Financial difficulties to full fill obligations.	Relates to habitat directive. Substantial consistent with EU regulations and ESDP objectives of sustainable management development of bio diversity and support local cultural heritage.
<b>Ljubljana</b>	Natural reserve, specific bird species, landscape	Artificial water management for agri culture and levelling the area with coal residue. Now urbanisation, infrastructure.	Specific management plan not yet ready. Harmonisation needed with spatial plans for urban and agricultural development.	Applied to Natura 2000, relate to EU conventions and national Acts.
<b>Thames Basin</b>	Coherence heather/forest landscape	Residential development, housing is attracted by landscape qualities.	Bird numbers illustrate effectiveness. Insufficient overall strategy may be enhanced in regional planning. Difficulties in harmonising with local spatial planning.	Habitats directive and English nature together are effective basis.
<b>Rondane national park</b>	Genetic uniqueness of wild reindeer, protection requires large areas and migration trails connecting them. Now also natural science and cultural history.	Agriculture extensification and abandonment created touristic pressure: hunting and cabins, climate change reduces areas	Designation as national park, protected landscapes as well as regional spatial plan seems effective. No specific management plan ready.	No relation to EU directives, or ESDP objectives.
<b>Lanzarote</b>	UNESCO biosphere Reserve. Protected are 40% of island, habitats, species, and geomorphologic features.	Tourism and related urbanisation (population doubled in 1986-2001).	13 Protected areas under different designations. Growth control/limits to urbanisation have lead to concentrated development.	EU NH management is broadly implemented. ESDP objective of sustainable polycentric development broadly met.

## 9.5 Findings per topic

### 9.5.1 Agriculture

Agricultural practices largely influences natural heritage and is perceived as a major issue for the future.

In both cases, the Rondane mountain region and the Forest of Vallombrosa, the protected sites are surrounded by environment friendly agricultural practices linked to the physical characteristics of the mountainous or hilly regions. This land use helps preventing urbanisation spreading up to the limits of the protected sites. The issue clearly reported lays in maintaining these "buffers". In the Rondane region is reported a decrease of the agricultural activity (non viable) and a transfer to tourism facilities (plots for cabins and second homes). It is not quite the case for the site of Vallombrosa as now; however the concern is current and at stake is the question how to ensure that if present land uses cannot be maintained, the changes of land use around protected sites will not destroy landscapes and produce negative impacts on these sites.

In both cases, the developing activity is tourism and to some extent residential settlements (second homes). The issue is not only to manage land re-use, but also to manage "visitors" activities. In the case of the Vallombrosa forest it is a major objective of their management plan. In the Thames Basin case study, it is reported that natural sites are extremely attractive for residential areas because of the recreation offer of the protected sites. Access and recreation are real pressures on nature. This results in reconsidering the strategic spatial development. Economic activities (knowledge based) are considered to be favourable rather than residential land uses.

In most cases, farmland is part of the natural heritage. Although, if intensive agriculture coincides with low biodiversity, also high natural values of other farmlands are acknowledged. These currently include extensive agriculture with environment friendly practices; they largely contribute to the diversity of landscapes and to maintaining biodiversity. If they remain unprotected they are clearly threatened by agricultural changes.

The Borsodi – Mesoseg case combines both phenomena: intensification and abandonment of low productive farmlands endangers the semi-natural habitats and cultural landscapes of the area.

In the Nord-Pas de Calais, the Thiérache rural area known for its "bocage" landscapes and their habitats is economically depressed. Traditional

agricultural practices (cattle grazing, which shaped the “bocage” landscape) is abandoned since it is not economically viable.

Globally, the agricultural activities are strongly influenced by the world market prices and the WTO-agreement. The trend is not in favour of extensive and/or environment friendly agriculture. In the EU, the CAP can provide support to better agricultural practices. But, it clearly requires elaborating policies under pillar two in order to influence national policies.

As for now, where high nature value farmland is abandoned, the issue is to ensure that the change of use does not jeopardize the natural heritage. In the EU15 countries case studies and Norway, second home settlements and tourism development generally “replace” agricultural activities in such areas. This underlines the need for integrated development strategies.

### **9.5.2 Urbanisation**

All case studies report about the pressure of urbanisation on natural heritage. Urban development results from the past and current economic development and associated human activities as well as the increasing demand of tourism and recreation facilities.

Specific attention is needed on the issue of major infrastructure (EU network) which definitively have an important influence on nature heritage since creating more than direct fragmentation but real multi modal corridors and thus irreversible barriers between parts of the ecosystem.

This is illustrated by the case of the Nord-Pas de Calais, where motorways, canals and HST have built infrastructure corridors, in the crossing of the corridor from the Ile de France region to Amsterdam and from London to Brussels.

The case is relevant in the way the concern for coherence in the ecological network is taken up in planning and building infrastructure. Ecological corridors corridors are built with, under and/or over infrastructure passages, aiming at maintaining certain continuity in the network of semi-natural areas.

This approach has been strongly sustained by increasing protection legislation (Loi littoral, laws constraining to have environment impact assessment with compensatory measures before realising any major infrastructure - ref. Code de l’Environnement) on the one hand, and the financial context of major infrastructures building (concession) on the other. Although it is difficult to say to which extent these actions are effective, the

development of interesting ecosystems is reported. No scientific reliable evaluation is available yet.

Beside this point of major infrastructure, urbanisation (residential, industrial areas and regional/local infrastructure) is the major driving force in the regions under pressure of economic development. The general trend reported at macro and meso level showing the historical evolution of urbanisation and the present tendency of increasing concentration of activities and population in areas of major cities and in coastal areas is confirmed by case studies (Nord – Pas de Calais, Thames Basin, Ljubljana marshland and to some extent the Vallombrosa Forest). However, case studies show the diversity of the causes and/or consequences of urban pressure, as well as the diversity resulting from the past development, the physical characteristics and the management systems.

The physical characteristics of the Rondane mountain region and of the Vallombrosa forest have contributed to preserving the natural heritage, urbanisation developing preferably in the valleys and plains. To some extent, the risks of river floodings contributed to contain urban sprawl, such as reported in both central Europe case studies.

Both, Thames Basin and the Lille agglomeration and coal mining area of the region Nord-Pas de Calais, manage remnant natural sites and in the French case major industrial brownfields recovered by nature.

The management system of the natural heritage in these case studies, appear to be the driving force in preserving the heritage.

In the case of the Thames Basin, the natural sites are protected by nature protection regulations and the major concern is preserving the sites from impacts due to their access and recreation use, and maintaining standards of habitats. The integration of natural heritage in spatial planning and project implementation is a rather recent development.

In the Region Nord-Pas de Calais, some sites are strongly protected by national regulations (example: coast line, Regional Parks). Yet, for most of the natural heritage, its preservation depends on local (municipalities mainly) planning policies, which respect the national legislation integrating the preservation of natural heritage. Globally, this system works well.

Yet, in the areas under strong urban pressure, authorities have elaborated a planned network of the natural sites (La Trame Verte).

In the Central Europe case studies, where economic development is a major issue, it appears to be addressed in a way that is not to the detriment of natural and cultural heritage. The Ljubljana marshland is in a process to be designated for protection since the 1990's. This started by farmers and

nature associations, resulting in having the marshland designated as nature reserve in local land use plans, as well as being proposed for Natura 2000. In the Hungarian case, the situation is different: the rural region is economically depressed and the main issue is to ensure that local economy (through diversification and production in high added value activities) generate sufficient income in relation to appropriate living standards in order to retain population. The development strategy has been elaborated by local authorities together with state organisation, private business and nature associations grouped in the Cotkény Subregional Development Association created in 1995 an innovated a process by placing natural and ecological resources as foundation of the plan.

Recreational use of natural sites is becoming a major concern. Perceived as an opportunity in some cases (Ljubljana marshland), as an evolution to revolve in others (Thames Basin), the concern is to manage visitors and their activities. This issue is reported to be a priority not only for protected sites (Thames Basin, Forest of Vallombrosa), but also in unprotected high value nature lands (Rondane mountain region).

A similar concern is there for areas under tourism development. The Lanzarote case study is a relevant example for the confrontation of natural heritage preservation and economic interest. In spite of protection measures on specific sites and the awareness that the island's economy is based on tourism, rests precisely on the value of this site, the effectiveness of protecting and managing natural heritage is relevant to only a certain degree. Protection measures (which are respected) appear insufficient with regards to touristy activities and residential developments.

## **9.6 Nature: an asset for development**

Natural values are assets for development in different ways in the case study areas.

Nature is an asset for touristy developments in the case of Lanzarote Island (which from inhabited island has become an international holiday destination); but, also in areas such as The Rondane mountain region where plots are sold, the Ljubljana marshland, the forest of Vallombrosa, where the natural sites offer a range of recreational activities.

Nature is also considered as an asset for settlements. The Thames Basin case report confirms that the proximity and access to natural sites influence residential settlements. In the Nord-Pas de Calais, recognising nature as a condition for development has led authorities to focus on preserving natural

sites in the densely urbanised Lille agglomeration and coal mining areas, but also restoring or creating new sites (Parc de la Deule).

None of the case studies clearly mentioned natural heritage as an asset for attracting new economic activities, except for Vallombrosa where conference and meeting facilities are envisaged.

The Hungarian case study mentions diversifying local economy in favour of high added value production in order to increase the income generated in the region. Since the protection of the area and its' "use according to its' high nature value" is considered as the main management objective, promoting environment friendly economic activities may result.

Except for the Hungarian case, considering natural heritage as an assets does not necessarily leads to placing natural heritage as the prior driving force when elaborating development strategies. It probably influences decisions especially in prosperous areas under pressure to finance management measures in favour of natural heritage preservation and/or restoration. In areas economically depressed, natural heritage, even if considered as an asset is confronted with socio-economic priorities.

Quite noticeable is that several cases report the influence of climate change: Vallombrosa and Rondane.

## **9.7 Conclusions**

### **9.7.1 Spatial patterns**

Considering the seven case study areas that have been selected partly for their diversity, allows for some conclusions. Acknowledging that representation was not a criterion for their selection, the information gathered in the case studies; anyhow refine the knowledge in an illustrative but anecdotic way.

- The case studies demonstrate the large variety of valued natural heritage, forces that threaten them, social-economic and cultural contexts in which the management has to be carried out and the variety of legal possibilities.
- The small number of case studies does not allow for an analysis on the effectiveness relating management aspects and the characteristics of the context.
- The importance of local mixes of relevant aspects requires regional specific approaches of the management of the natural heritage. Within given legislative frameworks, all relevant socio-economic and

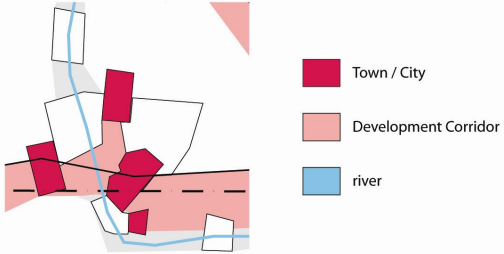



ecologic/environmental aspects should be balanced on the regional level, when preparing decisions on future developments.

- The protective orientation of the management of the natural heritage is in many cases extended to the regional cultural heritage.
- The protective orientation of the management of the natural heritage does not include the application of nature as an asset for economic developments.

The above leads to a regional typology at the micro scale as depicted in figure 20 below.

**Figure 20 Regional typology at the micro scale**

Site related to urban area	Site related to nature / environment
<ul style="list-style-type: none"> <li>- In or close to MEGA</li> <li>- In or close to FUA</li> <li>- Rural area outside FUA</li> <li>- Old industrial site</li> </ul>	<ul style="list-style-type: none"> <li>- (Protected) semi-natural area or cultural landscape</li> <li>- Open space with low or mediocre natural value</li> </ul>
	

### 9.7.2 Management

The case studies demonstrate that the management of natural heritage has a “defensive” orientation. All case studies are examples of the profusion of legal measures protecting natural heritage and landscapes. In fact, this diversity of protection mechanisms could provide an interesting source in building a “common culture” of natural heritage management, foundation for more harmonisation in natural heritage management, working towards management of natural heritage at EU scale. Today, the “common culture” seems to be the compliance to the EU regulations for EU members.

Pro-active management generally consists of limited actions of “maintaining” natural heritage. Stronger pro-active measures such as land purchase by public authorities, preservation and/or restoration interventions are still scarce. The resources dedicated to natural heritage management which are reported as quite insufficient to meet the targeted standards seem to be the

main reason. In some cases – for instance the Vallombrosa forest- funds are provided only by the national budget, others benefit from regional funds; yet most of the funding rests on the local level, municipalities and/or the site itself (income provided by visitors of parks).

The case studies underline the growing awareness of all actors of the need for active management of natural heritage. All show that at least at local level, management of natural heritage is integrated in their local policies and territorial strategies. More integration at higher level (regional and national) could be reached but above all it appears that management of natural heritage requires to be more taken into consideration when deciding about specific sectoral policies, such as tourism development and agricultural orientations. All case studies pin point the past and future impacts of agricultural policies.

Protection measures and management plans are reported to be respected and to meet targets, although not all cases assess post evaluation processes or monitoring systems. Yet, effectiveness is said “to a certain degree”. Next to the insufficient finances dedicated to natural heritage management, difficulties in elaborating strategies that integrate the different complex driving forces are widely acknowledged. No doubt, choices have to be made between competing interests. A balanced sustainable development requires an integrative approach on the regional level.

### **9.7.3 Monitoring**

Relevance of indicators:

- The overview of forces, threatening the natural heritage as expressed in socio-economic and agricultural indicators confirms the relevance of the indicators used in the analytical chapters 7 and 8.
- Although wider checking may conclude in some modification, the composed indicator ‘urban pressure’ seems applicable.
- The application of agricultural indicators, distinguishing between intensification and extensification with regard to spatial development, should also be elaborated.



## **10 Nature as an asset for economic development**

### **10.1 Introduction**

The thematic scope and context of this ESPON project has been described in the terms of reference, respectively emphasising the following items:

The recognition and valorisation of natural networks and individual natural assets in integrated development strategies;

Landscape, being a basic component of the natural and cultural heritage and promoting European identity, is an important part of quality of life;

Natural heritage is increasingly considered an asset and a development potential in the economic development of cities and larger territories. Locations of new investments are increasingly taking the qualities of surrounding areas, such as access to beautiful landscapes and sites into account. The management approach should integrate natural heritage in the development of territories.

When discussing the role of nature as an asset for economic development, it should initially be noted that spatial developments in the past were strongly related to the natural conditions in a region. Chapter 4, which outlined long-term spatial developments, refers to agriculture, mining and water related land uses that have been drivers for historic developments. These factors hardly apply to modern developments in which accessibility and social and fiscal conditions are more pertinent. The dominance of service industries makes economic activities more foot-loose. This consequently is increasingly enhanced by the new tools ICT-developments are providing.

As a result, the decisive factors for selecting new sites for economic activities are becoming increasingly similar to those for choosing sites for residential uses. Attractive locations are those where quality of life is assured.

Important attributes of the surrounding environment of dwellings are:

- safe surroundings;
- healthy environment;
- accessible site;
- sufficient level of services and amenities;
- cultural activities;
- identity of place.

Clearly, the priorities of mixes of these characteristics may differ according to individual and cultural preferences.

The assumed importance of those qualities of the environment is clearly expressed when examining the leaflets by which cities promote themselves in order to attract citizens and economic activities.

It seems quite obvious that easy access to beautiful landscapes and sites during leisure time are important aspects of an area's attractiveness. However, questions surrounding the relative importance of the natural heritage, in the sense of aspects of biodiversity and specific natural features, are less simply answered.

## **10.2 Economic values of landscapes**

Nature undoubtedly is an asset for economic activities that are directly related to landscapes. When landscape is understood (according to the European Landscape Convention) as a contributor to the formation of local culture, being a basic component of European natural and cultural heritage and promoting the consolidation of European identity, then it is clear that 'landscape' is a much wider concept than natural heritage.

A direct relation between economic activities and landscape is particularly apparent in tourist activities and in those (agricultural) activities that concentrate on the production of regional products.

The economic value of the landscape for tourism-related turnover is, although difficult to separate from economic value of the cultural aspects of the landscape, significant.

The most important tourist destinations of Europe can be described as mixes of beautiful scenery and specific cultures. The combination of summer

climatic conditions with the attractive beaches and cliffs of the Mediterranean coast and its cities forms an exceptional asset for the attraction of millions of international visitors.

The combination of winter snow and the mountainous areas of the Alps offer contrasting but exceptional assets for the attraction of millions of visitors.

The tourist industry tends to develop and increase in turnover, following innovations in leisure attractions.

Those activities that focus on the production of regional agricultural products have historically centred on cheese and wine industries. Now more wines and cheeses are being developed, often related to historic traditions. However, additional sectors are also being included, such as specific types of hams, sausages or vegetables which are being promoted within a rich context of regional cultures.

Economic values are related to images of traditional healthy environments. These environments, fitting in landscapes with characteristic identities, are mixtures of aspects of cultural and natural heritages.

Again, it is not simple to separate the influence of the natural heritage on the economic value of the landscape.

### **10.3 Socio economic benefits of Natura 2000**

The background report for the European conference on promoting the socio economic benefits of Natura 2000<sup>73</sup>, states that bio diversity protection is often perceived as implying costs or restrictions to local people and local economies. But in reality Natura 2000 sites can offer significant economic and social benefits. A broad appreciation of the full range of benefits, concerns and trade offs, can lead to the identification of how a Natura 2000 site can become a driver for sustainable development of the local community. The study further notices<sup>74</sup> that the benefits overall are very significant. In terms of jobs, the current estimate is 125 000 FTE (paid jobs in the EU). This translates in economic investment and the value added of the sector into billions of Euros. The estimates include rural tourism spending, employment, leisure, promoting natural culture heritage, educational activities.

---

<sup>73</sup> November 28-29, 2000 (WWF/EEP)

<sup>74</sup> November 28-29, 2000 (WWF/EEP), page 6

The case studies presented do not show examples of attracting new economic activities in the surroundings of the protected areas.

#### **10.4 American experiences**

Studies examining the economic value of the natural heritage in the United States are presented by the American Wilderness Society.

The experiences in the USA, based on the 1964 Wilderness Act, may be helpful with regard to this subject. The Wilderness Act established the National Wilderness Preservation system, comprising 644 designated areas totalling up to 105 million acres. The 40 year old Act states that "certain areas should be protected in their natural condition for the American people of present and future generations to secure benefits of enduring resources of wilderness". Studies were carried out in order to identify the economic impacts of wilderness area designations, as well as management decisions regarding the protection of other federal lands. It should be acknowledged that the wilderness protection and the economic benefits that resulted from its designation came instead of earlier utilisation of the areas and their associated economic benefits (e.g. logging, mining and motorised access).

In order to estimate the economic impacts, direct use benefits are distinguished from community impacts, scientific benefits, educational benefits, biodiversity, benefits, ecological service benefits and passive use benefits.

The economic benefits have been calculated in a study on the 5.5 million acre Sierra Nevada region, made available by the Wilderness Society.

The economic benefits of Wildlands in the Eastern Sierra Nevada Region in California result from extensive recreation uses, in addition to providing opportunities for scientific research and education and generating extensive off-site benefits and passive values. The total economic effect is estimated by Robert B. Richardson of the Department of Agricultural and Resource Economics, Colorado State University as benefiting and supporting more than 2800 jobs and generating 700 million US Dollars per year. This estimate is considered conservative because it does not include values for benefits for which no economic valuation method exists.

Among the community impacts, expenditure is made by visitors. In addition, Moisey and Yan<sup>75</sup> reported that the recreational and environmental

---

<sup>75</sup> Moisey and Yan, 1992

amenities of wilderness and other semi-natural areas contribute to the quality of life of nearby residents and attract new residents, retirees and firms who wish to locate near such places.

Rudzitis<sup>76</sup> found that “among the fastest growing counties in the nation are those adjacent to federally designated areas”. 45% of long time residents and 60% of recent migrants to counties containing designated wilderness areas indicated that wilderness is an important reason for living there.

Rasker<sup>77</sup> found that entrepreneurs cite quality of life factors over business climate factors (such as cheap labour, low taxes, lax environmental standards) as reasons for locating and keeping their business near public protected land<sup>78</sup>. The Wilderness Society reported about the enhancement of values of properties as reflected in land prices, as a consequence of the proximity to wilderness<sup>79</sup>. This report was based on an economic study that focuses on enhanced property values on lands surrounding the Green Mountains National Forest in Vermont.<sup>80</sup> The study demonstrates that people are willing to pay more for residential property when that property is closer to designated wilderness, and that the presence of wilderness areas boosts property values in the town.

Although those American studies are focused on the economic aspects of designated areas with acknowledged natural heritage, it is not easy to identify the effect of the natural heritage itself, as separate from the influence of landscape – scenery.

Nevertheless, these recent studies indicate mechanisms that might also apply to Europe. However, more focused studies should be conducted to answer the question on the value of natural heritage in attracting economic activity.

---

<sup>76</sup> Rudzitis et al.,1991

<sup>77</sup> Rasker, 1994

<sup>78</sup> Power 1996, Florida 2000

<sup>79</sup> The Economic Benefits of Wilderness: Focus on Property Value Enhancement. In: Science & Policy brief, The Wilderness Society, March 2004 (2)

<sup>80</sup> Phillips, 2004



## 10.5 Innovations and location

The Lisbon and Göteborg strategies aim to make Europe the most competitive region for (sustainable) knowledge based economic activities and to promote economic innovation. The main focus of the innovative activities is on the development of new high technologies and the improvement of conditions that facilitate those developments. Innovation not only includes activities with regard to high-tech research and development but also the other economic sectors like agriculture and tourism. Tourism has developed into the most important economic activity in Europe. The activities related to leisure, travelling and long stay facilities are numerous and provide jobs. Europe offers a large diversity of tourism activities. Innovations in that sector consist of developing new activities, new experiences, new sites and new ways to enjoy them. In addition, the economies connected to modern cultural activities during leisure time of different generations are increasing. The innovative culture of experience and excitement is of growing importance.

Some types of innovative developments may be related to urban centres, while others can be related to more remote places like the islands of the Mediterranean region or inland areas such as the mountainous regions. The Alpine region also offers attractive locations to settle. The objective of polycentricity of the ESDP argues for the distribution of economic activities in regions outside the Pentagon.

The European Trend Chart on Innovation<sup>81</sup> presents regional innovation performances. With regard to the location of best performing regions, the score board confirms that best innovation performers are located in the main (capital) city's regions as well as in less urbanised regions. The high ranking of Swedish and Finish regions, partly related to their capital cities is apparent.

The question on whether natural heritage is an asset for economic innovation cannot be answered on the basis of the information of the European Trend Chart on Innovation. Although no evidence exists for causal relations, it can be noticed that best performers are located in Boreal areas with relatively low urbanisation in a forest dominated environment.

Next to innovation for which the European Union has developed dedicated programs, creativity is increasingly recognised as a driving force for

---

<sup>81</sup> EC Enterprise directorate General, 2002

innovation and the resultant economic growth. The ability to compete and prosper in the global economy goes beyond technology, trade in goods and services, and flows of capital and investment but, according to authors like Richard Florida, is also dependant on new creative applications. He identifies the importance of the creative class of cities and regions.<sup>82</sup>

The creative class is attracted by an attractive medium, which for some is a high metropolitan environment, whereas for others are a healthy and green environment where one can enjoy the tranquillity. For entrepreneurs, the attractiveness of the environment could represent one of the aspects that play a role in the decision about the settlement of an organisation.

The non-pronounced aspect of creativity is difficult to measure. Research generally focuses on the traditional (spatial) economic factors, such as accessibility, availability of workforce, costs of the site, and so on. Richard Florida developed an index for creativity, which ranks countries. Table 27 shows the results for the EU14 (without Luxembourg).<sup>83</sup>

**Table 27 The Euro-Creativity Index**

Rank	Score	Talent Index			Technology Index			Tolerance Index		
		Creative Class	Human Capital	Scientific Talent	Innovation	High Tech Inno	R&D	Attitudes	Values	Self Express
Sw	0,81	8	7	2	2	3	1	2	1	1
F	0,72	4	6	1	4	2	2	3	5	10
Nl	0,67	3	2	10	6	4	8	5	4	2
Dk	0,58	9	15	4	5	5	6	7	3	3
De	0,57	11	4	7	3	6	4	12	2	9
Be	0,53	2	8	6	7	9	7	13	8	8
UK	0,52	5	3	8	9	6	9	8	9	6
F	0,46	n.a.	11	5	10	8	5	11	7	11
Au	0,42	12	14	11	8	10	0	9	10	5
Ie	0,37	6	10	9	11	12	1	5	15	7
E	0,37	10	4	12	13	13	3	1	12	14
It	0,34	13	12	13	12	11	2	4	11	12
Gr	0,31	7	9	15	14	14	5	14	6	13
P	0,19	14	13	14	15	15	4	9	14	15

Source: R. Florida, Europe in the creative age, February 2004

<sup>82</sup> Florida, 2002; Florida, 2004

<sup>83</sup> Florida, 2004

The Euro-Talent Index is based upon three indicators: the creative class, human capital and scientific talent.<sup>84</sup>

It can be seen that the top three countries with the most creative media, Sweden, Finland and the Netherlands, are all located in North West Europe. In contrast, the lowest three are all from the southern part of Europe, namely Portugal, Greece and Italy.

This creativity index is of course disputable. Therefore, other indicators that measure the economic potential must be used alongside this creativity index. Nevertheless, a remarkable co-incidence with innovative regions is clear.

The question of whether differences in urbanisation in the various bio geographic regions affect creativity is now discussed. Urbanisation in the Boreal region shows that relative low-density urbanisation within a dominating natural environment is characteristic of the most innovative regions of Europe and part of the most creative societies. Therefore, it cannot generally be argued that low-density urbanisation in a dominating natural environment is a weakness of a region for economic development. The Swedish and Finnish regions are most promising for future development. It might be assumed that these spatial circumstances might add to the attractiveness of the region. These considerations may be important, but are still quite soft factors and should be considered next to the more generally accepted harder factors for economic activities inducing urbanisation. Of these factors, accessibility is the most relevant to the location of an area.

The Atlantic region illustrates the importance of accessibility to urban regions. For example, London developed as a city on the river, giving access to its global empire. Paris, although not strongly maritime related, also developed in a highly accessible location, and the French, Belgium, UK, Dutch and north German harbours are of global significance. The trading and production activities that took place in the Atlantic region, on the basis of its natural assets, resulted in strong urbanisation. This concentration of people and activities led in the 20th century to a high concentration of airports, of which many are of global significance. Enhanced accessibility again resulted in ongoing urbanisation, demanding new transport facilities such as high-speed trains and special cargo railway lines.

Urbanisation in the Continental region confirms this observation. Widespread urbanisation in easily accessible regions shows concentrations at accessible locations, like river valleys, and on cross-roads of important highways. Highly accessible multi-modal transport corridors therefore are regarded as

---

<sup>84</sup> Florida, 2004

favourable conditions for urbanisation. Development pressure materialises on access points to the transportation systems. On the European scale these corridors are considered to be development zones, as linear sequences of nodes at access points.

## **10.6 Limitations to nature as an asset**

The importance of accessibility to the economic development of a region is paramount. European regional economic development within the social and economic cohesion policies, therefore strongly supports the improvement of the accessibility of more inaccessible regions. EU Transport and TEN policies address these handicaps by projecting and improving highways, railways and waterways. By improving accessibility, spatial developments can be better distributed across the European territory, supporting polycentric-city. But there are limitations to the urge and desirability of equal accessibility. For example, the carrying capacity of the specific region should be taken into consideration. At certain locations, such as in the Alps and along the Mediterranean coasts, the scenery as well as natural values are being jeopardised by tourist developments that are attracted to settle by those same qualities.

The extreme consequence of equal opening up of the European territory might be an equal network of infrastructure, hardly disrupted by physical barriers like geophysical features. In such an extreme case, there would be no difference in level of disclosure, business, tranquillity, whereas those attributes are becoming increasingly rare qualities. It is increasingly difficult to find quiet places, where nature and tranquillity still dominate. Regions that choose to enhance those qualities may be seen as capitalising on their assets in a wise way. Such quiet places, probably situated in remote locations, like in mountains or on islands, may become increasingly attractive for specific activities. For example, selective institutions such as research and development institutions in those fields requiring facilities for concentrated contemplation, conferences, or medical and health oriented institutions. Territorial cohesion, requiring specialisation in different networks, demands for the articulation of specific local qualities, one of which may be a quiet and remote environment. This aspect, arguing that there are limitations to polycentric-city in the sense of taking care of the values for regions that might be called handicapped, but that, in fact, must be regarded as special values, requires careful selectivity in the implementation of EU policies on transport and accessibility. Integrated development strategies could be helpful for these considerations.

## 10.7 Conclusions

The value of natural heritage as an asset for attracting new economic activities is not easy to establish in this very broadly oriented study on the Territorial Effects of the Management of the Natural Heritage in 29 European countries. A positive influence is apparent, especially when natural heritage is considered as one of the important components of attractive scenery. The fact that many municipal city marketing efforts include the promotion of their attractive surrounding landscape, especially for leisure, does not provide any evidence of its effectiveness in attracting economic activities. Because undisturbed wilderness is extremely rare in Europe, areas of high natural values are in many cases also areas of cultural value. Tourist values in most of these areas, is apparent, although it does not generate high expenditures in all areas.

Recent American studies of the Wilderness Society provide supportive evidence of the economic value of (federal protected) semi-natural areas, even on the market value of real estate around them. More focused research on the effect of the natural heritage on attracting business, should be carried out.

Finally, it is noticed that if natural heritage is increasingly viewed as an asset for attracting economic activities, limitations to distributing this driving force for urbanisation of the European territory should also be considered. Integrated development strategies could play a role in the preparation and formulation of a policy.

Selectivity in accessibility in the EU transport policy, together with local and regional responsibility for the natural heritage, may result in a specific locally/regionally balanced sustainable spatial development, capitalising on acknowledged qualities of remote locations.

# **ESPON project 1.3.2 - Territorial trends of the Management of the Natural Heritage**

## **PART 2      Section III**



*Royal Haskoning*





**ESPON project 1.3.2  
Territorial Trends in the  
Management of Natural Heritage**

**PART 2      Section III Recommendations  
and conclusions**



This report represents the final results of a research project conducted within the framework of the ESPON 2000-2006 programme, partly financed through the INTERREG programme.

The partnership behind the ESPON programme consists of the EU Commission and the Member States of the EU25, plus Norway and Switzerland. Each partner is represented in the ESPON Monitoring Committee.

This report does not necessarily reflect the opinion of the members of the Monitoring Committee.

Information on the ESPON programme and projects can be found on [www.espon.lu](http://www.espon.lu)

The web side provides the possibility to download and examine the most recent document produced by finalised and ongoing ESPON projects.

ISBN number 90-74718-12-4

This basic report exists only in an electronic version.

© The ESPON Monitoring Committee and the partners of the projects mentioned.

Printing, reproduction or quotation is authorized provided the source is acknowledged and a copy is forwarded to the ESPON Coordination Unit in Luxembourg'.

## Table of contents

<b>Table of contents</b> .....	<b>237</b>
<b>Figures</b> .....	<b>237</b>
<b>Maps</b> .....	<b>237</b>
<b>Tables</b> .....	<b>237</b>
<b>Section III: Recommendations and conclusions</b> .....	<b>239</b>
11 Recommendations.....	241
11.1 Introduction .....	241
11.2 Integrating natural heritage and spatial planning.....	243
11.3 General recommendations.....	246
11.4 Recommendations on management.....	247
11.5 Recommendations, macro level.....	248
11.6 Recommendations, meso level.....	251
11.7 Recommendations, micro level.....	252
11.8 Recommended policy responses.....	255
12 Regional typology .....	258
12.1 Introduction .....	258
12.2 Role of typologies .....	259
12.3 Typologies.....	259

## Figures

Figure 21 Regional typologies .....	262
-------------------------------------	-----

## Maps

Map 30 Potentials and threats in EU based on networks .....	245
---	-----

## Tables

Table 28 Findings of the analysis in DPSIR terms .....	242
--	-----



## **Section III: Recommendations and conclusions**



## **11 Recommendations**

### **11.1 Introduction**

This chapter aims at formulating ways in which ESDP objectives, related to the natural heritage, can be met. The wide scope of the subject includes such a broad range of relations that it addresses almost all space consuming activities. In relation to ESDP objectives the question is:

How can be achieved, a more balanced, sustainable spatial development combining a polycentric urban network and a coherent ecological network.

The text of the thematic scope and context of this project mentioned: "new forms of development must be found to assure synergy and co-existence of men activities and actions affecting the natural heritage and also that the aspect of natural heritage considered an asset and a development potential in the economic development of cities and larger territories calls for a management approach that integrates natural heritage as an important part of the development of larger territories, cities and regions.

The results of the analysis in this respect are summarised in table 28 below.

The emphasis on integrating policies with regard to natural heritage in other policy fields, especially in (spatial) development policies, does not mean that the management of the natural heritage is only considered as a supportive activity to regional economic development.

**Table 28 Findings of the analysis in DPSIR terms**

	<b>Macro: EU</b>	<b>Meso: national</b>	<b>Micro: regional/local</b>
Driving forces and pressures <b>D&amp;P</b>			
Agriculture	Policy stimulates agricultural production. This result in large land take due to intensive agriculture and decreased semi-natural area and biodiversity. The Pillar 2 of CAP reform allows for rural development, including the development of natural heritage. This change in the CAP policy can perhaps stop or turn the negative process of the natural heritage	International policy influences the national policy	Influenced by international and national agricultural policies
Socio-economic and territorial development	No European spatial planning, except the first attempt of the ESDP	Few coherent national spatial plans	Concentrated in local and regional initiatives
Infrastructure	Wide spread accessibility as a prerequisite for economic development resulting in ongoing fragmentation	Facilitates mobility by following the urbanisation and enhancing further suburbanisation in national policies	Facilitates local accessibility. Tendency to improve accessibility regardless of natural values as silence and rest
States <b>S</b>	Natural heritage consists of remains of nature.		
Impacts <b>I</b>	During ages a decrease of species is taken place. The natural heritage is also very fragmented.		
Policy Response <b>R</b>	Environmental legislation safeguarding quality. Birds, Habitat directive, Natura 2000, ESDP aiming all at harmonisation and territorial coherence. Integration with spatial planning is too new to show results of these policies	Few integral national plans. Plans can stimulate coherence, territorial balance and harmonious development	Growing attention for integrated regional development strategies. Plans can facilitate initiative and stimulate coherence, territorial balance and harmonious development. Pro active planning instead of ad hoc decisions

Although management of the natural heritage is justified as enhancing and protecting the natural heritage for its own right, it also must be acknowledged for its influence on the enhancement of the quality of life. As a result, it enhances the attractiveness for settling new residents and businesses. When this value of the natural heritage is recognised and specified, environmental and economic policies may become less perceived as conflicting interests. These considerations are in the heart of the ESDP objective of a balanced sustainable development.

## **11.2 Integrating natural heritage and spatial planning**

It is acknowledged that Natura 2000 is an accepted policy under realisation and aiming at building a coherent ecological network throughout Europe. This policy partly coincides with the Emerald Network and the Pan European Ecological Network PEEN.

It is also acknowledged that the Water Framework Directive is an accepted policy aiming at integrating ecological and other interests in catchments area management measures. Those measures often require space with strong limitations to other land uses.

It is also acknowledged that the Integrated Coastal Zone Management is an accepted policy, aiming at the integration of all relevant aspects when considering the development of a coastal area.

The ESDP objectives of urban polycentric development in combination with the Trans European Network of Transportation (TEN and TINA's) aim at the distribution of economic activities and the related urbanisation over the wider European territory, away from the Pentagon.

The way forward to approach those policies and objectives in spatial planning that is recommended here, is firstly to present these policies in two spatial networks: the natural heritage network and the network of potential urbanisation. Secondly, both networks are projected over each other in order to identify overlaps.

The natural heritage network could consist of a map presenting the natural areas of Europe, including the protected natural areas, and the Natural 2000 ecological network, together with the main rivers and the riverine zones that offer potentials for new natural areas that may enhance coherence in the network along the rivers.



The network of potential urbanisation could be assembled out of the map of the Trans European network in which the multi modal axes of transportation are the most important, corridors together with the ESPON project 1.1.1. maps on the MEGA's and FUA's.

The interrelation between the largest cities and the transportation axes is obvious, the potential MEGA's as ESPON project 1.1.1. indicated are especially important when focussing on the future.

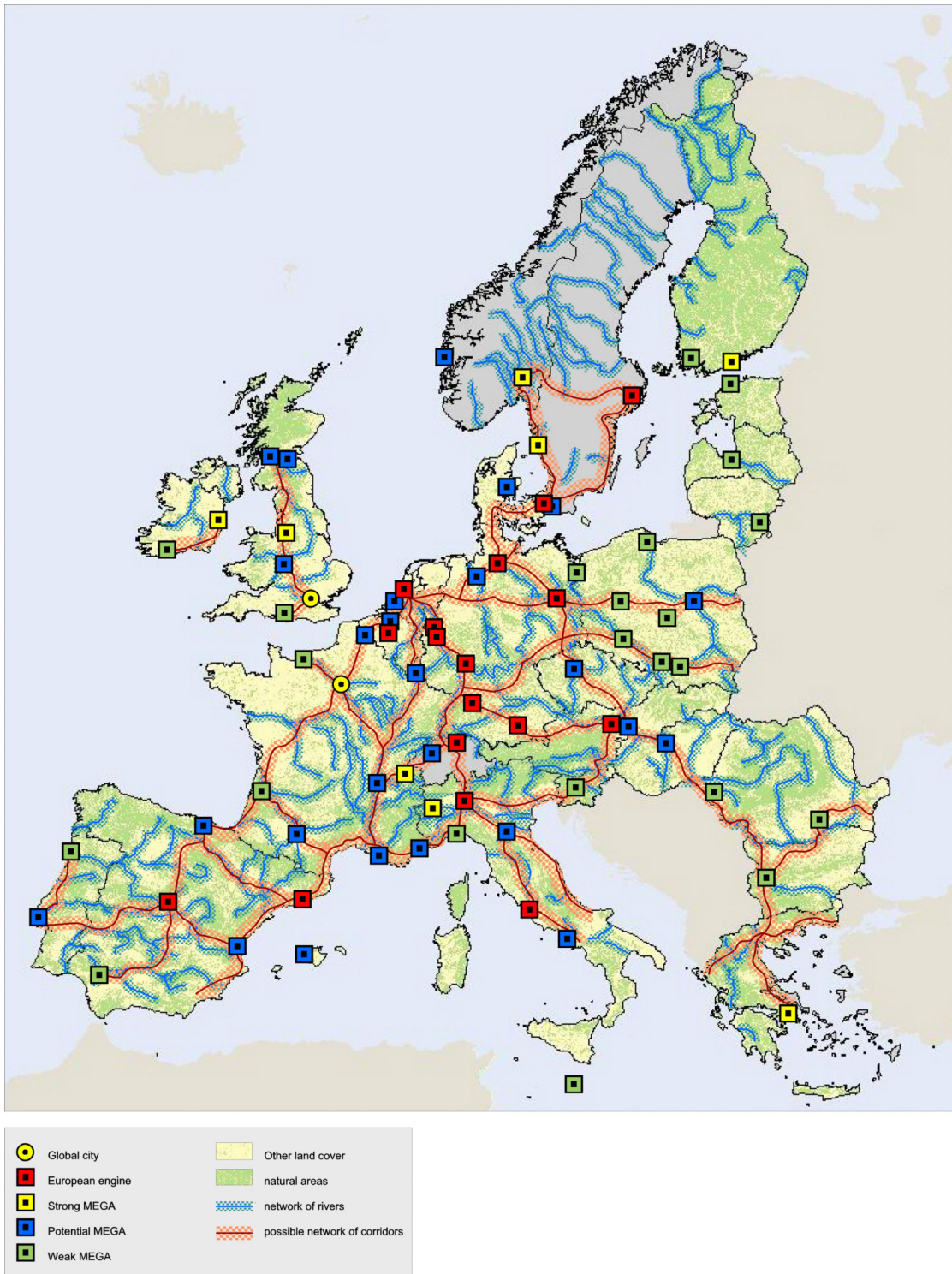
The superposition of the ecological network and the network of cities (and infrastructure) will show the locations of competing interest: where both networks, cross potential conflicts are located.

These areas of crossing of networks require extra attention. There are tensions, like should nature or the urban functions dominate? There are opportunities as well: the confrontation with natural features may add to the attractiveness for urban land uses. It is obvious that these locations of potential conflicts can be identified from the top-down projection of the networks, but should be solved bottom-up on the regional level where regional interests can be balanced in a sustainable way.

Map 30 is included, showing a possible shape of the confrontation of the two networks as are discussed above. It illustrates the approach as recommended without claiming to contain proposals for the content of such maps.

The networks of Natura 2000, the main rivers, the main urban development axes as well as the MEGA's should be established by the responsible authorities. The proposed way forward, include close co-operation, not only horizontally but also vertically. Therefore the recommendations of this chapter are organised along the spatial levels macro, meso and micro.

**Map 30 Potentials and threats in EU based on networks**



Source: Royal Haskoning, 2004

In relation to the ESDP objectives it is assumed that:

- The ESDP objective of balanced development can be promoted by stimulating urbanisation outside the core area, more especially within the CEE countries and in peripheral regions.
- The ESDP objective of polycentric development can be enhanced by aiming at a network of cities, (de-)concentrating developments in development axes, which are projected around the most important European multi modal corridors of infrastructure.
- The ESDP objective of sustainable development is supported by avoiding unnecessary extra infrastructure and land take for urbanisation. This can be promoted by concentrating urbanisation at accesses and stations in those development corridors.
- New development corridors along TEN and TINAS will grow along improved east-west directed infrastructure, connecting the new union member countries with the existing, predominantly north-south directed axes.

These assumptions indicate that the urban-development pressure on the existing natural heritage is located away from the Pentagon, along development axes, concentrated in access nodes.

### **11.3 General recommendations**

1. The management of the natural heritage, aiming at protection and enhancement of the natural heritage should be approached in close relation to existing environmental policies, addressing the quality of water, air and soil.
2. Since space is a scarce resource, the natural heritage should be managed also in close relation to the spatial policies in order to avoid unnecessary land take, fragmentation and developments interrupting ecological coherence. These spatial development policies are managed on the national, regional and local scales.
3. Acknowledging forthcoming changes in the Common Agriculture Policy and the fact that agriculture is on average the largest

land cover, requires close co-operation in formulating rural development policies. Especially pillar two measures should be elaborated into specific regional rural development plans.

4. The importance for the natural heritage of the geohydrological system, consisting of main fresh water sources in mountainous areas connected by rivers to the seas, requires an integrated approach with actions within the Water Framework Directive. Water management measures are expected to require spaces that can offer opportunities for nature. The approach promoted by the Integrative Coastal Zone Management seems an adequate tool integrating natural heritage in spatial development for coastal zones.
5. Apart from the management of protected natural areas, the management of the natural heritage should focus more on “protection - by - developing”, rather than mere conservation.
6. The importance of a beautiful landscape and a natural environment for the general image of a region may not be underestimated. More knowledge should be developed about the influence of the natural heritage on the attractiveness of a region. Especially the way in which natural values are an asset for settling of individuals and companies needs closer study.
7. The existing economic value of natural and cultural landscapes for touristic and regional production activities also should be specified more precisely, in order to validate nature not only as costs but also as assets.

#### **11.4 Recommendations on management**

8. It has already been mentioned that there is not uniformity of categories/types of Natural Heritage protection. It is apparent that there is not a unique way of classifying protection of nature and thus the reason for protection and the means used are not the same. The internationally agreed classification of IUCN should be a base for further harmonisation.

9. The lack of standardisation of typologies inevitably causes extreme difficulties. Since European Natural Heritage should be seen as one issue which cannot be contained by national borders it is necessary to evolve policies and strategies that can be applied readily to both new member states as well as to accession countries.
10. The management of specific natural areas generally is focussed merely on the protection of its nature values. Particularly large areas and national landscape should, without jeopardising the natural values be managed in a way that also orients on sustainable development, using nature as an asset.

### **11.5 Recommendations, macro level**

11. Elaboration and enhanced implementation of Natura 2000 is strongly recommended. This action is expected to be supportive for meeting the ESDP goals of balanced, polycentric and sustainable spatial development. The network of natural areas, as Natura 2000 aims at, may be expected to add to the attractiveness of regions for starting new activities.
12. Special attention should be given to the Europe large north-south zone located near the former Iron Curtain. Here potentialities are still existing that should be considered as occasional opportunities for development of nature. The crossings of east-west corridors that may become development axes, are locations of potential conflicts.
13. Stronger integration of Natura 2000 especially with water related policies like the Water Framework Directive, addressing not only water quality but also quantity requires consideration of the location of natural areas within the European hydrological structure. As many actions following from the Water Framework Directive have spatial consequences, for instance space needed for upstream buffering of water, widening river beds mid-stream and space for retention down-stream, the Directive provides opportunities for specifying and enhancing the ecological structure.

14. When implementing nature protection policies and considering the enhancement of territorial cohesion by adding new areas to the Natura 2000 ecological network, river related areas like river valley forests, and river bed marshlands should be included.
15. Since the impact of climate change differs in the various bio geographic regions, specific approaches should be developed for flooding caused by excessive water run-offs in the Alpine and Mediterranean regions, river flooding in the Continental and Atlantic regions and combined sea-river flooding near the delta's in the Atlantic and Boreal regions. Also the problems of desertification in the Mediterranean region and of increased temperatures on the Alpine areas require specific approaches.
16. Flooding should, in relation to the natural heritage not always be seen as a hazard. Wide riverbeds can be used to retain the larger quantities of water flowing incidentally through the rivers after extreme rainfall. Inundations that are a consequence, can be regarded as part of quite normal natural dynamic processes. These should be regarded as hazards if human life and investments are at risk. The selection and implementation of flood areas should be balanced with regional socio-economic interests.
17. The importance of relatively small scale actions to defend the natural heritage against fragmentation by agriculture, urbanisation and infrastructure must not be underestimated. Especially in areas with high development pressure, the remnants of the natural heritage must be considered as extremely important for their effects on the perception of nature, health and spatial quality within concentrations of urbanisation.
18. Co-operation within rural development schemes should be differentiated according to the bio geographic regions. Not only the impact of climate change on the natural heritage differs per bio geographic region, also the agricultural problems resulting in increasing intensification, extensification as well as

abandonment, are different.

19. With regard to the urbanisation pattern on the macro level that should be projected over the geomorphologic structure and the ecologic network upcoming new development axes should be identified. It may be expected that many will be oriented east-west, connecting with the north south main development axis within the core. These development axes will be based on existing concentrations of urbanisation and partly coincide with main rivers (Danube).
20. Where those development axes, being concentrations of potential urbanisation, cross concentrations of natural areas, special attention should be given to the balance of the two. This especially applies to the concentration of natural areas at the former Iron Curtain.
21. Spatial development policies should reach a substantially stronger transsectoral dimension. The spatial development approach involves co-operation of various sectors of activity, various levels of authorities, and various stakeholders. Therefore it is an important policy implementation tool, providing widely acceptable solutions. It allows for all public policies with territorial impacts to be scrutinised and assessed so as to strengthen and increase their synergies and the sustainability of their outcomes. But sectoral policies should fully integrate the dimension of sustainability themselves, particularly the central ones, e.g.: transport, energy, agricultural and other. *(From Ljubljana Declaration, 13<sup>th</sup> CEMAT conference)*
22. The measures deriving from Natura 2000 should assure also qualitative possibilities for spatial developments of environment friendly economic activities in order to avoid side effects caused by restrictions.
23. The fact that non disturbed areas, containing increasingly rare qualities as quietness are going to be valuable assets, requires identifying those areas on the European level. Road accessibility

as a general development measure should be applied, more selectively.

### **11.6 Recommendations, meso level**

24. Next to the general implementation of nature protection policies, each country should give high priority to the actions required for the implementation of the Natura 2000 / Emerald ecological network and balance those according to the requirements of sustainable spatial development.
25. Special attention as well as cross border co-operation is needed for the territorial cohesion of the ecological networks on both sides of national borders. Since many natural borderlines are related to geomorphologic features like mountain ranges, seas or rivers, these border areas are generally containing exceptional concentrations of natural values. On top of that, the fact that some administrative boundaries have been existing for centuries, these border areas were barriers with less accessibility. This also implied in some cases concentrations of hazardous or polluting industrial activities.
26. Border crossing rivers, connecting natural areas and hydrological systems on both sides may be preferable be designated as parts of the cross border ecological network.
27. Within the countries, the ecological network includes the important protected natural areas of the country as well as other protected national landscapes, areas with natural land cover and agricultural areas that contain natural values. Strategic zones where new stepping stones or corridors can be located in order to enhance the territorial cohesion of the national ecologic network, are to be indicated.
28. Preferably these connecting zones can be related to larger geomorphologic features within the country, like mountain ranges, rivers and coastal zones.



29. Maps of the infrastructure, being part of the TEN or TINA international network of multimodal connections that form part of transnational development axes, should be superposed over the national ecological main structure as described before, in order to identify overlaps and potential conflicting interests.
30. These overlapping areas require extra attention. At the one hand nature can become under threat of urbanisation and fragmentation, on the other hand these areas may be especially attractive for settling of residential and economic activities in a healthy, natural environment. In such cases, a balanced sustainable development should be specified and implemented carefully in accordance with the regional authorities and other interests.
31. Agricultural developments, resulting in intensification, extensification or abandonment should be related to the national ecological policy and its main structure. Conflicts and opportunities to enhance the territorial cohesion of the ecological main structure must be identified and included in regional rural development policies.

### **11.7 Recommendations, micro level**

32. At the regional and local level stock should be taken of the existing natural values as included in protected natural areas, landscapes, natural land cover and agricultural areas containing natural values, as well as the location within the national and European ecological network. This may enhance the public awareness of natural values.
33. Identifying new areas for protection and inclusion in the ecological network should be based on the strategic location of the area for strengthening the coherence in the national network and on the socio-economic development of the region. Agricultural developments especially may cause problems as well as opportunities.

34. Sustainable development requires avoidance of unnecessary land take for urbanisation and infrastructure. This includes concentrating urbanisation at the existing urban nodes, located in development axes near the exits of highways and railway stations.
35. These well accessed urban nodes offer opportunities for concentrating different types of economic activities, depending on the needs for transporting goods, mobility of workers and the cultural characteristics of the region and / or the town.
36. Specific natural values at those locations may add to the attractiveness for settling of individuals, touristic activities and, in relation to specific agricultural activities the production of regional products.
37. Less accessible locations in quieter, natural environments, may be attractive for specific residential functions, institutions for research and development, for specific education, cultural and tourism activities. This especially applies for peripheral and remote regions.
38. Although the tourism industry is among the largest economic sectors, innovations in tourism products are hardly reflected in indicators for innovations. These should be acknowledged as important innovative actions within the service economy. Innovations of tourism products should preferably be related to regional qualities like natural values, geomorphologic features and cultures.
39. In order to balance the implementation of nature protection and of an ecologic network with the social economic developments of a region, an integrated future oriented approach is recommended. Such an approach, taking into account all relevant aspects and interests, should result in a spatial development vision for the region integrating a rural development policy, an urbanisation policy with regard to residential and economic functions, and policies with regard to natural heritage, the environment and water.

40. Acknowledging that in most countries the spatial development legislation does not imply such visions and that most relevant regions are not represented by official regional authorities, informal processes should be organised involving all relevant stakeholders to promote the common regions interest. National governments can promote and support such processes
41. Such regional development visions that preferably result in spatial plans or even projects should aim at identifying the specific opportunities for future economic developments of regions that are to be defined as multi municipal areas that are functionally connected. The FUAs of ESPON project 1.1.1 are complying that definition. The opportunities for economic developments of such FUA are related to the characteristic of the surrounding landscape.
42. The future economic development of the FUA / regions should preferably be based on innovations in accordance with the Lisbon and Goteborg objectives in accordance with the specific natural features related to its identity.
43. The specific qualities of the area and its population on which innovative actions can be based, should be identified by carrying out regional SWOTS on the location and its natural and cultural characteristics, being assets for future developments.
44. The process resulting in a common vision on the future spatial development must be organised by involving relevant stakeholders and interests. Scenario's and SWOT analyses are helpful tools to arrive at commonly accepted selection of objectives and spatial configurations.
45. Such integrated processes leading to spatial plans on the regional level, should under certain conditions, including the integrated approach to the natural heritage, be supported by national government and the EU.

## 11.8 Recommended policy responses

- **Balanced development in corridors.**  
In order to minimise conflicts and maximise synergy between natural heritage and economic activities, it is recommended to concentrate the polycentric urban development within the main corridors of infrastructure that will act as development axes. This type of spatial development distribute the development pressure away from the pentagon as is envisaged in the ESDP and at the same time it concentrates developments as nodes in linear zones avoiding unnecessary fragmentation of the landscape.
  
- **Polycentric development in nodes.**  
If these nodes are concentrated near the highway accesses and the high speed railway station, unnecessary fragmented (sub) urbanisation throughout the landscape as well as unnecessary mobility are avoided. These locations combine good accessibility with the probability to be well embedded in the landscape, thus supporting the synergy between economic activities and the natural (and cultural) heritage.
  
- **Selective accessibility.**  
The decisions to locate access roads to new infrastructure (as part of the TEN or TINA) are to be balanced between improving the accessibility and competitiveness of existing towns and the strategic value for the ecological network of natural areas that will come under pressure of urbanisation.
  
- **Priority to old industrial areas**  
Although the community environmental policy aims at a general healthy quality of the environment, project to reconstruct and sanitise polluted old industrial areas should get priority because improved environmental conditions and images of those sites, that are often quite centrally located, support the economic revitalisation of the towns as well as the re-use of concentrated infrastructure. This is supportive to avoid unnecessary land take for new developments.

- **Elaboration of ESDP**  
 In order to better co-ordinate the community environmental policy with spatial policies, spatial policies on the European level, addressing the ecological (and hydrological) network as well as the urban (and infrastructure) network, should be integrated. The European Spatial Development Strategy as has been adopted in 1999 is within this context a very relevant start. Actual developments like the accession of new member states, experiences with trans border co-operation and other Interreg results as well as the achievements of ESPON projects, demand for elaboration and revision of the ESDP. Regular revision will involve more national and regional representatives as well as other experts in the process and enhance the understanding for future oriented developments. The effect of involvement in the process as well as of the resulting documents will, as already could be noticed after the first ESDP attempt, be a more common orientation on Europe's future. Such an integrative approach will also improve the territorial orientation of the community environmental policy.
  
- **International co-ordination**  
 Territorial cohesion within the Community will be strongly supported by the elaboration and implementation of ecologic and urban cross border networks. Especially the connections between national networks require co-ordination with national or regional spatial policies.
  
- **Vertical integration**  
 It should be acknowledged that the decisions about areas to be included within the ecologic or urban networks must be taken at the regional level. The Commission should indicate where strategic connections between elements of the networks are desired. However, the actual decisions about designating specific areas within those networks should preferably be taken at the regional level, balancing all relevant regional interests.
  
- **Regional development vision**  
 Decisions about designating specific areas at the regional scale should be taken on a basis of a common vision on the regions future development. Processes to prepare regional development

visions or plans. They are helpful to identify the regional strengths and weaknesses and its threats and opportunities. Specific cultural and natural qualities must be identified in order to increase the awareness of potentials for (innovative) economic activities. Such processes will result in common recognition of the regions competitive edges which helps to specialise its spatial development in a more focussed way.

- **Regional variety as an asset**  
Such spatial development visions or plans result in differentiation between regions with regard to their cultural and natural characteristics. Every town or region contains its own specific mix of cultural and natural elements. The more specific these aspects are formulated, the closer fitting locational conditions for specific functions are offered. In that way spatial variety is important for economic development and should be enhanced. Still, too often too general notions like "ITC, logistic, tourism" are regarded as base for economic development.
- **Natural values as an asset**  
With regard to the natural heritage the fact that existing natural values are left-overs, remaining from century-long processes should be acknowledged. Natural values are a scarce resource that is to be increasingly appreciated. The importance for a locations image of a healthy, clean, quiet, undisturbed environment is felt to increase. Dedicated studies specifying this expectation should be carried out.
- **Community Support**  
Regions organising integrative processes towards spatial development visions should be financially supported. Such processes, involving all relevant stakeholders will lead to a stronger common orientation on and support of future developments. They also may be helpful to discover the regions populations' creativity and to identify new innovative regions in the enlarged Europe.

## **12 Regional typology**

### **12.1 Introduction**

ESPON wishes to define regional typologies that can be applied when examining submissions for financial support. Such a typology should allow consideration of submissions with regard to criteria that reflect relevant policies. The result of European funding eventually must be a stronger socio-economic and territorial cohesion. Equity and equal opportunities are essential elements for coherence, but also important values like physical and mental health, cultural identity etc. should be respected. Therefore the tension between prosperity and regional culture should be regarded.

GDP as being the important criterion for Objective 1 funding does not take into account aspects of cultural identities as they vary per region. The concentration of economic activities in the core area, together with employment and relatively high GDP are subject to the policy of balanced development aiming at distributing economic growth to peripheral areas outside the core. It is a challenge to distribute economic activities over Europe in such a way that it does not result in levelling out local and regional differences. The large variety in cultures and landscapes of Europe is on the one hand a weakness of Europe, which is addressed by the policy of coherence but at the same time it is an important quality. Its large variety adds to Europe's attractiveness not only for visitors but also for economic activities producing regional quality products. These differences are important for the large economic sector of tourism but may also enhance the innovative climate of Europe.

## **12.2 Role of typologies**

A typology of regions with regard to the natural heritage should take into account the location in Europe's macro structure. The essential elements of the physical structure, being the mountainous areas and the coastal zones, together with islands, are at the same time regarded in economic terms as the handicapped areas. As a result, those areas should on the one hand be safeguarded for the value of their natural and cultural heritage and for the fact that their qualities are becoming increasingly scarce in the whole of Europe and on the other hand these values are still seen as handicaps for developing an equal GDP.

As a result, in those areas European support should be focussed on safeguarding the natural heritage as well as on enhancing the economic activities. That requires extra attention to these elements of the macro level, which should be reflected in a regional typology.

## **12.3 Typologies**

Variety of cultures is felt to be a basis for innovative climate, such as required to meet the Lisbon objectives aiming at situating Europe in the highest rank of innovative and high-tech economies. Therefore the development of cultural values also may have an economic value. Different approaches in different environments can result in creative solutions. Also the relation between natural heritage and economic activities should be considered. A healthy natural environment may be an important factor for locating specific activities like high-tech production in different fields, research and development, health care, university institutes, and cultural production. A coherent network of natural areas such as Natura 2000 envisages, may secure this type of environment in several places. This may provide at the meso and micro level sites with quiet and healthy images that enhance innovative activities.



Decisions about the development of specific sites should be considered within the context of the region.

Balanced development should therefore consider interventions within a wider socio-economic structure as well as in the context of natural and cultural heritage. This might be seen as confronting two physical structures at different meso levels:

- The social and economic structure of a polycentric urban system connected by infrastructure;
- The natural and cultural heritage structure of a network of natural areas, partly connected by rivers, and landscapes.

A typology of regions should take into account the location of regions within this macro structure.

In their confrontation interesting and promising opportunities will exist. Specific economic activities may develop as a result of both the position and connections of a specific site in the polycentric urban system and the position in a characteristic landscape with specific natural values.

The regional typology is based on characteristics of individual regions, indicating its properties on the macro, the meso and the micro scales. On each of those scales the typology is composed out of the combination of the natural (and cultural) values with the social economic / urbanisation aspects. These should be balanced for the sake of sustainable development.

At the macro level the ESDP objective of balanced development applies, indicating that spatial development (as based on economic activities) should be supported outside the area with highest development pressure: the pentagon.

The natural characteristics on the macro level for which the location with regard to mountain ranges, coastal zones islands are important, can be specified according to the large bio geographic entities. At the macro level the socio-economic aspects can be indicated by the core, periphery, islands, CEE distinction.

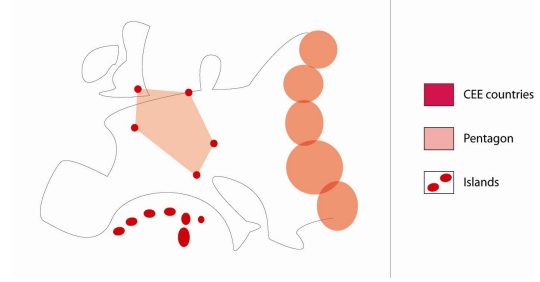



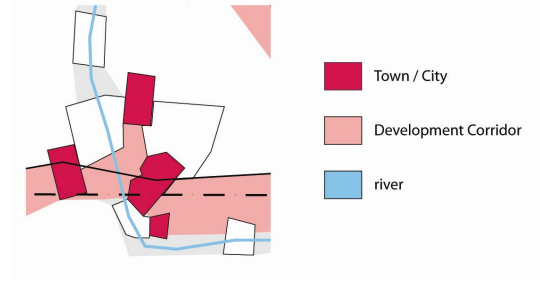

At the meso level, cross border co-operation towards more social economic and territorial cohesion is aimed at. This implies connecting development zones within the one country with that in the neighbouring country, as well as cross border connections of national ecologic networks. Investments that enhance the coherence of the ecological network should be supported as well as investments in infrastructure or in (innovative) economic activities located within the development axes outside the pentagon.

At the micro level sustainable developments should be promoted that add to the polycentric urban system outside the pentagon and that impact the environmental qualities in a minimal way or, that are aiming at the reconstruction and sanitation of old industrial areas.

Urban concentrations should preferably be located at the main multi-modal infrastructures at axes of highways and around stations of (high speed) trains. Urbanisation supportive to functional urban areas (FUA's) outside the pentagon, within development axes and located at good accessible infrastructure should be supported. The developments in less accessible areas, for instance in handicapped regions should be supported on basis of the enhancement of their qualities as quiet, healthy places, offering opportunities for specific new economic and cultural activities as well as tourism.

This may result in next typology, balancing socio / economic main characteristics with natural aspects on each of the three levels. This typology aims to reflect the tension between the different objectives of responsible policies. At the one hand every society aims at prosperity, based on economic achievements, labour, incomes, wealth and at the other hand the quality of life and personal well-being of the population based on health, freedom, cultural identity and peace. With regard to sustainable development the ESDP triangle, showing the social, economic and ecologic aspects of sustainability is relevant for the regional typology in the sense of regional societies that balance economy and ecology.

**Figure 21 Regional typologies**

	<b>Socio / econ. / urban</b>	<b>Nature / environ./cultural</b>
<b>MACRO</b>	<p>Development pressure</p> <ul style="list-style-type: none"> <li>- Pentagon</li> <li>- Outside pentagon</li> <li>- In CEE</li> <li>- Island in periphery</li> </ul>	<p>Bio geographic region</p> <ul style="list-style-type: none"> <li>- Boreal</li> <li>- Continental</li> <li>- Atlantic</li> <li>- Alpine</li> <li>- Mediterranean</li> <li>- Pannonian</li> <li>- Macronesian</li> </ul>
		
<b>MESO</b>	<p>Urban network</p> <ul style="list-style-type: none"> <li>- In development axis</li> <li>- Outside development axis</li> </ul>	<p>Ecological network</p> <ul style="list-style-type: none"> <li>- In Natura 2000 / Emerald network</li> <li>- Outside ecological network</li> <li>(- Agricultural intensification)</li> <li>(- Agricultural extensification / abandonment)</li> </ul>
		
<b>MICRO</b>	<p>Site related to urban area</p> <ul style="list-style-type: none"> <li>- In or close to MEGA</li> <li>- In or close to FUA</li> <li>- Rural area outside FUA</li> <li>- Old industrial site</li> </ul>	<p>Site related to nature / environment</p> <ul style="list-style-type: none"> <li>- (Protected) natural area or cultural landscape</li> <li>- Open space with low or mediocre natural value</li> </ul>
		



# ESPON project 1.3.2 - Territorial trends of the Management of the Natural Heritage

## ANNEXES



*Royal Haskoning*





**ESPON project 1.3.2  
Territorial Trends in the  
Management of Natural Heritage**

**ANNEXES**

This report represents the final results of a research project conducted within the framework of the ESPON 2000-2006 programme, partly financed through the INTERREG programme.

The partnership behind the ESPON programme consists of the EU Commission and the Member States of the EU25, plus Norway and Switzerland. Each partner is represented in the ESPON Monitoring Committee.

This report does not necessarily reflect the opinion of the members of the Monitoring Committee.

Information on the ESPON programme and projects can be found on [www.espon.lu](http://www.espon.lu)

The web site provides the possibility to download and examine the most recent document produced by finalised and ongoing ESPON projects.

ISBN number 90-74718-12-4

This basic report exists only in an electronic version.

© The ESPON Monitoring Committee and the partners of the projects mentioned.

Printing, reproduction or quotation is authorized provided the source is acknowledged and a copy is forwarded to the ESPON Coordination Unit in Luxembourg”.



## Table of contents

<b>Table of contents</b> .....	<b>3</b>
<b>Tables</b> .....	<b>3</b>
1 Questionnaire .....	5
2 Case studies .....	7
3 List of indicators developed and datasets provided to the ESPON Database .....	9
4 List of maps and tables .....	11
4.1 Maps .....	11
4.2 Tables .....	12
4.3 Figures .....	14
5 List of missing data .....	15
6 List of abbreviations and glossary .....	16
6.1 Abbreviations .....	16
6.2 Glossary .....	18
7 List of references, including the use of results from projects outside the ESPON programme .....	21
8 List of publications of the TPG members resulting from the research undertaken .....	23
9 Indication of performance indicators achieved .....	25
10 Additional maps not included in the core text of the Report .....	27
11 Bibliography .....	29

## Tables

Table 1 Number of performance indicators achieved .....	25
---	----



# **1 Questionnaire**

See separate annexe.



## **2 Case studies**

See separate annexes containing the case studies:

- Borzodi Mezőség
- Nord-Pas de Calais
- Lanzarote
- Ljubljana
- Rondane Region
- Thames Basin
- Vallombrosa Forest



### 3 List of indicators developed and datasets provided to the ESPON Database

<b>Indicators</b>	<b>Criteria</b>	<b>Source</b>	<b>Comment</b>
Urban pressure	Population density, GDP per area, bed density, road density	EUROSTAT, GISCO	Qualitative measure for urbanisation
Fragmentation of nature	Fragmentation index		for NUTS3





## 4 List of maps and tables

### 4.1 Maps

	page number:
Map 1	Bio geographical regions with the most important threats .....27
Map 2	Topography of Europe.....36
Map 3	Potential natural vegetation of Europe .....38
Map 4	Simplified European hydrological system.....41
Map 5	Percentage built-up area for NUTS3.....50
Map 6	Percentage semi-natural areas for NUTS3 .....51
Map 7	Average size of holding in ESU for 1997 .....56
Map 8	Population density for NUTS3.....62
Map 9	Population changes between 1995 and 2000 for NUTS3 .....63
Map 10	Innovation index .....68
Map 11	Fragmentation index for NUTS3 .....98
Map 12	Fragmentation in land cover of Vlaanderen (Belgium) and the south part of The Netherlands .....99
Map 13	Natura 2000 network.....114
Map 14	Year of designation.....120
Map 15	CORINE land cover and the bio geographical regions, including a 20 km coastal zone.....135
Map 16	Land cover and the large designated areas (the size of the circles represents the actual surface areas of designated sites) .....140
Map 17	Livestock units per hectare of utilised agricultural area in the EU in 1995.....142
Map 18	Location of MEGA's.....156
Map 19	Percentage semi-natural area compared to urban pressure .....165
Map 20	Percentage semi-natural area compared to population density (2000).....170
Map 21	Percentage semi-natural area compared to changes in GDP (1995-2000).....173
Map 22	Percentage semi-natural area compared to GDP 2000 (relative to surface area).....174
Map 23	Percentage semi-natural area compared to innovation .....176
Map 24	Semi-natural area compared to bed density.....177
Map 25	Partitioning of land by transport infrastructure .....181
Map 26	Percentage semi-natural area related to road density .....182
Map 27	Semi-natural area, main hydrology and the MEGA's.....185
Map 28	Comparison of flood risk to the percentage semi natural area .....186
Map 29	Europe and location of the case studies.....204
Map 30	Potentials and threats in EU based on networks .....246

## 4.2 Tables

	page number
Table 1	Different levels used ..... 25
Table 2	Short description of case studies ..... 32
Table 3	Land cover for each bio geographic region and 20 km coastal zone (in percentages) ..... 47
Table 4	Land cover per country (in percentages) ..... 52
Table 5	Land cover with natural values, for bio geographic regions (in percentages) ..... 88
Table 6	Semi-natural, agriculture, forest and water body land cover with natural value per country (in percentages)..... 89
Table 7	Indicators.....102
Table 8	Conventions and legal instruments .....105
Table 9	Policies and Strategies .....106
Table 10	Funds .....106
Table 11	IUCN Management Categories.....110
Table 12	Total protected area (IUCN) for each country.....111
Table 13	Land cover at the macro level (in percentages) .....134
Table 14	IUCN categories of protection and agricultural land cover (in percentages) .....138
Table 15	Agricultural land cover in terms of extensive and intensive use (in percentages) .....141
Table 16	Population density, population change 1995-2000, and the percentage built-up land cover at the macro level .....147
Table 17	FAO increase/decrease agricultural area (in percentages).....162
Table 18	Indicators for urban pressure at NUTS0 level .....167
Table 19	Protection compared to cover built up area (in percentages).....168
Table 20	Legal Framework related to natural heritage .....190
Table 21	Centralised or Decentralised agencies responsible for protection and management of natural heritage .....193
Table 22	Diagram: Spatial Planning Systems and Protection of natural heritage .....197
Table 23	Bio geographic regions and landscapes for the case studies .....204
Table 24	Rural territories.....205

Table 25	Urban related territories .....	205
Table 26	Ultra peripheral territories .....	205
Table 27	The Euro-Creativity Index.....	237
Table 28	Findings of the analysis in DPSIR terms.....	243

### 4.3 Figures

	page number:
Figure 1	An example of the process in DPSIR terms ..... 19
Figure 2	Application of DPSIR, including management aspects..... 20
Figure 3	Illustrating the structure of the meso scale maps. .... 31
Figure 4	Illustrating the legend in case of a qualitative indicator ..... 31
Figure 5	DPSIR and agriculture..... 58
Figure 6	DPSIR and population ..... 64
Figure 7	DPSIR and economy(GDP)..... 69
Figure 8	DPSIR and tourism ..... 72
Figure 9	DPSIR and infrastructure..... 74
Figure 10	Number of species in relationship to the evolution of agricultural practice ..... 93
Figure 11	State of proposals for protected sites under the EC Habitats Directive (as of November 2003).....115
Figure 12	State of proposals of protected sites under the Habitats Directive by bio geographic region (as of November 2003) .....116
Figure 13	Development in number of holdings and land use by agriculture, EU15 .....144
Figure 14	Regional typology at the macro level .....159
Figure 15	Average size of non-fragmented land parcels .....181
Figure 16	Diagram: Environmental and Spatial Planning legislative framework in relation to EU's framework .....187
Figure 17	Diagram: Countries with central government responsibility for the protection of natural heritage .....192
Figure 18	Diagram: Countries with decentralised responsibilities at regional or local levels for the protection of natural heritage .....194
Figure 19	Regional typology at the meso level.....199
Figure 20	Regional typology at the micro scale.....228
Figure 21	Regional typologies.....264

## **5 List of missing data**

Missing data:

- complete CORINE 2000 dataset
- statistical data, such as bed density data complete for all EU27 and preferably since 1950
- Long term trends for indicators developed
- PEEN; ecological network for Central Europe

## 6 List of abbreviations and glossary

### 6.1 Abbreviations

CAP	Common Agricultural Policy
CEE	Central and Eastern Europe
CEECs	Central and Eastern European Countries
CORINE	Information system on the Co-ordination of Information on the Environment.
CROW	Information and technology Centre for Transport and Infrastructure
CU	Co-ordination Unit
DIPSR	Driving Forces, Pressure, State, Impact, Policy
ESDP	European Spatial Development Perspective
EC	European Commission / European Community
ECNC	European Centre for Nature Conservation
EEA	European Environmental Agency
ESAs	Environmentally Sensitive Areas
ESPON	European Spatial Planning Observation Network
EU	European Union
EU-15	The "old" 15 EU Member States: Belgium, Denmark, Germany, Greece, Spain, France, Ireland, Italy, Luxembourg, the Netherlands, Austria, Portugal, Finland, Sweden and the UK
EU-25	EU15 and the N10
EU-27	EU 15 + N12
EU-27+2	EU-27 + Switzerland and Norway (building together the ESPON study area)
EUNIS	European Nature Information System

FUA	Functional Urban Area
GDP	Gross Domestic Product
GIS	Geographical Information System
ICT	information and Communication Technology
IR	Interim Report
IUCN	International Union of the Conservation of Nature and natural resources (World Conservation Union)
LP	Lead Partner
MEGA	Metropolitan European Growth Area
N10	10 new Member States: Cyprus, Czech republic, Estonia, Hungary, Latvia, Malta, Poland, Slovenia, Slovene republic (CY, CZ, EE, HU, LT, LV, MT, PL, SI, SK)
N12	N10 + Bulgaria and Romania
NGO	Non Governmental Organisation
NCI	Natural Capital Index
NUTS	Nomenclature of Territorial Units for Statistics.
PEEN	Pan-European Ecological Network
Phare	Poland and Hungary Assistance to the Restructuring of the Economy.
pSPA	Potential Special Protected Areas
SAC	Special Area of Conservation
SPA	Special Protection Area under the EC Birds Directive
Tacis	Technical Assistance for the Commonwealth of Independent States
TEN	Trans-European Network
RSII	Regional Summary Innovation Index
TEN	Trans European Network of Infrastructure
TINA	Transport Infrastructure Needs Assessment
UNEP-WCMC	United Nations Environment Programme - World Conservation Monitoring Centre

## 6.2 Glossary

Bio diversity	<p>“Biological diversity” (biodiversity) means the variability among living organisms from all media sources, including, terrestrial, marine and other aquatic ecosystems in addition to the ecological complexes of which they are part. This includes diversity within species, between species and of ecosystems.</p> <p>Biodiversity is characterized by genetic diversity, species diversity and habitat diversity</p>
Blue Banana	<p>The zone in which most of the economic activities were developed, including England, Belgium, the Netherlands, the Rhine Ruhr, and the Rhine main development zone, connecting Switzerland with Milan.</p>
Forest	<p>Forest is defined as land with tree crown cover (or equivalent stocking level) of more than 10% and area of more than 0.5 ha. The trees should be able to reach a minimum height of 5 m at maturity (Eurostat)</p>
Landscape	<p>Landscape is defined as an area, perceived by people, whose character is the result of the action and interaction of natural and/or human factors.</p>
Macro level	<p>The global, European level</p>
Meso level	<p>The national, transnational level</p>
Micro level	<p>The local and regional level</p>
Pentagon	<p>The core area component of the core-periphery model outlined in the ESDP. The pentagon consists of the area between London, Paris, Milan, Munich and Hamburg.</p>
Semi-natural areas	<p>Natural areas with a specific mix of cultural and natural values. Undisturbed natural areas hardly exist in Europe.</p>
Species richness	<p>The number of different species living in an area</p>
Species diversity	<p>Indicates the relative importance of the number of species, either in comparison to the range of species potentially present in a given area or to the same relative value in different geographical areas.</p>



NUTS	This nomenclature of territorial units for statistics was drawn up jointly by Eurostat and the other commission departments in order to provide a single and coherent territorial breakdown for the compilation of EU regional statistics. The current NUTS nomenclature (version 2001) subdivides the territory of the European Union into 78 NUTS 1 regions, 211 NUTS 2 regions and 1 092 NUTS 3 regions. (Eurostat)
Ramsar	Ramsar sites are designated under the Convention on Wetlands, signed in Ramsar, Iran, in 1971, which is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources.
Semi natural areas	Semi natural areas can be defined as natural areas with a specific mix of cultural and natural values. Undisturbed natural areas hardly exist in Europe.
Urbanisation	The concentration of human activities in settlements of various densities, including residential, industrial, other economic and service activities as well as the related infrastructure.



## **7 List of references, including the use of results from projects outside the ESPON programme**

See bibliography.



## **8 List of publications of the TPG members resulting from the research undertaken**

Presentation by Royal Haskoning at the Space Conference (Ruimte Conferentie), held at 26 October 2004 in Rotterdam, organised by the Dutch national planning agency (Ruimtelijk Plan Bureau)



## 9 Indication of performance indicators achieved

**Table 1** Number of performance indicators achieved

Number of spatial indicators developed: - in total covering - the EU territory - more than the EU territory	2  yes no
Number of spatial indicators applied: - in total covering - the EU territory - more than the EU territory	14  yes no
Number of spatial concepts defined	-
Number of spatial typologies tested	6
Number of EU maps produced	26
Number of ESDP policy options addressed in that field	3





## **10 Additional maps not included in the core text of the Report**

Not relevant.



## 11 Bibliography

- Baland, J.M. and J.P. Platteau, Halting Degradation of Natural Resources: Is There a Role for Rural Communities?, FAO and Clarendon Press, Oxford (UK), 1996.
- Baldock, D., G. Beaufoy, F. Brouwer & F. Godeschalk (1996) Farming at the Margins: abandonment or redeployment of agricultural land in Europe. – London, Institute for European Environmental Policy & The Hague, Agricultural Economics Research Institute.
- Borrini-Feyerabend G., Collaborative Management of Protected Areas: tailoring the approach to the context, IUCN, 1996.
- Bos, H. for the European Travel commission, 'Trends for Tourism in Europe', Brussels, 2003.
- Bouwma, I.M., R.P.B. Foppen & A.J.F.M. van Opstal (2004) Ecological corridors on a European scale: a typology and identification of target species, in Jongman, R.H.G. & G. Pungetti (Eds) Ecological Networks and Greenways: Concept, Design, Implementation. – Cambridge, Cambridge University Press.
- Bouwma, I.M., Jongman, R.H.G. & R.O. Butovsky, Indicative map of the Pan-European Ecological Network for Central and Eastern Europe. In: ECNC Technical report series, 2002
- Bromley, D.W. and M. Cernea, The Management of Common Property Natural Resources: Some Conceptual Fallacies, World Bank Discussion Paper 57, Washington D.C., 1989.
- Brouwer F., F. Godeschalk, Nature management, landscape and the CAP, Agricultural Economics Research institute (LEI), the Hague, 2004
- Carter, R.W.G., Coastal Environments. From the SEAGIS Phase 1 report Interreg IIC North Sea Programme, page 5, 1991
- Commission of the European communities, Commission communication to the council, the European parliament, the economic and social committee and the committee of the regions. Basic orientations for the sustainability of European tourism, Brussel, 2003 (COM(2003)716 final)
- Council for the Pan-European biological and landscape diversity strategy (STRA-CO), Working group on agriculture and environment (est.

Hoogeveen, Y.R., J.E. Petersen, P. Gabrielsen), Agriculture and biodiversity in Europe, Strassbourg, 2002 (STRA-CO?AGRI (2001)17)

- Delbaere, B.C.W. (ed.), Facts & Figures on Europe's biodiversity, State and trends 1998-1999, Tilburg: ECNC, 1998
- EEB, Protecting nature in rural areas outside Natura 2000 – The role of agriculture. EEB report 2003/004 – Brussels, European Environmental Bureau, 2003.
- ENVIPLAN – G. Tsekouras & Associates, REP – A Resource Exchange Programme for River Potamos, Corfu – Greece, LIFE98 ENV/GR/000234, Corfu Municipality Development Enterprise, 2001.
- ENVIPLAN – G. Tsekouras & Associates, Comprehensive Management Plan of Coastal Areas: innovative actions for the National Marine Park of Zakynthos, Greece, LIFE ENV/GR/000751, National Marine Park of Zakynthos Agency, 2004.
- ESPON, The ESPON 2006 programme, Interreg III Community initiative – Art. 53, Luxembourg, 2002
- European Commission (EC), ESDP European Spatial Development Perspective. Toward balanced and sustainable development of the territory of the European Union, Luxembourg, 1999
- European Commission, DG XXIII, Facts and Figures on the Europeans on holidays, 1997-1998, Executive Summary, March 1998
- European Commission, Enterprise Directorate General, 'European Trend Chart on Innovation', A publication from the Innovation, 2002
- European Commission, Eurostat yearbook 2002. The statistical guide to Europe. Data 1990-2000, Luxembourg, 2002.
- European Commission, First Report on Economic and Social Cohesion, 1996
- European Commission, Second Report on Economic and Social Cohesion, 2001
- European Commission, Structure, performance and competitiveness at European tourism and its enterprises, Luxembourg, 2003
- European Commission, Third Report on Economic and Social Cohesion, 2004
- European Environment Agency (EEA), Core set of indicators, Febr. 2004
- European Environment Agency (EEA), Europe's environment: the third assessment, Environmental assessment report No 10, 2003

- European Environment Agency (EEA), The Bio geographical Regions Map of Europe. Basic principles of its creation and overview of its development, Marc Roekaerts, March 2002A
- European Environment Agency (EEA), Environment in the European Union at the turn of the century, 1998.
- European Environment Agency (EEA), From National monitoring to European Reporting. The EEA framework for policy relevant indicators, by A.R. Gentile, 1997
- European Environment Agency (EEA), Nature Conservation – Annual Summary Report 1996, published 1999.
- European Environment Agency (EEA), Development of common tools and an information infrastructure for the shared European Environment Information System, 2002B
- European Environment Agency (EEA), Paving the way for EU enlargement: Indicators of transport and environment integration – TERM 2002. Environmental issue report No. 32 – Luxembourg, Office for Official Publications of the European Communities, 2002C
- European nature, The Pan – European Ecological Network, (issue 1) Tilburg, 1998.
- Expert group on the urban environment, working group: measuring, monitoring and evaluation in local sustainability, Towards a local sustainability profile – European common indicators, Methodology sheets for testing phase 2001-02, Luxembourg, 2001
- Fisher, R.J., Collaborative Management of Forests for Conservation and Development, Issues in Forest Conservation, IUCN, September 1995.
- Florida, R., 'The rise of the Creative Class and how it's transforming work, leisure, community and everyday life', 2002.
- Florida, R. Competing in the Age of Talent: Environment, Amenities and the New Economy'. Carnegie Mellon University, Pittsburgh, PA, 2000.
- Greek Ministry of the Environment, Planning & Public Works, Study of the Spatial Impacts of the co-funded Policies / Programmes / Actions of the EU on Greek Regions for the period 1986 – 1996, Athens 1998.
- Greek Ministry of the Environment, Planning & Public Works, The Enhancement of the Environment as a Factor of Development in the Mediterranean Space" Final Report, Synthesis of Tasks, pilot action ARCHI-MED, art. 10 ERDF Sub-action 2.2, transnational cooperation in the field of spatial planning, Athens 2001.

