Territorial Trends of the Management of the Natural Heritage

ESPON 1.3.2.

Third Interim Report

Executive Summary

and

Introduction

April 2004

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Utrecht

EuroNet EEIG in co-operation with
European Centre for Nature Conservation (ECNC)

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Executive summary ESPON 1.3.2

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."

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. 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 time. 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. This report describes the concept of territorial cohesion extended beyond the notion of economic and social cohesion, where by territorial balance and harmonious development of the Union are the key issues. Natural heritage, nature and biodiversity are sparsely mentioned in the text, but nevertheless there is a significant shift when comparing to previous Cohesion reports. Nature as an asset is identified as an opportunity and challenge for regions. It is recognised that even the in EU-terms called handicapped areas have potential due to their geographical characteristics and peripheral location.

The report 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

2. The scope

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 must be addressed at 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 and is planned to be finished within 1.5 years. Taking into account the broad objective, the large number of countries and the lack of data together with the relatively short period that is available for this project, answering the central question requires a precise, careful and robust definition of the scope.

The central 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 or territorial trends.

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 natural heritage in the large bio-geographic features on urbanisation at the macro level?

Key question 2: 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 3: 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 4: What was the influence of social economic and agricultural trends on the natural heritage?

Key question 5: How effective are EU and national level policies for the management of natural heritage?

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 does imply a certain qualitative assessment, but it 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 Concerning the Protection of the World Cultural and Natural Heritage, adopted by UNESCO in 1972. All Member States of the European Union have ratified this 'World Heritage' convention.

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 (see ESPON project 2.1.3 on 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.

The project focuses on the relationship between spatial development and natural heritage for the territory of Europe, including the accession countries and the islands. The seas, with also certain natural value are not included. The seas form a natural barrier for cohesion as islands are physically isolated.

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. Also decisions, aiming at improved environmental conditions favourable for more species are included in the management of natural heritage.

3. Methodology

The objective of this ESPON project is to provide information that may be relevant to anticipate future trends and develop appropriate policies to influence them. The starting points are the trends and the status quo. It is important to have an overview of, and insight into, the trends, and associated processes, of the past if long term projections are envisaged.

At the start, it should be noted that the desired level of data is not complete or sufficient:

- Trends can be drawn for certain issues, such as population growth, development of GDP and so on, but for many other issues this data is not available;
- Data on the current situation or status quo varies in date. For instance the land use information is gathered in a period of approximate 20 years. Corine land cover data does not represent a certain year but is based on analyses of satellite data from a number of years;
- Data is often not available or missing for certain countries. The data collections for the EU15, for the accession countries and for Switzerland and Norway are different;
- Data for the EU15 and the accession countries is based upon different definitions and therefore not fully compatible;
- Information is available at different levels.

Methodological remarks:

- Relations are seldom causal and one should be cautious with expected relations. For example, ecofarming does not automatically have a positive influence on fauna;
- This project is based on a combination of inductive and deductive approaches. By trial and error, verification and falsification of assumptions can be made. The gathering of observations and data by case studies and the questionnaire in order to draw general conclusions is the inductive approach;
- Both approaches are complementary; when data is missing the deductive approach cannot be followed, inductive gathered information may 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 following methods are used:

- Secondary sources, consisting of policy documents, scientific research, existing statistical information. A significant quantity of documents on social, demographic and economic trends, agriculture, infrastructure, nature and landscape provides a useful information source;
- GIS analyses and map overlays;
- Tentative explanations for correlations;
- Trend extrapolation. Predictions of the future circumstances can be achieved through extrapolation of past trends;
- Questionnaire on national policies relevant for the current study;

- Case studies illustrating the local processes and trends for different locations.

Case studies and scenarios

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

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

In addition to refining our understanding of policy and management of the natural heritage, the case studies also help to meet the following objectives:

- Evaluation of the relevance of the database;
- Evaluation of the relevance of the analysis of the interrelations;
- Highlighting the limits and the level of reliability of the analysis;
- Providing input to the project with ground-based information;
- Provision of matter to develop long term evolution scenarios.

The case studies are integrated in part II of this report. The full descriptions are included in the appendix.

The scenarios focus on the main question of this project: what is the influence of management of natural heritage by comparing two possible territorial evolutions:

- Evolution in line with current trends;
- Evolution under a scenario of effective protection and valorisation of natural heritage.

To build realistic scenarios the following steps will be taken:

1. Identify the main factors influencing the evolution of the studied system. These factors evolve and interact, causing changes over time;
2. Analyse the possible evolutions of each driving force and their influence on the studied system (creation of sub-scenarios);
3. Consider different combinations of sub-scenarios to create global scenarios.

The evolution regarding the current trends is based on the main economic driving forces, such as urban and infrastructure developments and farming / forestry. These forces consume space which place great pressure on natural heritage. The evolution regarding effective management of natural heritage will be based on the following system of influences:

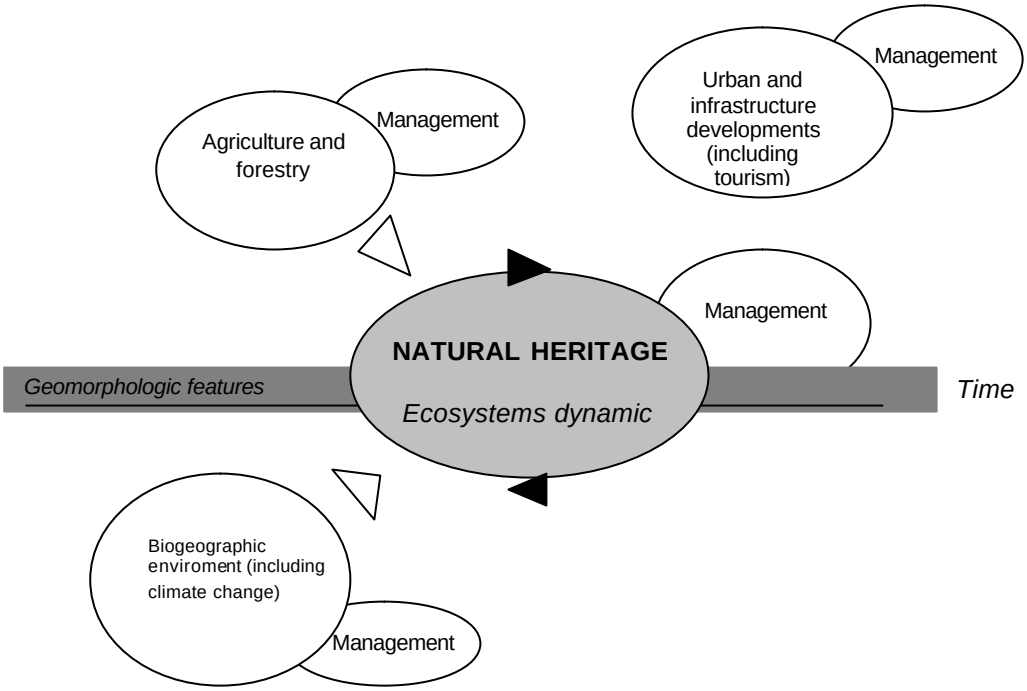

Figure: Influences on natural heritage

- The dynamics of the natural heritage in this view consist of the mutual influences of geomorphologic features, climate and the internal dynamics of the natural ecosystem;
- Farming and forestry can be regarded as being external to the natural heritage, determining the space left for natural heritage, or they can be regarded as being internal to the natural heritage, as agro-dependent ecosystems and forest ecosystems;
- Urban and infrastructure developments shape the landscapes and natural heritage structures. They cause fragmentation and soil consumption and soil sealing. These processes have negative impacts such as decreasing potential for food production, increasing run-off and decreasing the area of natural heritage;
- The management of the natural heritage influences the natural evolution of the natural heritage through planning regulations, site management and ecological farming incentives, , but also the management of agriculture and forestry, urbanisation, infrastructure and tourism and the environment may influence the natural heritage.
- Environmental conditions impact the natural heritage. Farming, forestry, urbanisation, and mobility influence some of the environmental conditions.

Questionnaire on management

Next to the case studies at the local and regional level a questionnaire at the national level was carried out, aiming at refining the understanding of the processes of law making and transferring European legislation to the national level. Therefore representatives of national governments and of non-governmental-organisations (NGO's) were asked 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 full information on and results of the questionnaire are incorporated into the appendix and integrated in this Third Interim Report.

4. Reading guide

The current Third interim Report on ESPON 1.3.2 Territorial Trends of the Management of the Natural Heritage presents the findings of the third stage of work of the TPG and is the elaboration of the approved Second Interim Report. While the First Interim Report gave a reflection of the deductive approach, the Second presented the inductive approach. These complementary approaches are combined in this Third Interim Report.

The report is split into three parts: Part 1 provides detail on each of the three strands – management, natural heritage and spatial development/territorial strands; Part 2 gives an analysis of the relationship between these strands, and looks at future scenarios. Part 3 sets out a number of conclusions, recommendations as well as a draft regional typology.

In order to understand the occurrence of flora and fauna and their relation to the characteristics of the territories, Chapter 2 gives a description of the physical structure of the territory of Europe. Chapters 3, 4 and 5 give a diagnosis of the different strands in terms of past, status quo and prognosis. Indicators are developed which deal with, at a minimum, land use, landscapes, natural areas and biodiversity. These indicators lay a foundation for part II of the report, the analysis.

Chapters 7, 8,9 and 10 give descriptions of the interrelationships, through analyses and explanations, between the different strands. The analysis concentrates on:

- a diagnosis, at European level, for each of the four themes mentioned above. This diagnosis focuses on two points and takes into account the spatial structure of the European territory. It makes 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 and the past evolution (long-term and recent);
- “ecologically sensitive areas”, using spatial analysis methods.

The distinction between macro (global, European) meso (national, transnational) and micro levels (local and regional) has been applied.

Chapter 11 gives an outlook for the future, analysing potentials and threats and a description of the expected opportunities for nature development as well as likely threats.

Finally, Chapters 12, 13 and 14 conclude the report with recommendations and a suggestion for a regional typology. The recommendations focus on:

- how far Community policy related to the four themes affect the concept of a polycentric development;
- which type of territorial development would minimise conflicts and maximise synergy between natural heritage and economic activities and, hereby, ‘contributes to improved management of an area’s natural heritage;
- conditions for taking better advantage of Community environmental policy objectives in relation to economic and social development as well as support to territorial cohesion;

- structures at EU level in order to improve the co-ordination of Community environmental policy with spatial policies and to provide reference for a better territorial orientation of the EU environmental policy;
- whether co-ordination with national policies is necessary;
- how Structural Funds and the Community environmental policy could develop a more coherent and effective approach in promoting territorial cohesion and environmental objectives.

In chapter 14 some evaluative remarks in relation to the TOR, the addendum to the contract and the Matera guidance paper are made.

5. Physical Structure

Relevance of physical structure

The occurrence of flora and fauna is strongly related to the characteristics of their territory. Specific combinations of soil types, hydrological and climate conditions determine the habitats of species. This variety of physical conditions influences the variety of species. Therefore, it is of eminent importance to consider the physical structure of the territory of Europe, when analysing and monitoring the territorial trends of the natural heritage.

Geomorphologic structures, sometimes with striking scenic qualities, such as specific mountains, coastlines, islands or lakes are also considered to be part of the natural heritage. Some of these features such as natural harbours, fjords, strategic rocks, offered conditions that enhance the attractiveness of an area for human settlement, coupled with conditions advantageous for agriculture, mining or tourism. The geomorphologic structure should therefore be taken into consideration, not only for analysing the natural heritage, but also for considering potentialities for future developments.

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 forms the permanent divide for climate, history and trade in the continent, while the plains are home to most economic and social activities. The close presence of the sea has strongly influenced the history, economy, landscapes and traditions.

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

Geomorphologic features and biodiversity

Certain geomorphology features have a specific relation to biodiversity that give them special value in terms of natural heritage. Three in particular are considered: mountain ranges, rivers within their basins and coastal areas.

Mountain ranges by their very massive structure inhibit many forms of intensive human land use, encouraging extensive land use that is appropriate for the development of species richness and diversity. Their altitudinal range amplifies the range of species located in a geographical zone.

The linear character of rivers operates differently to the 'refuge' quality of mountain ranges, and provides connectivity between biodiversity hotspots such as wetlands. This also acts 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 specific formations such as dunes.

Hydrological system

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.

Figure Simplified European hydrological system

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 to be considered. The location of specific 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. Although Europe is home to a large range of domestic animal breeds, about half of these breeds are at risk of extinction.

6. Territorial trends

Before elaborating on the trends and their impacts, an overview of 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.
The description of the long term spatial developments provides a framework for considering actual problems: Actual land use in Europe is the result of a century long process of land occupation by an increasing population demanding for an increasing area for agriculture.

- Understanding that historic spatial development processes to consider future developments, requires comprehensive understanding of the mutual influence of space requiring activities like agriculture, urbanisation, tourism, infra structure and the natural heritage.
- The existing natural heritage consists to a large extend of co-incidental 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?

	% nature	% agriculture	% built-up
AT	61	36	2
BE	21	59	16
BG	40	54	4
CH			
CZ	34	59	4
DE	30	61	6
DK	12	77	5
EE	56	32	1
ES	46	51	1
FI	80	7	0
FR	33	62	3
GR	52	35	1
HU	20	72	5
IE	13	67	1
IT	41	54	3
LT	32	62	2
LU	37	55	5
LV	50	44	1
MT			
NL	11	75	8
NO			
PL	30	65	2
PT	46	52	1
RO	41	52	5
SE			
SI	63	34	2
SK	44	51	5
UK	31	58	5

Table Land cover data based on Corine data set.

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.

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. 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.

Intensification of agriculture

Probably one of the major factors having an impact on changes of natural areas, in terms of dimension, rate and trends, is the intensification of agriculture. 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.

Extensification of agriculture

At national level, there is much evidence that extensive and species-rich farming systems are becoming increasingly rare. A study (Van Dijk, 1991) showed that only a small percent of lowland grasslands around the North Sea have a high botanical value, whereas the uplands in the British Isles and large parts of France are important strongholds of botanically important grasslands in the non-Mediterranean part of Western Europe.

The abandonment of agricultural land

Abandonment is the result of marginalisation in the agriculture. This agricultural marginalisation process is driven by a combination of social, economic, political and environmental factors, by which in certain areas farming ceases to be viable under an existing land use and socio-economic structure (EEB, 2003).

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, Ireland, Scotland and the Nordic countries. Agricultural land in regions

that in the past were farmed less intensively, because of the climate, soil or economic conditions, is now being abandoned. In some regions (e.g. mountains) this leads to reduced biodiversity, the impacts being more pronounced in areas where small-scale traditional farming methods predominate (ECNC, 1998).
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.

The strict nature conservation rules in some Central and Eastern European countries at local level (see chapter 5) can be very demanding and may result in marginalisation agriculture ending in abandonment (EEB, 2003 p. 26).

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. The forest area in Europe has decreased to 5.65 million km2 today. 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.

At the end of 19th century extent vast broadleaves woods were on a great extent replaced with conifers plantation, especially in Germany. In the same period 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 enormous. The diffused management of the European forests caused a simplification of forest structures and composition.

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). In Central and Eastern Europe the transformation of biodiversity-rich meadows into forest is taking place 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 (EEB).

Urbanisation

Population

During the period from the late 1960s to the early 1980s fertility fell well below replacement level (circa 2,1) in most European countries.

Regions experiencing population decline will be widely spread across the EU territory, comprising around half of the EU population (Project 1.1.4).

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. The annual population growth rate in Europe declined from 0.44% to 0.03% during 1985 and 2000. The rate is projected to reduce further and will probably decline to -0.24% in 2020-2025. However, while the rural population is decreasing remarkably the urban population is continuing to grow with a relatively dense network of cities, towns, roads and railways.

Trends of declining population densities can be observed in large parts of Europe, while the urbanisation process continued. Over the last fifty years, the urban expansion and intensification of agriculture resulted in radical changes of the rural landscapes, including natural areas.

Economy

Next to innovation for which the EU developed extensive programmes, creativity has become a driving force of economic growth. The ability to compete and prosper in the global economy goes beyond trade in goods and services and flows of capital and investment. Between 1992 and 2000, US GDP grew by 36% in real terms, compared to 19% for the combined EU countries. Despite the enormous structural changes undertaken in Europe in the last twenty years, including the integration and liberalization of key markets across the EU, the birth of the Euro, the accession of a dozen 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. 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.

The Euro-Talent Index is based upon three indicators: the creative class, human capital and scientific talent (Florida, 2004).

Tourism

Tourism and its growth continue to be one of the major economic and social phenomena. 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. Europe is the most-visited tourist region in the world, representing today nearly 60% of worldwide international tourism activity. The signs are that growth is set to continue. Numbers in Europe are expected to further increase considerably, and Europe will remain one of the principal markets for tourism to other parts of the world.

Rural tourism is not a new phenomenon in Europe. However, in recent years the market has become more sophisticated and discriminating and there has been an increasing interest in tourism 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 tourism potential.

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

Environment and climate change

Influences on the environment

During the last decades a wide range of demographic, social and economic trends (like the switch from an agricultural and manufacturing economic base towards a more service oriented society and rising levels of individualization) have had different impacts on land use and spatial patterns. These changes in land use and spatial patterns have, in their turn, influenced the environment of Europe significantly.

On a more positive note it can be said that total energy consumption and related pressures on the environment fell in Europe in the 1990s. This is mainly caused by direct improvements in industrial, manufacturing and construction processes leading to a more efficient use of energy and an increase in the proportion of renewable resources (mainly hydropower and biomass). Next to that governments are more active and effective in lowering emission rates caused by (car)traffic. At this moment all regions of Europe are on track to achieve their 2010 emission targets for pollutants. Still a much faster growth in 'new renewables', such as wind and solar power, is needed (EEA, Europe's environment: the third assessment (Environmental assessment report No 10, 2003).

Hazards

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 Europe.
This means that any effect of climatic change in Europe could amplify water resource differences between northern and southern Europe.

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

The risk of flooding, erosion and wetland loss is likely to be increased, especially in the coastal areas of the continent which represent a valuable element of the European natural heritage.

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

Increasing urbanisation and associated infrastructure, changes in agriculture and the development of the tourism industry are affecting the quality of the environment in a number of ways:

- Small ecological network structures are decreasing;
- Natural qualities are disappearing;
- Wetlands and water bodies are decreasing as groundwater tables are lowered;
- Substitute landscapes are often more uniform in physical and biological character;
- Remaining habitats are smaller, more fragmented (see chapter 4).

Territorial trends may also create opportunities for nature, for example changes in land use such as the abandonment of agricultural land in areas where agricultural production is not viable anymore.

Natural Heritage

Some urban studies have established unexpected high biodiversity indicators.

These outcomes may be due to the fact that it seems a rule that the more biological attention is focussed on a specific area, the more natural value will be discovered. Another explanation which probably also applies, is that nature has the dynamic capacity to adapt to unfavourable conditions.

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 natural areas.

Landscapes

Landscape is defined as an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors (Article 1.a. of the European Landscape Convention, adopted 19 July 2000). 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 large natural areas can clearly be identified in Finland, the Alps, the Cantabrian Mountains, the Pyrenees, the Carpathians, Greece and Scotland. The dominance of mountainous regions is obvious. Apparently those areas 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 Conservational Nature) or they are part of the Natura 2000, the Emerald network, Ramsar, The Pan European Ecological Network as mentioned in Kiev resolution of 2003 or the Biosphere approach (see Chapter 5).

Fragmentation

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 land use types. In recent decades a range of initiatives to protect the natural heritage, at the national and European level, have been implemented.

Species diversity and species richness

“Biological diversity” (biodiversity) means the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.

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. 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-third of the European wetlands that existed 100 years ago, have been lost (EU, Third Report on Economic and Social Cohesion).

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.

Apart from the size of natural areas, the spatial configuration of natural areas is also important. Especially in fragmented landscapes, where natural patches are small and separated by other types of land-use, the connectivity of the patches is an important factor in metapopulation survival. Populations in small natural areas have a higher risk of extermination than those in larger areas.

There is, therefore, an important ecological interest in stopping the process of decrease of natural area and fragmentation. The reverse process should be encouraged, to increase the natural area and enhance the territorial coherence between separated natural areas.

As such, increasing the total size of natural areas has its positive effects but a larger effect may be expected if additional areas are located where they connect two separated natural areas. The objective is to develop a network rather than one large area.

Both the decrease of number of natural areas and the average size of the areas pose a threat to the natural value. Many of Europe's most important habitats are especially vulnerable to the pressures because they are often already small and fragmented. Only through an increase of the natural area and coherence between the separated areas, can the current biodiversity and natural 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.

For the moment, 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 / designation status(IUCN).[1] The only spatially specific, European record of sites with both habitat and species information is the Natura 2000 network data (Corine Biotopes), including its proximate extension eastwards to the accession countries and some of the other affiliated countries to the EEA: the Emerald network.

[1] Not all designated sites, such as many of the Natura 2000 areas, have a protection status.

7. Management

Protection

In general the conservation of nature and biodiversity is regarded as very important for man. Whether lack of, or irresponsible protection of nature will in the short term have a negative impact on the well being of mankind is disputable. However, in the long-term shortages of for example raw materials and food might occur. With ongoing large-scale deforestation, effects on climate and erosion will be significant but difficult to predict. Global warming, temperatures rising, unpredictable rainfall and consequent flooding may be future reality. As such processes are often irreversible; nature protection is vital for sustainable development and for the conservation of the world's natural and cultural resources.

Protection of nature

The ambition to 'protect' biodiversity means to create awareness of its special value and to geographically identify – and sometimes limit land use upon – areas in which particular value is found, as a way of ensuring the continued existence of biodiversity. Within Europe there are several systems for identification of biodiversity value, and three of these have been retained: IUCN Protected Areas List, the Ramsar Convention and the Natura 2000 ecological network.

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 an imminent group of volunteer scientists, the IUCN has compiled 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.

To provide an overview of the effectiveness of all different policies on natural heritage, it would be ideal to have data on all different designated areas and the type and degree of protection afforded. However, such data does not exist. For the moment, there is one systematic classification of protected areas that extends across the European continent, and that is the IUCN Protected Area Categories. The coverage provided by the IUCN lists of protected areas is exhaustive at the national level and complete enough at the regional level to be used as a standard reference for a study such as this. Only the Natura 2000 listing, when fully complete, will be able to provide a more detailed perspective that will include small areas that are significant at local levels. Data exists on the spread of designated Ramsar sites, but these focus on wetlands associated with species only.

Natura 2000

Natura 2000 is the principal EU policy instrument for the protection of flora and fauna and habitats, however it does not assimilate all the policies described above into one spatial strategy. This is because policy, including the agri-environmental measures, is not unified at present. A number of DG's of the European Commission have a remit to some degree to address nature conservation, including Environment, Region and Agriculture, and Transport. Whilst these departments do discuss the issue, there is no clear centre of responsibility setting overall policy principles. 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.

Natura 2000 gives an administrative status to both protected and non-protected areas (nature reserves and farm land, for example). It seeks to ensure Member States accept their responsibility to implement measures to ensure the safeguarding of European fauna and flora in the context of the EU territory. Natura 2000 lists 'priority' species and habitats, which are prioritised for EU financial support.

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. Article 4 gives precision as to the criteria for selection, giving emphasis to the relative presence of a species or its habitat, and Article 10 underlines that "Member States shall endeavour, where they consider it necessary, in their land-use planning and development policies and, in particular, with a view to improving the ecological coherence of the Natura 2000 network, to encourage the management of features of the landscape which are of major importance for wild fauna and flora." The network of Natura 2000 sites covers land that both does and does not fall under another formal designation processes, which means there may be no other legal obligation than to maintain 'favourable conservation status' (Article 1)2.

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'.

[2] Note should be made of the Emerald Network that has a similar function in non-EU countries, and that uses the Bern Convention listing of species and habitats as its scientific reference.

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.

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.

Designated natural areas and sites

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 natural areas and / or implementation of management measures and hence designation.

It can also be concluded that some countries, such as Denmark, 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. While in Germany cultivated landscape had priority, 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.

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: pg 136). 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: pg 137).

The specific policy options proposed by ESDP that are particularly relevant to project 1.3.2:
(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 such as coastal areas and wetlands balancing protection and development on the basis of territorial impact assessments and involving the 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 1.3.2 this means more specifically to answer the question 'to what extent current policies with regard to natural heritage support the objectives of the ESDP?'

It may be expected that when Natura 2000 has been fully implemented and a large European network of natural areas has been realised, the value of specific areas is recognised as being a strategic 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.

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.

Third report on economic and social cohesion

Territorial cohesion is a section in the Third report 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 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 is 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 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;
- 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).

The Cohesion report contains a map with the fragmentation of natural areas.

Other policies and instruments

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

The Common Agricultural Policy also provides structural funding, principally for the improvement of agricultural efficiency and the encouragement of entrepreneurial activity to transform agricultural produce as well as for the market penetration of goods coming from the agricultural sector. This policy has been reformed, serving 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, also making clear that the reinforcement of the agri-environmental policy, combined with a rural development programme, is the main strategy for integrating the environment into the CAP.

8. Data

This project makes a distinction between macro (global, European), meso (national, transnational) and micro levels (local and regional). For the macro level, mainly the so called bio-geographical regions and the coastal zone (20km) are considered.

Bio geographic regions

It is important to consider the geomorphologic backbone, including the hydrological system, when implementing the ecological networks. In that context it is relevant to consider the bio geographical regions, when defining typologies as these regions are based both on climatic, botanic and typological factors (see map 6.x).

The geographic units defined are descriptive of relatively homogenous ecological conditions within each unit, and therefore allow meaningful comparison between units in terms of their differing ecological potential. Combined with land cover data and species distribution data, it offers a valid way to benchmark biodiversity conditions within an area, and to follow the progression of the improvement or deterioration of the natural heritage. With climate change, it is to be expected that the boundaries of the ecological regions would change over time, but this would be measurable; and the ecological conditions within the boundaries would remain constant.

Coastal zones

Due to the specific characteristics of the coastal area (very susceptible to human induced threat and climate change), it is relevant to consider this region separate from the bio geographical regions. The Coastal Zone is that space in which terrestrial environments influence marine (or lacustrine) environments and vice versa. The coastal zone is of variable width and may also change in time. Delimitation of zonal boundaries is not normally possible, more often such limits are marked by an environmental gradient or transition. At any one locality the coastal zone must be established according to the specific physical, biological, cultural and economic circumstances. Within this study, where developments in the coastal zones are considered separately, a zone of 20 km of land from the coastline has been used.

Polycentricity: FUAs and MEGAs

In the ESPON project 1.1.1. a classification of functional urban areas is developed. All Functional Urban Areas (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.

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 has 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.

Objective 1 and 2 areas

Objective 1 of the Structural Funds, the main priority of the European Union's cohesion policy, works to "promote harmonious development" and aims particularly to "narrow the gap between the development levels of the various regions". This is why more than 2/3 of the appropriations of the Structural Funds (more than EUR 135 billion) are allocated to helping areas lagging behind in their development ("Objective 1") where the gross domestic product (GDP) is below 75% of the Community average.
All these regions have a number of economic signals/indicators "in the red" of low level of investment, a higher than average unemployment rate, lack of services for businesses and individuals and poor basic infrastructure.
Some fifty regions, home to 22% of the European population, are covered in the period 2000-06. The Structural Funds will support the takeoff of economic activities in these regions by providing them with the basic infrastructure they lack, whilst adapting and raising the level of trained human resources and encouraging investments in businesses.
Objective 2 of the Structural Funds aims to revitalise all areas facing structural difficulties, whether industrial, rural, urban or dependent on fisheries. Though situated in regions whose development level is close to the Community average, such areas are faced with different types of socio-economic difficulties that are often the source of high unemployment. These include the evolution of industrial or service sectors, a decline in traditional activities in rural areas, a crisis situation in urban areas and difficulties affecting fisheries activity.

9. Analyses

Nature and agriculture

The following questions will be answered:

- How did agricultural processes influence natural heritage, such as natural areas and the biodiversity at the European, national and regional level;
- And the other way around: How did natural heritage influence agricultural processes in Europe, the countries and regions;
- How to manage natural heritage in order to use nature as an asset for agriculture.

Macro level

Agriculture is changing: intensification, extensification and abandonment are the processes that influence the agricultural sector all over Europe. The current section contains analyses on the influence of these agricultural processes on the natural heritage, the impact of natural heritage on agriculture and the management of agriculture in relation to natural heritage. One would expect that intensification of agriculture has a negative impact on the natural heritage, especially on the biodiversity and number of species.

Also extensification and abandonment of agricultural area, results in changes in the existing natural heritage. Such dynamics are from the standpoint of protection often regarded as threats.
On the other hand, extensification may be expected to have a positive impact on nature. There will be more surface available for flora and fauna and disturbance by the agricultural production processes is limited. Abandonment may also have a positive impact on nature, although changes from one sort of species to another will probably appear.

Meso level

The meso level focuses on the national scale. The following overlays have been made in order to illustrate the threat or potential due to changing agricultural activity:

- Countries: nature (land use) x agriculture (intensification/extensification based on Corine land cover);
- Countries: nature (IUCN) x agriculture (intensification/extensification based on Corine land cover) Countries: nature (Bern convention) x agriculture (intensification/ extensification based on land use).

Nature & urbanisation

This chapter focuses on the relation between urbanisation and natural heritage at the macro, meso and micro level. The following questions will be answered:
How did urbanisation influence natural heritage, such as natural areas and the biodiversity at the European, national and regional level;

And the other way around: How did natural heritage influence urbanisation in Europe, the countries and regions.
How to manage natural heritage in order to use nature as an asset for settlement, economic activities, innovative activities, and so on.

Macro level

Nature as land use is not evenly distributed over the Ecological Regions (according to bio geographical) in Europe. The percentage natural area as land use category (Corine) is highest in the Scandinavian montane birch forest and grassland (97%), the Corisican montane broadleaf and mixed forests (96%) and Euxine-Colchic deciduous forest (95%). These areas all have peripherical location and have a built up percentage of zero. These areas do not belong to the largest natural areas in Europe, which are the Scandinavian and Russian taiga, Western European broadleaf forests, Iberian sclerophyllous and semi-deciduous forests, Alps conifer and mixed forests and Central European mixed forests.

The highest built up percentages is shown in the English Lowlands beech forests (7%), the Coastal corridor of 20 km (6%), Pindus Mountains mixed forests (6%), Southern Temperate Atlantic (5%). In the Ecological Regions with high levels of urbanisation the percentage nature is low.

Micro level

The comparison of the average size of designated areas with the percentage built-up area shows that the size of designated areas is smaller in highly urbanised areas. This observation is supported by the map that shows the mean size of natural areas and the map, which shows the relation between coverage of natural area and designation. Hence in those areas where the fragmentation is limited the designated areas tend to be larger in size.

A correlation between an indicator for development pressure such as population density and average size or patch density of designated areas could be expected. However, statistically this correlation cannot be shown. Assuming that development pressure is an important factor to decide for protection, apparently differences in population density and growth are not sufficient to show a clear correlation on basis of NUTS 3 data.

Tourism

The relation between tourism and natural heritage at the macro, meso and micro level, addressing the question “How did tourism influence natural heritage, such as natural areas and the biodiversity at the European, national and regional level?” is integrated in the chapter about nature and urbanisation.

- And the other way around: How did natural heritage influence tourism processes in Europe, the countries and regions;
- How to manage natural heritage in order to use nature as an asset for tourism.

Nature & environmental aspects and hazards

Data as far as available from the EEA assessment are analysed with regard to the question: How did the environment and hazards influence natural heritage, such as natural areas and the biodiversity at the European, national and regional level?

Threats and potentials of nature

As soon as Corine 2000 data is available, trends of the development of the natural heritage will also be analysed.

Also the reverse effect of the natural conditions on the development of the territorial land cover types as a consequence of the social economic trends, are considered.

This chapter is based on confrontation of the results of the analyses of the previous chapters with the bio geographical categorisation of macro scale bio geographic entities. The assumption is that it might be expected that impact on territories with similar topographic, climatic and botanical conditions will be more or less similar. National administrative boundaries are less relevant. The three categories of land use functions: agriculture, urbanisation and tourism are described in this chapter. For the sake of avoiding unnecessary repetitions, urbanisation is discussed including economic activities/industry, infrastructure and environmental impacts of these activities.

Urbanisation, as the concentration of human activities in settlements of various densities, includes with regard to our subject, residential, industrial, other economic and service activities as well as the related infrastructure.

Urbanisation is, as observed in the previous paragraphs, present in different spatial patterns, more or less concentrated, in linear or dispersed patterns. 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.

Apart from some artificial intensive forms, agricultural activities are related to natural conditions. Climate soil types, precipitation are determinants.
The dependency of agriculture from natural characteristics like soil type, climate and altitude makes it irrelevant to speak about imbalances and disparities with regard to agriculture, since those conditions can not be influenced by policies.

Optimisation of food production related to the natural conditions in a region, together with subvention of activities of farmers to enhance and maintain landscape qualities may be appropriate. The main reason for subvention than is to sustain natural heritage, cultural heritage and to maintain the attractiveness of the landscape for human activities.

Threats to nature

The Atlantic region shows a strong contrast with for instance the Boreal region. In the Atlantic region 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, thus concentrating a large number of potential environmental threats.

The natural conditions in the Atlantic region are favourable for intensive forms of agriculture. Large production units for crops and dairy, profit from generally good soil and climatic conditions. Combined with the extremely good transport facilities in the Atlantic regions, this area is highly under pressure to intensify food production.

Urbanisation in the Continental region is more widely spread. Most concentrations in larger cities are found along the rivers. Especially the highly accessible Rhine Valley 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.

The urbanisation in the Alpine regions is quite different. Especially 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. The urbanisation pressure is lesser than in the Atlantic region. The population growth is around zero. Budapest is the centre of crossings: important highways and the river Danube. Further economic development in the corridor along the Danube form Belgrado to Budapest may be expected. In the Pannonian region the agricultural land uses are concentrated that may intensify in the future.

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 world's most important tourist 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 large cities.

Potentials for nature

Forestry in the Boreal region is one of the most extensive agricultural activities, especially in Finland there is almost no intensification of the agriculture. In the

Baltic States, the expansion of nature is because of the intensifying agriculture not likely. In the Baltic States the urbanisation will probably stabilise of decrease because the population growth between 1995 and 2000 was below zero. The more south, the more fragmentation will occur. The natural area in the Boreal region north of the Baltic Sea therefore is hardly disturbed. It suffers from industry induced acid rain. Biodiversity in these areas is not extremely high; the natural value in the Scandinavian Peninsula is more determined by the presence of rare species 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 Rumania are used for vine farming. Nature may expand in those Continental 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. 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 a basis of innovative activities. Exportation of high quality products, balanced expansion of tourism and expansion of nature may be the result.