- Hall, P., Growing the European Urban System, London/Prague Institute for Global Urban Development.
- Harmon, D., "National park residency in developed countries: the example of Great Britain", in West and Brechin, 1991.
- Heath, M.F. & M.I. Evans (Eds), Important Bird Areas in Europe: Priority sites for conservation. 2 vols. BirdLife Conservation Series No 8 – Cambridge, UK, BirdLife International, 2000
- IUCN (The World Conservation Union), 1993 United Nations List of National Parks and Protected Areas, UNEP (United Nations Environment Program), WCMC (World Conservation Monitoring Center) & IUCN, Gland (Switzerland), 1994a.
- IUCN, Guidelines for Protected Area Management Categories, IUCN, Gland (Switzerland), 1994b.
- IUCN, Parks for Life: Action for Protected Areas in Europe, IUCN, Gland (Switzerland), 1994c.
- IUCN, Best Practice for Conservation Planning in Rural Areas, IUCN, Gland (Switzerland) and Cambridge (UK), 1995a.
- IUCN, Evaluation of the Implementation of the 1984 Action Plan for Biosphere Reserves, paper presented at the March 1995 UNESCO Conference in Seville, 1995b.
- Jongman, R.H.G. & G. Pungetti (Eds), Ecological Networks and Greenways: Concept, Design, Implementation. – Cambridge, Cambridge University Press, 2004.
- Koomen A.J.M., D.M. Wascher, Aspecten van success en vallen van het landschapsbeleid, Alterra-rapport 426, Wageningen, 2002
- Lewis C. (editor), Managing Conflicts in Protected Areas, IUCN 1996.
- LEI- Landbouw Economisch Instituut: Landbouwsubsidies soms schadelijk voor ruimtelijke kwaliteit' in: Agri Holland, 22-08-2003
- Lovei M. and Weiss C. Jr, Environmental Management and Institutions in OECD Countries: Lessons from Experience, 1998, World Bank.
- Lutz E. (Ed), Caldecott J., Decentralization and Biodiversity Conservation: A World Bank Symposium World Bank, January 1997.
- Marren, P., England's national nature reserves. – London, T & AD Poyser Ltd, 1994.
- Mücher, C.A., R.G.H. Bunce, R.H.G. Jongman, J.A. Klijn, A. Koomen, M. Metzger & D.M. Wascher, Identification and Characterisation of

Environments and Landscapes in Europe. Alterra-Report 832 - Wageningen, Alterra - Green World Research, 2003a.

- Mücher, S., D.M. Wascher & J. Klijn, European Landscape Character Classification and Map. Alterra Technical Report – Wageningen, Alterra (in press), 2003b.
- Nowicki, P., G. Bennett, D. Middleton, S. Rientjes & R. Wolters (eds), Perspectives on ecological networks. – Tilburg, European Centre for Nature Conservation, 1996.
- NRC (dutch newspaper)25-3-2004, 'Stand kievit dealt door natuurboeren', 24-3-2004, 'Nederland raakt achterop bij Ambities EU'
- OECD, Highlights OECD Environmental Strategy, 2004 Review of Progress, 2004.
- Phillips, S, "Windfalls for Wilderness: Land Protection and Land Value in the Green Mountains."Ph.D. Dissertation, Virginia Polytechnic Institute and State University, Blacksburg, VA, 2004.
- Power, T.M. 'Lost Landscapes and Failed Economie: The Search for a Value of Place.'Island Press, Covelo, CA, 1996.
- Rasker, R., 'A new look at old vistas: the economic role of environmental quality in western public lands.' In: University of Colorado Law Review, 65: 369-99, 1994.
- Richardson, R.B., 'The economic Benefits of Wildlands in the Eastern Sierra Nevada Region of California', Wilderness society, San Francisco and Colorado State University, 2002
- Rudzitis, G., and H. Johansen, 'How important is wilderness? Results from a United States survey' In: Environmental management 15(2): 227-233
- Stanners, D. & P. Bourdeau (Eds), Europe's environment: the Dobris assessment. – Copenhagen, European Environment Agency, 1995.
- TERRA – An experimental laboratory in spatial planning, European Union Regional policy, Luxembourg, 2000
- The Economic Benefits of Wilderness: Focus on Property Value Enhancement. In: Science & Policy brief, The Wilderness Society, March 2004 (2)
- UNEP, Protected Areas and Biodiversity: an Overview of Key Issues, 2004.
- UNEP / GRID-Arendal, Biodiversity in Central and Eastern Europe, 2000.

- UNESCO, "The Seville Strategy for Biosphere Reserves", *Nature and Resources*, 31, 2: 2-10, 1995.
- United Nations European Economic Committee: Working Group for the Sustainable Cities Report, 1995-1997
- Van Swaay, C.A.M. & M.S. Warren (Eds), *Prime Butterfly Areas in Europe: Priority sites for conservation*. – National Reference Centre for Agriculture, Nature and Fisheries, Ministry of Agriculture, Nature Management and Fisheries, The Netherlands, 2003.
- Visser, N. 'Regions of Europe: Tourism is coming'
- 'Voor boeren, burgers en buitenlui', Raad voor het Landelijk Gebied, June 2002.
- Williams, P.H., Key sites for conservation: area selection methods for biodiversity, in G.M. Mace, A. Balmford & J.R. Ginsberg (Eds) *Conservation in a changing world: integrating processes into priorities for action*. – Cambridge, Cambridge University Press, 1998.
- World Bank, *Advancing Sustainable Development: The World Bank and Agenda 21*, June 1997.
- WPEP, *Environmental Performance Reviews (1<sup>st</sup> cycle): Conclusions and Recommendations 32 countries (1993-2000)*, OECD, 2000.
- WWF HELLAS - Ministry of the Environment, Planning and Public Works, *Special Environmental Study for the Management of the Protected Forest of Dadia*, EEC-ACNAT Programme, 1993.



# **ESPON project 1.3.2 - Territorial trends of the Management of the Natural Heritage**

## **ANNEX 1 QUESTIONNAIRE**



*Royal Haskoning*





**ESPON project 1.3.2  
Territorial Trends in the  
Management of Natural Heritage**

This report represents the final results of a research project conducted within the framework of the ESPON 2000-2006 programme, partly financed through the INTERREG programme.

The partnership behind the ESPON programme consists of the EU Commission and the Member States of the EU25, plus Norway and Switzerland. Each partner is represented in the ESPON Monitoring Committee.

This report does not necessarily reflect the opinion of the members of the Monitoring Committee.

Information on the ESPON programme and projects can be found on [www.espon.lu](http://www.espon.lu)

The web side provides the possibility to download and examine the most recent document produced by finalised and ongoing ESPON projects.

ISBN number 90-74718-12-4

This basic report exists only in an electronic version.

© The ESPON Monitoring Committee and the partners of the projects mentioned.

Printing, reproduction or quotation is authorized provided the source is acknowledged and a copy is forwarded to the ESPON Coordination Unit in Luxembourg'.





## Table of contents

Questionnaire.....	10
1     General information .....	13
2     Results .....	18
3     Conclusions and Recommendations .....	38

## Questionnaire

The 29 countries of ESPON space in the European continent encompass a huge variety of environmental status, of natural areas, as well as of policies and management practices.

Such search inevitably dictates the need for revealing and studying the relationship between the protection of nature and the means by which this is carried out. In other words it is very important to understand how natural heritage is managed.

Any form of intervention, either formal (e.g. legislation, regulations, etc) or informal (e.g. traditional practices, etc) by public (e.g. central government, local authorities, etc) or the private sector (e.g. NGO's, etc) should be explored.

Moreover, since Management could be applied either directly or indirectly in relation to matters of natural heritage (e.g. enhancement or protection can be achieved by spatial planning directives as well as, in a more direct form, by specific regulation regarding natural resources), the effectiveness of management has to be investigated.

Thus, main issues that ought to be clarified regarding management of natural heritage are: what, where, how, and by whom?

In order to understand and research the process of management and its relation with the spatial development, a questionnaire has been elaborated. The questions that have been incorporated to the circulated questionnaire have been designed in order to cover all the aforementioned issues.

The questions that have been included to the questionnaire fall to five categories, in order for all aspects of protection and spatial planning to be covered.

The first three questions have been formulated in order to register the degree of consistency of the legislative environmental and spatial planning framework within the European space, as well as in relation to the European Union's corresponding framework.

Questions 4 and 5 are useful in order to research the perception that European Countries have regarding 1) their Natural Heritage and 2) the main threats to their environment.

The integration of the protection of Natural Heritage into the Spatial Planning systems of the European countries is being researched through questions 6, 7, 8 and 9.



Questions 10, 11, 12, 13 and 14 focus on the protection of natural areas. It is important to understand which type of areas are being protected, as well as the financial and management procedures that support the process of protection.

Finally, the means used currently for nature protection, such as land acquisition, incentives and grants and their relation to conventional means, are being investigated within the European space, through questions 15 and 16.

In order for the questionnaire to provide the necessary data and information for the European territory, a target group of contributors was identified.

It was of paramount importance to obtain information through two discrete channels. The first was an official one which would have provided the perception of each country and/or region. Formal sources include Ministries of Environment and Spatial Planning as well as other relevant official Agencies. The second channel was expected to reflect the other viewpoint (if such existed) and thus encompasses experts and NGO's that are involved in environmental protection.

Therefore, the management questionnaire was sent to all ESPON National Contact Points, to the Ministries of Environment and Planning of 29 countries, to relevant environmental agencies and to experts within the ESPON space. Moreover, this questionnaire was sent to NGO's that are involved with environmental protection.

Firstly, all ECP have been contacted for two reasons. Firstly to provide any relevant contacts in their respective countries and secondly, to investigate if it will be feasible for any of them to contribute themselves to the questionnaire.

The second task was the registration of all available contacts which could be contacted through the project's TPG. That is agencies, ministries and experts in universities as well as in the private sector.

The third task was to contact main NGO's such as WWF, Greenpeace and FoE. This type of contributors would be very helpful, since objectivity can be strengthened in cases where their answers differ from those provided by state authorities and thus should not be ignored.

The following twenty two countries are these which provided data and information through the "management questionnaire". Regarding the United Kingdom, only Wales has not responded.

From all the countries that have been contacted, Belgium, Germany, Czech Republic and Cyprus, responded, stating that they will provide the completed

questionnaire as soon as possible, but they have not sent any completed questionnaire. On the other hand Estonia, Latvia, Malta and Austria, have not responded at all.

In the next table, the countries that have completed the “management questionnaire” are presented.

1	BULGARIA	12	POLAND
2	DENMARK	13	PORTUGAL
3	FINLAND	14	ROMANIA
4	FRANCE	15	SLOVENIA
5	HELLAS	16	SLOVAK REPUBLIC
6	HUNGARY	17	SPAIN
7	IRELAND	18	SWEDEN
8	ITALY	19	SWITZERLAND
9	LITHUANIA	20	THE NETHERLANDS
10	LUXEMBOURG	21	UK
11	NORWAY		

The countries which have not responded are presented in the next table.

1	AUSTRIA
2	ESTONIA
3	LATVIA
4	MALTA

The countries which have responded, but not provided the “management questionnaire” yet, are presented in the next table.

1	BELGIUM
2	CYPRUS
3	CZECH REPUBLIC
4	GERMANY

The obtained information has been collected through the following organisations, agencies and ministries, which were the contributors to management questionnaire.

## 1 General information

The obtained information has been collected through the following organisations, agencies and ministries, which were the contributors to management questionnaire.

- |                         |  |
|-------------------------|--|
| <b>1. Bulgaria:</b>     | Experts  |
| <b>2. Denmark:</b>      | Danish Forest & Landscape Research Institute   |
| <b>3. Finland:</b>      | Ministry of Environment<br>Finnish Environment Institute<br>Forest and Park Service      |
| <b>4. France:</b>       | Ministry of Ecology and Sustainable Development-<br>Directorate of Nature and Landscapes |
| <b>5. Greece:</b>       | WWF HELLAS<br>Ministry of Environment, Spatial Planning and<br>Public Works<br>Expert    |
| <b>6. Hungary:</b>      | VÁTI Hungarian Non-Profit Company for Regional<br>Development and Urbanism               |
| <b>7. Ireland:</b>      | Department of the Environment, Heritage and<br>Local Government                          |
| <b>8. Italy:</b>        | University of Tuscia   |
| <b>9. Lithuania:</b>    | the state service for protected areas under the<br>ministry of environment               |
| <b>10. Luxembourg:</b>  | Ministry of the Interior, Direction for Spatial<br>Planning (Datur)                      |
| <b>11. Netherlands:</b> | National Reference Centre of the Ministry of<br>Agriculture, Nature and Food Quality     |
| <b>12. Norway:</b>      | Eastern Norway Research Institute  |
| <b>13. Poland:</b>      | Ministry of the Environment  |
| <b>14. Portugal:</b>    | Nature Conservation Institute (ICN)  |
| <b>15. Romania:</b>     | INCD URBANPROIECT  |

- 16. Slovak Republic:** Ministry of Environment - Branche for Landscape planning
- 17. Slovenia:** Ministry of the Environment, Spatial Planning and Energy - National Office for Spatial Planning, Natural Conservation Sector
- 18. Spain:** Directorate General for the Conservation of Nature - Ministry for the Environment
- 19. Sweden:** Swedish ECP  
The Royal Institute of Technology
- 20. Switzerland:** Swiss Agency for the Environment, Forests and Landscape  
Swiss Federal Office for Spatial Development
- 21. United Kingdom:** **England:** English Nature  
**Scotland:** Scottish Natural Heritage  
**N.Ireland:** Environment and Heritage Service of the Department of the Environment for Northern Ireland

## **Problems and General Observations**

All twenty-nine countries have been contacted, by various means. All ESPON national contact points have been contacted more than once. Moreover, ESPON contact persons in observer countries have been also contacted. Available contacts through ESPON data navigator have been contacted as well. Many experts have been contacted, as well as various NGO's at various levels, national and European.

Unfortunately, a 100% return has not been achieved. The responses come from twenty one countries, out of twenty nine. Furthermore, the number and type of responses from the contributing countries does not make up the necessary for the extraction of firm conclusions.

Despite all the efforts that have been made and for a long time period (which continued up to the end of July 2004], the contributions made were not up to expectations.

The majority of countries which responded, almost 65%, have more than one agency and /or ministry responsible for the protection and/or management of natural areas. The respective organisations for each country are presented in the next table.

## **BELGIUM**

3 Regions :

- Brussels - Capital - Institut Bruxellois pour la Gestion de l' Environnement,
- Wallonia- Direction générale des Ressources naturelles et de l'Environnement,
- Flanders-Institute of Nature Conservation

## **BULGARIA**

- Ministry of Environment and Water,
- Ministry of Agriculture and Forestry - National Forestry Directorate

## **DENMARK**

- The ministry of the environment - The Danish forest and nature agency

## **FINLAND**

- Ministry of the Environment,
- Ministry of Agriculture and Forestry: Metsähallitus (manages protected areas acquired by the state),
- 13 Regional Environmental Centres,
- Finnish Environment Institute,
- Finnish Forest Research Institute

## **FRANCE**

- Ministry of Ecology and Sustainable Development - Regional Direction of the environment,
- Ministry of Farming, Fishery and Rural Matters,
- Ministry for Infrastructure, Transport, Spatial Planning, Tourism and the Sea

## **GREECE**

- Ministry of the Environment, Spatial Planning and Public Works,
- Ministry of Agriculture

## **HUNGARY**

- Ministry of the Environment And Water,
- Ministry of Agriculture

## **IRELAND**

- Department for Environment, Heritage and Local Government,
- Department of Agriculture and Food,
- Department of Communications, Marine and Natural Resources,
- Office of Public Works,
- Environmental Protection Agency,
- Planning authorities

## **ITALY**

- Ministry for the Environment,
- Ministry of Agricultural and Forest Policy

## **LITHUANIA**

- Ministry of Environment - The State Service for Protected areas

## **LUXEMBOURG**

- Ministry of environment:
  - Environmental management and audit scheme,
  - Administration for waters and forests,
- Ministry of the Interior:
  - Spatial Planning,
  - Water Management

## **THE NETHERLANDS**

- Ministry of Agriculture, Nature and Food quality,
- Forestry Agency,
- Ministry of Transport, Public Works and Water Management,
- Ministry of Housing, Spatial Planning and the Environment

## **NORWAY**

- Ministry of the Environment
- The Directorate for Nature Management
- Ministry of Agriculture,
- Ministry of Fisheries,

## **POLAND**

- Ministry of the Environment,
- Ministry of Agriculture & Rural Development

## **PORTUGAL**

- Ministry of Agriculture, Rural Development & Fisheries,
- Nature Conservation Institute (national level),
- Local authorities (local level)

## **ROMANIA**

- Ministry of Agriculture, Forestry, Water and Environment

## **SLOVAK REPUBLIC**

- Ministry of the Environment,
- Ministry of Agriculture,
- Slovak Environmental Agency,
- Water Research Institute,
- Slovak Caves Administration,
- Slovak Inspection of Environment,
- State Nature Conservancy

## **SLOVENIA**

- Ministry of the Environment, Spatial Planning and Energy,
- Ministry of Agriculture, Forestry & Food

## **SPAIN**

- Ministry of Environment - General Directorate of Nature Conservation,
- The Autonomous Agency for National Parks
- 17 Autonomous regions + 2 Autonomous cities which have the competence on the issue of nature conservation

## **SWEDEN**

- Ministry of the Environment,
- Swedish Environmental Protection Agency

## **SWITZERLAND**

- Primarily Cantons have the Authority and have their own environmental agencies
- Swiss Agency for the Environment, Forests and Landscape,
- Federal Commission for the Protection of Nature and the Preservation of National Heritage

## **UNITED KINGDOM**

### ***England***

- Department for Environment, Food and Rural Affairs,
- English nature

### ***Scotland***

- Scottish Natural Heritage,
- Forestry Commission,
- Environmental Protection Agency

### ***N. Ireland***

- Environment and Heritage Service of the Department of Environment
- Department of Agriculture and Rural Development

## **2 Results**

The answered questionnaires give information on the number, type, location, protection status, and surface area of protected natural areas.

### **(BG) BULGARIA**

*Total area of PA-s: 549 927.2 ha*

*National parks – 35 690.6 ha*

*Reserves – 76 979.0 ha*

*Nature landmarks – 21 833.6 ha*

*Protected cities – 41 634.4 ha*

*Historical sites 8246.7 ha*

*National Parks – 150 362.3 ha*

*Nature parks – 210 663.5 ha*

*Maintained reserves 4517.1 ha*

*Data is based on NSI documents as of 31.12.2002*



## (CH) SWITZERLAND

Number and total extent of natural areas listed in Federal Inventories and other protected areas:

For the location look at the List of Landscapes and Natural Monuments (BLN):

<b>Inventory</b>	<b>No. of sites</b>	<b>Protection status (IUCN category)</b>	<b>Total area (ha)</b>	<b>Proportion of area of CH (%)</b>
National Park	1	I	17,033	0.41
Landscapes and Natural Monuments (BLN)	160	III / V	780,704	18.91
Reserves for Waterbirds and Migrants	28	IV	18,920	0.46
Game Sanctuaries	41	IV	149,528	3.62
Mire Landscapes	89	IV	87'334	2.12
Raised Bogs and Transitional Mires	549	IV	1,524	0.04
Fenlands	1,163	IV	19,186	0.46
Alluvial Zones	227	IV	20,083	0.49
Amphibian Spawning Areas	701	IV	10,878	0.25
Ramsar Convention	8		6,641	0.16
Biosphere Reserve	2		56,473	1.36
Area covered by Ordinance concerning Compensation for Losses in Hydropower Generation (VAEW)	1		27,891	0.68
<b>Total area of CH</b>			<b>4,128,416</b>	<b>100</b>
Standing waters			141,922	3
Flowing waters			30,632	0.7

[http://www.kbnl.ch/site/d/landschaft\\_ist/bln/uebersicht\\_inventar.htm](http://www.kbnl.ch/site/d/landschaft_ist/bln/uebersicht_inventar.htm)

## **(DK) DENMARK**

Large parts of the Danish nature are protected with the help of one or several provisions. This can be specific localities like protected areas and reserves or more generally with the help of specific legal rules and provisions. Often, there is a large overlap which implies that many nature areas are protected with the help of several legal provisions. As an example, the Wadden Sea is protected as a nature- and wildlife reserve, as a Ramsar area, a EC Habitat Area and a EC Bird Protection Area as well as the general provisions on protected with the help of the Act on Nature Protection.

<b>Area</b>	<b>Code</b>	<b>Area (km<sup>2</sup>)</b>	<b>Protection status</b>
Common	3210	392,09	Protected area - § 3, Nature Protection Act
Heath	3220	979,47	Protected area - § 3, Nature Protection Act
Fresh meadow	4110	808,88	Protected area - § 3, Nature Protection Act
Bog	4120	875,42	Protected area - § 3, Nature Protection Act
Marsh & Tidal meadow	4210	384,62	Protected area - § 3, Nature Protection Act
Nature- & wildlife reserve / land & wetland		3.302,75	Nature- & wildlife reserve, Act on Hunting & Wildlife Administration
EC Habitat Area / land & wetland		10.256,81	EC Habitat Area, Provision nr. 782 / 1998, Ministry of the Environment
EC Bird Protection Area / land & wetland		9.761,79	EC Bird Protection Area, Provision nr. 782 / 1998, Ministry of the Environment
Ramsar Area		7.383,33	Provision nr. 782 / 1998, Ministry of the Environment, Ramsar Convention
Area protection		1.832,10	Protected area, Nature Protection Act
State protection		1.966,51	Protected area, Nature Protection Act
Total		37.943,77	

## **(ES) SPAIN**

<http://www.europarc-es.org>

<http://www.europarc-es.org/s/lista/index.html><sup>1</sup>

## **(FI) FINLAND**

*The statutory protected areas, wilderness areas, national hiking areas, recreation forests, protected area reservations and public water areas managed by Metsähallitus on December 31, 2002:*

<b>Type of Area</b>	<b>Number</b>	<b>Surface area, sq.km</b>
<i>National Parks</i>	32	8.079
<i>Strict Nature Reserves</i>	17	1.502
<i>Protected Mire Areas</i>	173	4.487
<i>Protected Herb-rich Forests</i>	49	11
<i>Other Protected Areas</i>	177	788
<i>Established by Decision of Metsähallitus</i>	24	8
<b>Statutory Protected Areas in total</b>	<b>472</b>	<b>14.875</b>
 <i>Protected Area Reservations in Protection Programmes</i>		
<i>Wilderness Areas</i>	12	6.246
<i>National Hiking Areas</i>	7	14.895
<i>Recreation Forests</i>	101	359
<b>Other Protected Area in Total</b>		<b>23.195</b>
<i>Public Water Areas</i>		27.520
<b>All Areas in Total</b>		<b>65.590</b>

---

<sup>1</sup> Access to this site has proved impossible

## **(FR) FRANCE**

### **STATUTORY PROTECTIONS**

**7 national parcs** (public administrative establishments ), 0,7 % of the national territory,

Vanoise, Port-Cros, Pyrénée, Cévennes, Ecrins, Mercantour, Guadeloupe

**and 3 parcs to be created**

le parc de la forêt tropicale de Guyane, le parc de la mer d'Iroise, le parc de la Réunion

**153 national nature reserves**, 1% of the national territory,

540 833 ha (306 542 in overseas territories),

**153 regional nature reserves** representing 16 000 ha,

**516 'arrêtés préfectoraux de biotope'** covering **275 000** hectares.

**5 100** 'sites inscrits' et

**2 700** 'sites classés' under the 1930 law

**177 biological reserves** in public forests covering 143 900 ha

### **CONTRACT PROTECTIONS**

**40 regional natural parcs** (syndicats mixtes), 12% of national territory

#### **Bird directive**

- **119** ZPS (zones de protection spéciale) **934 141** ha

#### **Habitat directive**

- **1174** pSIC

## **(GR) GREECE**

All the areas already protected under the former national legislation were included in the ecological network Natura 2000. Therefore the Greek national list of pSCIs (under the Habitats Directive) can be regarded as containing the total of Greek protected natural areas. This list included 336 areas and covers 27.228 Km<sup>2</sup>, that is around 20,6% of the country.

According to WWF Greece the terrestrial part of national list of pSCI is quite satisfactory. On the other hand, marine protected areas are restricted

to only about 2%, a percentage quite low compared with the relevant percentages of other EU countries with a much shorter coastline.

There are ten National Parks (Olympos, Parnassos, Parnitha, Ainos, Samaria, Iti, Pindos, Vikos-Aoos, Prespa, Sounio). Regarding Natural monuments more than 51 exist. There are 19 aesthetic forests and 10 Ramsar wetlands.

## **(HU) HUNGARY**

National parks	Landscape protection areas	Nature conservation areas	Natural monuments	Local nature conservation areas
9	35	142	1	1223
4.409.000 ha	3.492.000 ha	259.000 ha		367.000 ha

## **(IE) IRELAND**

*Note that there is substantial overlap of designations e.g. more than 70% of SPAs have partial or full overlap with SACs. However data are not available at this time which would give a more exhaustive analysis.*

<b>Num-ber</b>	<b>Type</b>	<b>Location</b>	<b>Protection Status</b>	<b>Surface area (ha)</b>
420	SAC	Nationwide	European; protected by 92/42/EEC & National legislation	1,097,297
135	SPA	Nationwide	European; protected by 79/409/EEC & National legislation	ca. 260,000
82	NHA	Nationwide	National; protected by Wildlife (Amendment) Act 2000	23,347
78	Statutory Nature Reserve	Nationwide	National; protected by Wildlife Act 1976	18,095
6	National Park	Nationwide	State Property Act and Habitats Directive	59,581
7	Refuge for Fauna	Nationwide	National; protected by Wildlife Act 1976	1,756
68	Wildlife Sanctuary	Nationwide	National; protected by Wildlife Act 1976	?
47	Ramsar Site	Nationwide	Moral	70,550
14	Biogenetic Reserve	Nationwide	Moral	6,587
2	UNESCO Biosphere Reserve	Nationwide	Moral	11,500
1	World Heritage Site	Nationwide	Moral	780

### **(IT) ITALY**

*Terrestrial areas officially designated for nature conservation: National Parks = 1255995 ha; State Reserves = 113773 ha; Regional Parks = 1187139 ha; Regional Reserves = 140930 ha; Other designated areas = 55155 ha.*

*Marine areas officially designated for nature conservation = 259690 ha.*

### **(LI) LITHUANIA**

<b>Category</b>	<b>Number</b>	<b>Area (ha)</b>	<b>% of country area</b>
Strict reserves:	5	18922	0,292
Nature	3	18363	0,281
Cultural	2	559	0,009
Strict nature reserve boundary	1	120	0,002
National parks	5	152294	2,332
Regional parks	30	438480	6,715
State nature reserves:	254	146238	2,239
Geological	10	638	0,010
Geomorphological	40	22987	0,352
Hydrographical	34	11933	0,183
Soil	11	1282	0,020
Botanical	32	5118	0,078
Zoological	26	8854	0,136
Teriological	1	9	0,000
Ornitological	6	2425	0,037
Herpetological	3	116	0,002
Icthiological	10	5843	0,089
Entomological	6	461	0,007
Botanical-zoological	14	16904	0,259
Telmological	39	23764	0,364
Landscape	48	54758	0,839
Municipality nature reserves	101	11186	0,171
Biosphere strict reserves	1	18493	0,283
Protected objects of nature heritage	683	-	-
<b>Total:</b>	<b>1080</b>	<b>785733</b>	<b>12,033</b>

## **(LU) LUXEMBOURG**

The protected area in Luxembourg is listed by the Ministry of Environment under:

[http://www.environnement.public.lu/conserv\\_nature/travaux/zones/index.html](http://www.environnement.public.lu/conserv_nature/travaux/zones/index.html)

The surface area is also displayed in this list. The reserves are classified as:

- Humid area
- Dry lawn (=pelouse seche)
- Forestal reserve
- Other reserve

## **(NL) THE NETHERLANDS**

The Netherlands In hectare (100 x 100 m, ha.)	Birds directive (79/409/EEG)	Habitat directive (92/43/EEG)
Agriculture: 2.500.000 ha.	1.000.000 ha.	750.000 ha.
Nature/forest: 500.000 ha.		
Cities: 200.000 ha.		
Infrastructure: 100.000 ha.		
Water: 900.000 ha.		
<b>TOTAL: 4.200.000 ha</b>	<b>24%</b>	<b>18%</b>

N.B. The total area is excluding the Dutch Seas.



## **(NO) NORWAY**

On the Norwegian mainland or continent natural areas are protected according to the Nature Conservation Act. Areas protected at Svalbard are protected according to the Protection of the environment in Svalbard Act.

### **Areas protected according to the Nature Conservation Act. Unofficial status, 24.11.03.**

	<b>Number</b>	<b>Surface area km2 (inkl. freshwater)</b>	<b>% av the Norway</b>
National Parks	21	18316	5.7
Protected Landscapes	134	11741	3.6
Nature Reserves	1647	3256	1.0
Natural Monuments	101	2	0.00
Other Protected Areas	79	97	0.03
<b>Sum</b>	<b>1982</b>	<b>33412</b>	<b>10.3</b>

*Minor areas may be protected according to other Acts, as the Wildlife Act, but the majority of the areas on Norwegian continent are protected according to the Nature Conservation Act. The protected areas are generally located all over Norway, but especially National Parks are located to Mountain Areas and the interior of Northern Norway. See this web address (not updated)*  
[http://www.environment.no/datasok/Data/Biologisk\\_mangfold/Naturvernomrader/verneomr.asp?topmenuindex=4&pagename=Protected+areas](http://www.environment.no/datasok/Data/Biologisk_mangfold/Naturvernomrader/verneomr.asp?topmenuindex=4&pagename=Protected+areas)

## Areas protected according to the Protection of the Environment in Svalbard Act.

	Number	Area km2 <sup>1)</sup>	% av the Svalbard Mainland
National Parks	6	14945	22
Nature Reserves	22	33742	41
Other Protected Areas	79	97	0.02
<b>Sum</b>	<b>107</b>	<b>48784</b>	<b>63</b>

**1)** *The total area protected by the Protection of the Environment in Svalbard Act includes marine areas.*

*In addition to the land area protected (63 %), 76.3 % of the sea within the territorial border at Svalbard is protected according to the Protection of the Environment in Svalbard Act.*

### **(PO) POLAND**

*23 national parks – area: 314 500 ha, protection status: the highest*

*1354 natural reserves – area: 149 000 ha, protection status: the highest*

*120 landscape parks – area: 2490 000 ha, protection status: medium*

*409 areas of protected landscape – area: 7271 000 ha, protection status: low*

*6728 ecological grounds – area: 48460 ha, protection status: low*

*104 documentation posts – area: 881 ha, protection status: low*

*184 natural landscape complexes – area: 79500 ha, protection status: low*

**(PT) PORTUGAL**

*The National Network includes 44 Areas: 1 National Park, 12 Natural Parks, 9 Natural Reserves, 7 Protected Landscapes, 5 Natural Monuments and 10 Protected Sites:*

**Protected Areas in Portuguese Mainland / ha (Protected Sites not included)**

Peneda Gerês National Park	69.693
Montesinho Natural Park	74.618
Douro Internacional Natural Park	85.146
Alvão Natural Park	7.220
Serra da Estrela Natural Park	101.060
Serras de Aire e Candeeiros Natural Park	38.900
Serra de São Mamede Natural Park	29.694
Sintra-Cascais Natural Park	14.451
Arrábida Natural Park	16.521
Sudoeste Alentejano e Costa Vicentina Natural Park	89.595
Vale do Guadiana Natural Park	69.600
Tejo Internacional Natural Park	23.441
Ria Formosa Natural Park	18.400
Dunas de São Jacinto Natural Reserve	666
Paul de Arzila Natural Reserve	580
Serra da Malcata Natural Reserve	16.348
Berlengas Natural Reserve	9 560
Paul do Boquilobo Natural Reserve	529
Estuário do Tejo Natural Reserve	14.560
Estuário do Sado Natural Reserve	23.160
Sapal de Castro Marim e Vila Real de St. António Natural Reserve	2.089
Lagoas de St. André a da Sancha Natural Reserve	3.123
Protected Landscape of Litoral de Esposende	440

Protected Landscape of Serra do Açor	373
Protected Landscape of Corno de Bico	2.181
Protected Landscape of Arriba Fóssil da Costa da Caparica	1.570
Protected Landscape of Lagoas de Bertandos e São Pedro de Arcos	346
Protected Landscape of Albufeira do Azibo	4.897
Protected Landscape of Serra de Montejunto	3.710
Natural Monument of Pedreira do Galinha	147 meters
Natural Monument of Carenque	120 meters
Natural Monument of Pedreira do Avelino, Pedra da Mua e Lagosteiros	-

### **Protected Áreas in Madeira Autonomous Region / ha**

Madeira Natural Park	56 700
Ilhas Desertas Natural Reserve	9 672
Ilhas Selvagens Natural Reserve	9 455
Sítio da Rocha do Navio Natural Reserve	1 710
Garajau Natural Reserve	390

### **Azores Autonomous Region**

*There are 32 legally protected areas spread along the various islands of the archipelago:*

Natural Reserves	11
Protected Landscapes	5
Parcial Natural Woodland Reserves	16

### **Special Conservation Zones and Special Protection Areas in Portuguese Mainland**

**(Natura 2000 Network) / ha**

Rio Lima	5.382
Rio Sabor e Mações	33.476
Morais	12.878
Valongo	2.553
Serra de Montemuro	38.763
Rio Vouga	2.769
Carregal do Sal	9.554
Serra da Gardunha	5.892
Cabeção	48.607
Caia	31.115
Guadiana-Juromenha	2.501
Cabrela	56.555
Comporta-Galé	32.051
Monchique	76.008
Ribeira de Quarteira	582
Cambarinho	24
Litoral Norte	2.540
Barrinha de Esmoriz	396
Monfurado	23.946
Alvito/Cuba	922
Serra da Arga	4.493
Samil	91
Minas de Santo Adrião	3.495
Romeu	4.700
Nisa/Laje da Prata	12.658
Sicó/Alvaiázere	31.678
Azabuxo/Leiria	136
Serras da Freita e Arada	28.659
Barrocal	20.864
Cerro da Cabeça	570

Complexo do Açor	1.362
Arade/Odelouca	2.112
Moura/Barrancos	43.309
Fernão Ferro/Lagoa de Albufeira	4.413
Dunas de Mira, Gândara e Gafanhas	20.511
Peniche/Santa Cruz	8.438
Caldeirão	47.286
Ria de Alvor	1.454
Rio Paiva	14.562
Serra da Lousã	15.158

*In Madeira Autonomous Region there are 14 areas included in Natura 2000 Network and 41 in Azores Autonomous Region, spread along the various islands of the archipelago.*

### **(RO) ROMANIA**

(We attach the Annex 1 to the Law nr. 5/2000, comprising the above needed information).

Biosphere areas and natural parks are 17 sites in total, covering 11.322 km<sup>2</sup> of the surface. Other areas under various protection acts are 824 in total, covering 2.317 km<sup>2</sup> of the surface.

### **(SE) SWEDEN**

**National parks:** (year 2001) number: 28, surface area: 654 020 ha (source: Statistics Sweden), Location: Primarily in the northern part of the country.

**Nature reserves:** (year 2001) number: 2286, surface area: 3 913 190 ha (source: Statistics Sweden). Location: Primarily in the northern part of the country and along the coasts.

**Nature Conservation areas:** (year 2001) number 141, surface area; 224 097 ha (source: Statistics Sweden). Location: Location: Primarily in the northern part of the country and along the coasts.

**Wildlife sanctuaries (land and water) :** (year 2001) number: 1039, surface area: 107 445 ha (source Statistics Sweden). Location: throughout the country.

**National City Parks:** (year 2001) number: 3, surface area: 2639 ha. Location: Stockholm, Solna, Lidingö

**Natural Monuments (individual trees, stones, etc.):** (year 2001) number: 1433, surface area: negligible. Location: throughout the country.

## (SI) SLOVENIA

Category of the protected area	IUCN	number	Surface in ha	Percentage of the total surface of Slovenia (20.365,73 square km)
<b>National protection</b>				
National park	II/V	1	83.807,00	4, 1 %
Regional park	V, III	2	21.166,00	1,0 %
Landscape park	V	2	56.866,00	2,8 %
Nature reserve	I, IV	10	120,00*	
<b>Local protection</b>				
Landscape park	V	39	47.374,00	2,3%
Nature reserve	I, IV	49	**	
Nature monument	III	623	**	
Designed nature (=gardens)***		77	**	
Areas of natural and cultural		10	**	

heritage***				

\* the figure is only for one nature reserve

\*\* no exact figure

\*\*\* *common category with the cultural heritage protection*



**(SK) SLOVAK REPUBLIC**

Review of natural protected areas:

23.3 % - National network of protected areas of Slovak republic

Category	Number	Acreage of protected areas in ha	Acreage of protective zones in ha
National parks	9	317 821	276 379
Protected landscape areas	14	525 547	---
<b>National parks and protected landscape areas together</b>	<b>23</b>	<b>843 368</b>	<b>276 379</b>
<b>Protected area + protective zones</b>		<b>1 119 747</b>	
Natural reserves (NR)	376	11 766,7217	243,4022
National natural reserves (NNR)	231	85 905,4584	3 296,9989
Natural monuments (NM)	230	1 531,5489	207,5711
National natural monuments (NNM)	60	58,9381	26,6225
Protected areas (PA)	189	7 001,1997	2 263,2476
<b>Together NR, NNR, NM, NNM, PA</b>	<b>1 086</b>	<b>106 263,8668</b>	<b>6 037,8423</b>
<b>Protected areas + protective zones</b>		<b>112 301,7091</b>	

Global acreage of Natural parks and Protected landscape areas in Slovak republic is 4 903 500 ha (22,8% of global area).

Global acreage of NR, NNR, NM, NNM, PA together with their protective zones (3. – 5. degree of protection) is 2,3% of global area of Slovak republic.

40,8 % (1 998 283 ha) - Woodland areas of Slovak republic

**(UK) UNITED KINGDOM**  
**ENGLAND**

Designation	Number of Sites	Area (ha)
SSSI Sites of Special Scientific Interest	4111	1,076,703.76
NNR National Nature Reserves	215	87,917
SAC Special Area of Conservation	234	885,904
SPA Special Protection Area	87	682,045
Ramsar Wetland of International Importance	70	377,057

**SCOTLAND**

Summary of Natural Heritage Designations in Scotland in force as at 31 March 2003

Type of Designation	Number	Area (ha) / Length (km)	% Land Area of Scotland <sup>1</sup>
<b>Statutory Sites designated under International Conventions and Directives</b>			
Candidate Special Areas of Conservation (cSAC) <sup>2</sup>	230	874,808	8.9%
Special Protection Areas (SPA) <sup>3</sup>	137	624,774	7.9%
Ramsar Sites <sup>3</sup>	51	313,208	4.0%
(Natural) World Heritage Sites (WHS)	1	853	0.01%
Biogenetic Reserves	2	2,388	0.03%
<b>Non-Statutory Site designations of International importance</b>			
Biosphere Reserves	5	11,199	0.14%
European Diploma Areas (EDA)	2	5,848	0.07%
<b>Statutory Sites designated under National statute <sup>4</sup></b>			
Sites of Special Scientific Interest (SSSI) <sup>5</sup>	1,451	1,004,700	12.8%

Areas of Special Protection (AoSP)	8	1,518	0.02%
National Scenic Areas (NSA)	40	1,001,800	12.7%
National Parks (NP)	2	567,994	7.2%
Regional Parks (RP)	4	86,160	1.1%
Country Parks (CP)	36	6,481	0.08%
Long Distance Routes (LDR)	5	731 km	n/a
Local Nature Reserves (LNR)	36	9,392	0.12%
National Nature Reserves (NNR)	73	131,139	1.7%
<b>Other Non-Statutory Site designations of importance in Scotland</b>			
Historic Gardens and Designed Landscapes (HGDL)	328	66,765	0.85%
Marine Consultation Areas (MCA)	29	111,895	n/a

<sup>1</sup> Land area of Scotland (down to MHWS) taken as 7,875,191 ha.

<sup>2</sup> Total area (ha) covered by candidate SACs includes both land and marine area. % figure given is for land area only.

<sup>3</sup> Total number of sites excludes three previously classified SPAs/Ramsar Sites, which were subsequently subsumed as part of larger sites.

<sup>4</sup> Although the statutory power exists, no Marine Nature Reserves, Natural Heritage Areas, nor Limestone Pavements have been designated in Scotland.

<sup>5</sup> More than one SSSI may be notified over the same piece of land. The approximate net SSSI area stated in the above table has been adjusted to take account of over 2,300 ha of land where overlapping SSSIs occur. Total gross SSSI areas are as follows :

SSSI still notified under the 1949 Act as at 31 March 2003	14	2,601	ha
SSSI notified under the 1981 Act as at 31 March 2003	1,437	1,004,387	ha
Total for all SSSI	1,451	1,006,988	ha

## **N. IRELAND**

*Details of sites/areas designated as Areas of Special Scientific Interest, Special Protection Areas, Special Areas of Conservation, Nature Reserves and Areas of Outstanding Natural Beauty can be obtained from the EHS website (see above).*

### **3 Conclusions and Recommendations**

- Introduction into the Structural Fund programmes of assessment of the linking of community sectoral policies with an integrated spatial policy for protecting and highlighting the value of the natural and cultural heritage.
- Promotion of coordination mechanisms at community level and with a bottom-up approach in the provision of information, through observatories and participation involving integrated planning procedures on a regional basis (NUTS II).
- Promotion of compensatory measures for:
  - the support of developmental production processes associated with environmental preservation and protection
  - a more compatible operation of existing environmentally hostile land uses
  - switch to new production processes.
- Promotion of policies and means for the area that are linked to:
  - successful management, protection and preservation of the region's characteristics that constitute international and European heritage or an outstanding feature in the European space
  - their successful incorporation in compatible development opportunities
- Promotion of special community initiatives for dealing with natural disasters and the hazards posed by climate changes and the effects of desertification
- Promotion of pilot applications and common practices in regional planning.

These policies may be implemented by stretching (or making more specific) the common European policies currently in effect. They should aim at:

a) Remedial and / or deterrent actions concerning the apparent pressures and threats associated with the compatibility of the "environment – development" relationship in the area in question

b) Supporting actions that will promote the comparative advantages, possibilities and opportunities that already exist or are being created in the various states and regions as a result of European and national policies.

Policies and means should also be aimed at:

- Monitoring the natural and cultural heritage
- Increasing knowledge and research through common mechanisms and structures
- Including actions related to education and training in "peak" issues that may arise.

Demands for the formulation of such options at European level, for the eligibility of their actions and for securing the necessary funds could be the object and responsibility of a new interstate / interregional organisation of European Natural Heritage.

**ESPON 1.3.2 TERRITORIAL TRENDS IN THE MANAGEMENT OF  
THE NATURAL HERITAGE:**

**CASE STUDY OF BORSODI MEZŐSÉG, HUNGARY**

---

PREPARED BY INSTITUTE OF ENVIRONMENTAL AND LANDSCAPE  
MANAGEMENT, SZENT ISTVAN UNIVERSITY (KTI)  
2004

# **Borsodi mezőség**

## **Introduction**

More than 60 % of land is under agricultural use in Hungary which is still abundant in valuable natural and semi-natural habitats albeit the intensive agricultural practices of the socialist regime. Important, semi-natural habitats are found scattered across particular local areas surrounded by agriculture operating at varying degrees of intensity. Effective biodiversity conservation depends upon the control of activities within protected sites and the regulation of land use and the promotion of sympathetic practices on the surrounding land.

Disadvancing the headway of reintensification, promoting variegated intensity agriculture and environmentally responsible farming practices that consider natural production conditions are of paramount importance to safeguard the diversity of these natural values.

The study looks at the case-study area of the Borsodi Mezőség, a remote economically depressed rural area where extensive agriculture is the main source of local income but biodiversity conservation on valuable fragmented and scattered habitats is also an issue. The area is a highly important environmentally sensitive area because semi-natural habitats are found scattered through agricultural areas with farming operating at varying degrees of intensity. Great bustard habitats and steppe land bird species are among the main conservation priorities in the area. Site protection alone is inadequate to ensure the favourable conservation status of the great bustard, in particular, being a wide-ranging species. These sites must be safeguarded and should become a part of a broader countryside approach. Effective biodiversity conservation depends upon the control of activities within protected sites and the regulation of land use and the promotion of sympathetic practices on the surrounding land.

The interviewed local stakeholders in the biodiversity conservation and agricultural land use conflict problem included national park officers, farmers' consultants, the manager of the 'Cötkény' Subregional Development Association (SDA) in the Borsodi Mezőség region, mayors of interested settlements and farmers.

## **Chapter 1. General Analysis**

### ***Data collection and Analysis***

#### **The territorial context**

The Borsodi Mezőség (Landscape Protection Area) is a very important, approximately more than 32 000 ha of size area situated in North-East Hungary. The area is a very diverse grassland habitat-complex scattered with wet habitats, arable lands, which was created and shaped by traditional grazing agriculture in the recent centuries. In the area the characteristic steppe (puszta) habitats, flora and fauna was

prevailing with high biodiversity. Our pilot area (PA) is situated in the Borsodi Mezőség. A special unique feature is that PA is a „meetingpoint" of the North-Mountains and the Hortobágy puszta with the delta area of more than 100 streams and small rivers. The PA is dominated by saline soil related ecosystems, habitats. Due to the prevailing agricultural management systems and methods several strictly endangered (Red Book) bird species found living space here, such as the great bustard (*Otis Tarda*), corncrake (*Crex crex*), Imperial eagle (*Aquila heliaca*), Ferruginous duck (*Aithya nyroca*), etc.

The pilot area is bordered by the river Tisza from south, from Négyes to Ároktő. The Eastern border is the road from Ároktő to the M3 highway line. The border in the north is the M3 highway till the road line between Borsodivánka and Mezőkövesd. From here the border continues towards Borsodivánka, and finally to Négyes where we meet the river Tisza again. The PA area is approx. 25 200 ha (map 1, map 2).

## **Geographic aspects of the area**

### **Climate**

Afforested steppe climate, with moderately warm-dry characteristics

Annual sunshine average:	1900 - 1950 hours (summer: 760 - 780 hours, winter: 185 hours)
Annual mean temperature:	9,8 - 9,9 C°
Mean temp. of the vegetation period:	17,0 C°
Annual average precipitation:	560 - 590 mm
of which in growing season:	330 - 340 mm
Snow covered days:	36 -38 days
Average snow depth:	16 cm
Aridity index:	1,19 - 1,25
Major wind direction:	NE (often SW,S)
Average wind speed:	2,5 m/s

### **Hydrology**

The Borsodi Mezőség PA is a sediment plain which is fragmented by surface streams. The sediment plain was built by the ancient Sajó river and the Csincse, Kácsi creeks. The south part of the PA was influenced by the Tisza floods till 1939 when the protecting dike was constructed. Water supply of the north part was provided by the downhill streams from the Bükk mountain. The area was drained and dried up artificially in the 50's, 60's (large scale farming) so the groundwater level is under critical level in summer periods. Only the remaining small streams ensure some water supply nowadays, mainly the Csincse creek. The groundwater level is at 2 meters in Mezőnagymihály. Eastward from here it is between 2-4 meters. Average quantity is 1-3 liter/s km<sup>2</sup>. Average hardness of water: 15-25 DH (German Hardness).



## **Geology**

The area developed on the sediments of the Pannon sea (pleistocen era). The river effected secondary sedimentation by Sajó, Hernád rivers later the Tisza was in the quarter-era. Due to these effects the area is characterised by dense loam (silt-loam) soils. The middle part of the area is loess-spotted dominant saline soils. Only the north part is affected by sandy soils near the rivers, streams.

## **Geomorphology**

The area is rich in small streams and beachings. The Northern part is creekly by the old riverbeds, the Southern part is more homogenous landscape due to the Tisza flood effects.

The studies justify that the main river was the Sajó in the PA. All other streams went through the area not flowing to the Tisza but „lost" in the wetlands abundant in the Southern part. It has changed dramatically in the last 40 years. The streams disappeared, the wetland dried up.

The PA's altitude is 88 - 94 m above see, small relative relief (2 m/km<sup>2</sup>).

Settlements: Ároktő, Gelej, Igrici, Mezőcsát, Mezőkeresztes, Meződövesd, Mezőnagymihály, Négyes, Szentistván, Tiszabábolna, Tiszadorogma, Tiszavalk.

## **Landscape**

The protected part of the area is a large open puszta landscape very similar to the Hortobágy, influencing the visitor with its large openness. Viewing from closer we can discover the characteristic micro-mosaic like structure. At winter and spring large bird groups bring vivid life to the silent landscape. There are special landscape values like the remaining of the old waterflows and adjacent diverse treelines (willows, poplars).

## **Land use**

The case-study area of the Borsodi Mezőség is a remote economically depressed rural area where extensive agriculture is the main source of local income.

The strategic position of the region is determined by the high share of high value landscape and nature features.

The settlements of the region (Mezőcsát, Tiszavalk, Tiszabábolna, Tiszadorogma, Ároktő és Mezőnagymihály) are underdeveloped and disadvantaged peripheries of not only the statistical districts of Mezőkövesd and Tiszaújváros but of Borsod-Abaúj-Zemplén county as well. Along with other similar subregions alongside the Tisza river they belong to an „inner periphery" within the country.

## **Territorial strategy**

The local governments, private businesses, state organisations and natural persons in the settlements covering the area of the Borsodi Mezőség Landscape Protection Area and its surroundings have established the Cötkény Subregional Development Association in 1995. It was one of the first micro regional associations in the country. The main strategic objective of the Association is to preserve and restore the population retaining capacity of the microregion.

Over the years, they have worked out a complex development strategy and a range of development programmes for the area published in 2000 with the title „The Rural Development Strategy for the Borsodi Mezőség”. During the elaboration of the strategy they have used the most progressive elements of current and proposed EU programmes and rural development rhetoric, well overstriding currently available or promised resources. The main innovation of their strategy is building, first of all, on natural, ecological resources. Among the general aims and objectives are the following:

- To use and protect their area according to its high nature value; to conserve the nature values, to put nature conservation, environment protection and water protection as the most important economic factor in the landscape management of the area; to restore the original features of the landscape that was distorted by large scale agriculture;
- To diversify the local economy, to support the production of products with high added value in order to increase and retain the amount of income generated in the region; to ensure that local activities can support appropriate living standards and the area does not lose its population;
- Resource development: to try to get the financial warranties for the realisation of the programme and help activate the local population.

A geographic feature of the area is that

- the settlements (Tiszavalk, Tiszabábolna, Tiszadorogma) in the south, because the Tisza river is close, can well serve the activities related to water (reed production, fish production, angling tourism, bird watching, etc.); while
- the settlements in the north of the area are passed by the recently built M3 motorway that provides good accessibility and opportunity to present the values of the subregion while providing services for the traffic (car service, catering, etc.). This road development means a better possibility for SME development, too.

A special objective in the document is a full landscape restoration. In the framework of this objective the tasks listed are the following

- Restoring the features of the ancient Tisza floodplain,
- Reactivating the farming traditions of the local community,
- Preserving and development of cultural and architectural traditions,
- Development of facilities for surface water management,
- Restoring old river beds, oxbows and marshes,
- Reintroduction of grass on the lowest fertility ploughlands,
- Improvement of weedy grasslands,
- Planting woodlots of domestic wood species.

Apart from the complex rural development strategic programme, the legal framework has not been explored yet that would ensure that the objectives of the planned strategy could be put in practice in the way and with the beneficiaries (primarily with the local community) it was planned. The inner co-operation is not insured through legal means

at present and the microregion has no measures to defend itself against effects opposing the planned strategy.

### **Sectoral policies**

The river regulation works of the Tisza started in the second half of the 19<sup>th</sup> century and were finished by the 1940s. During the 1960s the streams coming from the Bükk Mountains were heavily regulated and were often converted into canals. These works cut the main water supply off the puszta. The objective of the drainage works was to convert the puszta into land suitable for large scale farming and to convert the most land possible ready for arable farming.

Under the circumstances after the political system change on the plough lands, dried out due to the draught period prevailing from the 1980s but also because of the bad fertility and water management properties of these soils, profitable farming became impossible. The biomass production capacity of grazings and hay meadows also decreased significantly.

The landscape that was negatively transformed during the previous decades to serve large scale farming, could not meet the expectations. Although irreversible damage was not made but the economically faulty system started a degradation process the result of which can be seen today: an impoverished economic, social and environmental situation.

Forest management is not typical for the area because of the insignificant share of forest cover. However, the increase of forest cover is desirable and would be needed from many aspects.

Apart from agriculture, the economic effects and scale of non-agricultural activities are insignificant.

The remarkable landscape features, however, might trigger the development of tourism services on the long run.

### **Research groups / networks**

The Cötkény Regional Development Association is active in learning from international experiences and search for multiple funding. They participated in the „Avalon Project”, co-ordinated by IEEP, London; made connections with German, Dutch, Swiss, Swedish foundations and international organisations, such as WWF or ECOVAST.

The Bükk National Park Directorate, being the administrative authority for the Borsodi Mezőség Landscape Protection Area also work in strong co-operation with the Association.

A local conservation NGO, the Tiszatáj Környezet és Természetvédelmi Közalapítvány (Tiszatáj Environment and Nature Conservation Public Foundation), now also co-operating with the Cötkény Association, was particularly active in rescuing high conservation value sites during the years of privatisation.

The Cötkény Association also has significant domestic support from various universities, research institutes and other civil organisations.

The Institute of Environmental and Landscape Management, Szent István University is active in the region with various research projects. The most substantial of these is analysing and evaluating the possibilities for realizing the European Multifunctional Agricultural Model and agri-environment schemes for the complex landscape development plan of the Borsodi Mezőség.

## **The Natural Heritage**

### **Description and spatial structure of natural heritage**

More than 60% of the 300 km<sup>2</sup> acreage microregion is under nature conservation. The increase of the share of these areas are expected in the near future. The microregion is listed with 28 000 ha being Environmentally Sensitive Area in the National Agri-environment Programme.

The Borsodi Mezőség Landscape Protection Area, lying within the area of the microregion, has nature and landscape values of both national and regional importance.

The bay of Tisza lake near Tiszavalk settlement has a rich vader fauna. Moreover, the importance of the area is increased particularly during the bird migration periods in autumn and in spring.

### **History of evolution of Natural Heritage**

The present face of the landscape is determined by the ancient river beds of the Tisza river, the creeks running off the Bükk Mountains and their planing and sedimenting work creating the puszta, the mother riverbed of the Tisza together with its natural oxbows and artificially regulated dead channels and the exuberant gallery forests along them.

As a result of the disharmonic landscape management practices of the previous years many of the woodlots, boskets and marginal natural areas have been cut back. Today a diversity far below the natural capacity of the landscape is the feature of the area.

### **Pressures and driving forces**

In the region one can find two major processes next to each other. There is a long standing degradation process characterised by loss of living space, loss of assets, erosion of human assets and pessimism. On the other hand there is a dynamic strive for economic and social development whose beneficiaries should be the present local community and its future generations.

### **Demography**

The demographic situation shows a slightly ageing trend and a continuous loss of population.

Between the 1960s and the late 1980s the region lost half of its population, as a result of the out-migration of mainly young, educated families. Local people say “Study, my son that you could go away from here”. This process has obvious connections with the economic and social characteristics of recent decades.

The general economic crisis of the 1990s stopped this trend and the population have even increase, though most immigrants are gipsies or members of other disadvantaged groups.

The employment situation of the region is bad. The unemployment rate exceeds both the national and the higher regional average.

Local people kept many traditions, social networks and cultural heritage still form important parts of local life. A helyi lakosság őrzi kulturális örökségét, főként az idős korosztály által.

There is education in 1 high school and 6 primary schools in the micro region. There is a need that specific elements be built into the curricula which could deliberately focus children's attention onto local values.

### **Urbanisation**

Regarding village renewal the continuous activity of the local governments and of the weekend house owners has slowed down the decay of villagescapes with success. In the villages near the Tisza river, in particular, it is mainly the summer house owners who first stabilized and then significantly increased the value of low value real estates. Old farmhouses are being renovated and cleaned that also inspires local inhabitants. In some cases, the share of such houses reach 30 % of the total real estates of a village.

### **Infrastructure**

Physical infrastructure (roads, sewage system etc.) is poor, though the motorway M3 built through the north part of the area 2 years ago represents a future array of development opportunities.

The Tisza River and the Tisza Lake (a large reservoir on the former floodplain of the river) provide excellent possibilities for sustainable tourism.

Tourism in the region is increasing in recent years. This trend is hoped to be sustained. An increase is also expected in the biking and canoeing tourism going through the area.

In the settlements with attractions (floodplain of the Tisza river) the businesses engaged in village tourism could provide enough room and beds for tourists so far. However, in the event of a substantial increase in the number of tourists the current capacity will not be able to serve this properly. Providing bed and catering for larger groups of tourists, let it be children on school trips or a larger mass of people arriving to this area for several days with a scientific, commercial etc. purpose, currently is an unsolved issue.

### **Agricultural Activity**

Agriculture has been mainly low input for the last 15 years. Today, arable production ins the most widespread; monocultures, reduced crop diversity and outdated technologies are characteristic. In the past (turn of the 19<sup>th</sup> century) animal husbandry (cattle and sheep grazing) and a wide range of agricultural products was more typical, which suited more to the natural environment. Today semi natural habitats and cultural landscapes are threatened by land abandonment and water pollution.

Local agriculture is characterised by low efficiency and sometimes environment damaging farming practices atypical for this region beside a product matrix, hit with quality and productivity deficiencies, difficult to market. Partly due to low fertility soils, arable production yields very low earning. The results of animal husbandry are also far from optimal despite the very suitable natural conditions for animal rearing.

The land properties in private hands are very much subdivided and unsuitable for profitable farming in their present forms.

The relatively small number of farms, that are middle sized on the EU scale (20-100 ha), can not develop due to lack of financial resources. However, there are some viable farming businesses operated by groups, communities.

The shifts of properties and lands, in particular those marketed at insignificant share of their real values during the privatisation process and liquidation of socialist property structures to outsiders, have led to a *shrink of living space* of the local community. The disinformed local dwellers who are unable to formulate and enforce their common interests, can not stop this process. As a result their living space further decrease along with the population retaining capacity of the area.

The Borsodi Mezőség is a typical low income agricultural area with declining population and shows a strong decline in traditional farming practices, especially extensive grazing of sheep and cattle that have created a man made landscape of valuable grassland habitats during centuries. From a nature conservation perspective, agri-environmental programmes are strongly needed, principally for reversing the abandonment of such valuable grassland habitats or ensuring their appropriate management, but also for maintaining the biodiversity value of other agricultural land.

### **Natural driving forces**

The environmental status of the area is acceptable. However, this is not the result of an appropriate level technology management but the relatively low environmental load from local activities. Waste management and sewage treatment facilities still have to be developed.

Nature conservation is a factor of paramount importance in the small region and is a geographical and economic basis for the rural development process.

Decisive features of the area are the puszta with its ancient Tisza river floodplains, grazings, old riverbeds and marshland, the Borsodi mezőség Landscape Protection Area and the rural community of the settlements around the puszta, the cultural and farming traditions of villagers adapted to the local natural conditions.

Area of ornithological interest: 39 000 ha

Level of protection: Borsodi Mezőség Landscape Protection Area 17,932 ha

Main land use categories of the area: non-irrigated arable lands (52,4 %), natural grasslands, semi-natural meadows (31,9 %), meadows/grazings (10,5 %)

Risks: abandonment of agricultural activity, water management problems

General ornithological description: important habitat for steppe grassland birds, a stock of global importance of imperial eagle, corncrake and great bustard live in the area. The stock of birds of prey is significant also outside the nesting season. During winters flocks of geese, overwintering on the Tisza lake, frequent the area for feeding.

The following bird species and their stocks justify the proposal for the designation of the area in terms of the EC Birds Directive.

Species	Size of population (nesting population)
Imperial Eagle ( <i>Aquila heliaca</i> )	3 pairs
Red footed falcon ( <i>Falco vespertinus</i> )	80-90 pairs
Saker ( <i>Falco cherrug</i> )	8 pairs
Corncrake ( <i>Crex crex</i> )	5-30 pairs
Great bustard ( <i>Otis tarda</i> )	30-40 pairs
Black winged Stilt ( <i>Himantopus himantopus</i> )	0-17 pairs
Whiskered Tern ( <i>Chlidonias hybrida</i> )	0-160 pairs
Black Tern ( <i>Chlidonias niger</i> )	18-20 pairs
Roller ( <i>Coracias garrulus</i> )	70-75 pairs
Lesser grey Shrike ( <i>Lanius minor</i> )	100-150 pairs

Stocks of other bird species listed in Annex I. of the Birds Directive.

Breeding stocks: white stork (*Ciconia ciconia*) (80-90 pairs), Marsh Harrier (*Circus aeruginosus*) (40-45 pairs), Montagu's Harrier (*Circus pygargus*) (3 pairs), Common Tern (*Sterna hirundo*) (10-15 pairs)

Migratory species: Great White Egret (*Egretta alba*) (120-150 pairs), Spoonbill (*Platalea leucorodia*) (120-150), Smew (*Mergus albellus*) (17), Ruff (*Philomachus pugnax*) (5000-6000), Wood sandpiper (*Tringa glareola*) (100-150).

## Natural heritage management

### History and objectives

The objectives and legal frames of nature conservation in Hungary are set out in the Act on Environmental Protection, Act on Nature Conservation, Act on Forests, Act on Game Management and Hunting, the National Conception for the Conservation of Natural Resources and the National Nature Conservation Master Plan, that are in line with the nature conservation policy of the EU.

As a part of the EU accession process surveys for the designation of natural areas of European importance have started. Negotiations are continued to enlarge the habitats and species list of European importance.

For the designation of potential NATURA 2000 areas the present protected areas of national importance give a good basis. Current surveys, ex lege protected areas, the Environmentally Sensitive Areas and the programme for the designation of National Ecological Network being part of the Pan-European Ecological Network help to draw up the list of potential areas.

The Special Protection Areas, on contrary to the designation process of the Habitat Directive, will automatically become part of the NATURA 2000 from the time of entering the EU. This means that Hungary will have the obligation to maintain the proper state of these areas through both legal and economic measures.

The designation of the ecological network also serves other interests beside nature conservation. It helps the development of rural and eco-tourism, the promotion of environment friendly farming and practices in line with local traditions that might also improve the marketability of agricultural products.

Part of the Borsodi Mezőség was declared a Landscape Protection Area in 1989 with an area of 9168 hectares. The area was enlarged in 1993 to 17,932 hectares. The area used by great bustards is approximately 20 000 hectares.

There is around 12-13,000 hectares of great bustard habitats in state property and under nature conservation management. This may be enlarged to 16-17 thousand hectares at a later stage. The area is tenanted to farmers with strict prescriptions. Intensive and semi-intensive arable plots wedge in between large grasslands. Increased disturbance due to more mosaic structure of small scale farming is a problem in places.

Birdlife Hungary cooperates with the Bükk National Park Directorate in regular counting of birds, assessing danger factors of land use, ensuring local protection for endangered nests, brood rescuing, encouraging rape seeding, snow clearing in winter feeding sites, and reducing the number of undesired predators. Monitoring activity is moderate. The pace of reduction was lowered which is a good result when considering the available policy and financial measures. Although this is far from enough for sustainable conservation of the species. Supporting rape seeding was financed from the national park budget. Despite all efforts the great bustard population of 30-50 individuals in the beginning of the 1990s decreased to 20-25 by now. This is a strong implication that the introduction of an effective conservation management plan and ESA Scheme is inevitable. There is no officially approved conservation management plan at the moment for this area.

The Borsodi Mezőség is a typical low income agricultural area with declining population and shows a strong decline in traditional farming practices, especially extensive grazing of sheep and cattle that have created a man made landscape of valuable grassland habitats during centuries. From a nature conservation perspective, agri-environmental programmes are strongly needed outside the Landscape Protection Areas, principally for reversing the abandonment of such valuable grassland habitats or ensuring their appropriate management, but also for maintaining the biodiversity value of other agricultural land.

The objectives of the management

#### *General habitat protection*

- Complex habitat rehabilitation, especially for wetland habitats which serve both the maintenance of characteristic wetland fauna and flora, furthermore offer breeding and feeding area for migratory bird species
- Traditional agricultural methods expansion all around to upkeep existing nature (biodiversity) values and improve the conditions for habitat development, especially in pasture management related methods
- Instead of intensive cash crop production more labour intensive and environmentally beneficial horticultural and arable production methods near the settlements. Strong impetus is to be given to organic farming methods to reduce chemical inputs



- Pasture-arable land ratio optimisation for great bustard, for wintering, feeding, breeding (rapeseed 20%, alfalfa 30%)

#### *Plant species protection*

- Wetland rehabilitation for swampy, saline and meadow plant association maintenance
- Special protection for the core area loess-pastures with regulated grazing/mowing
- Organic cultivation of arable lands adjacent to valuable grasslands and wetlands for keeping from chemical drift and pollution (damage)

#### *Bird protection*

- Maintenance and improvement of worldwide endangered bird species
- Providing feeding and breeding possibilities for predator birds and for rollers (*Coracias garrulus*)
- Feeding sources for migratory birds (wild geese and cranes)

#### *Landscape protection*

- Maintenance of open puszta landscape
- Preserving traditional agricultural building (cultural/landscape/architecture)
- Maintenance and improvement of tree lines and other linear natural object adjacent to waterfowls in the area

#### *Other*

- Improve employment and create supplementary income possibilities for local population
- Transformation of water management/holding systems for nature conservation purpose
- Providing opportunities for (soft) eco/agro-tourism development
- Contribute/supplement to other rural development measures

### **Implementation**

#### **Protected areas in the PA**

In the middle of the Borsodi Merzőség we find the Borsodi Mezőség Landscape Protection Area (LPA) which is categorised as V. zone by the IUCN nomenclature. The original legislation 9/ 1989. (VIII. 24.) KVM regulation which declared the area protected delineated 9168 ha fall under this protection. Additionally, the 14/1993. (IV. 7.) KTM regulation has increased the area by 8763 ha (map 3.).

Borsodi Mezőség Landscape Protected Area is on the territory of the Bükk National Park and it is under the direction of the Bükk National Park Directorate.

#### **International agreements relevant for the Borsodi Mezőség:**

- Bonn Convention (1979)
- Convention on wetlands of international importance especially as waterflow habitat ( Ramsar, 1971) (map 3.)
- Important Bird Areas (IBA) (map 4.)

- Natura 2000
- EU Birds Directive (1979)

### ***Payments and subsidies***

After the change of political regime in the early 90's highly detrimental economic situation has emerged, where most of the local enterprises has collapsed. This was resulted mostly land abandonment, underuse of the area, quitting traditional land use, but also certain intensive production expansion and overuse (e.g. corn and sunflower production) occurred. Both trends had negative impact on the status of nature values. In these years there is an everincreased demand both from agricultural and nature conservation side to reapply mainly traditional nature friendly agricultural methods in these High Nature Value areas. It is necessary to rehabilitate the wetlands, renaturate the grassland habitat complex, reseed pastures on poor arable lands, and continue with those important agricultural methods which has created and maintained this valuable habitat system. The agri-environmental incentive schemes offer a suitable solution to overcome the problem.

### **Environmentally Sensitive Areas Scheme**

The application of agri-environmental measures is not only an EU harmonisation obligation but also related to the realisation of tasks set out in the existing national legislation. In this way the introduction of the NAEP is linked to the LIII. Act of 1995 on the general rules of the protection of the environment, the LIII. Act of 1996 on nature conservation, and the CXIV Act of 1997 on the development of agriculture, this way facilitating the proper national support for environment-, nature and landscape protecting agricultural practices. The formulation and introduction of the programme support the realisation of the National Environment Protection Programme and the National Regional Development Concept. The establishment of the Environmentally Sensitive Areas network is also a related task, that forms a part of the planned measures of the agri-environment protection plan.

In the Borsodi Mezőség ESA farmers can participate in the following ESA Schemes (map 4.):

- Arable farming for great bustard (*Otis Tarda*) protection
- Alfalfa production for great bustard (*Otis Tarda*) protection
- Grassland management for great bustard (*Otis Tarda*) protection

### **Conclusions**

The local development strategy of the Cötkény primarily builds on the ecological resources of the area, combining them with socio-cultural aspects, traditions and local economic development. The first pillar of the strategy builds on proposed EU programmes for the maintenance of natural habitats and cultural landscapes (agri-environmental schemes); the second builds on sustainable tourism (eco-tourism, bird-watching, fishing, health-tourism, agro-tourism). Low-input environmental friendly farming could complement income from agri-environmental schemes, producing

high-value, local branded products. The last leg of the local economy could be area-specific arts and crafts. According to their strategy, local economic development has to be complemented with „soft projects”, capacity building, strengthening of social networks, enabling synergic effects and providing equal opportunities for local actors. The main aim is to keep local resources and local people in the area; to sell products (landscape, food, maintenance of nature) on the global market, but keeping most benefit and profit for the indigenous population.

The strategy was developed through a bottom-up process, by a partnership of nature conservation authorities, local authorities, businesses and NGOs. It created high expectations amongst the local population. The project leaders built international connections and tried to access multiple funding sources, however the lack of substantial EU and domestic funding has not resulted in a success of the programme so far but caused the disillusionment of a significant part of the locals.

## **Bibliography**

Lovászi, P. (ed.) Javasolt különleges madárvédelmi területek Magyarországon. Magyarország és a Natura 2000 – II. Magyar Madártani és Természetvédelmi Egyesület. Budapest 2002. 140 p. (in Hungarian)

Cötkény Térségfejlesztő Szövetség: Borsodi Mezőség Kistérség Vidékfejlesztési Stratégia. Tiszavalk. 2000. 44 p. (in Hungarian)

Cötkény Térségfejlesztő Szövetség: A Borsodi Mezőség vidékfejlesztési és agrárstruktúra átalakítási programja. Operatív program 1. ütem Tiszavalk 2000. 61 p. (in Hungarian)

Nemes, G. Cötkény- a Journey to the Furure- integrating nature, society and local economics for rural development. In: The Nature of Rural Development, Phase II. Europe's Rural Futures.

## **List of contacts interviewed**

Ms Maria Kis, farmers' consultant of the Ministry of Agriculture and Rural Development

Mr. Imre Zolnai, farmers' consultant of the Ministry of Agriculture and Rural Development

Mr. Laszlo Varga, farmers' consultant of the Ministry of Agriculture and Rural Development

Mr. István Mikola, mayor of Tiszavalk

Mr. Attila Sárvári, manager of the Cötkény Subregional Development Association for the Borsodi Mezőség

Mr. Mihály Bodnár, Bükk National Park, Officer in charge for the Borsodi Mezőség Landscape Protection Area

## **Annexes**

**Biological characteristics of the Borsodi Mezőség Protected Landscape Area**

**Maps**

## **Biological characteristics of the Borsodi Mezőség Protected Landscape Area**

In the following we describe the biological characteristics of the Borsodi Mezőség Protected Landscape Area based on the detailed description by Mihály Bodnár, the national park officer in charge for this area.

### **PLANT ASSOCIATIONS - HABITATS**

Water related habitats and associations

The most important habitats of the Borsodi Mezőség Protected Landscape Area are the wetlands. As a result of water management interventions they shrank to a fraction in the last 60 years. Nevertheless they are of regional importance even today, and more importantly the possibility of habitat restoration does exist. Consequently our surveying efforts were especially focused on them. The landscape rehabilitation works will also primarily aim at revitalizing these habitats, and the results of rehabilitation can be most easily monitored here.

The use of satellite images made possible the evaluation of wetland habitats not only by their present status, but on the base of their one decade-long condition. Our main aim was to develop a wetland habitat cadastre.

Cadastre of wetland habitats

Altogether there are 970 - 1010 wetlands on the studied area, which can be assigned to six types:

- Probable valuable swamp (cca. 100 cases) - with *Schoenoplectus* and *Glyceria*
- Swamp with meadow (cca. 100 cases) - with *Glyceria* and *Beckmannia*
- Meadow with swamp (cca. 100 cases) - with *Alopecurus*
- Valuable meadow (cca. 300 cases) - *Beckmannia* and *Alopecurus*
- Meadow (cca. 250 cases) - with *Alopecurus*
- Meadow drying out (cca. 500 cases) - with *Alopecurus* and *Festuca*, and
- Undetermined (cca 150 cases) e.g. covered by cloud, not or badly visible.

Altogether we distinguished about 1500 patches, because certain parts of greater wetland habitats belonged to different types.

During the validity check (comparing the results of field surveys and satellite images for 64 wetlands) we found that type of habitats were correctly determined in 33%, 49% of checked satellite images were placed into the adjacent type group, while only 17% were assigned into a totally different type. Thus the accuracy of the classification can be considered as 83%.

If we fuse the six groups to two (swamp: 1,2,3 and meadow: 4,5,6) for the sake of easier practical use, we got the following accuracy:

An area classified as swamp on the satellite images is proved to be swamp (by the field data) in 79-81%.

A swamp (in the field) was classified as swamp in 67-71%.

An area classified as meadow is proved to be meadow (by the field data) in 75-82%. A meadow (in the field) was classified as meadow in 84-93%.

A patch was classified as swamp if the following species were dominant: *Phragmites australis*, *Typha angustifolia*, *Schoenoplectus lacustris*, *Glyceria maxima*, *Phalaroides arundinacea*, *Bolboschoenus maritimus*

One patch was classified as meadow if the following species were dominant: *Beckmannia eruciformis*, *Alopecurus pratensis*, *Agrostis stolonifera*, *Carex melanostachya*.

*Carex acutiformis* is a characteristic plant species of transitional habitats.

Wetlands can be characterized by the following plant associations:

### **Swamps - marshes**

*Pusztá swamps* (swamps on grassland) are not alkaline swamps, *Bolboschoenus maritimus* and *Schoenoplectus tabernaemontani* are not their dominant species. The most characteristic swamp species regularly occurring on grasslands - which are rare or missing from very alkaline swamps - are: *Cirsium brachycephalum*, *Cirsium palustre*, *Ranunculus polyphyllus*, *Iris pseudacorus*, *Phalaroides arundinacea*, *Veronica scutellata*, *Calamagrostis pseudophragmites*, *Sium latifolium*, *Oenanthe aquatica*, *Cardamine parviflora*, *Sparganium erectum*, *Butomus umbellatus*, *Carex riparia*, *Lysimachia vulgaris*, *Symphytum officinale*, *Lycopus europaeus*, *Scutellaria galericulata*, *Stachys palustris*, *Rumex hydrolapathum*

Reed-grass species with the exception of *Utricularia vulgaris*, frogbit (*Hydrocharis morsus-ranae*) and *Lemna minor* survived exclusively in channels (e.g. *Salvinia natans*, *Lemna trisulca*, *Ceratosyllum submersum* in the smaller ones, or *Nymphaea alba*, *Stratiotes*, *Nuphar* in the greater ones).

During drought period when the swamp can be dry already in spring, the following species can overpopulate: *Cirsium arvense*, *Tanacetum vulgare*, *Polygonum* species. In 1995 we observed a great number of these species in certain swamps, while in the wet year of 1996 these species disappeared, and only their dry stalk of previous year could be seen. Ant's nests and vole burrows appear during prolonged drying out of swamps, the former clump like formations became overgrown with grass, *Alopecurus geniculatus*, *Mentha piperita* and other mud-living species overpopulate the muddy patches developed by overgrazing.

During drought period size of many species can decrease as follows (data from 1995): *Schoenoplectus* rush below 1m, mannagrass below 1 m, *Carex acutiformis* below 0.8m *Beckmannia eruciformis* below 0.6m

*Reed-bulrush swamps* (*Scirpo-Phragmitetum et typhaetosum*): we found smaller patches of this association in the deepest swamps only, often mixed with *Schoenoplectus lacustris*. In swamps rapidly drying out these species became monodominant and their population will be repressed only later. However lack of grazing can play an important role in this process. Current stands of this association are usually poor in species.

*Schoenoplectetum lacustris*: On the deepest points of the more valuable swamps generally the *Schoenoplectus lacustris* populations are dominant. The *Hydrocharis morsus-ranae* and the *Utricularia vulgaris* can also occur if water remains in the patch till summer. *Lemna* sp. can be found among rush stands more often.

*Glycerietum maximae*: This association is characteristic on those areas which dry out till the beginning of summer. Its common and attractive species is the Yellow Iris.

*Caricetum elatae*: Real rarities are the remnants of this association found in 3 swamps of the area (in Kenderes, Kut-lapos and the north swamp of Kocsordos). We found 2-300 well developed surviving clumps in each of the swamps in depressions surrounded by alkaline grassland. They life can be owed to the springs which lead the underground water currents rising from the Bukk Mountains to the surface. If those water sources will go dry - which is foreseeable as a result of the mining activity at Biikkábrany - the existence of boggies became questionable.

Data of the most beautiful boggy (boggy at Kút-lapos):

Tussock height: 50-60cm, foliage height: 150cm. Water depth is about 40cm in spring, surface is muddy in August. Data of coenological survey in 5x5 meters quadrat:

*Carex elata* 95 (or 300)%, *Carex riparia* 2%, *Schoenoplectus lacustris* 3%;

On the tussock: *Lythrum virgatum* 2%, *Agrostis alba* 0.5%, *Stachys palustris* 0.2%, *Gallium palustre* 0.2%, *Bidens tripartita* 0.1%, *Lycopus europaeus* 0.3%, *Poa palustris* 0.1%.

Other boggies are more desiccated, the tussocks are smaller (eg. 30/100 in Kenderes, 20/100 in Garzsa). Fen windows have disappeared from all of them, between the tussocks there are marsh vegetation or - in the case of intensive grazing - wet grasses.

This habitat requires special attention. For example the fire reached the Kenderes this summer destroyed the edge of the boggy by burning the peat in it, while greater part of the boggy resisted the fire and thus survived. Drying out endangering the most the boggies. If peatbog becomes dewatered, the oxidation process starts, and eventually the peat coming to the end. Grazing also degrades peatbogs.

#### ***Caricetum associations(tall sedges):***

These associations are living on drier habitats (drier than the habitats of the above associations) which habitats regularly dried out in the past as well. Among swamp species the following occur: *Cirsium brachycephalum*, *Ranunculus polyphyllus*, *Iris pseudacorus*, *Cardamine parviflora*, *Symphytum officinale*, *Scutellana galericulata*.

*Caricetum acutiformis-ripariae (quagmire)*: The most frequent and one of the most valuable marsh associations of the wet grasslands. Unfortunately its stands (with some exceptions) are more and more destroyed by drying out, and are very close to final extinction. The semi desiccated status is characterized by the total lacking of swamp species except of sedges, and by the invading dryer grassland species and weeds (e.g. Koszos marsh, Buzás creek). The most beautiful stocks can be found in the marshes of Kocsordos and Nagy-fenék.

People of farmsteads (tanya) regularly fire sedge marshes. This activity is basically damaging (mainly for the animals), and at the same time important as leaf-litter eliminating factor (leaf-litter restrict vegetation by even 60-80%). With regular mowing the dominance of sedge decreases, and the association becomes more diverse by the growing stock number of subordinant species.

*Caricetum distichae*: We found only in one marsh of the area, in a significant extension (see point map). Its species composition recalls the ones of tall sedges.

*Caricetum melanostachyae*: Another type of tall sedges. Characteristic association for wet habitats which dry out more often and in a greater extent than the previously mentioned ones.

#### ***Floodplain - non alkaline - meadows***

These meadows can be found on the previous and current floodplain of Csincse, along the Hosszii-6r and in the Kocsordos. Unfortunately all stands are strongly desiccated, becoming alkaline and weedy. They could formerly be hayfields, now they are pastures.

Characterizing species which do not or only very rarely occur on alkaline meadows: *Galega officinalis*, *Iris spuria*, *Serratula tinctoria*, *Pastinaca sativa*, *Senecio crucifolius*, *Potentilla naserina*, *Ranunculus repens*, *Centaurea pannonica*, *Viola pumila*, *Taraxacum officinale*, *Potentilla reptans*, *Cirsium canum*, *Cardamine pratensis*, *Cichorium intybus*, *Lotus comiculatus*, *Trifolium pratensis*, *Trifolium repens*, *Dipsacus laciniatus*, *Tetragonolobus maritimus*, *Glechoma hederacea*, *Rumex confertus*, *Ficaria verna*, *Aristolochia clematitis*, *Prunella vulgaris*, *Lathyrus pratensis*, *Rubus caesius* etc.

#### ***Alkaline meadows***

Very characteristic and extended wetland habitat types of the grasslands.

*Peucedano-Asteretum*: This association developed in the transition zone of floodplain and flood-free plains in the past. Recent stands (east to Szilpuszta forest and north to Eperjes-tanya) are relicts (Julianna V. Sipos reported from elsewhere: „at SW part of Kiszely-tag, 1km NE from Farkas-tanya, in the vicinity of Gelej and Mezőcsát"). Unfortunately the stocks strongly dry out. Characteristic species are: *Peucedanum officinale*, *Aster linosyris* and *Aster punctatus*, *Iris spuria*, *Serratula tinctoria*. The wetland habitat restoration will significantly promote the survival chance of this association. Grazing should be mostly restricted in its stands. Its zonation in the Kocsordos is the next: loess grasses on the highest altitudes, than meadows with *Serratula* and *Peucedanum*, than *ArtemisioFestucetum pseudovinae* with natron flows or sometimes with clear natron soils, than in the lowest lying parts meadows with *Alopecurus*.

Usually this association lives on the openings of the alkaline oaks which have already extincted from here. The nearby oaks (e.g. at Babolna) are all plantations.

*Agrostio-Alopecuretum pratensis*: The most frequent alkaline meadow with wet, solonetz soil. There are older, alkaline type and younger stocks, the latter ones were originally floodplain meadows which dried out. *Lythrum virgatum* and alkaline species have a characteristically low coverage on them. Owing to the drought all stands are degrading.

*Agrostio-Beckmanietum*: Rarer in the southern parts, more frequent in the northern parts where great stock (some hectares) can be found (e.g. East and North-East of Kisalmas-tanya). Unfortunately all of the stands of this association are rapidly drying out.

*Agrostio-Glyceritum poiformis*: Was found in smaller patches in swamps and in channels. Not characteristic for the puszta.

#### ***Berm alkaline habitats, natron flows***

On the very alkaline soil these associations are covered by water in spring - and thus have to be considered as wetland habitats - but are totally dry in summer. If regular flooding is missing they became closed alkaline grasslands.

*Camphorosmetum annuae*: Although berm alkaline associations are nowhere strongly developed, there are clear natron soil patches with *Kochia prostrata* in the South and with *Camphorosma* in the North. The height of berms are rarely exceed over 10cm.

*Pholiuro-Plantaginetum*: Can be found only in wheel-tracks in the South, but there are ancient stands in the central and northern parts. Characteristic species are: *Pholius pannonicus*, *Plantago tenuiflora*, *Matricaria chamomilla*, *Poa bulbosa*, and in south: *Kochia prostrata*, *Polygonum aviculare*, *Atriplex tatarica*.

*Puccinellietum limosae*: There are only very tiny stands, because berm alkaline habitats are poorly developed here.

#### ***Mud vegetation***

Common primarily on the overgrazed areas, e.g. on the Babolna oak used as pig field and around the pens. Characteristic species are: *Gnaphalium luteo-album*, *G. uliginosum*, *Peplis portula*, *Juncus bufonius*, *Mentha pulegium*, *Alopecurus geniculatus*, *Lythrum hyssopifolia*, *Ranunculus lateriflorus*.

#### ***Dry habitats and their plant associations***

Today the most extended associations of the puszta are the *Artemisio-Festucetum pseudovinae* and the *Achillea-Festucetum pseudovinae* grasslands dominated by *Festuca pseudovina*. The former one is characteristic for the ancient alkaline fields, why the latter one for the secondary alkaline fields. The small alkaline grasslands of the South Tiszantiil can be easily recognized by these associations. In the Borsodi-Mezoseg these two types of plant associations separate from each other but not sharply.

On the southern - secondary - part the *Achillea-Festucetum pseudovinae* association is more common, while in the central - more ancient - part the *Artemisio-Festucetum pseudovinae*, in the northern part both associations are considerable, along the Csincse non of them is significant. We intended to separate the two short grass puszta - which significantly different by nature conservation aspect as well - by satellite images. Unfortunately the dry grassland patterns could be identified very restrictedly by the color composition. Possibilities are better on clusters. However grasslands separate from each other on clusters not by floristical differences. The main differences came from the different extent of grazing. This is also indicated by the white cluster all time appearing around tanyas, the red appears beside the white, the green and light blue come between them and in the greatest distance from the tanyas - where the grazing is presumably the less intensive. Grazing rank at the northern parts is the following: white - black - claret - light blue - green.

Dry grasses of the puszta belong to the following associations:

#### ***Dry alkali puszta grasslands***

*Artemisio-Festucetum pseudovinae*: The most widespread dry alkaline grassland. The *Artemisia* and *Limonium* dominate in some localities, although the latter one is rarer in southern parts. Other characteristic species are: *Plantago maritima*, *Atriplex littoralis*. This association has also secondary stands, but the stands on the sandy and loessy ridges are ancient (i.e. evolved before the river regulation works). An interesting feature is its resistance to smaller extent overgrazing and to strong undergrazing as well. Among the degradation indicator species the *Hordeum hystris* is not frequent, while *Bromus mollis* is dominant in several localities. However, undergrazing increases the chance of grass fire



owing to the accumulating dry organic matter. Sinking of groundwater level does not affect directly the life of this grass association but will leave to soil leaching in longer period. According to the concordant opinion of both shepherds and agricultural experts the land (grass) improvement works remained unsuccessful in long term, and the original alkali steppe vegetation recovered the habitat.

*Achilleo-Festucetum pseudovinae*: Occurs mainly on the former open floodland of Borsod, in the common pastures of Gelej and of Mezőcsat. This association is an undistinctive secondary association which is rather poor in species. Its usual species composition is: *Festuca pseudovina*, *Achillea setacea*, *Koeleria cristata*; and in the more weedy associations: *Inula britannica*, *Cirsium arvense*, *Carduus acanthoides*. Easy to distinguish from the previous association by the missing alkaliphil species. These grassland does not have high conservation value in their present status. However they may be important in the development of artificial bird habitats. For example they can be suitable nesting sites for Collared Pratincole (*Glareola pratincola*) and Kentish Plover (*Charadrius alexandrinus*) colonies after adequate (even over) grazing, inundating, or by mechanical habitat restoration. Wetland habitat rehabilitation will lead in some cases to meadows with *Alopecurus*.

### **Steppes**

*Salvio-Festucetum rupicolae*, or *Cynodonti-Poetum angustifoliae* in degraded stands: There are several ancient loess grasses in the area, but unfortunately all the surveyed ones were very degraded. The huge amount of grazing animals of the past affected them radically. Its species composition is formed almost totally by the most grazing resistant species: the main weeds, *Ononis spinosa* and *Galium verum* may reach 50-80% coverage.

However these grasses preserve some valuable species as well: *Inula germanica*, *Adonis vernalis*, *Allium paniculatum*, *Phlomis tuberosa*, *Vincetoxicum hirundinaria*, *Seseli verum*, *Thalictrum minus*, *Veronica orchidea*, *Orchis morio*, *Potentilla recta*, *Stipa capillata* and *Holoschoenus romanus*, as well as *Dianthus ponederae*, *Coronilla varia*, *Asperula cynanchica*, *Filipendula vulgaris*, *Salvia pratensis*, *S. nemorosa*, *S. austriaca*, *Medicago facata*, *Betonica officinalis*, *Plantago media*, *Verbascum phoeniceum*, *Thymus marschallianus*, *Veronica prostrata*, *Nonnea pulla*, *Falcaria vulgaris*, *Stachys recta*, *S. germanica* and *Asparagus officinalis*.

It is typical, that meadow species often appear even in the primary vegetation stands (e.g. *Centaurea pannonica*, *Stellaria graminea*, *Serratula tinctoria*, *Lythrum virgatum*, *Iris spuria*, *Potentilla reptans*, *Cichonum intybus*, *Knautia arvensis*, *Trifolium pratensis*, *Daucus carota*).

The few loess grasses of the southern part are mainly secondary ones, consequently they are without any characteristic feature. The most beautiful loess grasses of the area were found between the Kolesháti and Nagyházi tanyas, and in Kocsordos, as well as SE to Gelej. These all are surrounded by *Artemisia* and *Camphorosma* grasses which fact also can be attributed to the ancient character of these loess grasses.

There are loess grassland-like grasses transformed/transforming from wet meadow associations in some parts of the Csincse floodplain. Species composition of them are even poorer, better species are: *Fragaria viridis*, *Galium verum*, *Hieracium pilosella*, *Plantago media*, *Senecio jakobaea*, *Salvia austriaca*.

### **Other dry habitats**

Abandoned ploughlands: There are abandoned ploughlands of different ages in various places of the puszta. Loess grass associations started to regenerate on them, while their rapid development does not supported by the surrounding areas which themselves are low propagula sources.

Characteristic species in these lands (of at least 5-10 years old): *Festuca pseudovina*, *Poa angustifolia*, *Achillea collina*, *Cardaria draba*, *Koeleria cristata*, *Carduus nutans*, *Eryngium campestre*, *Convolvulus arvensis*, *Pimpinella saxifraga*, *Agropyron repens*; (and if they are younger) the ploughland weeds: *Hyoscyamus niger*, *Cannabis sativa*, *Bromus sterilis*, *Cirsium arvense* are frequent.

Improved grasses: Rather undistinctive stands, and if the soil does not alkali-rich, they are also weedy. The „native” grasses usually recovered them, but the original vegetation mosaic borders are smudged on the satellite images owing to the ploughing.

Arable lands, tree plantations and tree lines, groves, farms: Does not have botanical values. Groves are rather degraded. Willows are exclusively brittle willows, which is worth to plant in the future as well

because they create important bird habitats. Robinia are also useful especially on the otherwise dry habitats. Planting oaks is risky but not impossible. Poplars (both silver and gray) may be promising.

## FAUNA

### Coleoptera:

Carabus clathratus auramensis	Necrodes litoralis	Anaxia pilosa
Harpalus sp.	Anthaxia hungarica	Melolontha hippocastani
Amara sp.	Byctiscus populi	Anisoplia segetum
Chlaenius festivus	Apion sp.	Pentodon idiota
Calosoma inquisitor	Cleonus sp.	Megopis scabricornis
Hydrous piceus	Lixus sp	Dorcadion sp.
Hydrous aterrimus	Larinus turbinatus	Phytoecia cerula
Histeridae	Copris lunaris	Plagionotus floralis
Necrophorus germanicus	Geotrupes spiniger	Donacia sp.
Galeruca tanacetii		

### Lepidoptera:

Pelosia obtusa H.S.	Scotia vestigialis Hfn.	Mythimna straminea Fr
Endrosa roscida Schiff.	Ochropleura signifera Schiff.	Cucullia thapsiphaga Fr.
Chelis maculosa Germ.	Ochropleura forcipula Schiff.	Cucullia balsamitae B.
Donacaula cicatricella Hbn.	Diarsia brunnea Schiff.	Derthisa glaucina Esp.
Ancylobomia palpella Hbn	Discestra dianthi hungarica Wagner	Atethmia centrago Hiv.
Proserpinus proserpina Pall.	Sideridis albicoln Hbn.	Simyra nervosa Schiff.
Celerio gallii Plott.	Mamestra splendens Hbn.	Apamea unanims Hb.
Cosmia affinis L	Antographa pulchra Hiv.	Catocala electa Bkh.
Archanara sp.	Antographa bractea Schiff.	Catocala fraxini L.
Calpe thalictri Bkh.	Epiono vespertaria F.	Alcis repandata Cl.
Sitochroa palealis Schiff.	Hissia cavemosa gormanyi Kovács	Cosmia diffinis L.

Papilionidae: Papilio machaon L. Zerynthia polyxena L.

### Pieridae:

Aparia crataegi L.	P. napi L.	Colias hyale
Leptidea sinapis		
Pieris brassicae L.	Pontia daplidice	Colias australis
P. rapae L.	Antocharis cardaminus	Colias croceus

Lycaenidae:

Calliphrys rubi L.	Zephyrus betulae L.	Everes argiades Pall.
Strymon acaciae F.	Lycsena disparutilus Wernb.	Plebejus argus L.
Str. pruni L.	Lycsena phlacas L.	Polyommatus icarus Rott.
Quercusia quercus L.	Heodes tityrus Poda.	

Erycinidae: Nemeobius lucina L.

Nymphalidae:

Apatura ilia Schiff.	Aglais urticae L.	Clossiana selene Schiff.
Pyrameis atalanta L.	Nymphalis polychboros L.	Clossiana dia L.
P. cardui	Araschnia levana L.	Issoria lathonia L.
Inachis io L.	Melitaea phoebe Knoch.	Argymis paphia L.

Satyridae:

Melanargia galathea L.	P. maera L.	C. pamphilus L.
Parargo aegeria egerides Stqr.	Maniola Jurtina L.	
P. magaera L.	Coenonympha iphis Schiff	

Hesperidae:

Pyrgus malone L., Pyrgus armoricamus Obth. Erymis tagos L

Hymenoptera: Vespa crabro Termex fusciformis

Arachnoidea:

Lycosa singariensis	Linyphia sp.	Misumena ratia
Araneus diadematus	Dolomedes fimbriatus	Argiope bruenn

Orthoptera:

Tetti onia viridissima	Gryllotalpa gryllotalpa	Mantis religiosa
Gryllus campestris		

Moluscs – Mollusca: Helix pomatia

Fish - Pisces: Practically extincted from the study area owing to the dried out habitats. One of the main aim of this project is to establishing suitable environment for their reintroduction.

Amphibians - Amphibia

Triturus vul aris	Bufo bufo	Rana esculenta
Bombina bombina	Bufo viridis	Rana arvalis
Pelobates fuscus	Hyla arborea	

Reptiles – Reptilia: Lacerta agilis Natrix natrix Emys orbicularis

Birds- Aves:

		Breeding birds	Not breeding	Migratory
Little Grebe	Podiceps ruficollis	+		
Black-necked Grebe	Podiceps nigricollis			+
Red-necked Grebe	Podiceps griseigena			+
Cormorant	Phalacrocorax carbo		+	
Grey Heron	Ardea cinerea		+	
Purple Heron	Ardea purpurea	+ (?)	+	
Squacco Heron	Ardeola ralliodes		+	
Great White Egret	Egretta alba		+	
Little Egret	Egretta garzetta		+	
Night Heron	Nycticorax nycticorax		+	
Little Bittern	Ixobrychus minutus	+		
Bittern	Botaurus stellaris	+		
White Stork	Ciconia ciconia	+		
Black Stork	Ciconia nigra		+	
Spoonbill	Platalea leucorodia		+	
Greylag Goose	Anser anser	+		
White-fronted Goose	Anser albifrons		+	
Lesser White-fronted Goose	Anser erythropus			+
Bean Goose	Anser fabilis		+	
Mallard	Anas platyrhynchos	+		
Garganey	Anas querquedula	+		
Teal	Anas crecca		+	
Pintail	Anas acuta			+
Wigeon	Anas penelope		+	
Gadwall	Anas strepera		+	

		Breeding birds	Not breeding	Migratory
Shoveler	Anas clypeata		+	
Pochard	Aythya ferina		+	
Tufted Duck	Aythya fuligula		+	
Ferruginous Duck	Aythya nyroca	+		
Goldeneye	Bucephala clangula		+	
Honey-buzzard	Pernis apivorus	+ (?)	+	
Black Kite	Milvus migrans	+		
Goshawk	Accipiter gentilis	+		
Sparrowhawk	Accipiter nisus		+	
Long-legged Buzzard	Buteo rufinus		+	
Buzzard	Buteo buteo	+		
Rough-legged Buzzard	Buteo lagopus		+	
Booted Eagle	Hieraetus pennatus			+
Golden Eagle	Aquila chrysaetos			+
Imperial Eagle	Aquila heliaca	+	+	
Lesser Spotted Eagle	Aquila pomarina		+	
White-tailed Eagle	Haliaetus albicilla		+	
Hen Harrier	Circus cyaneus		+	
Pallid Harrier	Circus macrourus			+
Montagu's Harrier	Circus pygargus	+	+	
Marsh Harrier	Circus aeruginosus	+		
Short-toed Eagle	Circaetus gallicus		+	
Osprey	Pandion haliaetus			+
Saker	Falco cherrug	+		
Peregrine Falcon	Falco peregrinus			+
Hobby	Falco subbuteo	+		
Merlin	Falco columbarius		+	
Red-footed Falcon	Falco vespertinus	+		

		Breeding birds	Not breeding	Migratory
Lesser Kestrel	Falco naumanni			+
Kestrel	Falco tinnunculus	+		
Partridge	Perdix perdix	+		
Quail	Coturnix coturnix	+		
Pheasant	Phasianus colchicus	+		
Crane	Grus grus		+	
Water Rail	Rallus aquaticus	+		
Corncrake	Crex crex	+		
Little Crake	Porzana parva	+		
Spotted Crake	Porzana porzana	+		
Moorhen	Gallinula chloropus	+		
Coot	Fulica atra	+		
Great Bustard	Otis tarda	+		
Lapwing	Vanellus vanellus	+		
Grey Plover	Pluvialis squatarola		+	
Golden Plover	Pluvialis apricaria		+	
Curlew	Numenius arquata			+
Black-tailed Godwit	Limosa limosa	+		
Spotted Redshank	Tringa erythropus		+	
Redshank	Tringa totanus		+	
Marsh Sandpiper	Tringa stagnatilis			+
Greenshank	Tringa nebularia		+	
Green Sandpiper	Tringa ochropus		+	
Wood Sandpiper	Tringa glareola		+	
Common Sandpiper	Tringa hypoleucos		+	
Snipe	Gallinago gallinago	+		
Woodcock	Scolopax rusticola		+	
Little Stint	Calidris minuta			+

		Breeding birds	Not breeding	Migratory
Ruff	<i>Philomachus pugnax</i>		+	
Stone-Curlew	<i>Burhinus oedicnumus</i>			+
Common Gull	<i>Larus canus</i>		+	
Herring Gull	<i>Larus argentatus</i>		+	
Black-headed Gull	<i>Larus ridibundus</i>		+	
Whiskered Tern	<i>Chlidonias hybrida</i>			+
Black Tern	<i>Chlidonias niger</i>			+
Common Tern	<i>Sterna hirundo</i>			+
Stock Dove	<i>Columba oenas</i>		+	
Wood Pigeon	<i>Columba palumbus</i>	+		
Turtle Dove	<i>Streptopelia turtur</i>	+		
Collared Dove	<i>Streptopelia decaocto</i>	+		
Cuckoo	<i>Cuculus canorus</i>	+		
Barn Owl	<i>Tyto alba</i>	+		
Scops Owl	<i>Otus scops</i>			+
Little Owl	<i>Athene noctua</i>	+		
Tawny Owl	<i>Strix aluco</i>	+		
Long-eared Owl	<i>Asio otus</i>	+		
Short-eared Owl	<i>Asio flammeus</i>		+	
Nightjar	<i>Caprimulgus europaeus</i>		+	
Swift	<i>Apus apus</i>		+	
Kingfisher	<i>Alcedo atthis</i>	+		
Bee-eater	<i>Merops apiaster</i>	+		
Roller	<i>Coracias garrulus</i>	+		
Hoope	<i>Upupa epops</i>	+		
Wryneck	<i>Jynx torquilla</i>	+		
Green Woodpecker	<i>Picus viridis</i>	+		
Black Woodpecker	<i>Dryocopus martius</i>		+	



		Breeding birds	Not breeding	Migratory
Great Spotted Woodpecker	Dendrocopos maior	+		
Syrian Woodpecker	Dendrocopos syriacus	+		
Lesser Spotted Woodpecker	Dendrocopos minor	+		
Crested Lark	Galerida cristata	+		
Skylark	Alauda arvensis	+		
Shore Lark	Eremophila alpestris			+
Swallow	Hirundo rustica	+		
House Martin	Delichon urbica	+		
Sand Martin	Riparia riparia	+		
Golden Oriole	Oriolus oriolus	+		
Raven	Corvus corax		+	
Hooded Crow	Corvus comix	+		
Rook	Corvus frugilegus	+		
Jackdaw	Coleus monedula	+		
Magpie	Pica pica	+		
Jay	Garrulus glandarius	+		
Great tit	Parus maior	+		
Blue Tit	Parus caeruleus	+		
Marsh Tit	Parus palustris		+	
Long-tailed Tit	Aegithalos caudatus		+	
Penduline Tit	Remiz pendulinus	+		
Bearded Tit	Panurus biarmicus	+		
Nuthatch	Sitta europaea		+	
Treecreeper	Certhia familiaris		+	
Short-toed Treecreeper	Certhia brachdactyla		+	
Wren	Troglodytes troglodytes	+		
Mistle Thrush	Turdus viscivorus			+
Fieldfare	Turdus pilaris		+	

		Breeding birds	Not breeding	Migratory
Song Thrush	Turdus philomelos		+	
Ring Ouzel	Turdus torquatus			+
Blackbird	Turdus merula		+	
Wheatear	Oenanthe oenanthe	+		
Stonechat	Saxicola torquata	+		
Whinchat	Saxicola rubetra	+		
Black Redstart	Phoenicurus ochruros	+		
Nightingale	Luscinia megarhynchos	+		
Robin	Erithacus rubecula	+		
Grasshopper Warbler	Locustella naevia			+
River Warbler	Locustella fluviatilis	+		
Savi's Warbler	Locustella luscinioides	+		
Moustached Warbler	Luscinia melanopogon			+
Great Reed Warbler	Acrocephalus arundinaceus	+		
Reed Warbler	Acrocephalus scirpaceus	+		
Marsh Warbler	Acrocephalus palustris	+		
Sedge Warbler	Acrocephalus schoenobaenus	+		
Olivaceous Warbler	Hippolais pallida			+
Blackcap	Sylvia atricapilla	+		
Barred Warbler	Sylvia nisoria			+
Whitethroat	Sylvia communis	+		
Lesser Whitethroat	Sylvia curruca	+		
Willow Warbler	Phylloscopus trochilus		+	
Chiffchaff	Phylloscopus collybita	+		
Wood Warbler	Phylloscopus sibilatrix		+	
Goldcrest	Regulus regulus		+	
Spotted Flycatcher	Muscicapa striata		+	
Pied Flycatcher	Ficedula hypoleuca		+	

		Breeding birds	Not breeding	Migratory
Meadow Pipit	<i>Anthus pratensis</i>		+	
Tawny Pipit	<i>Anthus campestris</i>	+		
Tree Pipit	<i>Anthus trivialis</i>	+		
Water Pipit	<i>Anthus spinoletta</i>		+	
White Wagtail	<i>Motacilla alba</i>	+		
Yellow Wagtail	<i>Motacilla flava</i>	+		
Great Grey Shrike	<i>Lanius excubitor</i>		+	
Lesser Grey Shrike	<i>Lanius minor</i>	+		
Red-backed Shrike	<i>Lanius collurio</i>	+		
Starling	<i>Sturnus vulgaris</i>	+		
Rose-coloured Starling	<i>Paster roseus</i>	+(1994)		+
Hawfinch	<i>Coccothraustes coccothraustes</i>	+		
Greenfinch	<i>Carduelis chloris</i>	+		
Goldfinch	<i>Carduelis carduelis</i>	+		
Twite	<i>Carduelis flavirostris</i>		+	
Bullfinch	<i>Pyrrhula pyrrhula</i>		+	
Chaffinch	<i>Fringilla coelebs</i>	+		
Brambling	<i>Fringilla montifringilla</i>		+	
Yellowhammer	<i>Emberiza citrinella</i>	+		
Corn Bunting	<i>Emberiza calandra</i>	+		
Reed Bunting	<i>Emberiza schoeniclus</i>	+		
Lapland Bunting	<i>Calcarius lapponicus</i>		+	
Snow Bunting	<i>Plectrophenax nivalis</i>			+

#### Mammals-Mammalia

##### Insectivora

Hedgehog (*Ermaceus europaeus*), Lesser Shrew (*Sorex minutus*), Common Shrew (*Sorex araneus*), Watershrew (*Neomys fodiens*), Bicoloured White-toothed Shrew (*Crocidura leucodon*), Mole (*Talpa europaea*).

## Chiroptera

Rhinolopus ferrum-equinum, Myotis myotis, Plecotus austriacus, Pipistrellus pipistrellus, Nyctalus noctula

## Lagomorpha

Lepus europaeus

## Rodentia

Citellus citellus, Cricetus cricetus, Arvicola terrestris, Microtus arvalis, Ondrata zibethicus, Apodemus agrarius, Micromys minutus, Apodemus flavicollis, Apodemus sylvaticus, Rattus norvegicus, Sicista subtilis

## Carnivora

Vulpes vulpes, Meles meles, Mustela erminea, Mustela nivalis, Mustela putorius, Mustela eversmanni, Lutra lutra, Martes martes, Martes foina, Felis silvestris

## Artiodactyla

Sus crofa, Capreoluscapreolus

## Evaluation of the pilot area from the point of view of nature conservation

### Size of the area

With the 1993 enlargement the area provides adequate habitat space for the characteristic puszta species. It offer such a great core, closed area (for „outsiders" the core is hardly accessible) that even for large space demanding species (like great bustards and falcons) provides proper conditions. Thanks to the large size of the area there is a great oppportunity to keep the natural landscape and habitat borders, helping species wandering and population dynamics. The outer cover provides a safety, buffering zone for the core.

### Diversity

Desired diversity is the multiscale habitats and landscapes within the PA, like wet areas, saline and non-saline grasslands, swamps, natural dry saline and loess pastures mosaics. Lot of the species require these complex mosaic habitats

Non-desired diversity: The area diversity in certain ways is higher than under natural conditions, mostly due to antropogenious effects, e.g. weed diversity, vegetataion diversity (crops). This should be reduced.

### Natural conditions

The area considered as semi-natural as it was created and developed by (human) agricultural activities. So the goal is not to recreate natural conditions but to provide conditions (by proper agricultural methods) for maintenance. Nevertheless the area considered as one of the most close to natural steppe, puszta conditions.

### Rarity

The characteristic associations are relatively common in Hungary on remaining Pannon saline - wet mosaics. Less extent the loess-spotted pasture with the related valuable species and associations are more rare. The existing saline meadows in the PA are rare even in international context.

The main values of the PA are the worldwide endangered species of which viable population can be found (great bustard, roller, sakeret, kestrel). Certain mammals are also valuable (e.g. steppe fitchet)

#### Sensitivity

- Wetlands, swamps - groundwater lowering, canalisation, pesticide, fertiliser use
- Peatlands - dry up, fires, pesticides
- Inland floodplain meadows - lack of flooding, water shortage, weeds
- Saline pastures - water shortage, under-, overgrazing, weeds
- Loess pastures - overgrazing, pesticide use
- Saline forest-pasture - groundwater, grazing intensity
- Great bustard - looks stabil, but intensive cropping, abandonment, overuse of pastures, increased predators (control!)
- Sakeret - reached upper limit of retention capacity!, breeding conditions (high trees) prey conditions (extensive land use)
- Redleg kestrel - very sensitive, decrease of wet pastures and treelines (reduction of prey) Roller - (more the 60 couples) feeding conditions, breeding (bolt-holes)
- Imperial eagle - (few couples) not succesful final settling due to disturbance, prey shortage Waders - less number, dried up wetlands, significant improvement expected

#### Description of the most important nature conservation values of the PA

Importance	International	National	Local
large open puszta	medium	high	high
relative indisturbance	medium	high	high
natural landscape borders	low	high	high
old riverbeds	low	medium	high
diverse vegetation mosaics	low	medium	high
ancient saline pastures (non-floodplain)	medium	high	high
saline meadows	medium	high	hi
steppe swam spots	medium	high	high
saline carex and meadow habitats	low	medium	high
loess-spotted „wild" saline pastures	low	low	medium
great bustard	high	medium	high
sakeret	high	high	hi h
redlegged kestrel	high	medium	high
roller	medium	high	high
corncrake	low	medium	high
imperial eagle	low	low	low
banded mouse	medium	high	high
Nagy sziki bagoly lepke	high	high	
Sziki kocsord Teucedanum officinale	medium	high	hi h
Buglyos boglárka (Ranunculus sp.)	low	high	hi h
Tavaszi hérics (Adonis vernalis)	low	low	high
Macskahere (Phlomis tuberosus)	low	low	medium
Fatyolos noszirom (Iris spuria)	low	medium	high
Kornis tárnics (Genciana neumonantha)	low	low	medium

Elegáns kosbor ( Orchis laxiflora)	low	low	low
Kétsoros sás (Carex disticha)	low	low	low
landscape values	medium	low	medium
old agricultural buildings	low	medium	medium
traditional handicrafts	medium	high	high

-----

## ANSWERS TO QUESTIONS OF JULY 29TH 2004-07-29

### About Nature and agriculture.

**Could you provide data on agricultural evolution over the past decades and information on foreseen evolution with the coming in the EU?**

**Are there any national, regional, local policies tending to anticipate this evolution? If so, What are their main measures?**

The National Strategy for Agriculture and Rural Development, developed by the Agricultural and Rural Development Round Table of around 300 professionals, was published 27 May 2004. It assesses the present situation that has been heavily affected by the past policies. The main priorities of the document are the following:

- Preserving and sustainable use of the agri-ecological potential,
- increasing food safety and marketing assurance
- strengthening competitiveness
- gradual restructuring of land property structure
- improving alternative rural employment opportunities
- restructuring institutional infrastructure to meet the EC requirements

These items well reflect the main concerns of the government regarding agricultural policy development.

The natural conditions for agriculture are very good in Hungary. According to this document 80% of all agricultural lands is suitable for utilisation with favourable cost-revenue figures. Of the total agricultural area 55-65% is suitable for more intensive production than at present, 15-25 % is suitable for environment friendly production while 10-20% of the agricultural area, through proper remuneration from the society, can serve nature conservation and recreational purposes. With these targets the ultimate objective is to create an agricultural sector that is sustainable and can supply profitable export at the same time.

The actual support mechanisms are set out in the Agricultural and Rural Development Operative Plan and the National Rural Development Plan.

Agri-environment measures, and within that the Environmentally Sensitive Areas Schemes are the most relevant from a nature conservation point of view. The development of agri-environment policy was started around 2000 when the National Agri-environment Programme (NAEP) was launched. Since then its measures were continuously developed. In 2003 similar but new agri-environment measures were set up within the framework of the National Rural Development Plan and farmers already contracted in the NAEP had a choice to shift their commitments under the new NRDP agri-environment schemes or to remain under the NAEP until their 5 year contract terminates. 90% of the farmers with NAEP contract chose to transfer their commitments under the NRDP from 2004.

Strengthening competitiveness is the main point of the National Strategy for Agriculture and Rural Development above all other priorities

The competitiveness of the Hungarian agricultural sector shows a mixed picture at present. Professional farming businesses, viable family farms and 1-2 hectare part-time hobby farms/ subsistence farms and households also engaged in agriculture are at present at the same time.

The balance between animal husbandry and crop production has broken up. Keeping animal welfare and environmental rules is problematic in many places. Farming lifestyle loses its social prestige rapidly. As a result the age structure and education level of the farming community deteriorate.

The strategy document forecasts the increase of agricultural performance with a future property structure of 80-100 thousand viable private farms and 6-7 thousand farming companies. Beyond production, processing, packaging and other services related to agriculture are expected to increase. This will slightly improve employment opportunities, too.

**Intensive agriculture coincides with low biodiversity. According to EEA above mentioned report, where as high nature value farmland often overlaps areas of extensive agriculture with more environment friendly practices. In these areas, the predominant trend is intensification and abandonment. Both are considered as detrimental to biodiversity ( also report says there is little information however on exact conservation status). Would you have information and/or data showing some evidence of trend ?**

In 1997 a study on a national land use zone system was carried out with the following objectives.

The resettlement process of agricultural and rural development policy of the EU and its adaptation may only give advantages for Hungary if the special conditions of the different measures to be taken are precisely determined i.e. a land-use zone system shall be formed which completely takes into consideration either the agricultural production or non-productive potentials of different regions, classifies the different areas of the country along these coordinates, and applies different strategies for agricultural and rural development in the different zones that have been formed in accordance with the above mentioned methods.

The realization of the concept outlined above i.e. the basic aim in developing Hungary's integrated land-use zone system is to develop an objective and ecologically-based analysis in several respects, to evaluate the suitability of these areas for agricultural production (i.e. agricultural potential) and environmental sensitivity, and to make a comparison between these two sides in order to balance natural resources (agricultural and environmental standards). The land-use zone system was developed by comparing the standards of suitability for agricultural production and of environmental sensitivity. This zone system is hoped to: give help to the discussions on EU-accession in agricultural issues by giving an objective land-use base to these issues; indicate the potential Hungarian target areas of the EU subsidizing system; be a basis of a regionally different but harmonized agricultural, rural and environmental policy; provide a direct base in the field of land-use for a long-term national rural development concept; can help in the development of a sustainable land-use structure, which is adjusted to the ecological conditions, and also in the realization of the sustainable development in practice.

The scenarios of national land use zone study proved that agricultural lands best suitable for production does not overlap with the environmentally vulnerable parts.

**Could you let us have your appreciation of the consequences of the changes in CAP in relation to financial support to agricultural production (no or less financial support)? In relation to increasing support under second pillar?**

As we could see from the National Strategy for Agriculture and Rural Development competitiveness development seems to be the leading theme in the Hungarian policy development despite the increasing importance of the second pillar in the EU.

The insistence of the government on primarily supporting viable agricultural businesses focus on productive areas only that had been farmed actively and successfully during the previous political regime. As a result, less biodiversity might have been remained in such areas compared to those agricultural lands where large scale farming was not successful due to worse natural conditions. There is a real threat of re-intensification in fertile areas.

The national land use zone study proved that agricultural lands best suitable for production does not overlap with the environmentally vulnerable parts.

Currently, we cannot foretell the result of increasing support under second pillar onto the development of Hungarian agricultural policies. It is hoped that an increasing share would be made available under agri-environment measures that can benefit landscape and nature management.

## **LIST OF MAPS**

Map 1.: Delineation of the Pilot Area I.

Map 2.: Delineation of the Pilot Area II.

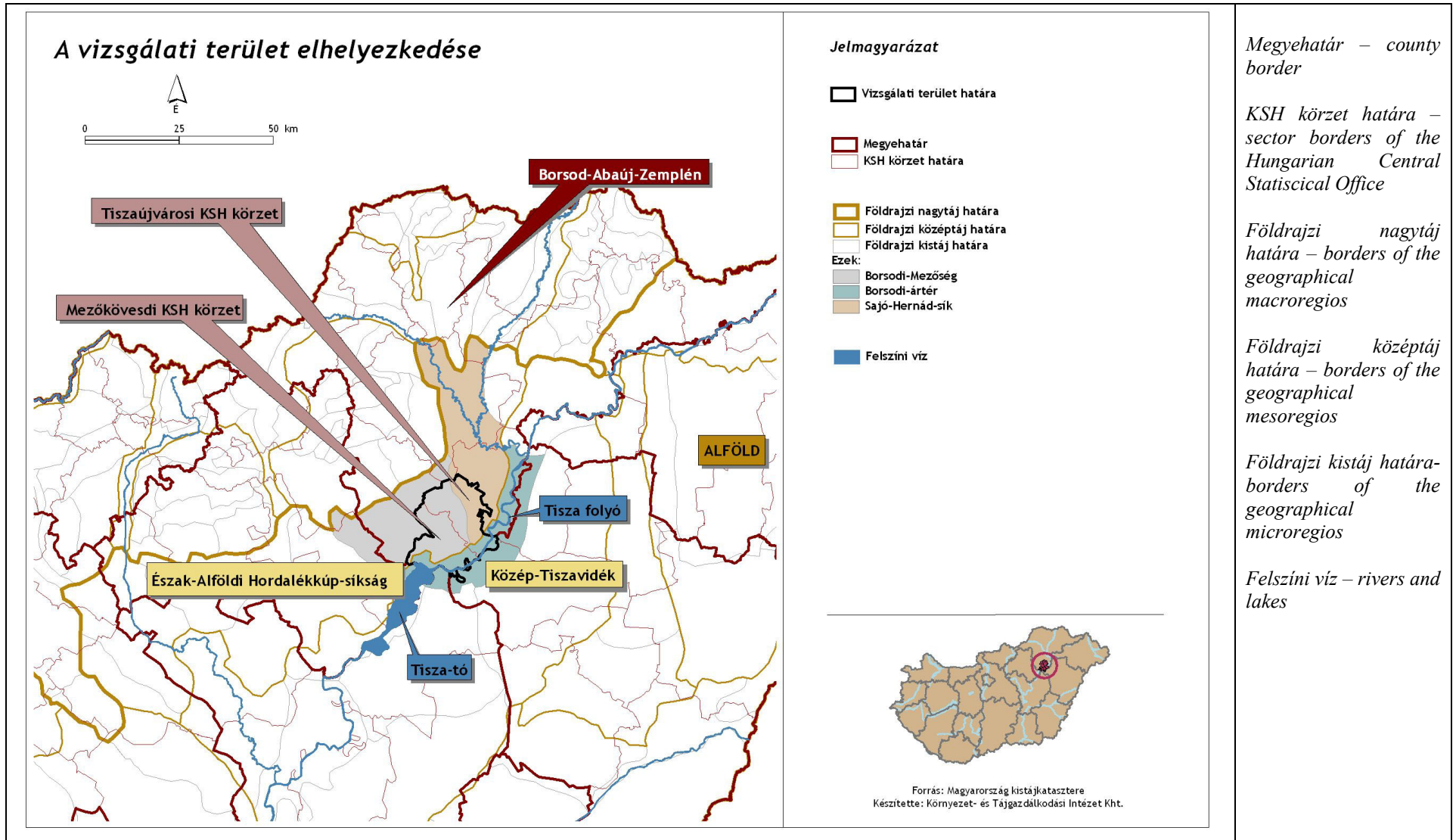
Map 3.: Protected areas and Ramsar sites on the Pilot Area

Map 4.: Environmentally Sensitive Area and Important Bird Area on the Pilot Area

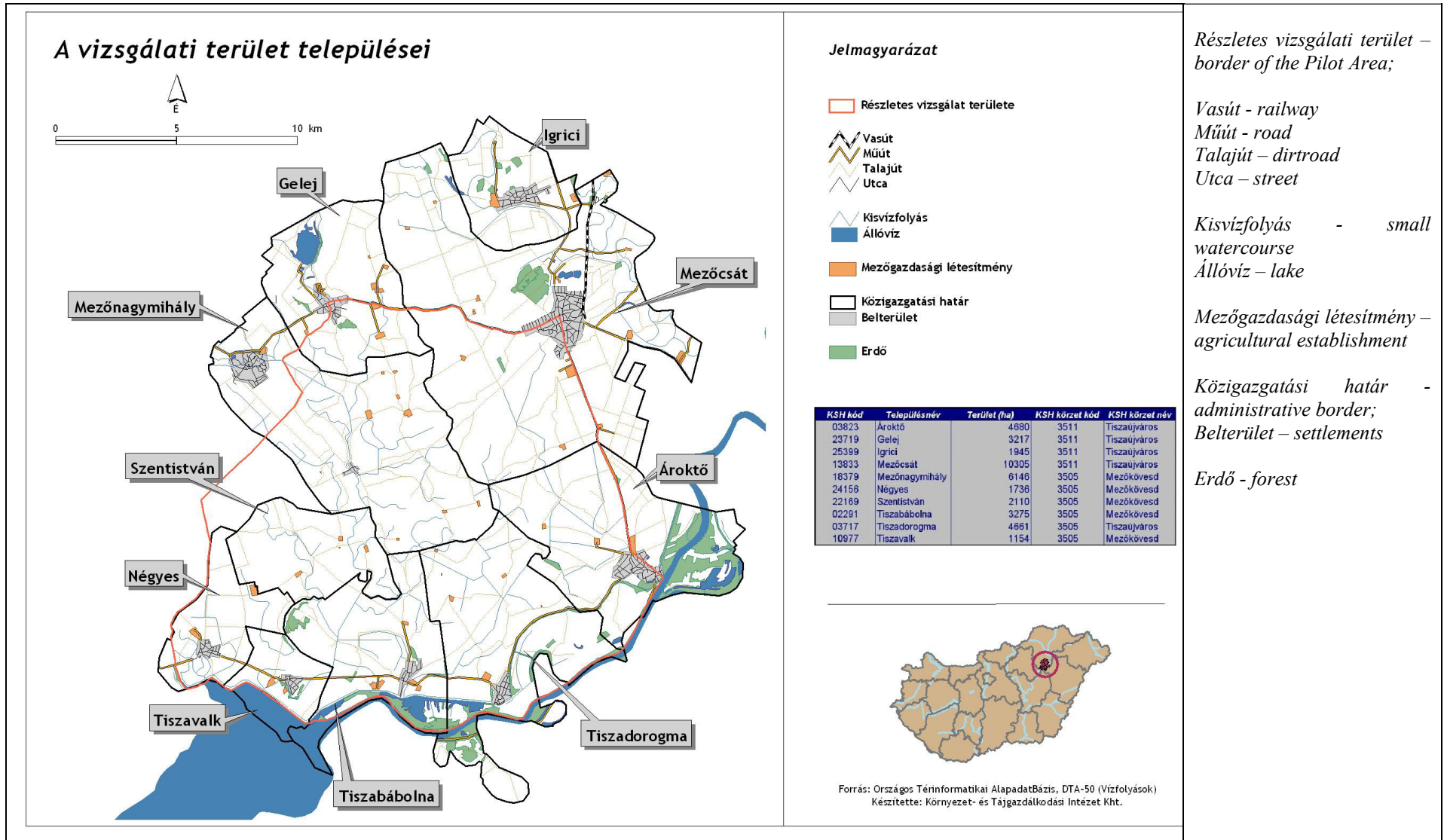
Map 5.: Ecological network on the Pilot Area



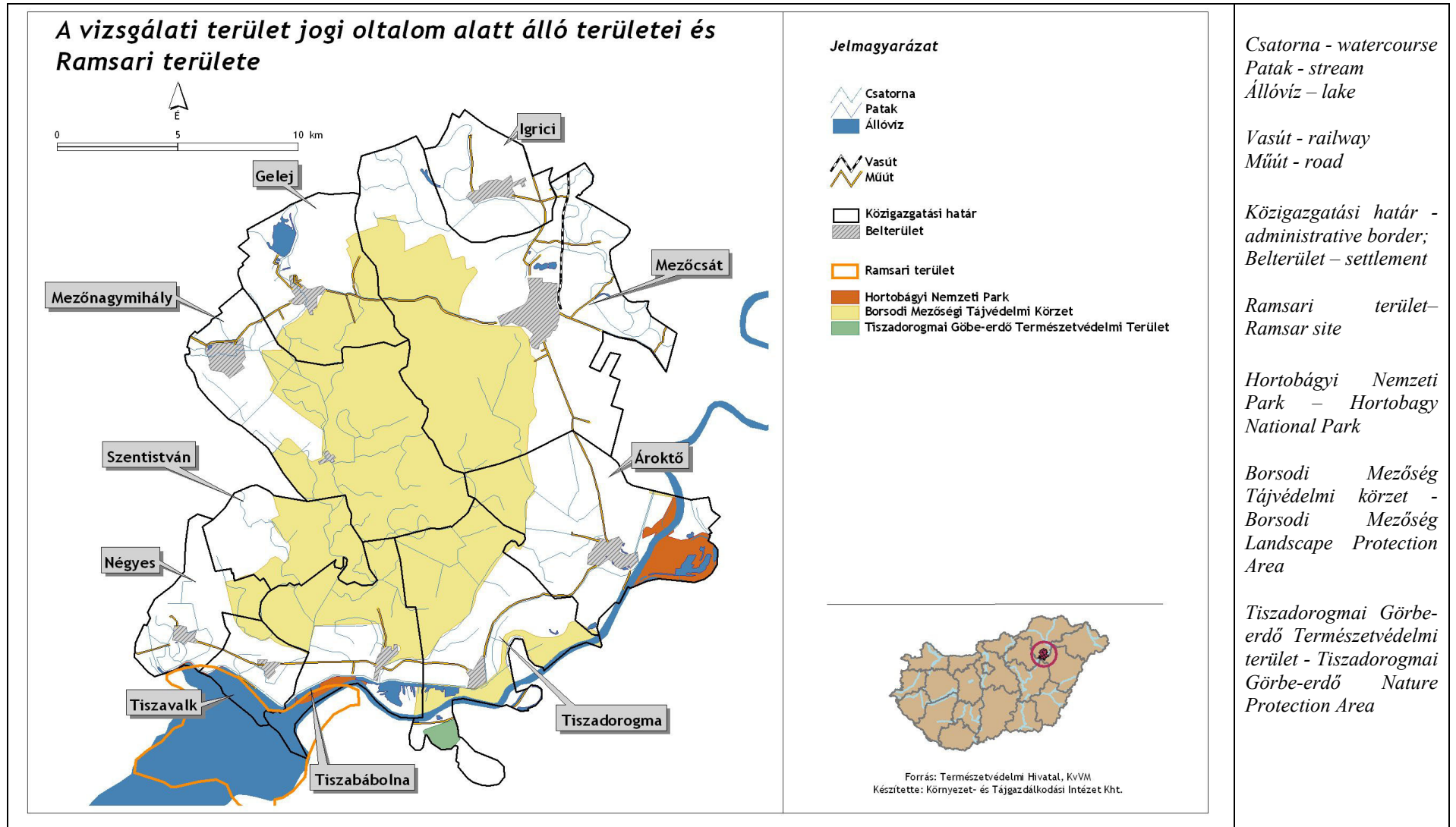
**Map 1: Delineation of the Pilot Area I.**



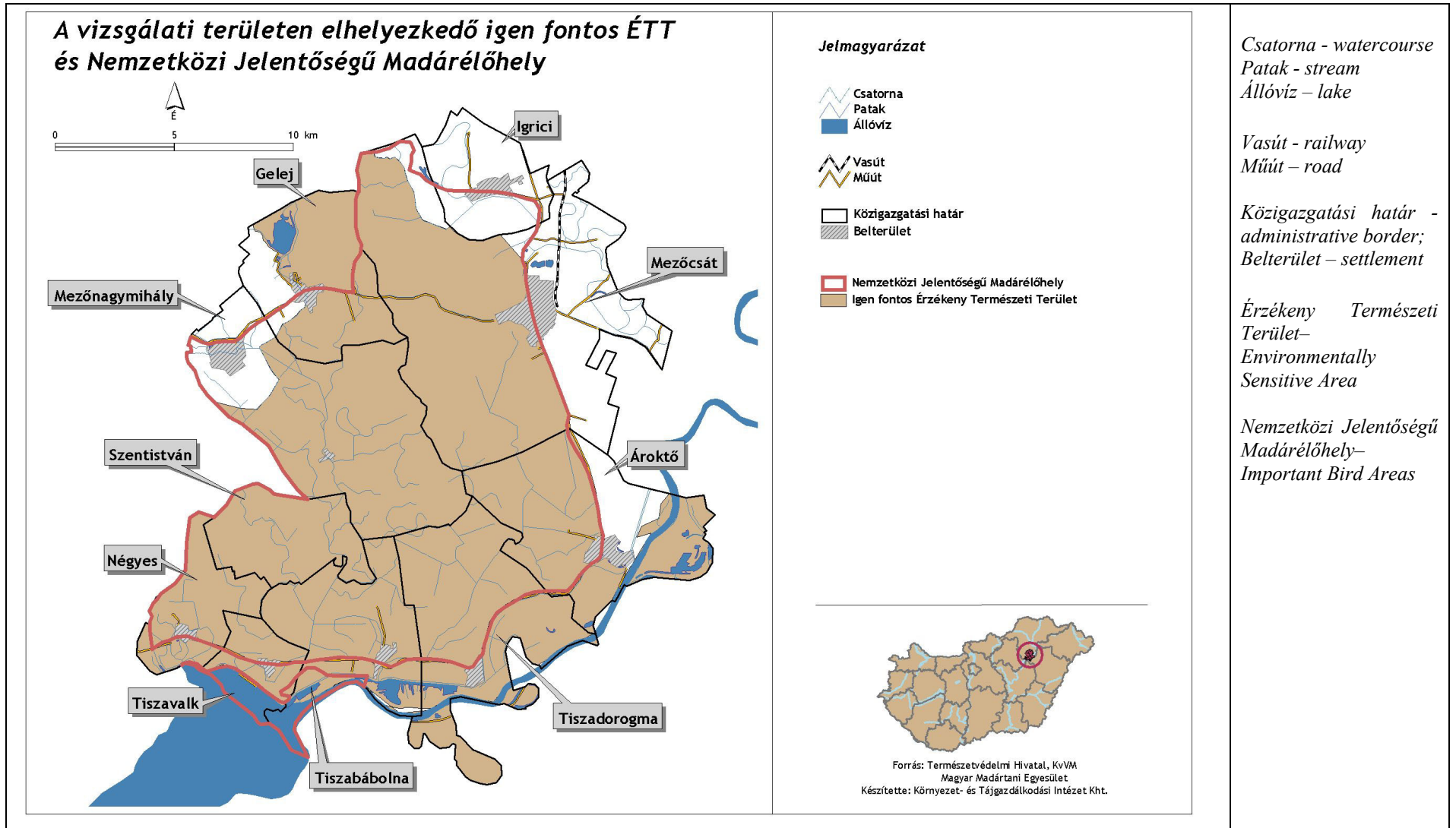
**Map 2: Delineation of the Pilot Area II.**



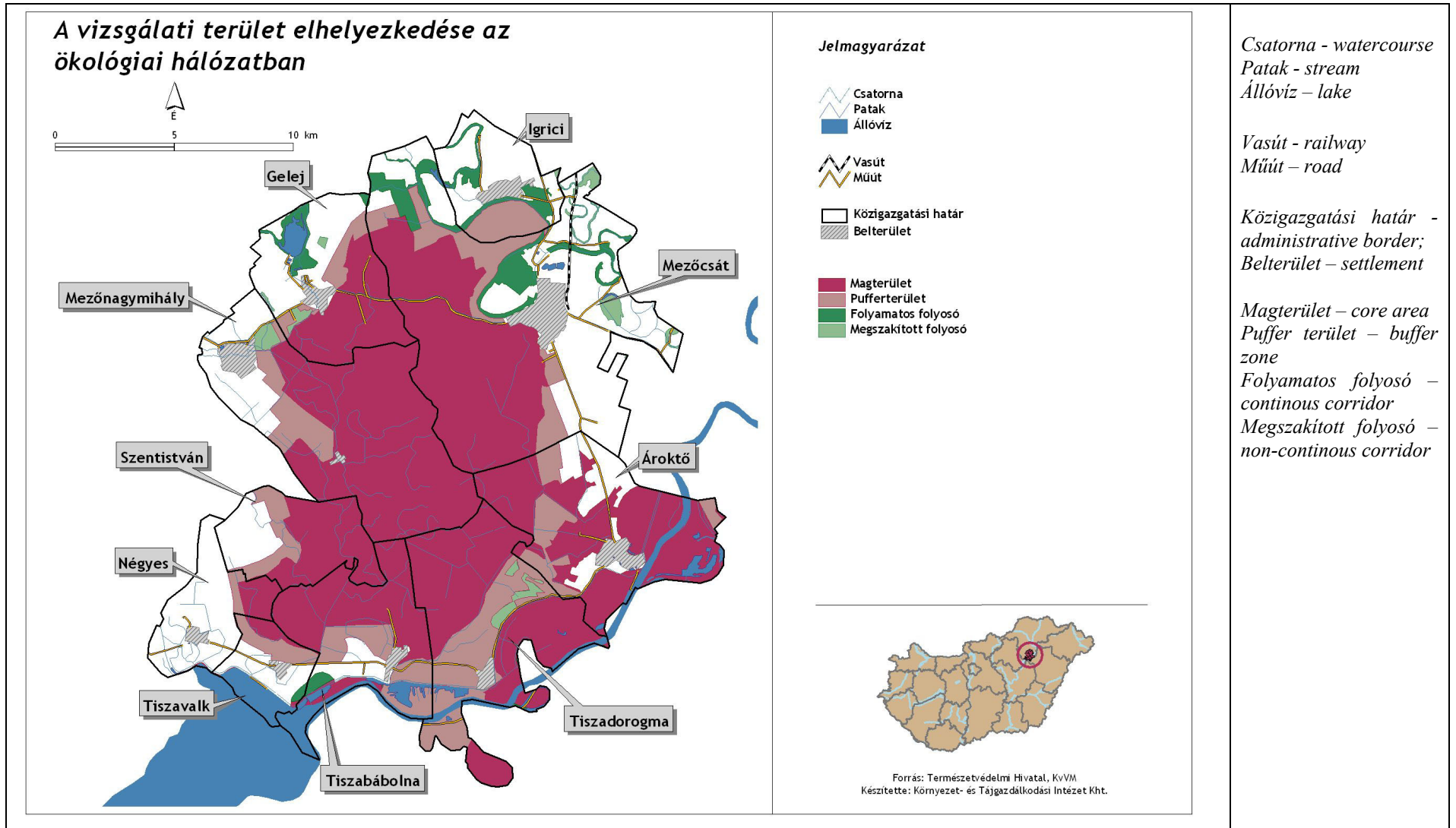
Map 3: Protected areas and Ramsar sites on the Pilot Area



Map 4: Environmentally Sensitive Area and Important Bird Area on the Pilot Area



Map 5.: Ecological network on the Pilot Area



**ESPON 1.3.2 TERRITORIAL TRENDS IN THE MANAGEMENT OF  
THE NATURAL HERITAGE:**

**CASE STUDY OF LANZAROTE, CANARY ISLANDS**

---

PREPARED BY TALLER DES IDEAS  
2004

# **ESPON 1.3.2 TERRITORIAL TRENDS IN THE MANAGEMENT OF THE NATURAL HERITAGE: CASE STUDY OF LANZAROTE, CANARY ISLANDS**

---

PREPARED BY TALLER DE IDEAS  
MADRID, SPAIN  
8 MARCH 2004

# 1. INTRODUCTION

The Canary Islands are singular worlds unto themselves, environmental very valuable, extremely vulnerable and complex. An analysis of their evolution leads us to the conclusion that the stability of inhabited island systems depend largely on the equilibrium and compatibility of the following factors:

- The characteristics of insular development and the level of compatibility of the human component, economic activity and the insular ecosystem.
- The reach or incidence of the interchanges with the exterior, with respect to the flow of people, information and cultural values, energy, material and economic resources.
- The interaction with the proximate environment (marine and atmospheric) and with the Biosphere in general, especially the problems derived from transport and accessibility and the consequential effects on many small islands due to the changes in climate and sea level.

Therefore, when we begin to analyse the evolution of an island over the medium- and long-term, it is essential to do so with an integrated vision of the island, contemplating the interaction between the principal components, creating a manageable and representative model of the insular system being analysed.

Lanzarote, like any other island, must be analysed as an integrated system of 846km<sup>2</sup>, relatively complex and constantly evolving. Twenty years ago, the sudden growth of tourism modified the traditional insular structure based on agriculture and fishing. In the 1970s when tourism first began its expansion, it did so slowly at first, into the almost virgin territory. The scale and rhythm of growth today is such that the island faces destabilised.

The representation of the insular system of Lanzarote manifests not only its complexity but also its vulnerability. It reflects an island whose ecosystems and landscapes are very fragile and that are being subjected to increasing human pressure. It is an island whose economic sustenance depends on the "health" of a mono-culture (tourism) whose decision-making centres are located far away from the island. It is an island whose levels of self-sufficiency are minimal and show an extraordinary dependence on the exterior for the basics: food, materials and energy. It is also an island whose population is currently subjected to a set of social and cultural tensions that make it especially sensitive and vulnerable before the uncertainties of the future.



## 2. SCENARIOS

The 1993 designation of Lanzarote as Biosphere Reserve constitutes the starting point for the realisation of the discussion about the future of the island and its form in the 1998 document “Estrategia Lanzarote en la Biosfera (E.L+B)”. The basic objective of the document was to contribute to deepen the discussions about the challenges and opportunities of the island as a whole, and about the proposals that could positively guide its evolution over the next few decades. It is an evolution that should be compatible with the social and human requirements of the population, the by-products of the economy, and the preservation of an extraordinary heritage of nature and landscape.

The objectives, programmes and actions that were defined combine two complementary courses of action: the realisation of in-depth interviews with more than 100 representative persons of the island, and a set of studies developed by a team of experts.

The work that was carried out permitted the establishment, in addition to the analysis of the current situation of the island, a double evaluation: the “trend” or “risk” scenario, the result of continuing the current trends in the evolution of the island; and an “alternative” or “L+B” scenario, the result of a set of proposed programmes that are aimed at taking advantage of the opportunities and the treatment of the most significant risks.

### 2.1. THE CURRENT SITUATION

This section summarises briefly the basic problematic of the Insular System of Lanzarote, starting with the definition of the scenarios. The current outlook for the island, due to the rapid expansion of tourism, is uncertain.

Thanks to the influence of the group led by César Manrique (Lanzarote artist and ecologist), Lanzarote has managed to mitigate the dramatic urban tensions that have devastated the Spanish coast, and is today considered both nationally and internationally as one of the most appreciated places in the world.

Nevertheless, it is also clear that the very scale and velocity of the growth of tourism has induced the following.

**Population Growth.** Population is growing strongly and quickly, and concentrated around Arrecife, in the centre of the southern coast of the island.

**Cultural Identity Crisis.** Within the short time, Lanzarote has seen the disappearance of its traditional productive base and landscapes: the amount of cultivated areas has been reduced to worrying levels over the last ten years. The old society is being rapidly substituted by the new and modern. The new society is strongly tertiary, with powerful sources of wealth and open to multicultural influences brought by the waves of tourists and new immigrants.

**New Opportunities and the Risk of Social Instability.** Today in Lanzarote, there are greater opportunities, higher income, more jobs and higher quality of life compared to 10 years ago. At the same time, problems and contradictions have also arisen that are alarming to the inhabitants. For example, housing prices have risen; the job market is polarized around tourism and become more precarious. Social issues, previously unknown, have also arisen: spread of drug addiction, increase of social marginalisation, begging, insecurity.

**A Growing but Undiversified Economy, Subject to the Permanent Expansion of Tourism.** Close to 70% of the productive capacity of Lanzarote is dependent on tourism. The tourism sector is excessively polarised towards hostelry and towards the traditional “sol y playa” (sun and beach) tourism. The decline of the traditional sectors and the lack of innovation and integration of the overall insular economy make it difficult to see the rise of the dynamics of diversification. This will have worrying effects in the medium and long term.

**Urban Transformation of the Island and the Decline of Arrecife.** Human pressure on the territory and the expansion of the urbanised areas has induced different transformation processes in the diverse zones. In particular, Arrecife has been devalued as the capital of culture, economy and housing of the island.

**Impacts on the Extraordinary Ecosystem and Landscape.** The singular ecological value, significant biodiversity and the extraordinarily attractive landscape of Lanzarote has a lot to do with its volcanic origins, its geographic situation, and its antiquity. Nevertheless, the main species of the interior and the coasts of the island have been devastated first of all by the devouring fever of the urbanisation process. This was then followed by an overwhelming tourism characterised by high-mobility, ecological insensitivity and scant respect for the local society, resulting in a significant degradation of the ecology and the landscape of the island.

**Lack of Concern over Key Environmental Issues.** The Lanzarote society traditionally maintained a certain sensibility for aesthetics and for landscapes. However, modernity and the changes in lifestyles appear to have diluted this sensibility on issues, such as water and energy consumption, transport and solid wastes. These are key environmental issues that are closely related to sustainability at the insular and global scale.

Before describing the scenarios, the L+B Strategy defines what has been called the “Insular System”, shaped by the following sub-systems:

1. KEY ENVIRONMENTAL SECTORS: Solid waste, Insular transport, water and energy
2. INSULAR ECOLOGY: Biodiversity, landscape, land, water systems, global atmosphere.
3. ARRECIFE & THE URBAN SYSTEM: Arrecife, tourist nuclei, municipal centres, rural nuclei
4. ECONOMY & TOURISM: Public funds, training, diversification, agriculture and fishing, tourism, wealth creation.
5. SOCIAL STRUCTURE: Demographic equilibrium, integration, marginalisation, co-existence.
6. CULTURAL IDENTITY & HERITAGE: Identity, patrimony.

## 2.2. THE “TREND” OR “RISK” SCENARIO

How would the insular system evolve over a period of twenty year if the influx of tourists were to maintain its high levels of growth?

The hypothesis of this trend scenario is based on the forecasts for Lanzarote prepared by the World Tourism Organisation. These forecasts consider average growth rates of 4.5% over the two decades to be plausible. Although this is very much lower than for the period 1986-1996, it means that in two decade times, there could be almost 3.9 million tourists per year.

*Estimated evolution of population in the Trend Scenario 1997-2017*

	No. of tourists	Average Stay (Days)	No. tourists on island each day	Accommodation available	Residents	Floating population
1997	1,552,172	10.4	44,226	53,285	78,956	123,182
2017 (est.)	3,883,776	7.0	75,518	94,397	115,787	191,305
Difference	2,331,604	+3.4	31,292	41,112	36,831	68,123

Based on these forecasts, and assuming no mediating actions are taken, the result could be:

**Demographic and Urban Overload.** The number of visitors on the island on any given day would rise by about 30,000 persons; the resident population would exceed 115,000 inhabitants, including more than 20,000 new immigrants; while the floating population, which the island supports on a permanent basis, would surpass 190,000 persons. By themselves, the figures reflect the extent of the transformations that could occur within a space as limited and vulnerable as Lanzarote. The basic indicators of the insular system would reflect the following negative tendencies: the growth rate of the floating population would be around 3,500 new persons per year (1,600 tourists); the population density will rise to 226 inhabitants/km<sup>2</sup>, that is, 55% more than the current density; the surface area occupied by urban nuclei will be extended, reaching 9% of the island surface (currently 5%); the population balance will worsen even more, rising from 0.56 to 0.65 tourist for resident on any given day.

The consequences of demographic growth such as the one described above would directly affect the urban system. All the urban nuclei would be affected, beginning with the tourist centres which, logically, would be most affected. Arrecife would also be especially affected: congestion and deterioration would be reinforced, and would reach 50% more than the current density.

**Risks that Increase Social Conflict.** In the Trend Scenario analysis of the evolution of the island warns of the foreseeable increase of social and cultural conflict in the Lanzarote society. Today’s unresolved conflicts between the old and the new identities, between the insular and the exterior would sharpen further, and would encourage the distinct social groups to keep to themselves. The competition to occupy spaces – cultural, economic, social and territorial – would also intensify. The break-up of coexistence, the congestion of services and the shortage of facilities appear more than likely to happen.

**Limits of an Economy based on the Rapid Expansion of Tourist Accommodations.** In the 20-year scenario characterised by the continued expansion of the tourism sector, the island’s economic growth could reach 50% over the 1996 figure. However, this economic growth would be mitigated by the growth in population which will cause the average available income per capita to hardly surpass the current levels. The number of tourists would increase, but they would be those who will spend less. In addition, the imbalances in the insular economy would deepen: weakening the possibilities of

economic diversification; major decline in agriculture and fishing; disappearance of incentives for innovation, sustainable management, and creation of new areas of opportunity ...

**The Insular Eco-System and Key Environmental Sectors Overwhelmed.** If the tourist and demographic growth were to occur as the trend analysis contemplates, along with the constant movement of tourists and residents all over the fragile insular space, the accumulation of the impacts and loads imposed upon the island would cause a qualitative change to the current situation, and the rupture of the basic ecological balance that could be irreversible. The need to desalinate sea-water could rise by 77% (water consumption by residents and tourists could reach 178 and 346 litres/day respectively, and 18 hectometres annually). The consumption of carbon-based energy could rise by close to 50% (until 83,000 Tons Equivalent Petroleum or TEP), inducing a 60% increase in CO<sub>2</sub> emission (reaching 697,000 tons/year or 4.5 tons/year for every resident or tourist). The volume of solid wastes would grow by 130% to 128,000 tonnes, more than doubling the volume of buried waste. The volume of traffic on the island would be tripled, reaching 1,700 million vehicles/km/year, with some sections of the road network handling some 200,000 vehicles per day. The level of CO<sub>2</sub> emissions due to internal mobility and arrivals/departures would reach 350.000 tonnes/year (1.83 tonnes/year for every resident or tourist) and 2,800,000 tons/year respectively.

### Conclusion

The analysis prepared by the expert group confirms the social intuition that Lanzarote does not have the capacity, from the human and ecological perspective, to assimilate the demographic and tourist growth that continue along the current trends. An environment as vulnerable as Lanzarote simply cannot assimilate neither the scale (200,000 residents and tourists living on the island at the end of the 20-year forecast period), nor the accelerated demographic growth rates, nor the unsustainable development based on the permanent urban expansion.

## 2.3. THE LANZAROTE IN THE BIOSPHERE (L+B) SCENARIO

The L+B scenario is conceived as a necessary alternative to meet the growing threats that Lanzarote faces, in case the tendencies described earlier does actually occur.

The L+B scenario has two fundamental objectives: preserve the basic equilibrium of the insular system and improve the quality of life of the inhabitants of Lanzarote and their visitors. The guidelines did not arise from an impossible conservationism, but from an approach oriented towards sustainability and compatibility between human, economic and ecological needs of the island. With this orientation, the L+B scenario sets out the following eight action plans:

### A. A 10-year Moratorium to Limit Tourism Growth to levels that the insular system can sustain, and to give time to for the local population to define and orient a sustainable future for the island.

The proposal of L+B scenario is to establish a Moratorium in relation to the growth in tourism over the next ten years based on the following criterion:

- That the number of new tourists that stay overnight in Lanzarote does not surpass 6,700 over the ten years. The total number of tourists staying overnight on the island does not surpass 51,000 per day.
- That consequently, over the ten years, the supply of tourist accommodation does not expand by more than 8,000 beds, and not exceed 61,300 in total. The replacement of obsolete accommodations, particularly those in the Puerto del Carmen, is encouraged.

*Estimated evolution of population in the L+B Scenario 1997-2017*

	No. tourists on island each day	Occupancy Rate (83%)	Residents	Floating Population	Average Stay (Days)	Influx of tourists
1997 (estimate)	44,226	53,285	78,956	123,182	10.4	1,552,172
2017 (estimate)	50,866	61,285	96,282	147,149	10.0	1,856,609
Difference	6,640	8,000	17,326	23,996	(0.4) (2.4)	304,437 768,589

### B. Reconstruct an Open Cultural Identity based on the Singularities of Lanzarote.

#### B.1. Collective Project to reflect on the Cultural Identity of the island: Lanzarote Museum of the Biosphere.

The L+B scenario proposes that the “Lanzarote Museum of the Biosphere” be founded on one of the pillars of the new cultural policy and in the emblematic area of culture and heritage. Under this designation, the proposal is to create a centre that fulfils the double task of museum and research/interpretation space.

## **B.2. Protection and Re-use of Historic Heritage.**

The proposals of the L+B scenario in relation with the historic and artistic heritage of Lanzarote have been prioritised by the Heritage Unit of the Cabildo (Inter-island Council) of Lanzarote. The proposals cover diverse fields: stocktaking, protection, management, conservation, restoration, rehabilitation and re-use, research, disclosure of heritage, improving museum studies, promotion, acquisitions ...

## **C. Preservation of Social Well-being, Support and Co-existence.**

### **C.1. Reorient Demographic Change and Composition.**

The proposals of the L+B scenario are aimed at reaching three fundamental requisites over the next ten years:

- The rate of annual population growth in relation to the total population to be less than 2%, which is the average growth of the resident population in the previous decade.
- At the end of the ten-year period, resident-tourist ratio should approximate 2:1.
- At the end of the ten-year period, the percentage of new immigrants should not exceed 50%.

### **C.2. Social Integration of the Younger Generation: A Social Pact for Quality Employment**

An authentic social pact is proposed between institutional, economic and social agents, particularly those from the tourism, the dominant sector in the island economy. The purpose is to offer opportunities for skilled employment and improved working conditions. The two aspects – training and quality of employment – are essential if the island aspires towards a positive integration of the younger generation in Lanzarote society.

### **C.3. Programmes for the Social Integration of Immigrants and for the Prevention of Drug Addiction.**

In relation to the processes of marginalisation, the objective of the L+B scenario is to dampen its growth in social collectives and urban spaces through a set of policies and programmes based on three basic parameters. These are a holistic conception of the processes and proposals for action; the territorialisation or sectorisation of the programmes; and the clear commitment to prevention and to improving social services.

The two programmes for the social integration of immigrants and the prevention of drug addiction that L+B scenario proposes are based on these principles.

## **D. Break the “Mono-culture” of Tourist Accommodations, Promoting Quality and offering Complementary Products, Diversification and Innovation, and Training.**

### **D.1. Quality versus Quantity: Towards a New Culture of Tourism**

The approach of the L+B scenario for the tourism sector is based on the reorienting its focus from simple growth towards a new, mature phase based on:

- Containing the scale and growth rate of tourism to level that the insular system can assimilate, as contemplated by the Moratorium.
- Renewing the “sun and sand” type of tourism that is falling out of favour, and the creation of new complementary products.
- Designing new tourism models that are less dependent on mobility, especially private vehicles.
- A strategic re-orientation of the network of Centres of Art, Culture and Tourism in relation to the criteria of quality, contents, and the capacity to regulate tourist mobility.
- Improving the quality of supply.

### **D.2. Maintain and Promote Certain Agricultural and Fishing Activities Closely Linked to the Cultural and Landscape Identify of Lanzarote.**

- Development of a strategy for specialisation, quality and excellence in the transformation and commercialisation of products with potential demand.
- Promotion of businesses offering agricultural services.

### D.3. Reinforce the Level of Integration of the Insular Economic System.

### D.4. Strengthen the Local Resources of Knowledge.

### D.5. Strengthen the Financial Capacity of Municipal Treasury Departments.

The application of the criterion contained in the L+B strategy would not worsen the economic results of Lanzarote, but would constitute a good option for the future. With 10,000 hotel beds less than the Trend Scenario, the L+B Scenario doubles the year-on-year tourism growth and a 144% increase in the Gross Value Added (GVA) generated on Lanzarote. In addition, it favours the diversification of the economy with the 3% growth of non-tourist activities and 25% growth in personal income at the end of the 10-year scenario.

*Comparison of Key Economic Measures Trend and L+B Scenarios 2007*

	Hotel Beds	Daily Tourist Spending/Year	Year-on-Year Tourism Growth	Year-on-Year Insular Gross Value Added	Percentage of Non-Tourism Activities	GVA per capita (in Euros)
Trend Scenario	71,000	0	2,5%	1,8%	28%	12,000
L+B Scenario	61,000	400	5,1%	4,4%	31%	15,000
Difference	10,000	+400	+2.7%	+2,6%	+3%	+25%

## E. Construct the Capital Status and Improve the Quality of Urban Life in Arrecife.

The L+B scenario suggests four action plans: Defining the “Capital City” project; the integral urban rehabilitation of the city; improving the social integration and citizen co-existence; and the recovery of Arrecife as centre of insular economic development.

### E.1. Arrecife, Capital of Lanzarote

Within the integral idea of the Capital Status, it is essential to endow the city with the capacity to offer a wide range of activities and the prestige of being the meeting place and the representation of Lanzarote. The city could promote two types of action: a social and institutional process that tackles the task of designing the focal points of the Capital Status; and the public commitment in relation to emblematic projects such as the Port, the Marina, or key facilities such as the Frances Islet Auditorium or the Lanzarote Biosphere Museum.

### E.2. The Integral Urban Rehabilitation of the City

Through the preparation of the “Esquema Director de Ordenación de la Conurbación de Arrecife” (Master Plan for Arrecife Conurbation), that include thematic considerations such as Mobility, Environmental Issues, and the Rehabilitation Plans for different zones of the city (Marina, Old City, Ensanche, and Plan for Urban Quality of the Neighbourhoods).

### E.3. Improving Social Integration in Arrecife

In handling the problems of delinquency and insecurity, the L+B scenario proposes the suitability of co-ordinating policing with preventative policies that bear upon the social conflicts and issues in certain segments of the population.

The integral plans for depressed areas proposed in the L+B scenario aspire to develop specific initiatives related to the following themes: socio-professional integration of the young people who have difficulty in accessing the job market; programmes oriented to the school-age population and families to prevent the process of marginalisation; and social welfare actions for the elderly in precarious living conditions.

### E.4. The Economic Revitalisation of Arrecife

The four principle axes within the urban revitalisation plan to promote Arrecife as the centre are: the Port; the rehabilitation of the city; the tertiary services; and the revitalisation of commerce. All these are contemplated within the “Programa de modernización y reforzamiento de la integración de la base productiva de Lanzarote”, included in the L+B strategy.

## **F. Preserving the Natural Heritage: Eco-Systems, Bio-Diversity and Landscapes.**

In addition to insisting on the essential sensitising of the insular society, growing demographically and changing patterns of consumption, the L+B strategy suggests a set of measures related to the scale, type and rate of tourism evolution in Lanzarote to improve the compatibility with the insular ecology. However, in addition to developing the set of preventative measures, Lanzarote needs to invest in the natural environment, in environmental quality and in the landscape, just as other societies invest in industrial systems.

### **F.1. The L+B Scenario and the Physical Substratum: Atmosphere, Water Resources and Land**

In the scenario envisioned by the L+B, the atmospheric emissions, especially that of CO<sub>2</sub> and other noxious gases produced by energy consumption and by transport on the island, can be stabilised (or even reduced to 50,000 Tons/Year or equivalent to 3,8 Tons per Residents and Tourists per Year). This will maintain the excellent air quality on Lanzarote. Nevertheless, the same does not occur with the emissions generated via the trips to and from the island, where it is expected that CO<sub>2</sub> emissions would rise between 11% and 30%. This may not directly affect the insular air quality, but will certainly do so at the global level, adding to the planetary greenhouse effect. In any case, the result of the sum of reductions and increases would be close to the stabilisation of the current situation.

In relation to the island hydrology, the L+B strategy suggest a set of measures to re-establish the techniques to capture surface run-off that would increase the strategic reserve to 30 days, without the need to strain subterranean sources and at a much lower cost than desalination.

With respect to land, the priority actions are centred on the development of effect programmes against erosion via increasing vegetal cover in the hillside areas affected by erosion. For mining activities, the insular situation is favoured by the importance of the available reserves on the island; the slowdown of the growth in tourism; and the availability of time to rationalise the processes and to develop corrective measures for the most deteriorated zones.

### **F.2. Preserve the Terrestrial and Marine Bio-Diversity**

The L+B scenario is oriented in three complementary directions:

- The establishment of effective containment measures and management systems for the demographic flows and mobility, making them compatible with the preservation of the biological elements most vulnerable of the island.
- The development of integrated programmes directed at both residents and tourists to raise consciousness.
- The promotion of plans and studies that contribute to operative criterion for the management of natural resources, resolving the current deficiencies in knowledge that make conservation actions very difficult. In other words, not only to prepare a Plan for Natural Resources and Plans for the Use and Management of Protected Natural Spaces, but also to orchestrate the resources necessary for the study and application of measures that are truly effective for the preservation of the spaces and of the flora and fauna they hold.

### **F.3. The Preservation and Restoration of Landscape.**

The L+B scenario suggests the need to establish a programme with a set of measures designed to preserve, restore, integrate, clean and signpost the land and marine zones of Lanzarote.

In the natural spaces, the Strategy insists on the need to program the restoration of the volcanic cones and spaces affected by mining activities and in the reforestation of the hillsides and other significant spaces. In the agricultural landscapes, the principle proposed action is to attempt to return the agricultural sector in Lanzarote to an economic footing, and to avoid at all costs the proliferation of buildings away from urban nuclei. With respect to the peri-urban landscapes of the interior and of the coast, the proposal is to repopulate, and to create parks and planned zones that would avoid the expansion of urban deterioration, and to create alternative spaces to protect those most vulnerable.

## **G. Manage the Basic Environmental Services with Sustainability Criterion: Water, Energy, Residues and Transport.**

The L+B scenario considers water, energy, residues and transport as ecological infrastructure indissolubly linked to quality and improvement of the environment.

### **G.1. Stabilise or Reduce the Need for Water Desalination: the Programme for Water Management (PGDA)**

The four objectives of the PGDA-Lanzarote are: Minimise the need for desalination; maintain the quality and the regularity of the water supply, meet the new foreseeable needs, and maintain or reduce the global costs of water supply for subscribers,

while making sure that the supply company remains viable. The basic components, to be developed over different time periods, are the following: maintain/improve infrastructure, conscientious use and voluntary water-saving, improve the hydraulic efficiency; substitution of resources; and improve the management systems.

In ten years, it would be possible to compensate for the expected increase in the floating population and to reduce, or at least stabilise the need to desalinate sea water (between 7 to 10 cubic hectometres). Depending on the extent of the proposed actions, unitary residential consumption would vary between 133 and 143 litres per day and consumption by tourism would vary between 230 and 270 litres per day. The network water loss would be reduced by 26% to between 14% - 18% while water recycling in the urban areas, currently non-existent would reach 15% to 30% of the total demand.

## **G.2. Stabilise or Reduce the Energy Consumption and Impact: the Programme for Integrated Energy Management (PGEI)**

The four objectives of the PGEI-Lanzarote are: Minimise total energy consumption; reduce CO<sub>2</sub> emissions; guarantee adequate energy supply to everyone; maintain or reduce the total costs of energy supply while not prejudicing the viability of company providing it.

To reach these objectives, the PGEI-Lanzarote contemplates a set of interventions that favour: energy-saving habits; improvement of energy efficiency; and the gradual substitution of current sources of energy with renewable ones or fossil-bases ones with reduced environmental impact.

The basic components of the PGEI-Lanzarote, to be developed over different time periods, are the following: raising public and institutional awareness; managing the demand for electricity; building energy efficiency; and substitution of combustible fuels in the generation of electricity.

In 2007, according to the extent of the proposed measures, it would be possible to compensate for the increase in the floating population, or at least stabilise, the needs of conventional supply (between 49,000 and 57,000 TEP). Unitary residential consumption would vary between 7.5 and 8.0 kWh per day, while the consumption by tourism will vary between 11.5 and 12.5 kWh per day. The level of renewable energies would rise to the current 2% to between 12 and 20%, while CO<sub>2</sub> emissions would be maintained or reduced, varying between 337,000 tons per year (2 tons per resident/tourist per year) and 442,000 tons/year year (3 tons per resident/tourist per year).

## **G.3. Reduce the Dumping of Residues through Reduction and Better Usage: the Programme of Integrated Waste Management (PGIR)**

The objectives of PGIR-Lanzarote are based on the accumulative nature of waste and to avoid turning the island into a waste dump that would negatively affect the insular eco-system as well as the quality of life for residents and visitors. In short, the PGIR-Lanzarote offers a set of measures to reduce or to better use the urban and other wastes generated on the island, improving efficiencies in waste collection, recycling and recovery.

The basic components of PGIR-Lanzarote, centred on urban and other solid wastes and developed over different time periods, are the following: raising public and institutional awareness; preventing the generation of residues; separation, selective collection and reuse; commercialisation of separated materials.

In 2007, the volume of residues would have increased (71,000 tons), but it would be possible to compensate this growth with the reduction of the amount transported to the dump from 54,000 to 19,000 tons/year. Waste generate would be situated around 1.27 kg/h per day, and the selective collection and re-use would reach 89% and 73% solid urban wastes generated on the island.

## **G.4. Improve Public Transport and Moderate Traffic and its Local Impacts: the Programme for the Ecological Re-Conversion of Transport (PRET)**

The five main objectives of PRET-Lanzarote are: ensure equitable mobility to everyone; moderate vehicle traffic and its local impacts; restrain the impact of transport infrastructure on the territory; reduce the number of traffic accidents; and reduce the environmental impact of transport arriving and leaving the island.

To reach these objectives, PRET-Lanzarote contemplates a set of planned and coordinated interventions on the transport system and road network of the island: support non-motorised transport; promotion of mass transport; reduction of

automobile use; minimising new road infrastructure; and improving the efficiency in relation to CO<sub>2</sub> emissions generated by transport arriving and leaving the island.

#### **H. Creation of an Insular Observatory of Sustainability and Quality of Life in Lanzarote**

The Observatory that the L+B strategy proposes would compile and offer synthetic information on a regular basis about social, economic and environmental issues from the sustainable and quality of life guidelines. Its existence would permit considered decisions to be taken on these issues, both at the personal level as well at the institutional or company level. To this end, the L+B strategy suggested that the Data Centre of the Cabildo seek collaboration with public and private institutions that would guarantee the feasibility of the project and continues connection with both the sources and destinations of the information it gathers.



## 2.4. COMPARACIÓN DEL ESCENARIO TENDENCIAL CON EL ESCENARIO LANZAROTE EN LA BIOSFERA (E.L+B)

ECONOMY AND TOURISM			
	INDICATOR	1997 VALUE	2007 VALUE (L+B SCENARIO)
<b>TOURISM</b>			
Supply	No. of Hotel Beds	53,285	< 61,300
Occupation	Annual Average (%)	83	83
Average Influx	Annual Average no. tourists/day	44,018	< 50,000
Economic Impact	Average daily expenditure per tourist (not incl. hotel or transport) (en pesetas)	5,449	7,728
<b>AGRICULTURE AND FISHING</b>			
Agriculture	Cultivated Area (in Hectares)	3,500	4,000
Fishing	% of Average Income of Services Sector	80	100
<b>DIVERSIFICATION</b>			
Activities not linked to tourism	% of non-tourism related Licences (based on IAE Returns)	24.6	30
<b>TRAINING</b>			
Specialisation	% of students in non-administrative vocational training	30	50
<b>LOCAL TREASURY</b>			
Income unrelated to Construction	% of licenses (based on IAE returns) per capita.	0.13	0.17

CULTURE AND PATRIMONY			
	INDICATOR	1997 VALUE	2007 VALUE (L+B SCENARIO)
<b>CULTURE</b>			
	Centres of Diffusion of Culture	Low	Improving
	Endowment of Cultural Facilities	Low	Improving
	Cultural Activities	Medium	Improving
<b>HERITAGE / PATRIMONY</b>			
	Properties in Inventory	Low	Improving
	Properties Declared to be of Cultural Interest	Low-to –Medium	Improving
	Properties being used.	Medium	Improving

KEY ENVIRONMENTAL SECTORS			
	INDICATOR	1997 VALUE	2007 VALUE (L+B SCENARIO)
<b>WATER</b>			
Desalinated Water	Volume (in cubic metres/year)	10,289,800	10,255,843 / 7,123,531
Network Loss	%	25.8	18 / 12
Urban Recycling	%	0	15 / 30
<b>ENERGY (Excl. Transport)</b>			
Final Consumption	Tons Equivalent Petroleum (TEP)	54,808	79,101
Renewable Sources	%	2.6	11.6 – 20.4
CO2 Emissions	Total en Tons/Year	440,767	442,384 / 336,505
<b>TRANSPORT</b>			
Insular Generation	Million/Vehicles Km	685	767 to 567
Insular Modal Split	Trips by Public Transport	20	37 to 46
CO2 Emissions (Insular)	Tons / Year	192,001	192,718 / 152,089
CO2 Emissions (Access)	Tons / Year	1,230,287	1,598,397 / 1,367,964
<b>RESIDUES</b>			
Generation	Weight (Tonnes)	55,472	71,347
	Rate (Kg / Inhabitant / Day)	1.21	1,27
Selective Collection	% Solid Urban Residues	3.68	89.3
Reuse of Residues	% Solid Urban Residues	2.91	73.0
Residues Buried	Weight (Tons)	53,567	19,396

POPULATION AND SOCIAL INTEGRATION			
	INDICATOR	1997 VALUE	2007 VALUE (L+B SCENARIO)
<b>DEMOGRAPHIC BALANCE</b>			
Rate of Growth of Floating Pop.	New Inhabitants / Year	4,500	< 2,500
Ratio of Growth Tourist/Residents	% of Tourists / Residents	60	25 to 30
Annual Growth Immigrants/Residents	% of Immigrants / Residents	51	< 50
<b>INTEGRATION</b>			
Adaptability of Education System	Scale of 1-10	5.1	6.5
Unemployment Rate (Youths)	% of Unemployed youths / Total youths	23	< 17
Precarious Labour Conditions	% Young Temp Workers / Young Salaried Workers	74	< 55
<b>SOCIAL ALIENATION</b>			
Drug Addiction	% of Drug Addicts / De jure Population	1.92	< 1.5
Insecurity	% Police reports / Residents	7.8	< 7.5
Rate of Poverty	% of population with minimum income	13.2	< 13
<b>CO-EXISTENCE</b>			
Confidence in politicians	Scale 1-10	4.9	> 5
Associations	% Youth in Associations / Total	25	> 33
Participation in electoral process	% of Youth who voted	41	> 50

INSULAR ECO-SYSTEM			
	INDICATOR	1997 VALUE	2007 VALUE (L+B SCENARIO)
GLOBAL ATMOSPHERE (Energy + Insular Transport and Access)	CO <sub>2</sub> Emissions (Ton/Year)	1,863,055	2,233,499 – 1,856,558
WATER SYSTEM (Reserves)	Days of provision of natural resources.	26.1	30
LAND RESOURCES			
Arid Land	Used/Authorised reserves (%)	1.5	2
Fertile Land	Area Lost/Total (%)	0.2	0.2
NATURAL SPACES			
Level of Protection	Protected Area (%)	41.3	41.3
Protection Regulations	Area Protected under Law (%)	14	100
Public Use	Visits/Day in M. Fuego	2,600	<2,500
Endangered Species List	No of Endangered/Threatened Species	57	0
MARINE ENVIRONMENT			
Area Protected	Area with Management Plan (%)	0	100
Coastal Deterioration	Badly deteriorated coast (%)	49.3	0
Area of Beach / User	All types of beaches m <sup>2</sup> /person	18	>15
LANDSCAPES			
Natural Landscapes	Volcanic cones that have been altered	56	0
Agricultural Landscapes	Deteriorated peri-urban landscapes	9,320	0
Coasts	Length of coast built-up (%)	20	20

URBAN SYSTEM OF LANZAROTE			
	INDICATOR	1997 VALUE	2007 VALUE (L+B SCENARIO)
<b>INSULAR SYSTEM</b>			
Population Density	Inhabitants per Km <sup>2</sup>	143	172
Territorial Occupation	Urbanised Area / Total Area (%)	5	6
Demographic Balance	Hotel Beds / Resident Pop.	68	64
<b>RURAL NUCLEI</b>			
Population Density	Resident Pop. / Area of Nuclei	40	45
Accessibility Infrastructures	Quality of Public Transport	Low-to-Medium	Alta
Basic Infrastructure	Existing Facilities/Under the Plan Insular de Lanzarote (PIOL)	3	100
<b>MUNICIPAL CENTRES</b>			
No. of Centres	Existing Facilities / Under PIOL	60	100
Population Density	Inhabitants per Km <sup>2</sup>	75	80
Ecological Level	Solid Wastes reused/ Total Solid Wastes	80	75
<b>TOURIST CENTRES</b>			
Quality of Accommodation	Quality and Building Maintenance	High	High
Complementary Activities	Diversification Activities	Low	Medium-to-High
Ecological Level	Solid Wastes reused/ Total Solid Wastes	3	75
Opinion of Tourists	Surveys Completed	High	High
<b>ARRECIFE &amp; SURROUNDINGS</b>			
Co-ordinated Planning	Zone Incorporated Plan	No	Yes
Accessibility	Quality of Public Transport	Low	High
Basic Infrastructure	Existing Facilities / Under PIOL	80	100
<b>ARRECIFE CIUDAD</b>			
Capital Status	Quality and Services	Low	Medium-to-High
Hierarchy	Recovery of the Urban Structure	40	80
Basic Infrastructure	Existing Facilities / Under PIOL	65	100
Ecological Level	Solid Wastes reused/ Total Solid Wastes	3	75
<b>MARINA &amp; OLD CITY</b>			
Planning	Firm plan for the zone	No	Yes
Public Space	Quality of Public Space	Medium-to-Low	High
Car – Pedestrian Mobility	Traffic - Pedestrian Plan	No	Yes

### 3. CONCLUSIONS

In 2003, within the framework of *Life Lanzarote 2001-2004*, the study "Evolution of Insular Indicators" was undertaken. The objective of the study was to analyse the recent evolution of the principle socio-environmental indicators. The principal conclusion the study found was that Lanzarote has reached its limit of capacity.