Nature as an asset

History showed that inventions and innovations were not exclusively situated in large cities. Some of the great names of people that contributed to the development towards the actual civilisation are to be related to rural environments. Also the fact that specific innovations took place in cities that are now among the large cities, must not be confused with the fact that the innovation generated growth to the actual size of those cities.
Since (sub) urbanisation takes such a fast pace and covers so much of the European territory, the availability of quiet places, hardly accessible and offering tranquillity becomes an asset. Next to that, facilities for research and development in specific food industries, health therapies and cultural innovations may be well located in rural areas.

This has also been recognised by policy makers. Natural heritage is an essential part of the environmental assets of each country. The value of (bio) diversity has been largely recognized 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 forms of development must be found to assure synergy and co-existence of men activities and actions affecting the natural heritage.

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. 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 time. This brings extra focus and potential synergy to the management of the natural heritage. By-in-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.

The facts show the same tendency. Urbanisation and economic activities on the macro and the meso scales are connected to locations that are well accessed. Spatial distribution of urbanisation shows linear patterns along lines of infrastructure: highways, railways and natural lines like rivers and coast lines. The TEN and TINA networks may be expected to induce further urbanisation at the European level as spatial development corridors. Whether in those corridors urbanisation occurs, is dependent from the development pressure. Where urbanisation at the micro level materialises, is dependent from qualities on that lower scale. The location should be de facto accessible by the exits of highways and stations of railways. Further, if the accessible location is offering attractive environmental conditions in comparison with other (candidate) locations, than the location might be selected for settling. The attractiveness of conditions for settling is determined by cultural and/or natural qualities on the local and regional level and by the general image of a location.

Since economic activities are shifting from primary and secondary towards tertiair and quartiair categories, they become less dependent from soil or other natural resources. Service industry relates to urban concentrations of economic activities, many of the newer sectors became even looser from locally bound determinants.

The possibilities ICT offers for distant working make site selection for new economic activities even looser from facilities. Sites just may be selected predominantly because of the qualities of an environment where it is good to stay. This is more or less similar to site selection for residential uses.
Where silence and tranquillity appear to be increasingly rare qualities, less accessible and more remote location will gain attractiveness. If such locations offer a healthy environment with non disrupted natural values, nature will be an asset for specific high quality developments.

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. Holidays consisting of inactivity and

enjoying the good life on southern beaches, or more actively boating, biking and climbing, visiting cultural assets of cities. Europe offers a large diversity of touristic items. 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 example of the Atlantic region shows the importance of the accessibility for the urbanisation: London developed as a city on the river, giving access to its global empire. Paris, although not strongly maritime related, developed also in a highly accessible location, Amsterdam acted also as a colonial centre, 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 basis of its natural assets, resulted in strong urbanisation. This concentration of people and activities lead 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 for new transport facilities like high speed trains and special cargo railway lines.

Urbanisation in the Continental region confirms that conclusion. The widespread urbanisation in the wide, rather well accessible region shows concentrations at better accessible locations like river valleys and on cross roads of important highways. Highly accessible multimodal transport corridors therefore are regarded as 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.

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 may 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 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.

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 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 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.

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.”

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. 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 time. 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. This report describes the concept of territorial cohesion extended beyond the notion of economic and social cohesion, where by territorial balance and harmonious development of the Union are the key issues. Natural heritage, nature and biodiversity are sparsely mentioned in the text, but nevertheless there is a significant shift when comparing to previous Cohesion reports. Nature as an asset is identified as an opportunity and challenge for regions. It is recognised that even the in EU-terms called handicapped areas have potential due to their geographical characteristics and peripheral location. The Cohesion Report has had the following impact on this project:

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

The 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, with also certain natural value are not included. The seas form a natural barrier for cohesion as islands are physically isolated. The report gives 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.

1.2. Objectives and aims

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

1. To contribute to the European Spatial Development Perspective (ESDP) fundamental objectives: economic and social cohesion, the conservation of natural resources and cultural heritage and more balanced competitiveness of the European territory;

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

3. 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, particular attention will be 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 or 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 on 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 lack of data together with the relatively short period that is available for this project, answering the central question requires 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 natural heritage in the large bio-geographic features on urbanisation at the macro level?

Key question 2: 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 3: 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 4: What was the influence of social economic and agricultural trends on the natural heritage?

Key question 5: How effective are EU and national level policies for the management of natural heritage?

Indicators are developed which deal with, at least, the four following themes: Land cover, land use, landscapes; Ecosystem diversity; Biodiversity; and Natural resources: mainly water and soil. These indicators lay a foundation for part II, the analysis. They are tools for the creation of a database and a Geographic Information System, in order to provide a consistent, homogeneous, reliable, and up-dateable information source.

The analysis concentrates 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) and future perspectives;
- "ecologically sensitive areas", using spatial analysis methods and Geographic Information System tools.

For better understanding of findings of the analysis a twofold approach is used:

- a questionnaire on management issues for the national authorities of all countries;
- case studies at the local level within variable bio geographical areas.

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 does imply a certain qualitative assessment, but it 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 Concerning the Protection of the World Cultural and Natural Heritage, adopted by UNESCO in 1972. All Member States of the European Union have ratified this 'World Heritage' convention.

1.3.2. 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 (see ESPON project 2.1.3 on 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 with the possibilities of spatial planning systems of the European countries and their legal possibilities 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. Methodology

1.4.1. General

The objectivities of this ESPON project is to provide information that may be relevant to anticipate future trends and develop appropriate policies to influence them. Starting points are the trends and the status quo. It is important to have an overview of, and insight into, the trends, and associated processes, of the past, if long term protections are envisaged.

Before going into detail, it should be noted that the desired level of data is neither complete nor sufficient:

- Trends can be drawn for certain issues, such as population growth, development of GDP and so on, but for many other issues this data is not available, such as data on biodiversity, unpaved/paved area, processes of intensification/extension of agriculture.
- Data on the current situation or status quo varies in date. For instance the land use information is gathered in a period of approximate 20 years. CORINE land cover data does not represent a certain year but is based on analyses of satellite data from a number of years.
- Data is often not available or missing for certain countries. The data collection for the EU15, for the accession countries and for Switzerland and Norway are different.
- Data for the EU15 and the accession countries is based upon different definitions and therefore not fully compatible.
- Information is available at different levels.

Methodological remarks:

- Relations are seldom causal and one should be cautious with expected relations. For example, ecofarming does not automatically have a positive influence on fauna. Research in the Dutch pasture areas shows that because of ecofarming the grass is too high and the groundwater level too low for specific birds, with the result that their number declines (Wageningen University, SOVON and Alterra, 2004);
- This project is based on a combination of inductive and deductive approaches. By trial and error, verification and falsification of assumptions can be made. The gathering of observations and data by case studies and the questionnaire in order to draw general conclusions is the inductive approach.

- Both approaches are complementary; when data is missing the deductive approach cannot be followed, inductive gathered information may refine the understanding of underlying mechanisms, 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.

Part I of the current Third Interim Report presents the data of the current situation and the trends. For the social economic aspects trends can be shown, but for the indicators on natural heritage only the current situation is available. The environmental quality is, as resulting from social economic trends, also included. Hazards are described as well. All information (when available) is presented for the macro- (European), meso- (national) and micro level (regional).

In part II the analyses of the management of natural heritage related to social economic trends is described. The current situation and expectation for future development are illustrated. This part also contains the possible identified threats and potentials for natural heritage in the future.
The role of management in the past and the roles that management can play in the future for protection of natural heritage are described. Next tot the conservation of nature, also spatial planning can contribute to the protection of nature by means of zoning and other limitative policy measures. Natural heritage also has, in specific circumstances, potential for social economic development. The presence of natural elements could offer favourable conditions to sites for economic and residential setting.

Part III of this interim report focuses on recommendations and conclusions.

The following methods are used:
- Secondary sources, consisting of policy documents, scientific research, existing statistical information. A significant quantity of documents on social, demographic and economic trends, agriculture, infrastructure, nature and landscape provides a useful information source.
- GIS analyses and map overlays.
- Tentative explanations for correlations.
- Trend extrapolation. Predictions of the future circumstances can be achieved through extrapolation of past trends.
- Questionnaire on national policies relevant for the current study.
- Case studies illustrating the local processes and trends for different locations.

1.4.2. Case studies and scenarios

The case studies were carried out using a harmonised checklist, designed to fit with different types of management, different territorial contexts and different scales, encompassing the following issues:
- Description of the territorial context
- State of the natural heritage
- Assessment of the spatial interrelations (the local or regional context, the relations to urban areas, infrastructure and to other natural areas)
- Assessment of the effectiveness of the management
- Assessment of the extent to which the case studies support ESDP objectives

In addition to refining our understanding of policy and management of the natural heritage, the case studies also help to meet the following objectives:
- Evaluation of the relevance of the database
- Evaluation of the relevance of the analysis of the interrelations

- Highlighting the limits and the level of reliability of the analysis
- Providing input to the project with ground-based information
- Provision of matter to develop long term evolution scenarios.

The case studies are integrated in part II of this report. The full descriptions are included in the appendix.

Scenarios
The scenarios focus on the main question of this project: what is the influence of management of natural heritage by comparing two possible territorial evolutions:
- Evolution in line with current trends
- Evolution under a scenario of effective protection and valorisation of natural heritage.

To build realistic scenarios the following steps will be taken:
4. Identify the main factors influencing the evolution of the studied system. These factors evolve and interact, causing changes over time;
5. Analyse the possible evolutions of each driving force and their influence on the studied system (creation of sub-scenarios);
6. Consider different combinations of sub-scenarios to create global scenarios.

The evolution regarding the current trends is based on the main economic driving forces, such as urban and infrastructure developments and farming / forestry. These forces consume space which place great pressure on natural heritage.
The evolution regarding effective management of natural heritage is based on the following system of influences:

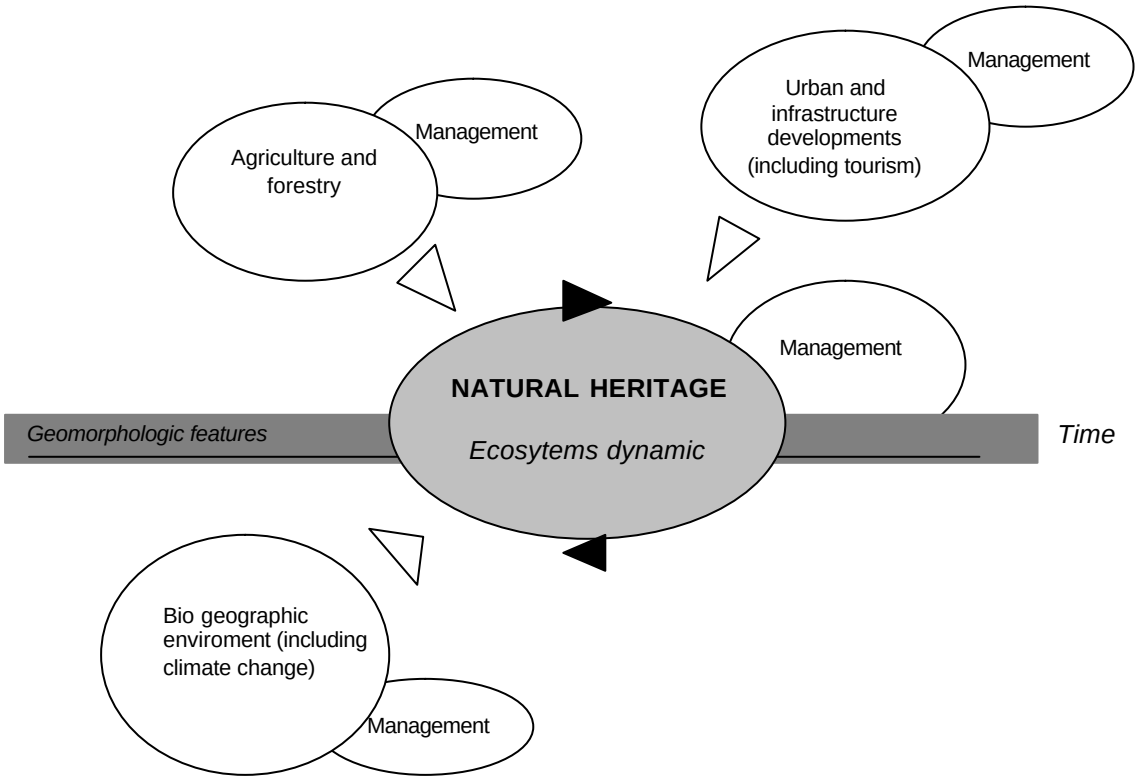

Figure 1.2 Influences on natural heritage

- The dynamics of the natural heritage in this view consist of the mutual influences of geomorphologic features, climate and the internal dynamics of the natural ecosystem.
- Farming and forestry can be regarded as being external to the natural heritage, determining the space left for natural heritage, or they can be regarded as being internal to the natural heritage, as agro-dependent ecosystems and forest ecosystems.
- Urban and infrastructure developments shape the landscapes and natural heritage structures. They cause fragmentation and soil consumption and soil sealing. These processes have negative impacts such as decreasing potential for food production, increasing run-off and decreasing the area of natural heritage.
- The management of the natural heritage influences the natural evolution of the natural heritage through planning regulations, site management and ecological farming incentives, but also the management of agriculture and forestry, urbanisation, infrastructure and tourism and the environment may influence the natural heritage.
- Environmental conditions impact the natural heritage. Farming, forestry, urbanisation, and mobility influence some of the environmental conditions.

1.4.3. Questionnaire on management

Next to the case studies at the local and regional level a questionnaire at the national level was carried out, aiming at refining the understanding of the processes of law making and transferring European legislation to the national level. Therefore representatives of national governments and of non-governmental-organisations (NGO's) were asked 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 full information on and results of the questionnaire are incorporated into the appendix and integrated in this Third Interim Report.

The scope of the project "Territorial trends of the management of the natural heritage" is to identify key issues and/or pressures, which affect in a positive and/or detrimental way Europe's natural heritage. 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.

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 study the process of management and its relation to 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.

This 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.

All National Contact Points have been contacted to provide any relevant contacts of their respective countries and to investigate whether they could contribute themselves.

Agencies, ministries and experts in universities as well as in the private sector were contacted to fill in the questionnaire.

Also NGO's such as WWF, Greenpeace and FoE were contacted since objectivity can be strengthened in cases where their answers differ from those provided by state authorities and thus should not be ignored.

At this time 18 filled in questionnaire are returned. They are all answered and sent back by Ministries. So far the response achieved is 18 out of 29.

The following eighteen countries which provided data and information through the "management questionnaire" are given below. Regarding the United Kingdom, only Scotland and Northern Ireland have responded so far.

From all the countries that have been contacted, Germany, England, Czech Republic and Cyprus, responded, stating that they will provide the completed questionnaire as soon as possible, but they have not sent the completed questionnaire up to date.

In the next table, the countries that have completed the "management questionnaire" are presented.

1 Bulgaria
2 Denmark
3 Finland
4 France
5 Hellas
6 Hungary
7 Ireland
8 Italy
9 Norway
10 Poland
11 Portugal
12 Romania
13 Scotland/N. Ireland
14 Slovenia
15 Spain
16 Sweden
17 Switzerland
18 The Netherlands

The countries which have not responded so far at all are presented in the next table.

1 Austria
2 Belgium
3 Estonia
4 Latvia
5 Lithuania
6 Luxembourg
7 Malta
8 Slovakia

The countries which have responded, but not provided the "management questionnaire" yet, are presented in the next table.

1 Cyprus
2 Czech Republic
3 Germany
4 England / UK

1.5. DPSIR

With regard to causal relations, these processes can be expressed in terms of the DPSIR model (Driving Forces, Pressures, States, Impacts and Responses).

Starting from the 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 (for example from nature conservation measures) have an impact. In the second perspective the natural heritage has a central position and drivers and pressures impacting upon it (for example through increase of urban density). Figure 1.3 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) and re-active in terms of defensive management actions protecting the natural heritage (right-hand side of the figure).

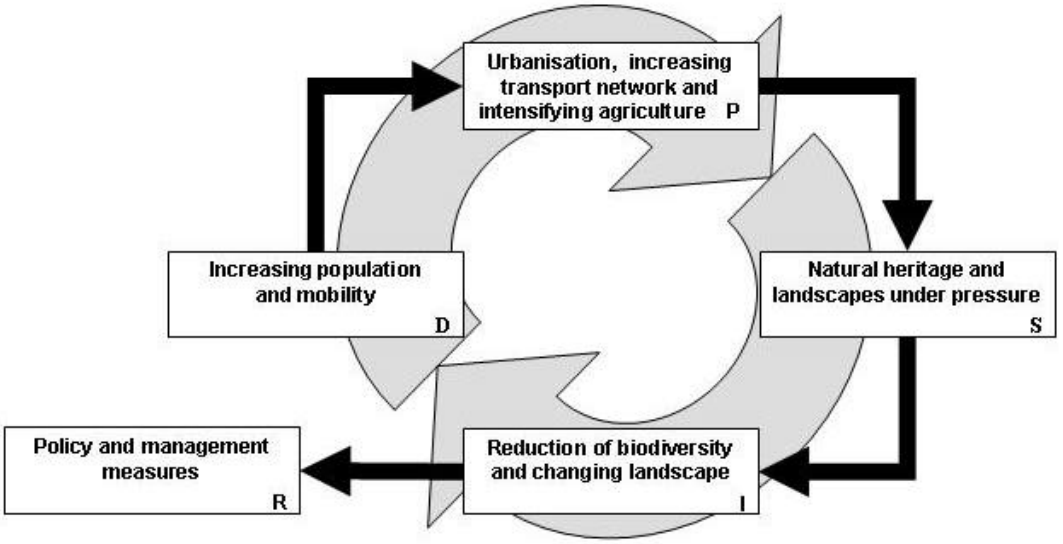

Figure 1.3 The process in DPSIR-terms

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

1.6. Reading guide

The current Third interim Report on ESPON 1.3.2 Territorial Trends of the Management of the Natural Heritage presents the findings of the third stage of work of the TPG and is the elaboration of the approved Second Interim Report. While the First Interim Report gave a reflection of the deductive approach, the Second presented the inductive approach. These complementary approaches are combined in this Third Interim Report.

The report is split into three parts: Part 1 provides detail on each of the three strands – management, natural heritage and spatial development/territorial strands; Part 2 gives an analysis of the relationship between these strands and looks at future scenarios. Part 3 sets out a number of recommendations and conclusions as well as a draft regional typology.

In order to understand the occurrence of flora and fauna and their relation to the characteristics of the territories, Chapter 2 gives a description of the physical structure of the territory of Europe. Chapters 3, 4 and 5 give a diagnosis of the different strands in terms of past, status quo and prognosis. Indicators are developed which deal with, at a minimum, land use, landscapes, natural areas and biodiversity. These indicators lay a foundation for part II of the report, the analysis.

Chapters 7 (agriculture), 8 (urbanisation), 9 (tourism) and 10 (environment and hazards) give descriptions of the interrelationships, through analyses and explanations, between the different strands. The analysis concentrates on:

- A diagnosis, at European level, for each of the four themes mentioned in the TOR. This diagnosis focuses on two points and takes into account the spatial structure of the European territory. It makes 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 and the past evolution (long-term and recent);
- "Ecologically sensitive areas", using spatial analysis methods.

The distinction between macro (global, European) meso (national, transnational) and micro levels (local and regional) has been applied.

Chapter 11 gives an outlook for the future, analysing potentials and threats and a description of the expected opportunities for nature development as well as likely threats.

Finally, Chapters 12, 13 and 14 conclude the report with recommendations and a suggestion for a regional typology. The recommendations focus on:
- how far Community policy related to the four themes affect the concept of a polycentric development;
- which type of territorial development would minimise conflicts and maximise synergy between natural heritage and economic activities and, hereby, contributes to improved management of an area's natural heritage;
- conditions for taking better advantage of Community environmental policy objectives in relation to economic and social development as well as support to territorial cohesion;
- structures at EU level in order to improve the co-ordination of Community environmental policy with spatial policies and to provide reference for a better territorial orientation of the EU environmental policy;
- whether co-ordination with national policies is necessary;
- how Structural Funds and the Community environmental policy could develop a more coherent and effective approach in promoting territorial cohesion and environmental objectives.

In chapter 14 some evaluative remarks in relation to the TOR, the Addendum to the contract and the Matera guidance paper are made.

PART I: STRANDS

Territorial Trends of the Management of the Natural Heritage

ESPON 1.3.2.

Third Interim Report

PART I

Strands

April 2004

Territorial trends of the Management of the Natural Heritage

ESPON 1.3.2

Third Interim Report

April 2004

Utrecht

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This report has been produced by the projects core group consisting of:

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PART I STRANDS

PART I: STRANDS

2. Physical Structure

2.1. Relevance of physical structure

The occurrence of flora and fauna is strongly related to the characteristics of their territory. Specific combinations of soil types, hydrological and climate conditions determine the habitats of species. This variety of physical conditions influences the variety of species. Therefore, it is of eminent importance to consider the physical structure of the territory of Europe, when analysing and monitoring the territorial trends of the natural heritage.

Geomorphologic structures, sometimes with striking scenic qualities, such as specific mountains, coastlines, islands or lakes are also considered to be part of the natural heritage. Some of these features such as natural harbours, fjords, strategic rocks, offered conditions that enhance the attractiveness of an area for human settlement, coupled with conditions advantageous for agriculture, mining or tourism. The geomorphologic structure should therefore be taken into consideration, not only for analysing the natural heritage, but also for considering potentialities for future developments.

2.2. 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 forms the permanent divide for climate, history and trade in the continent, while the plains are home to most economic and social activities. The close presence of the sea has strongly influenced the history, economy, landscapes and traditions.

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

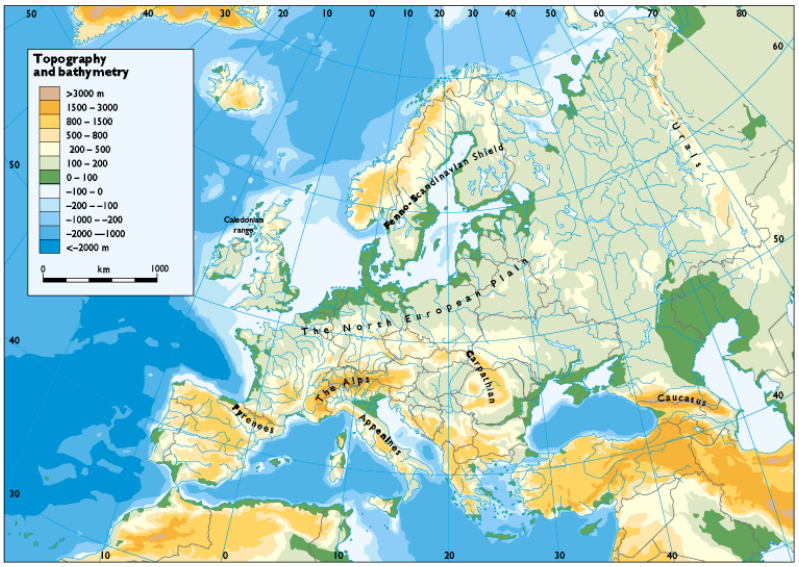


Figure 2.1 Topography of Europe (EEA)

Large parts of the European continent have been shaped during the quaternary period and especially during the last glacial period, which ended 10,000 years ago. Four major morphological zones can be distinguished:

- Old Fennoscandian Shield and Caledonian range, consisting of the Scandinavian highlands, and the north and west of Ireland and the UK;
- North European Plain from France to Russia;
- Central and southern European Highlands, comprising the Sierra Nevada, Pyrenees, Alps, Apennines, Carpathians;
- Balkans, and;
- the littoral zone of the Mediterranean.

Europe is distinct on the western border, while 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, the Atlantic, the North Sea and the Baltic Sea are extremely strongly profiled and carved out. In comparison with other continents the ratio of coastline to total surface is significantly higher. Europe has by far the greatest length of coastline per inhabitant and 60% of Europeans live in coastal areas within 20 kilometres from the sea. Coastlines are dynamic zones that change naturally through the effects of sea level rise, storm threats, wetlands, habitats and so on. The coasts also have cultural significance as locations for ports, fjords, sea sides. 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 the current study.

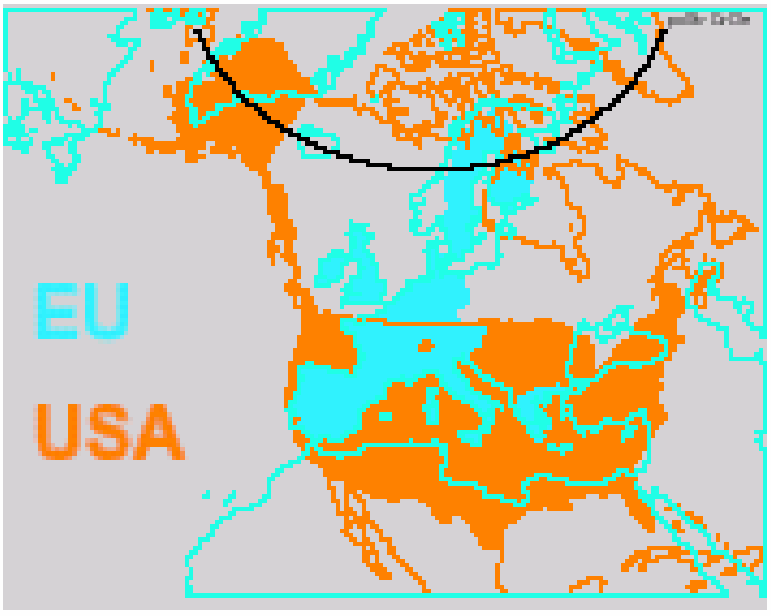


Figure 2.2 Comparison of coastlines in Europe and USA (source: ESDP, 1999)

The physical form of Europe is very fragmented, clearly reflected in the rich diversity of landscapes. The European mainland consists of many different peninsulas, with a large diversity of landscapes and natural qualities. The physical structure is strongly characterised by the high mountain ranges in the southern part of Europe and in Scandinavia and middle mountains and plains between the Alps and the coastal zones to the north and the west. The large west-east oriented range of the Cantabrian Mountains, the Pyrenees, the Alps and the Carpatian mountains forms the 'backbone' of mainland Europe. The Scandinavian and

Scottish mountains are more or less disconnected additions to that system. The north Spanish coast and Mediterranean coast abruptly confront mountains to the sea.

In contrast to these mountainous confrontations with the sea, along the Atlantic, the North Sea and the Baltic Sea, there are large coastal low laying plains, gradually reaching sea level. These low laying 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 the north and west and the central range of high mountains in the south are connected by the large European rivers, thus forming one Europe wide hydrologically coherent system.

Figure 2.3 gives a view of the potential natural vegetation, without human interference.

Figure 2.3 Potential natural vegetation of Europe (Federal Agency for Nature Conservation, Bonn)

2.3. Geomorphological features and biodiversity

Certain geomorphology features have a specific relation to biodiversity that give them special value in terms of natural heritage. Three in particular are considered: mountain ranges, rivers within their basins and coastal areas.

Mountain ranges by their very massive structure inhibit many forms of intensive human land use, encouraging extensive land use that is appropriate for the development of species richness and diversity. Their altitudinal range amplifies the range of species located in a geographical zone.

The linear character of rivers operates differently to the 'refuge' quality of mountain ranges, and provides connectivity between biodiversity hotspots such as wetlands. This also acts 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 specific formations such as dunes.

Without human interference the land-cover would be determined by the prevailing climatic conditions, resulting in a vegetation cover different from the one found today. The remaining natural vegetation is mainly found in the remote less densely populated areas such as part of Poland. Most existing natural areas and landscapes, although artificial are often rich in biodiversity, strongly affected by environmental factors such as air and water quantity mainly due to increasing population density. Coastal areas and wetlands area are particularly vulnerable to these pressures, while eutrophication and contamination may also lead to loss of biodiversity.

Climate change is also an important aspect impacting on biodiversity. Although still difficult to predict, it is more than likely to result in major impacts. Trees and other native plant distribution will change considerably, with a possible northward retreat of temperate tree species and the northward advance of tropical and sub-tropical species. Specifically the aquatic ecosystems such as the 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. It is a natural phenomenon that the extreme climatic conditions of northern boreal forests will allow the presence of only a few species of vegetation, as will those of the alpine conditions found at high altitudes in the Alps or far lower altitudes in the Scottish highlands. On the contrary, 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 (Stanners and Bourdeau).

2.4. Hydrological system

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 of rivers 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.

Figure 2.4 Simplified European hydrological system

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 very different ecosystem types. Riparian corridors can extend over considerable distances and provide habitats for many species of plants and animals, while also allowing for the necessary movement and survival of populations of wildlife. Lakes, on the other hand, have important transitional and seasonal functions as resting areas for species during long-term migrations. Freshwater ecosystems are vulnerable to external pressures deriving from human land use activities, namely water pollution and hydrologic modifications. Lakes as well as rivers do not end at their shores and 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.

2.5. Conclusions

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 to be considered. The location of specific 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. Although Europe is home to a large range of domestic animal breeds, about half of these breeds are at risk of extinction.

3. Territorial trends

3.1. Introduction

Before elaborating on the trends and their impacts, an overview of 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 therefore firstly describes the long term general spatial development of the European continent in section 3.2, followed by the actual state of European land use. The territorial trends in most important land use types are described thereafter. Section 3.3 focuses on agriculture and forestry (the non built up or rural areas) and, 3.4 describes the urbanised or the built up areas. The environment and climate change are described in section 3.5. In section 3.6 conclusions are given while paragraph 3.7 gives an overview of the related indicators.

3.2. Long term process

When man entered the area of Europe, they encountered a natural, untouched landscape: the wilderness. With an enormous diversity, this landscape was determined by the prevailing geophysical and climatic conditions. The first people collected nutrients as nature offered them. Small nomadic groups searching for food and hunting animals and fish, found shelter in caves or built shelters during less harsh climatic periods. Their influence on the wilderness has been very limited. Picking some roots or leaves and catching some fish hardly touched the natural environment.

Around 10.000 B.C. in the Middle East, awareness grew that nature could be influenced in a way which was advantageous to man. Seeds were planted and crops grown if people stayed for a longer period in one place and cattle were breed and kept for man's convenience. This Neolithic revolution spread over Europe from 5.500 B.C. over the Balkans to the Middle and West European forests zones up to South Scandinavia around 3.500 B.C.

After 10.000 B.C. when the last ice-age ended, average temperature increased and the liveable part of Europe grew. This was previously limited, for instance in the northern part of Europe by the Alpine and Scandinavian glaciers to the area roughly between Hamburg and Munich.

From that time on, farmers exploited nature in primitive ways. 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 vegetation of the landscape changed into more mixed vegetation. Deforestation for agriculture resulted, after abandonment, in mainly shrub vegetated areas. Valleys of the large rivers offering fertile soils and water became attractive locations for settlements. Soil and water conditions were determining the locations for settlements, resulting in a polycentric structure of settlements of only a few small buildings, disconnected from each other, and spread throughout the wilderness. Although man influenced nature on a small local scale, after exhausting fertile grounds or for other reasons, settlements were abandoned after some years and nature regenerated easily. The human population grew and agricultural production became more effective.

The exchange of information due to sporadic contacts with other tribes lead to innovations, better tools for agricultural uses and for more convenient living. The large migration of tribes during the start of our times together with the expansion of the Roman Empire would have

had a large influence, on the one hand on the dynamics of settling and on the other hand on the development of local and regional cultures.

The infrastructure of the Romans connected strategic points throughout Europe and increased populations and agricultural production enabled trading activities and the occurrence of markets. Their location is influenced more by the existence and accessibility of population than by physical production factors.

Still Europe was scarcely populated and natural wilderness was almost everywhere. People were depending almost completely on nature and natural events. Forest fires and flooding due to sea level rise or extreme rainfall were real disasters, although affecting small groups. Human activities remain almost completely related to local geophysical characteristics: with different types of agriculture producing, fisheries and mining. The production and trading of salt, offering possibilities to conserve meat and fish, was an important activity that lead to contacts throughout Europe, with producers of Mediterranean sea salt, salt miners in mountainous regions, and peat salt producers in low 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.

The European population grew, but the estimated growth of 1,5 % per century did not result in large numbers that would have a negative impact on the natural environment. Despite low population growth in the Middle Ages, towns developed around markets, located on crossings of roads or other strategic locations. In some areas capital accumulated as a result of the local cultural system of inheriting goods. Here rich farmers became noble men, who could exploit large areas with different farms and workers. These larger units were organised from the barons' houses that developed into strongholds. In other areas the heritage rights lead to fragmentation of goods into ever smaller units and an increasingly poor population.

The long term continuous process of an increase in the area under agricultural exploitation was sometimes disturbed by natural disasters, for instance in flood prone areas, by wars when the population abandoned a dangerous area and especially during periods of the plague when 30% of the population died. In those periods, large areas previously used for farming, were abandoned, and the average size of farm units increased in places.

Up to then, mining has been small scale and scarce, but after the industrial 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 as a result of mining taking place on a larger scale was becoming more significant. Industries became large pollutants of the environment and living conditions around those industries became unhealthy. This occurred especially in areas where coal and iron ore were accessible. Industrialisation formed the basis of increasing economic power of Europe, first in the UK Midlands, later in Northern France, Ruhr area, South Poland, South Belgium, 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 advantageous.

The growing population demanded for more food production and agriculture became more specialised and intensified. Since the 19th century fertilisation of arable land has become 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 according to agricultural requirements 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 covers less than 5%.

In addition to this, infrastructures lead to fragmentation in some areas of extreme intensity. Before the industrial revolution, roads were relatively minor elements in the landscape enabling transportation by environmental 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 the system of motorways developed, facilitating the significantly increased demand for transportation and connections between cities with short travel times. The huge demand resulting in separated ways of three or more lanes are separating both sides of the crossed area. Together with the modern system of high speed trains, this infrastructure fragments the territory into pieces in which liveability for certain species became sometimes problematic.

The long term spatial development as described before, 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 for an increasing area for agriculture.
- Understanding that historic spatial development processes to consider future developments, requires comprehensive understanding of the mutual influence of space requiring activities like agriculture, urbanisation, tourism, infra structure and the natural heritage.
- The existing natural heritage consists to a large extend of co-incidental 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?

Based on the CORINE land cover data, the current land cover for the bio geographical regions is given in the table below.
The bio geographic regions are described in section 6.2. A map of the situation of these regions can also be found in section 6.2.