Although it is likely that the measures adopted to restrain the tourist pressure growth in Lanzarote will have a positive effect in the coming years, it is vital to consider the new regional sustainability policies initiated by the Government of the Canary Islands through the General Guidelines on Planning and Tourism. This is an opportunity to improve the situation of the island, redoubling institutional and social endeavour to restrain real estate and tourist growth pressure. At the same time there appears to be some urgency to promote the development of the remaining programmes defined in the *Lanzarote Strategy in the Biosphere (1998)*, as a complementary approaches to the preceding measures and which will tend towards reducing impacts on the island caused by its inhabitants.

The excessive growth of human pressure registered on the island within the analysis period (1996-2001) showed the extraordinary difficulty in controlling such a powerful process by using the adopted measures over a short term. The indicators of human pressure on the territory reflect the overwhelming situation that Lanzarote was in over these years. Accelerated town planning development has led to a frantic growth in the building sector, with territorial impacts that significantly affect the fragile insular surroundings. Factors such as the introduction of the Euro, the RIC (Reforma Institucional Canaria. Briefly, devolution of powers to the local level) and the disappearance of the five-year periods initially proposed in the Review of the Plan Insular de Ordenación de Lanzarote (PIOL) have led to this situation. At present, although building pressure has started to stabilise, an in-depth study of the correcting measures applied is necessary ("insular moratorium" and "Regional Guidelines for Territorial Town and Country Planning), bearing in mind the potential residential offer existing in tourist areas.

In demographic terms between 1996-2001, the development of Trend Scenario mentioned earlier has become a reality. In addition to the strong population growth motivated by the immigration and the integration challenged implied, there are the qualitative components such as many young people who will place great pressure on housing, health and education services etc. They will also place great pressure on the job market, although until now, there have been sufficient jobs to absorb the demand.

Demographic pressure from tourists, although less critical in the period 1996-2001, is expected to increase in the coming years. They will fill up the hotels currently under construction and will provoke new impacts (direct and indirect) on the insular environment.

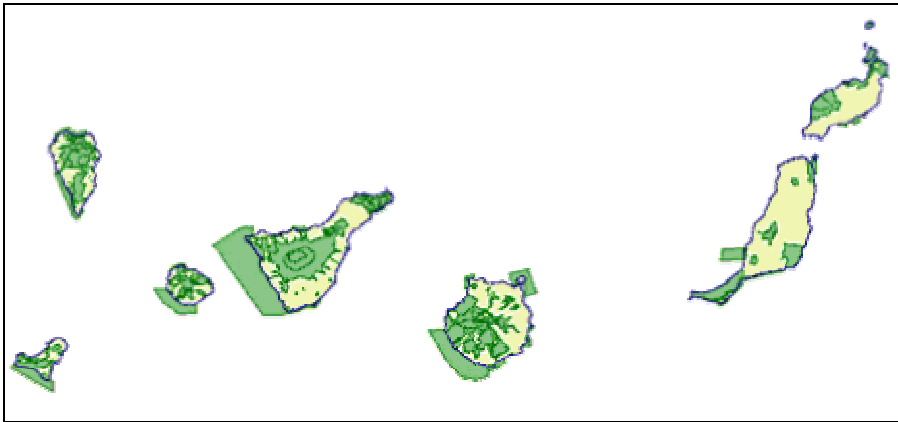
Economically, after the relative boom in the building sector during the period analysed, we expect the hotel sector to take over. Income stabilisation is also expected to occur. In addition, the low level of development of the action plans and programmes contemplated is worrying. These plans and programmes could have, to some extent, mitigated the negative impacts generated during this phase, and could have, to some extent, contributed to divert undesired tendencies in the process of development in future (Period 2000-2010).

Finally, it should be highlighted that although the measures adopted by Lanzarote to restrain tourist pressure is expected to have positive effects over the next few years, it is also essential to consider the process initiated by the Government of the Canary Islands towards new regional sustainability politics. This is an important opportunity to improve the insular situation by reinforcing institutional and social endeavours with the double objectives of (1) Restraining real estate growth and tourist pressure on Lanzarote and (2) Stimulating the putting in practice of the programmes contained in the 1998 as a complementary line to the former, and which tend to reduce impacts induced on the Island by the population unit. Both action plans should be instrumented on short, medium and long term.

---

# MAPS & IMAGES

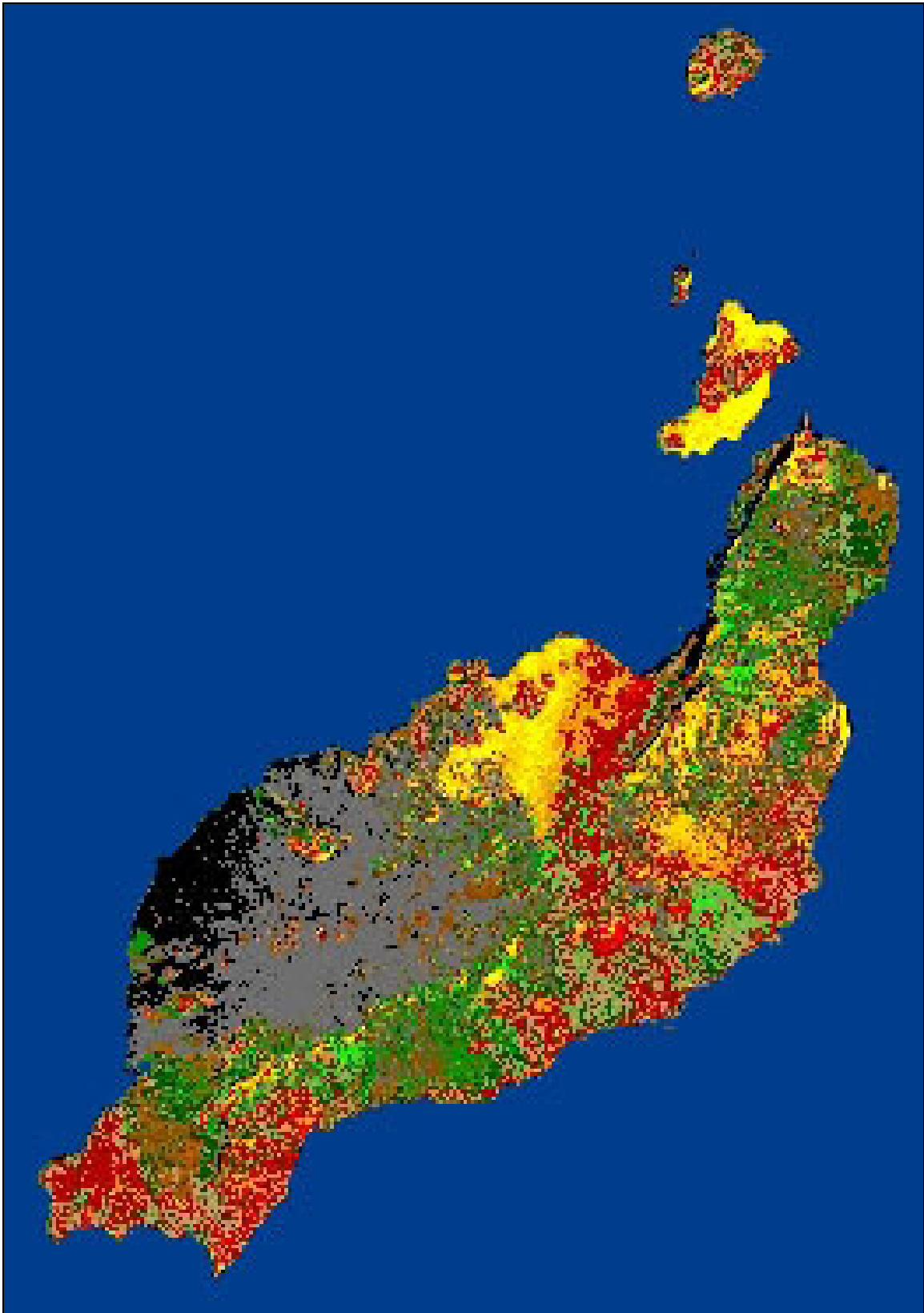
## 1. The Canary Islands



## 2. Lanzarote (General)

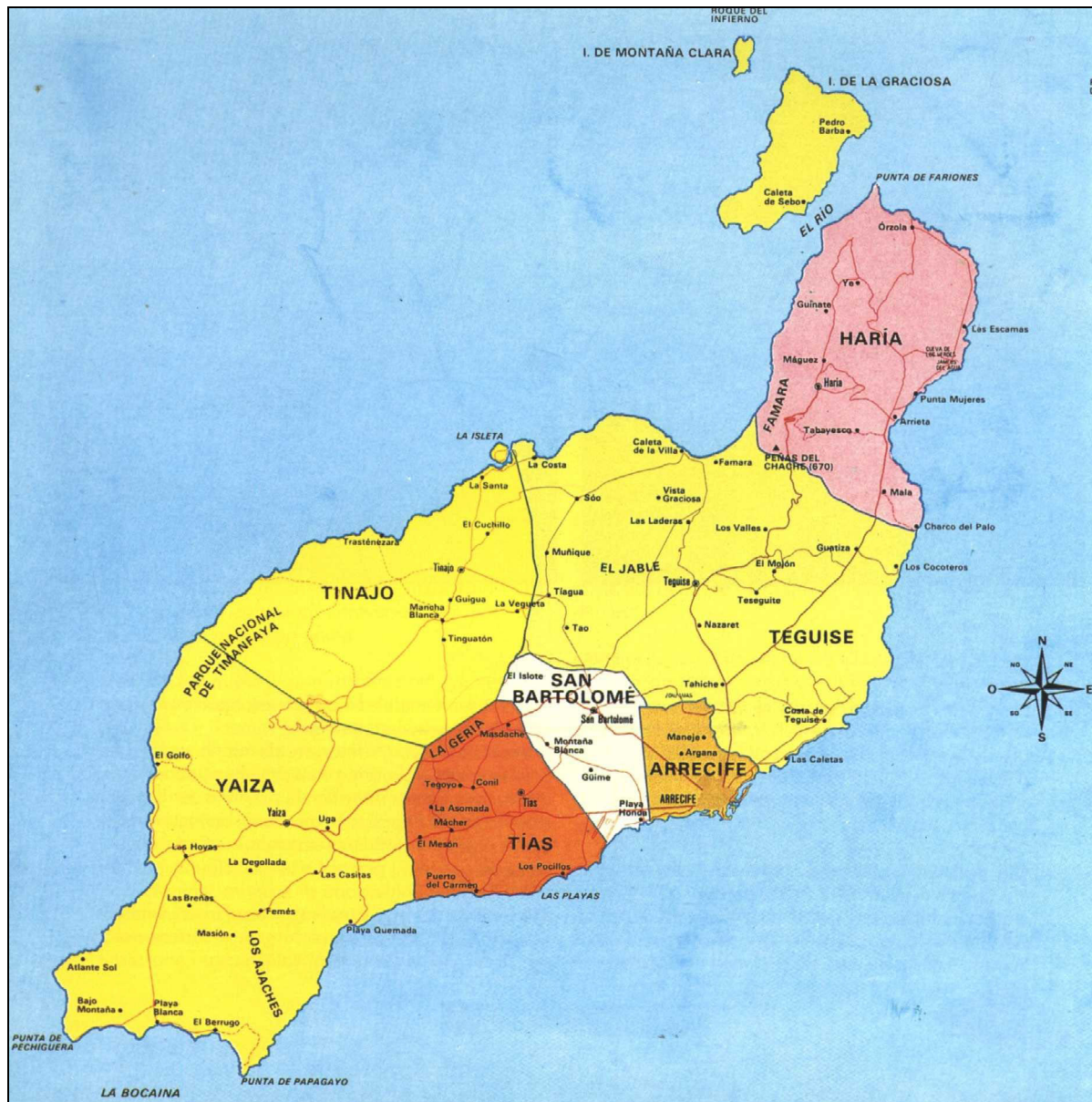


3. Lanzarote (Land Use)

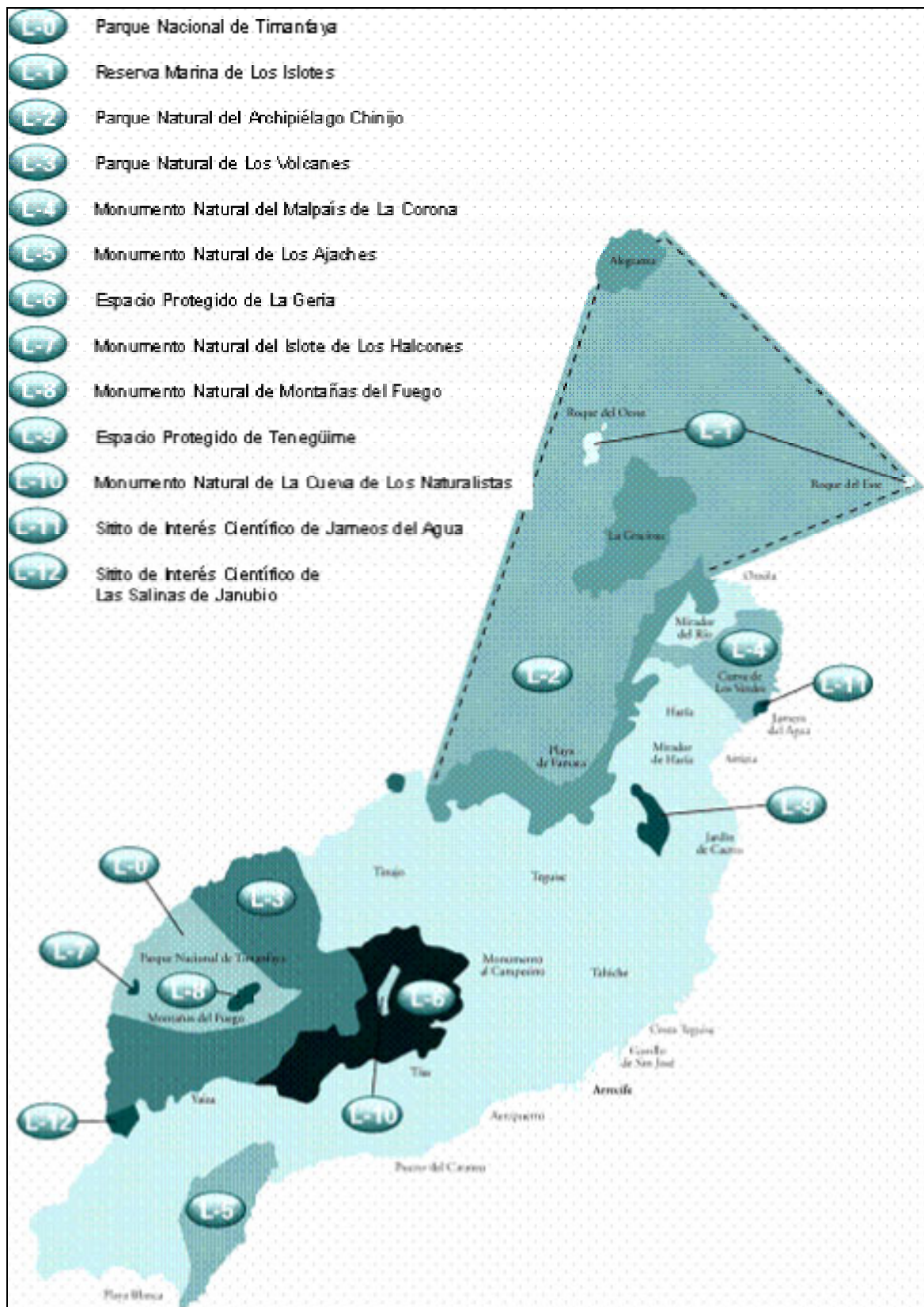




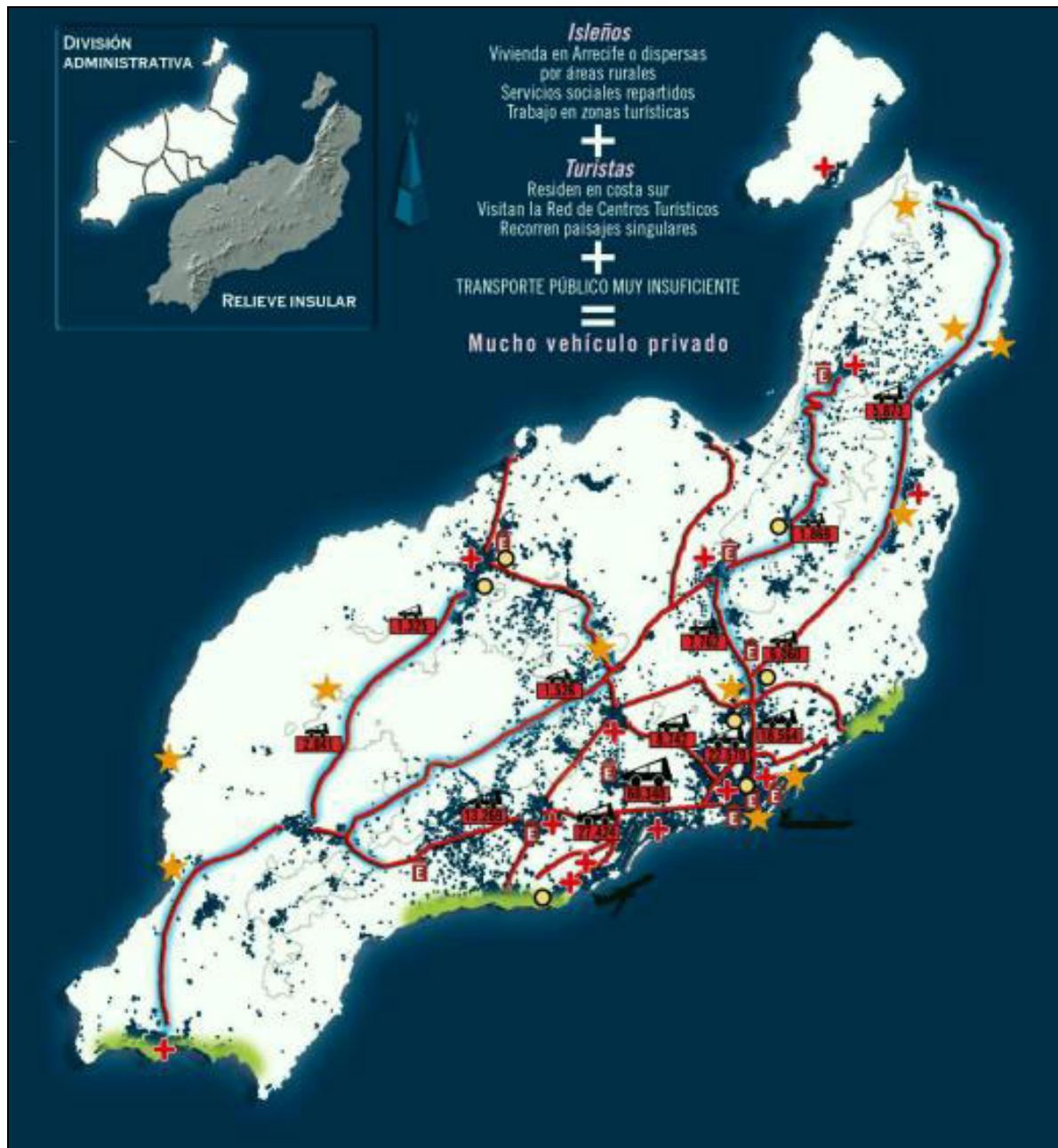
#### 4. Lanzarote (Municipalities)



5. Lanzarote (Natural Zones)



## 6. Lanzarote (Mobility)



7. Lanzarote (Solid Wastes)



8. Lanzarote (Volcanic Activity)



## 1. TERRITORIAL DATA

### 1.1. SURFACE AREA AND PERIMETER OF LANZAROTE BY MUNICIPALITIES

MUNICIPALITY	SURFACE AREA (Km <sup>2</sup> )	%	PERIMETER (metres)	ALTITUDE (metres)**	DISTANCE (Km.)***
Arrecife	22,7	2.7	26.820	20	209,3
Haría	106,6	12.6	54.128	270	28,0
San Bartolomé	40,9	4.8	28.202	240	6,2
Teguise	264,0	31.2	128.597	305	10,2
Tías	64,6	7.6	32.719	200	9,1
Tinajo	135,3	15.9	54.733	195	17,5
Yaiza	211,8	25.0	76.914	192	21,0
<b>LANZAROTE</b>	<b>845,9</b>	<b>100.0</b>	<b>186.993</b>		

\* % of the Canary Islands.

\*\* The altitude is of the municipal capital.

\*\*\* The distance of each municipality is the distance between the municipal capitals to Arrecife, the insular capital. In the case of Arrecife, it refers to the distance between it and Las Palmas de Gran Canaria, the provincial capital.

NOTE: The surface area of the municipalities includes the islets.

SOURCE: National Geographic Institute. ISTAC.

### 1.2.- SURFACE AREA OF THE ISLETS OF LANZAROTE\*

ISLET	m <sup>2</sup>	Km <sup>2</sup>
La Graciosa	27.446.475	27,44
Aleganza	10.202.340	10,20
Montaña Clara	1.326.054	1,32
Roque del Este	64.516	0,06
Roque del Oeste	15.765	0,01

\*Administratively, all the islets belong to the Municipality of Teguise.

SOURCE: National Geographic Institute. ISTAC.

### 1.3.- LENGTH OF COASTLINE BY MUNICIPALITY

MUNICIPALITY	Metres
Arrecife	12.005
Haría	47.262
San Bartolomé	2.730
Teguise	36.490
Tías	11.070
Tinajo	27.485
Yaiza	57.580
<b>TOTAL LANZAROTE</b>	<b>194.622</b>
<b>ISLETS</b>	
La Graciosa	30.395
Aleganza	16.400
Montaña Clara	5.640
Roque del Este	600
Roque del Oeste	1.400
<b>TOTAL ISLETS</b>	<b>54.435</b>

SOURCE: SECRETARY OF STATE FOR TOURISM

«Plan de Ordenación de la Oferta Turística de Lanzarote» (1992).

### 1.4.- PHYSICAL CHARACTERISTICS OF THE COASTLINE

TYPE OF COAST	Km.
Cliffs with shore platforms	110,6
Cliffs (2 a 20 metres)	47,8
Low coast	2,2
Pebble beaches	6,6
Pebble and sandy beaches	16,9
Fine and rough sandy beaches	9,6
Artificial works	19,5

SOURCES: Department of Territorial Policy. Government of the Canary Islands, «Plan Especial de Protección de Espacios Naturales» (1996).

## 1.5. TEMPERATURES

Arrecife  
Data 1945-1986

MONTHS	AVERAGE TEMPERATURES			EXTREME TEMPERATURES	
	Average	Maximum	Minimum	Maximum	Minimum
October	22.30	27.34	17.91	31.36	15.19
November	19.67	24.85	16.10	28.30	12.81
December	17.75	21.72	13.98	23.56	11.10
January	16.89	20.90	13.22	23.36	10.95
February	17.17	21.21	13.01	24.98	10.19
March	17.60	22.49	13.58	27.47	11.40
April	18.63	23.14	14.18	27.55	11.38
May	19.67	24.18	15.18	29.60	12.80
June	21.30	25.55	16.89	29.42	14.29
July	23.13	27.76	18.45	33.40	16.12
August	24.10	28.10	19.44	33.05	17.03
September	23.73	28.16	19.24	34.57	16.50
<b>Average</b>	<b>20.16</b>	<b>24.61</b>	<b>15.93</b>	<b>29.05</b>	<b>13.30</b>

SOURCE: National Institute of Meteorology



## 2. POPULATION

### 2.1. DE JURE POPULATION

Tabla 2.1. Censo de población de Lanzarote en el siglo XX

	1900	1910	1920	1930	1940	1950	1960	1970	1981	1991
Arrecife	3.082	3.764	4.758	5.118	7.733	9.178	12.886	21.906	29.502	33.398
Haría	3.101	3.196	3.763	3.533	4.772	4.491	4.150	2.968	2.555	3.199
S. Bartol.	1.860	2.067	2.153	2.234	2.651	2.923	3.305	3.462	4.753	6.798
Teguise	3.786	4.228	4.394	5.457	5.547	5.854	6.521	5.809	6.074	8.189
Tías	2.365	2.715	2.792	2.543	2.567	2.923	3.174	3.339	5.672	7.556
Tinajo	1.688	1.660	1.739	1.806	2.212	2.546	2.563	2.768	2.983	3.517
Yaiza	1.302	1.347	1.466	1.241	1.439	1.471	2.219	1.660	1.913	2.675
<b>Lanzarote</b>	<b>17.184</b>	<b>18.977</b>	<b>21.065</b>	<b>21.932</b>	<b>26.921</b>	<b>29.386</b>	<b>34.818</b>	<b>41.912</b>	<b>53.452</b>	<b>65.332</b>

Fuente: Instituto Nacional de Estadística. INE.

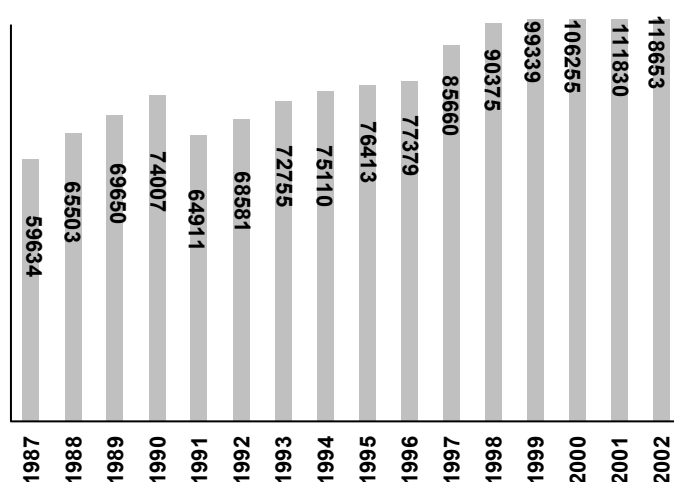
#### 2.1.1.- DE JURE POPULATION BY MUNICIPALITY (2002)

MUNICIPALITY	Inhabitants	%
Arrecife	51.024	43.0
Haría	4.887	4.1
San Bartolomé	18.338	15.5
Teguise	14.530	12.2
Tías	16.033	13.5
Tinajo	5.091	4.3
Yaiza	8.750	7.4
<b>LANZAROTE</b>	<b>118.653</b>	<b>100.0</b>

SOURCE: City Halls of the Lanzarote. Avance Rectificaciones Padronales.

ELABORATION: Centre of Data. Cabildo de Lanzarote.

#### 2.1.2.- Evolution of DE JURE POPULATION (1987-02)

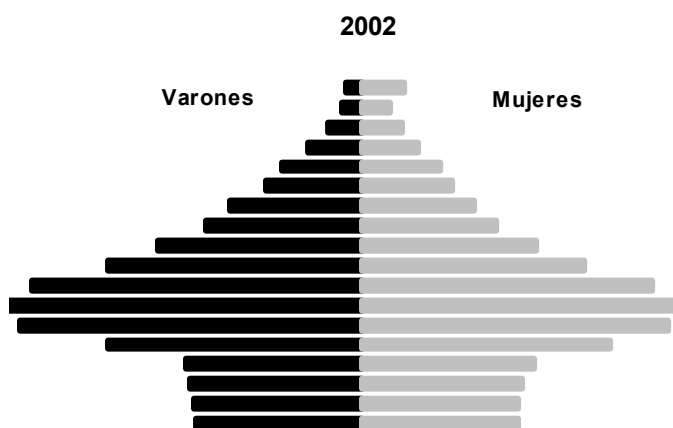
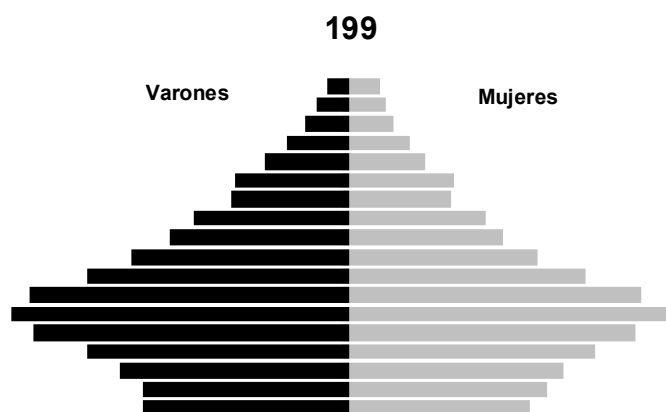


SOURCE: ISTAC, «Encuesta de Población de Canarias» (1996);

«Censo de población y Viviendas» (1991).

INE y Ayuntamientos: Avance Rectificaciones Padronales.

### 2.1.3.- Population Pyramids (1996 y 2002)



SOURCE: ISTAC «Encuesta de Población de Canarias» (1996) y Rectificaciones Padronales (2002).

ELABORATION: Centro de Datos. Cabildo de Lanzarote.

## 2.2. – DE FACTO POPULATION

### 2.2.1.- Evolution of the total insular population (1987-02)

Year	De jure Population	Average no. of Tourists*	Total Population
1987	58.634	17.182	75.816
1988	65.503	20.235	85.828
1989	69.650	23.989	93.639
1990	74.007	28.064	102.071
1991	64.911	34.354	99.265
1992	68.581	36.188	104.769
1993	72.755	36.929	109.684
1994	75.110	40.550	115.660
1995	76.413	42.984	119.397
1996	77.379	44.018	121.397
1997	85.660	45.544	131.204
1998	90.375	49.678	140.053
1999	99.339	49.997	149.336
2000	106.255	49.005	155.206
2001	111.830	49.759	161.589
<b>2002</b>	<b>118. 653</b>	<b>49.700</b>	<b>168.353</b>

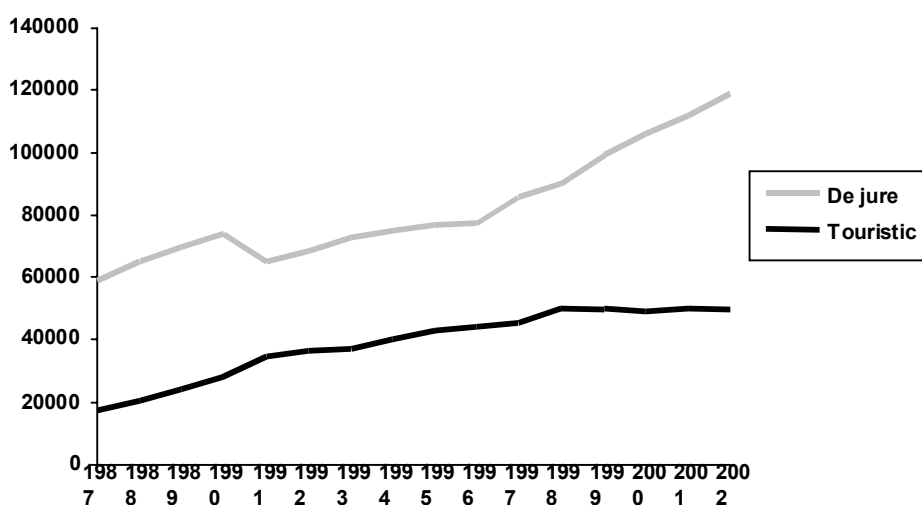
\* Estimate based on the occupancy rate of hotels.

SOURCE: For de jure population - ISTAC, INE and City Halls

For occupancy rates - ISTAC and ASOLAN.

ELABORATION: Centro de Datos. Cabildo de Lanzarote.

### 2.2.2.- Evolution of de jure and tourist population (1987-02)



SOURCE: For de jure population - ISTAC, INE and City Halls

For occupancy rates - ISTAC and ASOLAN.

ELABORATION: Centro de Datos. Cabildo de Lanzarote.

### 2.2.3.- Population Density(2002)

MUNICIPALITY	De jure Population	Average number of Tourists	De facto Population	Surface Area Km2	De facto Population Density (Inhab./Km2)
Arrecife	51.024	963	51.987	22,7	2.290,2
Haría	4.887	285	5.172	106,6	48,5
San Bartolomé	18.338	25	13.363	40,9	326,7
Teguise	14.530	12.283	26.813	264,0	101,6
Tías	16.033	23.914	39.947	64,6	618,4
Tinajo	5.091	760	5.851	135,3	43,2
Yaiza	8.750	11.470	20.220	211,8	95,5
<b>LANZAROTE</b>	<b>118.653</b>	<b>49.700</b>	<b>168.353</b>	<b>845,9</b>	<b>199,0</b>

SOURCE: For de jure population - ISTAC, INE and City Halls

For occupancy rates - ISTAC and ASOLAN.

ELABORATION: Centro de Datos. Cabildo de Lanzarote.

#### 2.2.4.- Evolution of de facto Population Density (1987-2002)

Year	Population Density (Inhab./Km2)
1987	89,6
1988	101,4
1989	110,7
1990	120,6
1991	117,3
1992	123,8
1993	129,6
1994	136,7
1995	141,1
1996	143,5
1997	155,1
1998	165,5
1999	176,5
2000	183,5
2001	191,0
<b>2002</b>	<b>199,0</b>

SOURCE: For de jure population - ISTAC, INE and City Halls

For occupancy rates - ISTAC and ASOLAN.

ELABORATION: Centro de Datos. Cabildo de Lanzarote.

### 3. LABOUR MARKET

#### 3.1.- NUMBER OF EMPLOYEES BY SECTOR AND MUNICIPALITIES (DECEMBER 2002)

ECONOMIC SECTOR	Arrecife	Haría	S.Bartolomé	Teguise	Tías	Tinajo	Yaiza	LANZAROTE
Agriculture, livestock and fishing	181	45	41	141	57	44	33	542
Industry								
Construction	3.339	156	1.243	818	859	302	556	7.273
<b>Services</b>								
Commerce and Repairs								
Hostelry	1.389	179	479	2.717	4.782	394	2.568	12.508
Transport and Communication	1.045	19	495	210	297	93	140	2.299
Financial intermediation	67		11	10	36	1	1	126
Real Estate and Rental	1.745	23	367	391	712	35	180	3.453
Public Admin. Defence and Social Security	2.328	45	225	188	264	61	248	3.413
Education	899	51	130	278	130	48	55	1.591
Health and Social Services	193	7	15	67	295	4	13	594
Other Social Activities	832	45	175	423	552	14	160	2.201
Domestic Personnel	186	7	29	45	60	5	34	366
Extra-Territorial Organs								
Others	15				1			16
<b>TOTAL</b>	<b>18.788</b>	<b>671</b>	<b>4.442</b>	<b>6.146</b>	<b>9.550</b>	<b>1.273</b>	<b>4.520</b>	<b>45.391</b>

**3.2.- REGISTERED UNEMPLOYMENT BY ECONOMIC SECTOR, PROFESSIONAL GROUP, GENDER AND AGE (DECEMBER 2002)**

<b>SECTOR ECONÓMICO</b>	<b>Male</b>	<b>Female</b>	<b>Total</b>
Agriculture, livestock and fishing	40	6	46
Industry	69	54	123
Construction	405	44	449
Services	<b>877</b>	<b>1.443</b>	<b>2.320</b>
Commerce and Repairs	199	362	561
Hostelry	344	565	909
Transport and Communication	68	44	112
Financial intermediation	2	13	15
Real Estate and Rental	135	244	379
Public Admin. Defence and Social Security	37	76	113
Education	20	33	53
Health and Social Services	16	31	47
Other Social Activities	56	72	128
Domestic Personnel		2	2
Extra-Territorial Organs		1	1
Without prior employment	63	93	156
<b>Total</b>	<b>1.454</b>	<b>1.640</b>	<b>3.094</b>
<b>PROFESSIONAL GROUP</b>			
Armed Forces	1	2	3
Executives	18	7	25
Professionals and Technicians (Scientific)	29	63	92
Professionals and Technicians (Support)	113	102	215
Administration	108	284	392
Service workers	263	597	860
Agricultural workers	62	12	74
Skilled workers	395	36	431
Machines operators	116	15	131
Unskilled workers	349	522	871
<b>Total</b>	<b>1.454</b>	<b>1.640</b>	<b>3.094</b>
<b>GENDER</b>			
%	<b>47</b>	<b>53</b>	<b>100</b>
<b>AGE</b>			

Below 20	51	34	85
Between 20 y 29	356	456	812
Between 30 y 44	430	733	1.304
Between 45 y 54	265	271	536
55 and above	211	146	357
<b>Total</b>	<b>1.454</b>	<b>1.640</b>	<b>3.094</b>

SOURCE: OBECAN.

ELABORATION: Centro de Datos. Cabildo de Lanzarote.



## 4. AGRICULTURE

### 4.1.- CULTIVATED SURFACE AREA BY TYPE OF CROP (2002)\*

CROP	AREA (Hectares)	%
<b>Legumes</b>		
Chickpea	17	0.40
Peas (Dried)	22	0.51
Others	28	0.65
<b>Vegetables</b>		
Onions	157	3.65
Watermelon	48	1.12
Tomatoes	43	1.00
Peas (Fresh)	14	0.33
Melon	35	0.81
Others	101	2.35
<b>Tubers</b>		
Potatoes	305	7.10
Sweet Potatoes	167	3.89
<b>Vineyards</b>	<b>3.072</b>	<b>71.51</b>
<b>Industrial Crops</b>		
Aloe	1	0.02
Cochineal	215	5.00
Flowers	2	0.05
Others	4	0.09
<b>Cereals</b>	<b>53</b>	<b>1.23</b>
<b>Fodder</b>	<b>12</b>	<b>0.28</b>
<b>TOTAL</b>	<b>4.296</b>	<b>100.00</b>

SOURCE: Department of Agriculture, Livestock, Fishing and Food of the Government of the Canary Islands

ELABORATION: Centro de Datos. Cabildo de Lanzarote.

#### 4.2.- Evolution of Cultivated Ares (1987-02)

Year	Hectares
1987	4.455
1988	4.865
1989	4.449
1990	4.695
1991	4.857
1992	4.073
1993	3.781
1994	3.635
1995	3.094
1996	4.299
1997	3.332
1998	3.498
1999	3.171
2000	3.696
2001	4.121
<b>2002</b>	<b>4.296</b>

SOURCE: Department of Agriculture, Livestock, Fishing and Food of the Government of the Canary Islands

ELABORATION: Centro de Datos. Cabildo de Lanzarote.

## 5. CONSTRUCTION

### 5.1.- Evolution of Permitted Construction (1997-2002)

USE	1997	1998	1999	2000	2001	2002
<b>TOURISM</b>						
Tourism	21.397	63.460	94.409	268.716	56.811	4.327,7
<b>NEW HOUSING UNITS</b>						
VPO Public			128		107	
VPO Private	5.205	9.366	9.109	25.560	138	12.656,9
Public Housing	104			10.614	351	
Private Housing	198.850	325.186	270.696	295.120	176.957	624.887,6
Shop Unites	5.009	43.932	27.159	16.572	16.157	20.966,5
Basements	21.753	804.174	32.553	25.423	21.441	61.009,3
<b>TOTAL</b>	<b>250.921</b>	<b>1.182.658</b>	<b>339.645</b>	<b>373.289</b>	<b>215.151</b>	<b>719.520,4</b>
<b>REHABILITATED HOUSING UNITS</b>						
Private Housing	8.587	6.565	10.151	7.172	230	10.013,4
Shop Units	623	792	1.535	1.727		
Basements	220	314	640	1.712		
<b>TOTAL</b>	<b>9.430</b>	<b>7.671</b>	<b>12.326</b>	<b>10.611</b>	<b>230</b>	<b>10.013,4</b>
<b>OTHER BUILDING TYPES</b>						
Agriculture / Livestock			76		116	
Commerce and Office	29.364	17.390	17.819	10.956	9.553	9.406,2
Sports	19.358	500		74	1.349	1.270
Education	644	918	1.349	491	224	355,9
Performance	392	356	1.512			
Industrial	194	762	407	3.837	19.923	3.302
Others	4	6.886	98	41.725	7.242	4.379,4
Health			10.112	634	920	
Culture and Religion	438	438			118	334.382,7
Basements	312	2.847	62	289	4.781	29.364,2
<b>TOTAL</b>	<b>50.706</b>	<b>30.097</b>	<b>31.435</b>	<b>58.006</b>	<b>44.226</b>	<b>382.460,4</b>

\*VPO – Vivienda de protección oficial

SOURCE: College of Architects of the Canary Islands.  
ELABORATION: Centro de Datos. Cabildo de Lanzarote.

## 6. WATER AND ENERGY

### 6.1.- PETROLEUM PRODUCTS

#### 6.1.1.- Evolution of consumption of gasoline and other petroleum products (1988-02)<

Year	Gasoline (1,000 Tons.)	Petroleum Products (1,000 Tons.)
1988	24.666	145.070
1989	26.600	162.605
1990	26.441	151.431
1991	27.323	126.989
1992	28.140	131.750
1993	30.005	135.505
1994	31.614	133.940
1995	33.828	142.455
1996	36.231	158.455
1997	39.441	173.490
1998	40.130	189.067
1999	40.191	212.968
2000	39.153	221.050
2001	39.244	227.031
<b>2002</b>	<b>39.575</b>	<b>251.418</b>

SOURCE: Directorare-General of Industry and Energy.Government of the Canary Islands

### 6.2.- ELECTRICAL ENERGY

#### 6.2.1.- Evolution of Consumption of Electrical Energy (Energy sold) and number of subscribers (1987-02)

Year	Consumption (1000 KWH)	Subscribers	KWH per subscriber
1987	167.634	32.517	5,16
1988	210.482	35.018	6,01
1989	253.566	37.852	6,70
1990	258.111	39.379	6,55
1991	286.678	40.485	7,08
1992	286.716	40.539	7,07
1993	306.734	40.964	7,48
1994	347.103	41.810	8,42
1995	370.685	43.562	8,51
1996	393.808	44.537	8,84
1997	429.494	46.304	9,27
1998	465.205	48.617	9,70
1999	499.111	51.093	9,76
2000	525.325	53.809	9,76
2001	573.708	56.701	10,10
<b>2002</b>	<b>658.229</b>	<b>59.463</b>	<b>11,06</b>

SOURCE: Unión Eléctrica de Canarias, S.A. (UNELCO).  
ELABORATION: Centro de Datos. Cabildo de Lanzarote.

### 6.2.2.-Evolution of the production of wind energy (1997-02)

WIND FARMS	1997 (MWH)	1998 (MWH)	1999 (MWH)	2000 (MWH)	2001 (MWH)	2002 (MWH)
Los Valles	9.203,9	13.479,1	13.648,2	12.457,9	12.083,2	11.215,6
Montaña Mina	3.554,4	4.366,8	4.348,6	4.036,6	4.131,2	4.127,0
<b>TOTAL</b>	<b>12.758,3</b>	<b>17.815,9</b>	<b>17.996,8</b>	<b>16.494,5</b>	<b>16.214,4</b>	<b>15.342,6</b>

SOURCES: ACSA and INALSA.

ELABORATION: Centro de Datos. Cabildo de Lanzarote.

### 6.3. WATER

#### 6.3.1. Water consumption (2002)

MONTHS	Metered Consumption (m3)	"Cubas" (Local unit of measure) (m3)	Volume recycled
January		12.278	
February	1.642.343	11.095	133.344
March		19.042	
April	1.709.266	13.141	146.070
May		20.212	
June	1.895.497	12.658	256.800
July		20.918	
August	2.229.753	15.927	170.839
September		11.726	
October	2.326.329	13.146	186.029
November		8.656	
December	1.657.518	5.728	88.942
<b>TOTAL 2002</b>	<b>11.460.706</b>	<b>164.527</b>	<b>982.024</b>

SOURCE: INALSA.

#### 6.3.2.- Water consumption by Municipality (2002)

MUNICIPALITY	Consumption (m³)	%
Arrecife	2.322.820	20.3
Haría	418.970	3.7
S. Bartolomé	1.559.411	13.6
Teguise	2.219.408	19.4
Tías	3.596.148	31.4
Tinajo	298.203	2.6
Yaiza	1.045.746	9.1
<b>LANZAROTE</b>	<b>11.460.706</b>	<b>100.0</b>

SOURCE: INALSA.

#### 6.3.3.- Summary of Water Data (2002)

CONCEPT	Cubic Metres
Production	17.209.940
Consumption	11.460.706
"Cubas"	164.527
Recycled Water	982.024

## 7. NATURAL SPACES

### 7.1.- Surface area of protected spaces (Hectares)

PROTECTION CATEGORY	Municipalities Implicated	Surface area of Municipality	Surface Area Total	% of island
Timanfaya National Park	Tinajo	2.206	5.107	6.0
	Yaiza	2.901		
Los Islotes Maritime Reserve	Teguise	165,2	165,2	0.2
Chinijo Archipelago National Park	Teguise	7.222	9.112	10.7
	Haría	1.890		
Los Volcanes National Park	Tinajo	5.512,8	10.158,4	12.0
	Tías	62,9		
	Yaiza	4.582,7		
Malpaís de La Corona Natural Monument	Haría	1.797,2	1.797,2	2.1
Los Ajaches Natural Monument	Yaiza	3.009,5	3.009,5	3.6
Cueva de Los Naturalistas Natural Monument	Tías	1,2	2,1	0.02
	Tinajo	0.9		
Islote de Halcones Natural Monument	Yaiza	10,6	10,6	0.01
Montañas del Fuego Natural Monument	Yaiza	155,9	392,5	0.4
	Tinajo	236,6		
Tenegüime Protected Space	Teguise	418,2	421,1	0.5
	Haría	2,9		
La Geria Protected Space	Yaiza	1.039,1	5.255,4	6.2
	Tías	1.902,5		
	Tinajo	783,7		
	S. Bartolomé	1.429,2		
	Teguise	100,9		
Los Jameos del Agua Site of Scientific Interest	Haría	30,9	30,9	0.03
Las Salinas de Janubio Site of Scientific Interest	Yaiza	168,6	168,6	0.1
<b>TOTAL</b>			<b>3.560,5</b>	<b>42.11</b>

SOURCE: Department of Territorial Policy. Government of the Canary Islands

**7.2.- Protected Spaces by Municipality (Hectares)**

<b>MUNICIPALITY</b>	<b>Area of Municipality</b>	<b>Area Protected</b>	<b>% of municipality protected</b>
Arrecife	2.272,36	0,0	<b>0.0</b>
Haría	10.658,76	3.721,0	<b>34.9</b>
San Bartolomé	4.089,87	1.429,2	<b>34.9</b>
Teguise	26.398,48	7.906,3	<b>29.9</b>
Tías	6.461,49	1.966,6	<b>30.4</b>
Tinajo	13.528,48	8.740,0	<b>64.6</b>
Yaiza	21.184,53	11.867,4	<b>54.0</b>
<b>LANZAROTE</b>	<b>84.593,97</b>	<b>35.630,5</b>	<b>42.1</b>

SOURCE: Department of Territorial Policy. Government of the Canary Islands

ELABORATION: Centro de Datos. Cabildo de Lanzarote.

## 8. TOURISM

### 8.1.- ACCOMMODATION

#### 8.1.1.- Amount of accommodation by type, by municipalities (2002)

MUNICIPALITY	Hotels	Others	TOTAL
Arrecife	588	591	1.179
Haría	50	300	350
San Bartolomé	30		30
Teguise	5.114	9.924	15.038
Tías	7.249	22.028	29.277
Tinajo		930	930
Yaiza	8.691	5.351	14.042
<b>LANZAROTE</b>	<b>21.722</b>	<b>39.124</b>	<b>60.846</b>

SOURCE: Office of Internal Tourism. Cabildo de Lanzarote.

#### 8.1.2.- Level of occupation hotel and non-hotel by month (2002)

MONTHS	Occupancy (%)
January	75.3
February	82.7
March	86.4
April	78.5
May	72.6
June	72.9
July	81.1
August	92.7
September	86.6
October	79.7
November	79.0
December	75.0
<b>AVERAGE 2002</b>	<b>80.2</b>

SOURCE: Insular Association of Hotels and Apartments of Lanzarote (ASOLAN).



## 8.2 –INFLUX OF TOURISTS

### 8.2.1.- Influx of tourists by month (2002)

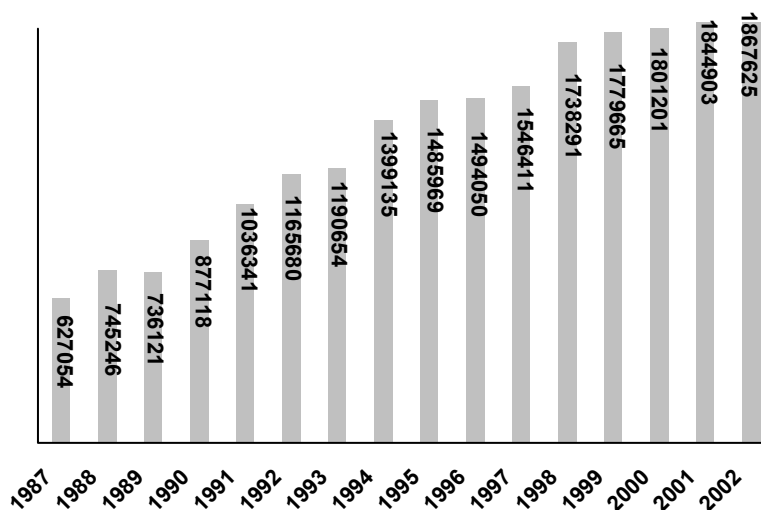
MONTH	International	National*	TOTAL TOURISTS
January	134.180	4.073	138.253
February	149.402	3.506	152.906
March	173.951	4.869	178.820
April	142.691	3.881	146.572
May	131.434	3.277	134.711
June	131.985	2.863	134.848
July	149.427	14.385	163.812
August	155.448	25.495	180.943
September	143.866	11.230	155.096
October	169.996	3.382	173.378
November	147.985	4.511	152.496
December	151.023	4.765	155.788
<b>TOTAL 2001</b>	<b>1.781.388</b>	<b>86.237</b>	<b>1.867.625</b>

\*Only charter flights.

SOURCE: AENA.

ELABORATION: Office of Internal Tourism. Cabildo de Lanzarote.

### 8.2.2.- Evolution of tourist flows (1987-02)

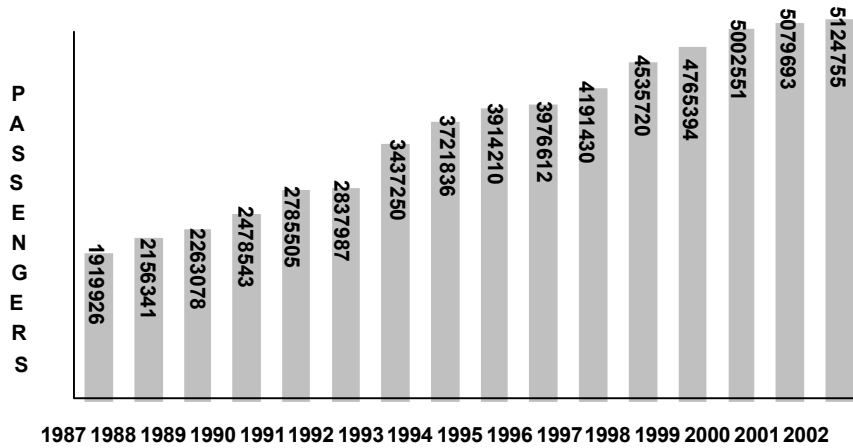


SOURCE: Office of Internal Tourism. Cabildo de Lanzarote.

## 9. COMMUNICATION

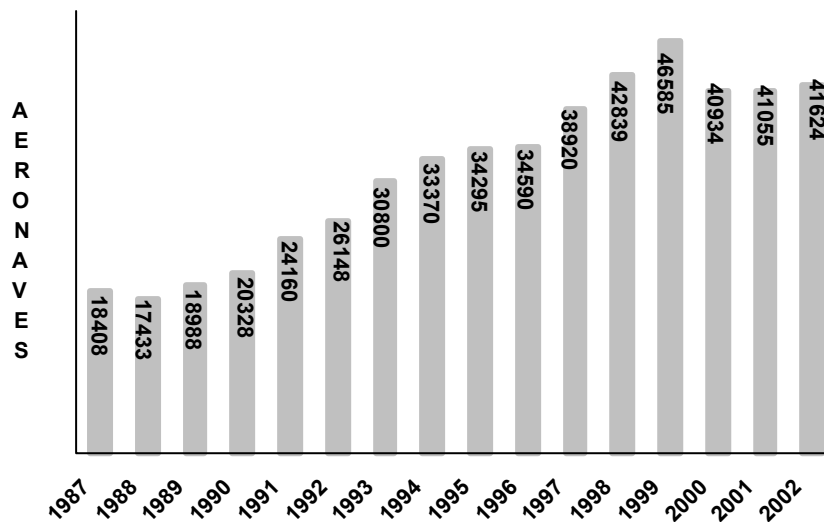
### 9.1.- AIR TRAFFIC

#### 9.1.1.- Evolution of passenger movements in the Airport of Lanzarote (1987-2002)



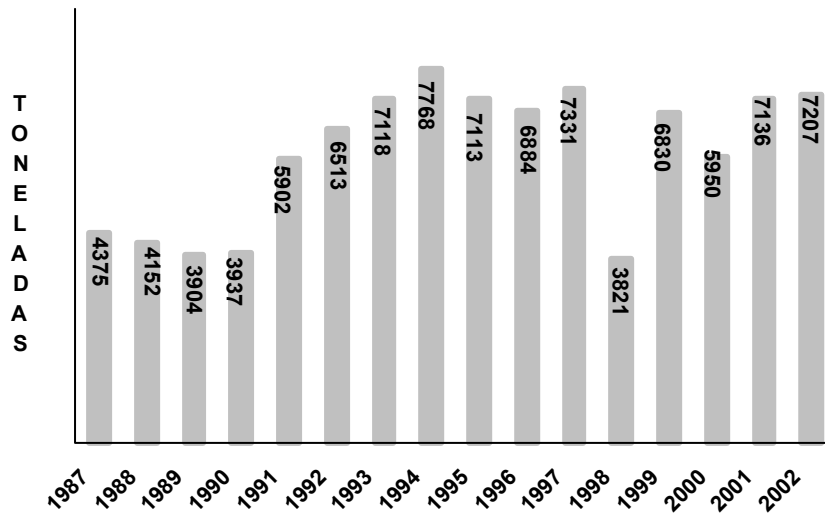
SOURCE: Directorate AENA (Lanzarote).  
ELABORATION: Centro de Datos. Cabildo de Lanzarote.

#### 9.1.2.- Evolution of commercial aircraft movements in the Airport of Lanzarote (1987-2002)



SOURCE: Directorate AENA (Lanzarote).  
ELABORATION: Centro de Datos. Cabildo de Lanzarote.

### 9.1.3.- Evolution of freight movements in the Airport of Lanzarote (1987-2002)



SOURCE: Directorate AENA (Lanzarote).  
ELABORATION: Centro de Datos. Cabildo de Lanzarote.

## 9.2. SURFACE TRAFFIC

### 9.2.1.- Number of vehicles de vehicles (2002)

MUNICIPALITY	Vehicles	%
Arrecife	30.069	31.8
Haría	2.779	2.9
San Bartolomé	19.641	20.8
Teguise	12.410	13.1
Tías	21.885	23.1
Tinajo	3.506	3.7
Yaiza	4.283	4.5
<b>LANZAROTE</b>	<b>94.573</b>	<b>100.0</b>

SOURCE: Directorate-General of Traffic. Ministerio del Interior

### 9.2.2.- Evolution of Number of vehicles de vehicles by municipality (1997-02)

MUNICIPALITY	Number of Vehicles					
	1997	1998	1999	2000	2001	2002
Arrecife	23.409	24.937	26.580	27.967	28.998	30.069
Haría	1.873	2.070	2.297	2.527	2.671	2.779
San Bartolomé	13.528	14.543	15.937	17.166	18.875	19.641
Teguise	9.066	9.633	10.321	11.185	11.982	12.410
Tías	17.059	19.460	21.074	22.439	22.538	21.885
Tinajo	2.502	2.733	3.013	3.224	3.403	3.506
Yaiza	2.816	3.092	3.365	3.651	3.969	4.283
<b>LANZAROTE</b>	<b>70.253</b>	<b>76.468</b>	<b>82.587</b>	<b>88.159</b>	<b>92.436</b>	<b>94.573</b>

SOURCE: Dirección General de Tráfico. Jefatura Provincial de Las Palmas.  
Oficina de Tráfico de Arrecife.

### 9.2.2.- Annual Increase of Number of Vehicles by Municipality (1997-02)

MUNICIPIO	Annual Increment			%	
	97-98	98-99	99-00	2000-01	2001-02
Arrecife	6.5	6.6	5.2	3.7	3.7
Haría	10.5	11.0	10.0	5.7	4.0
S. Bartolomé	17.5	9.6	7.7	10.0	4.0
Teguise	6.2	7.1	8.3	7.1	3.6
Tías	14.0	8.3	6.5	0.4	-2.9
Tinajo	9.2	10.2	7.0	5.5	-3.0
Yaiza	9.8	8.8	8.5	8.7	7.9
<b>LANZAROTE</b>	<b>8.8</b>	<b>8.0</b>	<b>6.7</b>	<b>4.8</b>	<b>2.3</b>

SOURCE: Dirección General de Tráfico. Jefatura Provincial de Las Palmas  
Oficina de Tráfico de Lanzarote.

### 9.2.3.- Vehicle Ration by Municipality (2002)

MUNICIPIO	Vehicles per 1000 inhabitants	Cars 1000 inhabitants
Arrecife	589,3	403,4
Haría	568,6	351,3
San Bartolomé	1.071,0	894,1
Teguise	854,0	615,6
Tías	1.365,0	1.131,3
Tinajo	688,6	435,0
Yaiza	489,5	352,9
<b>LANZAROTE</b>	<b>797,0</b>	<b>599,0</b>

SOURCE: Dirección General de Tráfico. Ministerio del Interior.  
Oficina de Tráfico de Lanzarote.

**ESPON 1.3.2 TERRITORIAL TRENDS IN THE MANAGEMENT OF  
THE NATURAL HERITAGE:**

**CASE STUDY OF LJUBLJANA MARSH AREA**

---

PREPARED BY PETER BASSIN, SLOVENIA  
2004

## THE LJUBLJANA MARSHLAND

### Section 1: territorial context and state of the natural heritage

Territory
<p>What is the position of the area as regard to the urban/rural system? Is the area pressured or depressed?</p>
<p><i>Urban/Periurban/Rural/Remote rural</i>  <b>The marshland is surrounded by: the Capital City of Ljubljana (on the north) and five small rural Communes from the other three sides.</b>  <i>Growth pressure/depression</i>  <b>Like the fringes of each settlement there is a permanent pressure for urbanization (even illegal) along the roads connecting the City and the rural Communes.</b></p>
<p>What is the dominant land use?</p>
<p><i>Urban/Forest/Agriculture (Intensive/Mixed/Extensive)</i>  <b>Of the total area 163 km<sup>2</sup>, there are 107 km<sup>2</sup> marshy meadows, 40 km<sup>2</sup> of arable land and 11 km<sup>2</sup> of forest (naturally grown mostly in the last centuries).</b></p>

Territorial strategy
<p>Is there an overall spatial strategy for the area? What are its objectives? Its effectiveness?</p>
<p><b>In the spatial development plans of the City and the rural Communes the Ljubljana Marshland is proposed to be treated as a <u>natural heritage reserve of wetland</u>, known now as a breeding place for well over 100 different birds' species. It seems to start having positive effects especially in the last decade.</b></p> <p><b>The historical development showed actually the opposite public interest. Ever since the 16<sup>th</sup> century great endeavours were made to minimize the intensive flooding of the Ljubljana Marshland that was partially successful in gaining arable land instead of marshy meadows.</b></p> <p><b>At the end of the 19<sup>th</sup> century the last constructions for this purpose took place with the deepening of the existing Ljubljanica river basin and with the introduction of an additional discharging Gruber Channel. Quite important negative influence on the preserving of marshy wetland was intensive digging of peat (used for heating) what was abandoned after the WW1 (after 1920).</b></p>
<p>What are the objectives of the other policies that may influence on natural heritage?</p>
<p><i>Agriculture, Forest, Urban development, Transport development, Tourism development</i>  <b>The objectives of other policies seem now to be in accordance with the general policy to preserve this natural wetland reserve. The only really most up today positive tendency is the planning of organizing educational parks as places dedicated to leisure time and inoffensive tourism activities.</b></p> <p><b>Definitely the City of Ljubljana has during its expansion policy times: from end of WW2 till the formation of the independent state Slovenia, expressed the most intensive urbanization tendencies of marshland by setting on the fringes of Ljubljana marshland: the city waste disposal for household waste, the industrial zone Rudnik and finally the construction of the southern city bypass highway. This period is definitely over now.</b></p>

<b>State of the natural heritage</b>
Check the relevance of the provided maps concerning the state of the natural heritage. Are they updated? Are they comprehensive? Are they relevant at local level?
<b>For Slovenia (very small area!) some inaccuracies are detected: on map 2.5 distribution of urban fabric is neglected the Ljubljana metropolitan area with some 500.000 inhabitants, shoving the urban fabric elsewhere to the north east. The map 2.1 shows a more realistic built-up situation. The map with fragmentation of natural areas is difficult to follow –up due to the complicated division of specific % of fragmentation. The map 2.6 shows a realistic percentage of natural area.</b>
Are there other areas managed in an ecological way (railways, roadsides, agricultural areas...) but unmonitored by the database or by local designations?
<b>The national highway system has been in the planning phases presented and prepared as a very eco responsible scheme with intensive studies of alternative courses. Yet the results may not be as expected, though it is quite impossible to imagine what the results would be if the chosen courses would be different.</b>

<b>Pressures and driving forces</b>
Describe the 3 or 4 driving forces of local natural heritage evolution, as well as their expected trend.
<i>Amongst others, according to the case study: Ecosystems change according to climate change,</i>
<b>Agriculture and forest practices evolutions:</b> The main reason for the drainage of the Marchland in the past centuries was the desire to prevent inundations that swept away agriculture products on the artificially made arable land from natural meadows. With the decrease of rural population, actively engaged in agriculture, the demand for gaining new arable land declined. Since then the natural meadows remained almost untangled. The forest on the Marshland is definitely only its second natural environment that has ever since hosted the migratory birds.
<b>Urbanisation and transport – infrastructure development:</b> The City of Ljubljana has been bordering its Marshland ever since, yet it was mainly in the last 50 years that it begins to actively occupy its northern borders with housing, but lately also with other more profane uses. Due to the national energy policy in former Yugoslavia the local coal used in Ljubljana electro and steam power plant had up to 40% of tailings that were to be disposed somewhere in the vicinity. Thus the double purpose was achieved: disposing of the tailings was combined with consolidation of unstable marsh soil for possible construction of any sort of buildings, including highway or disposing the household waste. This practise of occupying the Marshland ended with the introduction of market economy in Republic Slovenia that enabled the import of cheap and quality Indonesian coal with practically no tailings at all.
<b>Management on local level:</b> One of the last non succeeded rather aggressive construction interventions to the centre of Marshland was the endeavour to place a sport's planes airfield (still using the tailings

**from coal burning in Ljubljana power plant). Due to hard opposition of local inhabitants backed up with the first “green” activists the airfield never got the building permit and since then the Marshland was slowly but definitely gaining the meaning of a “natural oasis”, that should remain untouched by the urbanization.**

...

Which driving forces can be considered as threats?

**Urbanisation and transport - infrastructure development; to some extent also agriculture with its intensive growing of monoculture (corn) on the arable land.**

Which driving forces can be considered as opportunities?

**Increasing leisure, sport and recreation time and local tourism**

What are the needs of the management according to the driving forces?

**The needs of management of Ljubljana Marshland could be easily limited to a single goal: stop the selfish, one sided human interventions in order to preserve the natural reserve for wild life and unobtrusive human activities.**



## Section 2: Objectives, means and effects of the management of the natural heritage

<b>2.1 History and objectives of the management of NH</b>
<p>When the management plan started? Why (circumstances of awareness of the need for NH management)?</p>
<p><b>The Ljubljana Marshland has been a challenge to for the management – local and national governments (not so long time ago still of the Austro-Hungarian Empire in Vienna). Then it was treated as a territory that has to be seized from the wilderness. When flooding was successfully limited to a manageable size, urbanization and transport drives became predominant. The construction of railway Vienna – Ljubljana -Triest (more than 150 years ago) was the first infrastructure to cross the Marshland and represented a high technical achievement of the period. Experiences from this construction were used later for planning of all regional roads in the area. For the construction of the southern city bypass highway on the Marshland in 70ies and 80ies a special Swedish technology was introduced, which consisted of two basic elements: one year long lasting overburdening of the complete future highway site combined with the introduction of millions of drainage pipes to dry and to shorten the settling down process. Only when these and similar technical measures of urbanization, that could have not been delayed were concluded, the consciousness of the importance of preserving the natural reserve of the Marshland start to grow.</b></p>
<p>Who decided? Is it the result of local initiative, or was it compulsory to implement the designations? Has it induced conflicts with local society or local authorities?</p>
<p><b>In the former Yugoslavia (till 1991) with its different communal governing division, the City of Ljubljana was a complex composition of five Communes, that each included (with the exception of the commune Centre) a part of the urbanized area and a large portion of the rural hinterland. The Marshland together with all its bordering villages was part of the Commune Ljubljana Vic Rudnik. In such political situation the voices of rural voters were permanently in minority. But with the growing process of democratisation the voters' voices became important. The Marshland farmers' opinion combined with the "green" activists' voices that the wildlife of Marshland should be preserved coincide with the growing awareness of importance of daily recreational activities of the still growing population of the Capital city. The idea of Natural Park Ljubljana Marshland was born.</b></p>
<p>How the initial management plan evolved to the current plan? Why?</p>
<p><b>Evolution of the territorial context in the case of Marshland represents the change of governmental communal organization in Republic Slovenia. The City of Ljubljana became a unified Capital City Commune and the villages around Marshland became five smaller rural Communes.</b></p> <p><b>As a matter of fact the coalition of six Communes (including Ljubljana) applied just recently with the proposal that the Ljubljana Marshland would become one of the natural parks in the network of the Natura 2000.</b></p>

Who implements the management plan at local level? Does the management rest on local participation?
<b>The implementation of the management is public, within the City administration a specific local agency is under creation, as there is the largest potential of financial human resources. Private and NGO's are active in preparing proposals, yet not in management of the Marshland.</b>
What are the objectives of the management plan?
<b>Conservation of specific natural habitats, conservation of endangered species, conservation of geomorphologic features, landscape maintenance, agricultural pressure control, urbanisation pressure control, tourism control open natural spaces to the public.</b>
<b>2.2 Means of the management</b>
Check the relevance of the management map (it includes formally protected areas and areas under management plans). Are they updated? Comprehensive?
<i>Not provided yet</i>
Which European directives do concern the area?
<b>Bonn Convention, Convention on Biodiversity, The Alps Convention, Barcelona Convention, Agreement on maintaining Afro-Eurasian water migration birds, Council's Directive on habitats, Council's Directive on birds, Pan European strategy of maintaining biotic and landscape diversity.</b>
Are the local level designations important as regard to European and national designations (give a map if possible)?
<b>There are no real special local designations, only national designation deriving from the Law on Preservation of Nature.</b>
Ecosystems conservation Primary method for site management? Amount of public resources allocated to site management? Type and amount of fiscal incentives involved?
<b>The primary method for natural sites management is a consequence of regulations deriving from the Law on Preservation of Nature. The Ministry of Spatial Planning, Environment and Energy have among other Institutes also the National Institute for Nature Preservation, which has seven local Regional Agencies. Among them is the Ljubljana Regional Agency responsible for managing the Ljubljana Marshland. The amount of public resources allocated to the Ministry of Spatial Planning, Environment and Energy is included in the Integrated Annual National Budget. Percentage may vary highly from year to year and means directly designated for Nature Preservation are then negotiated upon within the Ministry's different departments.</b>
Land purchase Is there any pre-emptive mechanism to acquire land?
<b>No, there is no pre-emptive mechanism to acquire land for natural heritage territories.</b>

Land rehabilitation

What type of land is subject to rehabilitation?

**In the open space: quarries, mines in their conclusion phase of excavation;  
Within urbanized areas derelict industrial sites.**

How is natural heritage valorised? Is public frequentation controlled? Is there a money turn-back and does it profit to local community and/or natural heritage?

**Natural heritage sites that are organized even for mass visitations like the Carstic Phenomena: the Caves of Postojna and the Caves of Škocjan (under UNESCO protection) have controlled and guided visits only. The money turn back is dedicated to the natural heritage for maintenance and further researching and development. Partially it returns indirectly also to the local community as salaries for employees, or visitors to the local restaurants or hotels-motels and other tourist offers.**

### Section 3: Assessment of the management of the natural heritage

<b>3.1 Relevance of the management: relevance of the objectives as regard to the needs</b>
Are the objectives relevant as regard to the needs for management?
<b>YES, in principle.</b>
<b>3.2 Internal coherence</b>
Are the means of the management consistent with the objectives?
<b>YES, in principle.</b>
To which extent designations are translated into local planning guidance?
<b>Local Communes Long Range Spatial Plans have as input for possible changes of buildable areas of (existing) settlements the Obligatory National Guide Lines, which are provided by all the Ministries. The final proposal of each Plan has to be approved by the Government after the procedure in which all Ministries have successfully verified that their Guide Lines are properly included in the Plan.</b>
.
To which extent compulsory guidance concerning the spatial integrity of the natural heritage are respected? If not why?
<b>The compulsory guidance should be respected in full. If they would be not, the Constitutional Court would on the proposal of the National Government disable the Plan and no construction at all within the Local Commune would be permitted.</b>
To which extent EU NH management policies are implemented or not at local level?
<b>In the phase of Accession to the EU all legislation in Slovenia has been harmonized with the European legislation.</b>
Where and why they are hardly or even not at all implemented?
<b>They are not implemented yet where there is no possibility to apply them.</b>
<b>3.3 External coherence</b>
Are the objectives of the other development policies consistent with the objectives of the management of the natural heritage?
<b>YES, in principle.</b>
Does the overall spatial strategy (if any) integrate natural heritage management objectives?
<b>YES, in principle.</b>
Are the ESDP objectives of conservation and valorisation of natural heritage achieved?
<b>YES, in principle where they are under national inherence.</b>

To which extent do you think natural heritage management helps to meet ESDP objectives (namely polycentrism, parity access to infrastructure and knowledge, sustainability)?
<b>Due to the private ownership of land including the buildable land within settlements a tendency to enlarge the potential buildable land is present. This could lead to uncontrolled spatial closing up of clearly separated and individual settlements and thus endanger the proclaimed polycentrism. If the natural heritage areas in between such settlements can be used as buffer zone for prevention of closing g up, a good help to meet at least one ESDP objective.</b>
<b>3.4 Efficiency</b>
Are the management plan objectives met? If not, why?
<b>The management plan objectives are in principle met. Yet in detail the conflicting development trends have to be harmonized: urbanisation (some elements of illegal interventions in space) and agriculture intensification in monoculture (corn growing only) should be replaced again with biodiversity grow.</b>
What are the difficulties encountered as regard to the management objectives?
<b>The fringe location of urbanized area is not always under enough tight environmental control (illegal interventions). The monoculture of corn growing has not been yet scientifically replaced with other plants of similar economic effect.</b>
Is there any assessment tool or processes? Does the assessment process help in reviewing the management plan?
<b>Nothing in the run at the moment. Application to enter the Natura 2000 Net has been submitted right now in a joint action of the five rural and the Capital Commune.</b>
Does it help in reviewing the spatial strategy of the area?
<b>Yes, in a way. The change (abolition) of buildable areas on the Marshland from the existing Long Range Spatial Plan Ljubljana 2000, still based on the tailings from domestic coal burning in power plant, is now in the process of official approval.</b>
What are the strengths of the management?
<b>Effects like influencing the spatial policy of the adjacent Communes is the strength of the management.</b>
What aspects of the management could be considered as 'best practice'? Why?
<b>Almost 95% successful prevention of any kind of construction in the Marshland could be considered as 'best practice'.</b>
What are the weaknesses of the management?
<b>Not enough direct power of governing the territory of the Marshland, only indirect influence by building the positive public opinion for the nature heritage preservation.</b>
What would happen with a sustainable management?
<b>In the case of Ljubljana Marshland a sustainable management would represent the maintenance of existing overall situation with a tendency of slow amelioration of biodiversity which would cause the increase of fauna species, like the migratory birds.</b>

<b>3.5 Effects on spatial developments : spatial interactions</b>
<b>Effects on productive landscapes</b>
Agriculture – Have you stated a shift in the production system?
<b>Replacing the prevailing corn grow with the scientifically chosen more bio diverse planting.</b>
Forestry – Have you stated a shift in the production system (forestry plans take into account ecological concerns, quality labels for private owners)?
<b>Not yet.</b>
<b>Effects on infrastructures</b>
Has the designated natural areas ‘guided’ the path of new linear infrastructures?
<b>No, as there is none additional infrastructure planned.</b>
<b>Effects on dwellings</b>
Have you stated an increase of the residential attractiveness of the area? Of land prices?
<b>No.</b>
Have you stated a shift in the social composition of the area?
<b>No effects in measurable dimensions of this kind have been detected. The rural settlements around the Marshland is not (yet?) considered as more attractive:</b>
Has the management of natural heritage induced a specific settlement pattern?
<b>No effects of that kind were detected yet.</b>
<b>Effects on economic development</b>
Has the management of natural heritage restrained the development of polluting economic activities and favoured the development of high quality activities?
<b>No effects of that kind were detected yet, as the southern part of the City is still looked upon as the less developed and not too attractive (yet!).</b>
Has it favoured the setting up of environmental management or quality labels?
<b>No.</b>
<b>Effects on tourism</b>
Has it induced an overall increase of tourism, or new forms of tourism?
<b>This kind of increase is under serious considerations and has been lately proposed as the most favourable new use of the natural heritage area.</b>
<b>Others effects</b>
Have you stated others spatial effects in relation to natural heritage management?
<b>No.</b>
<b>Spatial interactions: database relevance</b>
Do we have equivalence between the interplays shown by the database and the previous development interplays?
<b>Hard to say because the database on the sent maps is too small in case of Slovenia.</b>

**3.6 Achievement of the objectives of the European Spatial Development Perspective**

Are the ESDP objectives of conservation and valorisation of natural heritage achieved?

**In principle yes.**

To which extent do you think natural heritage management helps to meet ESDP objectives (namely polycentrism, parity access to infrastructure and knowledge, sustainability)?

**Same question as Section 3, External coherence 3.3. last (fourth) question!**

*Other useful comments*

**In what form should a map (Section 2, Means of management 2.2, question 3) of the case The Ljubljana Marshland be provided for the use of the Main Team?**

**Any additional clarification comments, if needed, would be supplied in the shortest time possible!**

**ESPON 1.3.2 TERRITORIAL TRENDS IN THE MANAGEMENT OF  
THE NATURAL HERITAGE:**

**CASE STUDY OF THE NORD – PAS DE CALAIS REGION, FRANCE**

PREPARED BY TERRITOIRES SITES ET CITÉS  
2004



**Territorial trends of the management of the Natural Heritage  
- ESPON 1.3.2. -**

**Case study:  
The Nord – Pas de Calais Region, France**

Final Report, July 2004

## Content

- O. Introduction
- 1. Territorial context of the Nord - Pas de Calais
- 2. State of the Natural Heritage in the Region
- 3. Management of Natural heritage
- 4. Driving forces: urbanisation, agriculture and forestry, climate
- 5. Assessment of the management and protection of Natural Heritage
- 6. Scenarios

## **O. Introduction: the reason for selecting the Nord - Pas de Calais Region**

The Nord – Pas de Calais territory complies with four selection criteria:

- its natural heritage policies evolve through various tools since the 70'. Historical records of the interrelations between management and natural heritage evolutions exist and enable an attempt of diagnosis
- the region is concerned by several ecological European Community directives
- the region is both under pressure and depression
- our team has an easy access to relevant data

It shows various territorial contexts, opening to the understanding of the relations between development trends, open spaces and settlement planning.

Since 1981, the Nord – Pas de Calais has its own political authority, the Region Nord – Pas de Calais. In the context the up-bottom rearrangement of territorial authorities the Region is acquiring new competences. It is also restructuring its natural heritage policies together with other territorial authorities, especially the 2 Départements. There is an overall process of convergence of policies that were previously dispersed.

The natural heritage framework called “Trame Verte Régionale” (regional green network) is today one of the major schemes of the Region. It will be included in the future regional integrated development scheme, the Schéma Régional d’Aménagement et de Développement du Territoire.

More practically, the elaboration of one case study was essential to prepare the case study methodology and overview our team is in charge of (Work Package4, “Case studies and scenarios”).

## 1. Territorial context.

### 1.1 Position in Western Europe.

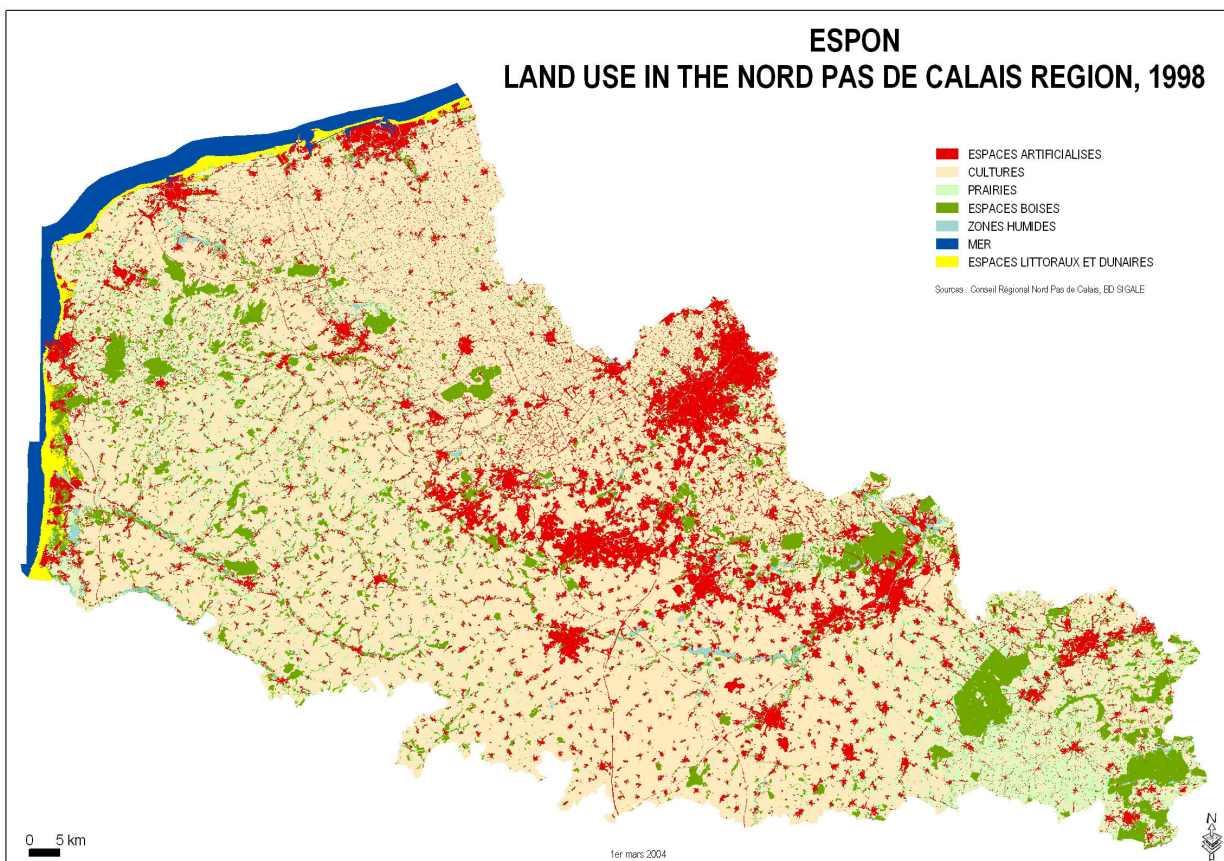
The Nord – Pas de Calais territory is part of North West of Europe region, one of the world's strongest economic regions.

Densely occupied, it is organised around core areas which concentrates global economic command functions and/or major global gateways, but also economic and industrial areas under restructuring.

The Nord – Pas de Calais is at the cross-road of the major links between these core-areas.

### 1.2 Land Use

The land use maps have been elaborated by the Nord – Pas de Calais Region Geographical Information System board. The 90 land use map is an interpretation of satellite images, the 98 land use map is partly a re-interpretation of the Corine Land Cover map. Precise geographical data concerning land use changes at micro scale are thus available on a ten-year background basis (see 2.4).



The Nord – Pas de Calais region has a high density population at France scale, about 320 inhabitants per square kilometres, comparable to northern Europe territories. About 1/3 of the territory is urbanised. Settlement density is unequal and mainly distributed over a west – east ensemble of physical agglomerations.

ESPON 1.3.2.

Case study Nord Pas de Calais – Report  
Document created on 23rd February 2004

Around 2/3 of the area is open spaces (natural spaces and agricultural lands), shared in the following way:

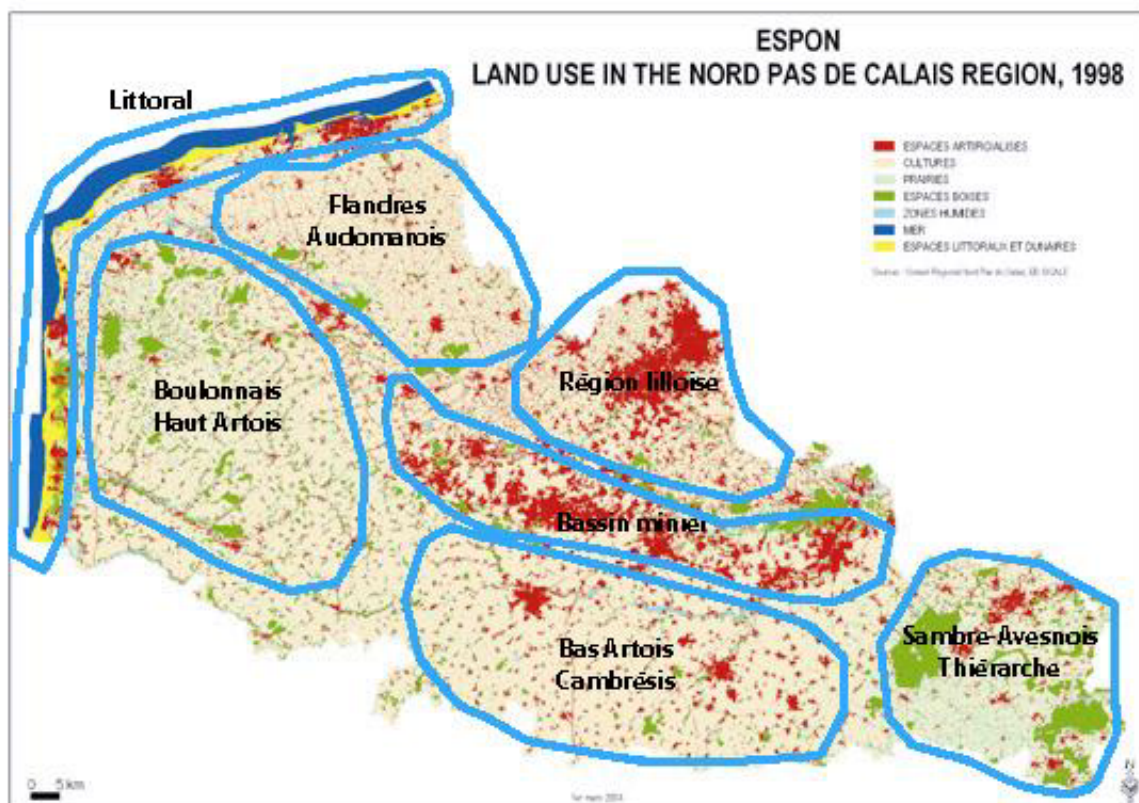
- Agricultural lands: %, developed on rich soils, dominantly arable from Artois to Flandre
- natural spaces (natural and semi-natural land use classes) :
- forests: 6.6%, what is quite low compare to other regions, traducing either a dynamic farming land use and a high level of urbanisation for part of the region

### 1.3 Territorial typology

For the purpose of the case study, aiming at integrated analyses and evaluations, sub territories must be defined.

Indeed the Nord – Pas de Calais territory is heterogeneous in term of physical spatial structures (urban structures and open spaces structures) and moreover in term of development trends (while some territories are under development pressure, others suffer depression).

The elaborated typology is based, on the one hand, on the large urban structure, and on an indicative open spaces typology of the region on the other hand (combination of farming systems and ecological structure).



The portraits of each territory are as follow:

	<b>Urban/Settlement form</b>	<b>Farming structure</b>	<b>Natural heritage</b>
<b>Littoral</b>	Ports and resort places Pressure	Not significant on the coastline, variable beyond	Coastal network Significant but fragile.
Boulonnais / Haut Artois	Dispersed Rural polarisation Depression	Fragile breeding systems Presence of organic farming	Ecologically significant: bocage and woodlands, farming dependant ecosystems
Flandres / Audomarois	Dispersed Dense Pressure	Intensive systems (industrial cultivations, market gardening and intensive breeding)	Remnant (wetlands)
<b>Région lilloise and</b>	Metropolis and suburbia Pressure	Mixed (suburban market gardening and industrial crops) Pressure	Remnant (wetlands and waste lands).
<b>(former) Bassin Minier</b>	Highly populated with industries. Social cohesion issues Depression	Industrial cultivations	Remnant Industrial linked ecosystems on waste lands
Artois / Cambrésis	Dispersed Depression	Industrial cultivations	Remnant
<b>Thiérarche / Avesnois</b>	Dispersed Depression	Fragile breeding systems	Significant: bocage and woodlands, farming dependant ecosystems

In the last section, three out them (in bold) are studied in detail, especially because they are representative for natural heritage management. They give support to work out the scenarios:

- the Avesnois is an area with high landscape qualities, designed as Parc Naturel Régional
- the Littoral is under strong protection and strong development pressure,
- the Lille area and the Bassin Minier area develop interesting strategies to reclaim a remnant natural heritage

## 1.4 Territorial strategy

One of the specificities of the territorial “management “ in France is the duality in the spatial planning decisions resulting from the decentralisation of competences and responsibilities that was started at the early 80’s. It seems necessary to describe evolution of the planning system, since it likely explains the current stage of integrated planning strategies.

Until the end of 1982, spatial planning orientations, land use and finally the projects were decided at central government level.

Since 1983, different laws have gradually transferred to local authorities (region, department and municipalities), the management of territorial planning. Currently, the National authorities are responsible of the implementation of the national policy which aims at ensuring sustainable and balanced development over the entire national territory. The orientations of this policy were produce in the “General orientations Law” of 1999 which sets the framework of the development strategies decided by the different local authorities. The “Schema collectifs”, produce the national decisions per sectoral policies. Besides the legal obligation for local planning strategies to be compatible with the national orientations, various measures, such the “ Contrat Etat / Region “ (national subsidies) , help implement these national orientations.

The territorial planning system is based on a “nest of integrated planning strategies”. As said national orientations and decisions are to be carried out in all local planning documents and first in the regional planning documents “ Schéma Régional d’Aménagement et de Développement du Territoire - SRADT; The SRADTs, when they are adopted, become the frame-works for planning documents covering the territories of several municipalities, “the schéma de coherence territoriale - SCOT which replaces the Schema Directeur since 2001“, which in turn is the reference document for the local land use documents of the municipalities.

Yet, at all stages, the representatives of the central government are associated to the establishment of the local planning documents.

In the Nord – Pas de Calais, a number of Schemas Directeurs have been adopted since 1975 mainly covering territories of several municipalities forming “physical” agglomerations of municipalities such as Lille, Arras, and Valenciennes... Most have been recently revised or are under course of revision.

But, these integrated planning are far from covering the regional territory and each plan does not necessarily take into consideration the objectives of the “neighbours” plan. Spatial development planning depends very much today of the municipalities’ land use documents. In short, spatial planning is fragmented.

The region Nord-Pas de Calais has elaborated an integrated territorial development plan called “OREAM” in the 70’ and is actually establishing its regional plan (SRADT). Since, this plan has not been adopted and will not be in the course of the coming months because of the elections, this survey can only present the propositions under study as provisional orientations.

Yet, is available a post-evaluation of the OREAM.

## 1.5 From OREAM to SRADT

The following section presents the objectives of the OREAM and the provisional orientations of the SRDAT.

Edited in 1971, the OREAM scheme had the ambition to promote an integrated regional economic development, focusing on 5 main objectives:

- the revival of industrial development
- the development of metropolitan functions
- the development of major infrastructures
- the renewal of housings
- the protection of natural equilibrium, natural spaces and landscapes

The latest element was dedicated to environmental objectives. That was quite an advanced vision, preceding the setting up of the ecological laws body. At that time, natural heritage was considered as important for the population daily environment, and as an essential asset for development. Its intrinsic or functional value was not regarded.

In spatial term, the OREAM was promoting:

- to concentrate development endeavours on the urban hierarchy
- to profit from port potential with a development from Dunkerque to Calais, together with the reinforcement of road infrastructures
- a tourism development of the south of the coast, and a natural parc in the Avesnois.

The 98 thematic assessments of the OREAM will be presented in the corresponding part of the case study (effective results of environmental objectives, results of urban and agricultural developments objectives).

Following a two year process of prospective at regional scale divided into several work groups, a provisional Charter produced in May 2003 now gives a framework for the Schéma Régional d'Aménagement et de Développement du Territoire.

It proposes issues, priorities and objectives in order to build a regional development project. The SRADT is not a scheme (spatial objectives) or a programme (financial commitment), but a common framework for defining regional policies.

The issues and and priorities that have been defined in an integrated attempt are:

- Promote knowledge and communication society (access to knowledge, life span education, reinforce regional culture in an European and global context)
- Open the region to Europe and World (reinforce exchanges and develop cooperation)
- Valorise specificities (reinforce Lille metropolis, performant economic fields, marine potential)
- Overcome disparities (public services as tool for social cohesion, reinforce territorial cohesion)
- Enhance environment (find other way to manage space and resources, promote individual responsibility, manage risks, traduce at regional scale the national commitment to adapt to climate change, promote new conceptions of urban developments)
- Mobilise regional society (reinforce participative mechanisms, build up a better cooperation between regional actors and territories)

Natural heritage policies are gathered in a framework called "Trame verte régionale" (*Green network*).



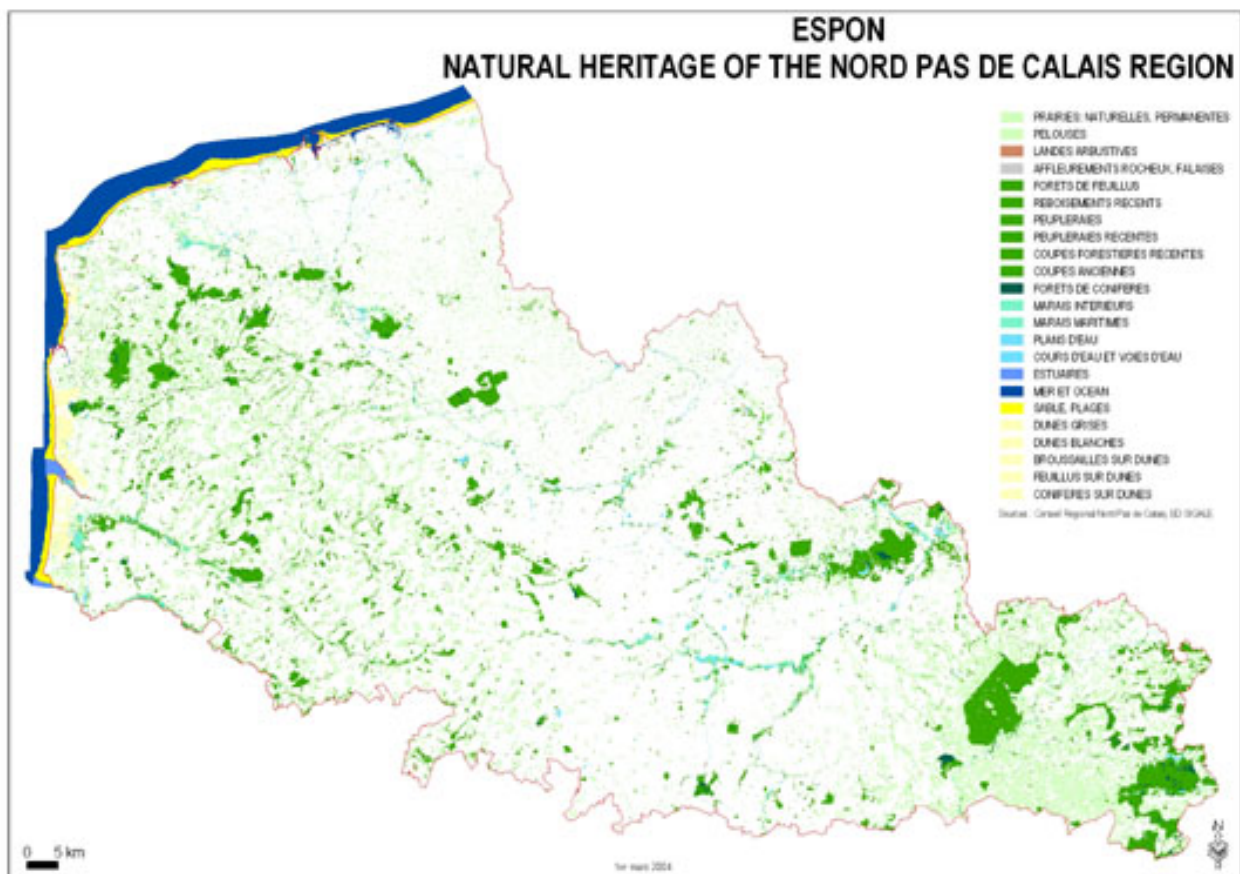
## 2. State of the natural heritage

The following section presents the main features of the regional natural heritage: ecosystems types and spatial structure.

### 2.1 State of the natural heritage

The natural heritage of the area is composed of several natural and semi-natural land use classes (id est. excluding urban and intensive land uses):

- Permanent meadows*
- Lawn*
- Heath land*
- Cliffs and rocks (with associated ecosystems)*
- Woodlands (mostly deciduous)*
- Sand dune*
- Sea*



The natural heritage can be defined through distinct natural heritage ensembles, related to the territorial typology presented above:

	<b>State of the Natural heritage</b>
<b>Littoral</b>	Significant and fragile coastal network.
<b>Boulonnais/Haut Artois</b>	Ecologically significant : bocage and woodlands, farming dependant ecosystems
<b>Flandres/Audomarois</b>	Remnant (wetlands)
<b>Région lilloise and Bassin minier</b>	Remnant (wetlands and waste lands)
<b>Artois / Cambrésis</b>	Remnant
<b>Thiérarche / Avesnois</b>	Significant farming dependant ecosystems (bocage) and woodlands.

Natural heritage:

- overlays the basic hydrological structure of the area,
- covers most of the least modified soils of the region and most of the lands where intensive land uses are unprofitable (steeps lands, wet, poor or polluted lands).

Apart for hardly managed ecosystems (coastal ecosystems and wetland ecosystems) and for ancient forest, the natural heritage is mostly farming-dependant or quite recent and linked to the farming abandonment consecutive of the post-war farming modernization.

Last, most of the natural heritage of the region is managed in some way: roads margins management, hedgerow management, extensive farming, extensive forestry and site maintenance trying to overcome natural evolutions toward forest climax.

## 2.2 High biodiversity value natural heritage

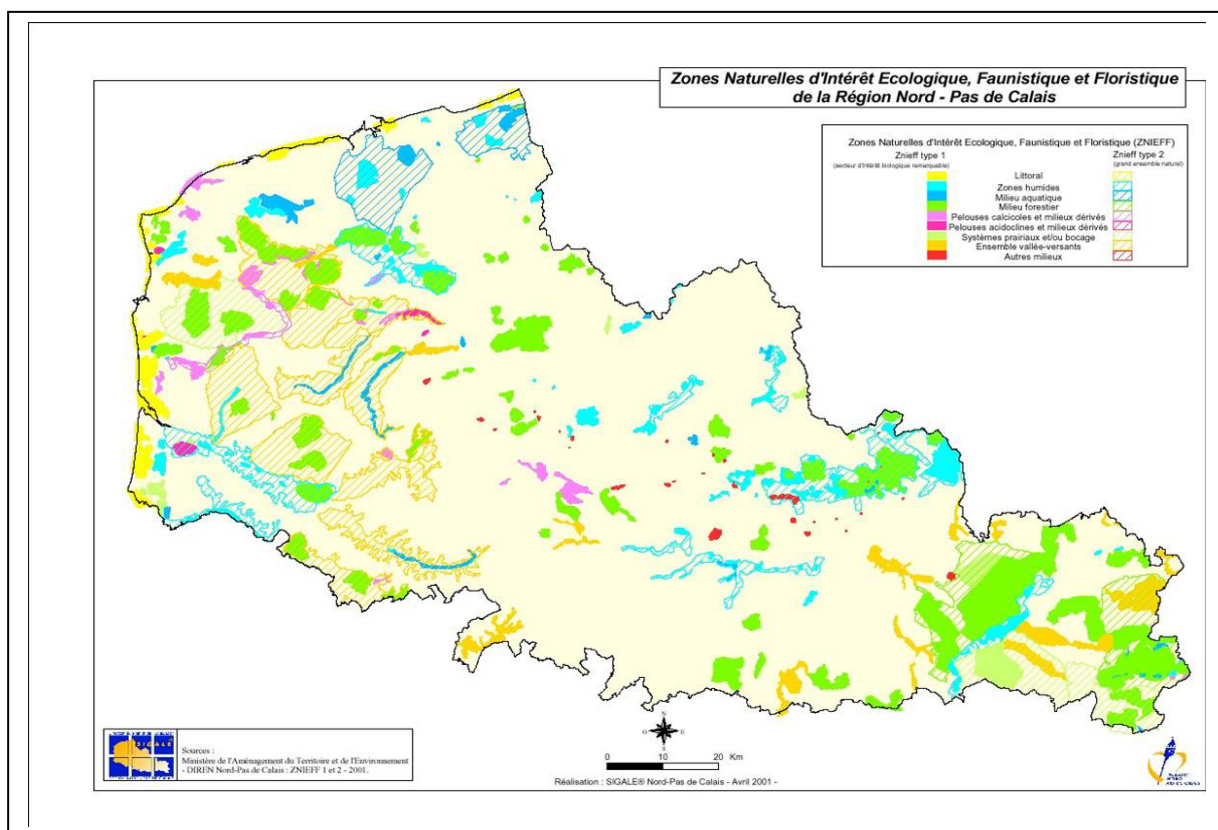
In 1982 started at national level an inventory of high quality natural spaces, called ZNIEFF (“Zones Naturelles d’Intérêt Ecologique, Floristique et Faunistique”). It has been carried out between 1984 and 1991 in NPDC region. It is scheduled that the ZNIEFF will be updated in the years to come to monitor evolutions and to take into consideration functions linked to water cycles (what had not been done in the first inventory phase).

Two categories of ZNIEFF are distinguished in the inventory:

- type 1 relate to small scale sites with rare or protected species
- type 2 relate to large natural and semi-natural spaces, hardly modified by man and offering a high potential for biodiversity

318 ZNIEFF have been identified in the Nord – Pas de Calais, shared within several types of high biodiversity value ecosystems:

- coastal ecosystems
- wet lands
- river ecosystems
- limestone lawn
- acidic lawn
- meadows and “bocage”
- ecosystems of valley slopes
- other rich ecosystems (notably those developing on slag heap)



They correspond to the lands where a significant natural dynamic occurs, corresponding both to the least intensive farming lands and to abandoned lands.

The ZNIEFF inventory is today the more complete and scientific-based natural heritage inventory.

ESPON 1.3.2.

Case study Nord Pas de Calais – Report  
Document created on 23rd February 2004

Seven sites have been designated under the Bird directive as Important Bird Areas (IBA). They are significant at international level for bird biodiversity:

Site	Terrestrial area (ha)	Marine area (ha)	Total area (ha)
Vallée de la Scarpe et de l'Escaut	11 150		11 150
Estuaire de la Canche	1200	3850	5150
Marais de Balançon et de Villers	1500		1500
Cap Gris Nez	300	8650	8950
Plateaux de Frencq	11450		11450
Forêt de Thiérarche	15000		15000
Baie d'Authie	400		400
Total	41000	12500	53500

They are today protected (see 4.1).

As for the sites to be designated under the Habitat directive, only 19 has been monitored as being potentially important at European scale. They are provisional: authorities have not decided yet to transmit definitive sites to the Commission:

<i>Cliffs and lawns of the Cap Blanc Nez, of the Mont d'Hubert, of the Noires Mottes, of the Fond de la Forge and of the Mont de Couples</i>
<i>Cliffs of the Cran aux Oeufs, of the Cap Gris-Nez, Dunes du Chatelet, wetlands of Tardinghen and dunes de Wissant</i>
<i>Cliffs and dunes of Wimereux, estuary of Slack, heath land of Ambleteuse</i>
<i>Estuary of the Canche, dunes and forest of Hardelot and cliffs of Equihen</i>
<i>Dunes and wetlands of the marine plain of Picardie</i>
<i>Estuaries, dunes of Authie, wetlands of Berck</i>
<i>Hillsides of Dannes and Camiers</i>
<i>Lawns and woodland of Boulonnais and Pays de Licques and forest of Guines</i>
<i>Lawns, woodland and heathland of the plateau d'Helfaut and alluvial system of the medium valley of Aa</i>
<i>Hillsides of La Montagne d'Acquin and lawns of the Val de Lumbres</i>
<i>Lawns, woodlands, forest and alluvial system of the medium valley of Authie</i>
<i>Heath lands, ponds and woodland of the Plateau de Sorous Saint Josse, meadows and wood of Montreuil</i>
<i>Meadows and wetland of the low valley of Authie</i>
<i>Meadows and wetlands of Guines</i>
<i>Meadows, wetlands and forests of the Cuvette Audomaroise and its hillsides</i>
<i>Forest of Tournehem and meadows of Pays de Licques</i>
<i>Forests of Desvres and Boulogne and bocage of Bas-Boulonnais</i>
<i>Wetland of La Grenouillère</i>

The designation procedure encounters delays and local oppositions. This is not specific to the region:

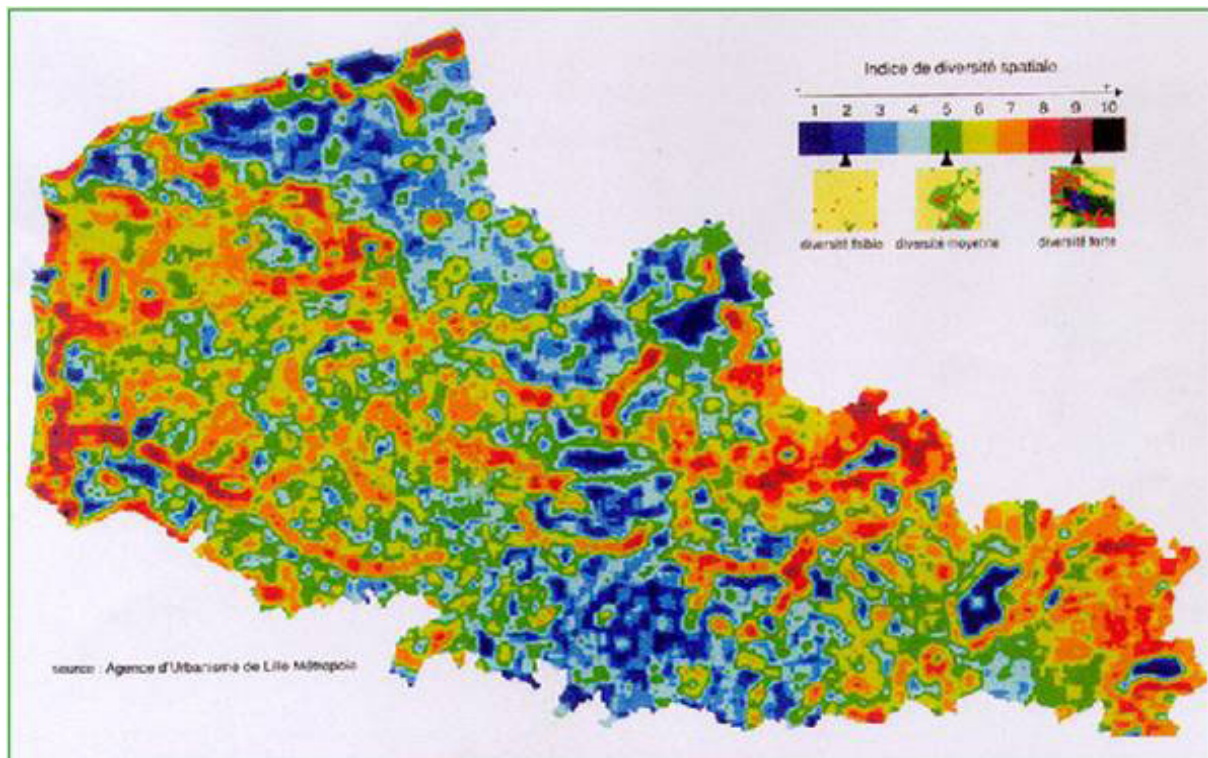
- there are opponents to a European process ; hopefully they are not majority
- sites are already recorded as natural heritage ; local population or authorities do not understand a new designation process
- there is a deep misunderstanding of the objectives France has chosen by virtue of subsidiarity : designations will not result in statutory rules, but in financial incentives according to site management objectives.

In fact, the Natura 2000 network of the region should largely overlap the ZNIEFF inventory. It might be adjusted in the future.

## 2.3 Spatial structure of the natural heritage

### *Heterogeneity index*

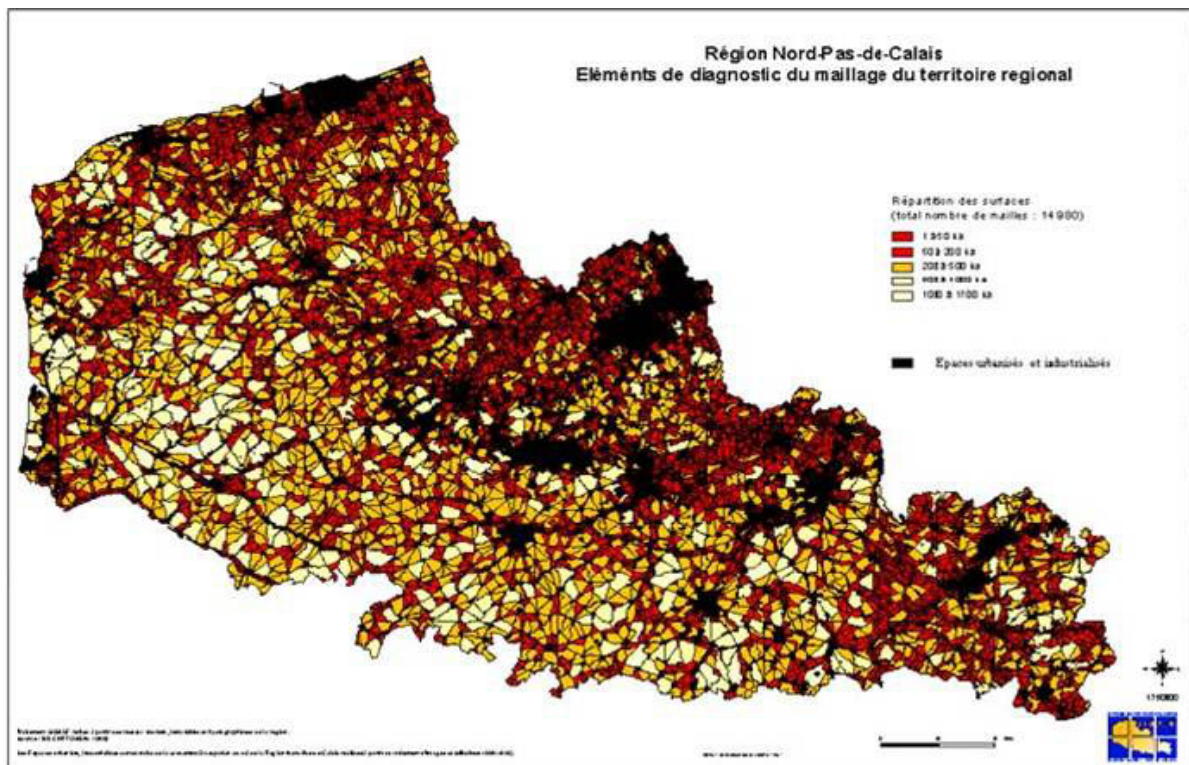
The heterogeneity index of the region has been elaborated thanks to a processed Landsat image. It gives a quite good overview of the distribution of biodiversity at landscape scale and partly corresponds to the ZNIEFF inventory. The process does not highlight forest ecosystems when they are too homogeneous though rich.



It is presented by the Region board for environment (Direction de l'Environnement, de l'Energie et des Déchets) as a good complement of the biodiversity inventories to promote the idea of ecological network. An other interest of that index is the identification of middle range biodiversity value.

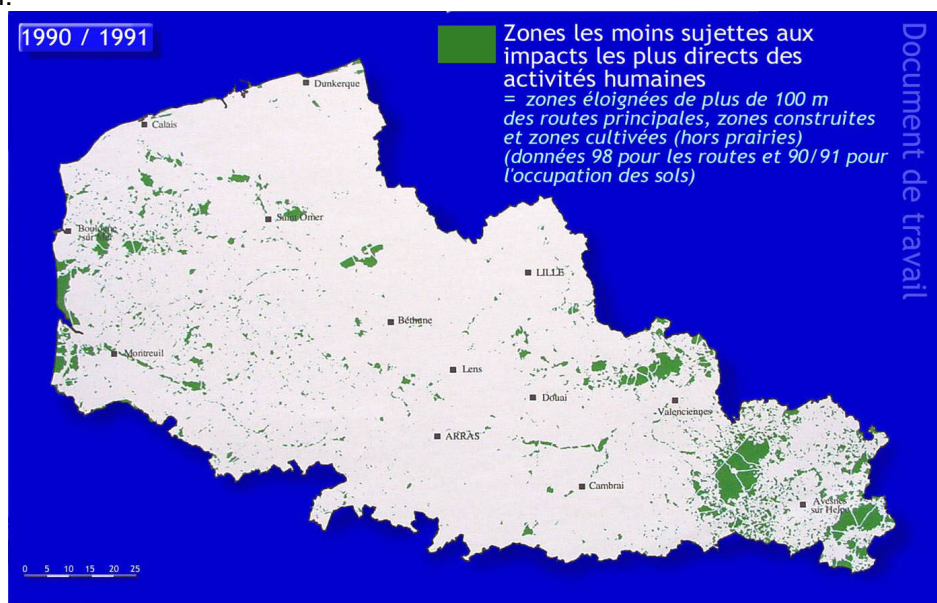
### Fragmentation index

The fragmentation index gives an overview of the spatial fragmentation of the regional territory. It has been elaborated by calculating the size of farming and natural areas cut up by the infrastructural and urban pattern.



### “Wilderness” index

At last, the spatial structure of the natural heritage can be defined by identifying the areas the less subject to disturbances. The map below points out the areas 100m-distant from urban areas, infrastructures and arable lands. Though managed and thought recreational uses are not taken into consideration, those natural spaces can be considered as the “wilder” lands of the region.



## **2.4 Thematic policies having an impact on the natural heritage**

Considering the large scale and the diversity of land use of the case study, the regional natural heritage evolutions are almost related to all the policies mentioned in the ESPON 1.3.2 report:

- urbanisation and infrastructures (resulting from local to national planning decision)
- Agricultural and forestry developments

Section 3 will analyse them in term of current and expected trends.

## **2.5 Conclusions**

The regional territory has been deeply modified over centuries and especially during the second part of the twentieth century. Nature is mostly remnant and the major challenge for natural heritage management is the recreation of natural features.

### 3. Management of natural heritage

The following section is dedicated to the core subject of the case study: how regional natural heritage is managed?

#### 3.1 History and objectives of the management:

The legislation related to the management of Natural heritage is found in the the “Code de l’Urbanisme” and the “Code de l’Environnement”. Management of natural heritage relies on 3 types of tools: statutory protections, protections by means of public or nature body ownership, and last contractual protection.

##### *Statutory designations*

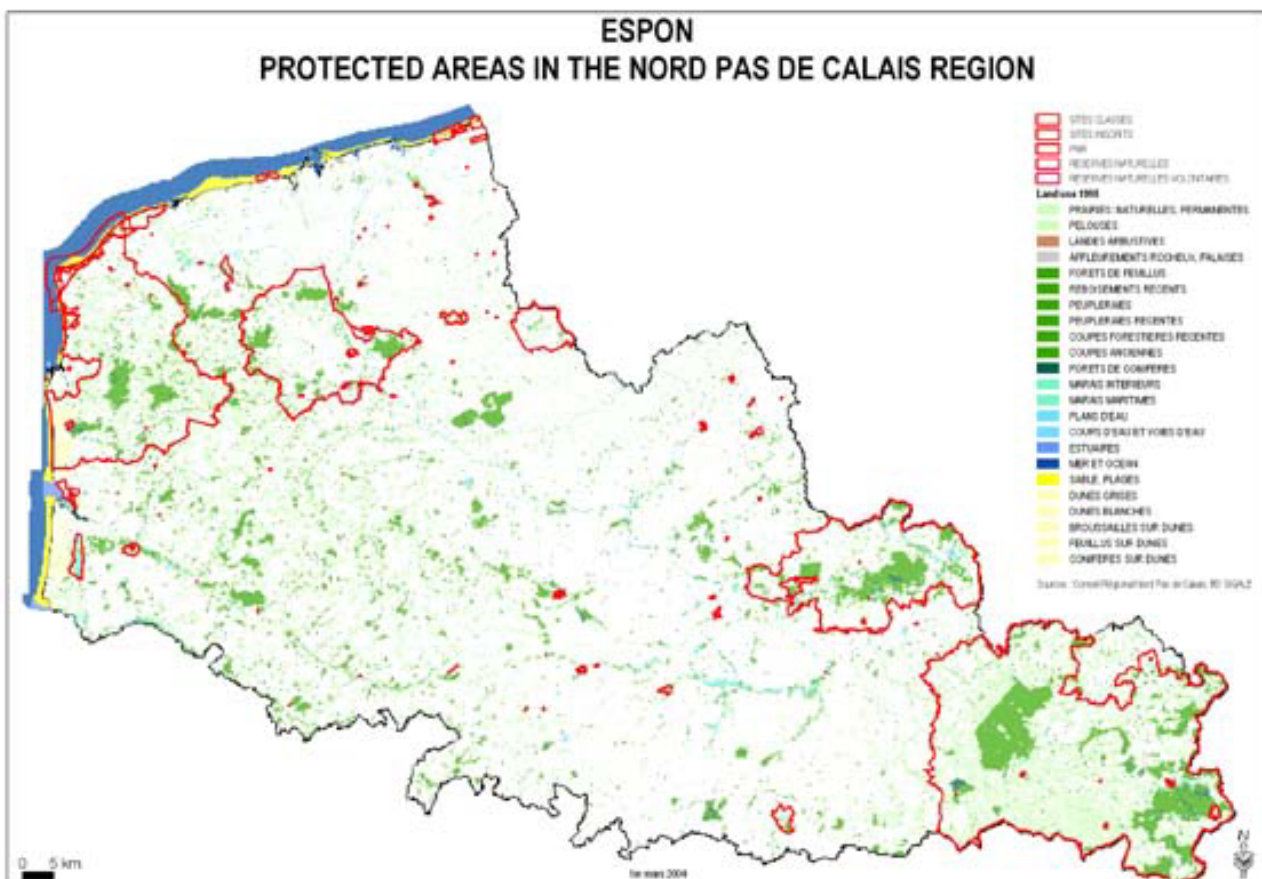
The first measures concerning management of natural heritage are founded on the constraining legislation that has been built up since the law of 1930.

“Sites classés”, “sites inscrits” and “reserves naturelles” (natural reserves) are statutory designations. The first two aim at “protecting natural monuments at sites of artistic, historical, legendary or picturesque interest”, and the second aim at protecting remarkable natural spaces, migratory steps and natural sites of scientific interest.

In 1976 has been voted the second law on nature protection, introducing the “Arrêtés de protection de biotope”, a statutory designation aiming at small scale habitats.

In Nord-Pas-de-Calais, natural heritage statutory designations have been mostly set up after the 70’, even those corresponding to the 1930 law, traducing the arise of an environmental awareness since that time.

Today, 18 700ha are concerned by statutory protections.



ESPON 1.3.2.

Case study Nord Pas de Calais – Report  
Document created on 23rd February 2004



In 1986, the Loi Littoral has been introduced to limit coastal urbanisation. The first 100meters from the upper level of the sea are non-building sites and there are urbanisation restrictions in the vicinity of the coast. It is controversial and often not respected.

#### *Contractual protections*

“Parc Naturel Régional” is a contractual designation modified by the Landscape Law in 1996. It is an integrated development tool for large territories with high natural qualities. Designation results from the initiative of the Region and the local authorities. The Park charter commands to the local authorities planning tools.

Three regional parks have been designated on the regional territory:

- Boulonnais, Audomarois and Scparte-Escaut regional parks were created in 1966
- the regional parc of Avesnois has been introduced in 2001
- it is expected that a regional parc will be designated in Flandres

Today, 3600 km<sup>2</sup> are concerned by contractual protection, representing 20 times the surface under statutory protection.

#### *Protection by means of ownership*

Two majors tools enable public bodies to acquire natural spaces, by negotiation with the owners or by pre-emptive mechanisms:

- the Sensitive Natural Spaces Policy, led by the two Départements of the region
- the policy of the Conservatoire du Littoral

The Sensitive Natural Spaces Policy is carried out by Départements, thanks to a fee on “Permis de Construire”, procedure enabling private building developments. Sites are acquired because of their natural qualities, sometimes to enable public access to natural sites (especially in urban and suburban areas), and then entrust to nature associations.

The Conservatoire du Littoral is a public body created in 1975 at national scale to acquire coastal lands for a definitive protection. After the rehabilitation of the acquired lands, the site management is entrusted to nature associations.

Today, 3200ha of natural spaces are publicly owned on the regional territory.

### **3.2 The management of natural heritage integrated in territorial development strategies.**

#### *National strategy*

At national level, it is part the scope of the “Schema National de Services Collectifs Espaces Naturels et Ruraux”.

The objectives addressed in this plan are namely:

- Build a national ecological network,
- Integrate environmental concerns in sectoral policies (agro-environment, sustainable management of forests for example)
- Protect maritime and coastal areas,
- Restore and valorisation of wetlands (governmental plan)
- Re dynamise agricultural depressed areas
- Improve water management in agricultural areas
- Maintain ecological balance in Mediterranean zones

#### *Local strategies*

Besides the legal obligation to take up the national orientations in local planning documents, the natural heritage is an increasing concern in the policies at all level and clearly taken into consideration in planning documents.

For example: The planning document of arrondissement of Lille adopted the 6<sup>th</sup> of December 2002. Evaluating the previous plan, was enhanced the failure in implementing policies promoting natural heritage because of insufficient financial means, of insufficient political will, of lack of synergies between the different local actors, and no land purchase manager. The new planning document places the “green and blue networking” as a major issue. Based on the inventory of the various programmes related to protecting or promoting natural areas and landscapes that local authorities have developed since the earlier 1990’s and on the areas of potential natural and recreation spaces, the plan ambitions to develop 10 000 ha dedicated to nature and recreation. Resting on the 4 major ecosystems – the Marque Valley, the Deule Valley, The forests of Phalempin and Pévèle, The pasture land of the Lys vallée that the plan protects, the policy is to network the different spaces by creating “green or blue “ continuities between the different items forming the Natural heritage including through the densely urbanised areas.

To do so, the plan has the following targets:

- create a organisation to advise, coordinate
- enforce the existing legal means of protection and management
- undertake a land purchasing policy
- adopt an integrated policy for agriculture.

## 4 Driving forces of natural heritage evolutions

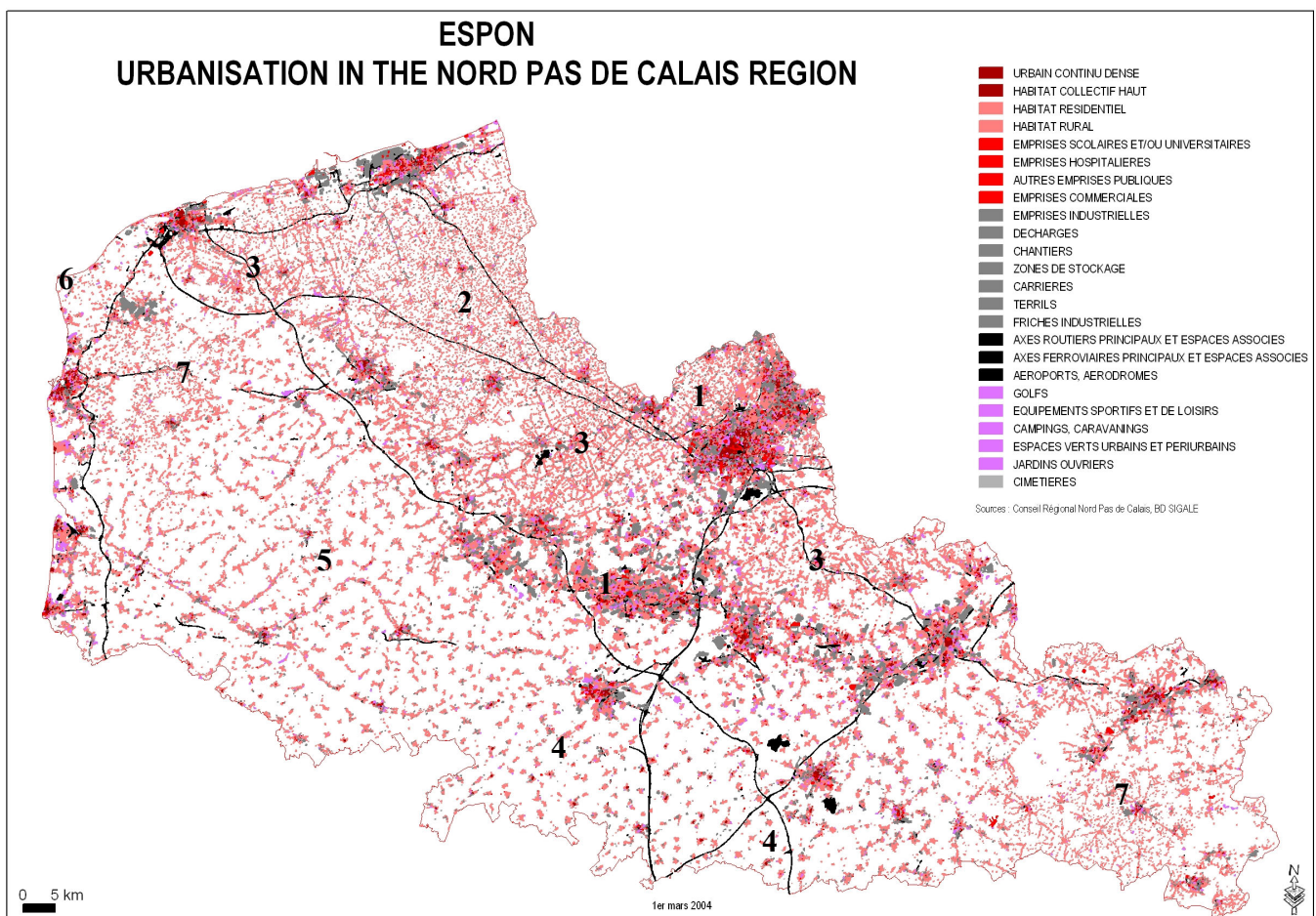
### 4.1 Urbanisation

#### *Spatial structure*

Settlement patterns are highly variable throughout the regional territory.

In brief:

- 1 *Lille region and the former Bassin Minier* show highly agglomerated urban pattern, result of industrial and metropolitan development
- 2 *Flandre* has developed a dense dispersed settlement from an initial dispersed rural settlement. The more developed areas tend to show linear urban development from the urban nodes, according to the roads network (see 3).



- 3 *The Plaine de la Lys, maritime Flandre and north Scarpe territories* had the same initial dispersed rural settlement pattern, but have been under per-urban development pressures in the recent years, what lead, without urban planning constraints, to linear urban developments
- 4 *East Artois and Cambresi territories* are dynamic industrial farming territories : urban development concentrated only on initial cities what lead to a polycentric compact urban pattern with a few villages in open spaces
- 5 *West Artois and Haut Pays d'Artois* are hilly territories with dynamic farming on the upper parts : constrained, urban developments follow the valleys

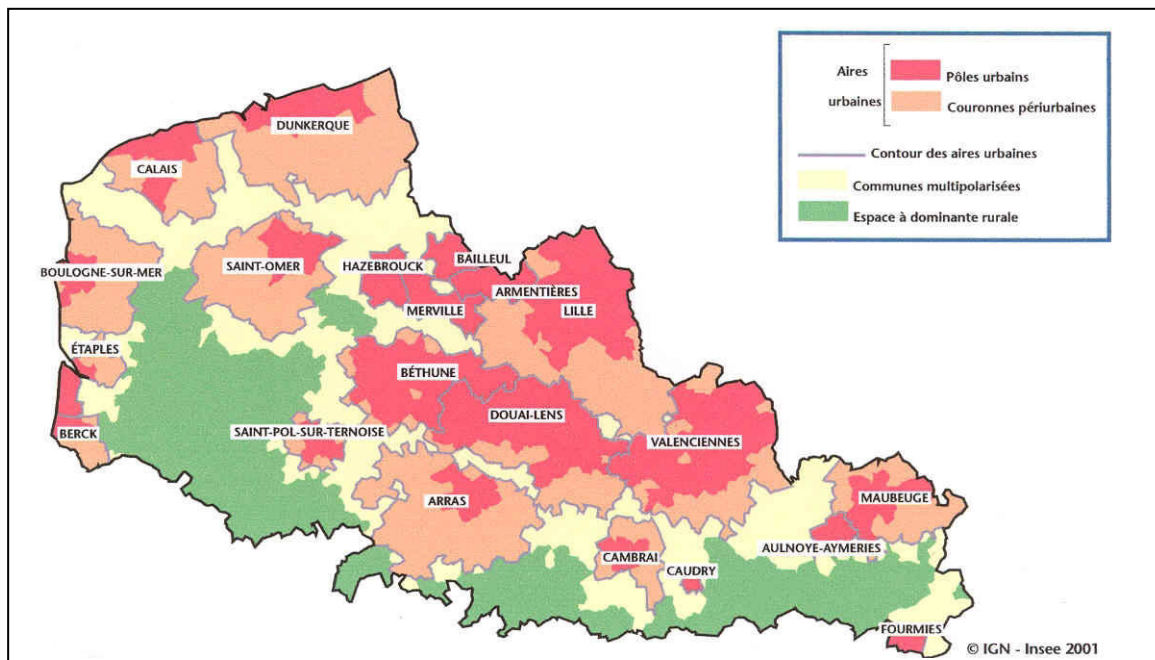
- 6 On the *Littoral*, urban pattern mainly depends upon the presence of industrial activities and resort places. 20 000ha have been urbanised since the 70' (80% of the linear has been urbanised at north and 40% at south). Coastal protections tend to limit urbanisation process to the fringe of existing urban nodes.
- 7 Two bocage show two different settlement patterns: *Boulonnais bocage* has a dispersed rural pattern, while the *Avesnois bocage* has a linear urban pattern. This is due to the fact that the Avesnois is an ancient small scale industries region, while the Boulonnais is still rural (though under residential development pressure). It is also possibly due to the fact that Parc Naturel Regional of Boulonnais is more ancient than the PNR de l'Avesnois ; urban developments had no landscape regulations in the case of Avesnois bocage, now benefiting from a contractual protection.

Factors determining settlement patterns are thus:

- the initial settlement pattern
- the level of development pressures (industrial, housing and resort developments)
- the level of farming dynamism,
- the relief
- the level of protection of open spaces and landscapes.

### *Polarisation*

The current urban areas are polarized around 23 centres (criteria used in the SRADT : >1500 jobs and >1500 local workers, stable workers rate > 50%, presence of services higher than the regional average). They gather 25% of the regional population and 41,2% of the employments: Lille, Roubaix, Tourcoing, Calais Dunkerque, Boulogne, Douai, Arras, Valenciennes, Lens, Bruay, Maubeuge, Cambrai, Armentières, Béthune, Hazebrouck, Denain, Saint Omer, Berk, Caudry, Auchel, Saint Pol, Avesnes.



In the case of areas knowing a kind of growth (demographic or economic), polarisation areas are correlated with a gradient of housing development pressure from town centre to peripheral areas (red to green).

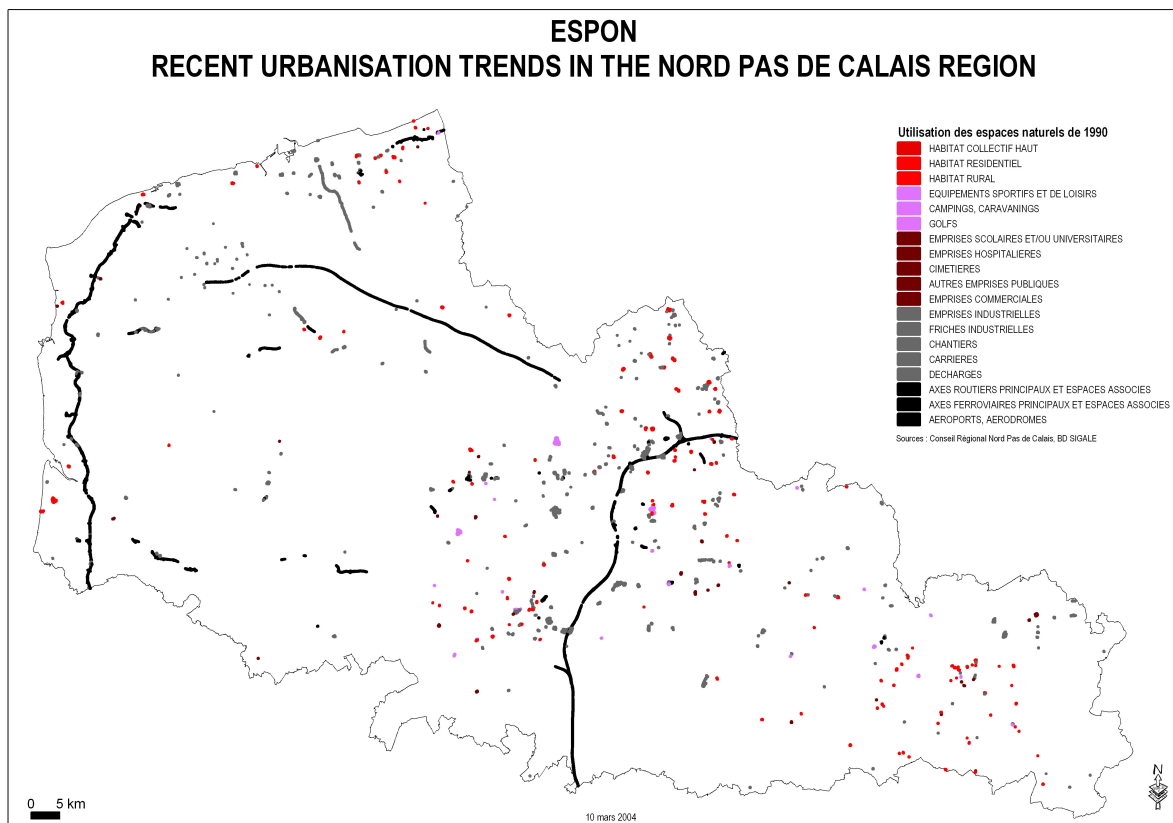
In rural areas, housing developments or large economic developments may occur: on the one hand because of the development of residences, on the other hand because of industrial re developments encroaching in large agricultural lands connected to major infrastructures.

### Current urbanisation trends

The SRADT working group on urban areas has highlighted the main characteristics of current regional urbanisation trends:

- the urban differentiation is increasing: Lille, Arras, Dunkerque, Saint Omer are growing while the Bassin Minier and the rural territories of the region are declining.
- second, the urban sprawl is a significant phenomenon, but it is less intense than in other France regions as the population and economic growth is weaker.
- third, the loss of industries continues while new economic activities are created outside urban areas.

Map 4 shows open spaces classes turned to urban land uses from 1990 to 1998, giving an overview of territories under development pressure.



Urban development mostly concentrates in the Lille, Bassin Minier and Artois areas. The outskirts of Lille and Arras are especially dynamic as regard to housing. All of them show industrial and economic developments. The map also retraces the creation of the railways for Paris-Lille high speed train.

The Avesnois area shows housing development, partly correlated to the attractiveness for secondary homes. There is an aggregation around one of the major natural features, the Mormal Forest.

Developments on the littoral are located on the existing cities and ports.

ESPN 1.3.2.

Case study Nord Pas de Calais – Report  
Document created on 23rd February 2004

### *Expected trends at the 2030 horizon*

The national statistical institute has produced demographic projections. They tend to show:

- the regional population would slightly decrease due to a migration deficit,
- while the urban concentration would continue, especially in Lille, regional metropolis that would gather 1 out of 4 to 1 out of 3 inhabitants of the region.

Nonetheless, urban sprawl around other cities would go on but with a diminishing rate, residential needs would grow as the number of household would increase for most of the territories.

It would lead, together with space consuming economic developments to a continuing soil consumption (at France scale, there would be no open space left in 2160).

The leisure use of the open spaces would also become more intense.

Sub territories would know different scenarios:

- Lille region, Littoral and all left rural territories would have a growth in population and a growth in the number of household
- Bassin Minier and Flandre would know a growth in population and a decrease in the number of household
- Bruay and the east of the region would know a decrease in population and in the number of household

## **4.2 Infrastructure developments**

### *Infrastructures in the OREAM vision*

The relationship between infrastructures and development is at the hearth of the OREAM vision. Were expected in the 70':

- the development of a dense network of highways
- the junction of Calais and Dunkerque ports, to build a port at the scale of the actual Rotterdam port
- the development and modernization of canals

Highways have been developed: Nord - Pas de Calais region road network is one of the densest in Europe, but traffic congestion is now a real problem without obvious solutions. In fact, the redactors of the OREAM evaluation note that the economic impacts of major highways are uncertain, in spite of massive public investments.

The development of the port has not been completed, due to an industrial based development conception not enough market oriented, and due to the fact that Belgium and Netherlands ports are nearby and have at the contrary succeed. Large natural areas under urbanisation schemes are now left to agriculture and nature.

Modernization of canals is still a project.

The impact on natural heritage is high, in term of destruction, spatial fragmentation and emission of pollutants.

### *Current trends*

Apart from regional and national schemes for infrastructure developments, there are two several cumulative causes for road network developments or enhancement:

- security and aesthetic norms become stricter
- traffic congestion is critical in the urban areas, increases and thus call for responses

- rural authorities often plead for better access to the urban areas, residential dependence being considered as an alternative to depression

The result is a continuous enhancement of the road network. Many projects are under course.

*Expected trends*

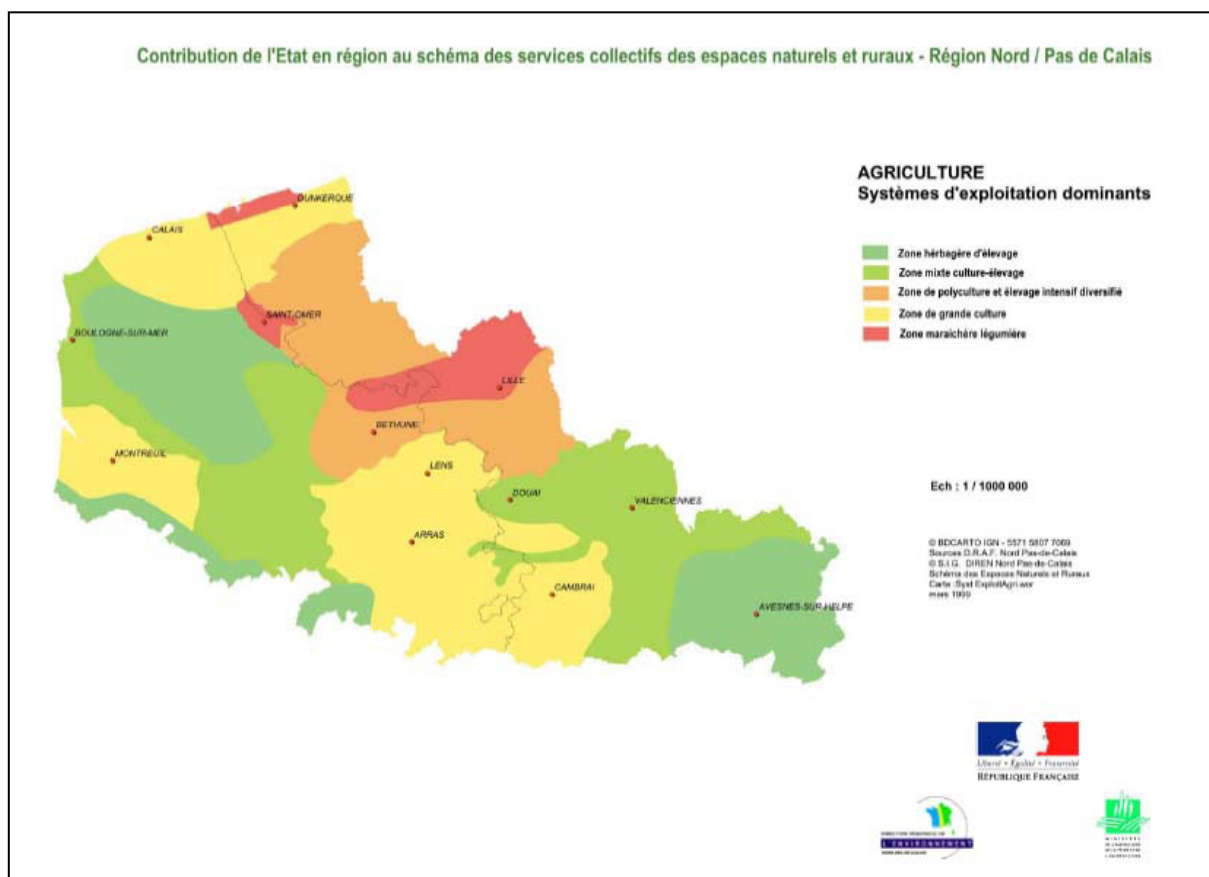
Today, regional actors have a high feeling of traffic congestion. At the same time, the region has the will to reinforce its role of crossroad region.

Infrastructure developments are expected and will probably be the first factor of semi-natural and natural spaces destruction, according to the SRADT working group on environment (housing and economic developments mostly concern arable lands).

### 4.3 Agriculture

Farming systems are dominated by intensive farming systems: crop production combine with intensive livestock, industrial cultivations (potatoes, beetroots), and intensive livestock. The region counts also two cattle breeding territories, combining intensive and extensive systems: the Avesnois and Boulonais bocages, and three vegetable market production territories.

At regional scale they are distributed within specific sub territories:



Each of those farming systems territories can be related to specific landscapes and specific contribution/impacts to the regional biodiversity:

Farming system	Landscape	Impact/contribution
Vegetable market gardening (red)	Open field	High/weak
Intensive livestock and crops (orange)	Open field	High/weak
Industrial crops (yellow)	Open field	High/weak
Grass livestock and crops (light green)	"Open bocage"	High/medium
Grass livestock (dark green)	Bocage	Medium/high

The farming pattern can be thus be related to the type 2 ZNIEFF distribution.



### *Agriculture in the OREAM vision*

At that time, production was the objective of farming development. From the 70' to the 80', farming estates have been modernized mainly throughout a public supported procedure called "Plan d'Aménagement Rural", systematizing estate concentration, wetland drainage and landscape simplification to enable mechanized productions. With the increasing use of biocides and fertilizers, it appears that it is the major cause for the loss of biodiversity at regional scale.

The OREAM was already emphasizing the importance to counteract urban development pressures on agricultural lands. The objectives defined at that time were:

- zoning of agricultural lands,
- enhancement of agriculture economic basis
- regulation of land market

Yet, soil consumption rate has been two time much higher than the population growth rate. Urban pressure is a heavy trend for which no efficient solutions or tools have been found.

### *Recent trends*

Over the past decade the farming system of the region has been again deeply modified, following national and international evolutions.

Between 1988 and 2000, the decrease of farm number has speed up with an annual rate of - 4,5%. It corresponds both to estate abandonment and to the restructuring of farming estates. Small and medium farms disappear on benefit of large ones: the average size of farms was 46ha in 2000 for 28ha in 1988.

Landscape modernization is also continuing, with a slower rate. Pressures for conversion of permanent pastures and destruction of bocage are noticed in the Avesnois bocage, at east of the region.

Cattle breeding is decreasing, what especially threatens ecosystems relying on pasture like limestone lawn.

Positive changes as regard to natural heritage have occurred recently.

Agro-environmental schemes have developed notably thanks to environmental objectives given through the renewal of the Common Agricultural Policy in 1992. Their objectives have been defined at department scale:

- promotion of local breed
- development of organic farming
- protection sensitive ecosystems
- protection of water and struggle against soil erosion by conversion of arable land into permanent pastures or by long term retreat

By compensating for virtual financial losses, contracts lasting 5 years are supposed to help meeting the objectives, specific to each contracting farmer.

Furthermore, territorial project more and more include objectives for farming development (either through local planning tools such as SCOT or through charters), at least in defining objectives.

At last, organic farming is developing but is still marginal, reaching the number of 105 estates.

### *Expected trends*

The prospective work of the SRADT shows a revealing missing thought on agriculture matters. They have not been deeply discussed for the elaboration of the regional project, partly because of the traditional independency of farming actors, and partly because of a lack of vision on that matter depending very much on higher regulations (or deregulations). Recently a regional think tank has been set up in the framework of the SRADT, notably because of the approval of the new Common Agricultural Policy in June 2003.

Two factors are known to influence upon the future agriculture:

- it is more and more difficult for young farmers to earn their living, as market is globalizing and as agriculture has become a highly capitalistic activity with small economic margins,
- The renewal of Common Agricultural Policy will step by step diminish the agricultural subsidies (today 70% of the agricultural revenue comes from public sources).

It is thus expected a very difficult economic context for agriculture, possibly leading to the continuing of modernisation : increase of estate concentrations on the most valuable lands, land abandonment in the least valuable, conversion toward products with more added value like organic products.

Impacts on the natural heritage would be varied:

- threats in a concentration context (potentially concerning all territories)
- threats for breeding-dependant ecosystems (corresponding to some high biodiversity features and to a smaller extent to bocage regions)
- opportunities for forest developments (corresponding to cattle breeding regions)

At last, organic farming is also expected to develop, as demand for biologic products is increasing.

#### 4.4 Climate change

According to the Third Assessment Report of the Intergovernmental Panel on Climate Change (2001), climate changes are probable in Western Europe for the next century:

- increase of the average temperature (2 to 3 °C)
- Increase of winter rainfall
- Higher frequency of extreme climate events
- elevation of 30 to 80 cm of the sea level, due to thermal dilatation of the sea

Long term scenarios show an extension of northern climates due to an oceanic oscillation. More recent simulations tend to show that this type of climatic reversion might be very fast.

Two contradictory theories of ecosystems reactions to climate change are presented in "Climate Change and Biodiversity" (IPCC, 2002):

- The hypothesis of "ecosystems movement" : climate change induce a movement of bio geographical regions toward north, ecosystems composition and diversity stay globally unchanged
- The hypothesis of a local rearrangement of ecosystems: new species appear with variations dominance according to new climatic conditions and to particular species movements.

It is also probable that rare ecosystems or fragile ecosystems will not be able to cope with a fast climate change. It is also probable that fragile ecosystems will be more prone to alien species invasion.

Climate changes are obviously difficult to anticipate. If short term changes have now gain a certain scientific consensus, longer term changes are controversial. Going down to the natural cover, highly dependant upon climatic condition, it is even more difficult to anticipate ecosystems reactions. The speed of climate change (a slow climate change unable ecosystems to follow the move of bio geographic regions), the state of the natural heritage (fragile and rare ecosystems are more prone to be impacted) and the geographical possibility for ecosystems movements will be crucial.

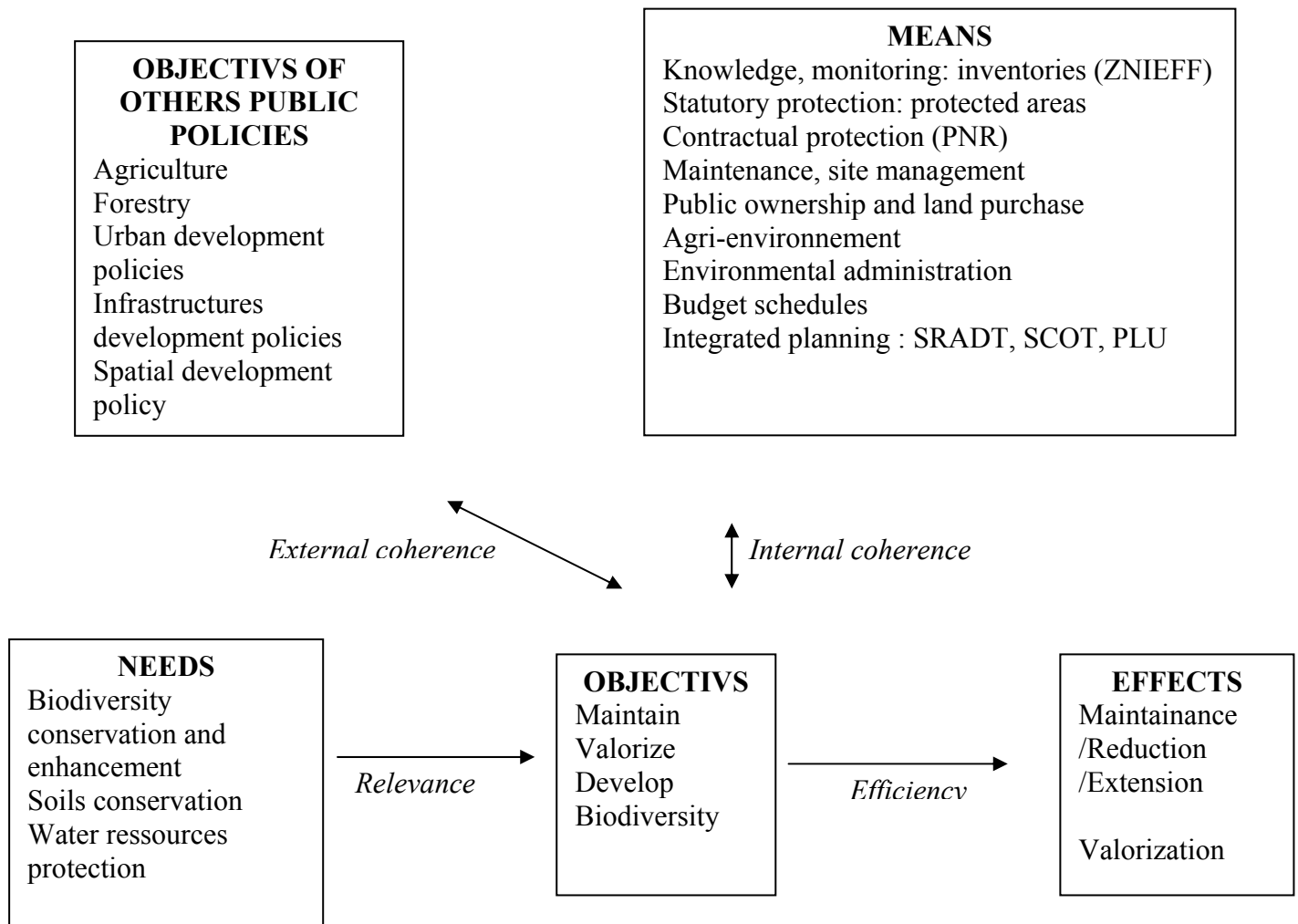
Climate change is expected to be fast, as previous climate change at geological scale occurred over longer period. In the case of the Nord Pas de Calais region adaptation and rearrangement will probably be weak: most of the natural heritage is fragile and under pollutions pressures, natural heritage ability to move is very weak as land is mostly occupied and highly fragmented. The conclusion is a probable high vulnerability of regional natural heritage to climate change.

At last, coastal erosion will increase. Today 3 out of 4 of the regional coastline are prone to erosion. Studies carried out by the Observatoire Littoral et Marin have tried to measure future impacts and to prioritise measures to cope with that phenomenon.

## 5. Assessment of the management

### 5.1 Management system

The management system can be described in the following way:



## **5.2 Management relevance**

The management relevance is the relation between the objectives and the need of the management of the natural heritage.

In principle, policies constitutive of the natural heritage management are relevant, as they are responding to the need for protection.

But relevance depends on the way the needs are defined. Needs are clearly defined for high biodiversity value natural heritage which protection is well advanced, but the definition of what is to be protected is not clear at local level for “common” natural heritage. Protection through local schemes depends very much on local commitment to nature protection.

On the other hand, the needs for the management of biodiversity-related development issues (water, air, pollutions) may be identified and corresponding objectives politically approved, but without benefiting of corresponding action framework or vision of what is to be undertake. It is the case for the two determining driving forces environmental farming management and for urban and economic developments control.

Three important points are highlighted by the evolution of the need for management.

First, in the national and international policy context, the definition of the needs slowly tend to encompass all biosphere components: soils, water, air, biodiversity. Biodiversity policies are being included in general environmental schemes (regional Agenda 21, “Trame verte” scheme, Environmental Charter at local level...).

Second, the policy references for the definition of the need tend to unify at all territorial level : from international to local level, with a progressive consensus on the issues, and a progressive “internationalisation” of policies (illustrated by the bottom-up process of integration of the Habitat Directive or the Water Directive).

Third, the need for biodiversity sound management is integrating the whole development policies field, either for thematic development policies or for integrated schemes, even when there is a clear conflict of objectives. A first step toward integrated management is set up.

## **5.3 Management internal coherence**

The internal consistency is the relation between the means and the objectives of the management.

Means are relevant as they relate to general management objectives. But, as said above, objectives are under-defined and so on the means don't encompass all the needs for management. Means are mainly related to high biodiversity value natural heritage.

## **5.4 Management external coherence**

The external coherence of the management system is the level of correlation between its own objectives and the objectives of the other policies having an influence on natural heritage.

It is the assessment field where most gaps or contradictions appear in the management.

As a general comment, integrated development might mitigate environmental impacts but there are always negative impacts residues. Development understood as an extension of consumerism/productivism is intrinsically negative as regard to natural heritage management.

#### *Coherence with urban and economic developments policies*

Though mostly damaging for natural heritage, those policies today integrate environmental objectives.

That is not new: when there is a clear conflicting issue (e.g. port development, resort development and coastal protection), economic interests overcome environmental interests. Employments criteria are put forward with a local standing point, territorial competition induce oblivion of social externalities, both on adjacent territories and at international scale. Bridging the gap is a challenge for future evolutions on those fields.

Settlement process is not regulated at larger scale because development schemes depend on the local authorities' level. The new development framework inducing larger development schemes often have still a limited effect.

Policies favouring urban renewal as well as the greening of cities are positive for the reduction of open spaces consumption rate. Progressing toward liveable human establishments is one of the ways to make great progresses for natural heritage management.

#### *Coherence with farming development policies*

There are still incoherence between nature policies and farming policies:

- differences of level between subsidies for production and subsidies for nature conservation
- farming policies does not integrate nature (ecological landscapes) nor the impact of intensive production (ecological impact, transformation impact, transport impact).

#### *Coherence with transport policies*

At local scale, no coherence is to be found: over developments of the road network is damaging both for natural heritage and for the support given to a continuous growth of individual mobility. Nether the less, public authorities at regional scale and for most of local authorities are setting up alternative transport services, mainly based on public transport. Non mechanized mobility is also receiving an increasing support. The effects of those alternative transport policies are rather unconvincing at the moment, but time is needed to modify behaviours and territorial structures. At last, a minimum level of coherence could be found thanks to Environmental Impact Assessment which mitigates road network developments in an environmental perspective for the more recent ones.

### **5.5 Management efficiency**

The efficiency of the management is the relation between its effects and its objectives.

There is an overall decrease of the consumption rate of natural heritage. Farming sectoral dynamic does not integrate enough environmental concerns. Valuable ecosystems are difficult to maintain due to the economic context for farmers.

Some specific territories are under strong pressure. The management efficiency is there related to local strong commitment to protect nature.

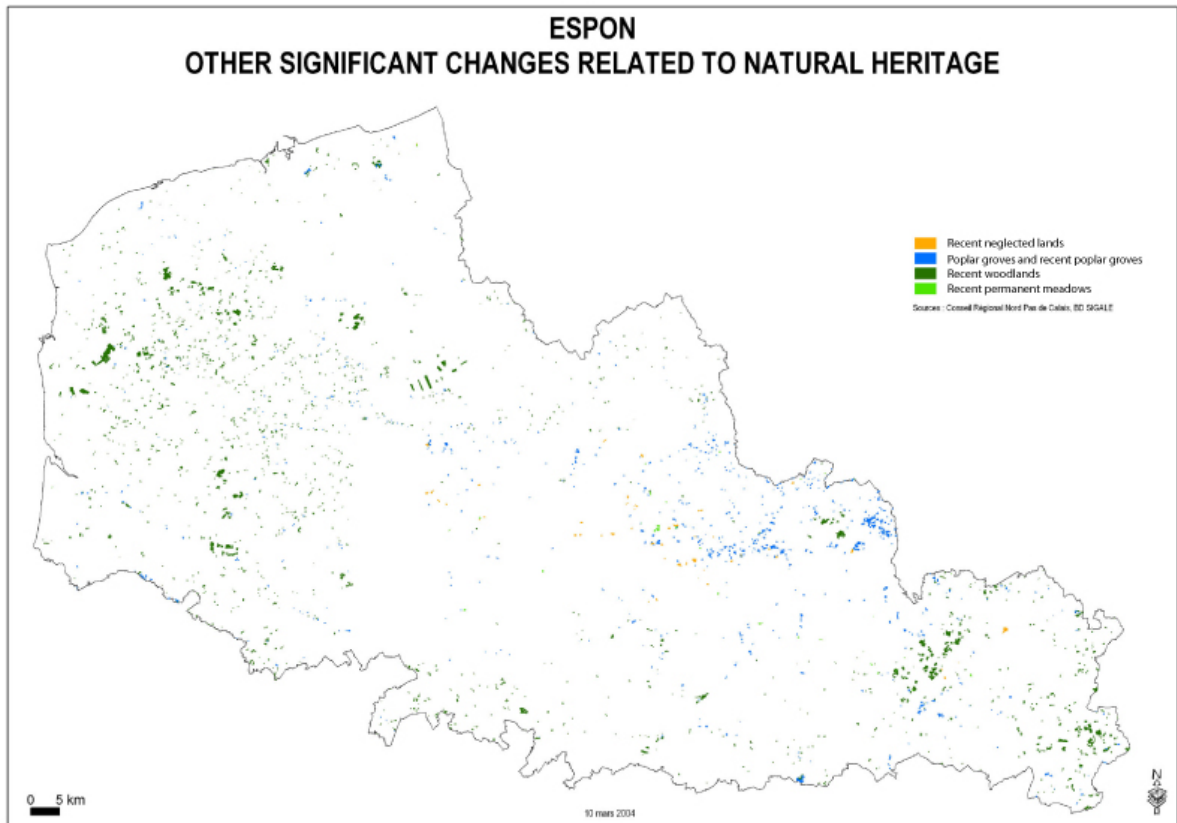
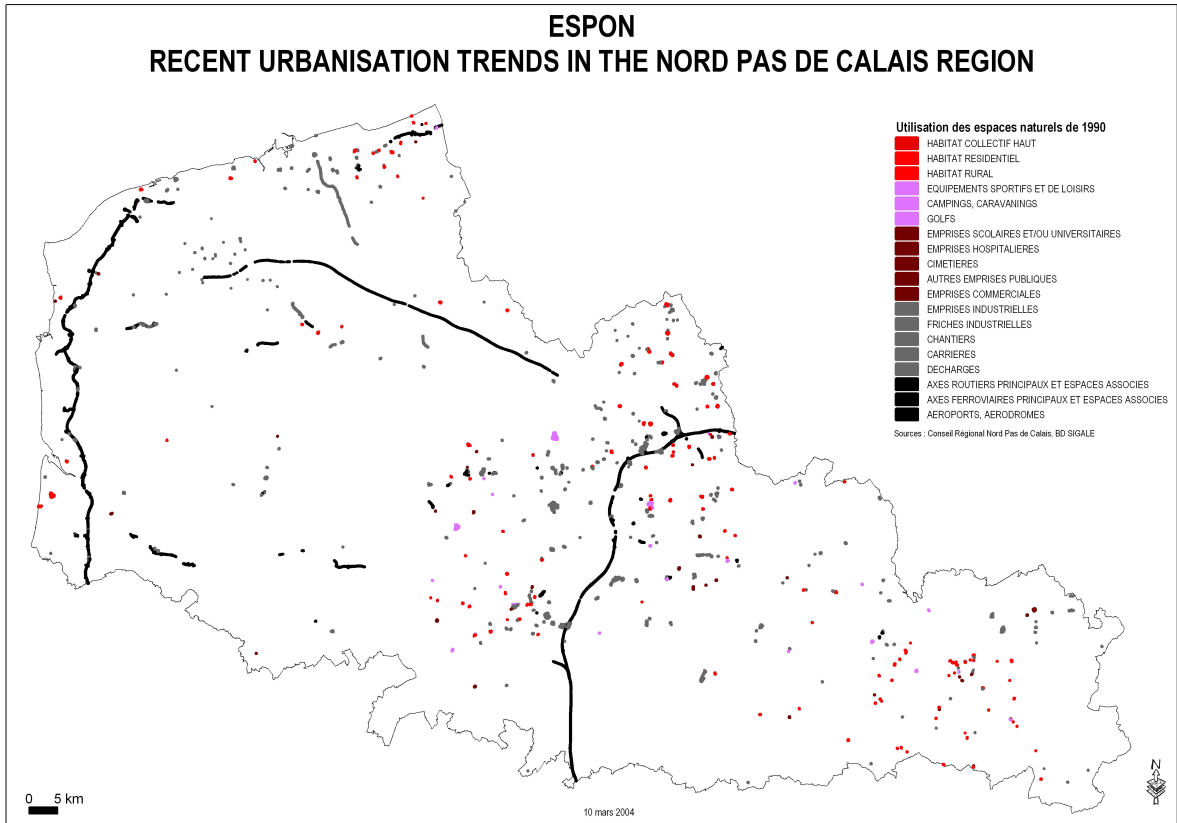
## **6. Scenarios**

In relation to the territorial context of the Region, scenarios are set out for three representative sub territories showing interest for scenario building due to their diversity of natural heritage, territorial context and management policies:

- the Eastern rural declining area
- the Lille and coal mining basin area
- the littoral area

After a short come back on their main characteristics and on recent territorial trends (see maps bellow, elaborated from the Conseil Regional du Nord Pas de Calais database on land use changes from 1990 to 1998), an attempt is maid to build on the one hand a scenario on the basis of current development trends, and on the other hand a sustainable scenario.

At last is presented a sum up of major provisions to set up for nature development.





## 6.1 The Eastern rural declining area

### *Context*

Situated in the eastern part of the region, this rural area bears the largest natural areas, namely the Forest of Thiérarche 15 000 hectares designated IBA under Bird Directive. In its' whole the Natural Heritage and landscape composed of forest, meadows and "bocage" (also called "linear forest", as fields are surrounded by hedgerows) is here specific, not to say unique and related to farming system.

Some of the natural heritage is under protection: Forest, Natural Park....

Economically declining the entire area is depressed and this trend is not expected to change.

The major threat is on the bocage heritage through changes of farming system (decrease of cattle productions). It is also the case to some extent for tourism development, although it is certainly a major asset for local development. In fact, tourism could be, in this area, the potential/ opportunity for increasing Natural heritage management, since natural heritage induce tourism. Yet, besides having a consensus of all actors on the necessity of strong management, is required important financial support, which an economically "poor" region has not.

Recent urbanisation trends (see map "Recent urbanisation trends in the Nord Pas de Calais Region) are important rural housing developments: secondary homes and sprawl from Valenciennes, together with housing abandonment in cities. Land use changes mostly happen on meadows.

Farming change trends are both intensification and abandonment with forest development and notably poplar plantations on wet lands (see map "Other significant changes related to natural heritage").

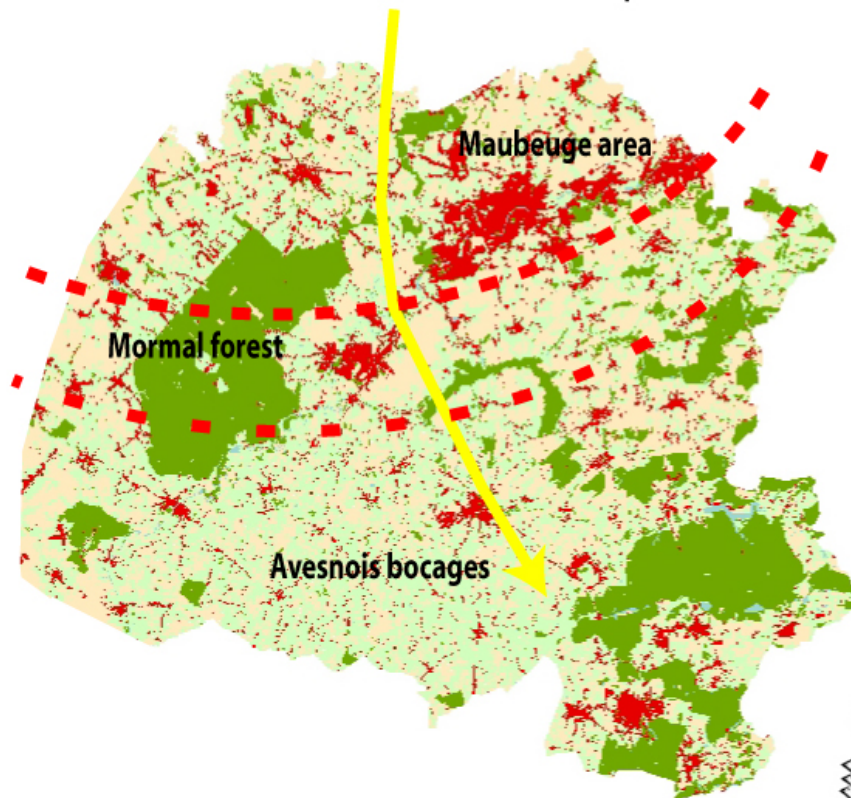
### *Current trends scenario:*






<b>Pressures</b>	<b>Impacts</b>
Demography: Population decrease	Urban abandonment
Urban developments: Linear developments and abandonment of existing town centres "Mitage": development of rural settlement (mostly secondary homes). Increasing transport needs and road developments	Arable land consumption Slight natural spaces consumption Landscape fragmentation
Tourism: Use of natural spaces for leisure purposes	Impact on local ecological conditions (quietness, pollutions, degradation)
Farming: Intensification (meadows converted to arable lands, bocage destruction). Abandonment of meadows with forest developments	Soil consumption Loss of valuable ecosystems, loss of valuable landscapes
Climate: Changing climatic conditions	Biodiversity loss due to species unable to cope with climate change, to pressure of invasive species.

*Sustainable development scenario:*

<b>Pressures</b>	<b>Impacts</b>
Population: Population does not grow	Ageing of the population
Urban developments: Set up of local green networks, inner greening, urban and economic renewal, containment of road network. Future urbanisation zones: space economy and ecological integration (water and sustainable building). Limitation of metropolitan polarisation	No urban sprawl, limitation of urban area ecological footprint.
Tourism management: Nature reserve	Limitation of leisure impacts
Farming: Decrease of soil urbanisation and ploughing Development of biological farming Maintenance of bocage, wetlands restoration (de-drainage): landscape ecological restoration for 5% of the surface. Sustainable forestry with integral forest reserves	Maintenance of valuable ecosystems (wet and dry meadows) Enhancement of the hydrologic system, pollution impacts limitation and of enhancement the landscape ecological network
Climate: Fast changing climatic conditions	Biodiversity loss due to species unable to cope with climate change, to pressure of invasive species and to the erosion of the coastline. Positive effect due to maximum protection, but uncertainty of the ecosystem reactions to change. Farming begins to adapt to new climatic conditions.

### ESPON 1.3.2 The Avesnois area sustainable development scenario



<b>Nature development</b>	
	<b>Arable lands:</b> decrease in soil consumption and ploughing <b>Water management:</b> ecological landscape restoration (5% surface)
	<b>Forests, bocages and meadows:</b> maintenance of breeding, buffering (dominant organic and extensive farming) and ecological landscape restoration
<b>Sustainable urban development</b>	
	<b>Urban areas:</b> set up of local green networks, inner greening, urban and economic renewal, containment of road network.
	<b>Future urbanisation zones:</b> space economy and ecological integration (water and sustainable building).
	Metropolitan polarisation limitation (endogenous development) Tourism and secondary homes impacts mitigation



Sources: Conseil Regional du Nord Pas de Calais, BD SIGALE

## 6.2 Lille and coal mining region:

In spite of currently major differences between both areas in terms of economic health and development, they form one sub-territory for our purpose as much as both areas show important similarities:

- Densely populated with continuous growth of population and households as expected trends.
- Land mainly dedicated to urbanisation and infrastructures, mainly roads, with more road development as expected trend (to reinforce its position of crossroad in the euro-region),
- Remnant and fragmented natural heritage.

In both areas, Natural Heritage is recognised as an asset for local development. Thus, policies are being carried out with an “active” approach.

- re-using brown fields : Parc de la Deûle / Politique CUDL
- identifying, restoring, valorising and networking natural spaces: Bassin Minier green network, Lille green network and Arras green network

This area shows that strong and thus expensive management policy and actions are indicators of economic health.

Recent urbanisation trends (see map “Recent urbanisation trends in the Nord Pas de Calais Region) are urban, industrial and infrastructure developments, and waste lands developments. They mainly happen on arable lands.

Farming trends are intensification and poplar groves developments (see map “Other significant changes related to natural heritage”).