	Agriculture	Forestry	Urban	Industrial
Boreal region	21,4	58,1	0,8	0,3
Atlantic region	66,8	13,4	4,5	1,2
Continental region	62,6	28,5	4,1	0,9
Alpine region	16,6	50,1	1,6	0,3
Pannonian region	74,2	16,5	5,2	0,9
Mediterranean	52,3	19,2	1,3	0,4
Steppic	78,1	6,3	4,5	0,7
Black sea	51,5	25,8	3,3	0,4
Average	52,9	27,2	3,2	0,6

source: CORINE land cover

Table 3.1 Land cover per bio geographic region in percentages

CORINE land cover

Next to the actual situation, the potentialities must be considered to restore and enhance natural values in accordance with agricultural, urban, tourism and infrastructural development policies. CORINE land cover types.

In 1985 the CORINE programme was initiated in the European Union. 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. As was noted in the 1st Interim Report, class 3 (Forests and semi-natural areas), class 4 (Wetlands) and class 5 (Water bodies) are all regarded as '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 3.1 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.

Figure 3.1 gives an overview of the state of the built-up area in Europe1. Figure 3.2 provides an overview of space occupied by agriculture, while Figure 3.3 represents the area covered by natural area. This land-cover data is also illustrated in table 3.2, which gives the percentage natural area, agriculture and built up for each country.

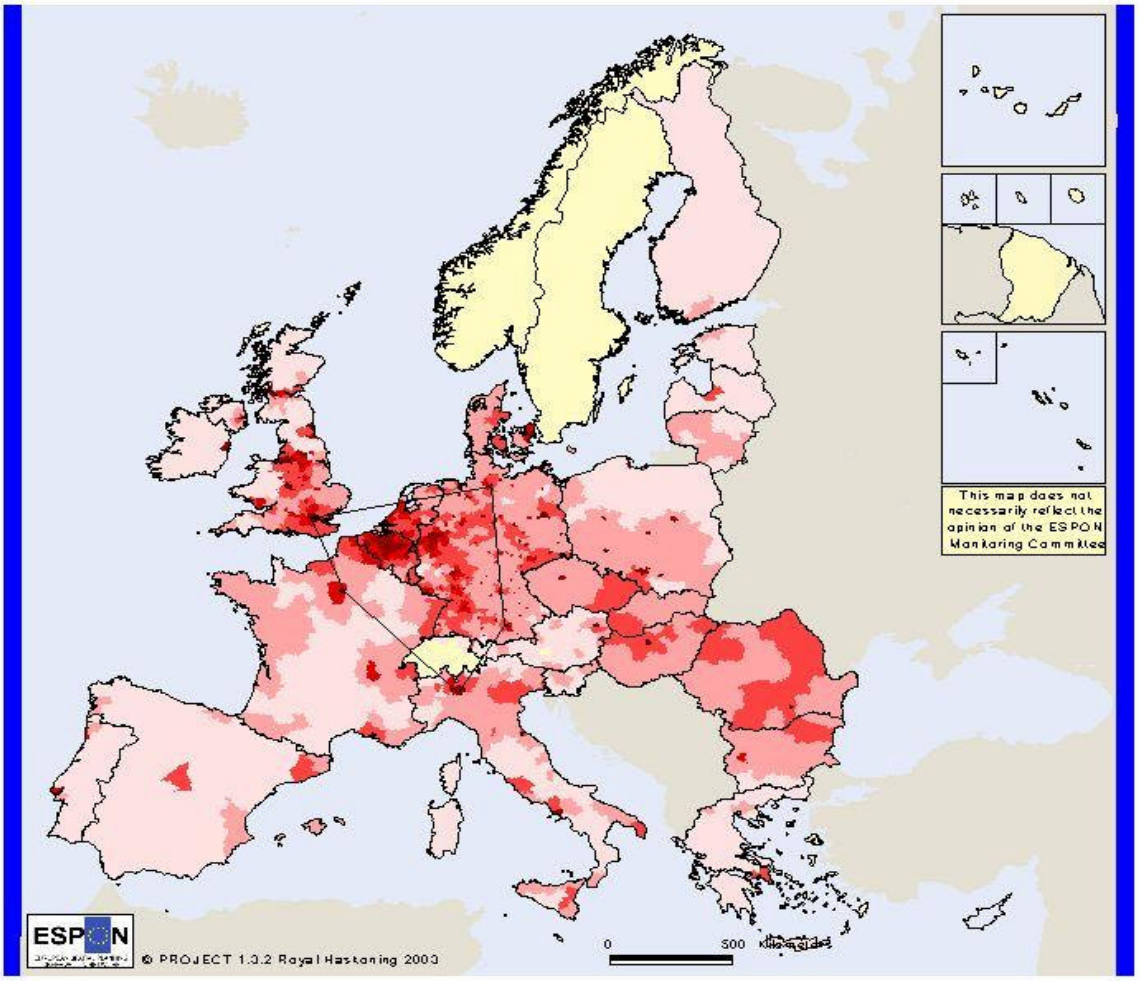


Figure 3.1 Percentage built-up area for NUTS 3

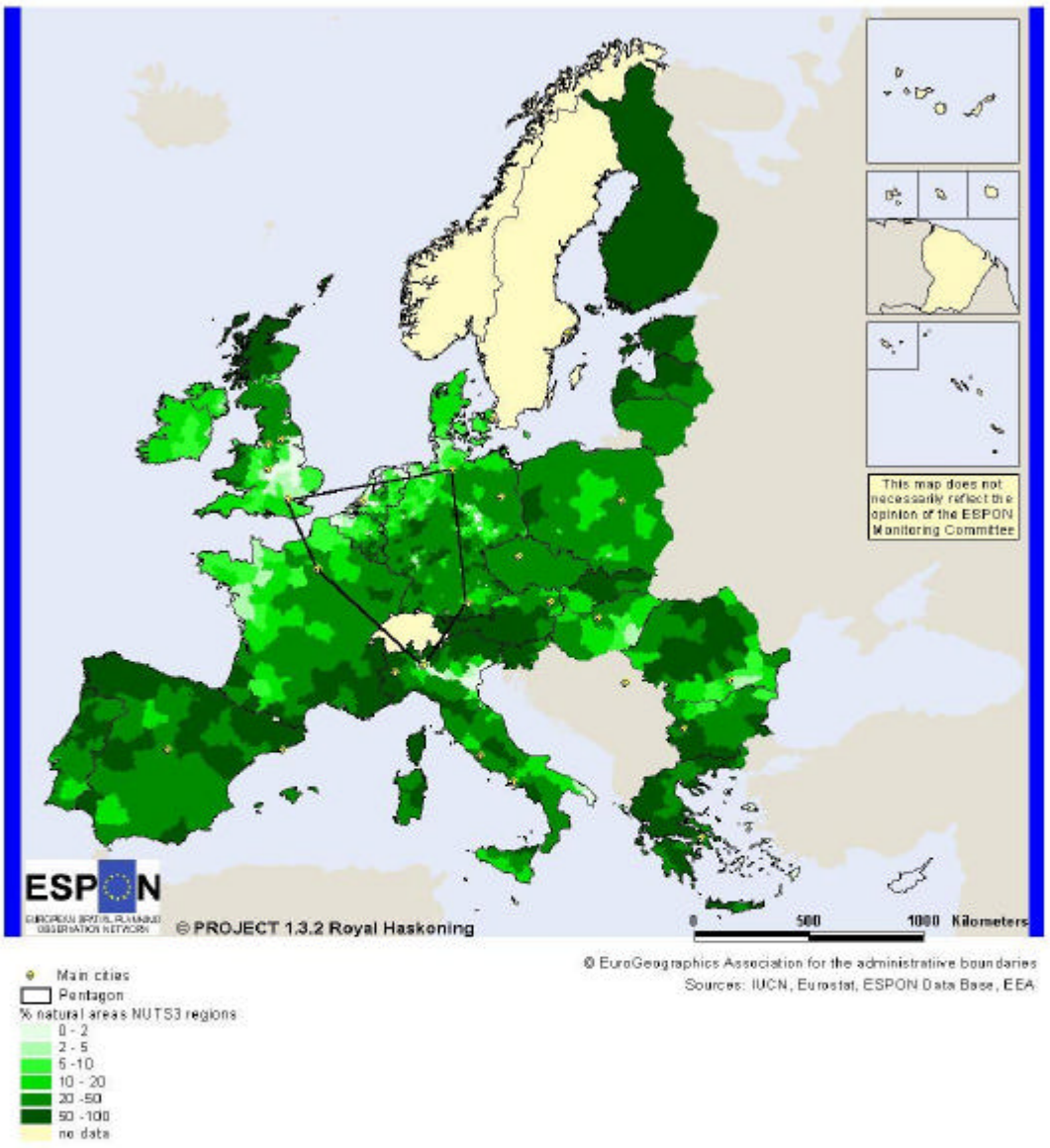


Figure 3.2 Percentage natural areas for NUTS 3

	Forest	Agriculture	Built-up
AT	44.4	36	2
BE	19.9	59	16
BG	30.8	54	4
CH	31.7		
CZ	31.2	59	4
DE	29.7	61	6
DK	9.9	77	5
EE	52.3	32	1
ES	17.7	51	1
FI	72.8	7	0
FR	25.6	62	3
GR	16.9	35	1
HU	18.3	72	5
IE	5.1	67	1
IT	24.5	54	3
LT	30.1	62	2
LU	37.1	55	5
LV	45.3	44	1
MT			
NL	9.1	75	8
NO	21.3		
PL	29.5	65	2
PT	28.0	52	1
RO	28.7	52	5
SE	76.0		
SI	57.7	34	2
SK	39.9	51	5
UK	7.5	58	5

Source: CORINE land cover

Table 3.2 Land cover per country in percentages

In Denmark, Hungary and the Netherlands more than 70% of the land is for agricultural purposes. More than 70% is in use for forestry in Sweden and Finland. Belgium is a country with the highest percentage built up area, which is twice as high as the percentage of the Netherlands.

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.

3.3. Agriculture and forestry

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.

Categories where extensification is, in general, not expected are:
- non-irrigated arable land;
- vineyards;
- fruit trees and berry plantations;
- annual crops associated with permanent crops;
- complex cultivation patterns.

3.3.1. Intensification of agriculture

Probably one of the major factors having an impact on changes of natural areas, in terms of dimension, rate and trends, is the intensification of agriculture. 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.
Land use intensification can be the result of specialisation processes in agriculture. This process is stimulated by several regulations of the CAP as one of its main objectives is to enhance food production. Agricultural intensification is the process towards decreasing the cost price of production per unit of agricultural product. The intensification leads to:
- A capital-intensive agriculture, where labour and land are relatively scarce. This results in a very intensively used land, such as in horticulture and glasshouses;
- Labour-intensive agriculture will develop where capital and land are relatively scarce. This attracts population;
- Land intensive agriculture. A lot of land is used where capital and labour are scarce (European Environmental Bureau (EEB)

During the last decade, agriculture in Europe has intensified rapidly, leading to a rise in productivity. Until the 1990s, western and eastern Europe showed a similar intensification trend. In absolute terms, however, the central and eastern European countries lagged behind. This is particularly true for milk yield, which consistently was some 30 % lower in central and Eastern Europe. At the start of the 1990s, the effects of the political changes in central and Eastern Europe became apparent. The intensification process was disrupted due to de-collectivization, loss of external markets and resulting lower agricultural investments. Productivity as well as inputs dropped significantly (Baldock et al. 1996), whereas the yields in Western Europe increased further. For example, in 10 CEECs the number of cattle fell by 39 % in 1989-1994 and the number of sheep by 43 % (Baldock et al. 1996). There are signs, however, that the intensification process in Western Europe levelled off in the same period, at

least with regard to agricultural inputs (Council for the Pan-European Biological and Landscape Diversity Strategy, 2004).

3.3.2. Extensification of agriculture

At national level, there is much evidence that extensive and species-rich farming systems are becoming increasingly rare. It seems that only a small percent of lowland grasslands around the North Sea have a high botanical value, whereas the uplands in the British Isles and large parts of France are important strongholds of botanically important grasslands in the non-Mediterranean part of Western Europe (Van Dijk, 1991).

Bignal and Mc Cracken (1996) and Veen et al (2001) provided two independent estimates of the proportion of low-intensity farming systems and semi-natural grassland (see tables 3.4 and 3.5 below). Their combined data cover a large part of Europe, but comparisons are difficult. Veen only considers grassland and will therefore arrive at low figures. The relatively low scores for Central and Eastern Europe are nevertheless surprising, given the relatively extensive agriculture in these countries.

Country	**Proportion of low-intensity farming systems (% of UAA)**
Spain	82
Greece	61
Portugal	60
Ireland	35
Italy	31
France	25
United Kingdom	25
Hungary	23
Poland	14

Source: Bignal & McCracken, 1996

Table 3.4 Proportion of low-intensity farming systems as percentage of the total utilised agricultural area

Country	Proportion of semi-natural grassland (% of UAA)
Slovenia	54
Romania	20
Hungary	14
Czech Republic	13
Slovak Republic	12
Poland	11
Bulgaria	7
Estonia	5
Latvia	5
Lithuania	5

Source: Veen, 2001

Table 3.5 Proportion of semi-natural grasslands as percentage of the total utilised agricultural area

Time series are not available for any of these data-sets. The trends in farm structure, farm management and farmland species, leave little doubt that species-rich agricultural habitats in Europe must have declined considerably during the last decades (Council for Pan-European Biological and Landscape Diversity Strategy, 2002:20).

3.3.3. The abandonment of agricultural land

Abandonment is the result of marginalisation in the agriculture. This agricultural marginalisation process is driven by a combination of social, economic, political and environmental factors, by which in certain areas farming ceases to be viable under an existing land use and socio-economic structure (EEB, 2003).

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, Ireland, Scotland and the Nordic countries. Agricultural land in regions that in the past were farmed less intensively, because of the climate, soil or economic conditions, is now being abandoned. In some regions (e.g. mountains) this leads to reduced biodiversity, the impacts being more pronounced in areas where small-scale traditional farming methods predominate (ECNC, 1998).

Utilized agricultural area is, as a result of urbanisation, afforestation and land abandonment, decreasing throughout Europe. Land abandonment is a dominant process in Central and Eastern Europe. In Estonia, for example, about 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 (Mägi and Lutsar 2001). The Council for Pan-European Biological and Landscape Diversity Strategy stated that it may be assumed 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).

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.

The strict nature conservation rules in Central and Eastern Europe at local level (see chapter 5) can be very demanding and may result in marginalisation agriculture ending in abandonment (EEB, 2003 p. 26).

3.3.4. Indicators for agriculture

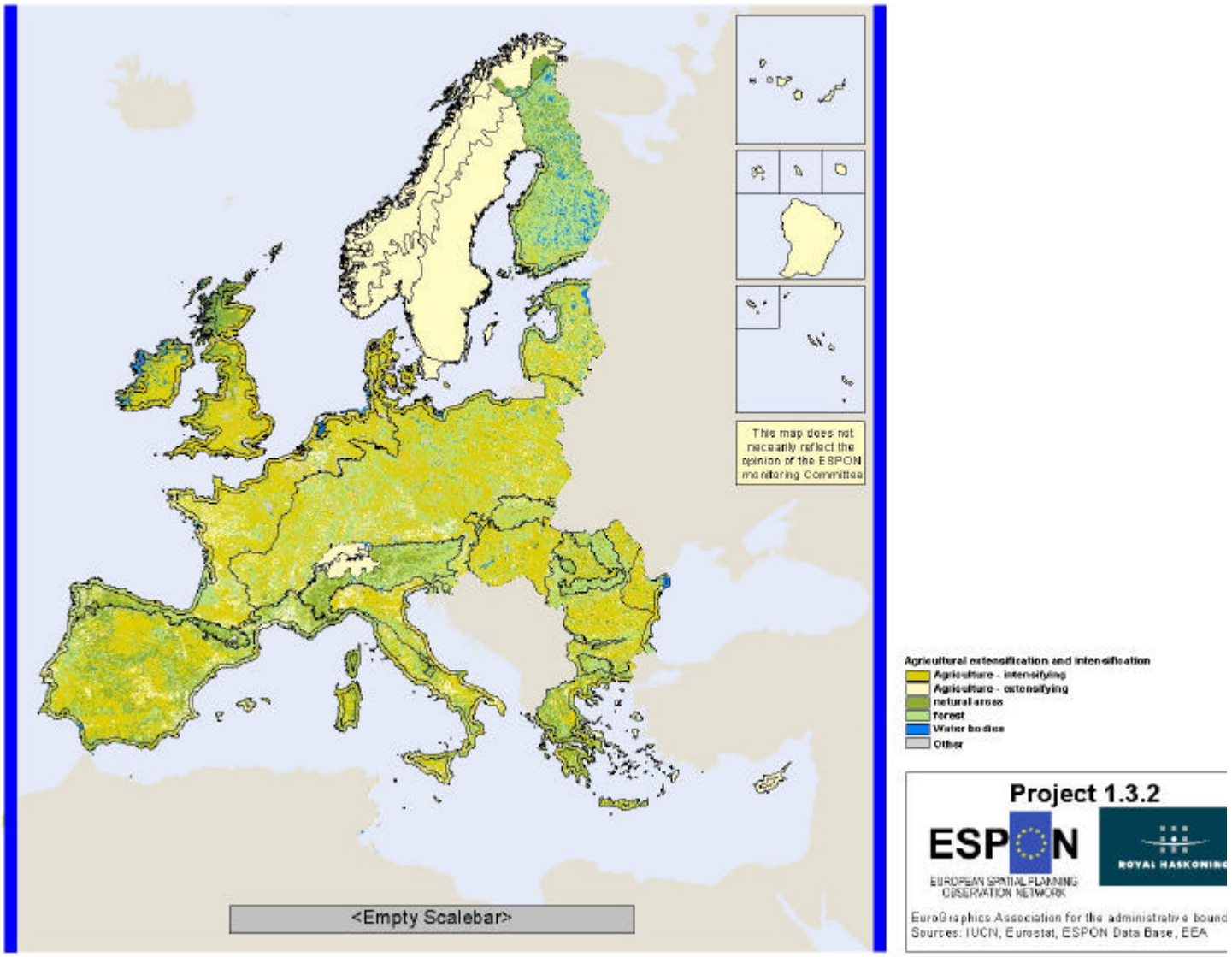
A map on agricultural changes has been compiled. Preferably, data from the Espon project 2.1.3. ‘The territorial impact of CAP and rural development policy’ was used, but this information is not yet available. We used the CORINE land cover categories to identify land that may have potentials for nature, because of extensification of the agriculture and abandonment of land. These categories where processes of extensification occur, generally speaking, are: permanently irrigated land (this land is not optimal for agricultural land use because of the lack of water), pasture (this land may come available because of the changes in ground bounded dairy farming), olive groves, land principally occupied by agriculture, with significant areas of natural vegetation and agro-forestry areas.

Nuts_0	Agriculture intensifying	Agriculture extensifying	Forest
AT	25.8	11.0	44.4
BE	41.1	18.2	19.9
BG	47.8	6.5	30.8
CH	14.4	10.1	31.7
CZ	58.2	1.7	31.2
DE	55.2	6.6	29.7
DK	74.4	7.2	9.9
EE	31.8	4.1	52.3
ES	41.3	10.6	17.7
FI	7.6	0.0	72.8
FR	46.5	16.7	25.6
GR	28.6	10.9	16.9
HU	68.8	4.6	18.3
IE	80.9	1.8	5.1
IT	39.4	15.3	24.5
LT	53.0	11.2	30.1
LU	29.5	26.3	37.1
LV	32.0	14.5	45.3
NL	62.0	16.2	9.1
NO	0.0	0.0	21.3
PL	59.6	7.1	29.5
PT	37.3	15.5	28.0
RO	46.6	6.2	28.7
SE	0.0	0.0	76.0
SI	20.0	14.0	57.7
SK	49.5	1.2	39.9
UK	58.8	1.9	7.5

Source: CORINE land cover

Table 3.3 Changing agricultural area and forest in percentage for 29 countries

Figure 3.3 Extensifying and intensifying agriculture



3.3.5. 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 and increasing efforts towards sustainable forest management more recently. 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. The forest area in Europe has decreased to 5.65 million km2 today. 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.

At the end of 19th century extent vast broadleaves woods were on a great extent replaced with conifers plantation, especially in Germany. In the same period 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 enormous. The diffused management of the European forests caused a simplification of forest structures and composition. The effects of those replacements are today still remarkable.

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). In Central and Eastern Europe the transformation of biodiversity-rich meadows into forest is taking place 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 (EEB).

3.4. Urbanisation

The process of urbanisation results physically in built up area and has the following driving forces:

- population change and density;
- economic aspects;
- tourism as one of the major economic aspects;
- infrastructure.

3.4.1. Urbanisation

During the period from the late 1960s to the early 1980s fertility fell well below replacement level (circa 2,1) in most European countries. However, the courses of decline differed and the fertility levels varied substantially among the countries in the decades following the steepest decline, pointing towards much differentiated demographic prospects in the years to come (Project 1.1.4).

Eurostat compiled regional population scenarios at NUTS 2 level in 1997, covering the period 1995-2025. According to the so called base-line scenario, described as a continuation of current trends, the EU-15 population as a whole will continue to grow at a very low rate, and start declining around 2020. While around thirty NUTS 2 regions faced a declining population in the latter half of the 1990s mostly concentrated to the former eastern Germany and southern Europe, the number of regions with a negative rate of population change is expected to have tripled by the year 2025. Regions experiencing population decline will be widely spread across the EU territory, comprising around half of the EU population (ESPON Project 1.1.4).

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. The annual population growth rate in Europe declined from 0.44% to 0.03% during 1985 and 2000. The rate is projected to reduce further and to will probably decline to -0.24% in 2020-2025. However, while the rural population is decreasing

remarkably the urban population is continuing to grow with a relatively dense network of cities, towns, roads and railways.

Trends of declining population densities can be observed in large parts of Europe, while the urbanisation process continued. Over the last fifty years, the urban expansion and intensification of agriculture resulted in radical changes of the rural landscapes, including natural areas. Figure 3.4 shows the population density in Europe for NUTS3 level in 1999, while Figure 3.5 shows the population growth and decline from 1995-2000.

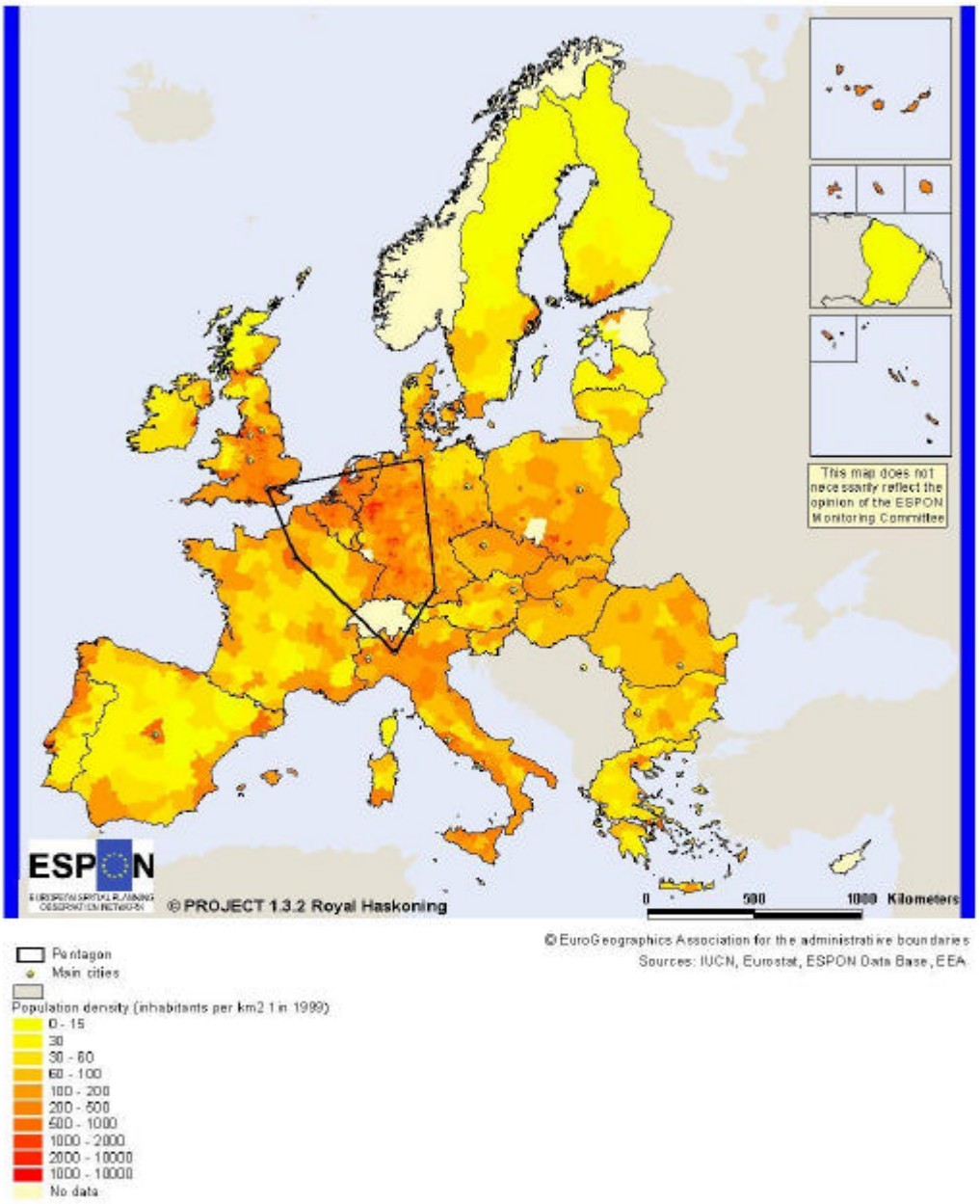


Figure 3.4 Population density for NUTS 3

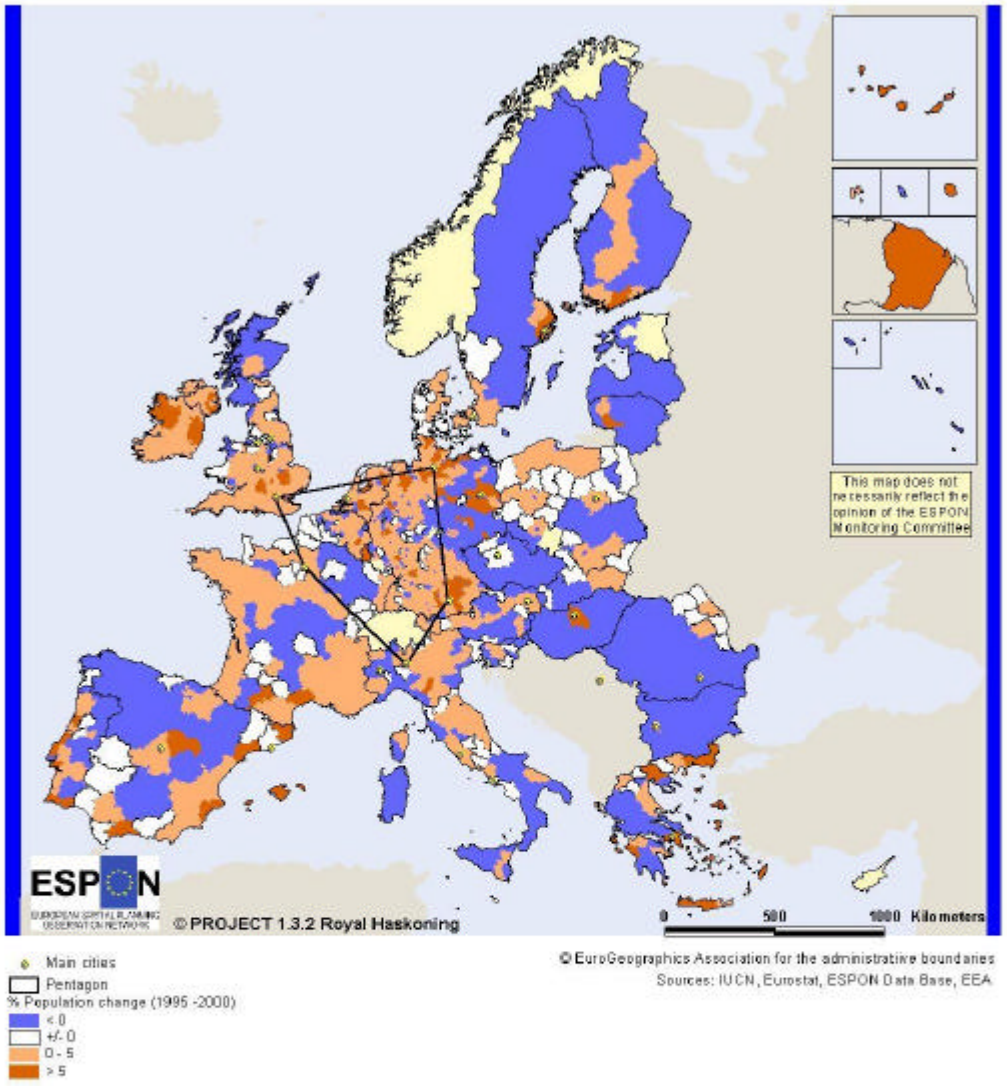


Figure 3.5 Population changes between 1995 and 2000 for NUTS 3 and extensification and intensification of agriculture

The development pressure determines the speed of urbanisation of the rural area or the surroundings of cities and on natural areas. The incremental process of urbanisation may be rapid or slow depending on the rate of economic development. As a proxy for development pressure, the growth or decline of the population can be applied. In areas with a decrease of the number of inhabitants the need for new land for urbanisation is less than in areas with an increase of the population.

3.4.2. Economic aspects

The European countries with the highest gross domestic products are Germany, UK and France. In the world ranking these countries are the numbers 3, 4 and 5. the USA and Japan are on the top of the ranking.

Next to innovation for which the European Union developed dedicated programs, creativity has become a driving force of economic growth. The ability to compete and prosper in the global economy goes beyond trade in goods and services and flows of capital and investment. Between 1992 and 2000, US GDP grew by 36% in real terms, compared to 19% for the combined EU countries. Despite the enormous structural changes undertaken in Europe in the last twenty years, including the integration and liberalization of key markets across the EU, the birth of the Euro, the accession of a dozen 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. 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.
The creative class is attracted by an attractive milieu, which is for some of the groups within the creative class a high metropolitan environment, for others it may be a healthy and green environment where one can enjoy the silence. For entrepreneurs the attractiveness of the environment could be one of the aspects that plays a role in the decision about the settlement of the organization. The non pronounced aspect of creativity is hard to measure. Research focus on the traditional (spatial) economic factors, such as accessibility, availability of workforce, costs of the site, and so on. The American Richard Florida did research on creativity and creative classes. He developed an index for creativity, which ranks countries. Table 3.4 shows the results for the EU15.

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

Table 3.4 The Euro-Creativity Index

The Euro-Talent Index is based upon three indicators: the creative class, human capital and scientific talent (Florida, 2004). The numbers in the second column represent the overall Talent score of each country on a scale from 0 to 15 points.

One may conclude that the top three of countries with most creative milieus, Sweden, Finland and the Netherlands, are all located in North West Europe. At the bottom, 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 potentials will be used next to the creativity index. The European Commission (Directorate-General for Economic and Financial Affairs) developed competitiveness rankings. Table x presents this ranking.

1. Finland
2. Sweden
3. Denmark
4. Switzerland
5. Iceland
6. Norway
7. Netherlands
8. Germany
9. UK
10.Austria
11.Malta
12.Luxembourg
13.Estonia
14.Spain
15.Portugal
16.France
17.Belgium
18.Ireland
19.Slovenia
20.Hungary
21.Greece
22.Latvia
23.Czech Republic
24.Lithuania
25.Italy
26.Slovak Republic
27.Poland
28.Bulgaria

Table 3.5 Competitiveness rankings: most competitive on top

The advantage of this table in relation to the above is that the ranking includes 28 countries. The strong competitive position of Northwest Europe is also reflected in this table. The Scandinavian countries are all in the top 6.

3.4.3. Population

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. Around the turn of the century a negative natural population growth rated appeared in 17 European countries: Bulgaria, Croatia, the Czech Republic, Estonia, Germany, Greece, Hungary, Italy, Latvia, Lithuania, Romania, Slovenia and Sweden. Close to zero natural growth are: Austria, Poland, Slovakia and Spain (ESPON Project 1.1.4).

The population is also getting older. The ageing process is a consequence of the low fertility rate during a long period of time and the out migration of young people in some countries (ESPON Project 1.1.4).

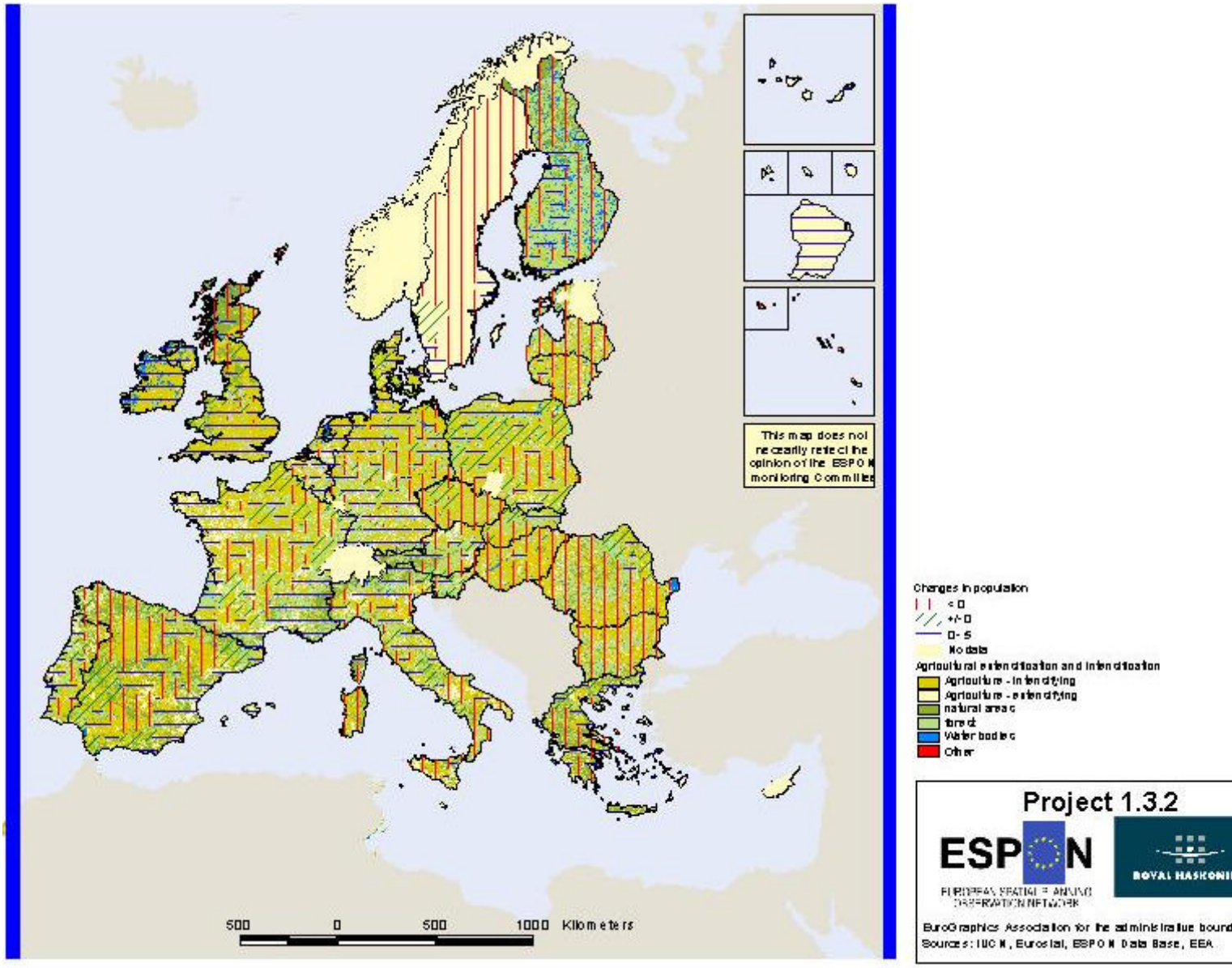


Figure 3.6 Population changes between 1995 and 2000 for NUTS3 and extensification and intensification of agriculture

3.4.4. Tourism

Tourism and its growth continue to be one of the major economic and social phenomena. 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. Europe is the most-visited tourist region in the world, representing today nearly 60% of worldwide international tourism activity. The signs are that growth is set to continue. Numbers in Europe are expected to further increase considerably, and Europe will remain one of the principal markets for tourism to other parts of the world.

In the current EU, two million tourism 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 one of the European economy sectors with the best prospects. The demographic shift towards an older population has a major impact on tourism trends and demand with the proportion of people over 60 in the developed countries expected to grow from 20% to 33% over the next 50 years. Pleasant living conditions and a healthy environment will become increasingly important. Also changes in transport influence tourism, for instance the low-cost flights. Rail travel is expected to increase as result of the road congestion (EC COM (2003)).

With over 60 million tourist arrivals per year the Alps are among the most heavily visited tourist destinations in Europe. The (Mediterranean) coasts have come under tourism pressure on a scale that totally outstrips the whole of previous history. Other European regions, particularly now in Eastern Europe, are also harmed by direct and indirect impacts of the tourism industry, such as construction of infrastructure, increased consumption of natural resources, increased pollution and high levels of disturbance. Tourism is likely to grow in Europe, and the World Tourism Organization foresees an increase of 3% per year in tourism arrivals in Europe in the next two decades. Fortunately, the major international tourist organizations are increasingly aware of their responsibilities and promote ecotourism and other methods of sustainable tourism, and in various regions projects to balance the needs of tourism and nature conservation are being implemented.

Environmental consciousness will continue to increase. For tourism, this will result in more demand for sustainable destinations, in which nature and population will play an increasingly prominent role.

Rural tourism is not a new phenomenon in Europe. However, in recent years the market has become more sophisticated and discriminating and there has been an increasing interest in tourism 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 tourism potential.

The scenery (49%) and the climate (45%) are the two determining factors when a destination is selected. The cost of travel (35%) and the cost of accommodation (33%) come next (EU DG XXIII, An Euro-barometer survey, 1998). The favourite countries are for 6 EU15 countries France, for another 7 Spain, for 1 Germany and for 1 Italy. The most popular types of destinations are the sea (63%), mountains (25%), cities (25%) and the countryside (23%). Neither gender, nor age makes any difference in the selection of this type of destination.

On total mobility, no specific data are available about the role of tourism. Nevertheless, tourism mobility is very relevant for many parts of Europe, including the coastal areas of

Spain, Italy, Greek islands and the Alpine Region. Seasonal destinations are characterised by the highest impact because of significant variation of traffic flows determined by tourism demand.

3.5. Environment and climate change

3.5.1. Influences on the environment

During the last decades a wide range of demographic, social and economic trends (like the switch from an agricultural and manufacturing economic base towards a more service oriented society and rising levels of individualization) have had different impacts on land use and spatial patterns. These changes in land use and spatial patterns have, in their turn, influenced the environment of Europe significantly. Examples are:

- rapid growth of transport and infrastructure volumes and its impact on greenhouse gas emissions, noise and habitat fragmentation and indirectly on quality of vegetation and forests;
- increase in tourism resulting on one hand in a growing use of cars and planes and on the other hand increasingly burdening the environment through e.g. the use of water, development of infrastructure and buildings, creation of wastes and land fragmentation;
- over-exploitation of resources, such as freshwater for irrigation, in agriculture induced by higher consumption levels and government supporting drainage, irrigation and land consolidation.

On the other hand, the total energy consumption and related pressures on the environment fell in Europe in the 1990s. This is mainly caused by direct improvements in industrial, manufacturing and construction processes leading to a more efficient use of energy and an increase in the proportion of renewable resources (mainly hydropower and biomass). Next to that governments are more active and effective in lowering emission rates caused by (car)traffic. At this moment all regions of Europe are on track to achieve their 2010 emission targets for pollutants. Still a much faster growth in 'new renewables', such as wind and solar power, is needed (EEA, Europe's environment: the third assessment (Environmental assessment report No 10, 2003).

Due to influences mentioned above, the environment will keep changing.
One of the most important indicators is climate change: the average temperature is projected to increase between 1.4 to 5.8 °C between 1990 and 2100; global precipitation is projected to increase 1 to 2 % per decade for the coming century. Due to more extremes in temperature and precipitation rates in some areas the risk of floods and in others the risks of droughts is projected to increase.

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. This is also resulting in a gradual fall in the concentration of ozone depleting substances in the troposphere.

Air pollution by sulphur dioxide (SO2) and to a lesser extent nitrogen oxides (NOx) has been reduced significantly in Western Europe but is still reasons of concern in EECA countries. In general ground-level ozone and particulate matter (PM) are, however, still issues for concern for human health and effects on ecosystems.

Water resources in many areas of Europe are under threat from a range of human activities. About 31 % of Europe's population lives in countries that use more than 20 % of their annual

water resource, this being indicative of high water stress. Drinking water quality is still of concern throughout Europe, with significant microbiological contamination of drinking water supplies in eastern Europe, contamination by salts in central Europe and more than 10 % of European Union citizens potentially exposed to microbiological and other contaminants that exceed the maximum allowable concentrations (EEA, 2003).

The health of humans and ecosystems is also threatened. One example is water contaminated by organic and inorganic pollutants such as pesticides and heavy metals at concentrations greater than those laid down in standards by the EU and other international organizations. Total fresh water abstractions fell during the last decade in most regions. However, 31 % of Europe's population lives in countries that experience high water stress, particularly during droughts or periods of low river flow. 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. Although there has been significant progress in management of water resources and quality across Europe, problems still persist (EEA, 2003).

In Western Europe and the accession countries, river, lake and coastal water quality, in terms of phosphorus and organic matter, is generally improving, reflecting decreases in discharges, resulting mainly from improved wastewater treatment. Nitrate levels have remained relatively constant — but significantly lower in accession countries reflecting less intensive agricultural production than in the EU. Concentrations of nutrients are much higher than natural or background levels. Eutrophication, as indicated by high phytoplankton levels in coastal areas, is highest near river mouths or big cities. 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 EECCA shows that many rivers, lakes, groundwater and coastal waters are polluted, often with hazardous substances including heavy metals and oil. The pollution tends be concentrated in localized hot spots downstream of cities, industrialized and agricultural areas and mining regions (EEA, 2003).

Drinking water quality: drinking water quality will remain a concern throughout Europe, with more than 10 % of EU citizens potentially exposed to microbiological and other contaminants that exceeded the maximum allowable concentrations.

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

Despite of conservation of biodiversity, a big part of the European 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 and will continue to do so (EEA, Europe's environment: the third assessment (Environmental assessment report No 10, 2003).

3.5.2. Hazards

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 tends that are likely to increase, particularly in southern Europe.

This means that any effect of climatic change in Europe Climate could amplify water resource differences between northern and southern Europe.

Other natural resources such as soil will also be affected under warmer and drier climate conditions. This phenomenon could impair soil functions having the effect of extending the area prone to desertification to northern territories, thus endangering areas currently not at risk. Moreover, the rate of desertification would increase owning to increased erosion, salinisation, impairment of soil quality and increased fire hazards. These processes could result into a desertification process that may become irreversible.

The risk of flooding, erosion and wetland loss is likely to be increased, especially in the coastal areas of the continent which represent a valuable element of European Natural Heritage.

The issues of soil sealing, water, dried out land resulting from lowering ground water levels, excessive droughts and rainfalls, erosion, contaminated sites, water use and quality et cetera, are not addressed specifically in this report. END

3.5.3. Infrastructure

The distribution of motorway and railway density in the 29 countries is presented in figures X and X. There is a clear decline in motorway density from the most central north-western regions in Europe to the peripheral regions. In the present EU, Portugal, Ireland, northern England, Scotland, northern Sweden, Finland and Northern Greece have comparatively few motorways. However, almost all parts of the candidate countries, with few isolated links around capital cities in Latvia, Romania and Bulgaria, are lacking motorways altogether (Project 2.1.1).

It can be seen that the ten CEC countries occupy about 25 % of the combined territory of the EU and CEC countries and about 21% of the population. GDP is only about 10% of the area however this imbalance is reflected in the provision of transport infrastructure. CEC countries have only 5% of the kilometres of motorways in the EU and CEC countries together. Moreover, the imbalance in motorway infrastructure is increasing: whereas in the EU more than 1,000 km of motorway are added each year, less than 100 km has been added in the CEC countries each year during last years. The CEC countries do have an over proportional share of rail infrastructure, however, although motorways are of a significant barrier for nature, (especially fauna) than railways. (Project 2.1.1).

3.6. Conclusions and discussion

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

Many current and past human activities have polluting effects on the environment. These activities affect the ecological quality of natural areas, resulting in a loss of species and a decrease in biodiversity. For instance 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 associated infrastructure, changes in agriculture and the development of the tourism industry are affecting the quality of the environment in a number of ways:

- Small ecological network structures are decreasing;
- Natural qualities are disappearing;
- Wetlands and water bodies are decreasing as groundwater tables are lowered;
- Substitute landscapes are often more uniform in physical and biological character;
- Remaining habitats are smaller, more fragmented (see chapter 4).

Territorial trends may also create opportunities for nature, for example changes in land use such as the abandonment of agricultural land. Chapter 4 deals with trends of natural areas and biodiversity. In the chapter 6 and 7 the future threats and opportunities are described.

3.7. Indicators for analysis

In order to analyse and monitor the above developments; a number of indicators have been developed:

Social economic aspects	Criteria	Source	Comments
Agriculture	Changes in the area of agricultural land	CORINE land cover and CORINE land cover 2000	CORINE land cover 2000 is just available for Ireland, Luxembourg, The Netherlands, Latvia, Estonia, Slovenia and Malta.
	Changes in the use of agricultural land: intensification/ extensification	Project 2.1.3. on The territorial impact of CAP and rural development policy	Project 2.1.3. has not developed data on changes in the use of agricultural land.
Urbanisation	Changes in the area of built up area	CORINE land cover and CORINE land cover 2000	CORINE land cover 2000 is just available for Ireland, Luxembourg, The Netherlands, Latvia, Estonia, Slovenia and Malta.
	Changes in the number of population: increase/ decrease	Project 1.1.4. on the spatial effects of demographic trends migration	
Economical structure and innovations	Changes in the GDP	Eurostat/ Worldbank	
	Competitiveness Creative Index	Florida	EU-15
Tourism	Changes in number of tourists	?	
Infrastructure	TEN	GISCO	
Environmental aspects	Changes in frequency of flooding	Project 1.3.1. on the spatial effect and management of natural and technological hazards	
	Changes in process of Desertification	?	

Table 3.6 Data

4. Natural heritage

4.1. Introduction

Natural habitats and species can be present in areas where their occurrence would be less expected. In polluted, old industrial areas species are sometimes discovered whose existence could not be expected. Additionally, some urban studies have established unexpected high biodiversity indicators.

These outcomes may be due to the fact that it seems a rule that the more biological attention is focussed on a specific area, the more natural value will be discovered. Another explanation which probably also applies, is that nature has the dynamic capacity to adapt to unfavourable conditions.

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 natural areas. Neither natural areas, nor protected natural areas can be considered separately from their environmental context. It might be argued that a certain minimum level of the environmental quality is a prerequisite for the existence of specific species in a protected area. This may apply to the quality of air or, water and the exchange of genetic material with species or habitats in surrounding areas. With respect to these considerations, within this chapter natural heritage is first considered with regard to the concept of landscapes, with regard to species diversity and species richness. The effect of fragmentation is then discussed and finally the indicators for analysis and further monitoring are considered.

4.2. Landscapes

Landscape is defined as an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors (Article 1.a. of the European Landscape Convention, adopted 19 July 2000). The long term process described in section 3.1 considers spatial developments of the European landscapes over centuries, resulting from agricultural activities, urbanisation and implementation of infrastructure in specific geomorphological conditions. One of the outcomes of that process is that undisturbed natural areas hardly exist in Europe. Therefore, the CORINE database on land use types applies the category of semi natural land uses to which many natural areas belong.

The term ‘landscape’ can be regarded as encompassing the whole of open spaces excluding only the artificial land use types such as urban areas for residential and industrial land uses, although some argue that cities must be included, as part of the landscape. The open space, being the non urbanised landscape, includes agricultural areas and natural areas.

The way agricultural and other human activities have been carried out over time and the way these are reflected in the geomorphological structure of the region is strongly influenced by regional culture.
As a result, the 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. The 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, 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 typical 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 that 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 the common grounds of 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 heath. 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 Wayact 2000.

It is clear that the European rural areas contain a large variety of the European'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. Also environmental (see 3.7) aspects should be taken into consideration. Nevertheless, analysing as well as monitoring the natural heritage requires data about natural values which are not systematically collected in Europe's rural area.

4.3. Natural areas

Table 4.1 shows the percentage nature including forest and wetlands for the bio geographic regions (the typology of the bio geographic regions is presented in section 6.2).

	Natural areas	Forest	Wetlands
Boreal region	11,6	58,1	2,5
Atlantic region	11,7	13,4	2,2
Continental region	3,2	28,5	0,3
Alpine region	30,2	50,1	0,6
Pannonian region	2,3	16,5	0,6
Mediterranean region	26,4	19,2	0,2
Steppic region	6,8	6,3	3,2
Black sea region	6,4	25,8	11,0
Average region	12,3	27,2	2,6

source: CORINE land cover

Table 4.1 Land use per bio geographic region in percentages

In the Alpine and Mediterranean regions more than one fourth of the land cover is natural area. In the Pannonian and continental regions less than 3,5% is nature. In the Boreal and Alpine regions forest covers more than half of the land. The highest percentages wetlands are in the Steppic and Boreal regions. These proportions are low, all less than or equal to 3,2.

Nuts0	natural areas	forest

AT	17.1	44.4
BE	1.5	19.9
BG	10.0	30.8
CH	37.7	31.7
CZ	3.5	31.2
DE	1.1	29.7
DK	2.6	9.9
EE	10.0	52.3
ES	29.3	17.7
FI	19.0	72.8
FR	7.5	25.6
GR	42.3	16.9
HU	2.5	18.3
IE	10.9	5.1
IT	16.8	24.5
LT	2.5	30.1
LU	0.3	37.1
LV	6.9	45.3
NL	2.2	9.1
NO	78.7	21.3
PL	0.7	29.5
PT	18.0	28.0
RO	12.8	28.7
SE	24.0	76.0
SI	5.7	57.7
SK	3.8	39.9
UK	25.2	7.5

Source: CORINE land cover

Table 4.2 Land use per country in percentages

The proportion of nature in the total land cover varies strongly between the countries, with the extremes Norway (78,7%) and Luxembourg (0,3%).
The northern countries Finland and Sweden, are covered with forest for more than 70%. the lowest forest cover is in Ireland, UK, the Netherlands and Denmark.

The large natural areas can clearly be identified in Finland, the Alps, the Cantabrian Mountains, the Pyrenees, the Carpathians, Greece and Scotland. The dominance of mountainous regions is obvious. Apparently those areas provide biotopes in the different climate zones that are of high natural values.

4.4. Fragmentation

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 land use types. In recent decades a range of initiatives to protect the natural heritage, at the national and European level, have been implemented. Those policies are discussed in chapter 5. Monitoring, and measuring results of interventions to counteract the process will require long periods of time. The European Environmental Agency (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 and animal populations. The average size of non-fragmented land in the ACs (174 km 2) is still above the average of that of the EU (121 km 2).'

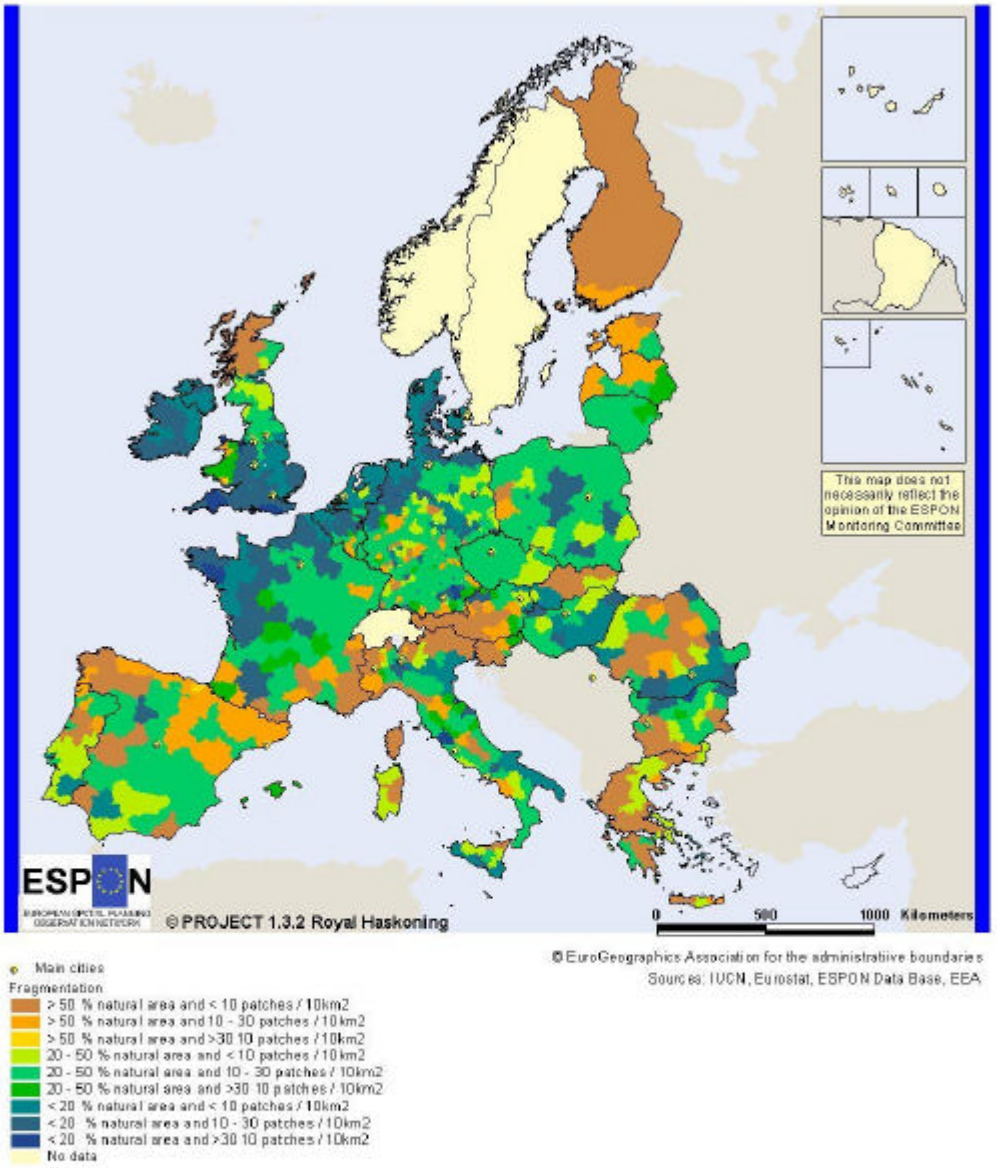


Figure 4.1 **Fragmentation index for NUTS 3**

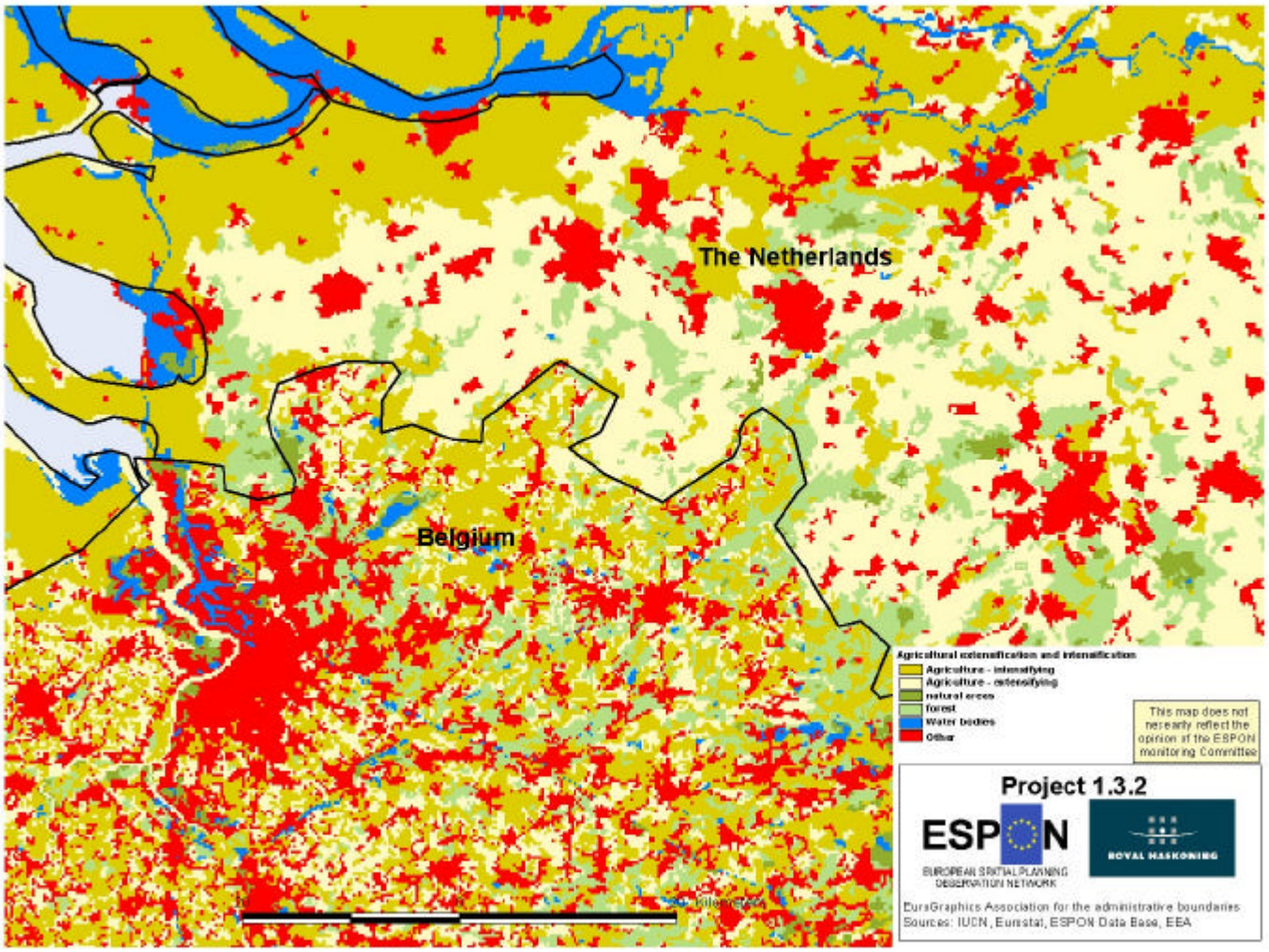


Figure 4.2 Difference in land cover of Vlaanderen (Belgium) and the south part of The Netherlands

The fragmentation of natural areas is illustrated in figure 4.1, showing the number of natural area patches and the average size of the patches for each NUTS 3 region. Although the sizes of these regions are not similar, the map gives an impression of the degree of fragmentation of the natural heritage. Most extensive fragmentation shows 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 relative 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, The Netherlands and along the rivers.

Figure 4.1 gives an overview of the CORINE land cover classes of natural areas and forests. The fragmentation can clearly be observed. Figure 4.1 further underpins this argument by showing the percentage cover of natural area and forest for each NUTS3 region. Both of these maps demonstrate the overall impression of fragmented natural areas.

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 take into account the passage of their associated animals such as otters through tunnels or wider bridge spans. Fauna bridges are being constructed in several countries for deer and other large mammals, and enlarged culverts are increasingly put into place for amphibians such as frogs and small mammals such as badgers.

4.5. Species diversity and species richness

"Biological diversity" (biodiversity) means the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and 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 region under review in this current ESPON project, as well as within the European Community as a whole, have ratified the 'Biodiversity' convention1. 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 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. 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-third of the European wetlands that existed 100 years ago, have been lost (EU, Third Report on Economic and Social Cohesion).

Biodiversity is continuously in a state of flux. Natural movement occurs, as species will colonise areas that have been 'prepared' for them by the presence of others species such as with the successionary stages of vegetation when one species will progressively alter the soil conditions so that they become appropriate for another to take root in. 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 glaciation, or on the contrary make areas more hospitable. Significant shifts in climate, such as those the earth may 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 (EEA, 1999: 383). Altitudinal belts found in mountains also correspond to latitudinal belts from the equator to the poles, and the matrix of these along with other determining influences on climate – such as the moderating influence of oceans upon temperature variation that lessens with distance from the sea – all result in the variability of flora and associated fauna. A last factor, that of human activities and 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. It is a natural phenomenon that the extreme climatic conditions of northern boreal forests will allow the presence of only a few species of vegetation, as will

[1] Exceptions are Albania, Andorra, Bosnia and Herzegovina, Holy See and the Former Yugoslav Republic of Macedonia.

those of the alpine conditions found at high altitudes in the Alps or far lower altitudes in the Scottish highlands (considering the influence of latitude on 'normal' climatic conditions).In contrast, it is mans 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 (Stanners and Bourdeau, 1995, Chapter 9).

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. 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 natural areas than in smaller ones. Possible negative effects of surrounding human activities are usually less severe. Larger natural areas are more likely to be self-regulating, and thus self-sustaining to a greater degree.

Larger 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 natural areas provide resources for large populations. Large natural areas can consist of combinations of different ecotopes. 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 natural areas, the spatial configuration of natural areas is also important. Especially in fragmented landscapes, where natural patches are small and separated by other types of land-use, the connectivity of the patches is an important factor in metapopulation survival. Populations in small natural areas have a higher risk of extermination than those in larger areas. Recolonisation 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 survival. Winter and summer habitats have to be at a distance 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 natural area in a surrounding of agricultural of built-up zones.

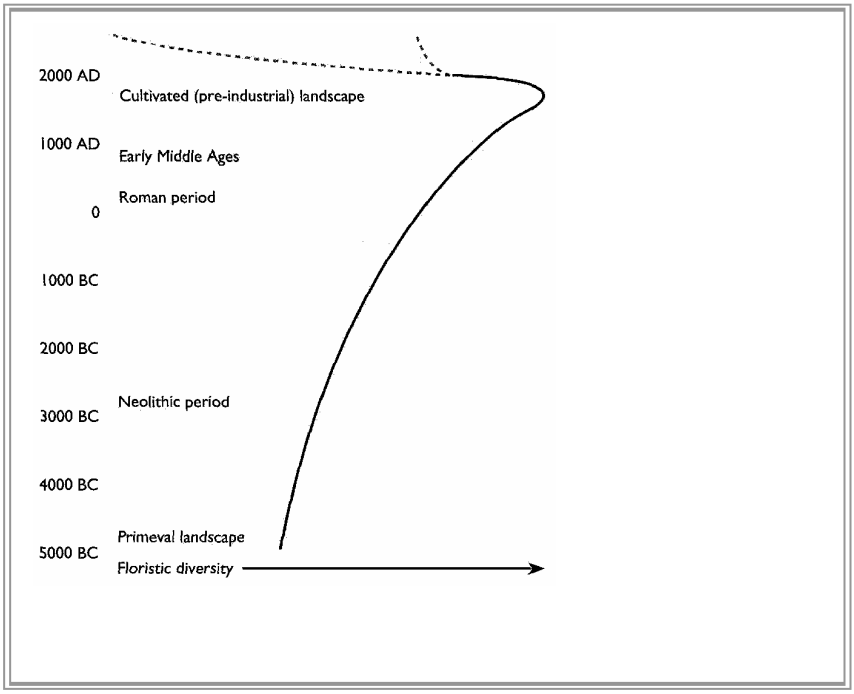
There is, therefore, an important ecological interest in stopping the process of decrease of natural area and fragmentation. The reverse process should be encouraged, to increase the natural area and enhance the territorial coherence between separated natural areas.

As such, increasing the total size of natural areas has its positive effects but a larger effect may be expected if additional areas are located where they connect two separated natural

areas. The objective is to develop a network rather than one large area. Therefore, the selection of sites where land use is to encourage natural areas should be done carefully, considering its strategic contribution to the development of a network of natural areas. In order to meet this objective, sites that may provide corridor and stepping stone functions within a network of 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.



Source: Stanners, David and Philippe Bourdeau, eds (1995) Europe's Environment – the Dobris Assessment, European Environment Agency, Copenhagen.

Figure 4.3 Number of species in relationship to the evolution of agricultural practice

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'), and gives an indication of the distribution of biodiversity from four perspectives. Although surveying biodiversity results in practical problems, as it is impossible to count all species, there are several atlases [2] 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 (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).

4.6. Conclusions and discussion

The continual erosion of natural areas by agriculture and urbanisation and other related processes during many ages has led to the ongoing fragmentation of natural areas. In fact, the actual natural heritage consists of those areas that are leftovers, untouched by the age-long process of urbanisation, infrastructure development and agricultural cultivations.

Also, the further expansion and modernisation of the European infrastructure has strongly affected the European landscapes, where roads and railway lines are particular elements that have lead to ecological disruption. This continuing fragmentation of existing nature leads to a lack of connectivity between the natural areas.

Both the decrease of number of natural areas and the average size of the areas pose a threat to the natural value. Many of Europe's most important habitats are especially vulnerable to the pressures because they are often already small and fragmented. Only through an increase of the natural area and coherence between the separated areas, can the current biodiversity and natural 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.

4.7. Indicators for analysis

In its first published briefing for 2004, the EEA analysed the availability of information regarding biodiversity, underlining 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."

[2] The atlases have been produced by Atlas Florea Europea, European Biod Census Council, Societas Europaea Herpetologica and Societas Europeae Mammologica.

Even among the indicators that the EEA is committed to work on[3], 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 EU 15 (25) level or at the national level, with only the number of threatened taxa likely to be at the Nuts 2 level (Indicator BDIV3a).

Other initiatives already exist, such as the 10x10 km sq grid mapping of species richness ('Worldmap' of the Natural History Museum, London), or are planned, such as the Natural Capital Index (NCI) being prepared by the WCMC (World Conservation Monitoring Centre, Cambridge). The NCI will compare habitat types – in terms of both quantity and quality – with the associated fauna species. In many ways it will cover much of the subject matter that has been requested of the Parties to the CBD: 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 exist, but the exactitude 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 European Environment Agency - EEA) habitats types prepared by the EEA Topic Centre on Nature Conservation and Biodiversity. Also, the scale of reporting is not exact enough for understanding / mapping of 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 (yet) officially accepted as a standard reference for reporting. The ecological units proposed, however, do not correspond to the NUTS administrative boundary breakdown, but to the presence / absence of ecological qualities in relation to the geo-morphological character of the land.

For the moment, 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 / designation status (IUCN).[4] The only spatially specific, European record of sites with both habitat and species information is the Natura 2000 network data (CORINE Biotopes), including its proximate extension eastwards to the Accession Countries and some of the other affiliated countries to the EEA: the Emerald network.

Unfortunately, there is not a broadly excepted database on biodiversity for the 15 member states and the accession countries. Therefore biodiversity will not be treated as an indicator itself, but the species diversity and richness is measured via the IUCN designated areas. This policy about the protection of natural areas is set out in chapter five.

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

[3] EEA Core Set of Indicators, revised April 2003
[4] Not all designated sites, such as many of the Natura 2000 areas, have a protection status.

Natural heritage	Criteria	Source	Comment
Natural area	Changes in the size of the natural area	CORINE land cover and CORINE land cover 2000	CORINE Land Cover 2000 is just available for Ireland, Luxembourg, The Netherlands, Latvia, Estonia, Slovenia and Malta
	Changes in the size of forest	CORINE land cover and CORINE land cover 2000	
	Changes in the size of wetlands	CORINE land cover and CORINE land cover 2000	
Fragmentation of nature	Fragmentation index		for NUTS 3

Table 4.4 Data

5. Management

5.1. Justification of protection

In general the conservation of nature and biodiversity is regarded as very important for man. Whether lack of, or irresponsible protection of nature will in the short term have a negative impact on the well being of mankind is disputable. However, in the long-term shortages of for example raw materials and food might occur. With ongoing large-scale deforestation, effects on climate and erosion will be significant but difficult to predict. Global warming, temperatures rising, unpredictable rainfall and consequent flooding may be future reality. As such 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.

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

- Economics and production. Nature protection is necessary, as it performs a range of functions, including food-production, providing building material, 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 climate, forest on soils and the purifying qualities of soils on acid rain;
- Perception. This aspect includes the appreciation of nature as 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, for example biological, archaeological, and geological. 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;
- Politics. Protection of a common good like the natural environment could enhance the feeling of solidarity of a community.

5.2. Key policies on nature

In Europe many conservation strategies exist alongside each other.

	Protection of	Implementation in EU policy
Ramsar convention	Fauna Sites: wetlands	Ramsar sites are directly incorporated into the Birds Directive as category 'c' of special conservation 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
Birds Directive	Fauna Habitats	Natura 2000
Habitats Directive	Fauna and flora Habitats	Natura 2000

Table 5.1 Conventions and legal instruments

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 Landscapes Diversity Strategy guides the setting of objectives for natural heritage, without having the status of a legal instrument.

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 Integrated Coastal Zone Management policy (ICZM) identifies and promotes measures to remedy the generally encountered problems in coastal zones of deterioration of the environmental, socio-economic and cultural resources in an integrated approach.

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.