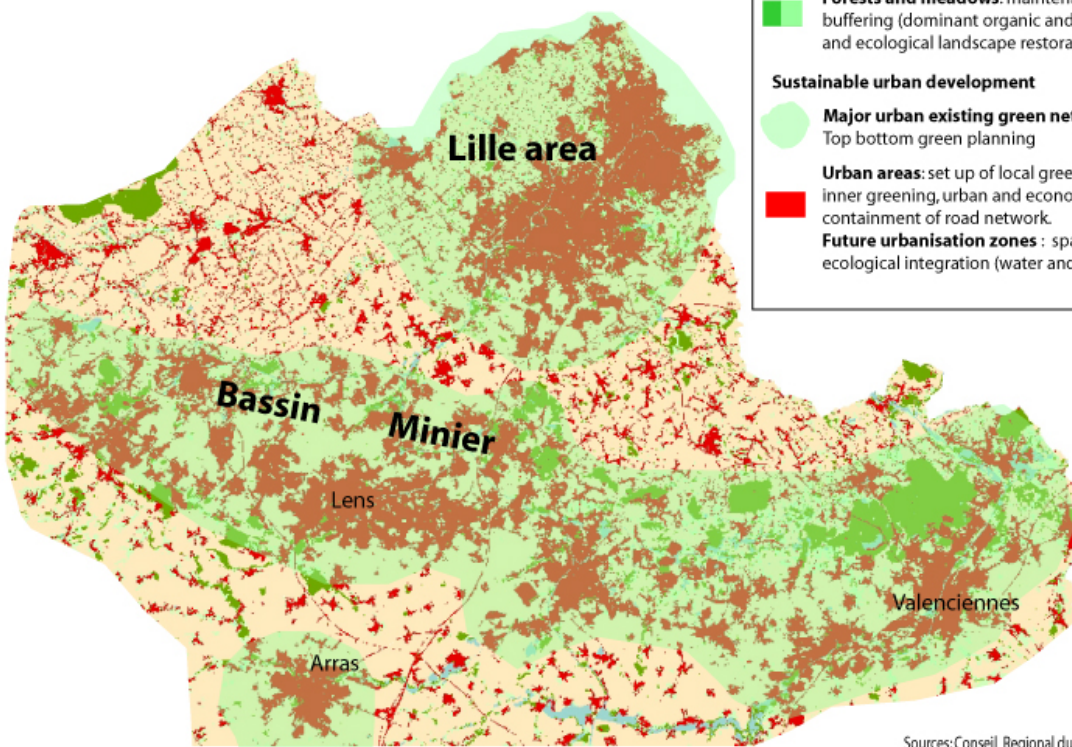
### *Current trends scenario*

Pressures	Impacts
Demography: Population slowly grows	
Urban developments: Continuing suburban urbanisation. Urban sprawl around existing cities and linear extensions Increase in transport needs and road developments. Limited “mitage” (strong protection for open spaces). Industrial field turn to waste lands Natural spaces turn to green spaces	Arable land consumption Limited natural spaces consumption. Increase in fragmentation and light pollution.
Farming developments: Intensification for most of arable lands. Abandonment of meadows and some arable lands	Loss of valuable ecosystems (wet and dry meadows). Slight forest development, mostly with fast growing species
Tourism: Increasing use of natural spaces for leisure purposes	Impact on local ecological conditions (quietness, pollutions, leisure degradation)
Climate: Fast changing climatic conditions	Biodiversity loss due to species unable to cope with climate change, to pressure of invasive species.

*Sustainable development scenario*

Pressures	Impacts
Demography: Population does not grow	Ageing of the population
Urban developments: Top bottom green planning on the basis of existing green networks: set up of local green networks, inner greening Urban and economic renewal, containment of road network. Future urbanisation zones: space economy and ecological integration (water and sustainable building).	Maintenance of the urban structure Urban greening, decrease in transport needs, enhancement of the urban ecological footprint
Tourism: Integral natural reserves	Limitation of leisure impacts
Farming and forestry: Decrease in soil urbanisation and ploughing Development of biological farming. Wetlands restoration and de-drainage Controlled forest development with landscape ecology objectives Sustainable forestry with integral forest reserves	Maintenance of valuable ecosystems (wet and dry meadows). Enhancement of the hydrologic system, pollution impacts limitation and of enhancement the landscape ecological network
Climate: Fast changing climatic conditions	Biodiversity loss due to species unable to cope with climate change, to pressure of invasive species and to the erosion of the coastline. Positive effect due to maximum protection, but uncertainty of the ecosystem reactions to change. Farming begins to adapt to new climatic conditions

**ESPON 1.3.2**  
**The metropolitan area**  
**sustainable development scenario**



- Nature development**
- **Arable land** : decrease in soil consumption and ploughing. Water management: ecological landscape restoration (5%)
  - **Forests and meadows**: maintenance, buffering (dominant organic and extensive farming) and ecological landscape restoration
- Sustainable urban development**
- **Major urban existing green networks.** Top bottom green planning
  - **Urban areas**: set up of local green networks, inner greening, urban and economic renewal, containment of road network.
  - **Future urbanisation zones** : space economy and ecological integration (water and sustainable building).

Sources: Conseil Regional du Nord Pas de Calais, BD SIGALE

### 6.3 The littoral area

A major (declining?) urban industrial areas in the north (Dunkirk) with 80% of the coastal line (is urbanised) and developing areas in the south under tourism development pressure (since the 1970's 20 000 hectares have been urbanised).

Pressure is to continue with an expected constant growth of the population.

Although fragmented, the coastal area bears significant Natural spaces.

They are "managed" on the basis of reactive and active approach: reactive because strongly protected by national protection policy for example Loi Littoral and active at Regional/local level: policy and action of the Conservatoire du Littoral; the policy of the departmental authorities in relation to Natural sensitive areas (ENS).

Recent urbanisation trends (see map "Recent urbanisation trends in the Nord Pas de Calais region") are urban developments around existing cities, retro littoral road development and industrial developments around existing industrial area. The coast line is quite stable due to strong protections.

Besides, there is a slight tendency to forest development, due to difficult farming conditions (see map "Other significant changes related to natural heritage").

#### *Current trends scenario*

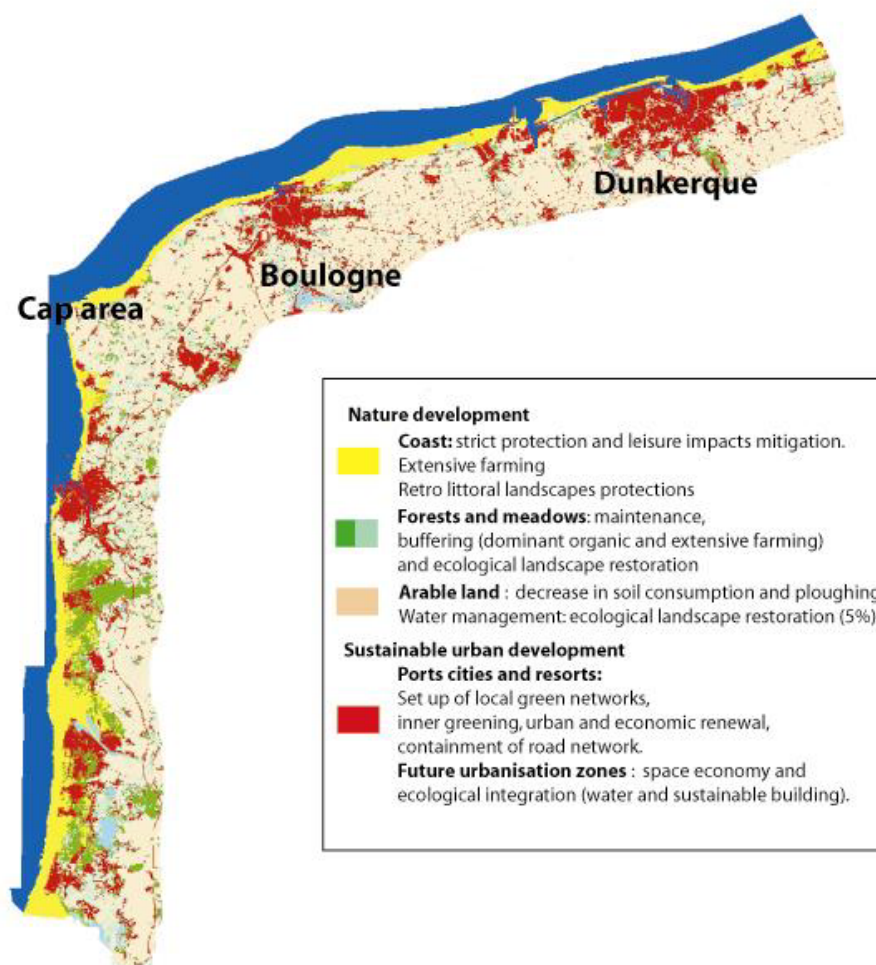
<b>Pressures</b>	<b>Impacts</b>
Demography: Population slowly grows	Residential developments, mostly retro-littoral
Urban developments: Littoral and retro littoral urbanisation Coast line consumption continues at lower rate (near existing ports and cities) Important retro littoral developments ("mitage"), excepting for outstanding landscapes (id est in PNR's)	Continuing decrease of the most valuable ecosystems, fragmentation Retro littoral arable land consumption.
Tourism developments: Use of natural spaces for leisure purposes	Impact on local ecological conditions (quietness, pollutions, leisure degradations). Increase in transport needs.
Farming: Increasing rate of land abandonment. Forest developments	Loss of valuable ecosystems (wet and dry meadows). Slight Forest development, mostly with fast growing species
Climate: Fast changing climatic conditions	Biodiversity loss due to species unable to cope with climate change, to pressure of invasive species and to the erosion of the coastline

#### *Sustainable development scenario*

<b>Pressures</b>	<b>Impacts</b>
Demography: Population does not grow	Ageing of the population

Urban developments: Urban renewal : no littoral urbanisation	No change of the urban pattern and urban renewal
Tourism developments: Integral nature reserves and sustainable management for tourism	Limitation of leisure impacts
Farming: Development of biological farming. Controlled forest development with landscape ecology objectives	Maintenance of valuable ecosystems (wet and dry meadows) Reinforcement of the landscape ecological network
Climate: Increasing sea level and fast changing climatic conditions	Biodiversity loss due to species unable to cope with climate change, to pressure of invasive species and to the erosion of the coastline. Positive effect due to maximum protection, but uncertainty of the ecosystem reactions to change. Farming begin to adapt to new climatic conditions

### ESPON 1.3.2 The littoral area sustainable development scenario



Sources: Conseil Regional du Nord Pas de Calais, BD SIGALE



## 6.4 Provisions for nature development

Provisions should be made for:

The environmental regulation of economic developments, as regard to

- surface consumption,
- transports-induced needs,
- the ecological balance of production processes,
- toxique drifts,
- ecological networks (micro scale hydro systems and biotopes, remnant corridors such as coasts and valleys, large ecologically sensitive areas).

The environmental regulation of urbanisation and settlement evolutions, as regard to

- surface consumption,
- mobility and access to services and goods,
- nitrogen, pollutants and biocides drifts,
- micro-scale hydrological system and natural habitat,
- flooding and sea level risk.

The environmental regulation of farming systems and practices evolutions as regard to

- soil-plant-ecosystems equilibrium (regulation of biocides, fertilizers and ploughing),
- water capture fields protection,
- landscape ecological restoration (concerning an average of 5% of farming lands),
- a territorial-based basal food consumption,
- ecological networks (micro scale hydro systems and biotopes, coasts and valleys, ecologically sensitive area).

The environmental regulation of tourism development:

- the maintenance of wilderness areas,
- the limitation of infrastructure and outdoors developments.

Regulation mainly depends on planning: farming market planning and landscape planning, housing and infrastructure planning. Local disparities are to be taken into account when designing the regulation to promote: they depend on the local issues and on the specific governance system.

## References

CETE, LATTIS, L'œil, "25 ans d'aménagement et de développement en Nord-Pas-de-Calais",  
Eléments pour un débat, Observatoire Régional de l'Habitat et de l'Aménagement, April 1998

CETE, LATTIS, L'œil, "25ans d'aménagement et de développement en Nord-Pas-de-Calais",  
Thème Environnement, Observatoire Régional de l'Habitat et de l'Aménagement, April 1998

H. Gitay, A. Suárez, RT. Watson, DJ Dokken (Eds), Climate Change and Biodiversity, IPCC,  
Geneva, 2002, pp85

INSEE, « Projections de populations du Nord Pas de Calais en 2050 : un vieillissement  
inélucltable », Profils Nord – Pas de Calais, n°10, November 2001

INSEE, « Projections infrarégionales de population pour 2030 : des situations contrastées  
sur les différents territoires du Nord Pas de Calais », Profils Nord – Pas de Calais, n°9,  
November 2001

INSEE, « Le recensement agricole 2000, témoin d'un évolution rapide », Profils Nord – Pas  
de Calais, n°7, August 2002

**ESPON 1.3.2 TERRITORIAL TRENDS IN THE MANAGEMENT OF  
THE NATURAL HERITAGE:**

**CASE STUDY OF THE RONDANE REGION, A NORDIC MOUNTAIN  
REGION**

---

PREPARED BY EASTERN NORWAY RESEARCH INSTITUTE  
2004

**The Rondane Region**  
**a case study of natural heritage management in a Nordic**  
**mountain region**

**By**  
**Hans Olav Bråtå**



østlandsforskning

**Eastern Norway Research Institute,**  
**Lillehammer, Norway**

# 0. Introduction

## **The reason for selecting the Rondane Region**

The Rondane Region is a case because it presents the natural heritage management in a Scandinavian mountain region, and because historical records about that management exist. Some of the planning and management efforts are innovative and probably interesting for a larger audience.

## **Preparation of the case study report**

Dr. Hans Olav Bråtå, senior researcher at the Eastern Norway Research Institute, Lillehammer, Norway has written the case study report.

The study is about the natural heritage management in a large district and region. Due to the short term and limited resources the case study is based on existing knowledge and literature about the region. Due to its size and mixture of interests it is not possible to go deeply into the material and present regional data about all interesting and relevant matters. Reservations are made, amongst other because some of the planning efforts are new or the ongoing research has not yet concluded in their findings. Still, I have tried to answer the ESPON questions as good as possible.

## **Spatial planning and management in Norway**

The spatial management of the Dovrefjell- Rondane district and the Rondane region more specific is based on the Nature Conservation Act and the Planning and Building Act. Other acts influence the activity, but the two acts mentioned are the principal acts for spatial planning.

The areas having the strongest restriction according to the Nature Conservation Act are nature reserves. They are generally restricted to minor areas. National parks are used to protect large areas and have strong restrictions but not as strong as nature reserved. People are allowed to walk everywhere in them and to hunt and fish. Domesticated animals are allowed to graze there. In order to become a national park an area generally has to be free of large-scale impacts. Protected landscapes do also cover large areas but usually not as large as national parks. This type of protection is selected if an area has impacts but still qualities to be maintained. Valleys with summer farms and few other impacts do often become protected landscapes. Existing activities may continue but major change of the landscape is not allowed.

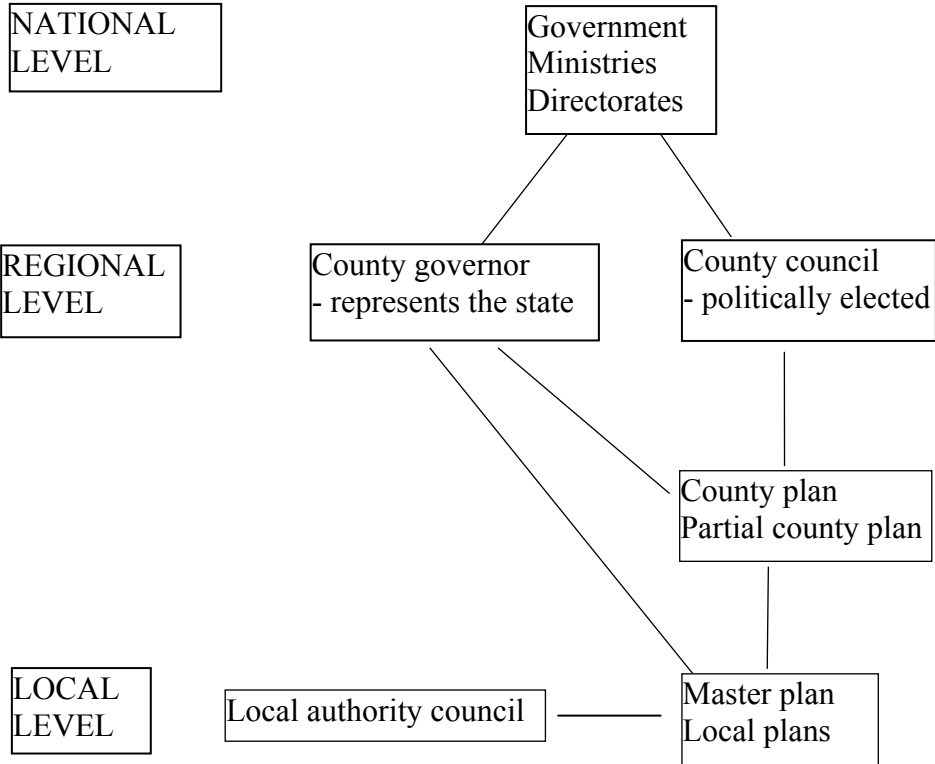
In areas outside of protected areas the land use is steered according to the Planning and Building Act. The municipalities are the ones deciding on legally binding spatial plans, as where to draw the limit between built up areas and areas where substantial new impacts are not allowed for. In areas outside of built-up areas agriculture and forestry is generally not restricted but the Agriculture and Forestry Acts may limit or steer activity there.

In the Norwegian administrative system two bodies exist at the county level. The County Governor is representative of the national state and has since 1982 had an environmental division. The county governor may have comments and objections to plans in conflict with the natural heritage. Objections are the most powerful instrument.

The other public body is the county municipality. They are steered by a county council, politically elected every fourth year. They and their administration are responsible for a wide range of activities, as environmental protection and economic development. Concerning management of the natural heritage they have more complicated goals than the county governors. The county municipality may decide to establish partial county plans for selected regions and issues, as the partial county plan for the Rondane region. Such plans are only binding for the activity of the county municipality. Partial county plans are not binding for the municipalities or the county governor but they are encouraged to follow them. Conflicts with the goals or guidelines in partial county plan may justify objections from county level authorities.

The means for achieving the goals in partial county plan are therefore to get municipal politicians and others to freely accept the joint rules for an area or to some extent force them to do so. Still in the long run a partial county plan will not function if it is only based on objections. Figure 1 illustrates the general system of the planning according to the Planning and Building Act.

Figure 1. The administrative system of Norway and major types of plans according to the Planning and Building Act.



# Chapter 1. General Analysis

## 1. The large territorial context

### 1.1. Territory

#### **Position of the Rondane region within the major urban/rural system**

The most urbanised part of Norway is the south-eastern part of the country, which include the capital Oslo. In year 2003 2 087 211 persons, 46 % of the Norwegian population, lived in this part of Østlandet (the counties Oppland, Hedmark, Østfold, Vestfold, Oslo, Akershus and Buskerud). Another urbanised part is Sør-Trøndelag, which includes the town Trondheim. In year 2003 268 188 persons lived in Sør-Trøndelag.

The Rondane region is north south oriented and is situated between these urbanised areas. The Rondane Region is generally limited in the west by the large valley of Gudbrandsdalen with the river Gudbrandsdalslågen and in the east by Østerdalen/Atndalen and Glomma (largest river in Norway) and the minor rivers of Atna and Folla, cf, figure 2. The region is most easily accessible for the population at Østlandet. Due to good communication, railways, roads and airports, the region is easily accessible for foreign tourists.

#### **The Rondane region is part of the Rondane-Dovrefjell mountain district**

The Rondane region is part of the large Rondane – Dovrefjell district, which include mountain areas from the west coast of Norway to the eastern part of Norway. The wild reindeer areas coloured dark blue (no 19-22) is equal to the Rondane-Dovrefjell mountain district, figure 3.

The mountain areas in the district are to a large extent protected as national parks, protected landscapes or nature reserves. The largest protected area in the western part of the district, is Dovrefjell – Sunndalsfjella National Park. The park was established in the 1970s, but enlarged and renamed in 2002. It is 1693 km<sup>2</sup> large.

Within the Rondane region the following protected areas exist, see figure 4:

- Dovre National Park. Established 2003. 294 km<sup>2</sup>
- Rondane National Park. Established 1962 (580 km<sup>2</sup>), enlarged in 2003 and is now 963.5 km<sup>2</sup>.
- Vesle Hjerkin Protected Landscape, established 2003. 12,9 km<sup>2</sup>
- Grimsdalen Protected Landscape, established 2003. 122,5 km<sup>2</sup>
- Dørålen Protected Landscape, established 2003. 16.8 km<sup>2</sup>
- Frydalen Protected Landscape, established 2003. 39.9 km<sup>2</sup>

The protected landscapes are generally located at the fringe of the national parks or between them, because these areas have more impacts and human activity and therefore cannot be national parks. About 20 km<sup>2</sup> is protected as nature reserves.

Areas not qualifying to be protected according to the Nature Conservation Act, or being too controversial are to a large extent preserved through partial county plans. The aim of the partial county plans is to preserve the living areas of the wild reindeer but to allow for new human activity not conflicting with that aim.

Figure 2. The Rondane region and the area ruled by the partial county plan for Rondane.

Dark green is Rondane National Park, but the map is not updated on protected areas, see figure 4. Light green is the primary area used by the wild reindeer (the “planning area”). In that area planning proposals or other new activity is supposed to be strongly restricted. The yellow area is the zone of influence. Proposals on activity in that zone are supposed to be judged concerning their influence on the wild reindeer in the primary area. The areas labelled with a “K” includes municipal plans to be especially judged.

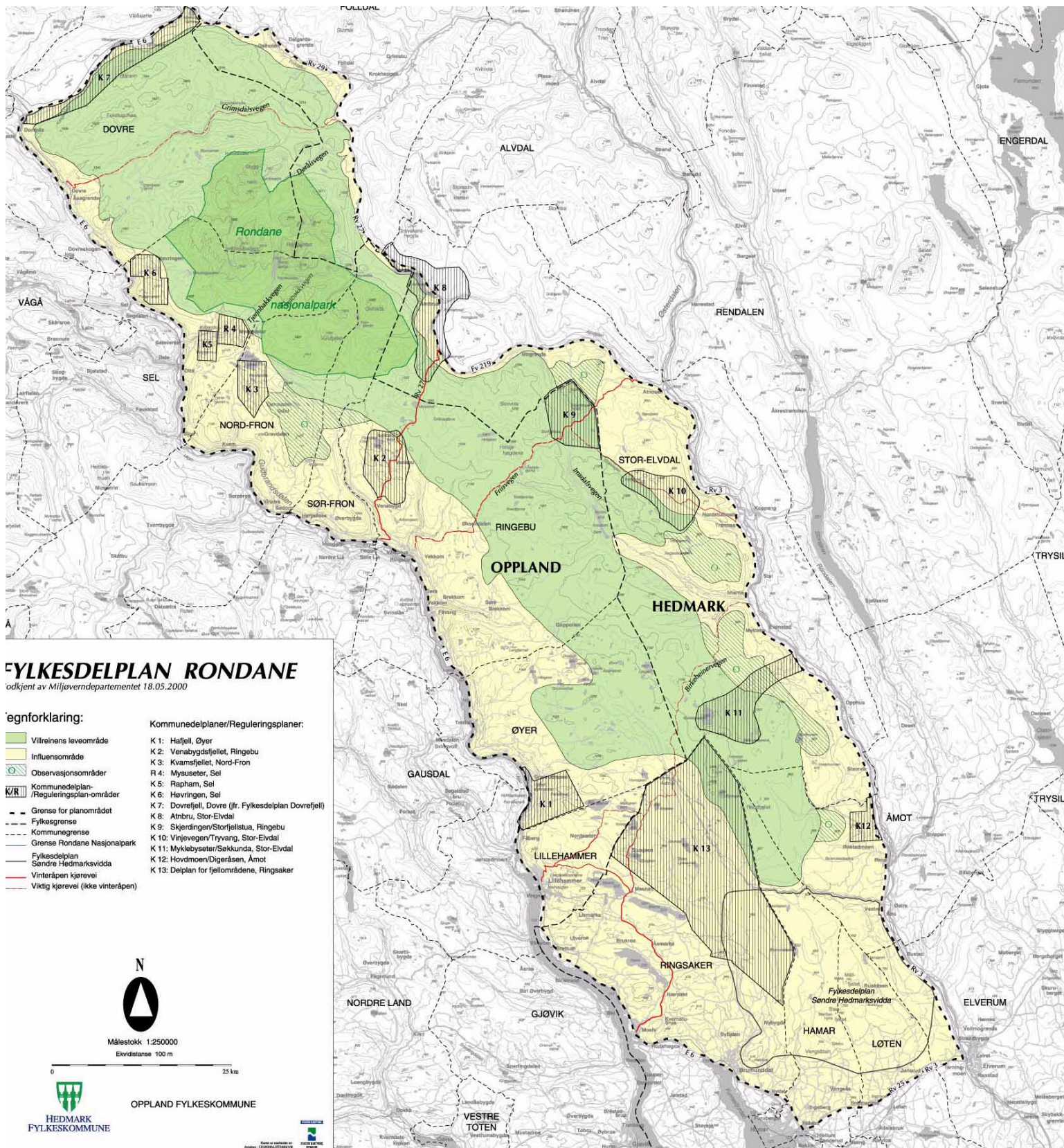




Figure 3. Wild reindeer districts and areas in Norway.  
 The Dovrefjell-Rondane district is coloured in dark blue, wild reindeer areas 19-23.  
 Wild reindeer regions are equal to wild reindeer districts.

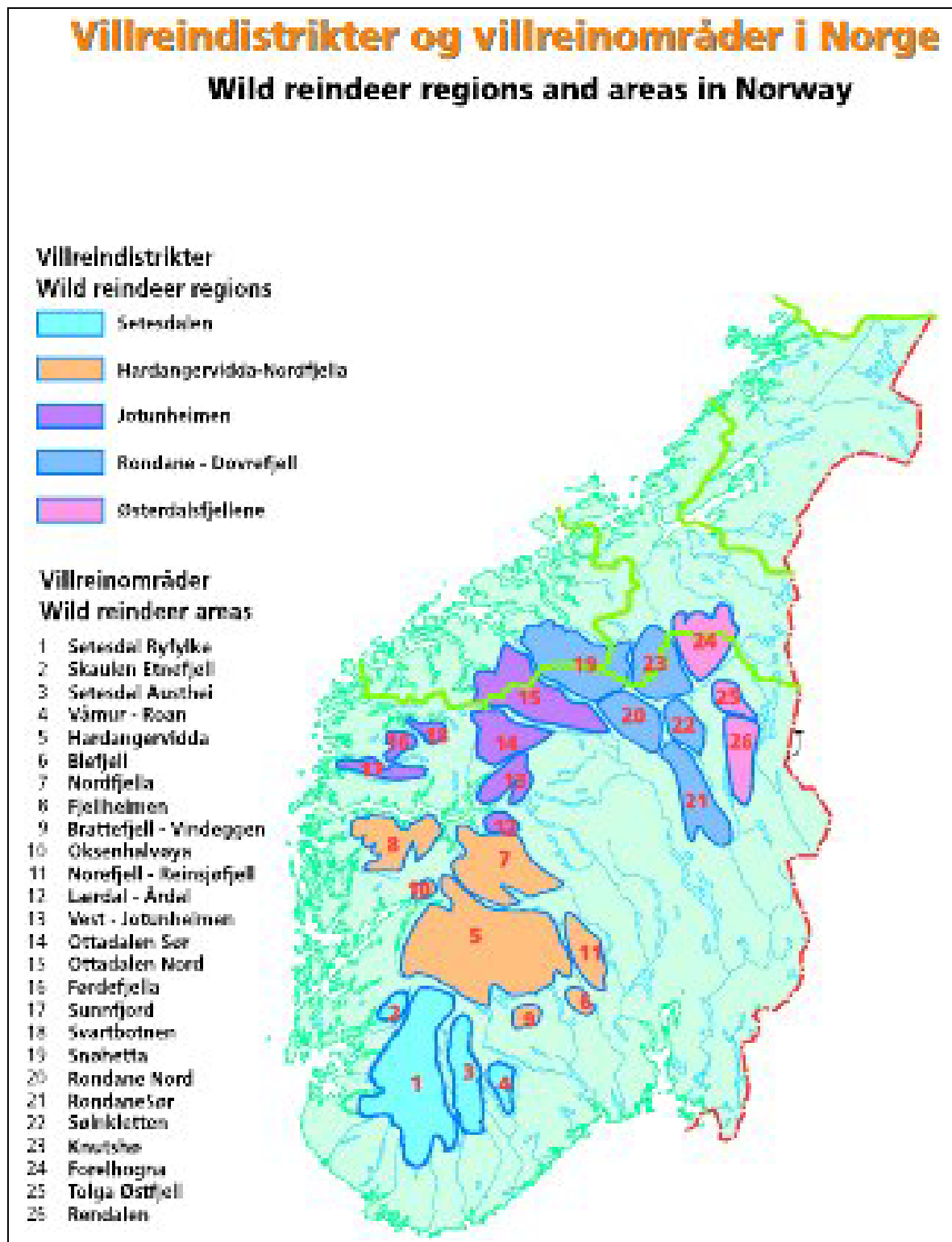
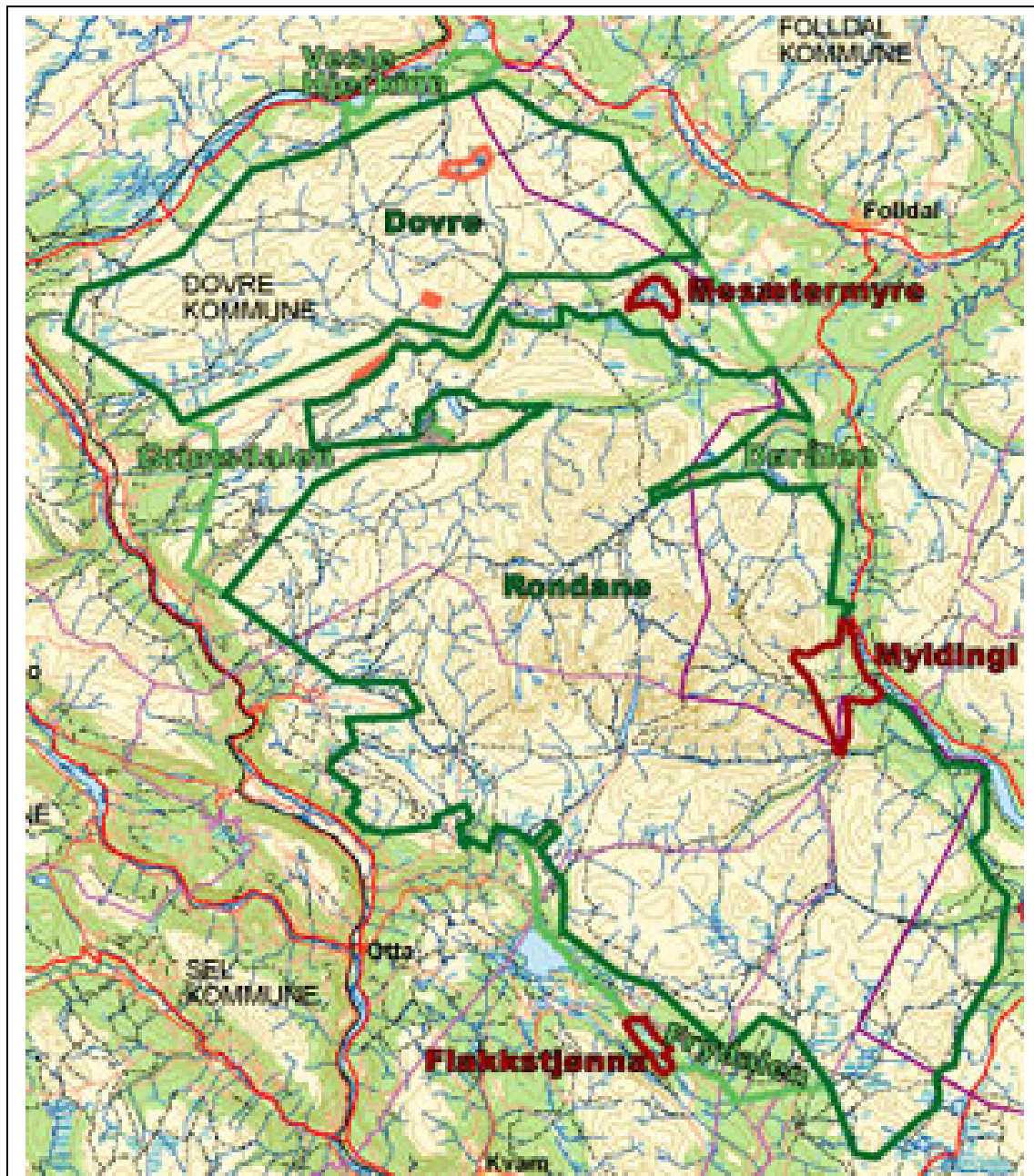


Figure 4. National parks and protected landscapes in the Rondane Region, February 2004.  
Source: Directorate for nature management (2004)

Named in dark green and limited by dark green borders; the Dovre and the Rondane National Parks.

Named in light green and limited by light green colour; the Vesle Hjerkin, Grimsdalen, Dørålen and Frydalen Protected Landscapes.

Named in red and limited by red colour the Mesetermyre, Myldingi and Flakktjønna Nature Reserves.



Two partial county plans exist within the district; the Partial County Plan for the Dovrefjell area in the northwest and the Partial County Plan for the Rondane region in the eastern part.

The Rondane-Dovrefjell district is dominated by mountain ecosystems. An important species is the wild reindeer. This is the only area in Norway where the original wild European mountain reindeer lives. The wild reindeer in all the other wild reindeer areas in Norway are mixed with domesticated reindeer. Preservation of the living areas of the wild reindeer was important for the new national parks and enlargement of existing park, the new protected landscapes and the partial county plans.

### **Levels of assessment in this study**

To some extent I present the development in the Rondane-Dovrefjell district, but the main emphasis is the Rondane region. Within the Rondane region some data exist only for the northern part, north of State Road no. 27, se figure 2.

## **Land use**

### **Main structure of topography and land use**

The north-south core of the Rondane region is uninhabited alpine land with naked rocks, 1000 – 2000 meters above sea level. The average altitude is higher in northern than the southern part. The eastern and western fringe, some valleys and the southern part, is forested with mountain birch at high altitude and coniferous forest in lower areas. Agricultural activity, as summer farms and grazing by domesticated animals as sheep, seems decreasing. Second homes and its infrastructure is a major land use at the fringe of the region, especially in the middle and southern parts. Commercial forestry is usual at the southern fringe and in the larger valleys within the region.

## **1.2. Territorial strategy**

### **Spatial strategy**

A kind of overall spatial strategy for the Rondane – Dovrefjell district was formulated by the Parliament in 1993 when they decided on an increased protection of land in the district. The objective of the strategy is to protect the natural qualities of the area, the high-mountain ecosystem and especially the unique wild reindeer herds. See later in this case study.

The tool selected for reaching the overall strategy seems adequate. Several of the means had already functioned for several years, as the national parks and the partial county plan for the Rondane region. Still the overall goal or strategy included the existing means into a coherent and joint goal or strategy.

The effectiveness of the selected tools, national parks, protected landscapes and the partial county plan for Rondane is discussed later in this case study.

### **Sector policies**

Sector politics relevant for the management of the natural heritage of the region:

Nature conservation: The initiatives and management of the Rondane region is in line with the overall Norwegian policy on nature conservation. Scientific knowledge from the late 1980's

about the genetic uniqueness of the wild reindeer herds fitted very well into the national and international focus on preservation of biodiversity and genetic variation within species. This uniqueness seems to have increased the local pride about the wild reindeer herds.

Since the early 1990 the national conservation policy has increased its focus on local or municipal participation in the processes leading up to national parks, protected landscapes and nature reserves, and their management when established. One reason is the need for linking these areas to the local communities and that the general increase in protected areas. In some municipalities more than 50 % of the land is protected. That leads to a pressure for including local people in the management. The proposed local participation in preparation of management plans and their implementation is in line with national policy. The test management for Dovrefjell-Sunndslasfjella national park, where local politicians is the management board, is at the front concerning new types of management policy in Norway.

Agriculture. The traditional agriculture in the municipalities has been decreasing for years and decades. It seems to be a general opinion that the pressure on the traditional agriculture will increase due to a more open world trade and the WTO-agreement. Norway's adaptation and adjustment to EU-politics is also generally regarded as increasing the pressure on the agriculture due to lower prices on agricultural products and reductions in support to peripheral areas in general.

This change in sector politics increases the pressure on the farmers to find new ways of exploiting their land. Although farmers have been selling plots for private cabins for decades, this new situation and a high demand and often very good prices, has caused an increased interest for selling of plots for cabins. But new plots and cabins may cause an increased disturbance on the wild reindeer. The new agricultural policy has also inspired a landlord to build a few cabins in the interior of the region as part of commercial hunting package for amongst others wild reindeer. That case became very controversial because if some landlords were allowed to establish cabins for commercial hunting others could follow.

The intensified pressure on the agriculture may inspire the farmers to find new and environmentally friendly ways of harvesting from nature. Specialised and small-scale production of food or other commodities from nature, and commercial eco-tourism, may be element in the future. This process has just started. Notwithstanding, such activities can probably only be a supplement to the other agricultural production.

Forestry: I do generally not know much about forestry politics. Forestry is generally peripheral to the overall land use of the region but new roads for forestry, in steep valleys at the fringe has been controversial. Forestry is more important in the southern parts of the region and is may be in conflict with some aspects of protection of the land of the wild reindeer. I am not sure about the extent of possible conflicts between forestry and the natural heritage.

Tourism: Tourism is an important sector politics and is generally regarded as very important in the counties of Hedmark and Oppland and the municipalities involved. One aim of the Partial county plan for Rondane is too steer tourism and its infrastructure in order to reduce or avoid conflicts with the natural heritage and the wild reindeer. See later in this report. Although tourists already use the national parks and protected landscapes it is a general policy to increase the commercial tourism in protected areas. That may be controversial concerning the natural heritage but is, by the means of good planning, expected to be managed.

### **1.3. State of the natural heritage**

#### **The Natural Heritage**

The natural heritage of the Dovrefjell-Rondane district is predominantly high-mountain ecosystems but it does also include deciduous forest as mountain birch and coniferous forests as spruce and pine. Despite the facts that high mountain ecosystems are characterised by a scarce vegetation, some part of the region, especially parts of the Dovre and Dovrefjell – Sunndslafjella national parks and adjacent protected areas have a unique mountain vegetation. A large number of summer farms have produced many interesting and beautiful cultural landscapes in the lower mountain valleys. Together with old wooden buildings at the summer farm this has produced landscape highly appreciated for their beauty.

Within the whole district a large number of ancient pitfalls and systems for trapping wild reindeer exist, reflecting a continued harvesting for thousands of years. Some of the pitfalls are organised in large systems

The northern part of the landscape in the Rondane region is dominated by huge U-shaped valley with a wide range of peaks, of which 10 peaks are higher than 2000 meters above sea level. Southwards the landscape becomes gentler with wider mountain plateaus and lower peaks. The amount of barren ground in the mountains is reduced and the amount of forest increase. The most southern part is totally forested. The northern part of the Rondane region has a wide range of natural elements displaying how the ice melted down at the last part of the ice age.

In the Rondane region the climate in the northern part is characterised by a low precipitation, and little snow in the winter. That is especially the case for the northeastern part, which is dominated by lichens. To the south the precipitation increase and the vegetation is more varied. The amount of bogs and water increase and the amount of snow in the winter increase. The mountain areas close to Lillehammer do often have 2 meters of snow in the winter. There is usually more snow in the west than in the east.

The vegetation and the amount of snow cause different conditions for the wild reindeer. The best winter forage areas are in the eastern, and especially northeastern part of the region. The best summer forage areas are in the western and especially southern and southwestern parts, although larger of pockets of varied vegetations is found several places.

The wildlife in the Rondane-Dovrefjell region is supposed to include a “complete” high mountain ecosystem with all the major species; wild reindeer, wolverine, some Arctic foxes and a hundred individuals of musk, a varied number of birds including birds of prey as eagles and falcons. In the valleys, as mountain valleys, bears are observed and a stable population of lynx exist. Some wolves occasionally visit the Rondane region.

The most important species in this high-mountain ecosystem is the wild reindeer. The number of wild reindeers has varied throughout the last hundreds of years. Within the Rondane region (Rondane wild reindeer area) the population is about 3 700 individuals. The goal is to have a herd of 4500 wild reindeer. On the average 797 wild reindeer were annually killed by hunting in the Rondane region in the period 2000-2003. Many hunters live in the municipalities. Much of the land in the northern and middle parts of the region is owned by the crown but managed

by locally elected boards (mountain boards). The land in the southern part is to a larger extent owned by private persons, who often have income from selling commercial hunting packages.

In order to function as good as possible, the mountain ecosystem, especially the wild reindeer, needs large areas with few impacts. The wild reindeer have to migrate between those parts of the region having the best forage at different seasons. Due to human impacts and disturbance the living areas of the wild reindeer is gradually reduced and fragmented, which has caused the managers to reduce the herd in order to keep the pasture at good health and avoid overgrazing.

An additional problem is that the wild reindeer must have the possibility to follow their ancient migration routs between the forage areas. Keeping the migration routes free from impacts and disturbance is therefore of major importance, but is complicated because the landscape often restrict where people and wild reindeer may go. Often the trails follow the same passages as the migration routes. It is also a problem that some of the roads across or into the mountain due to the traffic on them may restrict or influence on the migration.

Several of the watersheds in the region are interesting from a scientific point of view, amongst others because they display quite natural water ecosystems. A range of protected rivers exists. Protected rivers are protected by decisions in the Parliament, most of all against hydroelectric power construction but also against other major impacts influencing the rivers. Some protected rivers is now included in areas protected according to the Nature Conservation Act, but parts of them, especially the lower parts is not protected that way. National guidelines for management of protected rivers exist, but it is debated how well they preserve or influence on the values supposed to be maintained. The status of the protected rivers is monitored but I do not have data.

### **Relevance of provided data and maps**

The maps provided are of no use because generally no data exist for Norway or the scale is not detailed enough. It ought to be at presented at a regional level.

### **History of evolution of Natural Heritage**

During last decades the amount of space without solid physical impacts as roads and cabins is reduced. The area defined as wilderness, 5 km or more from such impacts, is reduced. That is also the cause in the Rondane National Park.

During the last hundred years the number of wild reindeer in the Rondane region has varied much, from almost extinction at the start of the 1900 hundreds to a quite stable from the 1960 and especially the 1970s. The reason for a better management was the introduction of licences (in 1931) and better knowledge about the number of wild reindeer and their sex and age composition. That has especially been the case from the late 1970s and onwards. Local interest for the wild reindeer has been a major force for achieving these results.

## **1.4. Pressures and driving forces**

### **Demography/urbanisation**

Few people live within the mountain part of the Rondane region. They live in the valleys and use the Rondane region. Figure 2 displays the localisation of each municipality and table 1 shows the changes in the population. Generally the total population of the region has

increased during the last 50 years. Still, the development is askew: Only municipalities in the southern part of the region have increased their population; Øyer, Lillehammer, Ringsaker, Hamar, Løten and Elverum. This reflects an increased urbanisation of the region. In the rest of the municipalities the population has decreased, in some as much as 36 %.

It is reason to believe that the population changes will continue but not at the same speed as during the last 50 years. Probably the rate of population decrease in the middle and northern municipalities will diminish and the increase in the others will be at a lower rate.

We do not know the rate of urbanisation within each municipality but that rate is probably of minor importance for the development of the Rondane region because most people already live in the valleys.

Table 1 Population in the municipalities, in which the Rondane region is situated.

	1.1.1954	1.1.1965	1.1.1973	1.1.1983	1.1.1993	1.1.2003
Dovre	3 026	3 003	3 148	3 239	3 041	2 883
Sel		5 866	6 452	6 687	6 341	6 102
Nord-Fron	6 018	5 696	9 566	6 387	6 109	5 890
Sør-Fron	3 618	3 663		3 623	3 462	3 335
Ringebu	5 727	5 448	5 317	5 393	5 050	4 644
Øyer	3 834	3 809	4 197	4 475	4 630	4 891
Lillehammer	17395	19 622	20 861	21 981	23 545	24 946
Ringsaker	26 544	27 972	29 264	30 487	31 304	31 830
Hamar	18 950	22 420	25 115	24 718	25 999	27 120
Løten	6 389	6 327	6 360	6 945	7 059	7 317
Elverum	12 695	13 664	14 780	16 929	17 595	18 638
Åmot	5 496	5 319	4 828	4 784	4 370	4 389
Stor-Elvdal	4 543	4 164	3 823	3 645	3 269	2 888
Folldal	2 379	2 191	2 196	2 183	1 923	1 764
<b>Rondane Region</b>		129 164	135 907	141 476	143 697	146 637

Source: [www.ssb.no](http://www.ssb.no) (Statistics Norway)

During the last 50 years several municipalities have merged to larger units. The borders between others have been adjusted. These changes are generally taken care of in order to obtain comparable units but some minor changes are not adjusted for.

### Infrastructure

Major roads follow the valleys and cross the Dovrefjell. The Dovrebanen railroad follows the Gudbrandsdalen and cross Dovrefjell in the same area as the E6. In the period with little or no snow on the ground four roads cross the region and a substantial number of roads penetrate the region from west and east. The numbers of roads and their standard has increased substantially since WW2 and have reduced the wilderness areas of the region.

Since Rondane National Park was established in 1962 several roads have been built close to or inside the national park, or the standard of the roads has been improved. That has reduced the wilderness areas within the national park.

In the period with snow only one road cross the region, state road no 27 between the municipalities of Ringebu and Stor-Elvdal. Quite few of the roads stretching towards the interior of the region are cleared in the snow period. That makes those parts of the region less accessible, and reduces the conflicts with the natural heritage, as the wild reindeer.

It is reason to believe that the attention concerning negative environmental impacts of new roads, and a better planning strategy concerning such impacts, prevent a substantial increase of new roads. Some minor roads will probably be built or improved, but I do not judge new roads as a driving force. The exception may be in the southern parts of the region, in order to provide infrastructure for forestry. The new airport for Oslo, Gardermoen, opened north of Oslo. That has made the region more accessible from abroad.

### **Agriculture**

Historically the Rondane- Dovrefjell has been used for agricultural purposed. Grazing by sheep, goat and cattle has long traditions, especially in the mountain valleys, which provide the best pasture. Still, the animals also graze at pasture higher in the mountains. Some of the grazing has been organised as part of the activity at summer farms but it is more usual to let the animals of in the mountain at early summer and collected them at the autumn.

We do not have data about the grazing in the whole Rondane region but numbers from 1995 exist for the area influenced by nature conservation, see figure 4. At that time 1100 cattle, 20 00 sheep, 770 goat and 30 horse grazed there. Due to the overall reduction of agricultural activity the number is probably reduced.

Growing of grass at summer farms has traditionally been usual in the lower mountain valleys and in some of the valleys the summer farms and the cultivation of grass dominate the landscape. Cattle using the areas around summer farm are milked every day. The valley of Grimsdalen at the northern part of Rondane is a famous example. In some valleys, as Grimsdalen and Frydalen, some summer farms are used as before. In the conservation area the total number of summer farms in 1995 was 120, of which 17 summer farms produced milk.

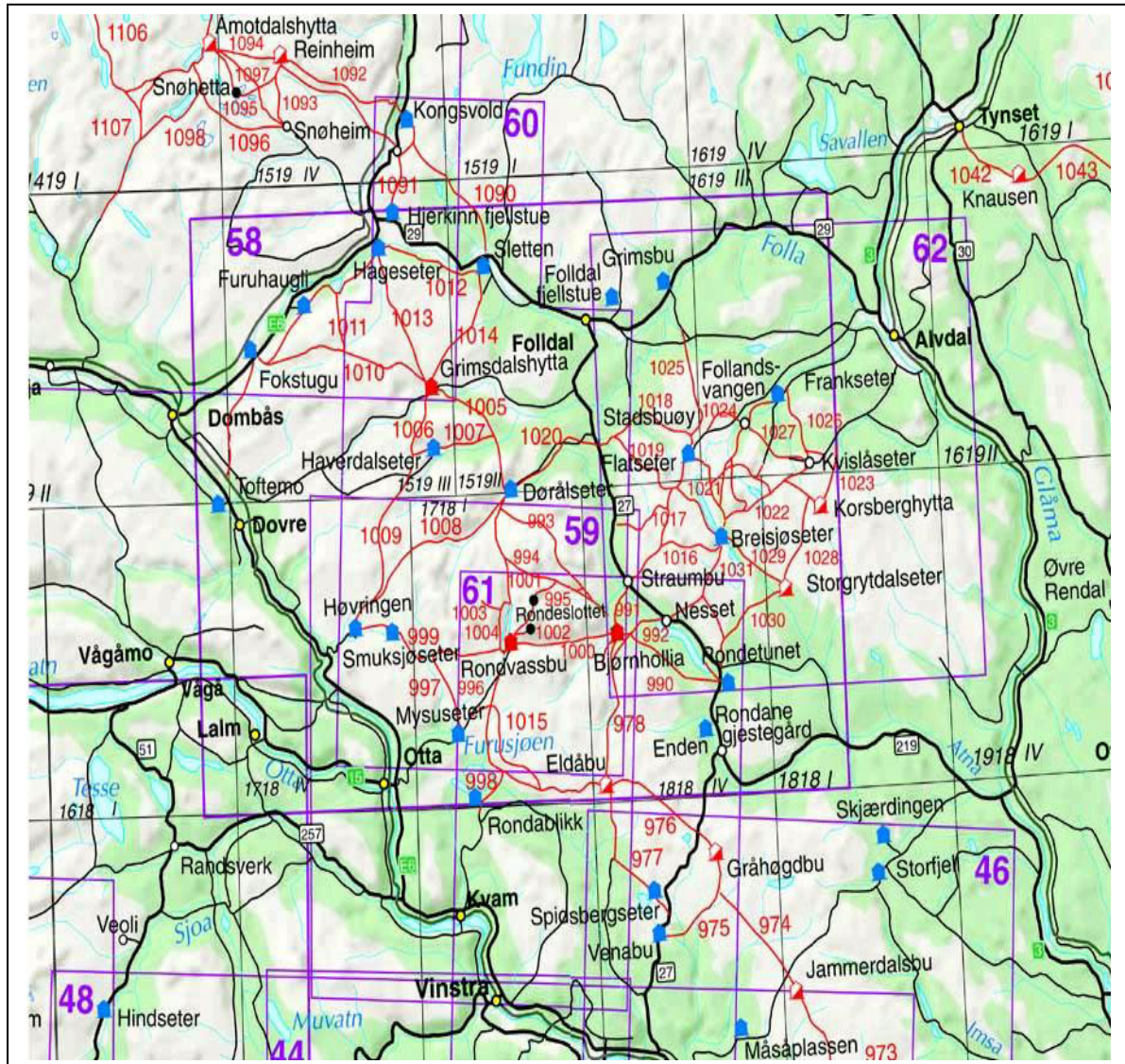
### **Tourism/Outdoor recreation**

Today, and for several decades, most impacts on the natural heritage has been caused by the development of infrastructure for tourism or out-door recreation. Concerning the wild reindeer some of the impacts by them selves are not the problem, because the wild reindeer often do not react negatively on minor impacts. The problem is that those impacts foster human disturbance and that the wild reindeer react negatively on humans. Still; most impacts, as cabins and roads, are made for use. For all practical purposed impacts is therefore also a problem for the natural heritage. That is also the case if cabins are located in the mountain valleys or outside the range of the wild reindeer, because people hike of ski into the mountain area. Still, that problem may to some extent be managed because people in the summer often follow marked trails, or marked and prepared ski trails in the winter. Figure 5 shows the summer trails in the area around state road nr. 27 and north of that road. Similar maps are not electronically available for the rest of the Rondane region. The description of tourism/outdoor recreation is concentrated both on its infrastructure and the actual use recorded.



Figur 5. Summer trails in the northern and middle parts of Rondane. The Rondane is limited by E6 in the west and the state roads no 29, 27 and 219.  
 Source: DNT

The summer trails are marked in red. The red tourist huts are tourist huts owned by the DNT. Huts marked half red/half white are their self service huts. Tourist huts marked in blue are private tourist huts. In some areas several tourist huts may exist despite only one is shown at the map. The Høvringen area in the western part has several hotels and tourist huts.



Private cabins (huts):

In 1991 the total number of existing cabins, and cabins accepted in plans within the Rondane region was 12 000. There are more cabins on the western side of the Rondane than in the eastern part.

We do not yet have precise data about the development of the number of cabins in Rondane. Still in the municipality of Sel 1691 cabin plots are registered. Not every plot is built on. Still, the annual registration of new plots, figure 6, illustrates the historic tendency for such impacts in that municipality. The numbers display some reduction of new cabins the last decade. That may be a coincidence but may also reflect an overall rate of reduction in new plots. The reason may be the Partial County Plan for Rondane, but better data is needed before a conclusion can be drawn. Ongoing research will hopefully clarify this point.

The private hotels are most often located at the fringe of the region. In 1991 the total number of beds in hotels, at camping places and other tourist firms at the fringe of the region was about 11 200.

Tourist huts:

The Norwegian Mountain Touring Association (DNT) or private persons own tourist huts in the interior of the mountain area. Most of the tourist huts in the interior of the mountains are owned by DNT and we have good data about the number of beds at those huts and the number of people staying overnight in them. Since other tourist huts exist and people may reach the interior through day trips from the fringe, or stay over night in tents, the data from DNT does not show the total use of the interior parts. Still they give some ideas and they illustrate the trend concerning number of people using the Rondane region in the summer and winter. The tourist huts with service are open in the summer from the middle of June to the middle of September. In the winter they are open from early March and about one month. For the rest of the year the huts provide self-service, but the number of beds available is then reduced. An exception is the period from May 1<sup>st</sup> to June 10<sup>th</sup> when all tourist huts are closed in order to avoid conflicts with the wild reindeer at their calving season.

In 2004 the 10 DNT huts in Rondane had altogether 365 beds. The largest tourist hut, Rondvassbu in the middle of Rondane National Park has 128 beds available in the summer season and at the most visited part of the winter.

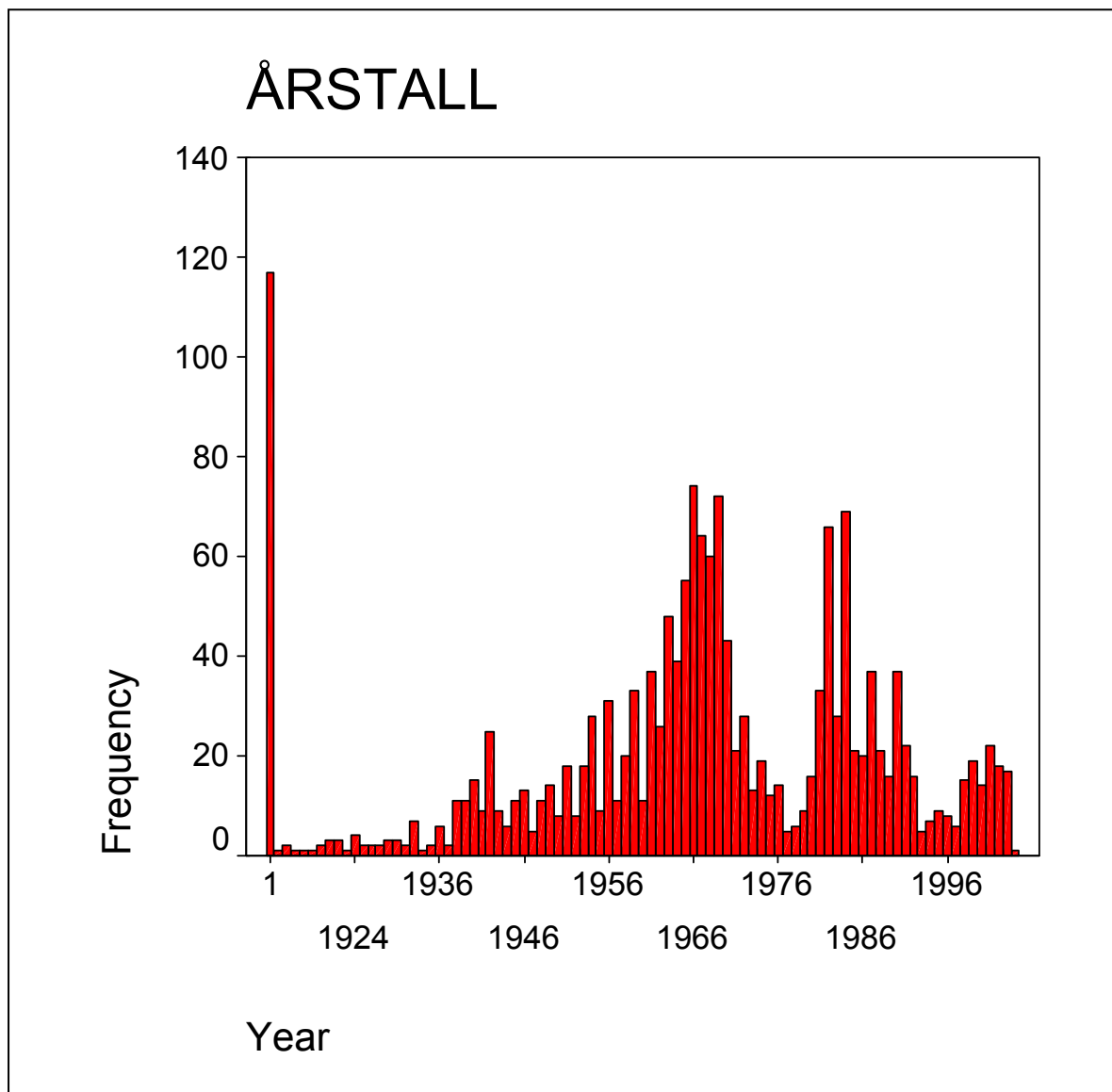
Between the early 1920's and 1996 the number of beds in tourist huts north of State Road no. 27 increased from about 60 to about 520. In the period 1920 to 1994-96 the number of overnight stays at DNT tourist huts in the northern part of Rondane increased from 225 to 21000 per year.

### **Expected trends**

It is reason to believe that the use of the Rondane region for agricultural purposes will decrease.

The number of cabins will probably continue to increase but at a lower rate and located more to the fringe of the Rondane Region. Marked trails summer and winter are used in order to direct human activity away from vulnerable areas. This will probably be used even more as a steering device. Due to the popularity of rambling and skiing, and better equipment, it is also reason to believe that the number of people using the DNT tourist huts will slowly increase, despite annual variations.

Figure 6. The annual number of new private cabins plots in the Rondane part of the municipality of Sel, 1819 – 2004. The number of cabins labelled “1” is cabins where the year for registration of the plot is unknown.



### **Natural driving forces**

In general the natural driving forces will continue. It is anticipated that global warming will cause the tree line to reach higher above sea level. That line has been increasing for decades due to a reduced grazing of domesticated animals. An increased tree line will reduce the barren ground areas and the typical high mountain ecosystems. The red fox is already a common species in the mountains and it is anticipated that its increase is one reason for the reduction of the number of Arctic fox in Norway. That species is now very rare, despite no legal hunting on them since the 1930s.

The living areas of the wild reindeer will probably be reduced due to a higher tree line. Still, the wild reindeer in the southern part of Rondane do already use forested areas. The overall result is therefore not easily foreseen but the wild reindeer will probably suffer.

More snow, and more frequent icing of pasture in the winter, may reduce the areas available for winter forage.

Wolves are not breeding in the Rondane region but they breed quite close to the region and are observed there. At the moment it is national policy to not have wolves in the Rondane region, amongst other due to conflicts with domesticated animals and the wild reindeer. If this attitude change, or the number of wolves increases by natural population increase, it is reason to believe that the wolf will influence on the ecosystem there and prey on wild reindeer. That will probably be harmful for the wild reindeer, as they have nowhere to escape.

One uncertainty concerning the wild reindeer is that its land use is rotating. The wild reindeer often graze in some areas for long period whereas other areas are not grazed. After some years this may change. The wild reindeer therefore need larger space than the land actually used at the moment. How and when they change the grazing is one of the natural factors influencing nature and the management, but it may be difficult to forecast.

## **Chapter 2. Natural heritage management**

### **2.1. History and objectives of the management of natural heritage**

The Rondane National Park was established in 1962, being the first national park in Norway. The national park was initiated in 1956 by local people who were interested in a sustainable harvesting of the wild reindeer in the Rondane Region. Those people, especially a mountain ranger, noticed an increased number of human impacts and disturbance in the mountain areas, and knew that more impacts were initiated. The ranger had already noticed negative impacts on the wild reindeer and wanted to protect the land in order to prevent further impacts. They wanted to preserve the living areas of the wild reindeer, which was hunted by local people. At the end of the 1950s no spatial planning act existed for mountain areas. The only means for preserving the area and obtaining a coordinated planning was to establish a national park, based on the Nature Conservation Act (1951).

Throughout the period 1956-1960 the planning process was steered by local people. In several of the municipalities the proposal had good support, in other there were substantial conflicts. During this period the wild reindeer was an important theme, because many local people were interested in hunting.

In 1960, the local steering committee passed over their proposal to the new established national authorities for nature conservation. The national authorities steered the rest of the planning process until the Rondane National Park was established 21st December 1962. But the national authorities changed the justification for the national park. They emphasised the areas value for natural science, cultural history, archaeology etc, and inherently for out door recreation. The wild reindeer was no longer a theme, despite it being the reason for local people initiating the park. During the late part of the planning process substantial conflicts emerged in two municipalities but not in the other municipalities.

In 1960 most people agreed that the park was supposed to be managed by a board representing local people and national authorities. Despite initial agreement, the national authorities later on, officially caused by legal problems, decided that no local board was supposed to manage the park. The management was passed over to national state agencies. No management plan was prepared. The management was based on national authorities implementing the §§ for the park.

The Rondane National Park prevented substantial impacts within its borders but not improvements of two roads to “car-standard”. The tourist huts within the park have also been allowed to increase their number of beds and a substantial network of marked trails exists summer and winter.

Outside of the national park the means for steering the management was the Building Act (introduced 1965). That act was supposed to balance between preservation of nature and economic development. But in the years between 1965 and the mid 1980s the planning only to a minor extent prevented impacts in the mountain areas and mountain valleys. Throughout these years a wide range of small and large impacts gradually reduced the areas where the wild reindeer could live, and its migration routes. Some people realized that if that development continued, the living areas of the wild reindeer would be substantially reduced.

In 1987 a mayor in one of the municipalities therefore, in cooperation with county officials, initiated a partial county plan for the Rondane region in the counties of Hedmark and Oppland. The aim of the plan was to have a coordinated planning of the areas outside of the Rondane national park in order to prevent impacts harmful for the wild reindeer. The range of the plan is illustrated in figure 2. By selecting a plan for coordinated planning according to the Planning and Building Act they agreed on a means that allowed for some new economic activity. The aim of the partial county plan for the Rondane region was to preserve the living areas of the wild reindeer but to allow for some development if care was taken for the wild reindeer.

The partial county plan was adopted in 1991 by the 12 municipalities and the counties of Hedmark and Oppland, and approved by the Ministry of Environment. The partial county plan is implemented through the ordinary municipal planning. The municipalities are the ones deciding on the binding land use of the mountain areas but that land use is supposed to be based on the guidelines of the partial county plan.

Due to some especial conflicts the Norwegian Parliament in 1993 instructed the Government to propose a conservation plan for the whole Rondane- Dovrefjell district to preserve the mountain ecosystem there. The proposal was initiated by a coalition of some local actors and some Parliament representatives. The area to be judged for conservation was set by the range use of the wild reindeer. That is the most characteristic species, and its range use was already

mapped. The areas protected according Nature Conservation Act was supposed to be enlarged and coordinated with partial county plans for the areas outside of the Nature Conservation Areas. In Rondane the Rondane Partial County Plan existed. In the Dovrefjell area (western part) a Dovrefjell Partial County Plan was supposed to be prepared.

The Parliamentary decision of 1993 formulated the strategy for the whole Dovrefjell – Rondane district; namely that the mountain ecosystem was supposed to be preserved and that preserving the living areas of the wild reindeer was especially important. Essential arguments for that strategy was that the Rondane-Dovrefjell is the last and largest high-mountain ecosystem “west of Ural” and that the wild reindeer in that district are the last remnants of the wild European mountain reindeer. The reindeer in that district is therefore genetically unique.

The strategy caused the new national park mentioned (Dovre) and enlargement of the existing parks (Rondane and Dovrefjell-Sunndalsfjella). A number of protected landscapes were established and the partial county plan for the Dovrefjell was prepared and approved.

Within the Rondane region the management of the national parks and protected landscapes are supposed to include participation from municipal actors. A management plan for the Rondane national park has been proposed but delayed due to the enlargement proposals. As the parks and protected landscapes now are decided on, preparation of new management plans will be started this year.

Despite no management plan existing at this moment for the Nature Conservation Areas the objectives of the management plan will probably be to maintain the large and coherent high-mountain ecosystem and especially the needs of the wild reindeer. Still, the area is very popular for out door recreation and the need for that recreation has to be balanced in the management plan. The means will probably be a coordinated zoning of the land use within the national parks and protected landscapes.

The Partial County Plan for Rondane, which include the areas outside the national parks and protected landscapes, was revised in 2000. Preliminary results from a scientific evaluation of that plan indicate, based on data from interviews and studies of documents, that the partial plan has had some effects in restricting impacts possibly harmful for the wild reindeer. Quantitative data of impacts are being analysed but the analysis are not yet finished.

## **2.2. Means of the management**

The management maps do generally have no information about Norway and the maps providing some information is too inaccurate. Still the map on establishing of protected areas display the general development for each decade.

European directives are not significant for the action taken and has not played any role. Still, Norways international obligations for preserving the wild reindeer have been an argument for the action taken in the area. The genetically uniqueness of the wild reindeer has been a “good” argument. As they are hunted, the wild reindeer provide income for landowners, and outdoor recreation for amongst others local people.

The designated protected areas in the Rondane-Dovrefjell district and the partial county plans are very important in a national perspective because they protect an important high-mountain

ecosystem and the land to be used by the genetically unique wild reindeer herd. The management of the region is important in a European perspective.

Representatives of the county governors environmental division will manage national parks in the Rondane region (the Dovre and Rondane national parks) and follow a management plan. For each national park an advisory board including municipal representatives will be established. The Dovrefjell-Sunndalsfjella will be managed by the “Dovrefjell Board”, which consists of one politician from each municipality. That management is a test on decentralised management of national parks.

The municipalities can manage the Protected Landscapes in Rondane and Dovrefjell-Sunndalsfjella if approved management plans exist.

The aim of the efforts is to maintain the high-mountain ecosystem, but due to other interests, primarily site-specific tourism/outdoor recreation and agriculture, the means vary:

Fiscal incentives:

Few, if any fiscal incentives exist.

Land is not acquired, except for nature reserves. Most of the areas protected as national parks are already owned by the national state. Protected Landscapes may exist on private land.

Within the Dovrefjell-Sunndalsfjella a former large military field is rehabilitated, amongst other by destroying some roads and trying to re-vegetate them. A controversy exists on a major road and what is supposed to happen with a large tourist hut former owned and managed by the military. The reason for controversy is that the road and the former tourist hut may increase the human activity and disturb the wild reindeer.

Rehabilitation:

In the Rondane region some trails at the interior of the mountains are removed in order to reduce the human disturbance in larger areas. Some summer trails are deleted from the maps and the signs in nature displaying the trails (a red T) is physically removed. The reason is that some of the trails led people to areas where the wild reindeer was supposed to have priority. New trails are established in order to steer people to less conflictful areas, predominantly at the fringe of the region. A self-service tourist hut in the interior of the region was removed due to conflicts with the wild reindeer and a new hut was established at the western fringe.

The network of marked ski trails in the winter is shaped in order to steer people away from areas vulnerable for the wild reindeer and to leave some areas without impacts.

Marked trails, summer and winter, is regarded as an effective means for reducing the conflict between nature, especially the wild reindeer, and humans. It is a popular means because it is “soft” and effective. It is still allowed to walk and ski everywhere within then region, although people are encouraged to not visit some areas. The rehabilitation has been done both in the Rondane National Park, protected landscape and in an area ruled by the Rondane Partial County Plan. The hut being removed was in the area.

Valorisation. I am not familiar with that word but it seems to have the same meaning as condensing positive experiences from evaluations.

Some aspects of the natural heritage are monitored every year, especially the number of wild reindeer, their sex and age composition and the birth rate. The monitoring is done both by scientists and local mountain rangers.

The land use of the wild reindeer is not regularly mapped, but reports from the mid 1980s and late 1990s exist. As part of the process of establishing the national parks and protected landscapes reports were written about the natural heritage. Rondane and Dovrefjell have been popular fields for scientist for decades and substantial amount of research and registrations exist.

As part of preparation of the partial county plan in 1991 data about the nature, impacts and plans were collected. At the revision in 2000 some of these data were updated.

The test management of the Dovrefjell- Sunndalsfjella national park is followed by several social scientists. The Partial County plan for Rondane was evaluated in 1997 and some recommendations were implemented. At the moment I am doing a new evaluation of the plan and its implementation but only preliminary results exist. The evaluation is part of a large project including management of regional natural resources in two other Norwegian cases and three cases in England. It is cooperation with London School of Economics and the project will hopefully improve the management of regional natural resource and common pool resources. The focus is how social capital (networks, cooperation and trust) can foster a better management of large areas with natural resources.

Public frequentation is not controlled in the Rondane region. Except for some limitations in nature reserves people are allowed to walk and ski everywhere in the Norwegian nature, including national parks and protected landscapes. That is a part of the Norwegian outdoor tradition.

Some minor national park centres and paid personnel cause money turn-back to the municipalities and the region but no other organised money turn-back exist. Still, the substantial number of tourist is an income for the landowners, municipalities and business in general. It is argued that taking care of nature is a good device for keeping the region attractive for existing users and new groups of tourists. At the moment it is a debate in Norway concerning commercial use of national parks. An argument is that compared to abroad the financial basis for managing the parks is tool low. Too few guides and managers are engaged and too few resources are allocated to centres and an active management. It is reason to believe that the commercial activity will increase but the question is how to do it without destroying the natural heritage.



## **Chapter 3. Assessment of the management on natural heritage**

### **3.1 Relevance of the management: Relevance of the objectives as regard to the needs**

- Are the objectives relevant as regard to the needs for management?

The objectives are relevant to the needs for management.

### **3.2 Internal coherence**

- Are the means of management consistent with the objectives?

The means of the management are consistent with the objectives.

- To which extent designations are translated into local planning guidance?

When the management plans for the national parks and protected landscapes in Rondane are approved they will probably guide the local planning.

The Partial County Plan for Rondane has guidelines for local planning but the crucial question is often; how close to the living area of the wild reindeer can new impacts be established and what is the consequence of proposed impacts, as new cabins. For some impacts the conclusion is quite obvious, for others the effects is a matter of debate. In order to help the municipalities solving this problem, and to reduce the uncertainty in planning considerations a study about how people use the landscape for outdoor recreation has been prepared. The results of the study will be distributed to the municipalities and landowners and function as a guide for them.

- To which extent compulsory guidance concerning the spatial integrity of the natural heritage is respected?

Compulsory guidance is generally respected.

- To which extent EU NH management policies are implemented or not at local level?
- Where and why they are hardly or even not at all implemented?

EU natural heritage management policy is not implemented and is not considered as relevant. The reason is that Norway is not a member of the Union. Despite Norway cooperating with EU as members of the European Economic Space, EU natural heritage management policy has not been relevant for the planning in the Rondane region.

### **3.3 External coherence**

- Are the objectives of the other development policies consistent with the objectives of the management of the natural heritage?

According to the new agricultural policy farmers and landowners out to research for new ways of commercialising their properties, because the income from traditional farming is decreasing. This has caused conflicts with the guidelines of the partial county plan. New

conflicts with that plan and the use of national parks and protected landscapes will probably emerge as the farmers and landowners present new proposals.

The new initiatives and politics for commercial use of national parks may in some cases be not consistent with the objectives for management of the natural heritage. Hopefully good management plans prevent conflicts.

- Does the overall spatial strategy (if any) integrate natural heritage management objectives?

The overall spatial strategy formulated for the region by the Parliament integrate natural heritage management objectives. In fact, the strategy is aimed at preserving the natural heritage.

- Are the ESDP objectives of conservation and valorisation of natural heritage achieved?

I am not familiar with ESDP objectives but they are not mentioned in the discussions or in documents.

- To which extent do you think natural heritage management helps to meet ESDP objectives (namely polycentrism, parity access to infrastructure and knowledge, sustainability)?

I am not familiar with ESDP objectives.

### **3.4 Efficiency**

- Are the management plan objectives met? If not, why?

The management plans for the national parks in the Rondane region will be initiated this year. It is therefore not possible to judge if the management objectives are met. When Rondane national park was established in 1962 no management plans was elaborated. The intentions for the local people when initiating the national park in the late 1950s were to preserve the living area of the wild reindeer. Judged in that perspective the goals or objectives were not met for several years, as the disturbance within the park increased due to roads, a larger tourist hut and a general increase in human activity. This disturbance was probably one of the reasons for the reduced number of wild reindeer observed within the Rondane National Park. Still, other factors do influence on the range used by the wild reindeer, as the sex and age composition of the herd and the number of wild reindeer in adjacent areas. In the last decade the wild reindeer seems to have increased its use of the park. The reestablishment of the herd in an adjacent area is probably important, and may be the changed system of trails has been positive for the species.

Preliminary results from a social scientific evaluation of the partial county plan for the Rondane region indicate that the partial plan has had some effects in restricting impacts possibly harmful for the wild reindeer. The effects is amongst others that the rate of new cabins close to the most important areas are decreasing and that plans for cabins are reduced, or located more to the fringe. The findings are preliminary and based on interviews and studies of documents. Quantitative analysis of impacts are not yet finished.

- What are the difficulties encountered as regard to the management objectives?

Concerning the Rondane National Park the difficulties for several years was to get powerful people to acknowledge that a conflict existed between the two inherent goals of Norwegian national parks namely the goal of providing space for outdoor recreation and protection of the natural heritage, as the wild reindeer. Throughout the 1980s this attitude started to change, may be due to the establishment of an environmental division at the county governors office.

In the area ruled by the partial county plan the difficulties has been that the ones primarily responsible for the spatial planning, the municipalities, have not preferred the wild reindeer and the natural heritage compared to economic development. The impacts have often been private cottages but also other impacts serving tourism and outdoor recreation. As time has passed this seems, to some extent, to have changed.

Another part of the problem is where to draw the line between which impacts are harmful and which are not. Because the partial county plan is supposed to allow for some impacts, all impacts cannot be prohibited. If that become the case it reduce the support for the plan and then in the long run its survival. So some compromises have to be made, but where to draw the line?

Another problem is to judge all proposals equally, across the county border and municipal borders, and to obtain mutual acceptance on the decisions.

For the case of the partial county plan a planning board, with representatives from the municipalities in both counties and the county level authorities, seems to have played an important role in keeping focus on the plan and calibrating the judgements. Still, their judgements are some times questioned.

- Is there any assessment tool or processes?

For the Rondane national park and Dovre national parks so far no assessment tool or processed exist, but may be proposed in the coming management plans.

The Partial County Plan for Rondane has been assessed in a social scientific report and in ongoing research.

Still, an assessment seems to exist through the ordinary use of the plan. By organising meetings with each municipality the planning board has a dialogue with them about the plan. During the revision process the plan and its implementation was assessed. The plan is also assessed at the annual meeting with all interested parts, the Rondane conference.

- Does the assessment process help in reviewing the management plan?

The assessment of the partial county plan has influenced on the interpretation of it. The guidelines and types of areas or zones were changed at the revision in 2000.

- Does it help in reviewing the spatial strategy of the area?

The strategy itself for the area does not seem to be reviewed, but revised planning tools will be helpful in order to reach the spatial strategy because they are more in line with the ongoing thinking and practise.

- What are the strengths of the management?

The means are part of a coherent spatial planning and management system, where each mean is adapted to the different natural qualities and degree of human impacts/activity. It is a mix of national parks, protected landscapes, nature reserves and the partial county plan for the Rondane Region.

- What aspects of the management could be considered as ‘best practice’? Why?

The coherent system of spatial management mentioned seems to be a quite good on the paper. Still, we do not know how it will function with regard to the management in practice, as the management plans for parks and protected landscapes are not yet prepared. May be the partial county plan, and its planning board is good practice for areas with many impacts but we have to complete the ongoing research before answering that question. The Planning Board is interesting because it has a role that is generally important for management of common pool resources.

- What are the weaknesses of the management?

From the point of preservation of the natural heritage, and especially the wild reindeer, the increase in human activity throughout the last decades is a weakness. Still, the management is in progress, amongst others the evolution of soft means for steering hikers and skiers.

- What would happen with a sustainable management?

I do not know. May be the management is good?

### **3.5 Effects on spatial developments: spatial interactions**

#### **Effects on productive landscapes**

- Agriculture – Have you stated a shift in the production system?

We have no data about this but I do not think that the management has caused shift in the agricultural production system.

- Forestry – Have you stated a shift in the production system (forestry plans take into account ecological concerns, quality labels for private owners)?

We have no data about this but in areas preserved as national park or protected landscape forestry will probably be influenced by the rules for the protected areas.

#### **Effects on infrastructures**

- Has the designated natural areas ‘guided’ the path of new linear infrastructures?

According to the Partial County Plan for Rondane just one road crossing the region is supposed to be cleared for snow in the winter. The only road cleared is State Road no 27 between the municipalities of Ringebu and Stor-Elvdal. The problem with that clearing is that the road may be used as point of departure for skiers to important winter forage areas and a critical migration route. According to guidelines it is prohibited to stop a car at specific zone close to that migration route. The police are supposed to make sure that people do not stop their cars.

### **Effects on dwellings**

- Have you stated an increase of the residential attractiveness of the area? Of land prices?

We have no data about such matters but I doubt that the planning in the Rondane region influences prices on dwellings.

- Have you stated a shift in the social composition of the area?

We have no data about such matters but I doubt that the planning in the Rondane region influences on the social composition of people living in the municipalities.

- Has the management of natural heritage induced a specific settlement pattern?

It seems unlikely that the efforts in the Rondane region have influences on the settlement pattern.

### **Effects on economic development**

- Has the management of natural heritage restrained the development of polluting economic activities and favoured the development of high quality activities?

In the period 1987 – 1991 200 tons of ammunition and missiles was destroyed at the military field at Hjerkin, at the core of the Dovrefjell-Rondane mountain district. In 1991-92 the military field was proposed enlarged. The Ministry of Environment had also accepted that some old mines at Hjerkin were used as deposit for special waste. These proposals and decisions caused an intense local, regional and national debate. Dovrefjell is one of the national symbols of Norway. The outcome of the debate was that instead of more impacts/pollution a strategy in order to preserve the mountain ecosystems was formulated. I do not know the extent of new high quality activities, but probably a range of such activities exist.

- Has it favoured the setting up of environmental management or quality labels?

Closeness to the Rondane National Park is often used as an argument for visiting hotels, tourist huts etc. The wild reindeer herds, and its genetic uniqueness are often pinpointed in brochures and other written material aimed at inspiring people to visit the area. That material does also mention that people have to be cautious and not disturb the wild reindeer. I do not know how this advertising influences on the regions popularity for tourists or establishing of private cabins. Rondane is, in any case, one of the classic areas for tourism and out-door recreation in Norway.

### **Effects on tourism**

- Has it induced an overall increase of tourism, or new forms of tourism?

I do not have data about this issue. Rondane has for decades and back to the early 1900 been a very popular area for tourism and outdoor recreation due to it being easily accessible and its natural beauty. It is difficult to answer if Rondane national park and the new and enlarge parks have increased the tourism but parks make an area more famous and it is generally anticipated that tourism increase if an area is designated as national park.

#### **Others effects**

- Have you stated others spatial effects in relation to natural heritage management?

No.

#### **Spatial interactions: database relevance**

- Do we have equivalence between the interplays shown by the database and the previous development interplays?

The databases do not exist or is not precise enough for the Rondane- Dovrefjell district and the Rondane region.

### **3.6 Achievement of the objectives of the European Spatial Development Perspective**

See section 3.3.

#### **Assessment of the management of the natural heritage on spatial developments**

##### **Effects of the management of the natural heritage on spatial development**

This matter is discussed earlier in the case study, concerning the effect of the partial county for the Rondane region. The proposal and establishment of Rondane national park in 1962 aborted several proposals on new human activity. That was proposals on hydroelectric development, new roads into the mountains or across them, an airfield and a range of minor proposals. Still, since the park was established two roads are improved to “car standard” and the tourist hut Rondvassbu has been enlarged. Snow scooter trails to that hut is accepted and quite often used by the managers there.

Up to the mid 1980s the national park did not influence on spatial developments outside of its borders. From the mid 1980`s some proposals in municipal plans, as new cabins close to the park, were objected by the county level authorities and aborted due to conflict with the Rondane national park.

#### **Relationship of case study with ESDP objectives**

I am not familiar enough with ESDP objectives to make a judgement on the relationship between the case study and ESDP objectives.

#### **Conclude on the 3 or 4 prior driving forces of developing a scenario**

The most important driving forces for the spatial development in the Rondane region, and the influence on the natural heritage, is probably the general increase in outdoor recreation/tourism and the changes in agricultural policy. Although the farmers or landowners have sold plots for cabins throughout the last decades, the high prices for such plots and

reduced income from ordinary agriculture probably cause the increased efforts of selling plots and developing their infrastructure.

## **Chapter 4; Scenarios**

### **Scenario 1, Evolution under current trend**

A basic development force is an open world trade and cheap agricultural products from overseas and the EU. The price of agricultural products in Norway decrease as a consequence of such cheap imported products. That forces the farmers and landowners to search for new types of income. One reason for the low prices is probably that transport costs are low and that the real consequences of emission of CO<sub>2</sub> from transport, and subsequently global warming, are not reflected in the product prices. The real costs for society in the long run is therefore not reflected in the prices. As long as this can go on, as transport of meat produced in South-America, prices will be low.

Another factor fostering low prices on food is the large-scale agriculture. That agriculture may be questioned from the point of animal well being, and food quality and safety as people become sick due to contamination of the food.

The overall reduction in agriculture, and the general process of urbanisation, is probably important factors behind population decrease in the middle and northern part of the Rondane region.

At the same time the general income in Norway has increased considerably and people are afforded to stay in the mountain areas, either in their own cabin or at hotels etc. This process is helped by an increase in outdoor recreation, which may be quite environmentally friendly if managed.

This trend has generated new income to the municipalities but the population has decreased. It is reason to believe that this trend will continue. The partial county plan for Rondane will probably cause the cabins to be built more distant from the range of the wild reindeer in order to avoid disturbance of the wild reindeer. Still the total pressure within the region will probably continue and decrease the living areas of the wild reindeer. An important matter is, that despite a reduction in new cabins, at least 12 000 cabins are already built and are potential sources of disturbance. The new cabins will therefore in general be marginal to the existing ones, but may increase the disturbance in selected areas.

So far the long-term trend for hiking and skiing has been a general increase. It is reason to believe that this will continue and increase pressure on the wild reindeer and the natural heritage.

All together these trends, despite a partial county plan and national parks etc, will probably cause an increased use of the mountains and increase the pressure on the areas available to wild reindeer. That will probably cause an overall reduction of the herd in order to keep the right number of reindeer relative to the pasture really available. At the same time the high mountain ecosystem will be under pressure due to global warming and continued rise of the tree line. The wild reindeer and the ecosystem are therefore under double pressure.