	Orientation of	Implementation in EU policy
Common Agricultural Policy (CAP)	Promotes agri-environment and sustainable rural development	Ramsar sites are directly incorporated into the Birds Directive as category 'c' of special conservation areas
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	Agriculture
Pan-European Biological and Landscape Diversity Strategy		
European Community Biodiversity Strategy		Agriculture, Fisheries, Natural Resources and Transportation, as related to Biodiversity

Table 5.2 Policies and Strategies

	Implementation in EU policy
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

Table 5.3 Funds

5.3. 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.

5.3.1. 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 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.

5.3.2. Environmentally Sensitive Areas

The provision of Environmentally Sensitive Areas (ESAs) as a recognised designation status for land was legally formulated for the European Union by Council Regulation (EEC) No. 2328/91 (OJ No. L218, 6.8.91, p.1) 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 (Council Regulation (EEC) No. 2078/92 (OJ No. L215, 30.7.92, p.85) 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 (OJ No. L160, 26.6.99, p.80) 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.

5.4. Protection of nature

The ambition to ‘protect’ biodiversity means to create awareness of its special value and to geographically identify – and sometimes limit land use upon – areas in which particular value is found, as a way of ensuring the continued existence of biodiversity. Within Europe there are several systems for identification of biodiversity value, and three of these have been retained: IUCN Protected Areas List, the Ramsar Convention and the Natura 2000 ecological network.

5.4.1. 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 an imminent group of volunteer scientists, the IUCN has compiled 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.

CATEGORY Ia:	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.
CATEGORY Ib	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.
CATEGORY II	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.
CATEGORY III	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.
CATEGORY IV	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.
CATEGORY V	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.
CATEGORY VI	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.

Table 5.4 IUCN Protected Areas Categories[5]

To provide an overview of the effectiveness of all different policies on natural heritage, it would be ideal to have data on all different designated areas and the type and degree of protection afforded. However, such data does not exist. For the moment, there is one systematic classification of protected areas that extends across the European continent, and that is the IUCN Protected Area Categories. The coverage provided by the IUCN lists of protected areas is exhaustive at the national level and complete enough at the regional level to be used as a standard reference for a study such as this. Only the Natura 2000 listing, when fully complete, will be able to provide a more detailed perspective that will include small areas that are significant at local levels. Data exists on the spread of designated Ramsar sites, but these focus on wetlands associated with species only.

[5] 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/eng/index.html)

IUCN provides an overview in a list of different categories of protection, year of designation and the size of the area. Areas are included in the list if they meet the following definition:

> 'An area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means'.

The categorisation of the areas is based on the type of area and reason for protection. Examples are wilderness area or managed natural resources area. This does not provide the required information about the intensity of the management or its effectiveness.

Other types of designated areas, such as Ramsar sites have been mentioned in the preceding section. 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 European natural heritage would gain immensely from a concerted policy for definition of objectives and their implementation.

Table 5.5 presents the area in hectares of the IUCN protected natural areas as distributed over the biogeographic regions. Table 5.6 shows these protected areas as distributed over 29 countries.

Bio geographical regions	Number	Sum Size (ha)	Average size
Boreal	4.865	3.256.052	669
Artic	74	31.410	424
Atlantic	4.541	6.561.246	1.445
Continental	6.972	17.002.934	2.439
Alpine	2.733	13.169.388	4.819
Pannonian	274	697.249	2.545
Mediterranean	371	4.988.437	13.446
Steppic	12	583.449	48.621
Coastal zone	5.204	8.653.964	1.663

Table 5.5 Total protected area (IUCN) in ha for each bio geographical region and coastal zone (20km)

Nuts 0	Number	Total Size IUCN (ha)
AT	804	2387.282
BE	270	894.382
BG	49	490.743
CH	2.140	1179.534
CZ	1.733	1241.301
DE	2.466	7743.329
DK	236	172.869
EE	231	2263.559
ES	333	3945.986
FI	1.743	2783.133
FR	994	6681.721
GR	94	384.080
HU	171	571.167
IE	59	64.464
IT	569	3093.318
LT	57	577.219
LU	179	132.165
LV	201	414.592
MT	4	44
NL	90	442.702
NO	1.277	1975.362
PL	1.310	5838.712
PT	29	458.464
RO	68	1116.730
SE	3.243	3548.205
SI	36	122.044
SK	72	813.149
UK	6.798	6.477.910

Table 5.6 Total protected area (IUCN) for each country

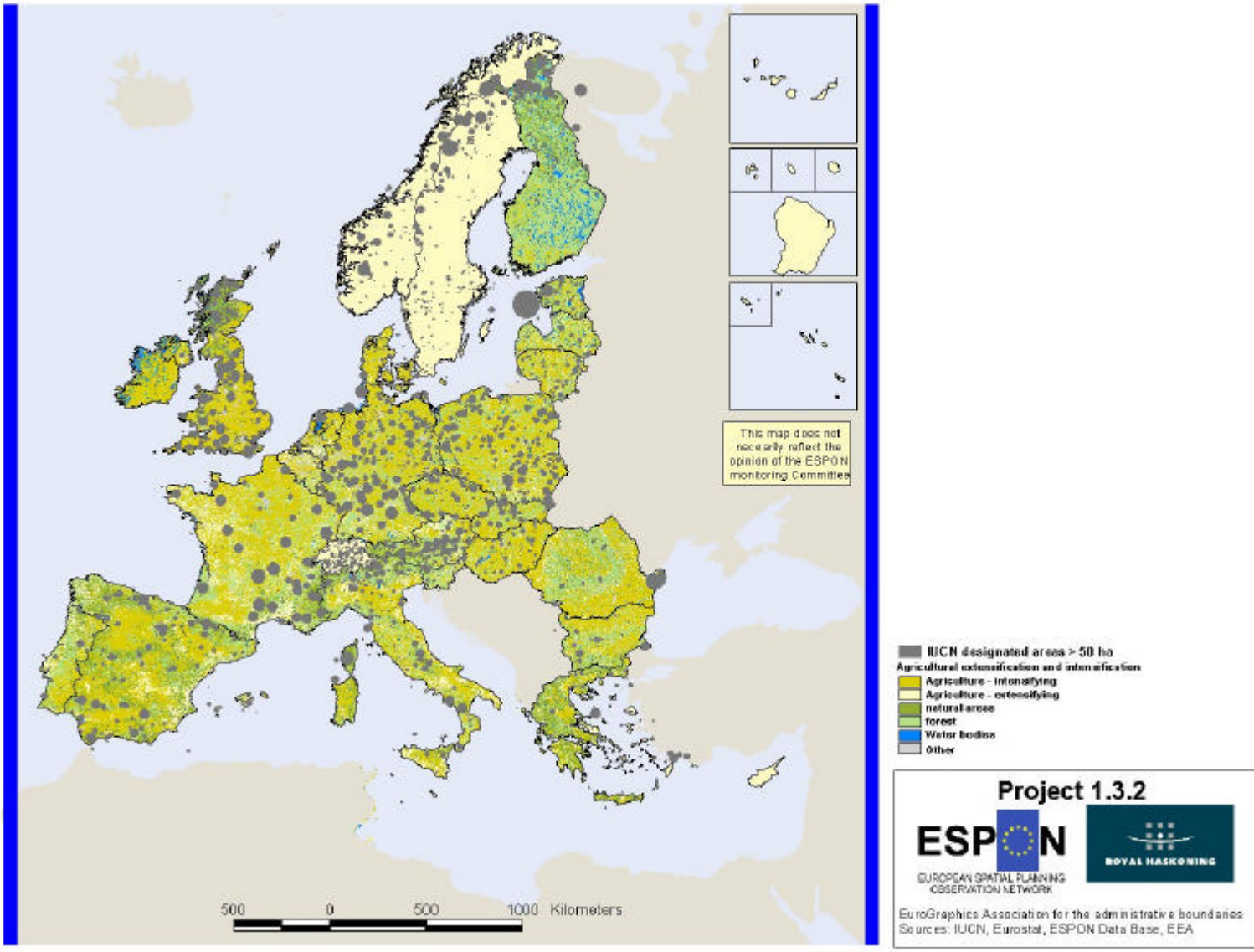


Figure 5.1 IUCN sites larger than 50 ha where the size of the circles represents the actual surface area

5.4.2. 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. These areas 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 European

Union 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 waterbirds;
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 waterbird.

Bio geographical region	Number	%	Total area RAMSAR (ha)	%
Boreal	40	9	342.598	9
Artic	2	0	3.115	0
Atlantic	77	17	483.652	12
Continental	64	14	485.159	12
Alpine	28	6	335.649	8
Pannonian	29	6	179.218	4
Mediterranean	20	4	54.678	1
Steppic	2	0	664.586	17
Coastal zone	197	43	1.446.038	36
Total	459	100	3.994.693	100

Table 5.7 Total protected area (Ramsar) in ha for each bio geographical region and the coastal zone (20km)

There are 459 areas designated as Ramsar sites. The total size of the area is 3.995 thousand hectares, 36% is situated in the Coastal zone; 197 areas are protected, with a total surface of 1.446 thousand hectares.

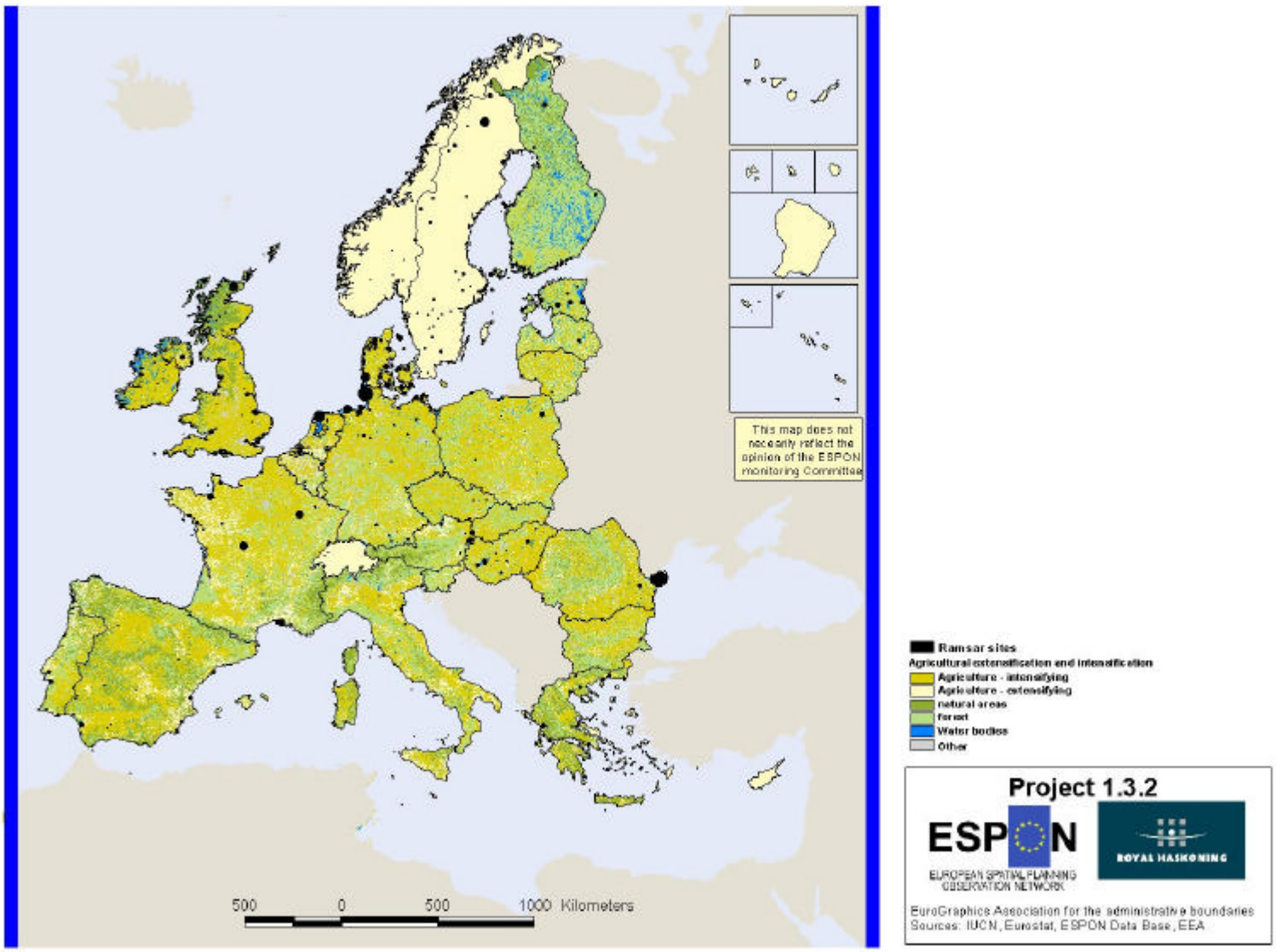


Figure 5.2 Ramsar sites where the size of the circles represents the actual surface area

5.4.3. Natura 2000

Natura 2000 is the principal EU policy instrument for the protection of flora and fauna and habitats, however it does not assimilate all the policies described above into one spatial strategy. This is because policy, including the agri-environmental measures, is not unified at present. A number of DG's of the European Commission have a remit to some degree to address nature conservation, including Environment, Region and Agriculture, and Transport. Whilst these departments do discuss the issue, there is no clear centre of responsibility setting overall policy principles. 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.

Natura 2000 gives an administrative status to both protected and non-protected areas (nature reserves and farm land, for example). It seeks to ensure Member States accept their

responsibility to implement measures to ensure the safeguarding of European fauna and flora in the context of the EU territory. Natura 2000 lists 'priority' species and habitats, which are prioritised for EU financial support.

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. Article 4 gives precision as to the criteria for selection, giving emphasis to the relative presence of a species or its habitat, and Article 10 underlines that "Member States shall endeavour, where they consider it necessary, in their land-use planning and development policies and, in particular, with a view to improving the ecological coherence of the Natura 2000 network, to encourage the management of features of the landscape which are of major importance for wild fauna and flora." The network of Natura 2000 sites covers land that both does and does not fall under another formal designation processes, which means there may be no other legal obligation than to maintain 'favourable conservation status' (Article 1)6.

Natura 2000 and the Emerald Network are explained in more detail in the boxes below:

Natura 2000: the ecological network of the European Union
Bruno Julien, European Commission, DG XI

Natura 2000 symbolises the conservation of natural resources in the European Union 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 (SACs) under the Habitats Directive, Natura 2000 represents the EU's contribution to the Pan-European Ecological Network.

What are the features of Natura 2000? It creates a European Union 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 about a few strictly protected core areas. Sites may include core areas, 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 of the Natura 2000 network by the European Union, 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 we are increasingly trying to incorporate its requirements into other policies and the Community financing mechanisms.

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 designation. Already over 12% of the territory of the European Union has been proposed by the member states for protection, although the task of finalizing a Community lists 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 interests.

[6] Note should be made of the Emerald Network that has a similar function in non-EU countries, and that uses the Bern Convention listing of species and habitats as its scientific reference.

The EU has from the outset made clear its willingness to share its experiences in developing Natura 2000 with our European partners. This is why we support the Council of Europe's Emerald Network which is based on the same principles and is developing similar methodologies and approaches.

The Emerald Network of Areas of Special Conservation Interest.
Eladio Fernandez -Galiano, Head of the Environment Conservation and Management Division, Council of Europe

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 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.

5.5. 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'.

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 (Marren, 1994).

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, among others, the IUCN (International Union for Conservation of Nature and Natural Resources) and the World Conservation Union. From then on a number of major conventions were drawn up, as described further on in this chapter.

Since 1979, the year in which both the Bern Convention and the Bonn Convention took place and the Birds Directive was adopted, the EU has played an increasingly active 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.

Natura 2000, which will be described later on in this chapter, 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 to the will of creating natural networks (with Natura 2000) and protecting given species such as birds, landscapes and peoples living environment.

5.6. Designated natural areas and sites

Figure 5.1 gives an overview of the distribution of designated sites according to IUCN throughout Europe. This map shows that designated areas are widely spread over Europe with striking concentrations in the western half of Germany, Czech Republic and Switzerland. Also in Denmark, Austria and Estonia high concentrations are found. Relatively low concentrations of protected areas are found in Sardinia, Romania, Bulgaria, Greece and Ireland.

Figure 5.2 gives an overview of designated Ramsar sites. These are wetlands of international importance for migratory waterfowl, and except for larger inland water bodies and marshlands, their primary occurrence is coastal wetlands, intertidal mudflats, estuaries, and offshore phenomenon such as shallow-water shoals. The map shows the highest concentration of protected wetlands in the coastal zones of the North Sea and the Irish Sea. Al lower concentration is located in the mountain ranges of southern Europe.
It should be stressed that the size of the Ramsar sites varies greatly.

Figure 5.3 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. 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.

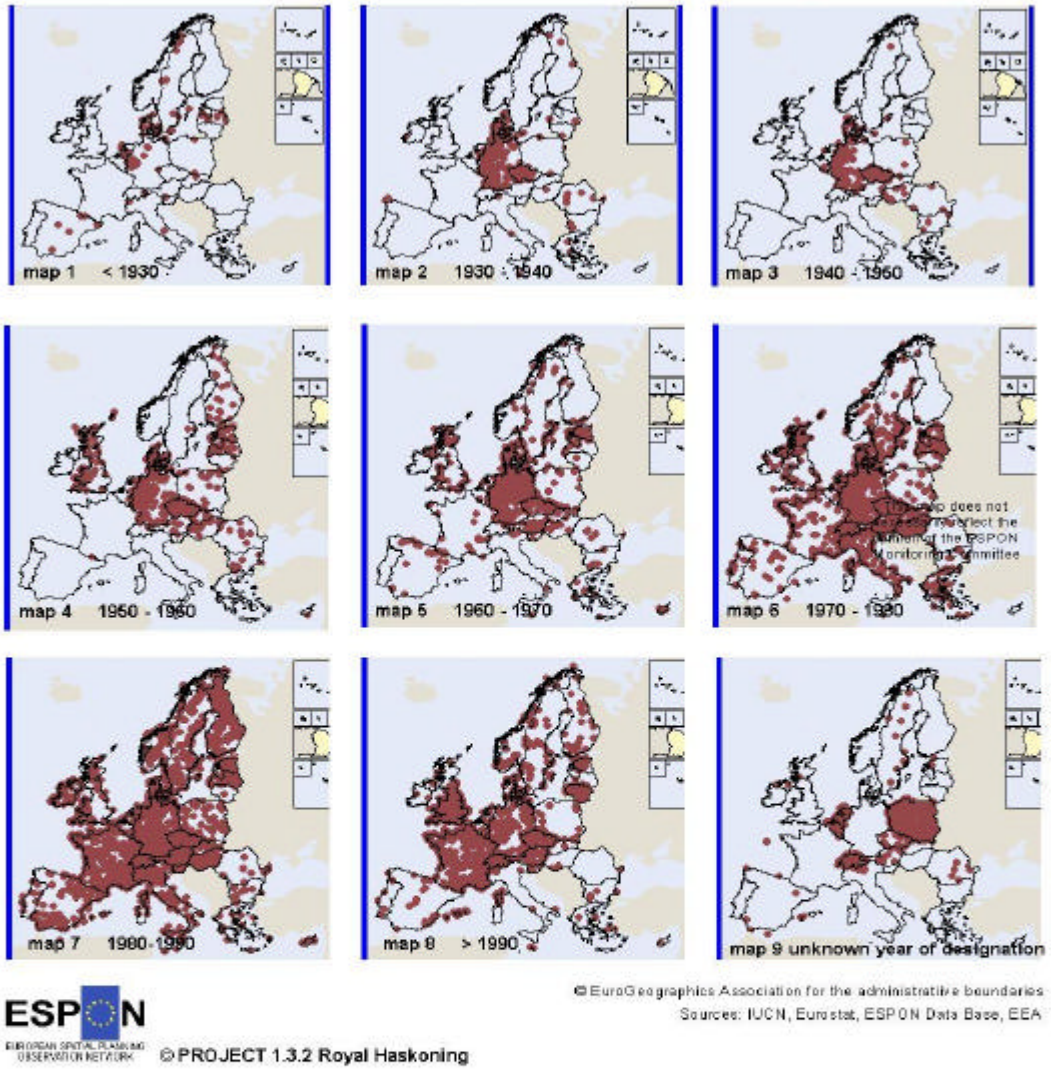


Figure 5.3 Mean size of designated areas for NUTS 3

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 natural areas and / or implementation of management measures and hence designation.

It can also be concluded that some countries, such as Denmark, 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. While in Germany cultivated landscape had priority, 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.

The mean size of the designated areas. From this map it appears clearly that mean size of designated areas is the largest in Finland, the Alps, Scotland, Sardinia and Greece. Large mean sizes are also found in Spain, southern France, Corsica, the Carpatians and a slightly less 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 the maps that protection has taken place for diverse reasons, such as 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. As the majority is mainly on protection of species, the types of areas (the biotopes) are of very different kind.
This means that different measures have been taken on the already dispersed natural values. The presence / absence of natural values is mostly related to the historical development of urban areas (density of population and the size of towns and cities) and the progressive intensification of agriculture of fertile soils in the areas between the urban poles. Where economic activity is less intensive, such as in peripheral zones, there has been less disruption of natural values.

5.7. Progress in EU countries

Country	Planned	In Development	Designed	Designed and accepted as policy	Designed and accepted in the process of implementation
Romania					X
Poland					X
Ireland					X
Sweden					X
Slovenia			X		
Norway					X
France					X
Bulgaria		X[4]			
Denmark					X
Finland					X
Italy					X
Greece					X
Scotland			X[5]		
Portugal					X
Belgium -Walloon region		X[6]			
Belgium -Flanders					X
Belgium -Walloon region		X			
Czech Republic					X
Denmark					X
Estonia	X				X (1)
Germany, Nordrhein- Westfalen	X				
Germany, Rheinland Pfalz					X
Hungary			X		
Italy, Aquila		X (2)			
Lithuania	X				
The Netherlands					X
Poland			X		
Portugal, Alentejo		X (2)			
Portugal, Lisbon Metropolitan Area		X			
Russia					
Central Russian Plain,		X			
Central Chernozem Zone,	x				
Volga Ural region	x				
Slovak Republic					
Spain, Catalunya		X			
Spain, Madrid region		X			
UK, Cheshire County		X			
UK, Scotland		X (3)			
Ukraine, Azov-Black Sea region	X				

Source: ECNC (Enviplan / Management Questionnaire), edited by B.C.W. Delbaere, 1998, Enviplan, 2004.

(1) There are plans to update and adapt the existing design for Estonia and Lithuania.
(2) Plans developed by the universities in the regions in co-operation with regional authorities.
(3) A forest habitat network has been designed by Scottish Natural Heritage.
(4) The Nation ecological network will be establish by 2006
(5) Candidate Sites exist as of 31 March 2003
(6) Candidate Sites exist as of 26 September 2002

Table 5.8 Countries and regions developing ecological networks

Boreal region
Sweden: Productive forestry in Sweden within nature reserves and national parks (that is protected areas) accounts approximately to 3,7% of total productive forests. In protected areas tourism is usually allowed as well as some hunting, fishing and reindeer husbandry in some areas.
Norway: Main sources causing reduction of wilderness areas (areas >5Km from human permanent impacts) and areas of nature without impacts (areas > 1Km from large permanent human impacts), are agriculture, forestry, hydroelectric power consumption. Recreational activities are generally accepted in protected areas.
There are some incentives in order to stimulate farmers to maintain certain activities at their properties because that activity is favourable for maintaining aspects of the landscape. This activity may be important because it keeps certain types of landscapes "living" and therefore is favourable for some species
Finland: forests exploitation represents one of the major pressures in Finnish natural heritage. Environmental subsidies for forestry exist in Finland. These Environmental subsidies granted under the Act of the Financing of Sustainable Forestry significantly promote biodiversity in commercially managed forests. According to that Act, landowners may obtain environmental subsidy for significant expenses or economic losses incurred when their forests are managed according to other considerations than timber production; certain separate management projects may also be financed. Another type includes Environmental subsidies for agriculture. Agri-environmental Programmes (1995-1999 and 2000-2006) aim to reduce the harmful environmental effects of agriculture, and to promote biodiversity in farmland habitats. Special agri-environmental subsidies may be granted for establishing buffer zones, creating and managing wetlands, organic farming, managing traditional agricultural biotopes and raising landrace livestock breeds, for instance.

Atlantic region
N. Ireland: Recreational activities non-damaging to the environment are generally allowed to protected areas.
Scotland: Specific legislation for agriculture, forestry, and the management of wild red deer, has been in force.
Ireland: Main goals related to the protection of Natural Heritage that are formulated in Irish National Planning System include the protection of agricultural land and the prevention of urban sprawl.
All farmers are eligible to apply to Agri-environmental scheme and to Rural Environmental Protection Scheme. Farmers in designated conservation areas, including Nature 2000, receive higher levels of payment than elsewhere in order to meet conservation requirements of these sites. Participation rates are of the order of 30% generally and higher in many designated areas.
Recreational activities are allowed to protected areas, with permits that have to be obtained thought.

Continental region
Romania: ecological agriculture is permitted in natural protected areas, as well as tourism and recreational activities.
Hungary: Urban growth, intensive farming and mass tourism represent the main pressures in Hungarian Natural Heritage. Aid to farmers for reaforastastion with the objective to increase the area of forests to 25% of the national territory, from present 18,5%).
Poland: Generally, forestry and agriculture is permitted within protected areas, depending of course on the protection status.
France: Depending upon the status, extensive farming, wood production, recreation, controlled hunting and fishing are permitted in protected areas. Agri-environmental scheme is also present.

Alpine region
Switzerland: In the Federal Law on Agriculture of 29 April 1998, in the Ordinance on Direct Payments to Agriculture of 7 December 1998 and in the DEA Ordinance of 22.September 1997 on Organic Farming, incentives for nature protection in the agriculture are specified.
Direct payments for farmers are given:

- for ecological compensation areas, areas of meadows or fruit trees where no pesticide or fertiliser is used.
- for the cultivation of areas in the mountains under difficult conditions
- for organic farming (e.g. for restricted use of fertiliser and pesticide)
- for the promotion of the quality and interconnection of ecological compensation areas

Slovenia: agricultural melioration in the areas of biological or landscape importance.
Farmers in the protected areas may get subsidies under the national agricultural environmentally oriented programme. The programme is divided in several groups; each of them has several measures. E.g. Conservation of natural characteristics, of bio-diversity, soil fertility and of traditional cultural landscape (grazing in the Alpine pastures; handy mowing of the steep meadows; handy mowing of the boss meadows in the moraine plateaus; conservation of the meadows with old fruit trees)
Conservation of the protected areas (appropriate agricultural use and practices in areas of wild animal habitats - i.e bears)

Mediterranean region
Greece: Mass tourism along with the change of agricultural practices and coastal degradation by various reasons, represents major threats to national natural heritage.
The main principles of policies regarding Sustainable Urban Planning include: Control and reduction of urban sprawl
Urban renewal
Protection and preservation of the natural environment
Protection and promotion of the cultural environment
As far as the policies on tourism are regarded, the main principles of Sustainable Tourism include:

- The linkage of tourism with natural and cultural environment as well as with rural development, e.g. ecotourism, agro tourism
- Integration of natural and cultural heritage protection into tourism planning and decision making process
- The elongation of tourist period as well as the distribution of tourist product in a more equal basis, regarding time and space, in order to avoid time peaks and space saturation
- The diversification of tourist product

Regarding the agricultural sector, a major sector of Greece's economy, policy towards sustainable agriculture incorporates mainly the following environmental objectives:

- The protection of surface water and underground aquifers
- The protection of soil quality
- The protection of agricultural landscapes and ecosystems and to
- Combat nitrate pollution.

In the above mentioned concept, incentives and grants are being utilised, especially for reaforestation and fallowing.

Portugal: Use of "best practices" in human activities such as agriculture is being implemented. In generally all uses that do not damage the environment are permitted. Recreational activities are included.

Source: Questionnaire

5.8. 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: pg 136). 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: pg 137).

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

(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 such as coastal areas and wetlands balancing protection and development on the basis of territorial impact assessments and involving the 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 1.3.2 this means more specifically to answer the question 'to what extent 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 an ecological network. In the following section we consider how the main objectives of the ESDP fit with the effects of protection of natural heritage so far, 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;
- sustainable development.

5.8.1. 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 are discussed. It is concluded that they address dispersed 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 judge its effect on polycentric urban development. It is almost certain that Natura 2000 has not had yet any influence on the spatial distribution of urban areas. The actual polycentric distribution of urban areas does not seem to be influenced by any policy with regard to natural heritage. If after a period of several decades, Natura 2000 is implemented successfully; resulting in a large network of protected natural areas, then the network may be expected to add to the attractiveness of 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. So, Natura 2000 may be expected to have a supportive influence when developing a more polycentric urban system.

5.8.2. Natural heritage and balanced competitive development

The ESDP promotes balanced social and economic development in order to avoid more 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 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 via Switzerland with Milan.

Balanced development should promote economic developments and investments outside these parts of Europe. Structural 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 the near future the accession countries in Central Europe will also be eligible for substantial funding.

Policies for natural heritage as described in chapter 3 do not seem to have had any influence on balancing development. It is also likely that they did not have an opposite effect. On the other hand, if Natura 2000 policies eventually result in a Europe wide network of 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.

5.8.3. 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 historic cultural and emotional considerations are at stake. The value that is attributed to specific natural areas 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 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[7] 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)[1] 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)[1] 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)[8] (…) The diversity of soil types and their natural functions are, however, greatly threatened by human activity in many areas.

(313)[1] 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)[1] 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.

5.9. 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

[7] 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 paragraph number ESDP (Luxembourg, 1999), page 72

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.

5.10. Third report on economic and social cohesion

Territorial cohesion is a section in the Third report 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 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 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 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;
- 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).

The Cohesion report contains a map with the fragmentation of natural areas.

5.11. Other policies and instruments

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

The Common Agricultural Policy also provides structural funding, principally for the improvement of agricultural efficiency and the encouragement of entrepreneurial activity to transform agricultural produce as well as for the market penetration of goods coming from the agricultural sector. This policy has been reformed, serving 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, also making clear that the reinforcement of the agri-environmental policy, combined with a rural development programme, is the main strategy for integrating the environment into the CAP.

5.12. Conclusions and discussion

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. Policies addressing specific species may in fact treat symptoms of other problems, instead of addressing the origin of the problem. Fighting the source of the many ecological problems means safeguarding the space and quality needed for habitats. Natura 2000 in fact aims at enhancing habitats by creating a network of natural areas.

As discussed, many different systems of protection of areas exist, depending on priorities. Legislative and institutional systems are diverse and also the local management objectives of the 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 World Conservation Monitoring Centre (WCMC); the latest list was published in 1997 (see map 4.2 in chapter 4).

The official EU policy on enhancing the natural heritage, Natura 200 is potentially the adequate policy in response to threats to natural heritage. Spatial impacts of this promising policy can not yet be measured.

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

5.13. Indicators for analysis

Protection (Ramsar, Natura 2000 and IUCN)
The data sources have different objectives, which are to focus on an area either because of it's the scientific value in terms of fauna and flora or because of the management priorities stemming from its scientific value. The first situation applies more to the Ramsar and Natura 2000 sites, and the second more to the IUCN protected areas. As the three sources are complementary, they have been retained in an additive manner to delineate areas that have a protected status. For the macro level of analysis, a minimum surface area of 1000 ha has been retained, which corresponds to the normative minimum size for an IUCN Category II protected area.

Territorial Trends of the Management of the Natural Heritage

ESPON 1.3.2.

Third Interim Report

PART II

Analyses and explanations

April 2004

Territorial trends of the Management of the Natural Heritage

ESPON 1.3.2

Third Interim Report

April 2004

Utrecht

EuroNet EEIG in co-operation with
European Centre for Nature Conservation (ECNC)

This report has been produced by the projects core group consisting of:

EuroNet – Royal Haskoning (lead partner)
European Centre for Nature Conservation (ECNC)
EuroNet – Enviplan
EuroNet – Land Use Consultants
EuroNet – Territoires, Sites & Cités

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- Accademia Italiana di Scienze Forestale (Italy)
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PART II ANALYSES AND EXPLANATIONS

PART II: ANALYSES AND EXPLANATIONS

6. Data

6.1. Introduction

In this project a distinction between macro (global, European), meso (national, transnational) and micro levels (local and regional) is made. For the macro level, mainly the so called bio-geographical regions and the coastal zone (20km) are considered. For the meso level, data at the NUTS 0 and NUTS 3 levels is used. In case of the micro level, most data is available from the case studies and NUTS 3. In addition functional urban areas and objective 1 and 2 regions are considered for the classification.

Levels	Represented by
micro	Cases studies, NUTS 3, FUA's and objective 1 and 2
meso	NUTS 0 and NUTS 3, FUA's and objective 1 and 2
macro	Bio geographic regions and coastal zones

6.2. Bio geographic regions

As stated in chapter 2, it is important to consider the geomorphologic backbone, including the hydrological system, when implementing the ecological networks. In that context it is relevant to consider the bio geographical regions, when defining typologies as these regions are based both on climatic, botanic and typological factors (see map 6.1).

The geographic units defined are descriptive of relatively homogenous ecological conditions within each unit, and therefore allow meaningful comparison between units in terms of their differing ecological potential. Combined with land cover data and species distribution data, it offers a valid way to benchmark biodiversity conditions within an area, and to follow the progression of the improvement or deterioration of the natural heritage. With climate change, it is to be expected that the boundaries of the ecological regions would change over time, but this would be measurable; and the ecological conditions within the boundaries would remain constant. The ecological regions offer a rendering of the European biodiversity framework. This bio geographic regions dataset is based on the official delineations used in the Habitats Directive (92/43/EEC) and for the EMERALD Network set up under the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention).