## **Scenario 2, Evolution under effective management and valorisation of natural heritage**

The basic assumption of this scenario is that the prices of agricultural products rise because the real social and future cost of emissions from CO<sub>2</sub> is incorporated in the food prices. Those costs are incorporated in order to halt and reduce global warming.

Agricultural products are also more expensive because the price of producing them increases due to smaller units and limitations in order to improve animal health, the quality of food and reduced spread of diseases. This will cause the Norwegian farmers to increase their prices, and higher prices are accepted because food is produced locally and environmentally friendly. The pressure on alternative income is lower, but farmers do still sell plots. Tourism and outdoor recreation continues but is adapted to the limits of the natural heritage. Good products and prices of food and other commodities from nature, and certification of environmental friendly production encourage local people to support care taking of the natural heritage.

The rate of new cabins is drastically reduced, but the very slow rise and the outdoor recreation from existing cabins and hotels are steered to areas with good quality experiences but with minor negative influence on nature. Effective means control the access to the interior of the mountain by car. That reduce the overcall pressure, but people do still walk and ski, but on an adapted system of trails and well aware of how to reduce negative impacts on nature. It is still allowed to walk freely in nature but most people prefer trails. This causes the nature heritage to develop naturally, and the range used by the wild reindeer has even increased. Special products are made from the meat, bones and fur of wild reindeer, causing farmers and landowners to strongly support a preservation of its range and a slow increase in the number of wild reindeer.

Reduced transport has halted and reversed the global warming and the tree line is falling. This does to some extent increase the size of the high-mountain areas and the long-term survival of the high-mountain ecosystem

## **Chapter 5. Conclusions**

The general conclusion is that through a variety of means based on both the nature Conservation Act and the Planning and Building Act, a reasonably good system for management of the region is established. Still, how this system will function in the long run will depend on the management plans prepared this year and their implementation. The challenge for the system of means will be to manage an anticipated increased use of the mountains for tourism and outdoor recreation.

## **Sources**

The report is based on a wide range of different sources, including written material and interviews with people actively working with the partial county plan for the Rondane region. The report is also much influenced by the knowledge I have from more than 20 years of experience in studies of the region and the spatial planning and management there.



**ESPON 1.3.2 TERRITORIAL TRENDS IN THE MANAGEMENT OF  
THE NATURAL HERITAGE:**

**CASE STUDY OF THAMES BASIN HEATHS POTENTIAL SPECIAL  
PROTECTED AREA**

---

PREPARED BY LAND USE CONSULTANTS  
2004

**ESPON PROJECT 1.3.2 TERRITORIAL  
TRENDS IN THE MANAGEMENT OF  
NATURAL HERITAGE**

**UK CASE STUDY: THAMES BASIN  
HEATHS POTENTIAL SPECIAL  
PROTECTED AREA**

**Prepared for Euronet  
Land Use Consultants**

**February 2004**

43 Chalton Street  
London NW1 1JD  
Tel: 020 7383 5784  
Fax: 020 7383 4798  
[luc@london.landuse.co](mailto:luc@london.landuse.co).



# CONTENTS

<b>1. INTRODUCTION</b> .....	<b>1</b>
<b>2. GENERAL ANALYSIS</b> .....	<b>3</b>
Description of the territorial context .....	3
State of the Natural Heritage .....	8
Assessment of Spatial Interrelations .....	9
Management Objectives .....	11
Management Measures .....	13
Assessment of the Effectiveness of Management .....	17
<b>3. SUB-SCENARIOS</b> .....	<b>21</b>
Scenario 1: continuation under current trends .....	21
scenario 2: evolution under effective management and valorisation of natural heritage .....	22
<b>4. INTEGRATED SCENARIOS</b> .....	<b>25</b>
<b>5. RECOMMENDATIONS, SUGGESTIONS</b> .....	<b>27</b>
<b>6. BIBLIOGRAPHY</b> .....	<b>29</b>
<b>7. LIST OF CONTACTS INTERVIEWED</b> .....	<b>31</b>

## TABLES

Table 1: Characteristics of Case Study Area .....	5
Table 2: Population of bird species listed in Annex 1 of the Birds Directive	8
Table 3: Example of Favourable Condition Table, Broadmoor to Bagshot SSSI .....	11

# 1. INTRODUCTION

---

## SELECTION OF CASE STUDY

- 1.1. This case study on the Thames Basin Heaths Potential Special Protected Area (pSPA) has been produced for ESPON project 1.3.2 entitled 'Territorial Trends of the Management of the Natural Heritage'.
- 1.2. The ESPON (European Spatial Observation Network) programme of research was developed on the back of the production of the European Spatial Planning Development Perspective (ESDP), which sets out three fundamental objectives in relation to balanced and sustainable spatial development:
  - Economic and social cohesion
  - Conservation of natural resources and cultural heritage
  - Balanced competitiveness of European Territory
- 1.3. The Thames Basin Heaths pSPA was chosen as the UK case study for two main reasons in relation to these ESDP objectives. Firstly, the area has a bearing on European policy as it is recommended as a SPA under the Birds Directive and therefore receives protection equivalent to European status under the Conservation (Natural Habitats &c.) Regulations 1994. Secondly, the area has experienced severe development pressure over the last 50 years, which has resulted in a fragmentation of important open heath habitats and a peripheral pattern of residential development.
- 1.4. Current and likely future trends in management and protection of the area provide useful experience which can feed into the analysis of trends and effects of European Community policy - the central theme of ESPON 3.1.2.

## METHODOLOGY

- 1.5. This case study was put together from three main elements. Discussions were held with English Nature staff involved in the management of the pSPA to gain an insight into how the management of the area has changed over time, the pressures it has faced and the effect that European protection status has had. Numerous guidance documents and legislation were researched, including specific material on Sites of Special Scientific Interest and the Habitats Regulations. These are listed within the bibliography at the end of the report. Finally, a recent case study of the Surrey Structure Plan was incorporated into the report, to illustrate how European policy is being applied at the local level.

## **LIMITATIONS**

- 1.6. There is little mapped data and data sets for the Thames Basin Heaths that could be incorporated into this study. There is currently an on going contract to compile this information into GIS format and this should be available in one month's time. Further discussions and interviews with English Nature project officers, land owners and managers would have helped to provide a more comprehensive qualitative evidence base for the project, but this was not possible in the time.

## **2. GENERAL ANALYSIS**

---

### **DESCRIPTION OF THE TERRITORIAL CONTEXT**

#### **Location**

- 2.1. The Thames Basin Heaths Potential Special Protected Area (pSPA) covers an area totalling 8377.21ha stretching across the three counties of Berkshire, Hampshire and Surrey in South East England. Map 1 shows the location and extent of the area.

#### **Land Use and development pressures**

- 2.2. The pSPA consists of a composite group of blocks of heathland and conifer plantations, comprising open dry heath, wet heath, acidic valley bog, scrub woodland, secondary woodland and rotationally-felled coniferous woodland. The surrounding land is predominantly made up of a mixture of pony paddocks and residential development. It is bordered to the south by the A3 and A31 and intercepted by a number of B roads links to Woking, Bracknell and Aldershot. There are also a number of river valleys cutting through the area including the Rivers Blackwater, Wey and Bourne.
- 2.3. The area is under a significant amount of development pressure due to its location within amongst a number of urban centres such as Guildford, Woking and Bracknell and in the wider context of substantial demand for housing in the South East region. Over the past one hundred years, the area has evolved from one composite block of open heathland to become a group of fragmented habitats inter-dispersed by residential development and associated infrastructure.
- 2.4. Maps 2, 3 and 4 were prepared to examine how land use has changed in the study period. Each map is an Ordnance Survey edition, dating from 1904, 1947 – 1959 and 2003 respectively. Map 3 is a composite of a number of different editions and had to be scanned from paper copy, whereas Maps 2 and 4 were obtained as digital copies. The pSPA is shown on each map for ease of reference. The principal land use changes are described below.

#### **1904 – 1947/1959**

- 2.5. One hundred years ago much of this part of south east England was still open land, comprising an extensive mosaic of woodland and heathland habitats. The areas that now form part of the pSPA were contiguous with the surrounding open land.



- 2.6. The railways had recently been constructed, including the mainline from London to the south coast (Southampton and Portsmouth), and there were signs of railway-related development, notably at Woking, Aldershot (a garrison town) and to the south of Broadmoor and Bagshot Woods and Heaths (the town now known as Camberley).
- 2.7. By the middle of the Century, the growth of the towns served by the railway network was more apparent. This was particularly marked at Guildford and Woking. To the north east of the pSPA is the Thames Valley itself. This was subject to very considerable land use change in the first half of the 20<sup>th</sup> Century, including the development of Heathrow Airport (on heathland, as its name suggests), the construction of water supply reservoirs for London, and extensive extraction of river valley gravels. The large expanses of open water to the south west of London are now a candidate SAC.

### **1947 – 2003**

- 2.8. The second half of the 20<sup>th</sup> Century saw a dramatic change. Most significant of all was the construction of the M3 Motorway from London to the Southampton. This shifted the focus of development from the railway corridors to the central part of what is now designated the pSPA, as well as along the valley of the River Blackwater. Camberley and Farnborough in particular grew almost out of all recognition.
- 2.9. The start of this period saw the introduction of the modern-day planning system in England, with the enactment of the 1947 Town and Country Planning Act. As well as introducing standard planning controls over development for the first time, it also paved the way for the new style of development plans. One of the main functions of these plans was to provide for the growth required to rebuild the economy of the country after the Second World War.
- 2.10. Later in the 1960s, attention focussed on the planned expansion of London through the designation of a new generation of towns and town expansion programmes. This policy was the driving force behind the expansion of Bracknell, immediately to the north of Broadmoor to Bagshot Woods and Heaths.
- 2.11. The pattern that is left is one of the designated parts of the pSPA now being almost entirely enclosed by urban development.
- 2.12. Overall, the extent of land use change, notably the scale of development and consequent fragmentation of the heathland, is apparent from the maps. We also examined the pattern of land use and development pressure illustrated by the relevant Europe-wide maps prepared for the Territorial Trends in the Management of Natural

Heritage (see Table 1), to see if the same pattern was revealed using much smaller scale maps and Europe-wide datasets.

**Table 1: Characteristics of Case Study Area**

<b>Map</b>	<b>Classification of case study area</b>
Percentage of built-up area for NUTS3 regions	50 – 100% of built-up area
Fragmentation index consisting of % natural area and number of patches	<20% natural area and 10-30 patches/10km <sup>2</sup>
Population density	500-1000 inhabitants per km <sup>2</sup> 1999
Population growth for NUTS3 regions	0-10% population change 1995-2000
Percentage of agricultural area for NUTS3 regions	50-60%
Distribution of semi-natural land cover types	Urban fabric and agriculture Corine land cover
Percentage of natural area for NUTS3 regions	5-10%
Mean size of natural areas for NUTS3 regions	1 – 250 ha

2.13. Although the Europe-wide maps are at a small scale and the data are therefore relatively coarse, they do confirm the general characteristics of the case study area.

### **Spatial Strategies**

2.14. A number of land use development plans apply to the area:

- At the regional scale **Regional Planning Guidance for the South East (RPG9)** runs from March 2001-2016. A number of key topics such as waste and transport are undergoing an early review and a full review is taking place within 2004/5. Existing RPG9 proposes a total of 23,000 houses to be built each year between 2001-2006.
- **Hampshire Structure Plan** runs from 2000-2011 and covers the western half of the pSPA including the **Districts of Hart** and **Rushmoor**. Local plans for both of these areas will need to accommodate nearly 5,000 and 3,000 dwellings per year respectively.

- **Berkshire Structure Plan** covers an area to the north of the pSPA. The new Structure Plan is currently being produced and will run from 2001-2016. Proposals include the provision for 2,500 houses to be accommodated in Bracknell District each year, the location of which will be determined by the **Bracknell District Local Plan**.
- The **Surrey Structure Plan** is currently being produced and is due to run from 2004 to 2026. It proposes 35,400 dwellings to be accommodated within this time period. In terms of the area covering the pSPA, this will have a bearing on Local Plans for **Woking** and **Guildford**. Allocations to the north-west of Guildford are the subject of a separate case study in this report under the section entitled 'Assessment of Effectiveness of Management'.
- A host of other strategic plans cover the area at county and local level, including **waste and minerals plans, economic** and **transport plans, rural strategies**.

### **Designated Areas**

- 2.15. The area is covered by a number of international and national designations. The full list of international, national and locally designated sites covering the area is set out in Appendix 1.
- 2.16. Sites of international importance include the Thames Basin Heaths pSPA, two Candidate Special Areas for Conservation (cSAC), and two RAMSAR sites which exist towards the north east boundary of Surrey.
- 2.17. The Thames Basin Heaths pSPA is proposed for designation under the European Commission Directive 79/409 on the Conservation of Wild Birds (the Birds Directive). Planning Policy Guidance note 9 (PPG9) *Nature Conservation* clarifies that for the purpose of considering development proposals affecting them, potential SPAs and candidate SACs should be treated in the same way as classified SPAs and designated SACs.
- 2.18. National designations covering the area include a total of 13 individual Sites of Special Scientific Interest (SSSIs) and three National Nature Reserves (NNRs). PPG9, paragraph 13 clarifies that all NNRs, terrestrial RAMSAR sites, SPAs and SACs are also SSSIs under UK national legislation.
- 2.19. PPG9 states that policies to be applied to key sites of nature conservation importance, such as SSSIs and SPAs, should reflect their relative significance, and place particular emphasis on the protection of internationally important sites (paragraph 22). English Nature's role in ensuring these sites are afforded the appropriate level of protection is discussed further under 'Management Measures'.



## STATE OF THE NATURAL HERITAGE

2.20. The site was formally confirmed as a pSPA in October 2000 because of its ornithological importance. It qualifies under the Birds Directive as it is regularly used by 1% or more of the Great Britain population of species listed in Annex 1 of the Directive in any season:

**Table 2: Population of bird species listed in Annex 1 of the Birds Directive**

Annex 1 species	Population	% of GB population
Nightjar <i>Caprimulgus europaeus</i>	264 churring males (1998/99)	7.8
Woodlark <i>Lullula arborea</i>	149 pairs (1997)	9.9
Dartford Warbler <i>Sylvia undata</i>	445 pairs (1999)	27.8

2.21. These species are characteristic of heathland habitats. The site also supports a range of other species associated with open habitats including:

Hobby *Falco Subbuteo*

Little Ringed Plover *Charadrius dubius*

Woodcock *Scolopax rusticola*

Redstart *Phoenicurus phoenicurus*

Skylark *Alauda arvensis*

Stonechat *Saxicola torquata*

Tree Pipit *Anthus trivialis*

Yellowhammer *Emberiza citrinella*

2.22. In winter, a number of Annex 1 species occur in small numbers:

Hen Harrier *Circus cyaneus*

Merlin *Falco columbarius*

Short-eared Owl *Asio flammeus*

Kingfisher *Alcedo atthis*

## **ASSESSMENT OF SPATIAL INTERRELATIONS**

- 2.23. Over one hundred years ago, the vast majority of the Thames Basin Heaths area was open heath land. The area was used for extensive forms of agriculture e.g. low density grazing which slowly began to be infilled by trees. Over the past fifty years **pressure for residential development** has increased which has resulted in a fragmentation of the heathland habitat. This reflects the locational circumstances of the local area being surrounded by a number of urban centres such as Guildford and Woking, but is also symptomatic of development pressures as a result of social and economic trends in South East region as a whole. Since the First World War, the use of the site for **army training activities** has had a significant bearing on its land use and management. Interrelations of the area with a number of different individual spatial elements are considered below.

### **Forestry**

Management of the pSPA is increasingly affecting forestry through seeking rotational felling regimes. These practices are beneficial to species by ensuring the sustained availability of heathland habitats rather than being interrupted by continuous forestry systems.

### **Agriculture**

One objective being applied to a number of SSSIs e.g. Chobham Common is the re-introduction of grazing. This stimulates heathland re-growth and hence is beneficial to nesting birds.

### **Settlement pattern**

pSPA status bring with it protection at the highest level for the pSPA. This has acted as a constraint on housing infill in the area. This has resulted in a pattern of development that is restricted to the peripheries of the designation.

### **Economic development**

Although the designation restricts all forms of hard development, economic development is likely to pose less of an indirect threat to the pSPA than residential. This is due to the fact that employment uses tend not to bring the pressures for access and recreation associated human populations in residential areas. For this reason, planning decisions may view certain forms of economic development (e.g. knowledge-based) more favourably to residential use.

### **Residential setting**

The residential setting is generally enhanced by the pSPA due to the attractive landscape it provides.

### **Land prices**

The pSPA is likely to have contributed to increased land prices in the locality. This is primarily because the designation is restricting the supply of developable land within a region of high demand for housing and economic development.

### **Tourism**

The area does not attract many tourists, but major events do take place in the area on an exceptional basis e.g. orienteering.

### **Other spatial elements**

The pSPA has had no obvious effect on the social composition and infrastructure (no major road schemes have taken place since pSPA status was granted in 1999) and there has been no establishment of any environmental management or quality label.

### **Effective protection in the future**

- 2.24. Fragmentation of the heathland over a number of years and the existence of hard developments - residential and associated infrastructure - mean that there is little scope for expanding the pSPA or seeking to develop habitat or wildlife corridors of any significance.
- 2.25. The main opportunity for securing the future of the area is likely to be through increased understanding of the needs and interactions of local communities with the individual SSSIs. Ideally, an overall strategic plan for the pSPA would include objectives for balancing community needs with protection of habitats and species. This would be informed by comprehensive monitoring and spatial data on levels of access, pressure points, user facilities, parking etc. as well as more comprehensive feedback on community wants and needs.
- 2.26. It is also hoped that more integrated and strategic planning decisions in the future can result in more contributions from developers towards the management and enhancement of the pSPA, and less of a need for objections to planning decisions on a site by site basis. These factors are discussed in more detail in chapter 3 'Sub Scenarios'.

## MANAGEMENT OBJECTIVES

2.27. Whilst there is no overall management strategy for the area, there is an overarching objective for the pSPA consistent with its status as a European designation, and paragraph C10 of PPG9 *Nature Conservation*:

**'Subject to natural change, to maintain\*, in favourable condition the habitats which support internationally important populations of woodlark, nightjar and Dartford warbler, with particular reference to lowland heathland and rotationally managed plantation.'**

\* maintenance implies restoration if the feature is not currently in favourable condition.

2.28. A Favourable Condition Table (FCT) is used by English Nature and other relevant authorities to determine if a site is in favourable condition. Each SSSI within the pSPA therefore has its own FCT.

2.29. A series of targets specify the natural structure of a particular attribute of a natural site feature required to meet this condition. Natural features are split into levels one and two. Level 1 are primary operational features underlying the designation i.e. habitats and Level 2 are those elements that Level 1 features support i.e. species.

2.30. Below is an example of existing targets for the extent of coniferous woodland in the Broadmoor to Bagshot SSSI (the full FCT for the Broadmoor to Bagshot SSSI is set out in Appendix 2).

**Table 3: Example of Favourable Condition Table, Broadmoor to Bagshot SSSI**

Operational feature	Criteria feature	Attribute	Measure	Target	Comments
Coniferous woodland	Annex 1 populations of European Importance: Woodlark,	Extent of habitat	Area of young plantation or other open areas	No decrease in overall extent of less than 4 years old (<6 years if appropriate management is undertaken), or other open areas, from a reference level, unless additional suitable habitat is provided i.e. restored heathland.	The overall area of suitable habitat with the correct vegetation characteristics (for nesting/display/feeding/ roosting woodlark) should be maintained, although the distribution will vary as areas of plantation mature or are felled.  Reference level to be determined



--	--	--	--	--	--

- 2.31. The assumption is that for the feature to be in favourable condition all attributes must be favourable for the feature on the site as a whole. It is not however necessary for every target to be met for an attribute to be judged favourable, nor is it necessary for the feature on every unit to be in favourable condition for the feature on the site as a whole to be favourable. A judgement is made as to the extent to which a target is missed and the significance of this target.
- 2.32. To date, management has concentrated on these objectives at the individual site level. For ease of management, each site is divided into a series of units to which level 1 and 2 features apply. The size of each unit is dependent on a mix of factors e.g. ownership, mix of natural features.
- 2.33. Site level management has been suitable for the short term, but is less effective when considering the long-term management of the pSPA as a whole. It is planned that management in the future will be informed by monitoring trends clearly illustrated by highly accessible data sets (likely to be GIS format) for a wider range of factors e.g. bird populations, recreational use.

## **MANAGEMENT MEASURES**

- 2.34. In order to explain the range of management measures undertaken by English Nature for the benefit of the Thames Basin Heaths, it is important to understand the Agency's formal responsibilities. English Nature's functions were laid down in sections 132 to 134 of the *Environment Protection Act 1990* (including functions previously discharged by the former Nature Conservancy Council under other Acts) and include:
- The notification of areas of land and water which, in the opinion of English Nature are of special interest by reason of their flora, fauna or geological or physiographical features, known as Sites of Special Scientific Interest (SSSI), to the Local Authority, all owners and occupiers of that land, and the Secretary of State;
  - Securing the favourable management of SSSI;
  - The implementation, on behalf of Government, of international conventions and European Directives on or affecting nature conservation in England, with responsibilities for the Habitats and Birds Directives and the Ramsar Convention;
  - The establishment, declaration and management of National Nature Reserves (NNR);
  - The provision of advice to Government on the development and implementation of policies for or affecting nature conservation, and the provision of advice and information on nature conservation to other organisations and individuals
- 2.35. The implementation of these functions is discussed below firstly in terms of English Nature's role in planning system, and secondly through working directly with site landowners and/or occupiers to promote active conservation management.

### **Protection through the planning system**

- 2.36. In essence, PPG 9 requires that local planning authorities should have regard to the relative significance of international, national, local and informal designations in considering the weight to be attached to nature conservation interests. PPG 9 also states that the presence of protected species is a material consideration when a local planning authority is considering development proposals. This should be reflected in development plan policy.
- 2.37. English Nature is a statutory consultee in the planning process and provides advice to planning authorities on nature conservation issues in relation to land use planning. This can be through representations to development plan policies (in this case, in relation to spatial strategies

listed under the section 'Territorial Context' in this chapter) to ensure supportive land use and sustainable development policies and through responses to individual planning applications.

- 2.38. A particular opportunity for securing positive policies for nature conservation exists for areas within the pSPA where there is pressure for minerals quarrying e.g. within Hampshire. Minerals operations in the area will often involve areas of land where only a small proportion of the site provides a habitat for nesting birds. English Nature is able to influence restoration conditions for these sites to provide new areas of heathland habitat.
- 2.39. Regulation 48 of the Conservation (Natural Habitats &c.) Regulations 1994 (subsequently referred to as the Habitats Regulations) provides the primary mechanism for safeguarding European nature conservation interests in the UK.
- 2.40. The Regulation requires that any plan or project likely to have a significant effect, either alone or in combination with other plans or projects, on a European site be subject to an *appropriate assessment* to ascertain that it would not adversely affect the integrity of the site. Regulation 48 of the Habitat Regulations sets out the requirements for appropriate assessment.
- 2.41. Paragraph (3) of Regulation 48 states that a competent authority<sup>1</sup> shall for the purposes of the assessment consult the appropriate nature conservation body and have regard to any representations made by that body.
- 2.42. The Favourable Condition Tables discussed under 'Management Objectives' are used to inform the scope and nature of any appropriate assessment under the Habitats Regulations, but an appropriate assessment will also require consideration of issues specific to the individual plan or project. The scope and content of an appropriate assessment will depend upon the location, size and significance of the proposed project. English Nature advise (as the appropriate conservation body) on a case-by-case basis.
- 2.43. Following an appropriate assessment, competent authorities are required to ascertain the effect on the integrity of the site. The determination of favourable condition is separate from the judgement of effect upon integrity.

---

<sup>1</sup> The competent authority as defined in Regulation 6(1) of the Habitats Regulations, includes any Minister, Government Department, public or statutory undertaker, public body of any description or persons holding public office,

### **Working with landowners and/or occupiers**

- 2.44. SSSIs were established under the National Parks and Access to the Countryside Act 1949 and have received strengthened protection through subsequent legislation, including the Wildlife and Countryside Acts 1981 and 1985, and the Countryside and Rights of Way (CROW) Act 2000.
- 2.45. This legislation provides a legal duty for all owners and occupiers of SSSIs to maintain sites in a favourable condition. In addition section 28G of the CROW Act places a general duty on public bodies to take reasonable steps to further the conservation and enhancement of the features for which a SSSI has been notified. They must consult English Nature before carrying out any potentially damaging works on sites and show that they have taken this advice into account.

### **Monitoring**

- 2.46. Each land unit described in the previous section is formally monitored by English Nature every 6 years and in addition more regular checks take place on an informal basis. Where problems or unwanted trends occur, EN will consider the cause of the problem and what management measure needs to be undertaken to resolve it. The management measure to be employed is dependent on the type of owner and/or occupier, which for the Thames Basin Heaths pSPA as a whole includes three main groups:
- Government Departments e.g. MOD
  - Public Bodies e.g. Forest Enterprise, Crown Estate, Local Authorities
  - Private Landowners

### **Management Agreements**

- 2.47. English Nature are increasingly seeking to establish management agreements with site owners and/or occupiers, in addition to advice given on appropriate management practices. This can include the establishment of appropriate grazing regimes, scrub clearance or rotational tree felling for example.

### **Fiscal measures**

- 2.48. The agency are able to provide a 50% (and in special cases 100%) grant to assist with management practices necessary to bring land into a favourable condition. Grants cannot be made to public bodies however.

### ***Informal Negotiations***

- 2.49. English Nature aim to ensure that appropriate management practices are implemented through informal negotiations with landowners and/or occupiers. Partnerships with owners and land managers are essential to maintain or, where past management has not been appropriate, to restore the special features of interest.

### ***'Soft Mitigation'***

- 2.50. 'Soft mitigation' involves developing wider partnerships to bring a 'joined-up' solution to problems of conflicting land uses. An example of this in the Thames Basin Heaths area has taken place at Broadmoor to Bagshot SSSI where the coming together of the local authority, police and recreational groups has helped to mitigate against the effects of inappropriate motorcycling.

### ***Enforcement procedures***

- 2.51. If SSSIs are suffering as a result of inappropriate management or neglect, and a voluntary solution cannot be reached, English Nature are able to employ more formal legal methods due to the underlying legislation for SSSIs. These include management schemes and management notices, voluntary or compulsory purchase of land.

### ***Valorisation***

- 2.52. Valorisation is neither a common or widespread measure, but one particular example exists at Broadmoor to Bagshot SSSI, where recreational events are often held e.g. rallying, horse riding. It is likely that some money generated from this is returned to the site through the funding of management measures.

## ASSESSMENT OF THE EFFECTIVENESS OF MANAGEMENT

### Working with landowners and/or occupiers

- 2.53. It is important to put the effectiveness of recent management measures into context, in that the vast majority of heathland in the area has not been managed for a significant period of time. Tree growth in particular has severely restricted the development of valuable habitat.
- 2.54. Evidence of bird numbers holding over time suggests that management of the pSPA is moving in the right direction. Populations will always be susceptible to significant stresses e.g. harsh winters, but the recovery from these is greatly assisted by the existence of well-managed, healthy heathland habitats.

### Strengths

- 2.55. **Strengthened obligations under the CROW Act.** The introduction of new legislation with regard to public bodies' responsibilities provides additional leverage for English Nature in ensuring appropriate management and enhancement of SSSIs on local authority owned land takes place.
- 2.56. **Influencing forestry practice.** English Nature is increasingly working with landowners and managers to consider how felling regimes can be undertaken on a rotational basis. Through this practice, heathland habitats are allowed to regenerate over a sustained period of time following felling, which provides time for species to populate an area.
- 2.57. **'Soft mitigation'.** Inappropriate land uses and operations within the Thames Basin Heaths can be damaging to habitats and species. At Broadwater to Bagshott SSSI a partnership arrangement was established between the local authority, private landowner, police, recreational groups and volunteers to mitigate the effects of motorcycling. This has involved re-directing activity from the most sensitive areas and monitoring usage and considering alternative sites.
- 2.58. Similar approaches have been employed to manage the potentially damaging effects of access e.g. people with dogs off leads. Controlled access e.g. diverted routes, limiting car parking spaces can be effective. Negotiations have also been with Local Authorities to try and communicate the responsibilities of individuals to keep dogs on leads.
- 2.59. **Grazing re-introduction.** There are examples of the successful re-introduction of grazing onto sites. At Broadmoor to Bagshot a management plan has been agreed with the MOD to do just this.

Grazing is beneficial in encouraging the regeneration of heathland habitats.

### **Weaknesses**

- 2.60. **Resources.** One major limitation to ensuring that effective and appropriate management is undertaken is resources. It is often the case that unless costs are minimal, management practices will not be done as there is no obvious incentive to the landowner.
- 2.61. **Working to common objectives.** Experience has shown some difficulties in trying to get commitment to common management objectives and practices for the pSPA e.g. local authorities.
- 2.62. **Local opposition.** It can be that there is local opposition to certain management practices such as tree felling. English Nature try to improve understanding by circulating leaflets and meeting groups where possible.
- 2.63. **Access restrictions.** With army training activities taking place on MOD land, access to sites is sometimes restricted preventing management practices from being carried out.
- 2.64. **Common land.** Certain common land rights have restricted capital works associated with management. Notably, in some areas this has prevented the fencing of common land to allow the re-introduction of grazing e.g. Chobham Common.

### **Overall effectiveness in sustaining the natural heritage**

#### **Strengths**

- 2.65. The existence of European designations underpinned by powerful legislation both within the Habitats Regulations and English Nature's statutory functions has provided an effective basis for English Nature's interventions in the planning system.
- 2.66. This effectiveness has tended to prevail on a site by site basis, rather than at the strategic planning level. A recent case showing the effective use of English Nature's powers in relation to the Thames Basin Heaths pSPA is illustrated below.

#### **Surrey Structure Plan Examination in Public (EiP)**

In September 2003, the EiP of the preparation of Surrey County's Structure Plan took place. The Structure Plan will provide the spatial strategy for the county for the next 25 years from 2004-2026.

Policy LO7 of the Structure Plan Deposit Draft (December 2002) sets out future housing provision for the county, including a long-term strategic allocation to the North West of

Guildford. English Nature had earlier drawn the Council's attention to potential issues relating to the impact of housing development and associated infrastructure on sites of ecological importance and the relevant nature conservation legislation and guidance. English Nature specifically identified the potential threat from the new communities identified in the strategy, to sites such as Whitmoor Common SSSI (part of the Thames Heaths Basin pSPA).

In discussion with Surrey County Council in relation to Policy LO7, English Nature advised that the Habitats Regulations require that any plan or project likely to have a significant effect, either alone or in combination with other plans or projects, on a European site be subject to an appropriate assessment to ascertain that it would not adversely affect the integrity of the site.

English Nature suggested that whilst there was no requirement for the Council to undertake an appropriate assessment of the Structure Plan there is nothing to prevent it from undertaking one for a particular policy or group of policies and such an approach would appear to be a sensible way to test the acceptability of Policy LO7. It would also be consistent with the general duty on the Council under Regulation 3(4) of the Habitats Regulations to exercise its functions having regard to the requirements of the Directive, and Section 28G of the CROW Act.

An appropriate assessment duly undertaken and whilst having reservations about some aspects of the assessment, it was English Nature's opinion that that it would not be possible for the Council as competent authority to ascertain that the potential strategic allocation to the North West Guildford would not adversely affect the integrity of the Thames Basin Heaths pSPA and that policy LO7 should be amended accordingly.

The form of words used in Regulation 48 of the Habitats Regulations promotes the precautionary approach in that projects may only proceed if the competent authority has ascertained that it will not adversely affect the integrity of the European site. For this reason, in part, Surrey County Council (as competent authority) has since decided to remove the potential strategic allocation at North West Guildford. English Nature supported this decision in the Examination in Public.

### **Weaknesses**

- 2.67. English Nature's perception is that there is a general lack of understanding of the pSPA and its status by developers and planners in particular. The agency has been involved in a number of cases such as the one illustrated above, on an individual site or proposal basis. At the local level, this results in a highly inefficient planning process with significant amounts of time and money going towards appropriate assessments and planning representation to individual sites.
- 2.68. In the future there is more likely to be strategic planning focus to English Nature's work, through influencing regional planning and national planning policy. The aim is that the pSPA should be given more recognition at these levels encouraging more integrated planning, taking into account environmental as well as social and economic factors. It would also involve more influence at an earlier stage in the planning process to direct development and seek opportunities for environmental gain. This is discussed further in the chapter 3 'Sub-scenarios'.





### 3. SUB-SCENARIOS

---

#### **SCENARIO 1: CONTINUATION UNDER CURRENT TRENDS**

- 3.1. It is clear that the designation of the Thames Basin Heaths as a pSPA has provided a strong level of protection for the site through the Conservation (Natural Habitats &c.) Regulations 1994. The precautionary approach set out in Regulation 48 places an onus on the competent authority to prove that plans or projects would not adversely affect the integrity of the site, through the undertaking of an appropriate assessment. Barring any change to this European legislation it is therefore inconceivable that any 'hard' development could be allowed to proceed within the designated area.
- 3.2. Current trends include a significant and increasing amount of development pressure in the locality - primary residential - and associated infrastructure requirements. Should this continue and with the Thames Basin Heaths maintaining an international status of protection, development pressure in peripheral areas is likely to further intensify.
- 3.3. The likely impacts of a new residential community in the vicinity of heathland sites have been the subject of much discussion and research. In particular the arguments were tested at length at the Purbeck Local Plan Inquiry in Dorset (2002) in relation to proposals for 1350 dwellings and associated infrastructure on land adjacent to heathlands with nature conservation designations. In this case the Inspector concluded that English Nature's fears about the likely impacts on the heathland interest were well founded and adopting a precautionary approach, found that they could lead to the proposed development failing to pass the tests of the Habitats Regulations and being inconsistent with the plan's own nature conservation policies.
- 3.4. A large new residential population close to a SSSI notified for its heathland habitats and associated breeding Annex I bird species is likely to result in a range of complex impacts including:
  - Disturbance to breeding Annex 1 bird populations from increased recreational use of the Commons, including informal recreation such as dog walking and from increased noise;
  - Subtle degradation of the mosaic of habitats from increased recreational use, including excrement and trampling, for example;
  - Impacts associated with increased difficulty in managing the SSSI for its wildlife interest, for instance through grazing;

- More uncontrolled fires which destroy habitat and kill animals and possibly increased illegal dumping;
  - More predation of young birds and eggs (in particular nightjar) by pets such as the increased numbers of cats living in the new dwellings and also by natural predators when adults are flushed from the nest or deterred from returning to it by the presence of people or dogs. The eggs, being pale, are more obvious when the cryptically camouflaged adult is not incubating them. Crows or other nest predators, often use flushed birds as clues to the presence of a nest;
  - Changes to the composition of heathland communities through changes in hydrology and air quality impacts;
  - More habitat fragmentation and reduced opportunities for habitat connectivity;
  - The establishment of alien and invasive species which may result in long term change to habitats;
  - Effects on off-site feeding areas of Annex I bird species
- 3.5. Should further peripheral development be approved in the vicinity of the pSPA, impacts such as those listed above would result in a need for more effective partnerships to undertake soft mitigation and other effective management measures. This would need to be supported by adequate resources.
- 3.6. The Habitats Regulations (Reg 48(6)) require the competent authority to consider whether a plan or project could be modified, or conditions imposed, so as to avoid adverse effects. It is likely that intensified pressure for development on the periphery of the Thames Basin Heaths could see increasingly creative plans and projects incorporating mitigation measures, testing the regulations to the full.

## **SCENARIO 2: EVOLUTION UNDER EFFECTIVE MANAGEMENT AND VALORISATION OF NATURAL HERITAGE**

- 3.7. Due to the relatively built-up nature of the pSPA's location, little scope exists to expand the area of natural heathland habitat or link fragmented sites through wildlife or habitat corridors. Effective management in the future would therefore involve continued protection of the integrity of site from both direct and indirect effects of development.
- 3.8. English Nature are keen for SPAs to have more recognition through national and regional planning policy. This would ensure that the need

to maintain the integrity of the pSPA is recognised in strategic planning decisions, resulting in less of a requirement for English Nature to object to projects on a site by site basis.

3.9. This would be greatly assisted by the wider recognition and adoption of new approaches to assessing the value of natural heritage. Some of these are set out below:

- **Quality of Life Assessment.** Quality of Life Assessment is a tool for maximising environmental, economic and social benefits as part of any land-use planning or management decision. Promoted by the four agencies (Countryside Agency, English Heritage, English Nature and the Environment Agency), it reflects the UK Government's integrated approach to sustainable development. The assessment process involves a systematic analysis of the value of physical economic, social and environmental assets that exist and their associated benefits and/or services. This is then developed into policy or management practice to conserve and enhance these benefits.
- **English Nature Natural Areas.** English Nature examined the local distinctiveness of each part of England and identified its characteristic wildlife and natural features. From this information a comprehensive series of Natural Areas have been defined, each with nature conservation objectives. Natural Area boundaries are based on the distribution of wildlife and natural features, and on the land use pattern and human history of each area. They therefore offer a more effective framework for the planning and achievement of nature conservation objectives than do administrative boundaries. This includes wildlife both within and outside designated and protected sites
- **Landscape Character Assessment** LCA is a recognised technique for understanding and managing landscapes. It follows national guidance contained in Planning Policy Guidance note 7 *The Countryside - Environmental Quality and Economic and Social Development*, and the Government's Rural White Paper recognising the contribution the approach can make to ensuring development respects or enhances the distinctive character of the land and the built environment. LCA can assist in understanding local character, defining management needs and priorities, developing character sensitive planning policies and assisting with development control.

3.10. There are also improvements that could be made in assessing the likely indirect effects of peripheral development as consultations arise. One particular approach currently being pursued by English Nature involves zonation. For example, a 400m zone would act as a course sieve for

development consultation likely to have a significant effect. As this is the distance people are normally prepared to walk to a site, proposed development within this zone would be likely to increase visitor pressure on the pSPA. A broader zone within which people tend to use cars and so require parking facilities might be also be adopted.

- 3.11. Effective management in the future would also require a greater degree of understanding and joint-working between local planning authorities in the area. This would involve improving the capacity for planning authorities to work together to make clear and early judgements as to the likely significance of development on areas of nature conservation value. A key part of this would be the development of comprehensive Geographical Information Systems containing a range of data sets on species and habitats, access etc., managed jointly by the 14 local authorities in the area. Improved information on trends in the management of the natural heritage would allow planning officers to input queries and consider the in combination effects of planning proposals at an earlier stage.

## 4. INTEGRATED SCENARIOS

---



## **5. RECOMMENDATIONS, SUGGESTIONS**

---





## 6. BIBLIOGRAPHY

---

The Conservation (Natural Habitats, &c.) Regulations 1994 (*HMSO, 1994*)

Countryside and Rights Of Way (CROW) Act 2000 (*HMSO, 2000*)

Planning Policy Guidance: Nature Conservation (PPG9) (*HMSO, 1994*)

Sites of Special Scientific Interest (SSSIs) - England's special wildlife and geological sites (*English Nature, 2002*)

English Nature position statement 'Sites of Special Scientific Interest' (*English Nature, February 2000*)

English Nature SSSI Citations, Broadmoor to Bagshot heaths and Whitmoor Common (*English Nature, 2001*)

Surrey Structure Plan Deposit Draft (*Surrey County Council, December 2002*)



## **7. LIST OF CONTACTS INTERVIEWED**

---

7.1. An formal interview was held with:

- Keith Payne - Deputy Team Manager, English Nature, Thames and Chilterns Area.

7.2. Further discussions were held with:

- Alan Law - Team Manager, English Nature, Thames and Chilterns Area.
- Sandy Toy - Deputy Team Manager, English Nature Surrey and Sussex Team).



**APPENDIX 1**  
**List of Designated Sites**



<b>SSSIs</b>	
<b>Name</b>	<b>Status</b>
Ash to Brookwood Heaths	Notified
Basingstoke Canal	Notified
Bentley Station Meadow	Notified
Blackheath	Notified
Blackwater Valley	Notified
Bookham Commons	Notified
Bourley & Long Valley	Notified
Bramshill	Confirmed by Council
Broadmoor to Bagshot Woods & Heaths	Confirmed by Council
Butter Wood	Notified
Castle Bottom to Yateley and Hawley Commons	Confirmed by Council
Charleshill	Notified
Charterhouse to Eashing	Notified
Chawridge Bourne	Notified
Chobham Common	Notified
Colony Bog & Bagshot Heath	Notified
Colyers Hanger	Notified
Combe Bottom	Notified
Dumsey Meadow	Notified
Eelmoor Marsh	Notified
Englemere Pond	Notified
Esher Commons	Notified
Fleet Pond	Notified
Foxlease & Ancell's Meadows	Notified
Gong Hill	Notified
Greywell Fen	Notified
Greywell Tunnel (Basingstoke Canal)	Notified
Hackhurst & White Downs	Notified
Hankley Farm	Notified
Hazeley Heath	Notified
Heath Brow	Notified
Heath Lake	Notified
Hook Common & Bartley Heath	Notified
Horsell Common	Notified
Kempton Park Reservoirs	Confirmed by Council
Knight & Bessborough Reservoirs	Confirmed by Council
Langham Pond	Notified
Leith Hill	Notified
Lodge Wood & Sandford Mill	Notified
Longmoor Bog	Notified
Moor Park	Notified
Ockham & Wisley Commons	Notified
Odiham Common with Bagwell Green & Shaw	Notified
Papercourt	Notified
Puttenham & Crooksbury Commons	Notified
Sandhurst to Owismoor Bogs & Heaths	Notified
Seale Chalk Pit	Notified
Sheepleas	Notified
Smarts & Prey Heaths	Notified
Staines Moor	Notified
Stanford End Mill & River Loddon	Notified
Swinley Park & Brick Pits	Notified
Thorpe Hay Meadow	Notified



Thorpe Park No. 1 Gravel Pit	Confirmed by Council
Thursley, Hankley & Frensham Commons	Notified
Upper Common Pits	Notified
Warnborough Green	Notified
Wellington College Bog	Notified
West Minley Meadow	Notified
Wey Valley Meadows	Notified
Whitmoor Common	Notified
Windsor Forest & Great Park	Confirmed by Council
Wraysbury & Hythe End Gravel Pits	Notified
Wraysbury No. 1 Gravel Pit	Confirmed by Council
Wraysbury Reservoir	Confirmed by Council
Wykery Copse	Notified
<b>SPAs</b>	
<b>Name</b>	
Thursley, Hankley & Frensham Commons	
South West London Waterbodies	
<b>pSPAs</b>	
<b>Name</b>	
Thames Basin Heaths	
<b>cSACs</b>	
<b>Name</b>	
Thursley, Ash, Pirbright & Chobham	
Windsor Forest & Great Park	
<b>RAMSAR</b>	
<b>Name</b>	
Thursley & Ockley Bogs	
South West London Waterbodies	
<b>NNRs</b>	
<b>Name</b>	
Castle Bottom	
Chobham Common	
Thursley	

**APPENDIX 2**  
**Favourable Condition Table**  
**Broadmoor to Bagshot SSSI**



Thames and Chilterns Team  
Foxhold House  
Thornford Road  
Crookham Common  
Thatcham  
Berkshire RG19 8EL  
Tel: +44 (0)1635 268881  
Fax: +44 (0)1635 268940  
Email: [\\_thames.chilterns@english-nature.org.uk](mailto:_thames.chilterns@english-nature.org.uk)

## **THAMES BASIN HEATHS SPECIAL PROTECTION AREA BROADMOOR TO BAGSHOT SSSI**

### **Conservation objectives for the European interest on the SSSI**

**The conservation objectives for the European interest on the SSSI are**

**subject to natural change, to maintain\*, in favourable condition the habitats which support internationally important populations of woodlark, nightjar and Dartford warbler, with particular reference to lowland heathland and rotationally managed plantation.**

\* maintenance implies restoration if the feature is not currently in favourable condition.

The conservation objectives for Broadmoor to Bagshot Special Protection Area are, in accordance with para C 10 of PPG 9, the reasons for which the SPA was classified.

**Annex:**

**FAVOURABLE CONDITION TABLE. Thames Basin Heaths: Broadmoor to Bagshot SSSI**

The Favourable Condition Table will be used by English Nature and other relevant authorities to determine if a site is in favourable condition. Favourable condition is achieved when the targets given below are met.

The favourable condition table should inform the scope and nature of any ‘appropriate assessment’ under the Habitats Regulations, but an appropriate assessment will also require consideration of issues specific to the individual plan or project. The favourable condition table does not by itself provide a comprehensive basis on which to assess plans and projects as required under Regulations 20-21, 24, 48-50 and 54 - 85. The scope and content of an appropriate assessment will depend upon the location, size and significance of the proposed project. English Nature will advise on a case by case basis.

Following an appropriate assessment, competent authorities are required to ascertain the effect on the integrity of the site. The integrity of the site is defined in para C10 of PPG9 as the coherence of its ecological structure and function, across its whole area, that enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it was classified. The determination of favourable condition is separate from the judgement of effect upon integrity. For example, there may be a time-lag between a plan or project being initiated and a consequent adverse effect upon integrity becoming manifest in the condition assessment. In such cases, a plan or project may have an adverse effect upon integrity even though the site remains in favourable condition.

The assumption is that for the feature to be in favourable condition all attributes must be favourable for the feature on the site as a whole. It is not however necessary for every target to be met for an attribute to be judged favourable, nor is it necessary for the feature on every unit to be in favourable condition for the feature on the site as a whole to be favourable. It depends whether there are minor or major missings of the target and whether the feature on the unfavourable unit constitutes a minor or major part of the whole.

Operational feature	Criteria feature	Attribute	Measure	Target	Comments
Heathland	Annex 1 populations of European Importance: Dartford warbler, woodlark, nightjar	Extent and distribution of habitat	Area, measured periodically (frequency to be determined).	No significant decrease from current level, subject to natural change.	
		Disturbance	Reduction or displacement of bird, measured periodically (frequency to be determined).	No significant reduction or displacement of birds attributable to human disturbance in relation to reference level,	Monitoring frequency to be determined. Reference level to be determined.

				subject to natural change.	
	Annex 1 populations of European Importance: Dartford Warbler	Landscape	Large, unbroken dwarf-shrub layer of heather with scattered gorse, measured periodically (frequency to be determined).	No significant reduction in shrub layer with scattered gorse from current level, subject to natural change.	Monitoring frequency to be determined.
		Food availability	Presence and abundance of shrub-layer invertebrates, measured periodically (frequency to be determined).	Presence and abundance of prey species should not deviate significantly from reference level, subject to natural change.	Monitoring frequency to be determined. Reference level to be determined.
Heathland	Annex 1 populations of European Importance: Dartford Warbler	Vegetation characteristics	Extent and proportions of mix of heather, trees and gorse amongst heathland vegetation, measured periodically (frequency to be determined).	No significant decrease in extent and proportions of mix of heather, trees and gorse amongst heathland vegetation from reference level, subject to natural change.	Monitoring frequency to be determined. Reference level to be determined.
	Annex 1 populations of European Importance: Nightjar	Food availability	Abundance of night-flying insects, measured periodically (frequency to be determined).	Presence and abundance of prey species should not deviate significantly from reference level, subject to natural change.	Monitoring frequency to be determined. Reference level to be determined.
	Annex 1 populations of European Importance: Nightjar	Vegetation characteristics	Extent and proportions of open ground with predominantly low vegetation (feeding), bare patches (nesting) and sparse woodland/scrub cover (feeding, roosting), measured periodically (frequency to be determined).	No significant decrease in extent and proportions of open ground with predominantly low vegetation (feeding), bare patches (nesting) and sparse woodland/scrub cover (feeding, roosting) from reference level, subject to natural change.	Monitoring frequency to be determined. Reference level to be determined.
Heathland	Annex 1 populations of European Importance: Woodlark	Vegetation characteristics	Extent and proportions of mix of shrub/tree cover (display), short-medium vegetation and bare ground (feeding, nesting, roosting), measured periodically (frequency to be determined).	No significant decrease in extent and proportions of mix of shrub/tree cover (display), short-medium vegetation and bare ground (feeding, nesting, roosting), from reference level, subject to natural change.	Monitoring frequency to be determined. Reference level to be determined.
	Annex 1 populations of European Importance:	Food availability	Abundance of ground surface invertebrates, measured	Presence and abundance of prey species should not deviate significantly	Monitoring frequency to be determined. Reference level to be

	Woodlark		periodically (frequency to be determined).	from reference level, subject to natural change.	determined.
Coniferous Plantation	Annex 1 populations of European Importance: Nightjar and Woodlark	Disturbance	Reduction or displacement of birds	No significant displacement, of birds attributable to human disturbance, in relation to reference level.	Methodology for assessing target to be established. Reference level to be established.
<b>Operational feature</b>	<b>Criteria feature</b>	<b>Attribute</b>	<b>Measure</b>	<b>Target</b>	<b>Comments</b>
Coniferous woodland	Annex 1 populations of European Importance: Woodlark,	Extent of habitat	Area of young plantation or other open areas	No decrease in overall extent of less than 4 years old (<6 years if appropriate management is undertaken), or other open areas, from a reference level, unless additional suitable habitat is provided i.e. restored heathland. .	The overall area of suitable habitat with the correct vegetation characteristics (for nesting/display/feeding/r oosting woodlark) should be maintained, although the distribution will vary as areas of plantation mature or are felled.  Reference level to be determined
		Food availability	Presence and abundance of ground surface invertebrates	Presence and abundance of prey species should not deviate significantly from reference level.	Spiders, weevils and caterpillars are important for woodlark.  Methodology for assessing target to be determined. Reference level to be determined.
Coniferous woodland	Annex 1 populations of European Importance: Woodlark	Vegetation characteristics	Extent of mix of shrub/tree cover (display), short-medium vegetation and bare ground (feeding, nesting, roosting), measured periodically (frequency to be determined).	No significant decrease in extent and proportions of mix of shrub/tree cover (display), short-medium vegetation and bare ground (feeding, nesting, roosting), from reference level.	Frequent bare patches of <0.5ha within mosaic of short (<5cm) to medium (10-20cm) ground vegetation, and small clumps of shrubs or trees. Plantations usually provide suitable habitat for 4 years after they were planted (<6 years if appropriate management is undertaken).  Methodology for assessing target to be established. Reference level to be established.
	Annex 1 populations of European Importance: Nightjar	Extent of habitat	Area of young plantation or other open areas	No decrease in overall extent of plantation less than 5 years old (ideal habitat) and 5-15 years old (suitable habitat), or other open areas, from a reference level, unless additional suitable habitat is provided i.e. restored heathland.	The overall area of suitable habitat with the correct vegetation characteristics (for nesting/display/feeding/r oosting nightjar) should be maintained, although the distribution will vary as areas of plantation mature or are felled.  Reference level to be determined
Coniferous	Annex 1	Vegetation	Extent of open ground	No significant	Vegetation mostly of 20-

Plantation	populations of European Nightjar	characteristics	with predominantly low vegetation (feeding), bare patches (nesting) and sparse woodland/scrub cover (feeding, roosting), measured periodically (frequency to be determined).	decrease in extent and proportions of open ground with predominantly low vegetation (feeding), bare patches (nesting) and sparse woodland/scrub cover (feeding, roosting) from reference level.	60cm with frequent bare patches of >2sq.m, 10-20% bare ground and <50% tree/scrub cover overall (>50% free from canopy). Plantations provide the best habitat <5yrs after planting. There is a decline in numbers supported as the age of stands increases from to 10-15yrs. Older stands only support nightjars where smaller areas within stands remain clear.  Methodology for assessing target to be determined. Reference level to be determined.
	Annex 1 populations of European Nightjar	Food availability	Presence and abundance of night-flying insects	Presence and abundance of prey species should not deviate significantly from reference level.	Moths and beetles are important for nightjar.  Methodology for assessing target to be established. Reference level to be established.

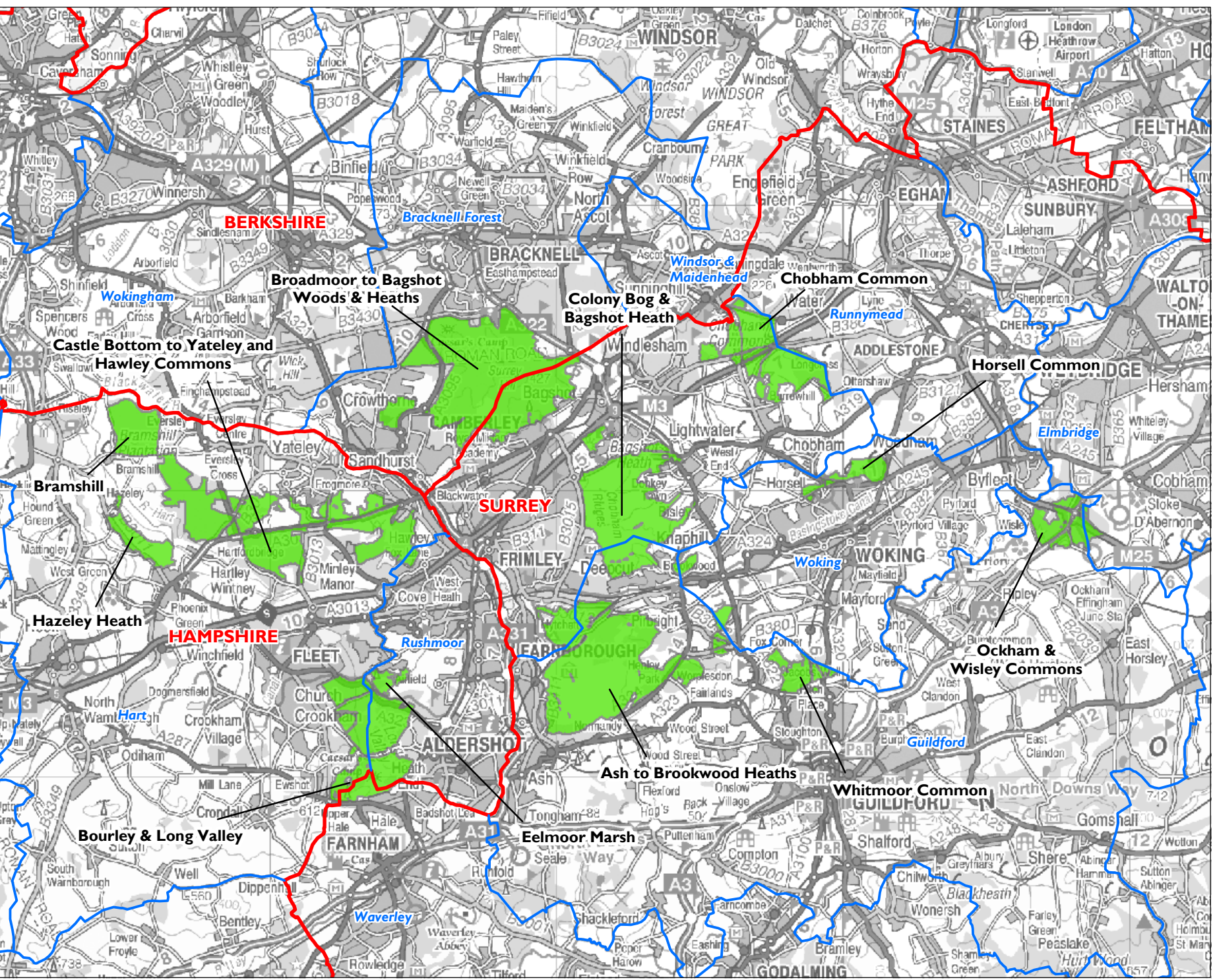


# ESPON I - 3 - 2

## Thames Basin Heaths Case Study

### Map I: Location of pSPA

- Key
- County Boundary
  - District Boundary
  - pSPA



February 2004

T:\Gis\2400\2453-01\_ESPON\Themes  
\\ArcGIS8-2\thames basin heaths pspa.mxd



Land Use Consultants  
43 Chalton Street  
London NW1 1JD  
Tel: 020 7383 5784  
Fax: 020 7383 4798  
www.landuse.co.uk

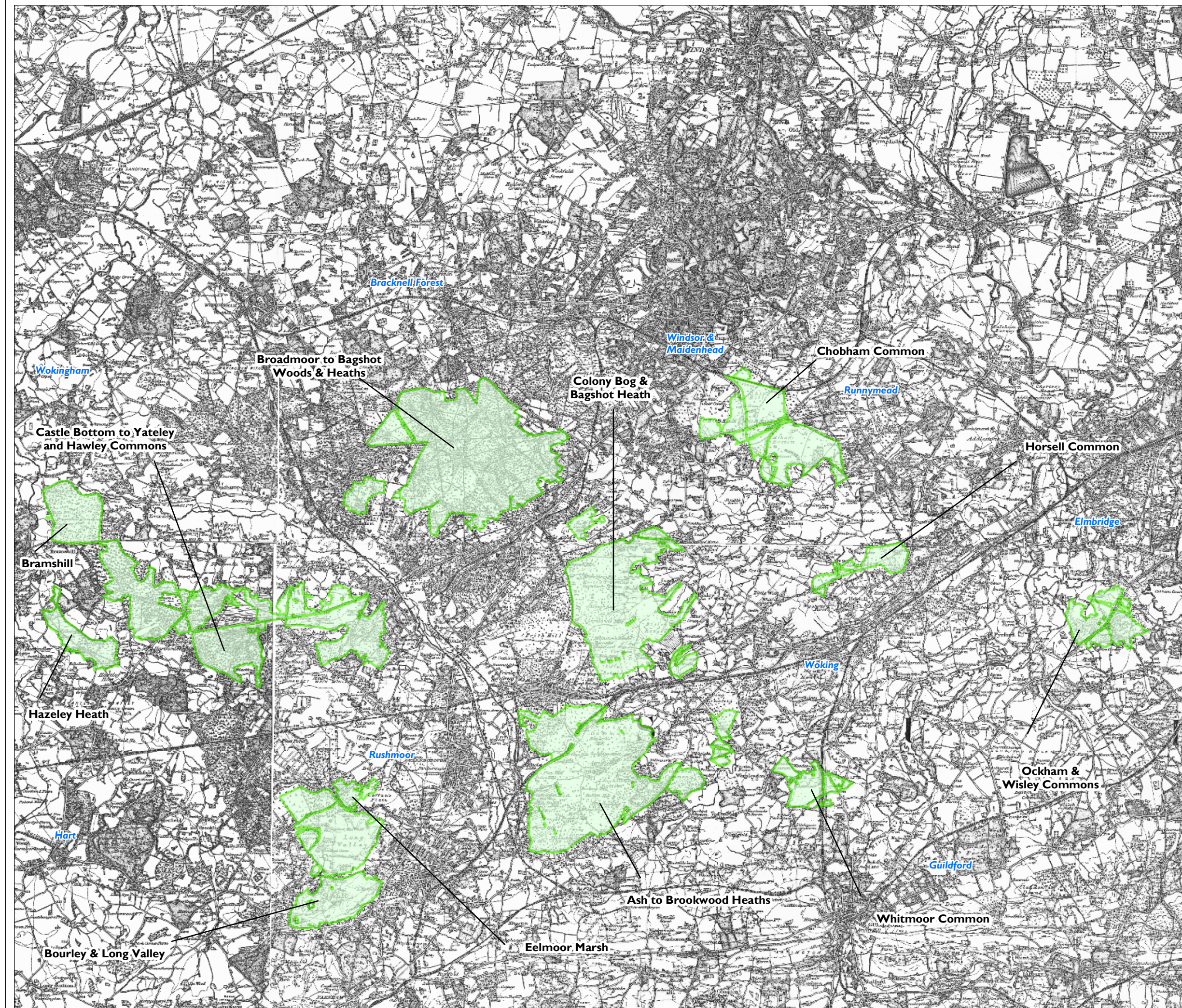


# ESPON I - 3 - 2

## Thames Basin Heaths Case Study

Map 2: 1904  
Location of pSPA

Key



February 2004

T:\Gis\2400\2453-01\_ESPON\Themes  
\ArcGIS8-2\thames basin heaths 1904.mxd



0 1 2 4 Km

Land Use Consultants  
43 Chalton Street  
London NW1 1JD  
Tel: 020 7383 5784  
Fax: 020 7383 4798  
www.landuse.co.uk



# ESPON I - 3 - 2

## Thames Basin Heaths Case Study

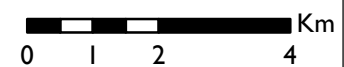
### Map 3: 1947 - 1959 Location of pSPA

Key

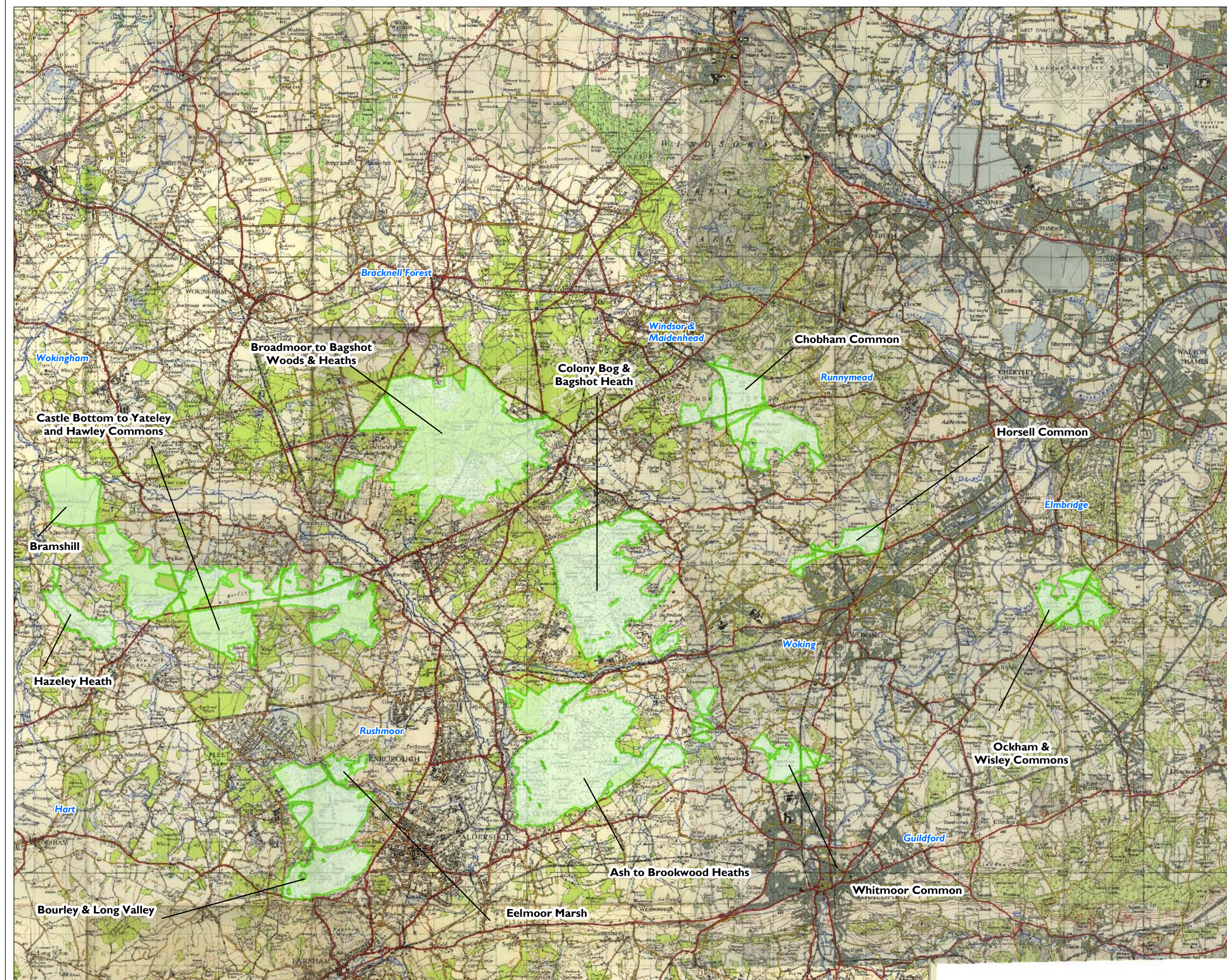


February 2004

T:\Gis\2400\2453-01\_ESPON\Themes  
\ArcGIS8-2\thames basin heaths 1959.mxd



Land Use Consultants  
43 Chalton Street  
London NW1 1JD  
Tel: 020 7383 5784  
Fax: 020 7383 4798  
www.landuse.co.uk



**ESPON 1.3.2 TERRITORIAL TRENDS IN THE MANAGEMENT OF  
THE NATURAL HERITAGE:**

**CASE STUDY OF THE VALLOMBROSA FOREST – TUSCANY, ITALY**

PREPARED BY ACCADEMIA ITALIANA DI SCIENZE FORESTALI  
2004



ACCADEMIA ITALIANA DI SCIENZE FORESTALI

Territorial trends of the management of the Natural Heritage  
ESPON 1.3.2

Case Study:

*The Vallombrosa Forest – Tuscany, Italy*



Edited by  
Barbati A., Maetzke F.

<b>INTRODUCTION .....</b>	<b>3</b>
<b>1. TERRITORIAL CONTEXT .....</b>	<b>3</b>
1.1 POSITION IN TUSCANY .....	3
1.3 RECENT LAND USE EVOLUTION .....	10
1.4 TERRITORIAL STRATEGY .....	12
<b>2. THE NATURAL HERITAGE.....</b>	<b>13</b>
2.1 ENVIRONMENTAL SETTING .....	13
2.2 STATE OF THE NATURAL HERITAGE.....	13
2.2.1 <i>Forest and other semi-natural habitats</i> .....	13
2.1.2 <i>Fauna</i> .....	19
2.4 RELEVANCE OF ESPON 1.3.2 MAPS.....	20
2.5 HISTORY OF EVOLUTION OF NATURAL HERITAGE.....	20
2.6 PRESSURES AND DRIVING FORCES .....	21
2.6 .1 <i>Population growth in Florence area and tourism pressure</i> .....	21
2.6.2 <i>Biotic disturbance</i> .....	28
<b>3. MANAGEMENT OF NATURAL HERITAGE.....</b>	<b>30</b>
3.1 HISTORY OF FOREST MANAGEMENT .....	30
3.2 FOREST MANAGEMENT OBJECTIVES AND TARGETS .....	30
3.3. PLAN IMPLEMENTATION.....	31
<b>4. SCENARIOS.....</b>	<b>33</b>
<b>5. CONCLUSIONS AND RECOMMENDATIONS.....</b>	<b>35</b>
<b>6. BIBLIOGRAPHY .....</b>	<b>36</b>
<b>7. LIST OF CONTACTS INTERVIEWED .....</b>	<b>36</b>

# Introduction

The Vallombrosa Forest is probably the best known of all the Italian Apennine forests; it offers a concentration of topics for an evaluation of the spatial interactions between the local management of natural heritage areas in Italy and the larger territorial context; the main features of interest are:

1. The forest is an high valued area for nature conservation; since 1977, the Vallombrosa Forest is a Natural Biogenetic Reserve for *in situ* conservation of forest vegetation germoplasm. Recently, it has also been proposed as Site of Community Importance in accordance with the provisions of the Habitats Directive (92/43/EEC).
2. Between the forest types found in the forest there is one of great cultural value; it is the fir high forest which represents a typical traditional landscape, of purely anthropogenic origin in the case of Vallombrosa, of importance comparable to Medieval pastures in the U.K. or dehesas in Spain, or chestnut groves scattered throughout Europe; these landscapes, once very common, represent today vanishing important remnants of cultural and esthetic value, bearing witness to cultivation systems that are no longer practiced in Europe. Cultural landscapes are an asset of European natural heritage – no less important than the biological one – that should be, as far as possible, conserved.
3. Within easy reach from Florence (approximately 40 km), Vallombrosa is a much visited area offering tranquillity, spirituality and silence; the presence of an old Abbey of Benedictine Monks in the mid of a varied forest landscape (see cover photo), traced by a number short and long footwalks, make it an ideal destination for excursions; in spring and summer times, especially during weekends, tourism pressure is really heavy and tends to destroy the qualities that determine the attractiveness of the area: traffic, noise and crowd.

A more practical reason for the selection of the Vallombrosa forest as case study is that our team has an access to relevant data and maps about historical and actual management of the forest and a direct experience of forest planning in the area.

## 1. Territorial context

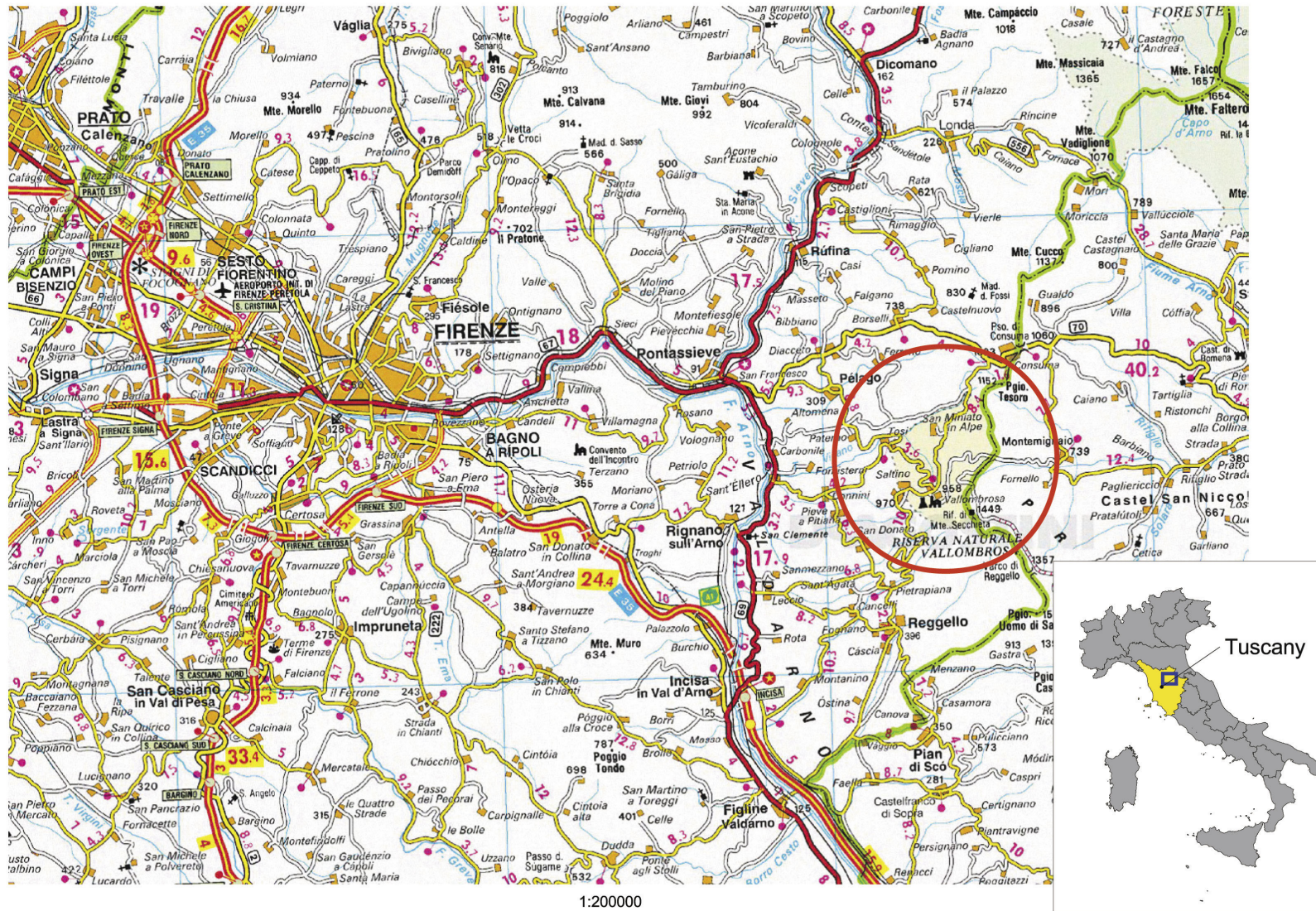
### 1.1 Position in Tuscany

Vallombrosa is located on the slopes of Pratomagno, a massif that forms a spur of the Tosco-Emiliano Apennine chain (Figure 1). The forest extends over 1270 hectares, on the western slope of Monte Secchieta (1449 m.) and is part of the Municipality of Regello in the province of Florence.

The forest is the core of a larger natural area covering the uplands of Casentino and Pratomagno, an horseshoe-shaped system of reliefs surrounding the Arno's river flood plain in its highest course (Figure 2); Pratomagno is bordered on its western flank by Valdarno hills, encircling the large expanse of Valdarno plain. Florence is located westward in the widest Arno river plane, fenced at north by the reliefs of the Calvana and Mt. Giovi. The delineated land units constitute the large scale territorial context of the case study.

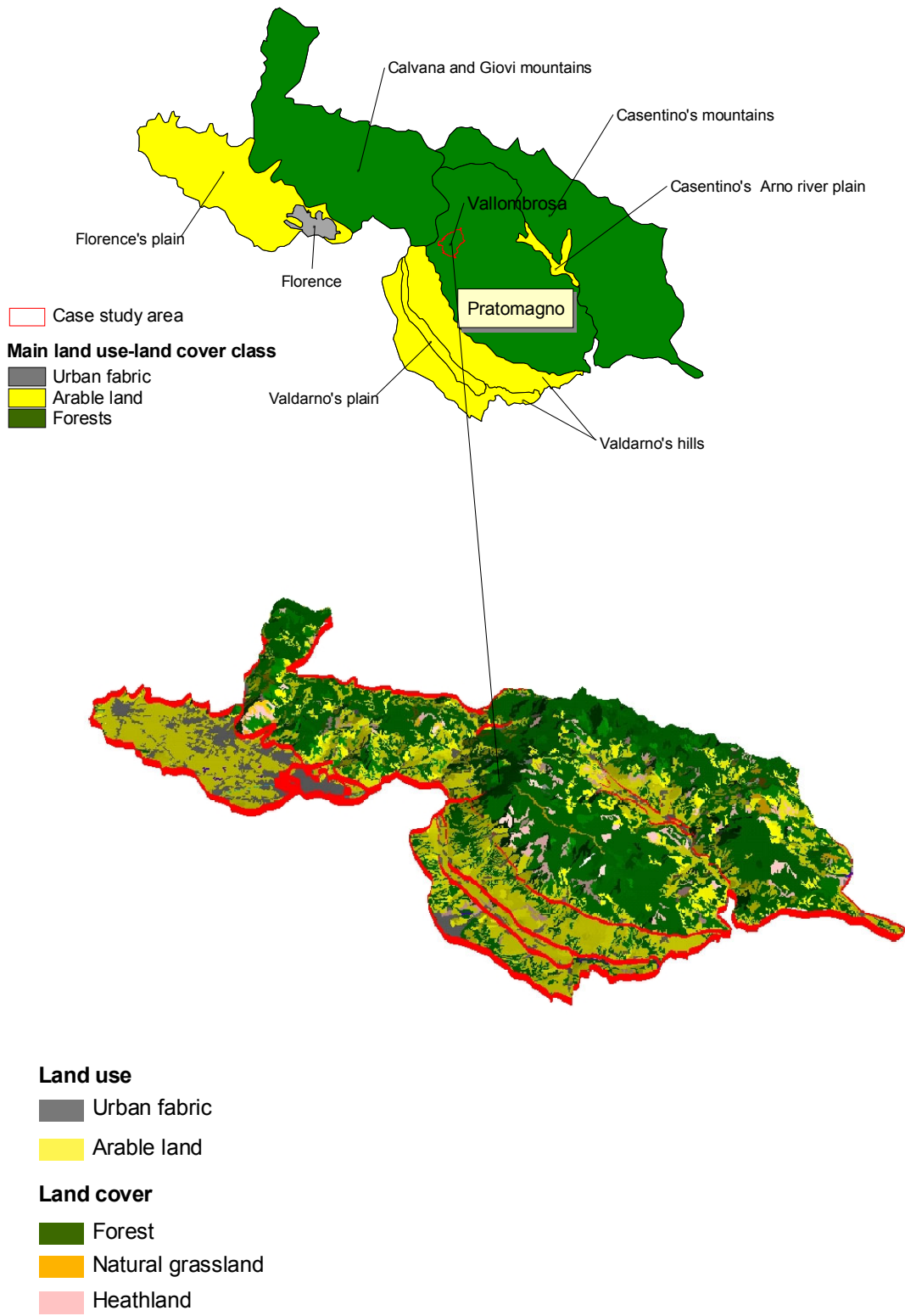
Figure 1 – Case study geographical position.

LOCATION OF VALLOMBROSA FOREST





**Figure 2 – Large scale territorial context of the case study, with delineation relevant land units. Bottom: territorial context physical structure and main land use and land cover typologies (Elaborated from Corine Land Cover database, 2000).**



## 1.2 Land use and territorial typologies

The case study area is almost entirely covered by coniferous, broadleaf and mixed forests; the forest hosts either habitats and species listed in the Habitat Directive, as will be described in detail in § 2.2.

In order to get an insight of the territorial trends that may affect the condition of natural heritage in the area at study, it is useful to describe its large scale territorial context in term of territorial typologies. To this end, a land use-cover map of the territorial context has been elaborated from Corine Land Cover database (Figure 3). The territorial typologies have been derived analysing both the landscape spatial structure of the land units identified in Figure 2 and ruralism (Table 1).

Ruralism has been classified according to Casini's methodology (Casini, 2000); the approach – through a processing of socio-economic indicators assessed at Municipality level - allows a classification of the socio-economic organization of a given territory into three classes with decreasing level of rurality: rural, semi-rural, urban (Figure 4). *Rural* areas have the highest level of ruralism, i.e. the highest values in terms of primary sector workers and of extent of agricultural areas. The relative weight of the primary sector decreases in the *semi-rural* territories and is marginal in urban ones, being characterized by an economy based on industry and services sectors. The spatial variation of other socio-economic indicators, like population density or income pro-capite, is strictly related to rurality, as will be illustrated in § 2.6.2.

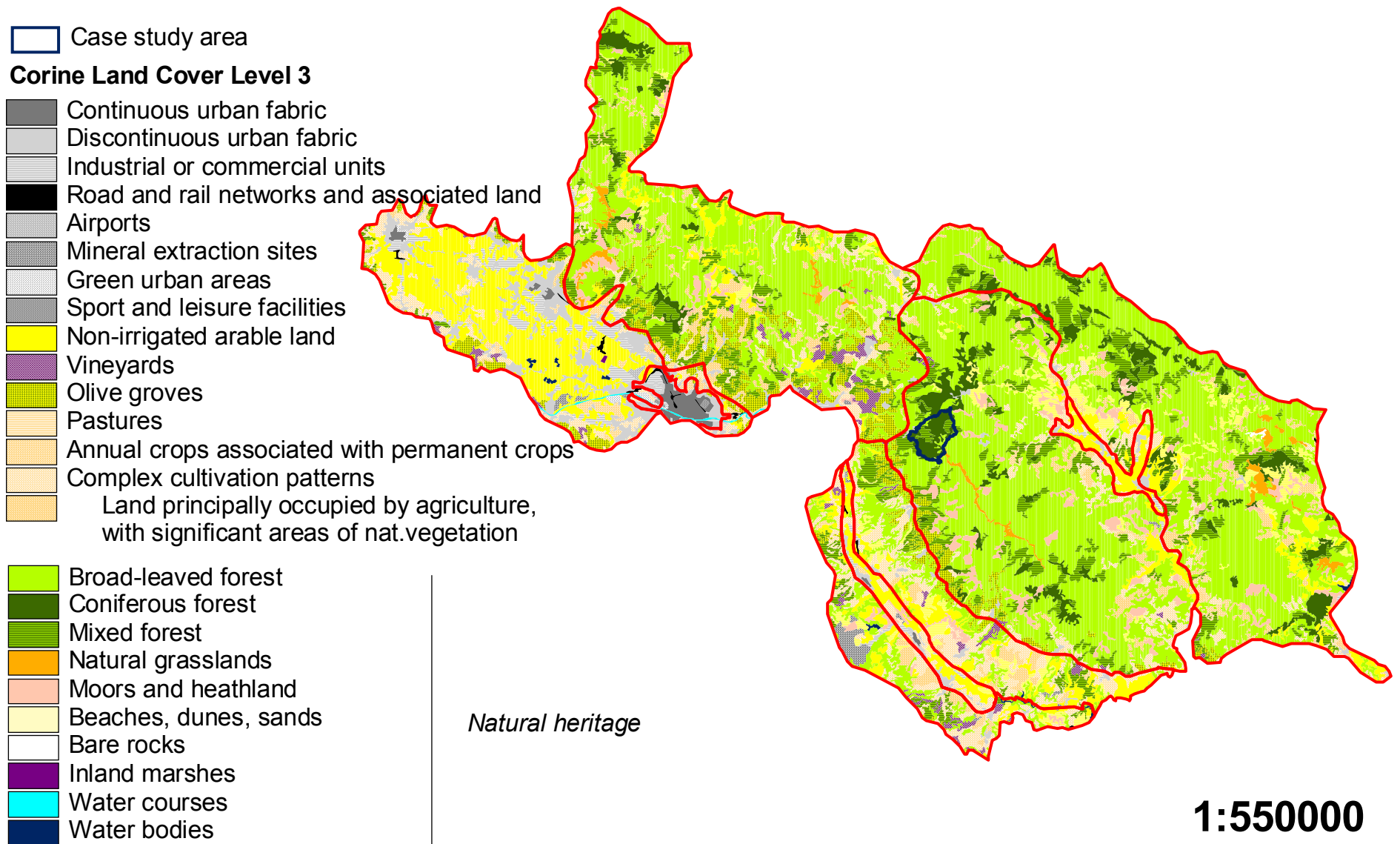
As shown in Figure 4, the Pratomagno and Casentino form a large rural system bordering at west with the urban one of the Florence's plains and Calvana and Giovi mountains; Pratomagno system is buffered at south-west by the agricultural system of Valdarno's hills, surrounding the urban plain of Valdarno.

In this territorial context Vallombrosa is the first outpost of the rural territory, at easy reach from Florence and Valdarno urban areas, through a network of highways (see Figure 1, roads marked in red and yellow). For this reason and for the value of its natural heritage the Vallombrosa forest is a favourite destination by local inhabitants of these urban areas for excursions during week-ends and summer times.