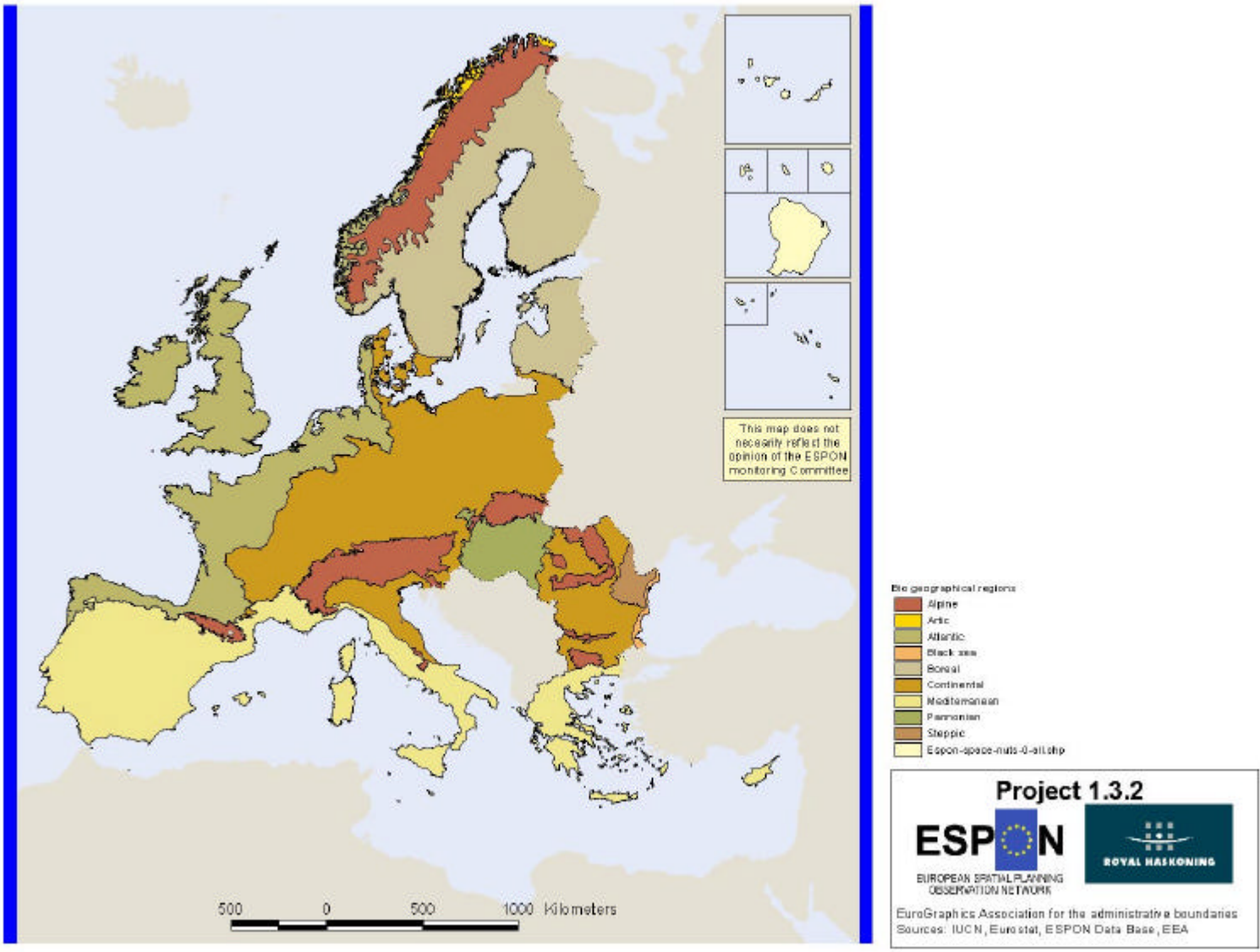

Figure 6.1 Bio geographical regions

The category: 'coastal corridor' is added to the bio geographical categories, which is represented by a zone of 20 kilometres along the coastline. Section 6.3. focuses on these coastal zones.

6.3. Coastal zones

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

locality the coastal zone must be determined according to the local or regional physical, biological and cultural criteria. These need not, and in fact rarely do, coincide. (R.W.G. Carter, 1991, Coastal Environments. From the SEAGIS Phase 1 report Interreg IIC North Sea Programme, page 5)1.

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.
Here a zone of 20 km has been applied arbitrary, only for analytical reasons. This does not mean that 20 km is the width of coastal zones according to the ICZM policy!

[1] In the UK, the most important laws for protection of the coastal land areas are the Planning Act and the Nature Protection Act. The Planning Act establishes a 3-kilometre inland coastal planning zone (outside urban zones) in which planning for new activities, etc is restricted. Planning for new recreational facilities, urban areas etc, requires a specific planning related or functional justification. Within existing urban areas the visual interference with coastal areas should be afforded attention. The Planning Act does not, however, require separate coastal zone planning – coastal protection considerations should be integrated into regional, municipal and local planning. Natura Protection Act

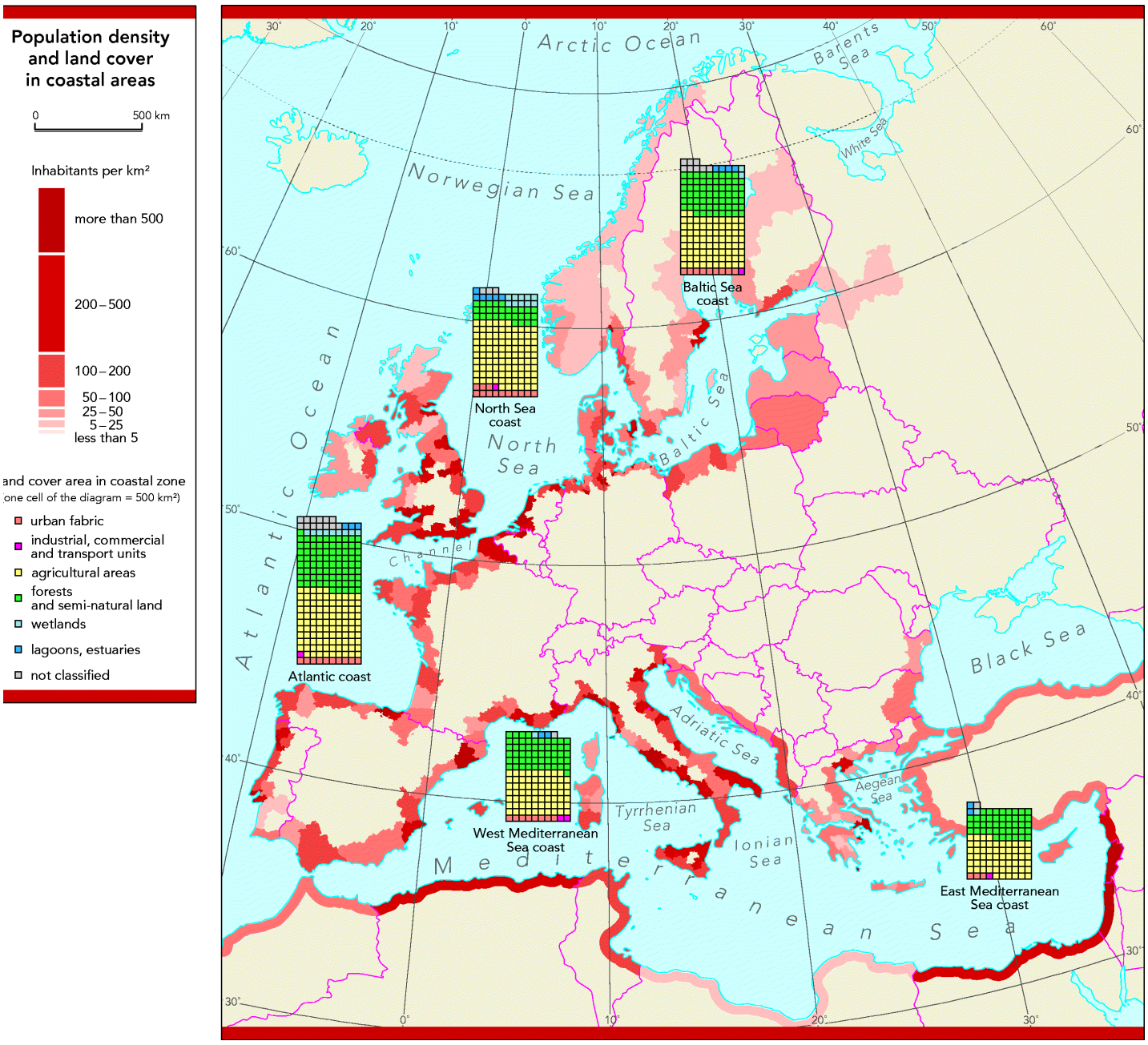

Figure 6.2 Population density and land cover in coastal areas (EEA)

6.4. Polycentricity: FUAs and MEGAs

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.

6.5. Objective 1 and 2 areas

Objective 1 of the Structural Funds, the main priority of the European Union's cohesion policy, works to "promote harmonious development" and aims particularly to "narrow the gap between the development levels of the various regions". This is why more than 2/3 of the appropriations of the Structural Funds (more than EUR 135 billion) are allocated to helping areas lagging behind in their development ("Objective 1") where the gross domestic product (GDP) is below 75% of the Community average.

All these regions have a number of economic signals/indicators "in the red" of low level of investment, a higher than average unemployment rate, lack of services for businesses and individuals and poor basic infrastructure.
Some fifty regions, home to 22% of the European population, are covered in the period 2000-06. The Structural Funds will support the takeoff of economic activities in these regions by providing them with the basic infrastructure they lack, whilst adapting and raising the level of trained human resources and encouraging investments in businesses.
Objective 2 of the Structural Funds aims to revitalise all areas facing structural difficulties, whether industrial, rural, urban or dependent on fisheries. Though situated in regions whose development level is close to the Community average, such areas are faced with different types of socio-economic difficulties that are often the source of high unemployment. These include the evolution of industrial or service sectors, a decline in traditional activities in rural areas, a crisis situation in urban areas and difficulties affecting fisheries activity.

6.6. Meso level: 29 Countries

This project focuses on 15 member states, 12 accession countries and Norway and Switzerland. The bio geographical regions contain the following countries:

Bio geographic region	Country
Boreal region:	Sweden, Norway, Finland, Estonia, Latvia, Lithuania
Atlantic region:	Ireland, UK, the Netherlands, Denmark, Germany, Belgium, France, Spain, Norway
Continental region:	Denmark, Germany, Luxembourg, France, Poland, Lithuania, Slovakia, Hungary, Austria, Republic of Czech, Romania, Bulgaria
Alpine region:	Spain, France, Switzerland, Austria, Romania, Bulgaria, Poland, Norway, Slovenia
Mediterranean region:	Portugal, Spain, France, Italy, Greece
Macaronesion region:	Azores, Madeira, Canaries Islands.

6.7. NUTS 3 level

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

The present NUTS nomenclature divides the 15 countries of the European Union, 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: NUTS 3, consisting of 1.324 regions, NUTS 2, consisting of 276 regions and NUTS 1, consisting of 91 regions. NUTS 0 are the countries.

7. Analyses: nature & agriculture

7.1. Introduction

This chapter focuses on the relationship between agriculture and natural heritage at the macro, meso and micro levels. The following questions will be answered:

- How did agricultural processes influence natural heritage, such as natural areas and biodiversity at the European, national and regional levels;
- And the other way around: How did natural heritage influence agricultural processes in Europe, the countries and regions?
- How can natural heritage be managed in order to use nature as an asset for agriculture?

The analyses presented in this chapter relies mainly on variables discussed in the chapters 3, 4 and 6.

7.2. Macro level

As described in chapter 3 agriculture is changing: intensification, extensification and abandonment are the processes that influence the agricultural sector all over Europe. The current section contains analyses on the influence of these agricultural processes on the natural heritage, the impact of natural heritage on agriculture and the management of agriculture in relation to natural heritage.

One would expect that intensification of agriculture has a negative impact on the natural heritage, especially on the biodiversity and number of species. On the other hand, extensification is expected to have a positive impact on nature, since there will be more surfaces available for flora and fauna and disturbance by agricultural production processes is limited. Abandonment will also have a positive impact on nature, although changes from one sort of species to another will probably appear.

Where nature borders on extensively used agricultural land, nature development could have potentials. Where nature adjoins intensively used agricultural land, agriculture is possibly posing a threat and nature could be under pressure. Where nature and extensively used agricultural land overlap, the agricultural land has natural value. Abandonment of these agricultural lands may be the next step. In the areas where nature overlaps with intensively used agricultural land, the nature is under pressure. This section focuses on the potentials and threats for nature in the various bio geographical regions.

The following GIS-overlays were made:

- Nature (CORINE land cover) x agriculture (intensification/extensification) for the bio geographical regions;
- Nature (IUCN) x agriculture (intensification/extensification) for the bio geographical regions;
- Nature (Bern convention) x agriculture (intensification/extensification use) for the bio geographical regions.

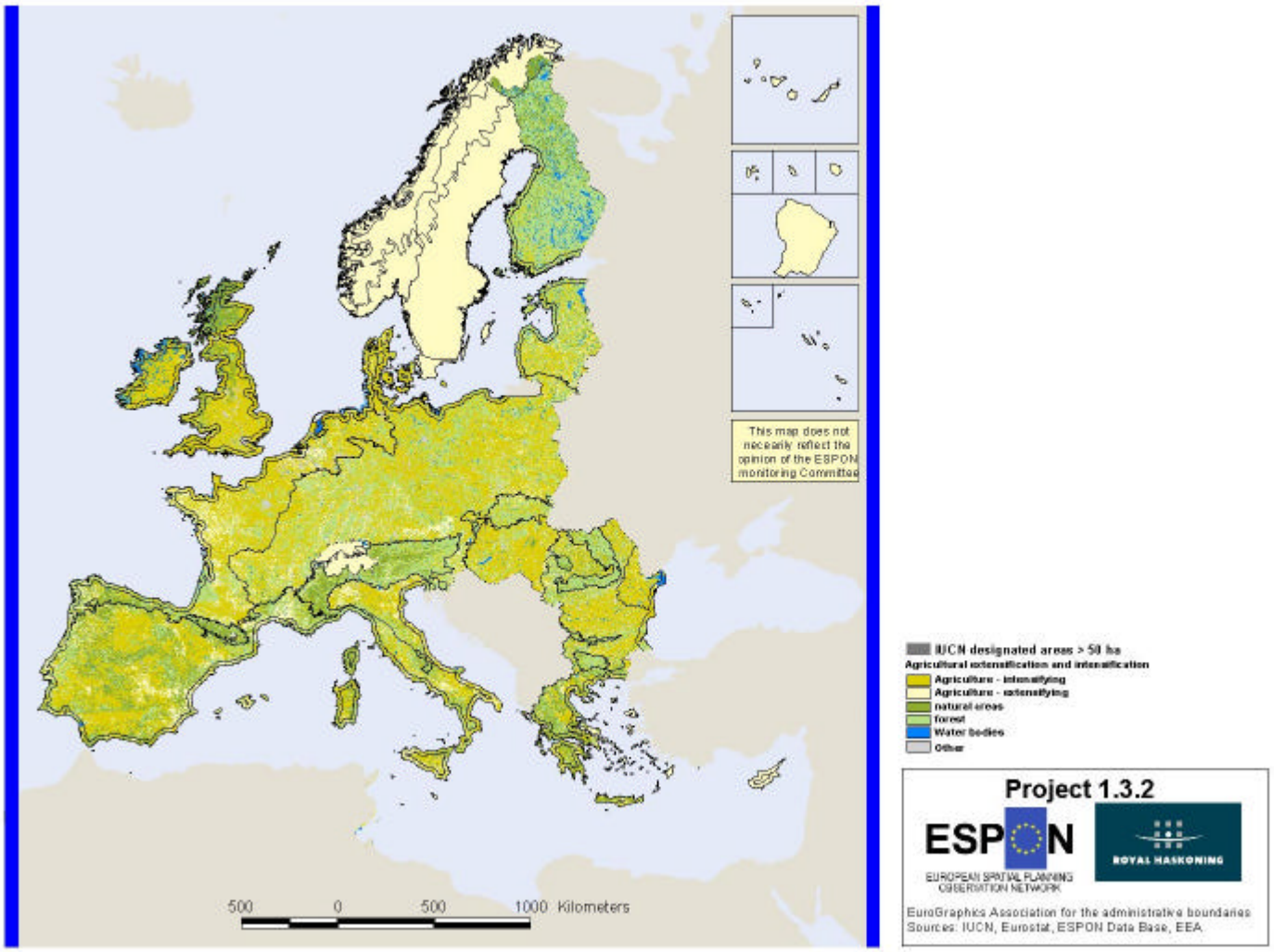

Figure 7.1 Agricultural intensification, extensification and bio geographical regions

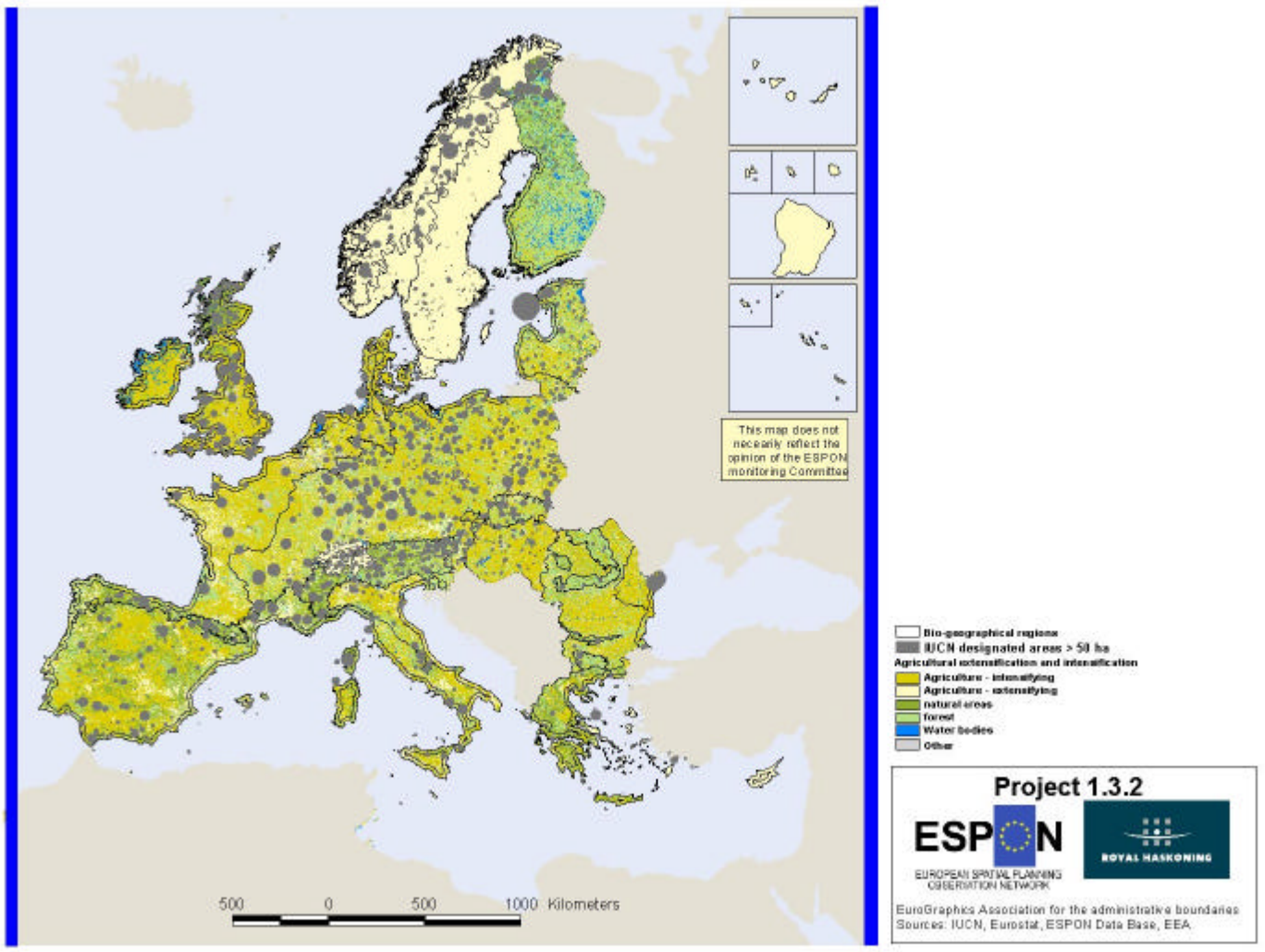

Figure 7.2 Agricultural intensification, extensification, IUCN protected sites, bio geographical regions and coastal zone

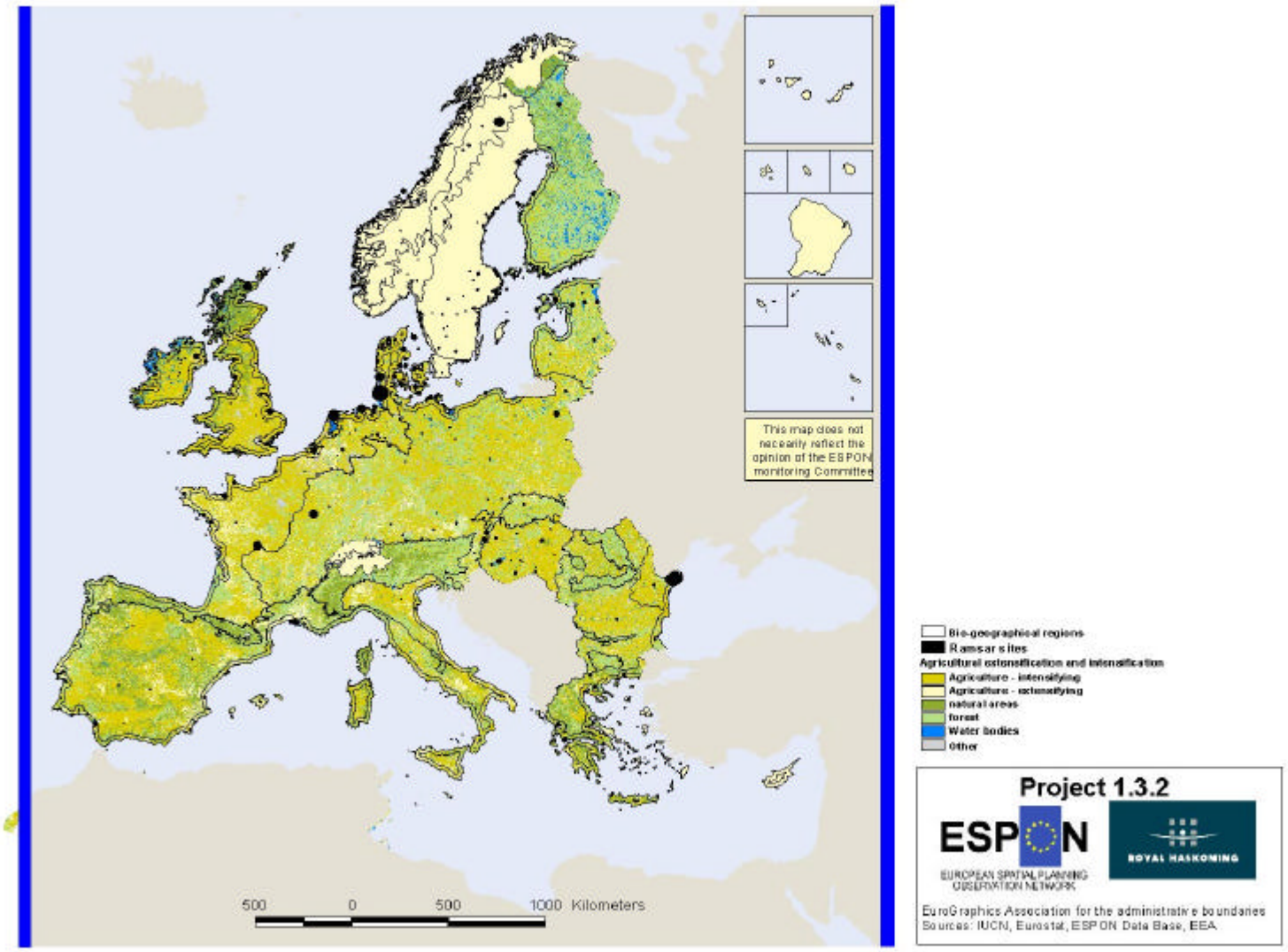

Figure 7.3 Agricultural intensification, extensification, Ramsar protected sites, bio geographical regions and coastal zone

Data on the Macaronesian region is missing.

	intensification of agriculture	extensification of agriculture	Nature areas	Forest	Wetlands
Boreal region	16,7	3,2	11,6	58,1	2,5
Atlantic region	56,1	10,1	11,7	13,4	2,2
Continental region	53,0	9,0	3,2	28,5	0,3
Alpine region	13,8	2,6	30,2	50,1	0,6
Pannonian region	68,1	5,2	2,3	16,5	0,6
Mediterranean region	38,8	13,2	26,4	19,2	0,2
Steppic region	69,1	7,1	6,8	6,3	3,2
Coastal region					

Source: CORINE land cover and Royal Haskoning

Table 7.1 Intensification and extensification of agriculture, natural areas, forest and wetlands in bio geographical regions in percentages

Figure 7.1 illustrates the differences between the bio-geographical regions for land-cover, including intensifying and extensifying of agriculture. Although the regions are large, with considerable regional differences, table 7.1 clearly illustrates that there exists a relation between the different regions and their land cover.
The alpine region shows a relatively high coverage of nature. Due to the topography, agriculture is very fragmented and small scale. In the Atlantic regions, including the 20 km coastal zone, agriculture is the most important cover and covers almost 70 %, of which especially the intensifying agriculture is dominating. In northern Spain, the land cover consists mainly of natural areas and forest.
The Boreal region, of which Finland is illustrated, shows a very high percentage of forest. This probably also counts for boreal Sweden.
The Continental region shows a fragmented land cover with a relatively high percentage of intensifying agriculture (>50%). Especially in the central part of the region, more extensifying land cover can be found. For the Mediterranean region natural area is found abundantly (>25%) Nevertheless the three countries that are part of this region; Greece, Spain and Italy, show large differences in land cover. Percentage natural area land-cover of are 42%, 25% and 16% respectively. This clearly illustrates the heterogeneity of land-cover within a bio geographical region.
The Pannonian region, mainly consisting of Hungary and part of Slovakia, shows a remarkable high percentage cover of intensifying agriculture. This is similar to the land-cover of the Steppic region.

	Intensifying agriculture	Extensifying agriculture
Boreal region	87	13
Atlantic region	83	17
Continental region	80	20
Alpine region	90	10
Pannonian region	99	1
Mediterranean region	80	20
Steppic region	67	33

Source: based on Corine land cover

Table 7.2 IUCN designated area in intensifying or extensifying agricultural area in bio geographic areas in percentages

Table 7.2 shows that the IUCN designated areas are concentrated in the agricultural areas that are in use as non-irrigated arable land, vineyards, fruit trees and berry plantations, crops or complex cultivation patterns, areas which will possibly become more intensified. Intensive agriculture use could be a driving force for nature protection.

Figure 7.2 and figure 7.3 illustrate the IUCN and Ramsar designation for the bio-geographical regions, based on which clear differences can be observed. As can be expected the coastal regions includes most Ramsar sites.

7.2.1. Boreal region

Parts of Scandinavia and the Baltic states belong to the Boreal region. The data for Sweden is still to be completed. In the Northern part of the Boreal region agriculture is not a threat for nature.
Intensive forestry is likely to be a threat for nature. In the Southern part of the region agriculture is in the process of both extensification and intensification. There are potentials for expansion of the size of the natural area and the development of ecological networks in the extensification areas. Expansion and development of nature decrease the fragmentation of natural areas.

	%	Number	Total size in ha
Agriculture - intensifying	13	76	240133
Agriculture - extensifying	2	18	36732
Built up	0	3	328
Natural area	16	76	311521
Forest	69	260	1330953

Source: based on Corine land cover

Table 7.3 Boreal region: IUCN designated area per land cover type

Table 7.3 shows that 69% of the IUCN designated areas lay in forest. Only three of the IUCN sites are located in built up areas. There are 260 IUCN sites in the forests. In agricultural areas that probably will intensify in the future and in natural areas 76 sites are located. In the agricultural areas protected for the pressure of intensification could have been a motive for designation. The average size of the IUCN sites in the agricultural area is smaller than the average in the natural areas.

The protected (IUCN) areas are located particularly in the northern part of the Boreal region and in the Baltic Sea. 9% of the Ramsar sites are located in the Boreal region.

7.2.2. Atlantic region

In the western part of the Atlantic region, the British islands, processes of intensification of the agriculture are expected. Agriculture is also a potential threat to nature here. Some countries have designated protected areas (see meso level where the facts for all 29 countries are described), while others have not. In the eastern part of the Atlantic region, extensification of the agricultural land is continuing. In these areas there may be potentials for the expansion of nature.

	%	Number	Total size in ha
Agriculture - intensifying	39	511	2096270
Agriculture - extensifying	8	59	429602
Built up	3	70	150843
Natural area	31	56	1709032
Forest	19	142	1049484

Source: based on Corine land cover

Table 7.4 Atlantic region: IUCN designated area per land cover type

Most of the IUCN sites lay in the agricultural areas which may intensify in the coming period, 39%. Almost one third of those sites lay in natural areas. Looking at the numbers of sites, it becomes clear that in the areas under pressure, agriculture-intensifying, built up the protected sites are small. The small sites that still exist require protection.

4.521 IUCN sites are situated in the Atlantic region. The average size of these sites is small: 1.445 ha. 17% of the Ramsar sites are located in this region.

Reintroduction of grazing

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. 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.

7.2.3. Continental region

In the western part of the Continental region processes of intensification of agriculture occurred. Agriculture is a potential threat to nature. 7318 IUCN protected areas, with a total size of 17.517 thousand ha, are located in the continental region, which is more than in any other bio geographic region. In the area north of the Alps, the agricultural activities and land use are becoming more intensified. Here there are potentials for the expansion of natural area. Extensification of agriculture also takes place in the northern and eastern part of the Continental region. Also here may be opportunities for further development of nature.

	%	Number	Total size in ha
Agriculture - intensifying	35	2152	4752329
Agriculture - extensifying	9	284	1179068
Built up	1	265	140192
Natural area	2	100	293149
Forest	53	1826	7038353

Source: based on Corine land cover

Table 7.5 Continental region: IUCN designated area per land cover type

The percentage of IUCN sites in forest is more than 50%, as shown in table 7.5. Roughly one third of the sites lay in the agriculture land cover category which has potentials for intensification. The number of sites is high and the average size of the sites is small.

7.2.4. Alpine region

The Alpine region is quite different compared to the other regions: only 17% of the land use is for agriculture. Nature is dominant with 81% of the total land use. There are 2.803 IUCN areas, with a small average size and a large total size of 13.201 thousand ha. Although the Alpine region contains many mountainous areas all over Europe, this dominance of nature is in the Alps, Pyrenees, Carpathians, Dinaric Alps, Balkans and Rhodopes. Unfortunately, the CORINE data for Norway and Sweden are not available. Additional data will be considered for the final report.

	%	Number	Total size in ha
Agriculture - intensifying	6	96	395335
Agriculture - extensifying	1	28	43593
Built up	1	20	49168
Natural area	54	218	3476447
Forest	39	373	2526030

Source: based on Corine land cover

Table 7.6 Alpine region: IUCN designated area per land cover type

Far most of all IUCN sites lay in the natural areas or in forest in the Alpine region.

7.2.5. Pannonian region

Extensification of agricultural land uses is a major influence on the expansion of the existing natural areas in the Hungarian pusztas. 274 areas, 697 thousand ha, which are protected by IUCN.

	%	Number	Total size in ha
Agriculture - intensifying	22	138	156117
Agriculture - extensifying	0	23	2042
Built up	2	24	12302
Natural area	15	8	107516
Forest	61	71	431554

Source: based on Corine land cover

Table 7.7 Pannonian region: IUCN designated area per land cover type

Table 7.7 shows that in the Pannonian region 61% of the IUCN designated area lay in forests, which is more than 430 thousand hectares. Also in the agricultural area, with intensive use, 22% of the surface of the sites is located. These sites have a small average size.

7.2.6. Mediterranean region

In the Mediterranean region, there is a mixture of extensification and intensification of the agriculture. Intensification is more likely to take place in the plains and extensification of the agriculture takes place in the mountains. IUCN protection is not commonly used. There are 762 sites designated with a total size of 6.544 thousand ha. Opportunities and threats both appear in the Mediterranean region.

	%	Number	Total size in ha
Agriculture - intensifying	25	68	1132220
Agriculture - extensifying	6	27	276600
Built up	0	2	871
Natural area	28	62	1223717
Forest	41	99	1813314

Source: based on Corine land cover

Table 7.8 Mediterranean region: IUCN designated area per land cover type

In the Mediterranean region the IUCN sites are spread over forests, intensive agricultural areas and natural areas. Only 2 sites are located in built up area.

7.2.7. Coastal Zone

Protection through Ramsar is an important instrument in the coastal region to protect remaining nature. 43% of the in total 459 Ramsar sites are located in the Coastal Zone, which is 36% of the total size of Ramsar sites. These high percentages are of course due to the fact that the Ramsar sites designated wetland with the presence of a significant quantity of aquatic birdlife. Another 17% are located in the steppic region (the west coast of the Black Sea). The most serious threat in this region is imposed by increased population and increased built up areas.

	%	Number	Total size in ha
Agriculture - intensifying	34	512	1379694
Agriculture - extensifying	12	129	479137
Built up	2	64	71583
Natural area	34	169	293149
Forest	20	205	7038353

Source: based on Corine land cover

Table 7.9 Coastal region: IUCN designated per land cover type

In the Coastal region the pattern of concentration of a large number of small sites in intensively used agricultural land is shown (see table 7.9). Also in the natural areas and in forests many IUCN sited are located.

7.3. Meso level

7.3.1. Introduction

The meso level focuses on the national scale. The following overlays have been made in order to illustrate the threat or potential due to changing agricultural activity:

- Countries: nature (land use) x agriculture (intensification/extensification based on CORINE land cover)
- Countries: nature (IUCN) x agriculture (intensification/extensification based on CORINE land cover)
- Countries: nature (Ramsar convention) x agriculture (intensification/ extensification based on land use)

In those areas where nature is bordering extensifying agricultural areas most opportunities for nature can develop, while in areas where the natural areas are located adjacent to intensifying agricultural areas, nature will possibly be under threat. In case of protected nature areas, the threat posed by agriculture will be limited. Although the data on IUCN protected only shows the centre of the area and the total surface area and not the spatial extent, from the overlays it is clear that in many areas, protected nature is located close to intensifying agricultural areas.

7.4. Micro level

To illustrate the relation between agriculture and natural heritage at the micro levels, the case studies are very relevant. For the location of three case studies used see figure 7.4. Figures 7.5 and 7.6 give an overview of the land cover for the Borsodi and the Pas de Calais case study. For Lanzarote no land cover data is available.

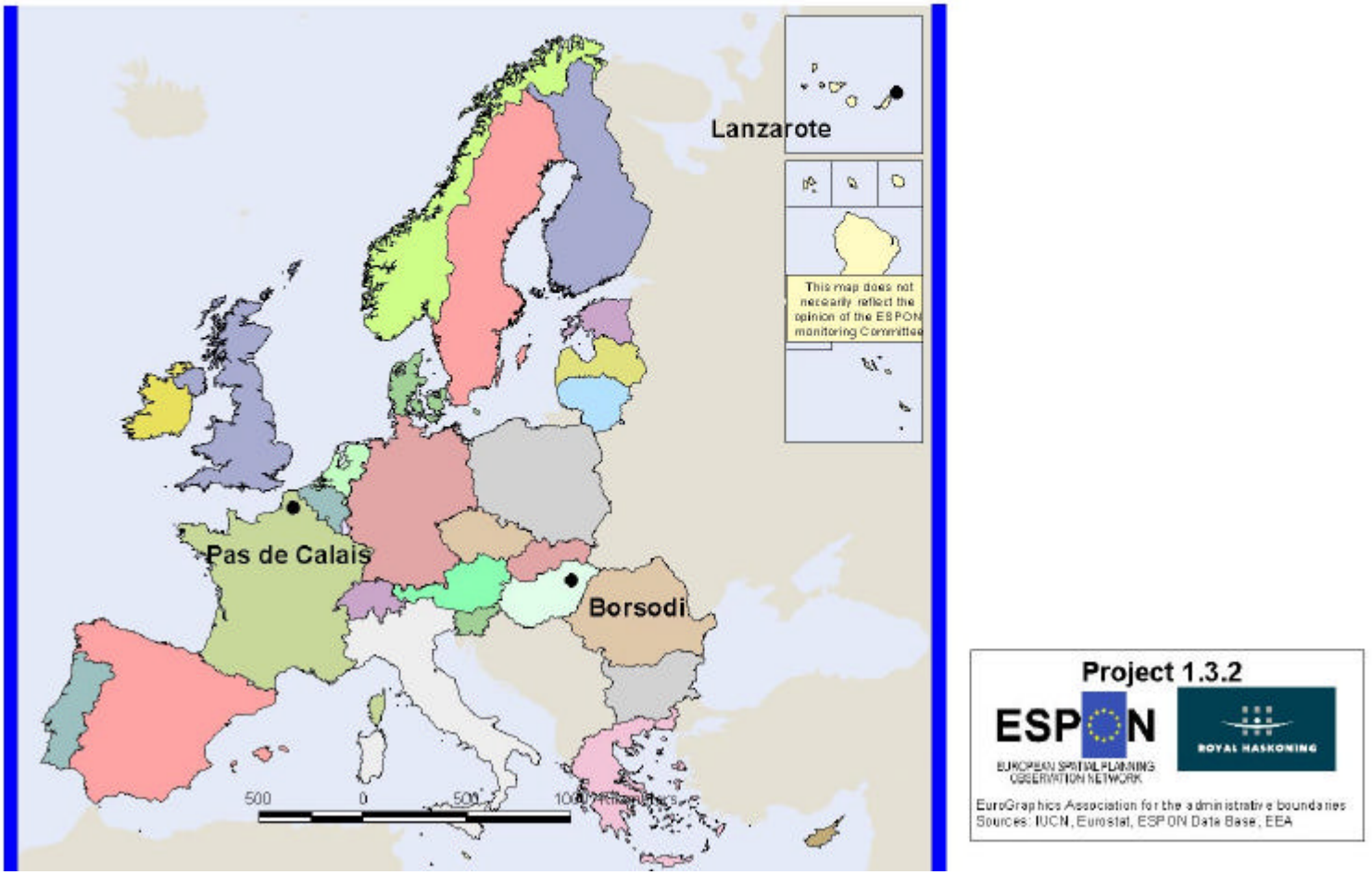

Figure 7.4 Location of case studies

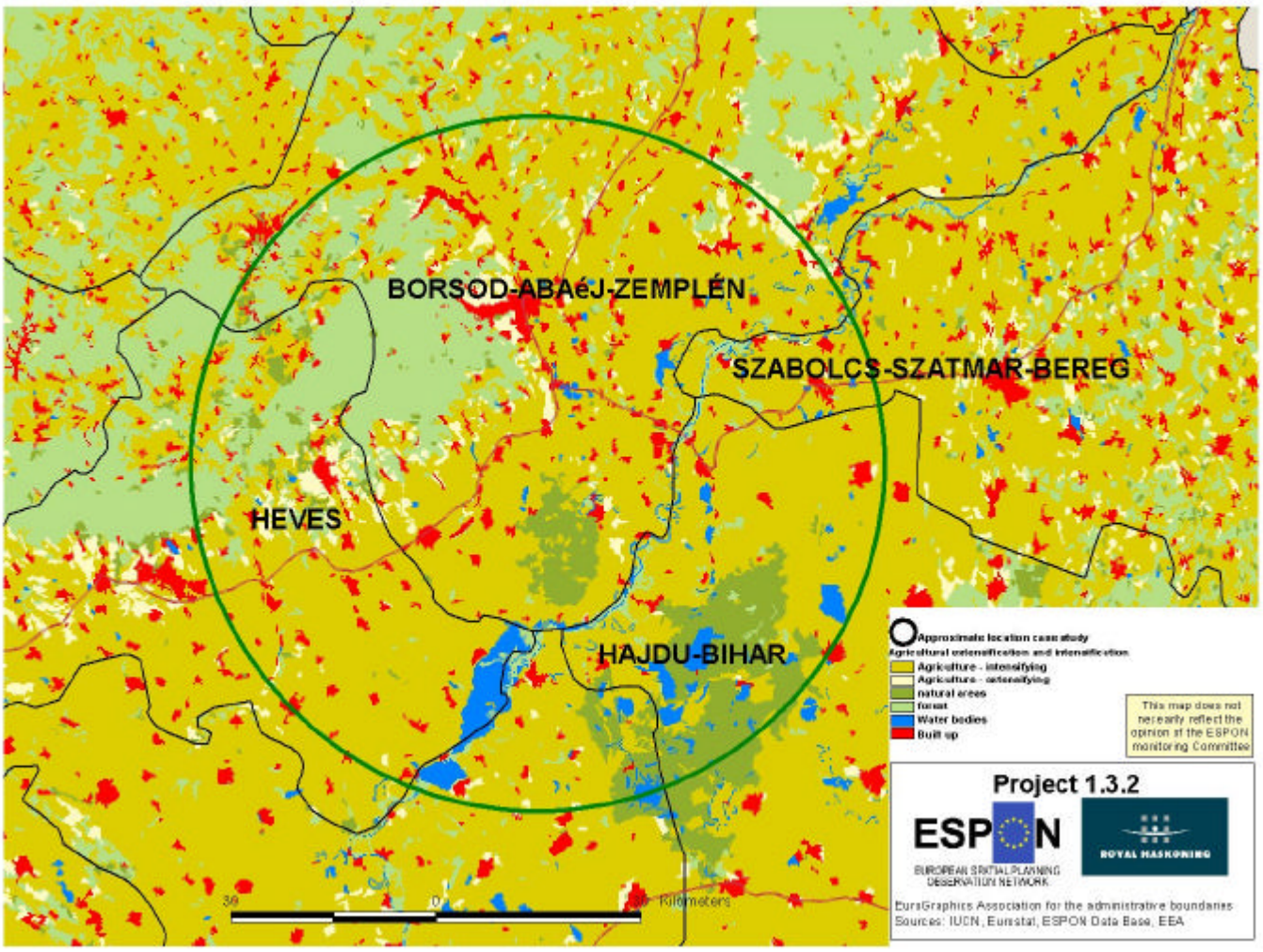

Figure 7.5 Overview of Borsodi case study area

Agri-environment in a changing political context

The Landscape Protection Area Borsodi Mezoség in North East Hungary is a diverse grassland habitat-complex scattered with wet habitats, arable lands, which were created and shaped by traditional grazing in recent centuries. In the area the characteristic steppe (puszta) habitats, flora and fauna was prevailing with high biodiversity.

Recently, after the change of political regime in the early 90's a highly detrimental economic situation has emerged, with most of the local enterprises collapsing. This has resulted in land abandonment, under use of the area, cessation of traditional land uses, but also certain intensive production expansion and overuse (e.g. corn and sunflower production) occurred. Both trends had negative impacts on the status of natural values. In recent years there has been an ever increased demand both from agricultural and nature conservation 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

have created and maintained this valuable habitat system. The agri-environmental incentive schemes offer a suitable solution to overcome the problem.

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 Mezoség, ESA farmers can participate in:

- Arable farming for great bustard (Otis Tarda) protection
- Alfalfa production for great bustard (Otis Tarda) protection

Grassland management for great bustard (Otis Tarda) protection

Lanzarote: traditionally oriented on agriculture and fishing

Lanzarote, like any other island, is 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 destabilisation.

Nature and agriculture both are under pressure from touristic growth. Programmes are set up for 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.

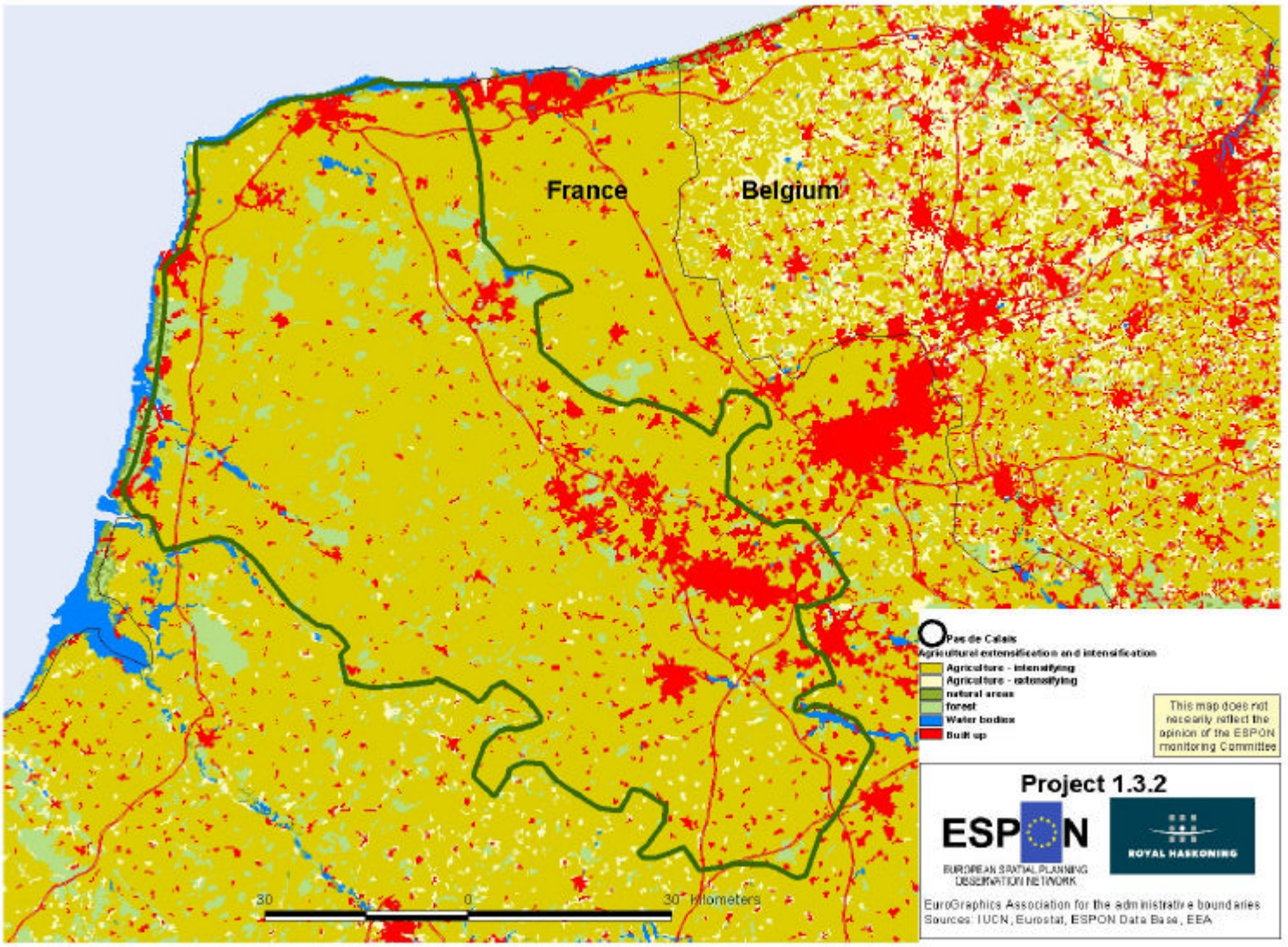

Figure 7.6 Overview of Pas de Calais study area

Threats for flora and fauna; opportunities for forestry in Pas de Calais

Positive changes with 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 breeds
- 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 intended to help meet 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.
Agriculture is expected to experience changes. Several factors will influence upon the evolution of agriculture:

- it is more and more difficult for young farmers to earn their living, as the market is globalizing and as agriculture has become a highly capitalistic activity with small economic margins;
- the renewal of Common Agricultural Policy will have a major impact by diminishing agricultural revenues (today 70% of the agricultural revenue comes from public sources). Many environmentally-friendly farming systems and other valuable ecosystems are directly or indirectly dependant upon public resources;
- the political weight of the farming actors is less important (end of the French “cogestion” model, binding France state and dominant farming syndicate, loss of legitimacy at national and local scale with a smaller demographical weight).

It is thus expected that a very difficult economic context for agriculture, possibly leading to a form of rationalisation; 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 expected to develop, as demand for biologic products is increasing.

8. Analyses: nature & urbanisation

8.1. Introduction

This chapter focuses on the relationship between urbanisation and natural heritage at the macro, meso and micro level. The following questions will be addressed:

- How did urbanisation influence natural heritage, such as natural areas and the biodiversity at the European, national and regional level?
- And the other way around: How did natural heritage influence urbanisation in Europe, the countries and regions?
- How can natural heritage be managed in order to use nature as an asset for settlement, economic activities, innovative activities, and so on?

The analyses presented in this chapter relies mainly on variables discussed in the chapters 3, 4 and 6.

8.2. Macro level

Nature as land use is not evenly distributed over the Ecological Regions (according to bio-geography) in Europe. The tables show that the percentage of natural area as the land use category (CORINE) is highest in the Scandinavian montane birch forest and grassland (97%), the Corsican montane broadleaf and mixed forests (96%) and Euxine-Colchic deciduous forest (95%). These areas all have peripherical location and have a built up percentage of zero. These areas do not belong to the largest natural areas in Europe, which are the Scandinavian and Russian taiga, Western European broadleaf forests, Iberian sclerophyllous and semi-deciduous forests, Alps conifer and mixed forests and Central European mixed forests.

The highest built up percentages are shown in the English Lowlands beech forests (7%), the Coastal corridor of 20 km (6%), Pindus Mountains mixed forests (6%), Southern Temperate Atlantic (5%). In the Ecological Regions with high levels of urbanisation the percentage nature is low.

The following overlays were considered for the analyses:

- Figure 8.1: bio geographical + coastal zones: nature (IUCN) x built up (land use);
- Figure 8.2: bio geographical + coastal zones: nature (Ramsar convention) x built up (land use).

The data for the FUA and Objectives 1 and 2 is not yet available for the analyses. For the final report these will included:

- MEGA's + FUA's x Nature (land use)
- MEGA's + FUA's x Nature (IUCN)
- MEGA's + FUA's x Nature (Ramsar convention)
- Objective 1 and 2 x Nature (land use)
- Objective 1 and 2 x Nature (IUCN)
- Objective 1 and 2 x Nature (Ramsar convention)

To map the pressure of built up areas on nature the trends will be based on CORINE 2000. Based on these analyses the following analyses will be carried out:

- bio geographical + coastal zones: nature (land use) x population change
- bio geographical + coastal zones: nature (IUCN) x population change
- bio geographical + coastal zones: nature (Ramsar convention) x population change

- bio geographical: nature (land use) x GDP (average per head)
- bio geographical: nature (IUCN) x competiveness
- bio geographical: nature (Ramsar convention) x creativity index (EU15)

- bio geographical: nature (land use) x infrastructure (TEN)
- bio geographical: nature (IUCN) x infrastructure (TEN)
- bio geographical: nature (Ramsar convention) x infrastructure (TEN)

8.2.1. Boreal region

	%
Agriculture - intensifying	-3.5
Agriculture - extensifying	-3.7
Built up	-6.0
Natural area	-2.8
Forest	-2.8

Source: based on Corine land cover

Table 8.3 Boreal region: population change in 1995-2000 per land cover type

In the Boreal region the population decreases. In the built up areas the decrease is strongest (see table 8.3). In the natural area and the forest the relative decrease is small.

8.2.2. Atlantic region

	%
Agriculture - intensifying	2.8
Agriculture - extensifying	3.0
Built up	2.0
Natural area	1.1
Forest	2.6

Source: based on Corine land cover

Table 8.4 Atlantic region: population change in 1995-2000 per land cover type

There is a growth of the population in all Corine land cover types of the Atlantic region, as shown in table 8.4. In the natural areas this growth is small. In the agricultural areas the growth is high (2,8 to 3 %).

8.2.3. Continental region

	%
Agriculture - intensifying	0.6
Agriculture - extensifying	1.3
Built up	0.3
Natural area	0.3
Forest	0.7

Source: based on Corine land cover

Table 8.5 Continental region: population change in 1995-2000 per land cover type

The population growth in the continental region is close to zero. In the expected extensively used agricultural areas the growth is 1.3 (see table 8.5).

8.2.4. Alpine region

	%
Agriculture - intensifying	0.9
Agriculture - extensifying	1.0
Built up	2.0
Natural area	1.0
Forest	0.6

Source: based on Corine land cover

Table 8.6 Alpine region: population change in 1995-2000 per land cover type

In the built up area of the Alpine region the population is 2%, as is shown in table 8.6. In the forest area the growth of the population is only 0.6%.

8.2.5. Pannonian region

	%
Agriculture - intensifying	-1.2
Agriculture - extensifying	-0.9
Built up	-1.4
Natural area	-2.0
Forest	-1.2

Source: based on Corine land cover

Table 8.7 Pannonian region: population change in 1995-2000 per land cover type

In the Pannonian region the population decreases, which varies from -0.9 to -2.0. In table 8.7 these data are shown. The decrease is strongest in the natural areas.

8.2.6. Mediterranean region

	%
Agriculture - intensifying	-1.2
Agriculture - extensifying	-0.9
Built up	-1.4
Natural area	-2.0
Forest	-1.2

Source: based on Corine land cover

Table 8.8 Mediterranean region: population change in 1995-2000 per land cover type

Also in the Mediterranean region the population was relatively negative in the period between 1995 and 2000 (see table 8.8). The strongest decrease was relatively in the natural areas. In the agricultural areas the decrease was 0.9 to 1.2.

8.2.7. Coastal Zone

	%
Agriculture - intensifying	1.9
Agriculture - extensifying	2.5
Built up	2.2
Natural area	0.7
Forest	-0.1

Source: based on Corine land cover

Table 8.9 Coastal region: population change in 1995-2000 per land cover type

In most land cover types in the Coastal region there was a relatively small population growth (see table 8.9). An exception is the population decrease in the forest of -0.1.

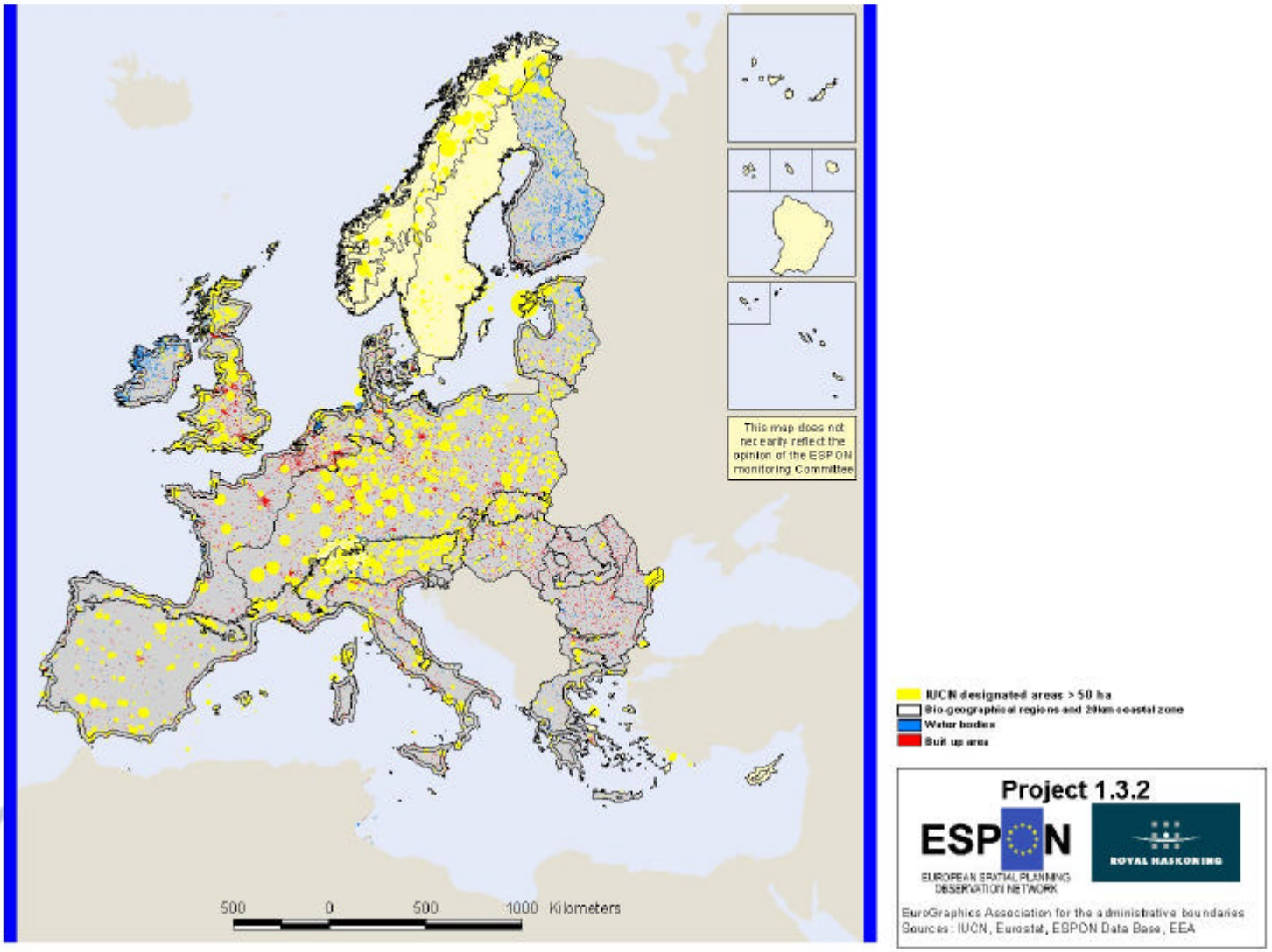

Figure 8.1 Built up area, IUCN protected sites, bio geographical regions and coastal zones

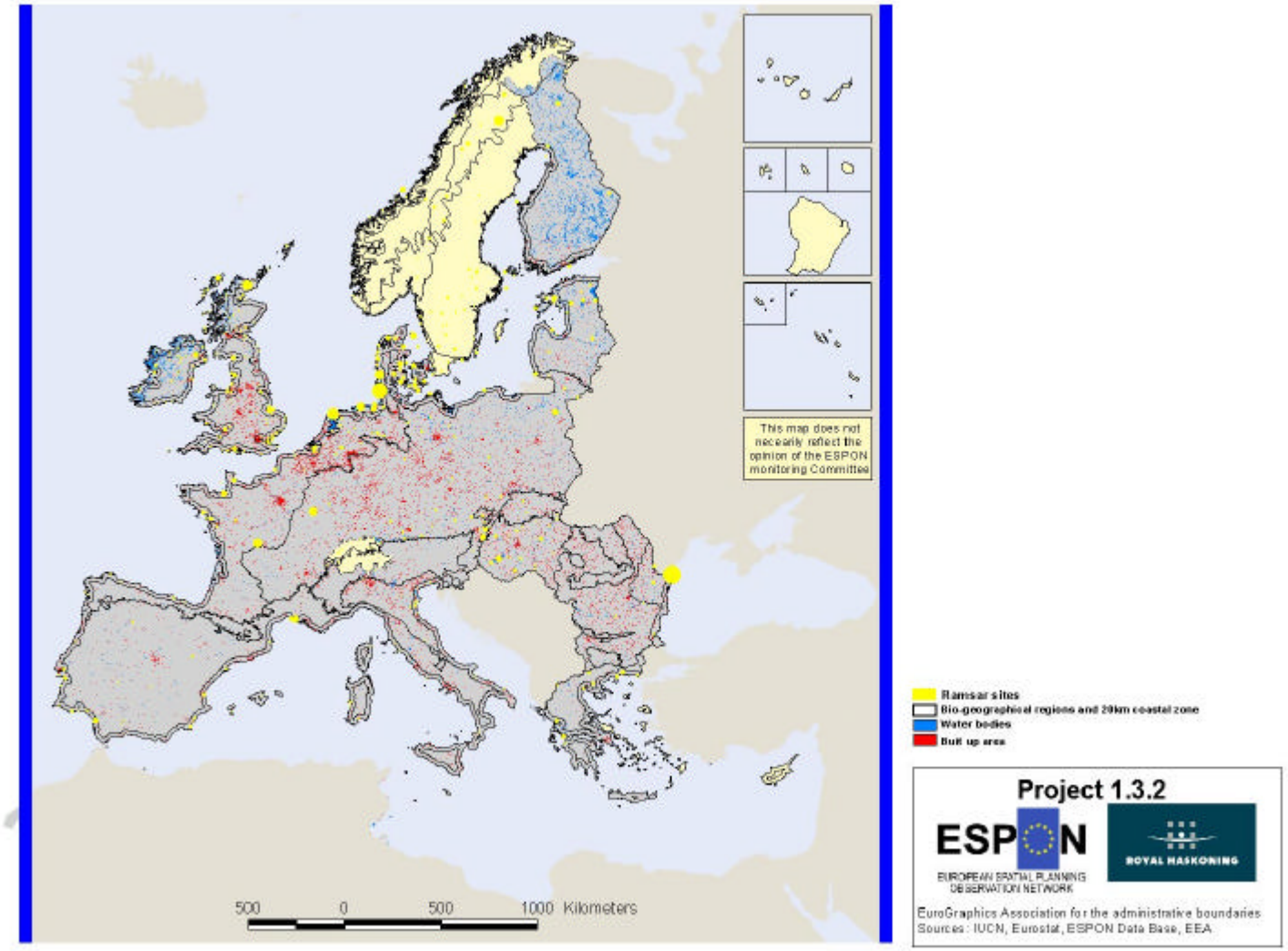

Figure 8.2 Built up area, Ramsar protected sites, bio geographical regions and coastal zones

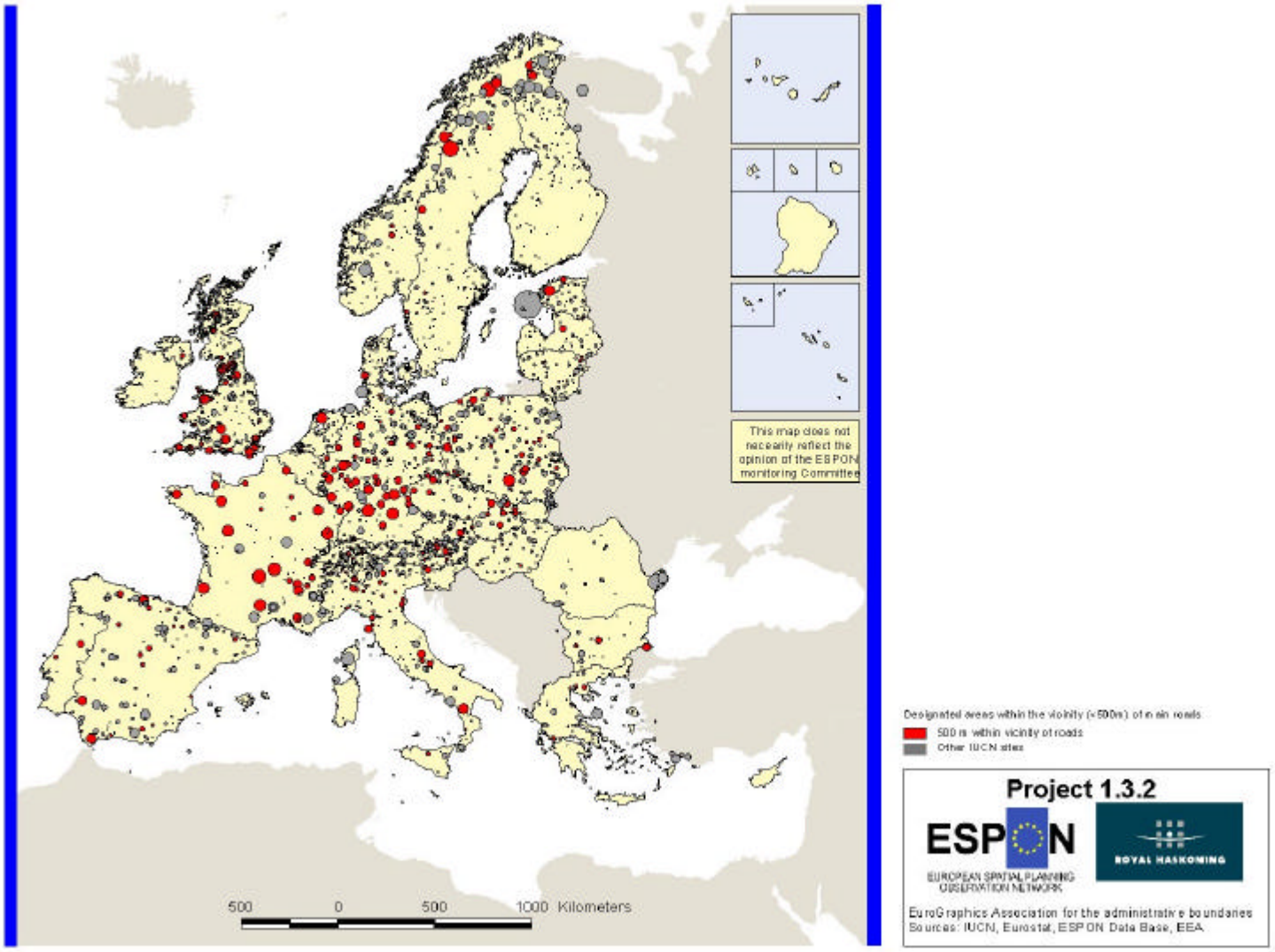

Figure 8.3 IUCN designated areas within 500 meter of main roads

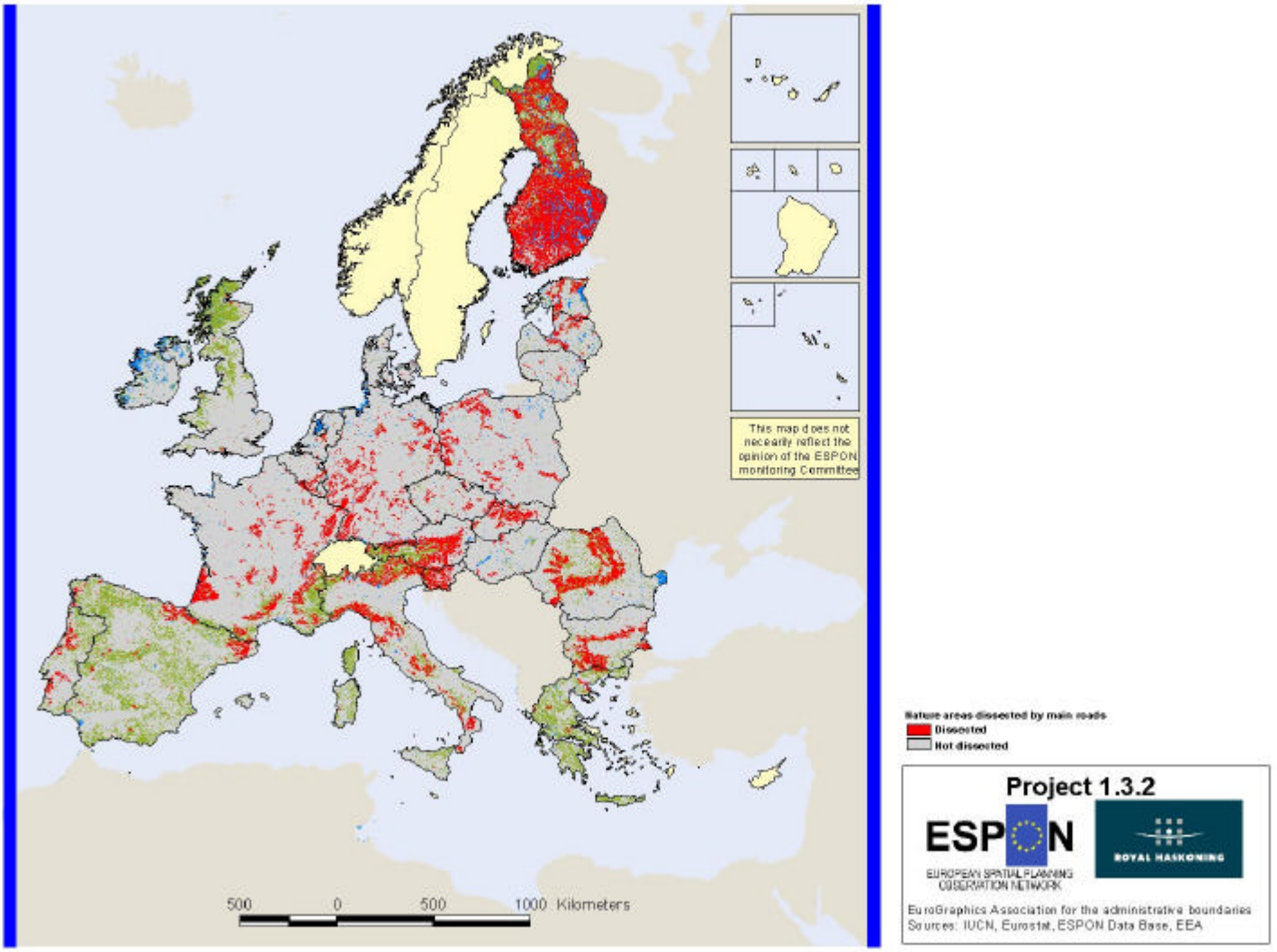

Figure 8.4 Natural areas dissected by main roads

8.3. Meso level

8.3.1. Introduction

- countries + coastal zones: nature (land use) x built up (land use)
- countries + coastal zones: nature (IUCN) x built up (land use)
- countries + coastal zones: nature (Ramsar convention) x built up (land use)

- countries + coastal zones: nature (land use) x population change
- countries + coastal zones: nature (IUCN) x population change
- countries + coastal zones: nature (Ramsar convention) x population change

Questions:
- in what countries nature is most pressured by increased population
- in what countries opportunities possibly arrise by decreasing population pressure

- Countries: nature (land use) x GDP (average per head)
- Countries: nature (IUCN) x competiveness
- Countries: nature (Ramsar convention) x creativity index (EU15)

- Countries: nature (land use) x infrastructure (TEN)
- Countries: nature (IUCN) x infrastructure (TEN)
- Countries : nature (Ramsar convention) x infrastructure (TEN)

The relative inaccessibility and the remote locations of these areas have protected these areas from development pressures.