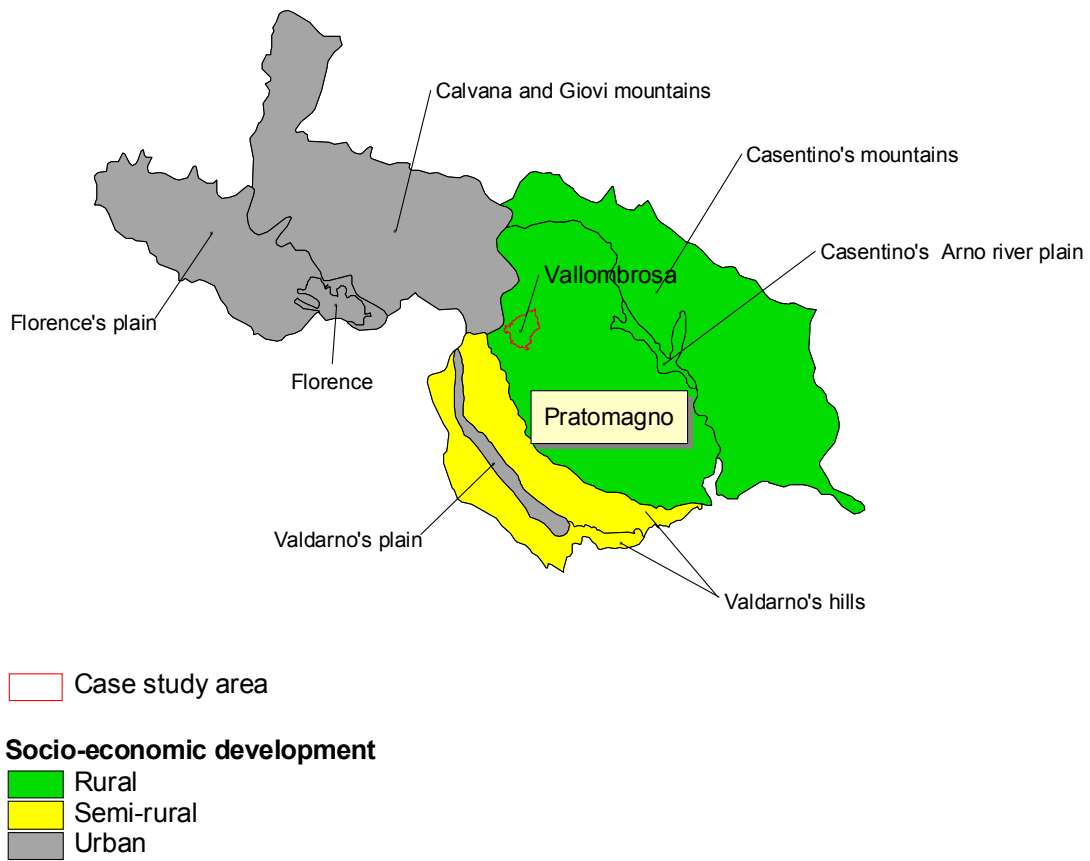
**Table 1 – Territorial typologies in the spatial context of the case study.**

<i>Territorial typology</i>	<i>Physical system</i>	<i>Landscape structure</i>	<i>Urban/Settlement</i>	<i>Socio-economic development (sensu Casini, 2000)</i>
Rural system	Pratomagno and Casentino mountains	Matrix of forest, with scattered patches of natural grasslands and heathlands; agricultural areas are also common. Rare rural settlements.	Dispersed	Rural
	Arno's river Casentino plain	Matrix of agricultural with sparse patches of built-up areas.	Dispersed	Rural
Agricultural system	Valdarno's hills	Matrix of agricultural areas with patches of forest and built-up areas.	Dispersed	Semi-rural
Urban system	Florence	Matrix of continuous and discontinuous urban fabric and industrial units, crossed by Arno's river.	Dense	Urban
	Florence's plain	Matrix of agricultural with large patches of built-up areas (urban fabric, industrial and commercial units, airport).	Locally dense	Urban
	Valdarno's plain	Matrix of agricultural with small patches of discontinuous built-up areas (urban fabric, industrial and commercial units).	Locally dense	Urban
	Calvana and Giovi mountains	Matrix of forest, with scattered patches of natural grasslands and heathlands, interspersed with large patches of agricultural areas. rural settlements are scattered throughout.	Disperse	Urban

Figure 3 – Map of land use and land cover of the large scale territorial context of the Vallombrosa forest.



**Figure 4 – The socio-economic organization of the large territorial context of the case study.**



### 1.3 Recent land use evolution

Land use change in the last decade has been assessed at the level of large scale territorial context by intersecting 1990 and 2000 Corine Land Cover maps. Accordingly a land cover change (LCC) map has been produced (Figure 5) showing areas affected by land use change in the reference period.

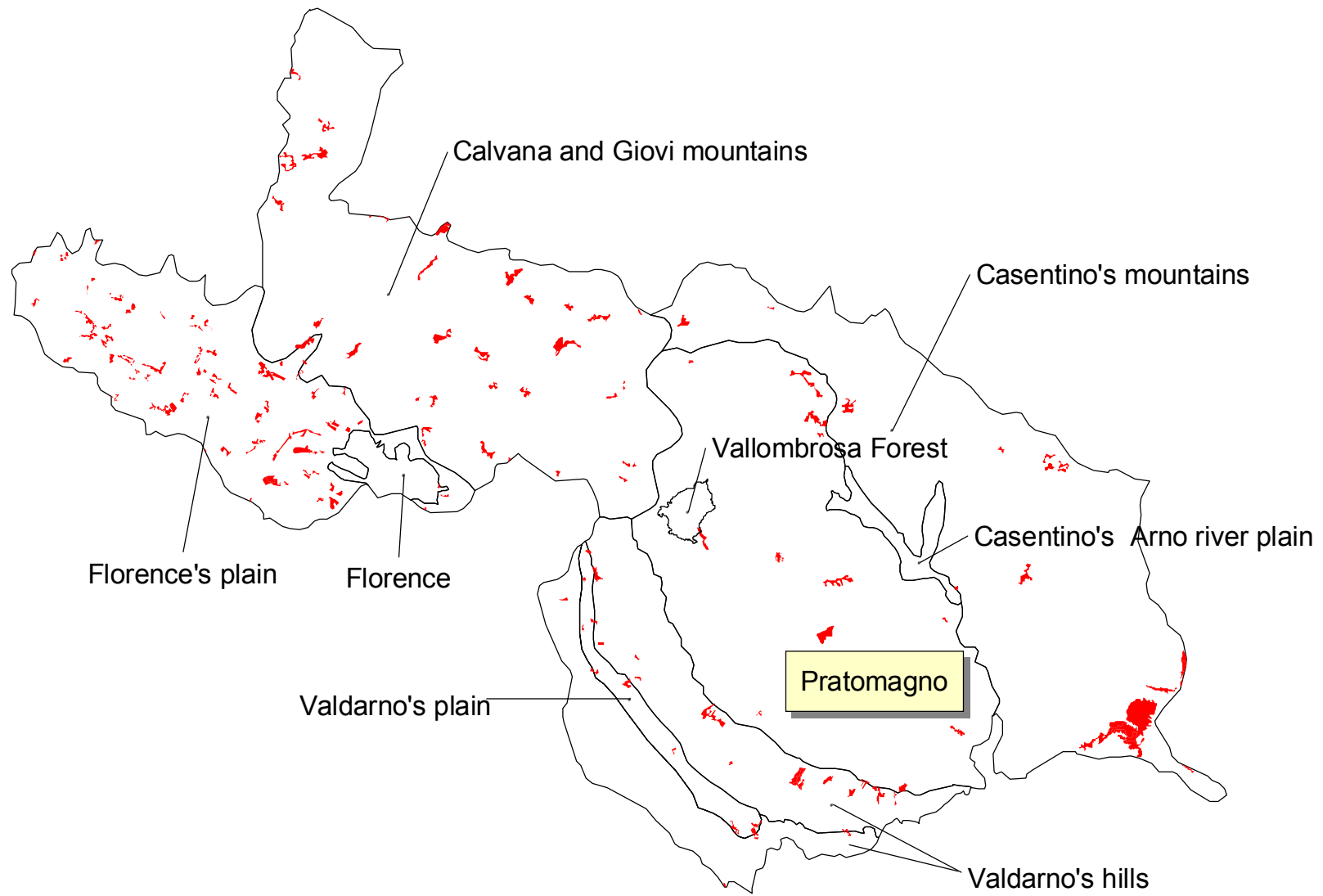
A summary of LCC by territorial typologies is reported in Table 2; for each land unit has been also identified the main LCC driving force, i.e. the type of land cover change with the highest relative percentage.

**Table 2 – Land cover change (LCC) in the land units and corresponding driving forces in the period 1990-2000. Territorial typologies are highlighted with colors: green, rural system; yellow, agricultural system; gray, urban system.**

Territorial unit	LCC 1990-2000 (ha)	LCC 1990-2000 (% Land Unit Area)	Driving force	% LCC
Pratomagno	508,772	1	Evolution of transitional wood-shrub to forest	46%
Casentino mountains	1349,203	2	Forest fires	69%
Casentino's Arno river plain	0,872	< 1	Urbanization of agricultural areas	100%
Valdarno's hills (right river side )	398,871	2	Change of farming system (arable lands to vineyards)	55%
Valdarno's hills (left river side )	35,573	< 1	Urbanization of agricultural areas	64%
Florence	3,721	< 1	Urbanization of agricultural areas	100%
Florence plain	1280,446	4	Urbanization of agricultural areas	94%
Valdarno's plain	122,055	3	Urbanization of agricultural areas	97%
Calvana & Giovi mountains	1130,758	2	Evolution of transitional wood-shrub to forest	50%

The territorial typology most affected by LCC is the urban system, with approximately 9% of its area changed in the period 1990-2000. As expected, the driving force of LCC is expansion of urban areas (residential and industrial zones, new infrastructures) on former agricultural lands; outward expansion of urbanization is chiefly constrained by the limitation given by the broken morphology of Valdarno hills and the steep mountain slopes of Calvana and Giovi mountains and Pratomagno. The rural system has been therefore preserved both from urbanization (< 1% in the Casentino's Arno river plain) but also from intensive farming.

**Figure 5 – Distribution of land cover changes (red) in the period 1990-2000 in the territorial context of Vallombrosa forest.**



#### **1.4 Territorial strategy**

Territorial planning in Italy is ruled on a decentralised basis, through a nest of integrated planning strategies and instruments; these are set out by different administrative authorities: Regions, Provinces and local municipalities.

The planning instrument addressing more directly issues, goals and strategies of spatial development in the territorial context before described is the “Piano Territoriale di Coordinamento Provinciale-PTCP” (Florence Province Territorial Coordination Plan). The PTCP sets out planning strategies which are mandatory for local planning at Municipality level; for the rural area of Pratomagno, and Vallombrosa therein, the PTCP provides that:

1. all the natural heritage of the massif will be protected under a large natural park, which will include the Vallombrosa Natural Biogenetic Reserve; this for the strategic position of Pratomagno - so close to and easily accessible from neighbouring urban and densely populated areas -, its naturalistic value - notably forest and natural grasslands - and dispersed rural settlement, all reasons that justify the designation of a protected area promoting local sustainable development.
2. the Vallombrosa Reserve will be the core of the future protected area; the PTCP refers to local management plan for spatial planning in the Reserve (see § 3).



## 2. The natural heritage

### 2.1 Environmental Setting

Vallombrosa forest Reserve is characterized by a temperate-humid climate with Mediterranean rainfall. The mild summer is part of the attractiveness of the area - designated since 1900 Vallombrosa as health resort location – being in stark contrast with the hot and sticky climate of Florence and Valdarno plains, where temperatures may reach 40° C during summer.

The forest grows on sandy-loamy or loamy soils, rich in humus on the surface horizons. Soil depth varies with the relief. The slopes are generally steep or very steep. During drought years short periods of soil aridity occur.

The diversity of site conditions (aspect, forest cover, humus) makes the forest a suitable place for the growth of mushrooms, some of them of edible species (cep, field mushroom); an appeal more for attracting visitors in spring-summer seasons.

There are no true streams or rivers in Vallombrosa, but many steep channels. Generally these are short and their discharge rates are characterized by seasonal fluctuations. There is also an abundance of perennial springs throughout the forest.

### 2.2 State of the natural heritage

The relevance of the Vallombrosa Forest for nature conservation is unquestionable; in 1977 the forest was designated as a Natural Biogenetic Reserve for *in situ* conservation of forest vegetation germoplasm. Furthermore, along with the nearby S. Antonio Forest, the Vallombrosa Forest has been proposed as a Site of Community Importance for the Italian Natura 2000 network.

The following section describes in more detail the biodiversity of the Vallombrosa forest, its past evolution and possible threats for its conservation, in order to give an insight of the natural and cultural values at stake in the local management of the forest.

#### 2.2.1 Forest and other semi-natural habitats

Forests form a continuous belt in Vallombrosa - but also throughout the uplands of Pratomagno - from 530 to 1350 meters a.s.l. (Figure 9); just the wind-beaten peak of Monte Secchieta is colonized by natural grasslands (Figure 6) of high value for nature conservation being a Natura 2000 priority habitat (6230\* Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas). The forest landscape is rather heterogenous consisting of types of different origin, composition, structure and development stage; some of these are Natura 2000 habitats. Figure 10 shows the spatial distribution of forest types in the Vallombrosa forest, as derived from the digital map of forest compartments of the last forest management plan (see § 3); Table 3 shows a summary of forest habitats features with relationship to Natura 2000 habitats.

**Figure 6 – Monte Secchieta natural grasslands. Casentino's mountains in background.**



**Table 3 – Summary of forest habitats features.**

<i>Forest habitat types</i>	<i>Habitat Natura 2000</i>	<i>Area (ha)</i>	<i>Area %</i>	<i>Mean age</i>	<i>Max age</i>	<i>Min. age</i>
Pure fir high forest	-	575,745	44,86	80	187	31
Beech high forest	9110, 9130, 9210	192,819	15,02	117	215	33
Mixed fir and beech high forest	9220*	115,046	8,96	80	120	34
Black pine high forest	-	148,776	11,59	63	110	31
Chestnut coppice in conversion to high forest	9260	31,618	2,46	57	63	48
Chestnut coppice	9260	27,72	2,16	48	64	31
Mixed coppice	-	99,511	7,75	53	129	33
Exotic species high forest	-	67,301	5,24	58	85	31
Arboretums	-	24,909	1,94	-	-	-
Total		1283,445	20			

A brief comment for each forest type is given below.

1. *Pure fir high forest* (Figure 7), it represents approx. the 46% of Vallombrosa forest growing from 680 to 1250 m. Though of artificial origin (see § 2.5), Vallombrosa fir forests are an outstanding cultural asset of Vallombrosa, whose conservation is one of the main targets of natural heritage management strategy (see further § 3).

Forest age ranges from 31 to 187 yrs; most of the stands are in the “optimum phase” of their biological cycle<sup>1</sup>. Old-growth fir stands are located in the Silvomuseum area (see Figure 9, Figure 10) bordering the Vallombrosa Abbey, ); they reach up to 187 yrs and are locally starting to regenerate naturally.

2. *Beech high forest* (Figure 8), it covers the 15% of the forest and occur as a narrow band at the highest altitudes; the beech forest is a natural habitat of high value from a conservation standpoint, as it encompasses the following Natura 2000 habitats: i) 9110 *Luzulo-Fagetum* beech forests; ii) 9130 *Asperulo-Fagetum* beech forest; iii) 9210 \*Appennine beech forest with *Taxus* and *Ilex*. Beech forests are in the “optimum phase” too and are on average older than fir forests. Old growth forest stands reach up to 215 yrs.

3. *Mixed beech and fir high forest*, approx. 9% of the forest, located in the northwest sector of the Reserve at lower levels; it is a priority Natura 2000 Habitat (9220 \*Appennine beech forest with *Abies alba*); the forest is for the most part in the “optimum phase”.

4. *Black pine high forest* (subspec. *Pinus laricio*), approx. 11% of the forest it is of artificial origin, deriving from a reforestation program started in the early twentieth century; pinewoods mean age is currently 63 yrs.

5. *Chestnut coppices*, approx. 5% of the forest; it is an Habitat 2000 (9260), though of cultural origin. The chestnut forests are mainly old orchards that had been converted to coppices part of which had later been converted to high forest. The mean age of the type ranges from 57 to 48 yrs.

<sup>1</sup> From the time of the culmination of height growth until the culmination of the growth of basal area.

**Figure 7 – Examples of pure fir high forest stands found in Silvomuseum compartments.**



6. *Mixed coppices*, they are mixed broadleaved coppices (with Turkey oak, flowering ash, European hophornbeam, hornbeam, opalus maple, pubescent oak), located on the steeper and sun-drenched slopes, covering approx. 8% of the forest; in the olden days thermophilous oakwood was the natural vegetation coverage of lower altitudes, gradually replaced by fir plantations (see § 3.1). Today broadleaved coppices have a mean age (53 yrs with stands reaching 129 yrs) much higher than traditional rotation period and are being invaded more and more by conifers (fir, Douglas fir).

In the forest there are also some experimental plots of exotic species (mainly *Douglas fir*) and 7 *arboretums*, divided into two nuclei, one near the Abbey (1200 specific and sub-specific taxonomic units, belonging to 137 different genera) and one near the Masso del Diavolo (146 taxonomic units belonging to 69 different genera). The arboretums and experimental parcels had been planted for the first time between 1880 and 1896, in the framework of the scientific and didactic activities carried out by the *Regio Istituto per l'istruzione superiore forestale* [Royal Institute for forestry education] created in 1869 in Vallombrosa, then (1936) the Forestry Sciences Faculty of the University of Florence.

**Figure 8 – Pure beech stand.**

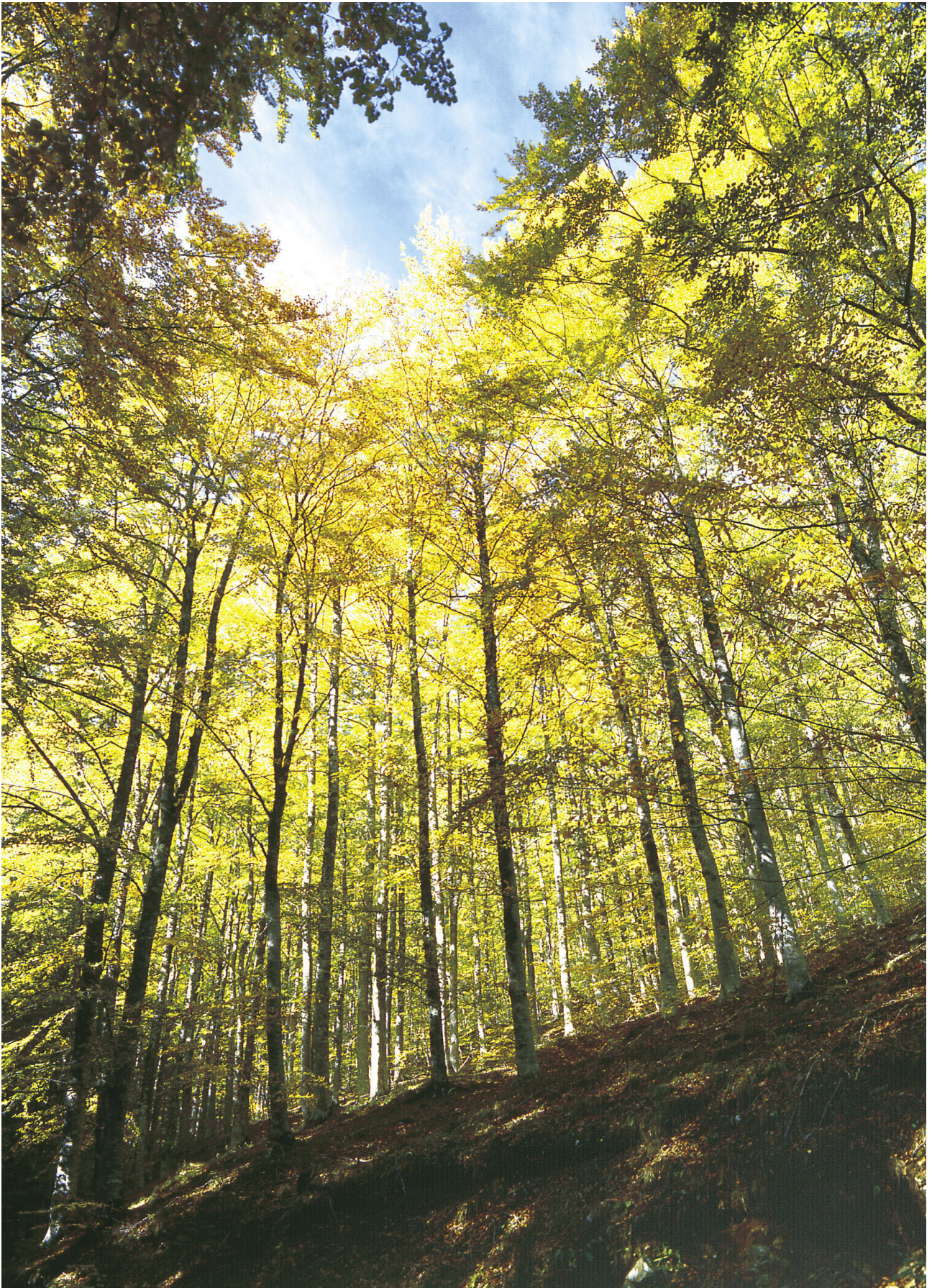
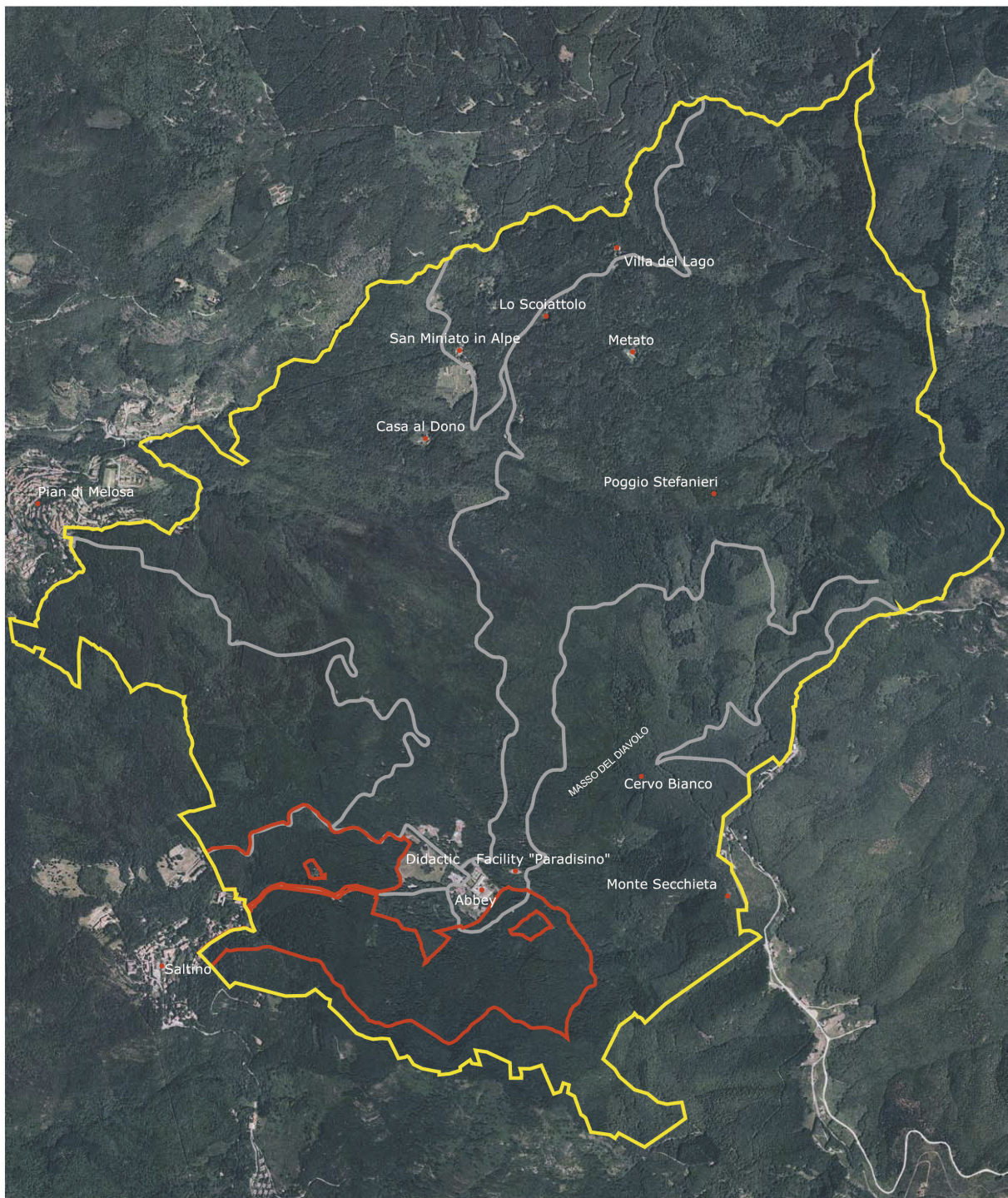




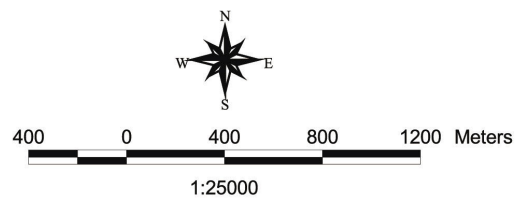


Figure 9 – Vegetation cover in the area designated as the natural heritage at study.

ORTHOPHOTO OF VALLOMBROSA FOREST (1999)



-  Vallombrosa forest limits
-  Silvomuseum limits
-  Toponyms
-  Main road network



geoLAB - Laboratory of Geomatics  
Università degli Studi di Firenze  
[www.geolab.unifi.it](http://www.geolab.unifi.it)



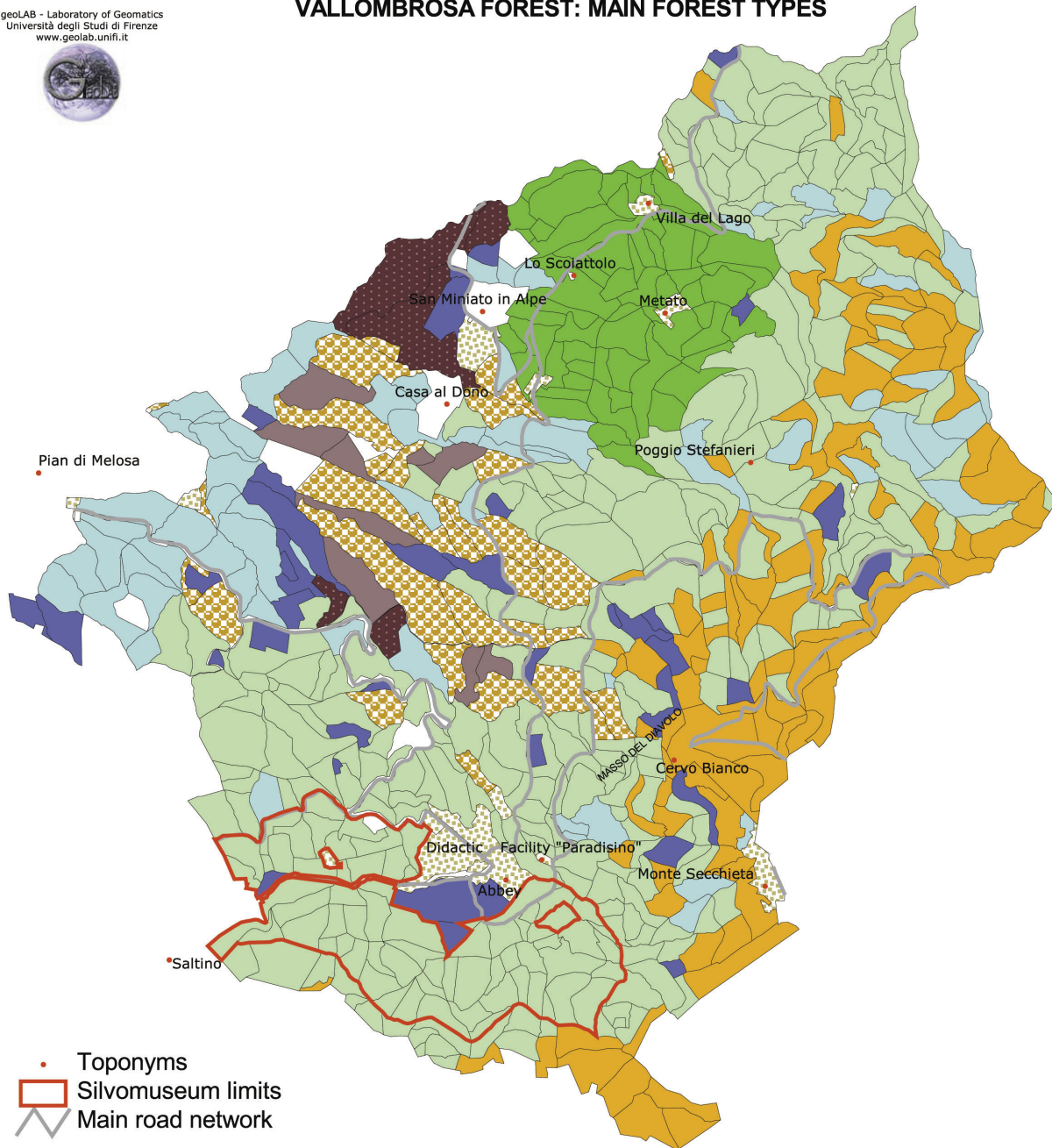
© copyright 2003 DISTAF-UNIFI

**Figure 10 – The variety of forest types within the Vallombrosa forest. Each single polygon in the map identifies a forest compartment of the forest management plan.**

© copyright 2003 DISTAF-UNIFI  
 geoLAB - Laboratory of Geomatics  
 Università degli Studi di Firenze  
 www.geolab.unifi.it



**VALLOMBROSA FOREST: MAIN FOREST TYPES**



- Toponyms
  - ▭ Silvomuseum limits
  - ▬ Main road network
- Forest Management Units - main forest types**
- Mixed fir and beech high forest
  - Pure fir high forest
  - Other areas
  - Chestnut coppice
  - Chestnut coppice in conversion to high forest
  - Mixed coppice
  - Non-autoctonous high forest
  - Beech high forest
  - Black pine high forest



400 0 400 800 1200 Meters

1:25000

### 2.1.2 Fauna

The structural and compositional variability of forest habitats, the presence of old-growth trees/stands, plus a hunting ban that has been in effect for many years has favoured the development of consistent populations of mammals and bird species. Main mammals populations include: roe deer, fallow deer and wild boar. Other mammals common in the forest are: porcupine, badger, dormouse and squirrel.

The forest is also rich in birds with various species of sylviids and wood pigeon, jay, blackbird water ouzel, green woodpecker, nuthatch, buzzard, sparrow-hawk and eagle owl which, in autumn are joined by migratory populations (thrush, fieldfare, woodcock, chaffinch, bullfinch, etc.).

To get a better insight of the value of Vallombrosa Forest as habitat for fauna, we queried a raster archive of habitat suitability maps for all the vertebrates of Italy (Boitani *et al.*, 2002) and found the total number of species the forest is a suitable habitat for.

Results are summarized in the table below.

**Table 4 – Evaluation of Vallombrosa habitat suitability for animal species. Habitat suitability is expressed as “No. of species”, that is total number of species for which Vallombrosa Forest is a suitable habitat. Values are reported according to habitat suitability classes identified at national scale. Values out of brackets represent the dominant class in the study area, values in brackets the maximum class.**

	No. of species in Italy	Vallombrosa forest habitat suitability class (No. of species)	Max habitat suitability class in Italy
Mammals	91	36-42 (47-57)	47-57
Birds	194	38-46 (58-86)	58-86
Red-listed vertebrates	149	25-28 (34-54)	34-54

This exercise highlights the outstanding value of Vallombrosa forest habitats: the dominant values show that the forest is more or less close to maximum habitat suitability condition recorded at national scale. This condition is found locally in the forest (see values in brackets).

Noteworthy are the results for red-listed species, stressing the conservationist interest of the forest. Between the species listed in the Habitats Directive those sighted in Vallombrosa are (source: database Natura 2000, Directorate for Nature Conservation, Ministry for the Environment):

- ✓ *Canis lupus*, wolf
- ✓ *Rhinolophus hipposideros*, Lesser Horseshoe Bat;
- ✓ *Rhinolopus ferrum-equinum*, Greater horseshoe bat
- ✓ *Myotis myotis*, Greater Mouse-eared Bat
- ✓ *Triturus carnifex*, Italian crested Newt
- ✓ *Lucanus cervus*, Lucanid beetle

## 2.4 Relevance of ESPON 1.3.2 maps

The sharp scale gap between the level of assessment of ESPON 1.3.2 maps (NUTS3 Regions) and that of the case study (local scale, Municipality level) makes the provided information too much generalized for being reliable for any evaluation of the spatial interrelations at stake in the case study area.

## 2.5 History of evolution of natural heritage

In Vallombrosa, as in most of European forests, cultivation and management for timber production have profoundly modified the original structure and composition of the forest ecosystem, both at stand and at landscape scale.

In the olden days the forest most probably consisted of xerophyle oak woods at the lower altitudes (on some XI century documents, the place name for Vallombrosa is given as *Cerreto*<sup>2</sup>) chestnut and mesophyle oak woods at the intermediate altitudes and beech forests at the highest levels.

Fir, going by the place names, was probably found in small groups and mixed formations scattered throughout the forest. Historical evidence shows that at least in the XIV century there was a nucleus of, probably spontaneous, fir in the area around what is currently known as Paradisino (Gabrielli, 2000).

Silviculture was one of the main business activities of the Vallombrosian monks, who have been in the area since the XI century. They concentrated their efforts primarily on raising chestnut and fir, while the beech forests were used for grazing and to fill the monastery's firewood needs.

The chestnut woods were cultivated as orchards for their fruit, to feed the monks and the local population and were also managed as coppice to supply building timber (large and small posts).

Fir was gradually spread through the Vallombrosa Forest from the XIV up to XX century for two main reasons:

- 1) to produce assortments with high market value: there was a huge demand for this type of timber for building and shipbuilding, both on the part of the city populations and of the grand ducal government and later on, on the part of the Italian government forestry administration.
- 2) to create a forest landscape that was in keeping with the Benedictines' religious and spiritual vision.

The earliest nuclei of the fir forests were planted near the monastery. They must have been very small and quite far apart (Gabrielli, 2000). Over the years, as the planting increased, the fir forests merged to the extent that by the XVII century the areas between the Abbey and Saltino and between the chapel of S. Giovanni Gualberto and 1200 meters a.s.l. were entirely covered by fir. The formations currently in this area are, therefore, known as the *Vallombrosa historic fir forests [abetine storiche della foresta]*.

To guarantee continuous timber production the Vallombrosian monks developed the cultivation technique of clear cutting combined with artificial regeneration, working the land and planting farm crops between one cycle and the next (Ciancio and Nocentini, 2000a). The need to make recourse to artificial regeneration, in the specific case of the fir in Vallombrosa, was also justified by the lack of natural regeneration in the pure fir stands, one of the manifestations of the fir's marginality with respect to its natural range (Bronzi, 2000).

In 1866 the Vallombrosa Forest came under the government forestry administration. During the years spanning the end of the XIX and the beginning of the XX century the Turkey oak, beech and

---

<sup>2</sup>[1] *Cerreto* is the Italian term for Turkey oak, and Turkey oak woods.



chestnut coppices were converted to high forest in order to obtain timber of big dimension (posts, boards and beams).

In the early twentieth century a major reforestation program was implemented and the arboretums and Douglas fir experimental plots were also established.

During that period, the high beech forests (excluding those on the ridge) were transformed into mixed fir and beech forests, while the mixed broadleaved forest, that had been converted to high forest in the preceding decades, was once again transformed to coppice forest in view of the meager results obtained.

Still during those same years, the chestnut orchards were transformed into coppices; in the areas where chestnut trees were already being cultivated, Corsican pine or fir were planted (the pinewoods Pian di Melosa and along the road to the Consuma Pass). The remains of these old woods are still visible today in the form of large coppices sometimes with some young shoots. In the high part of the forest, reforestation (with beech) also extended to some of the pastures.

The management trend following World War II was to break up the purity of the fir formations by reintroducing spruce and, wherever possible, to favour Douglas fir.

## **2.6 Pressures and driving forces**

The main driving force in the dynamics of the Vallombrosa Forest is, of course, forest succession. High forests and of coppices stands tend to evolve naturally through a sequence of development stages, ending generally with a phase of ageing and/or decay; the last is generally associated with a phase of intensive regeneration under the small or large gaps opened in the canopy. The forest management regime applied in the Vallombrosa Forest tends to support and enhance to the utmost the natural dynamics of the forest, with the only exception of the Silvomuseum area where a different approach is taken (see next chapter).

Apart from forest management, a couple of driving forces can be outlined which may influence the evolutionary process of the Vallombrosa forest. These are:

1. uncontrolled tourism pressure, that could cause degradation particularly in the forest stands close to most frequented forest paths;
2. biotic disturbance caused by: i) disease and pests (insects in particular) linked to fir stands, whose damages cause local decline phenomena; ii) the uncontrolled increase of populations of roe-deer and wild boar which induce negative physiological stress especially in young fir stands.

In the following the nature of each driving force is described.

### *2.6.1 Population growth in Florence area and tourism pressure*

The current population density in the large scale context of the case study is mapped in Figure 11.

The city of Florence is the core of a densely populated plain with values (1000-3700 inhabitants per km<sup>2</sup>) comparable to most densely populated in European areas (cfr. ESPON 1.3.2 Project map "Population density for NUTS3 regions"). Moving outward population density decreases progressively, reaching its minimum value in the Casentino's mountains. Built up areas percentage decreases as well moving from plains to surrounding reliefs (Figure 12). Florence and Florence's plain are characterized by a very high rate of built up areas, comparable to the highest classes at European scale (cfr. ESPON 1.3.2 Project map "Built up areas percentage for NUTS3 regions").

Population density growth trends for the territorial context at study have been estimated from the data for Tuscany Region assessed in periodical censuses carried out in Italy since 1861 (Table 5); from 1861 Tuscany population grows progressively up to the last decade, 1991 - 2001, during which a feeble diminution occurred. More interesting, the trends of residential inhabitants per municipality (Figure 14) show a constant withdrawal from Florence town towards neighbouring

little towns and villages (Figure 13). In the Reggello municipality, where Vallombrosa is located, and in the surrounding Municipalities of Pratomagno and Valdarno (Rignano, Incisa, Figline etc.) the population growth trend is increasing, specially during the last three decades. This phenomenon may be due both to the lower cost of dwellings out of the urban centre of Florence and to the wish to live in the countryside. This trend is expected to increase in the next years, due to the welfare of this accommodation out of the urban chaos and smog; this will result in a polycentric distribution of urban settlements along - cfr. § 1.3 – both Florence and in Valdarno plains.

According to an assessment carried out by “Legambiente”, a social-environmental Italian ONG, the Florence province is at 48<sup>th</sup> place for the quality of life in Italy; the mean annual income pro-capite in the territorial context of Vallombrosa is reported in Figure 15; as expected, income varies according to the socio-economic development of the land unit, recording its maximum value in Florence (approx. 15280 €/yr) and its minimum in Pratomagno (approx. 10703 €/yr). These values are higher than the Italian and regional value mean annual income *pro-capite* (Figure 16), ranking the Florence Province at 5<sup>th</sup> place in Italy as to mean annual income amongst the 103 Italian provinces.

In conclusion the urban system surrounding Pratomagno, notably the plain areas, is an highly developed territory with the typical faults of highly urbanized European areas: high population density, high rate of built up areas and relatively low life quality. Though not directly proven this may cause negative neighbourhood effects on the surrounding natural areas, especially Vallombrosa, in terms of the high tourism pressure during holidays and weekends. This is a phenomenon forest management should take care of, as public frequentation of forest areas raises a number of questions; between others: safety of forest stands (i.e. prevention of tree falls), at least those close to most frequented forest paths and regulation of outdoor activities (e.g. mushroom collection).

The increasing urbanisation trend eventually won't directly affect the Vallombrosa area with immediate impact on the forest, but it's likely to increase more and more the tourism pressure as a result of a increasing population density of the neighbouring municipalities.

Figure 11 – Population density in the large scale territorial context of the Vallombrosa Forest (Elaborated from ISTAT database, 1997).

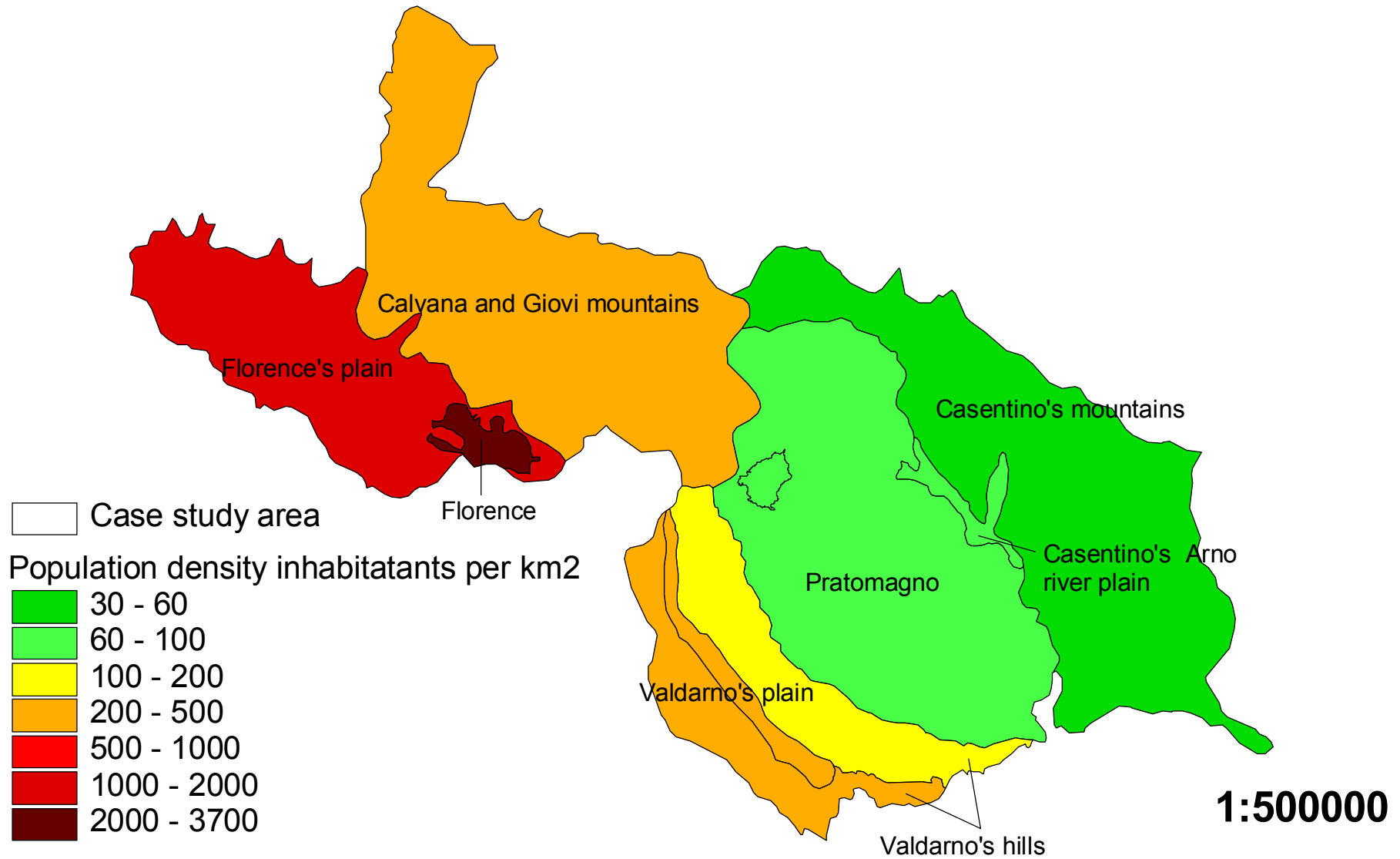
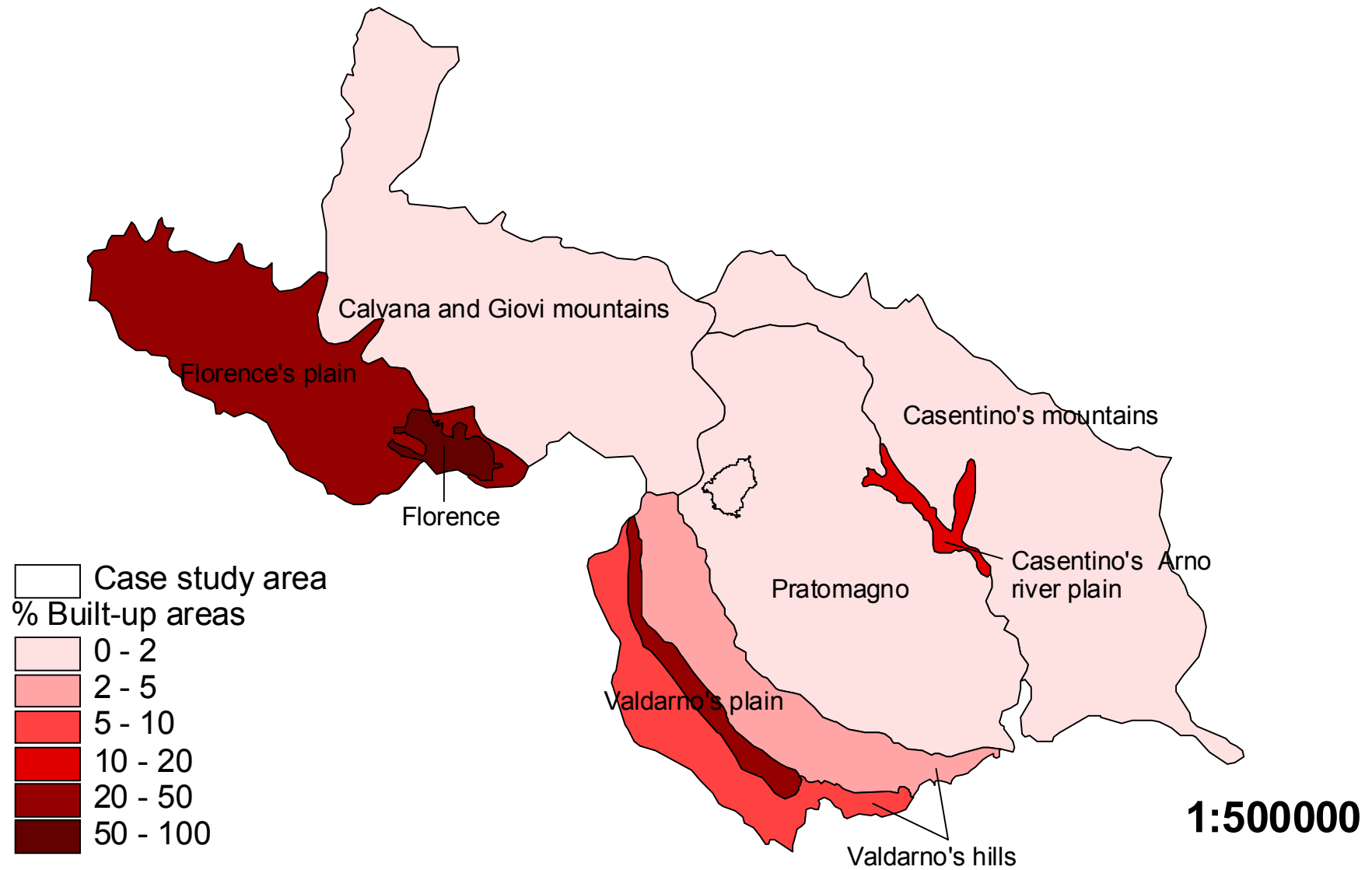


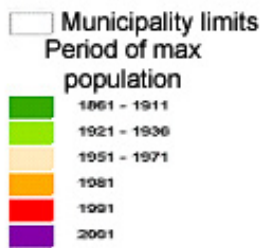
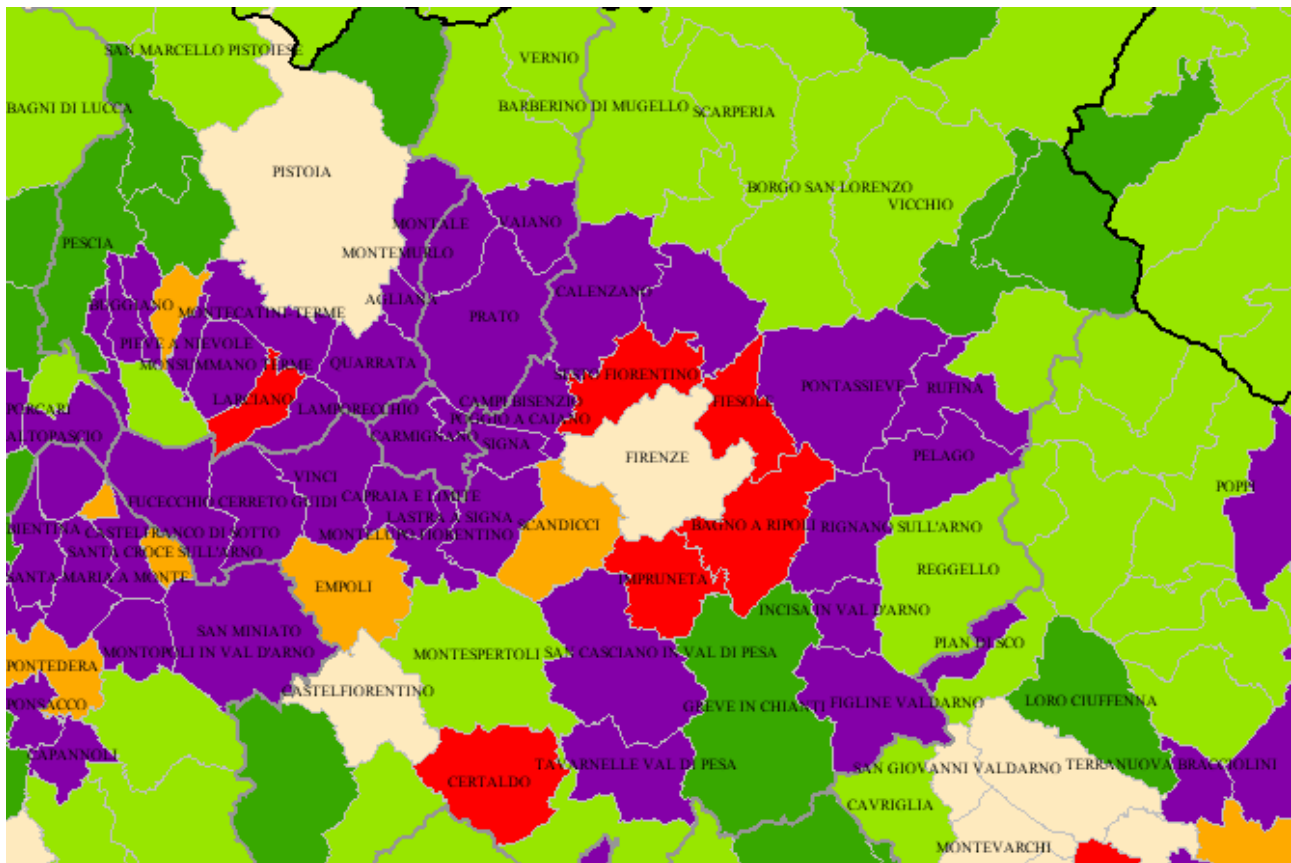
Figure 12 – Built up areas percentage in the large scale territorial context of the Vallombrosa Forest (Elaborated from CORINE LAND COVER, 2000).



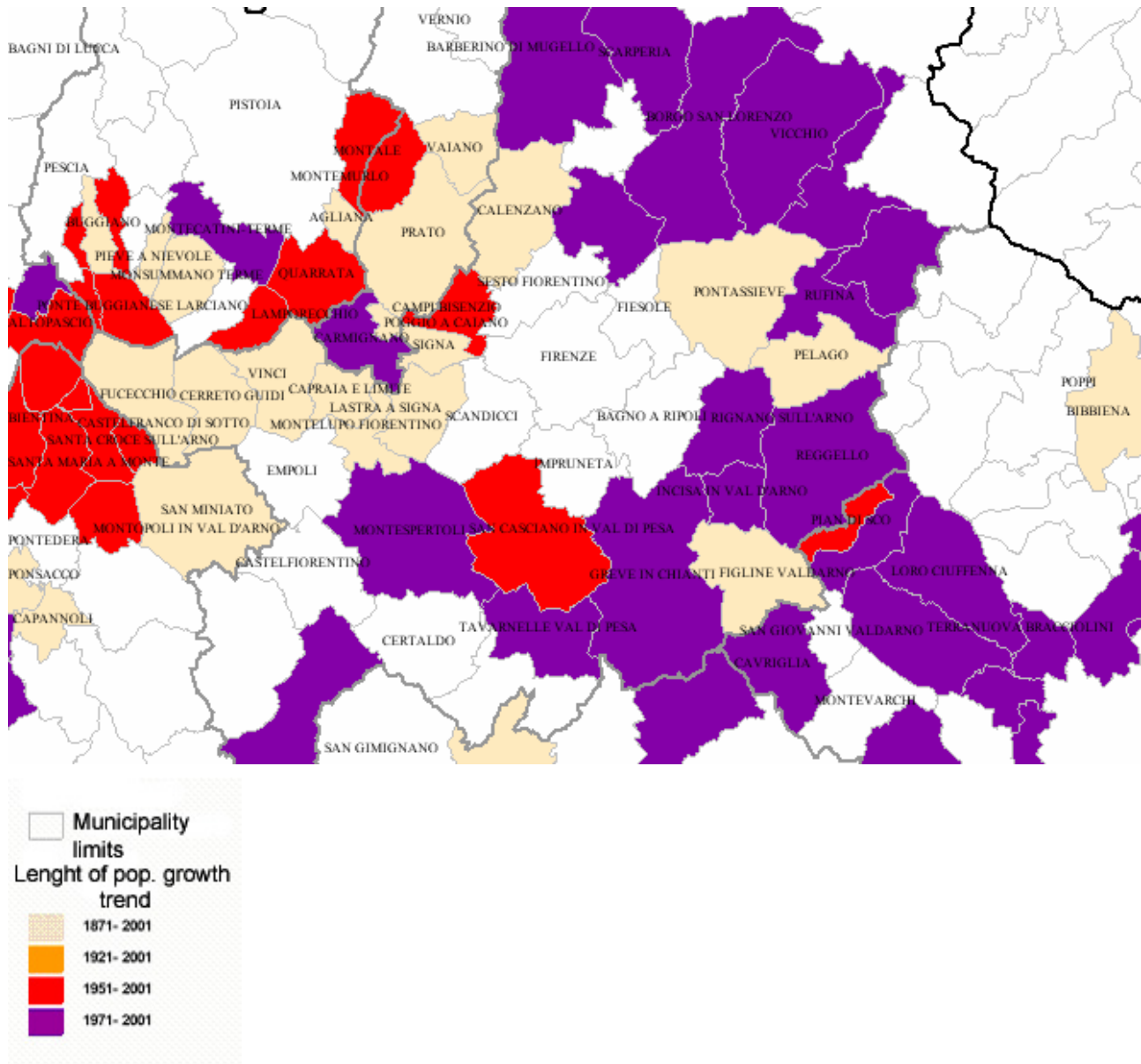
**Table 5 - Tuscany: population census from 1861 to 2001.**

Census date	Residential population	Mean variation per year %
Dec 31 1861	1920000	0
Dec 31 1871	2124000	10.1
Dec 31 1881	2187000	3
Feb 10 1901	2503000	7.1
Jun 10 1911	2670000	6.2
Dec 1 1921	2810000	4.9
Apr 21 1931	2914000	3.9
Apr 21 1936	2978000	4.4
Nov 4 1951	3159000	3.8
Oct 15 1961	3286000	4
Oct 24 1971	3473000	5.5
Oct 25 1981	3581000	3.1
Oct 20 1991	3530000	-1.4
Oct 21 2001	3498000	-0.9

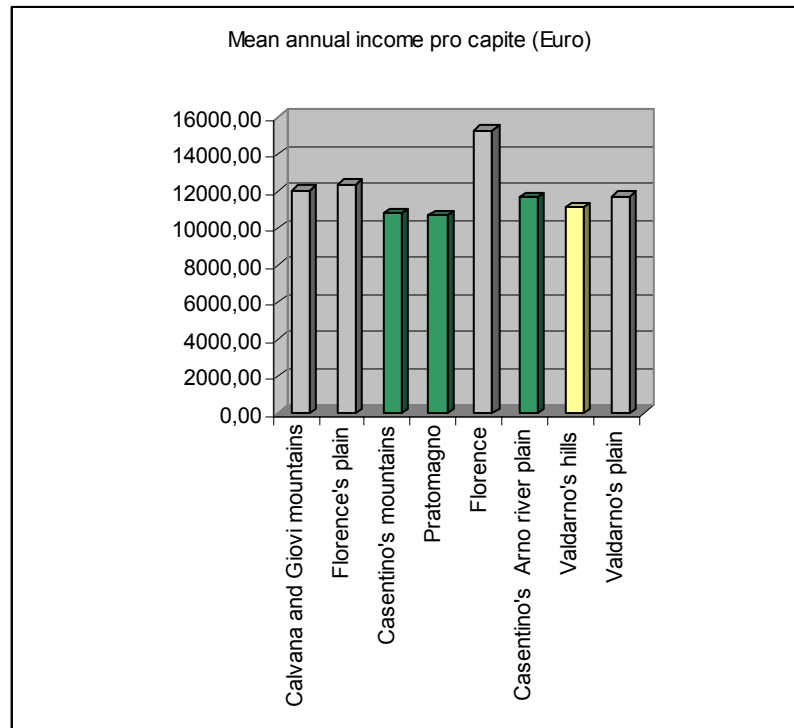
Figure 13 - Maximum population period per municipality



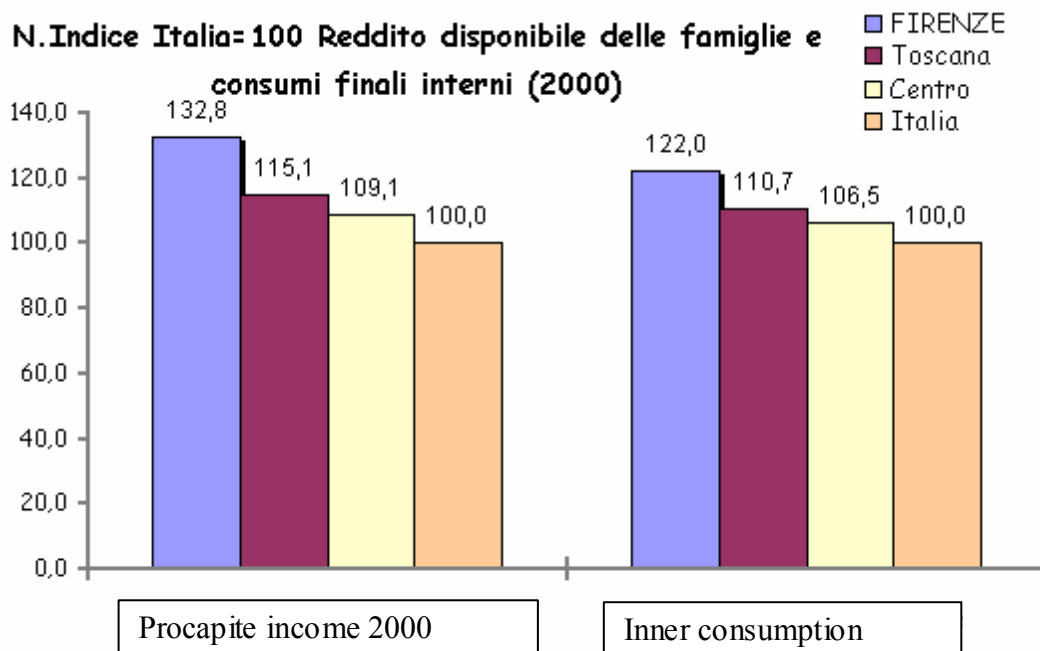
**Figure 14 – Population growth per municipality in the period 1861-2001.**



**Figure 15 – Mean annual income pro-capite in the large scale territorial context of Vallombrosa; histogram colour: grey-urban system; yellow-agricultural system; green-rural system (elaborated from ISTAT database, 1997).**



**Figure 16 – Income per family (2000) and final inner consumption, national value =100.**



*2.6.2 Biotic disturbance*

Health condition of the Vallombrosa Forest is on average good, but there are locally some fir stands highly degraded for the presence of diseases and pest (phytophagous and xylophage insects in particular), drought events, water table variation during the year (Moriondo and Tiberi, 2000).



These factors cause local a decline of fir stands, especially those located in lower altitudes at the limits of fir natural range, that tends to be replaced by the more competitive autoctonous broadleaves species.

The forest regeneration process is severely limited by acorn and seedling predators, represented mainly by the dense populations of wild boar and roe deer. Wild boar, notably, by rooting the soil has a negatively influence on pedofauna and hence on the decomposition of organic matter; in addition it causes damage to the plants by the rubbing on the trunks. Roe deer, on the other hand, cause damage to young shoots and seedlings by continuous browsing.

Biotic disturbance is hence a threat to the conservation status of Vallombrosa forest habitats to be taken in serious consideration when planning biodiversity conservation measures.

## 3. Management of natural heritage

### 3.1 History of forest management

The Vallombrosa forest has a well established and relatively long tradition of forest management.

The first management plan was drawn in 1876, when the former monastic property passed to the Italian State (Italian State Desmone Act Jul. 7, 1866). The management plan was drawn due to forest law prescription; management plans were compulsory for all public owned forests, by force of 1877 National Forest Law, and this was still implemented in following laws and valid up till now.

Regarding to the possible conflicts, since the area was historically a sole owned forest, scantily populated and with local population employed in forest jobs, the application of a management plan didn't induce any dispute.

The forest management approach applied in most plans was a traditional one, aimed to support and enhance timber production. Present day purpose, need and forest approach are definitely aimed toward the conservation of natural heritage.

The plans that succeeded from 1877 onward were all drawn by public institutions: the first plan was drawn by the Forest Authority, the following revisions were drawn by the Royal Institute for forestry education then Forestry Science Faculty of the University of Florence. Until now nine management plans have been drawn for the Vallombrosa forest.

The forest is currently administered by the Corpo Forestale dello Stato<sup>3</sup>. The last plan follows a multi-criterial approach (or Multiple Resource Management Approach).

### 3.2 Forest management objectives and targets

The proposed guidelines for the current management of the forest are based on three basic objectives and related forest management measures (Ciancio and Nocentini, 2000b):

1. Perpetuation of the unique scenario of the traditional fir forest landscape in the area of *Silvomuseum* (105 ha), corresponding to the lands on the longest fir-cultivated and integral part of the Abbey's landscape; this landscape bears witness to a cultivation system that is no longer practiced and risks gradual extinction due to the lack of management based on the cultivation techniques that allowed it to endure over the centuries. The idea of the *Silvomuseum* is to protect this historic nucleus by continuing to implement the cultivation system conceived by the Vallombrosian monks. This is accomplished by implementing clear cutting (over an area of 2000-3000 m<sup>2</sup>) with artificial regeneration. Preferably material produced *in loco* with seeds of local provenance will be used for replanting. The proposed rotation is 150 years in order to maintain the large trees of aesthetic and biological value.

2. Silvicultural management oriented towards the conservation and enhancement of forest habitat biological diversity for the rest of the Vallombrosa forest. This is the largest area and it embraces naturalistic, recreational and landscape functions and currently it is showing signs of natural evolution.

Goal of this strategy is to support the evolutionary dynamics of the forest ecosystems with good levels of biological efficiency and complexity (*active conservation*). The fundamental criterion is the restoration of bio-ecological function of the stands in the event of catastrophes and the prevention of situations that may compromise their use (e.g. tree falls, diffusion of pest and diseases).

---

<sup>3</sup> Government Forestry Service formerly known as Azienda di Stato per le Foreste Demaniali

In forests more simplified from a structural and compositional standpoint, like coppices and conifer plantations, forest management aims to enhance to the utmost the evolutionary dynamics of the stands through supporting natural evolutionary processes that will take the forest towards structural typologies that are in dynamic equilibrium with the environment. It accomplishes with a management system that favours, by cautious interventions, the natural process of structural and compositional de-homogenization of the stands.

3. Conservation and enhancement of the arboretums and experimental plots which, for over a century, have been playing significant roles in furthering silviculture and scientific knowledge. The plots are currently managed by the Istituto Sperimentale per la Selvicoltura. They were, and still are, one of the oldest research and training field laboratory for the University of Florence degree course in Forestry and Environmental Sciences.

In brief main aim of the plan is actually aimed to maintain and enhance the biological and cultural diversity of Vallombrosa forest. The internal coherence of the plan is achieved by outlining management measures that are tailored to the specific conservation status and dynamic of each forest type, in order to achieve in time, with adaptations to forest ecosystem reactions (*adaptive management*), the desired target. In doing this also other effects are achieved like tourist valorisation of the forest and prevention from events that may compromise its utilization.

Regarding possible negative effects of tourism pressure on the forest habitats and species these are managed through the regulations ordinarily applied in forest reserves (limitations and bans to the collection of plants, picking of mushrooms) and of course promotion of a respectful behaviour in the forest. In this regard it should be reminded the deterrent effect of the presence of the Corpo Forestale dello Stato, that keeps a close watch on the forest reserve.

A still critical and open point in the management of the Vallombrosa forest is the regulation of density of ungulates causing damage to forest habitats; the lack of natural predators - even though wolf populations are expanding in the neighbourhood Appennine forests - makes difficult to control the density of roe deer and wild boar, unless a specific management plan is applied; but as hunting is banned by law in Italian protected areas this hypothesis is not applicable under present conditions.

The conservation strategies designed in the forest management plan are also coherent with the Habitat Directive provisions for managing of Natura 2000 sites: maintaining in a favourable conservation status those habitats the site has been designed for, which are in the case at study the priority habitats listed in § 2.2.1.

With regard to external coherence with other spatial planning strategies as said in § 1.4 the PTCP refers to the specific management plan for the forest administration and running, avoiding conflicts and incoherence.

### **3.3. Plan implementation**

A critical question for the achievement of the targets outlined before are the economic constraints limiting the implementation of the plan.

The implementation of the forest management plans has been always a problem, due to the high cost of silvicultural operations. At present the forest management costs about 70 – 100.000 Euro per year, excluding the salaries of forest rangers.

Moreover, even if the forest is state owned and no tax are involved, the relevant cost of the forest-workers salaries makes the plan hard to be applied, so that its efficiency depends on the availability of cash funds. The planned silvicultural interventions involve silvicultural practices that are very expensive, with no financial return. So that, in absence of national or EU financial incentives,

priority is given to interventions aimed at the prevention of potential dangerous situations for users, but most other planned interventions aren't carried out.

## 4. Scenarios

Considering the driving forces delineated in § 2.6 and the limitations to the implementation of the Vallombrosa forest management plan two possible scenarios can be outlined:

### *Scenario 1. Evolution under current trend*

The long-time evolution of the natural heritage is chiefly driven by forest natural dynamics, with a limited influence of forest management. Biotic disturbances might play a major role in affecting the dynamic of the forest landscape.

### *Scenario 2. Evolution under effective management and valorisation of natural heritage*

The forest management plan is fully applied. The adaptive management approach would lead in time to the progressive achievement of the targets planned for the different forests types; both the biological and cultural values of the forest will be effectively protected and valorized.

The possible evolution path of each scenario can be summarized as follow.

### *Scenario 1. Evolution under current trend*

Natural forest natural dynamics would lead to the disappearance of the traditional fir forest landscape evolving toward a beech dominated or mixed fir and beech forest. This shift could be either gradual and punctiform - in the case of small gap forest dynamics triggered by the dieback of single or small group of trees - either relatively sudden and widespread in the event of epidemic diseases or storm damage. Considering that the natural regeneration of the fir is not really abundant and prevented by browsing, the presence of fir in the Vallombrosa forest will likely decrease in the long-term. On the other hand, forest succession will lead to a structural and compositional de-homogenization of the forest - a trend in general term positive for biodiversity development- that can be already observed throughout the forest as result of fir dieback (Figure 17).

**Figure 17 – Evolutionary processes in the fir stands: structural and compositional de-homogenization (replacement by beech).**



### *Scenario 2. Evolution under effective management and valorisation of the natural heritage*

The Vallombrosa forest's natural heritage would surely benefit from the implementation of the forest management plan. The main strength of the plan is understanding the importance of valorising both the ecological and the cultural asset of the forest and accordingly, planning finalized conservation measures. This will also enhance the Vallombrosa's attractiveness for tourism supporting local sustainable development.

The feasibility of this perspective, which has no direct financial return for the Vallombrosa Forestry Administration, is actually tied to the availability of Government funds assigned to the ordinary management of forest reserve. This is a weakness not of the planning strategy in itself but of Italian policies regarding nature conservation. Despite the social awareness of the intrinsic value of the natural heritage and its relevant public functions, funds assigned to its management are far below the required budget and of minor importance if compared to resources assigned to other sectors like infrastructures and urban development.

## **5. Conclusions and recommendations**

The case study here presented shows a clear example of a thorny question to be solved in Italy for an effective management of natural heritage. Even if conditions for an high quality management of natural heritage are found (long history of NH management, awareness of NH value, support of the scientific community in designing planning strategies, absence of social conflicts, etc.) economic difficulties risk to constrain the implementation of planned conservation strategies. This is mainly due to a weakness (and short-sightedness) of central and regional level spatial planning policies, allocating most of the financial resources to economically relevant sectors.

Another critical point the nature conservation policies would need to resolve is the formulation of a strategy for wild boar and deer control in protected areas. Wild boars, notably, having high reproductive rate and no natural predators are rapidly increasing their numbers in Italy and are likely to continue so in the future; some form of management is required as the species causes particular concern to nature conservation and to the agricultural sector (crop damage). Wild boars control is also important in relation to public safety, i.e. road traffic accidents. As much important for forest biodiversity conservation is the control of deer populations.

It is therefore highly recommended that the current legislation concerning the management of these species in protected areas is reviewed, with the objective ensuring, in absence of natural predators, sufficient grazing for the herds and other wildlife animals, without causing damage to the vegetation and the environment by overgrazing. Points to be considered are what management options could be considered in protected areas. In this respect, more research is required. Successful management should be based on a fully understanding of the basic biology, behaviour and ecology of the species and their relationships with natural habitats and agricultural lands. Field trials of potential control and management techniques should be tested such as trapping, culling and improved fencing design.

## **6. Bibliography**

Boitani L., Corsi F., Falcucci A., Maiorano L., Marzetti I., Masi M., Montemaggiori A., Ottaviani D., Reggiani G., Rondinini C. 2002 - Rete Ecologica Nazionale. Un approccio alla conservazione dei vertebrati italiani. Università di Roma "La Sapienza", Dipartimento di Biologia Animale e dell'Uomo; Ministero dell'Ambiente, Direzione per la Conservazione della Natura; Istituto di Ecologia Applicata. <http://www.gisbau.uniroma1.it/REN>

Bronzi Alberto, 2000 - La situazione attuale delle abetine di Vallombrosa. *Italia Forestale e Montana* 55 (6):363-368.

Casini L., 2000 - Nuove prospettive per uno sviluppo sostenibile del territorio. CNR. RAISA, Pubbl. n. 3050. Studio Editoriale Fiorentino.

Ciancio O., Nocentini S., 2000a - Il Silvomuseo di Vallombrosa: piano d'assestamento dell'abetina dei Monaci Vallombrosiani. *L'Italia Forestale e Montana* LV(6):409-450.

Ciancio O., Nocentini S., 2000b - Perché un Silvomuseo a Vallombrosa? *L'Italia Forestale e Montana* 55 (6):397-408.

Gabrielli A., 2000. Le storiche abetine di Vallombrosa. *Italia Forestale e Montana* 55 (6):381-385.

Moriondo F., Tiberi R., 2000 – Aspetti fitopatologici delle abetine di Vallombrosa. *L'Italia Forestale e Montana* 55 (6):369-380.

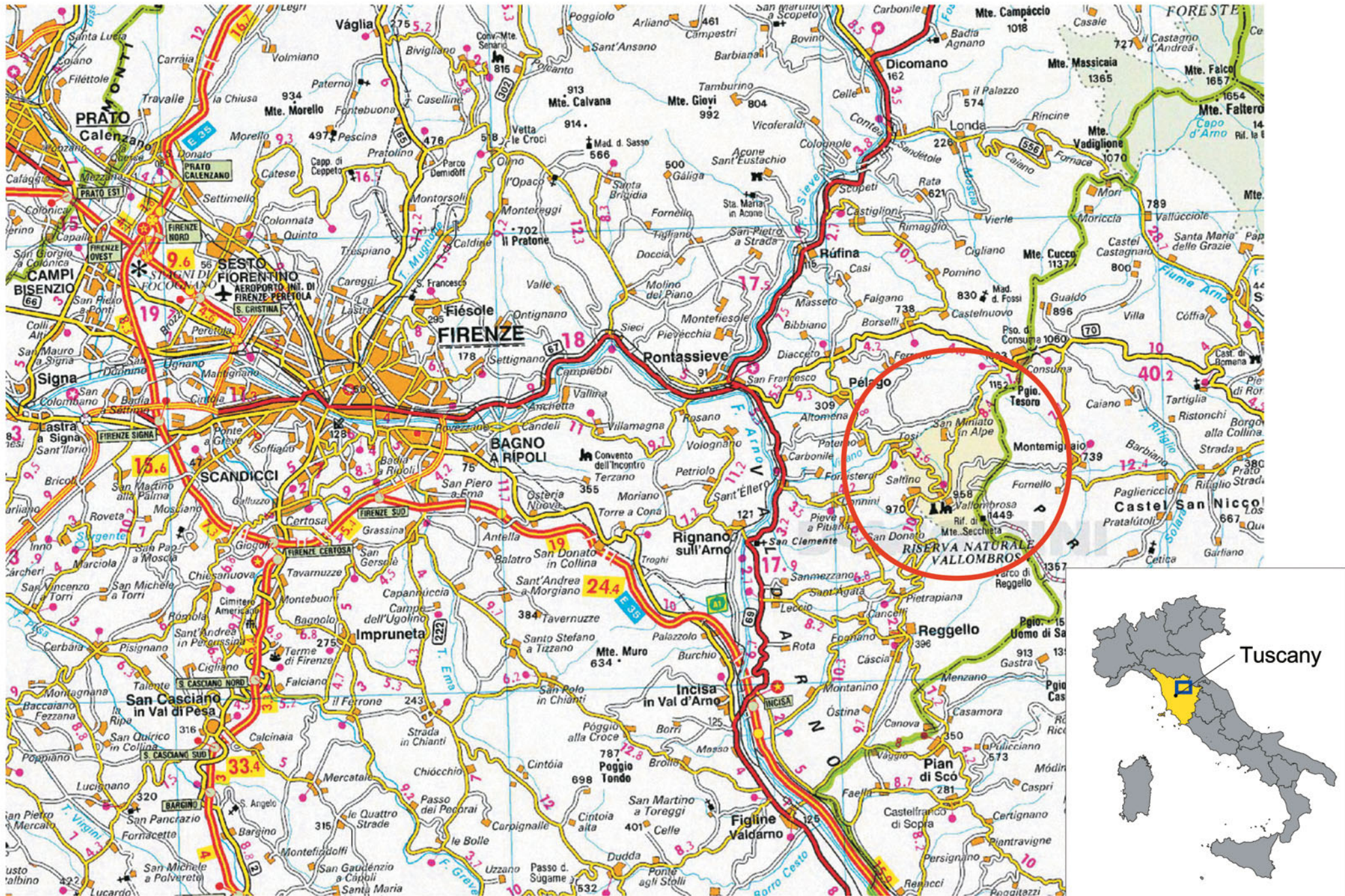
## **7. List of contacts interviewed**

Dr. Bronzi Alberto, Vallombrosa Forest Reserve, Government Forestry Service.

Prof. Ciancio O. and Prof. Nocentini S., University of Florence, scientific supervisors of the “Multiple-use Management plan for the Vallombrosa Forest”.

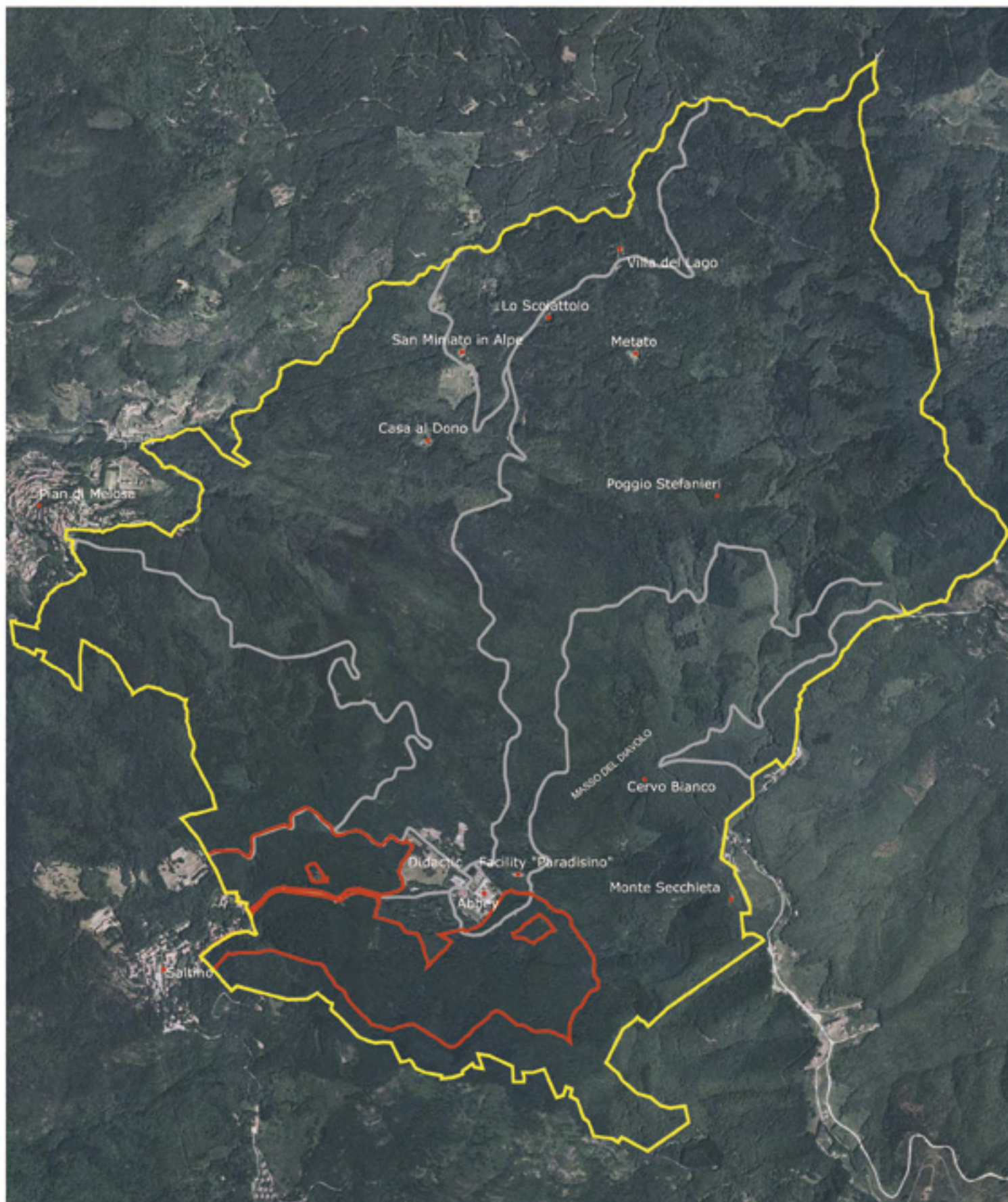






# LOCATION OF VALLOMBROSA FOREST



1:200000

# ORTHOPHOTO OF VALLOMBROSA FOREST (1999)



-  Vallombrosa forest limits
-  Silvomuseum limits
-  Toponyms
-  Main road network



400 0 400 800 1200 Meters

1:25000

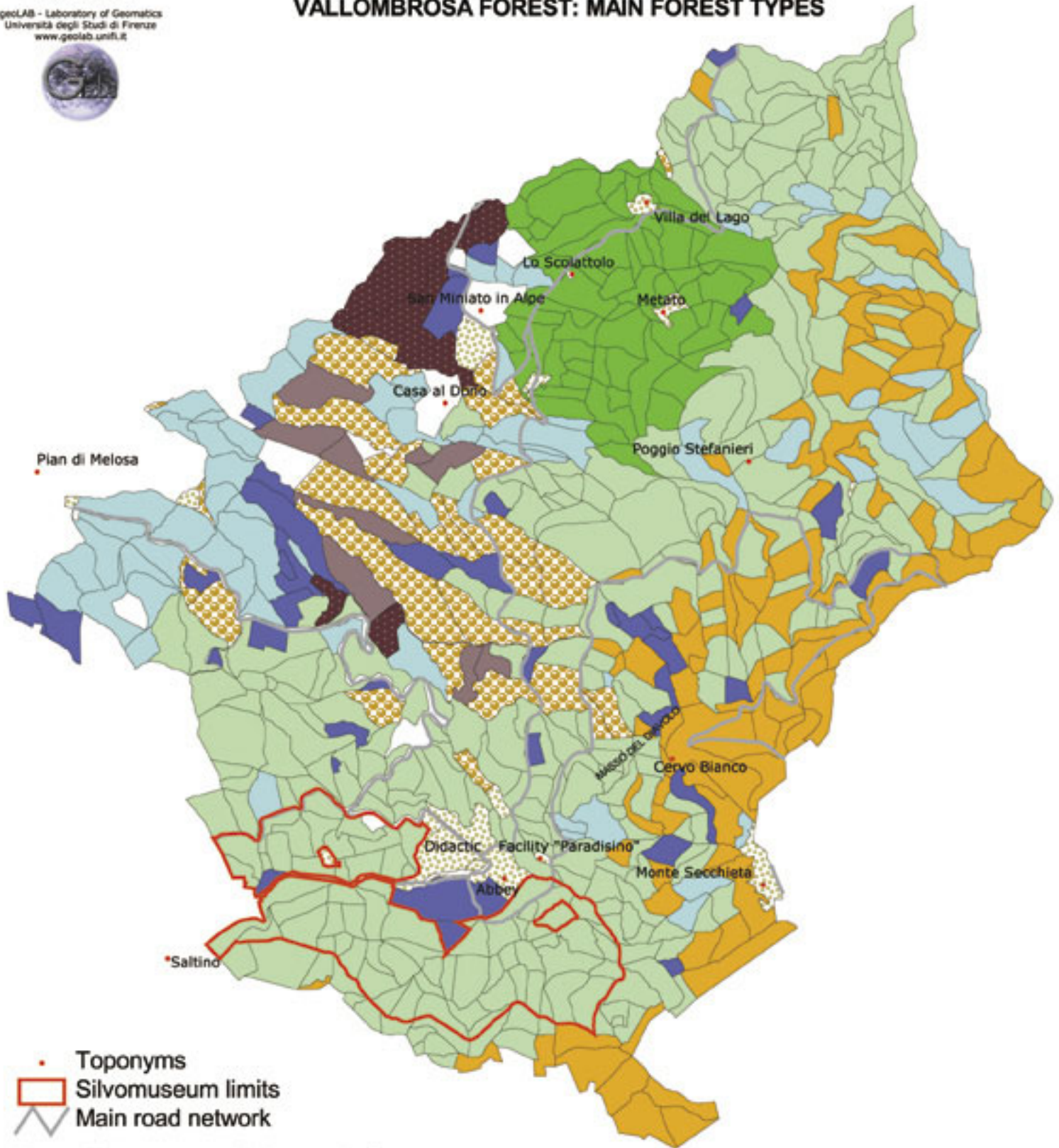
geolAB - Laboratory of Geomatics  
Università degli Studi di Firenze  
[www.geolab.unifi.it](http://www.geolab.unifi.it)



© copyright 2005 GeolAB-UNIFI



# VALLOMBROSA FOREST: MAIN FOREST TYPES



- Toponyms
- ▭ Silvomuseum limits
- ▬ Main road network

## Forest Management Units - main forest types

- Mixed fir and beech high forest
- Pure fir high forest
- Other areas
- Chestnut coppice
- Chestnut coppice in conversion to high forest
- Mixed coppice
- Non-autoctonous high forest
- Beech high forest
- Black pine high forest



1:25000