8.4. Micro level

- NUTS 3: nature (land use) x built up (land use)
- NUTS 3: nature (IUCN) x built up (land use)
- NUTS 3: nature (Ramsar convention) x built up (land use)

- NUTS 3: nature (land use) x population change
- NUTS 3: nature (IUCN) x population change
- NUTS 3: nature (Ramsar convention) x population change

- NUTS 3: nature (land use) x GDP (average per head)
- NUTS 3: nature (IUCN) x competiveness
- NUTS 3: nature (Ramsar convention) x creativity index (EU15)

- NUTS 3: nature (land use) x infrastructure (TEN)
- NUTS 3: nature (IUCN) x infrastructure (TEN)
- NUTS 3 : nature (Ramsar convention) x infrastructure (TEN)

Urbanisation in Nord Pas de Calais
The current urban areas are polarized around 23 centers (criteria used in the SRADT: >1500 jobs and >1500 local workers, stable workers rate > 50%, presence of services higher than the regional average). They contain together 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.

Polarization areas are correlated to a gradient of housing development pressure, from town centre to peripheral areas. Even if the polarization area is under depressure, housing developments or large economic developments may occur: on the one hand because inhabitants tend to out-migrate from urban areas, on the other hand because of industrial re developments endeavors.

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 French regions as the population and economic growth is weaker.
- Third, the loss of industries continues while new economic activities are created outside urban areas.

Expected trends at the 2030 horizon
The national statistical institute has produced demographic projections that 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 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 economic developments today more extensive, to a continuing soil consumption (at French scale, there would be no open space left in 2160). The leisure use of the open spaces would also become more intense.

9. Analyses: nature & tourism

9.1. Introduction

This chapter focuses on the relationship between tourism and natural heritage at the macro, meso and micro level. The following questions will be addressed:

- How did tourism influence natural heritage, such as natural areas and the biodiversity at the European, national and regional level?
- And the other way around: How did natural heritage influence tourism processes in Europe, the countries and regions?
- How can natural heritage be managed in order to use nature as an asset for tourism?

The analyses presented in this chapter relies mainly on variables discussed in the chapters 3, 4 and 6.

9.2. Macro level

Here developments in the Mediterranean and Alpine regions, the coast will be highlighted.

9.3. Micro level

Nature and culture under pressure

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

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.

Steering tourism for natural heritage

Tourism is an important sector politically and is generally regarded as very important in the counties of Hedmark and Oppland in Norway 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 wild reindeer. Although tourists already use the national parks and protected landscapes it is a general policy to increase the commercial tourism in protected areas. This may be controversial concerning the natural heritage but is, by the means of good planning, expected to be managed.

Management of Natural Heritage

During recent decades the amount of space without solid physical impacts as roads and cabins has reduced. The area defined as wilderness, 5 km or more from such impacts, has reduced. That is also the case 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 onwards. Local interest for the wild reindeer has been a major force for achieving these results. 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 co-ordinated 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.

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.

The coherent system of spatial management mentioned seems to be quite good on the paper. Still, we do not know how it will function with regard to 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.

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.

10. Analyses: nature & environmental aspects and hazards

10.1. Introduction

This chapter focuses on the relationship between environmental aspects and hazard on the one hand and natural heritage on the other. Data at the macro, meso and micro level are analysed. The following question will be answered:

- How did the environment and hazards influence natural heritage, such as natural areas and biodiversity at the European, national and regional level?

The analyses presented in this chapter relies mainly on variables discussed in the chapters 3, 4 and 6.

11. Potentials and policies

In this chapter the territorial impact of the social economic trends in the past, as analysed in Chapter 3, on the current situation of the natural heritage will be described and extrapolated to the future. As soon as CORINE 2000 data is available, trends of the development of the natural heritage will also be analysed.

Also the reverse effect of the natural conditions on the development of the territorial land cover types as a consequence of the social economic trends are considered.

This chapter is based on correlation of the results of the analyses of the previous chapters with the bio geographical categorisation of macro scale bio geographic entities. The assumption is that it might be expected that impact on territories with similar topographic, climatic and botanical conditions will be more or less similar. National administrative boundaries are less relevant. The three categories of land use functions: agriculture, urbanisation and tourism are described in this chapter. For the sake of avoiding unnecessary repetitions, urbanisation is discussed including economic activities/industry, infrastructure and environmental impacts of these activities.

11.1. Agriculture and nature

11.1.1. Agriculture in the Boreal region

Predominantly the Boreal region north of the Baltic Sea is characterised by large pine forests used for timber production. One of the main threats here is caused by intensive forestry practices. Another threat is the consequences of the exploitation of hydro electric power requiring dams and areas for artificial lakes at the one hand and disrupted water flows at the other hand

11.1.2. Agriculture in the Atlantic region

Agriculture in the Atlantic region is concentrated in Ireland, England and the lowlands in France and the Low Countries, the north western part of Germany and west Poland. Middle mountains are located in the Cantabrian coast and Scotland, where natural areas are concentrated, like in the coastal area of France south of the Gironde estuary, where forestry is predominant.

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

The effects on nature and the natural values of agricultural pressure result in a decrease of natural area, which is already less than 30% in Belgium, Ireland, Denmark and the Netherlands. Coupled with this decrease of area, the remaining natural areas suffer from more fragmentation. The natural areas bordering of next to areas where the agriculture is intensifying agriculture may be under pressure. If these natural areas are not designated as protected natural area, nature may get lost.

The protection of natural heritage differs strongly between the countries that lay (partly) in the Atlantic region. The percentage of nature with a protected status is in Ireland limited to 7% of the total size of natural area. In Belgium and Spain respectively 12% and 17% of the natural area is protected. In France, the Netherlands, Germany, the UK and Denmark the proportion protected areas is much higher, respectively 37%, 49%, 63%, 75% and 95%. The higher the

pressure from both agriculture and urbanisation on the natural heritage, the more areas needed protection and achieved it. For Ireland, a country characterised with an intensification of agriculture, the need for protected is expected to grow.

Overall effectiveness of management of the Thames Basin Heaths

Strengths
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.
This effectiveness has tended to prevail on a site by site basis, rather than at the strategic planning level.

Weaknesses
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, 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.
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.

11.1.3. Agriculture in the Continental region

Apart from specific points in the east of France, Germany and Poland, the continental region consists on average of 20-50% of highly fragmented 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 Continental and Atlantic regions are both characterised as regions of which 50% to 60% of the land is expected to be in use as agricultural area that is in extensive use. Within the Continental region specific local topographical conditions are determining whether sub regions are intensifying or extensifying. The intensification of agriculture is strongest in Denmark, Hungary, Poland, Czech Republic and Germany (estimated respectively as 74%, 69%, 60%, 58% and 55% of the total area). Countries expected to have relatively large extensifying agricultural areas and forest, both land use types which could have natural value, are Slovenia (14% and 58%), Luxembourg (26% and 37%) and Austria (11% and 44%).

In the Continental region the total IUCN-protected areas is equal to that in the Atlantic region, but the average size of the areas is larger. There are many IUCN-protected areas in Switzerland, Germany and Poland. The average size is large in France.

11.1.4. Agriculture in the Alpine region

In the Alpine region nature and forest are the dominant land use type only 17% of the area is in agricultural use. Climatic conditions in the different parts of the Alpine region differ strongly. The Norwegian mountains are much used for grazing of domesticated animals. In the mountains of Southern Norway graze mostly sheep but 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 times.

Abandonment of agricultural areas in the Alpine region is one of the threats to nature, as biodiversity related to the 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.

A significant part of the natural area is either designated IUCN or RAMSAR. The average size of the protected areas is almost 500 ha. The image of a healthy environment contributes to the possibilities to develop new regional (food) products which relate to traditional cultures. These possibilities appeal to quality aware consumers prepared to pay higher prices.

11.1.5. Agriculture in the Pannonian region

Agriculture forms a main threat to the natural value of the Hungarian puszta system. Extensification of agricultural land uses tends to modify the hydrological conditions.

11.1.6. Agriculture in the Mediterranean region

In the Mediterranean region agricultural activities are characterised by two processes: intensification in the plains and extensification and even abandonment in the middle mountains.

Intensification in the plains of the coastal zones, together with strong urbanisation in the coastal zones results in strong development pressure and fragmentation of nature values. The effect of abandonment in the middle mountains combined with climate change tends to result in desertification in some areas.

11.1.7. Agriculture in the Macaronian region

The Azores, Madeira and Canaries Islands suffer from uncontrolled tree felling and forest fires. Capital intensive forms of agriculture with large green houses have a significant affect on the landscape.

11.2. Urbanisation and nature

11.2.1. Urbanisation in the Boreal Region

In the Boreal region the southern parts of Norway and Sweden and the Baltic countries, must be distinguished from Finland and the largest, northern parts of Sweden and Norway.

In the southern part of the area urbanisation is relatively stronger than in the rest of the Boreal region. In general, the depopulation of the rural areas leads to concentration in the cities in that part of the region.

In the large parts of the Boreal region with low density of population nature is not strongly affected by urbanisation. The large entities of European natural areas are located here.

The urbanisation and industrialisation that took place in the Atlantic region, south-west of Scandinavia, impacted on water quality in the Boreal region. Acidification is a real ecological problem in the Swedish lakes especially.

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 middle 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. Striking is also is that the two countries in the Boreal region that are more than 50% covered with natural areas Sweden and Finland, are qualified by Florida as highest in Europe's creativity index (14 countries only).

11.2.2. Urbanisation in the 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 line Paris-London 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 activities. Urbanisation south of the line Paris-London 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 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 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, Midlands, London, Northern France, Belgium and 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.

11.2.3. Urbanisation in the Continental region

The Continental region is an enormous zone stretching from south central France to the east border of EU 27(+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 corridors of transportation: highways and rivers.

The effects of urbanisation on the natural heritage result in a decrease of natural area 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 sub-urbanisation 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 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 EU 27(+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 inland waterway, was conditional for the development of this central zone in Europe's core; at the same time the combination forms a threat to 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.

11.2.4. Urbanisation in the Alpine region

The Alpine region consists of four disconnected regions: the Alps in France, Italy, Switzerland, Austria and Slovenia, the Pyrenees in Spain and France, the Carpathians in Romania, Slovakia and Poland and the Scandinavian mountain range in Norway and Sweden.

The overall land cover of urban areas in the 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 for residential and economic uses (apart from tourism) as far as development pressure is not too high. Here 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 good 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 Directive Framework Directive, integrated policies addressing these natural hazards caused by climate change, must be prepared. It is likely that limited effects on urbanisation of the valleys will result.

11.2.5. Urbanisation in the Pannonian region

The Pannonian region consists largely of the Hungarian lowlands. The Hungarian central landscape covers specific area characterised by puszta, lakes and old rivers.

11.2.6. Urbanisation in the Mediterranean region

This region consisting of Portugal, most of Spain (except the Cantabrian coast), the French Mediterranean coast, half of Italy south and west side, the Dalmatic coast and Greece, includes 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.

The urban pressure in this Mediterranean region is extremely strong along almost the whole coastline, where high densities are 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.

11.3. Tourism and Nature

11.3.1. Tourism in the Boreal region

In the Boreal region, tourism is strongly related to quiet undistributed nature. Trekking and hiking in remote areas together with skiing are attracting tourists to this region.

11.3.2. Tourism in the Atlantic region

The largest cities in Europe are among the most tourist attracting destinations. London, Paris, Amsterdam, Brussels, Dublin are all located in the Atlantic region. The attractiveness is based on the concentration of urban cultures in the cities, the rainy climate is a draw-back for visiting

foreigners. The large quantities of tourists produce intensive air traffic with its air polluting effects. Especially where relative small towns are important tourist destinations, the carrying capacity of the local environment is exceeded by the amount of visitors (Bruges and Ghent in Flanders). The coastlines of the Atlantic region attract large flows of tourists: the Jutland west coasts, the Dutch beaches, the Normandy and Brittany bays, the Acquitain beaches and the Cantabrian bays. This adds to the high concentration of urban activities in the coastline and contributes to the fragmentation especially north from the Gironde estuary.

11.3.3. Tourism in the continental region

Coastal areas that are generally attractive tourist destinations are scarce in the continental area. Only the north German, Polish and partly Lithuanian coasts are part of the continental region. Here tourism maybe be expected to further develop.

Other tourist attractions are related to the rivers, especially where they cross the middle mountains, and to the cities of which many are connected to the rivers. Here specific mixes of natural assets and cultural assets lead to attractive regions. Examples are the Rhine valley with Cologne and Koblenz, the Mosel valley with Trier, the Rhone with Lyon, the Danube with Vienna, Bratislava and Budapest, The Elbe with Prague. In most of these areas the seasonal pressure of tourism affects the natural values.

On the other hand the landscape, where cities are confronted with rivers, offering extreme visual contrasts of small urban spaces and large river views as well as the microclimatic coolness compared to hot city centres in the continental climate region, are assets of those cities and regions.

11.3.4. Tourism in the Alpine region

The Alps are among the worlds most visited tourist destinations. Facilities for winter sport are increasingly influencing the landscape. Tree felling for ski tracks is done in such quantities that erosion is enhanced.
Climate change influences the Alpine habitats and decreases the amount of fresh water that has been stored in the Alpine glaciers. The contrast between crowded valleys and silent forested slopes and hay meadow highlands and bare rocks as well as the healthy image are strong assets of the Alpine region in the south of Europe. In the Scandinavian part of the Alpine region, tourism is a threat to the natural environment as well. Here, the development of cabins on abandoned agricultural land in areas in the vicinity of cities is having a negative impact on the landscape. Despite this, the spectacular scenery in both Scandinavia and the southern parts of the Alpine region, together with the relatively clean environment offer attractive conditions for settling.

11.3.5. Tourism in the Pannonian region

In the Pannonian region tourism has been developed especially at the shores of the large lakes. Large quantities of tourists and associated tourism are an environmental burden. The natural qualities however, form an asset for further development and reconstruction.

11.3.6. Tourism in the Mediterranean region

The Mediterranean region is the world's largest tourist destination. In many cases, spectacular scenery where middle mountains are confronted with the sea offer, together with the Mediterranean climate and the cultural qualities concentrated in the cities, attractive assets.

The attractiveness of the coastal zone for tourists as well as for residential uses, results in heavy development pressure and ongoing urbanisation of the coasts in the Mediterranean region. This tends to destroy the natural assets that are a major determinant of attractiveness of the area leading to fragmented nature, polluted rivers and sea, traffic noise and air pollution.

Apart from inland areas, tranquillity and silence are becoming scarce qualities in the Mediterranean region. Especially the islands are offering these qualities that are increasingly scarce resources.

11.3.7. Tourism in the Macaronesian region

The Macaronesian Islands, offering favourable climatic conditions, beaches and spectacular confrontations to the ocean, are also attractive tourist destinations. The effects of mass tourism on relatively small islands are tending to exceed the carrying capacity of nature.

11.4. Conclusions

11.4.1. Introduction

In terms of this project, urbanisation, as the concentration of human activities in settlements of various densities includes residential, industrial, other economic and service activities as well as the related infrastructure.

Urbanisation is, as observed in the previous paragraphs, present in different spatial patterns, more or less concentrated, in linear or dispersed patterns. Although urbanisation represents the strongest modification of land use, impacting natural areas by soil sealing, the influence of agriculture on the natural heritage may not be under estimated.

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.

Apart from some artificial intensive forms, the main determinants on agricultural activities are natural conditions, climate soil types and precipitation. The strong interrelation of natural characteristics like soil type, climate and altitude, make it difficult to draw conclusions about regional imbalances and disparities with regard to agriculture.

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. The main reason for subvention than is to sustain natural heritage, cultural heritage and to maintain the attractiveness of the landscape for human activities.

11.4.2. 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 natural conditions in the Atlantic region are favourable for intensive forms of agriculture. Large production units for crops and dairy profit from generally good soil climatic conditions. Combined with the extremely good transport facilities in the Atlantic regions, this area is highly under pressure to intensify food production.

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.

The urbanisation in the Alpine regions is quite different. Especially 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. The urbanisation pressure is lesser than in the Atlantic region. The population growth is around zero. Budapest is the centre of crossings: important highways and the river Danube. Further economic development in the corridor along the Danube form Belgrado to Budapest may be expected. In the Pannonian region the agricultural land uses are concentrated that may intensify in the future.

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

In the Mediterranean region, urbanisation is influenced by the attractive climate, attractive landscape and the quality of existing cities. This area, being 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 large cities.

11.4.3. Potentials for nature

Forestry in the Boreal region is one of the most extensive agricultural activities, especially in Finland there almost no intensification of the agriculture. In the Baltic States, the expansion of nature is because of the intensifying agriculture not likely. In the Baltic States the urbanisation will probably stabilise of decrease because the population growth between 1995 and 2000 was below zero. The more south, the more fragmentation will occur. The natural area in the Boreal region north of the Baltic Sea is hardly disturbed. It suffers from industry induced acid rain. Biodiversity in these areas is not particularly high; the natural value in the Scandinavian Peninsula is more determined by the presence of rare species 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 Rumania are used for vine farming. Nature may expand in those Continental 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. 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.

11.4.4. Nature as an asset

History showed that inventions and innovations were not exclusively situated in large cities. Some of the great names of people that contributed to the development towards the actual civilisation are to be related to rural environments. Also the fact that specific innovations took place in large cities, must not be confused with the fact that the innovation generated growth to the actual size of those cities.

Since (sub) urbanisation takes such a fast pace and covers so much of the European territory, the availability of quiet places, hardly accessible and offering tranquillity becomes an asset. Next to that, for research and development in specific food industries, health therapies and cultural innovations may be well located in rural areas.

This has also been recognised by policy makers. Natural heritage is an essential part of the environmental assets of each country. The value of (bio)diversity has been largely recognized 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 forms of development must be found to assure synergy and co-existence of men activities and actions affecting the natural heritage.

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. 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 access to beautiful landscapes and sites during leisure time. This brings extra focus and 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.

The facts show the same tendency. Urbanisation and economic activities on the macro and the meso scales are connected to locations that are easily accessible. Spatial distribution of urbanisation shows linear patterns along lines of infrastructure: highways, railways and natural lines like rivers and coast lines. The TEN and TINA networks may be expected to induce further urbanisation at the European level as spatial development corridors. Whether in those corridors urbanisation occurs, is dependent from the development pressure. Whether urbanisation at the micro level materialises, is dependent on qualities on that scale. The location should be de facto accessible like the exits of highways and stations of railways. Further, if the accessible location is offering attractive environmental conditions in comparison with other (candidate) locations, than the location might be selected for settling. The attractiveness of conditions for settling is determined by cultural and/or natural qualities on the local and regional level and by the general image of a location.

Since economic activities are shifting from primary and secondary towards tertiair and quartiair categories, they become less dependent from soil or other natural resources. Service industry relates to urban concentrations of economic activities, many of the newer sectors became even looser from locally bound determinants.

The possibilities ICT offers for distant working make site selection for new economic activities more loosely-related to facilities. Sites just may be selected predominantly because of the qualities of an environment where it is good to stay. This is more or less similar to site selection for residential uses.
Where silence and tranquillity appear to be increasingly rare qualities, less accessible and more remote locations will gain attractiveness. If such locations offer a healthy environment with non disrupted natural values, nature will be an asset for specific high quality developments.

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. Holidays consisting of inactivity and enjoying the good life on southern beaches, or more actively boating, biking and climbing, visiting cultural assets of cities. 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. 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 like 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 might add to the attractiveness of the region.

The example of the Atlantic region shows the importance of the accessibility for the urbanisation: London developed as a city on the river, giving access to its global empire. Paris, although not strongly maritime related, developed also in a highly accessible location, Amsterdam acted also as a colonial centre, 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 basis of its natural assets, resulted in strong urbanisation. This concentration of people and activities lead 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 for new transport facilities like high speed trains and special cargo railway lines.

Urbanisation in the Continental region confirms that conclusion. The widespread urbanisation in the wide, rather well accessible region shows concentrations at better accessible locations

like river valleys and on cross roads of important highways. Highly accessible multi-modal transport corridors therefore are regarded as 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.

The Mediterranean region is the world's 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 may spread activities more inland, towards areas where agricultural abandonment occurs.

Some specific types of service economy may locate in 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 healthy environment may be connected some more with sporting and physical activities. But also research institutes related to food processing and conference centres of technological innovations may find the right location in the mountains, away from high-density development.

Territorial Trends of the Management of the Natural Heritage

ESPON 1.3.2.

Third Interim Report

PART III

Recommendations

and annexes

April 2004

Territorial trends of the Management of the Natural Heritage

ESPON 1.3.2

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PART III: RECOMMENDATIONS

12. Conclusions

12.1. Introduction

These conclusions refer again to the ESPON objectives and aims.

- To contribute to the European Spatial Development Perspective (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 concrete and applicable information on the EU-wide effects of spatially relevant development trends and their underlying determinates;

- 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, particular attention will be paid to areas exposed to extreme geographical positions and natural handicaps such as mountain areas, islands, ultra-peripheral regions.

12.2. Europe in past and future

In the foregoing parts the natural heritage has been described as inherited from previous times in terms of the interactions of physical geographical conditions and the actions of previous generations. That has been a long term gradual process of a silent, incremental character changing slowly the landscapes of Europe. Every generation again reclaimed wilderness for soils to be exploited for food production and for building and expanding its settlements. Manufacturing and industrial activities together with artificial fertilisation polluted waters and soils. Pavements for roads and building sealed the soil. Trees were felled and erosion increased.

In the last century, due to population growth and increased prosperity these processes took an increasingly high speed, affecting more and more of the natural heritage. Growing expertise focussed on more effective ways of production. Agriculture intensified, affecting the environment stronger again. General prosperity, especially after the Second World War, lead to increased use of space per person for dwellings as well as for mobility. Prosperity also lead to more leisure time, and touristic travelling, also affecting the quality of air and soil.

The resulting situation in Europe, with large cities, heavily polluted old industrial areas, polluted rivers, air and soils, large sub-urbanised regions, homogeneous agricultural production areas and land fragmented by concentrations of infrastructure and disrupted hydrological systems, lead to the conclusion that these processes of urbanisation, agricultural intensification and fragmentation could not continue.

The awareness of the finite character of our resources in the last decades enhanced the growing feeling that society should take care of the natural heritage consisting of remainders of what has been our natural capital. The notions of environmental quality and nature

conservation grew and came to be included in national and international policies, addressing environmental problems and nature conservation.

Environmental legislation focuses on a large variety of components of the polluted and endangered environment. Nature conservation focuses on the protection of species and later on, of habitats. Protected national landscapes became an international phenomenon. These defensive actions as such did not turn developments in the good direction, they addressed symptoms locally. The notion of sustainable development became supported more widely. Policies became more pro-active and integrative.

In Chapter 8 it has been established that (sub) urbanisation is strongly induced by accessibility that means that the location of infrastructure and its access points are of strategic importance for the location of development pressure towards new urbanisation. If intensification of agricultural activities may be expected to take place in specific locations, characterised by soil types and climatic conditions, then development pressure affecting the natural heritage is likely to occur in these locations. On the other hand, in areas where farming extensifies or even land is abandoned, changes in habitats and biodiversity will take place and opportunities to develop other natural values will exist.

The development of tourism is also related to specific locations. Especially the coasts of the Mediterranean with its attractive combination of good climate, beautiful scenery and a hinterland with strong cultural assets developed to an area of global touristic importance. Also the Alps region with its attractiveness for winter sports and summer holidays developed into a major touristic destination.

Next to these southern European accents, in the northern parts of Europe tourism also developed along the coasts and in the large cities London and Paris.
The development pressure on the areas caused by the enormous flows of tourists in the Mediterranean region and the Alps affect the natural values. Polluted sea and rivers, touristic and other dispersed urbanisation, partly destroying the attractiveness of the landscape and infrastructural facilities sealing the ground are consequences.

Local authorities together with investors attract and develop touristic activities, bringing jobs and prosperity. Also national governments develop policies aiming at touristic development.

Sustainable policies should address the mechanism steering the developments of urbanisation, agriculture, infrastructure and tourism in a less sectional and more integral and strategic way. The policies orienting on the conservation of habitats became more offensive by aiming at networks of natural areas and landscapes within the Emerald and Natura 2000 strategies.

The influence of management on the territorial trends of urbanisation, agriculture, infrastructure and tourism is quite diverse.

Urban development is, as far as is managed through official planning systems, a process dominated by local decisions of investors and local authorities. In many countries regional authorities control and approve local planning initiatives. In some countries national spatial planning policies are developed in a comprehensive way, in others the system is more minimalist through planning guidelines.
The local dominated process does not include much co-ordination towards an envisaged spatial structure on a higher scale. Territorial cohesion is in such cases a coincidence.

As far as areas with natural or emotional values are affected by planning interventions local societies protested and came into action. Spatial planning, taking a pro-active attitude tried to include ecological and cultural considerations into its plans and the protection and enhancement of those values was to become quite normal practice. Notwithstanding the

tendency towards an integrated approach, natural areas under development pressure of urbanisation fragmented. Areas containing specific habitats or geomorphologic features that were endangered by city expansion, sub urbanisation, economic zone developments or infrastructure were defended and protective measures were taken. The selection of locations to be designated as protected areas seems strongly related to the locations where urban development was envisaged. As a result relative small protected natural areas, showing together a fragmented pattern, occur in regions with development pressure as a result of urbanisation.

It is clear that future oriented policies taking into account the objective of territorial cohesion should aim at avoiding ongoing fragmentation, and focus on a spatially coherent pattern, especially where development pressure is high.

Agricultural development has always been a strong sectoral policy field of the European and the national levels. The management of that process was directed at securing guaranteed prices for food products, which influence market mechanism. Recently agricultural policies tend to be more rural development oriented, taking an integrative approach related to spatial planning. This new approach to rural development aims to include socio-economic, ecological as well as cultural aspects. Including ecological considerations in rural development plans in many cases, involves restoration of previous interventions.

Agricultural intensification, apart from extreme forms of intensification like glasshouse horticulture or pig farming and depending on the landscape type, including in many cases modifying the water management, increasing the size of land parcels, diminishing the cultural differences, destroying old patterns of creeks, tree lines, hedges and stonewalls. Restoring these features includes also the enhancement of habitats for specific species. In that way the specific historic biodiversity related to the forms of farming prior the intensification measures, returns. Support to farmers, maintaining landscape features is therefore related to landscapes with special values, where the alternative is abandonment or intensification. The selection of regions where those policies are (to be) applied, therefore is strongly related to the regional agricultural developments. Where, as a result of climate change and product prices, food production can not be viable, a future oriented policy should be formulated. These decisions are predominantly sectorally oriented since the interests of the actual farmers are at stake. A sustainable, more balanced policy should therefore take into account the long term interest of building a more coherent ecological network, according to Natura 2000 and other mechanisms for the conservation of the natural heritage.

Where agricultural production can, as a result of soil and climatic conditions take place in an economic profitable way, optimisation of the production by further intensification may be the best policy. This may include that conditions for specific species are worse. The selection of the location of/or in the region where that process continuous should take ecological considerations into account in all related spatial development procedures. It should be secured that such an area does not interrupt ecological corridors or hydrological systems.

Agricultural intensification, being an important factor for the fragmentation of natural areas should be managed in such a way that spatial coherence of natural areas is enhanced. This demand for an integrative spatial planning strategy on the regional level, taking ecological and environmental considerations on board from the starting on.

Touristic development is partly managed as a sectoral policy, partly as a subject of spatial development. This economic activity of increasing importance has strong impacts on large European areas like the Mediterranean and the Alps as well as individual cities. Since it affects whole regions in terms of large scale urbanisation, infrastructure, environments/pollution and natural areas, touristic development should be approached in an integrative way, aiming at balanced and sustainable spatial development. The relation to natural (as well as cultural) assets is very sensitive. Touristic destinations exist by the sake of

attractiveness, resulting partly from landscape beauty and cultural features and large scale touristic visits with its related facilities, modifying the original sites in such a way that they tend to be destroyed. Policies with regard to the natural heritage, aiming at enhancing the biodiversity, may be supportive for touristic attractiveness of regions. Possible resulting effects, like improved scenery and image of healthy environment, use nature as an asset and add to the quality of a region. Nature may establish a framework, embedding cultural and other touristic attractions. Co-ordinated development in an integrative planning approach is therefore required.

12.3. Development of natural heritage

The most obvious conclusion of the foregoing is that a large proportion of Europe's natural heritage is concentrated in the mountainous regions of Europe and that the existing natural values are most fragmented along coasts and rivers and in intensively used agricultural regions like in Ireland and Denmark. Although in certain mountainous areas, especially in the Alps, development pressure is felt to be very high, here the largest natural areas, protected and non protected are located. Obviously the restricted degree of accessibility of large parts of the mountainous areas results in limited development pressures in the massifs. The high development pressure is here due to the lack of space in the valleys.

The area of the former Iron Curtain has been inaccessible for 40 years. This was a no-go zone for 1000 km of length. The consequence of a long absence of development pressure is that in that zone a large concentration of relatively undisturbed areas is located. The accession of central European countries will reverse the location conditions of this zone substantially. Instead of being a peripheral inaccessible region, this will become a centrally located region, connecting countries that were previously isolated from each other.

The low development pressure in this zone resulted in a 50 year long period of relatively undisturbed natural developments, which now provides a large potential to add to Europe's network of natural heritage. This potential of a pan European size should be fostered and preventing from being fragmented. It provides possibilities for enhancing a pan European network, extending Natura 2000 to the east. At the same time it provides possibilities for other spatial developments. Especially non-polluting economic activities that require quiet and healthy environments may find here excellent sites, near new east-west infrastructural connections, provided that those spatial developments are planned in a sustainable and integrated way. The same may apply for areas near the boundaries of European states that have had a relatively peripheral position for a long time. Also other areas may offer similar potentials which should be identified when elaborating the network.

The creation of a network connecting patches to coherent habitats allowing meta-population survival and maintaining biodiversity as promoted in Natura 2000 (see chapter 8) should be enhanced strongly. The large north-south zone through Europe along the former Iron Curtain offers excellent possibilities for responsible spatial developments. The ecological network can be extended to the east and also attractive locations for new economic activities can be developed.

The analyses show that:

- large natural areas are located in mountainous areas and islands because of their relative poor accessibility;
- fragmentation is concentrated in areas under high development pressure, such as coastal areas and river zones.

12.4. Policy towards cohesion

The policy responses as formulated in the ESDP and Natura 2000 aim at enhancing the natural heritage by influencing the process in such a way that the actual sequence of events leading to decrease of area and fragmentation stops and a new process starts leading to more coherence. The illustration describes how policy and management establish new driving forces, establishing pressures on the actual state, resulting in desired outcomes.

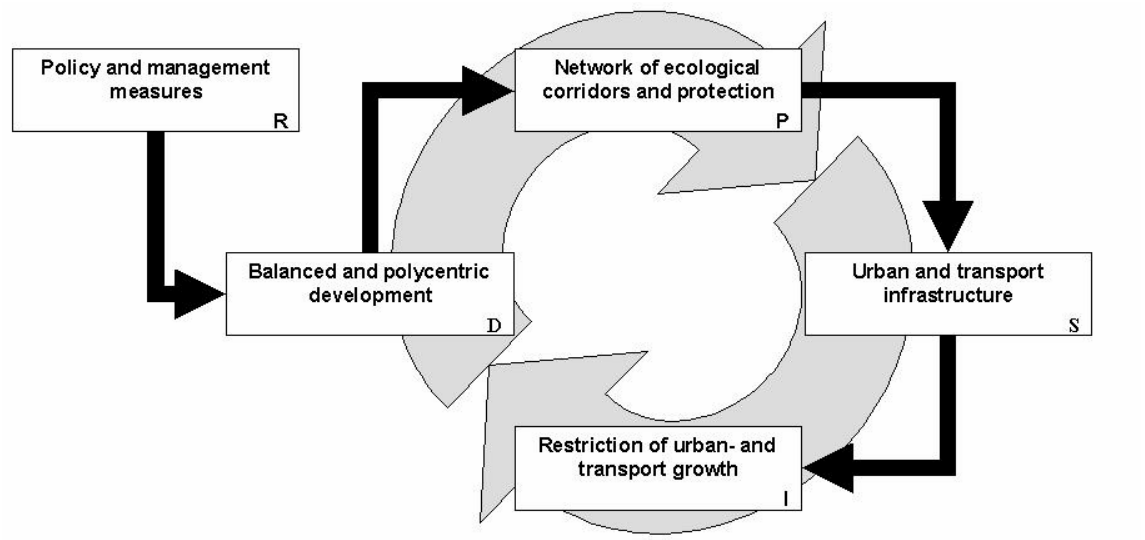


Figure 12.1 Policy towards cohesion

In the figure these relations are expressed in the causal configuration using the DSPIR model:

- Policy response: - creation of an ecological network
- Driving forces: - balanced and sustainable development
- Pressure: - increase of natural area
  - ecological corridors
- State: - spatial pattern, urban and transport infrastructure
- Impact: - restrictions on urbanisation
  - enhancement of ecological coherence

The original focus of the project on territorial trends of the management of the natural heritage can be identified in above scheme in the arrows between P, S and I.

12.4.1. Protection of open space

The continuous process of urbanisation by city extensions, with residential and economic zones and by building infrastructure seems to be unlimited, especially in regions with high development pressure. The dominance of city extensions for new developments over intensifying urban areas is due to the fact that in practice it is easier to implement projects in well accessed sites outside the cities and more difficult to regenerate old existing sites in an urban environment.

Serious limitations to city expansions are only perceived where large geomorphologic features like steep mountain slopes or large water entities constrain opportunities for outward expansion. This is why in some mountainous areas the development pressure is felt strongly. It is arguable that legal planning regulations are insufficient to limit the extension of cities as long as they are not supported by clearly recognised physical boundaries. In practice, actual needs of local societies will result in adapting the planning regulations thus enabling developments. The decision-making processes at the local level often show that economic forces dominate over forces arguing for the protection of the natural heritage.

In general, the overall impression is that all open space is considered to be potential building sites.

So, the challenge for EU policy with regard to natural heritage is to improve the balance between economic and ecological considerations as perceived at the local level, where decisions have to be taken and supported.

12.4.2. Protection of landscapes

The strong interrelation of agricultural activities and the physical geography has developed into visually recognisable entities that reflect the historic processes of human activities in relation to the geomorphologic conditions. These entities, usually called landscapes, include natural as well as cultural values. Here the combination of agricultural activities with natural conditions results in characteristic identities showing the typical European variety of cultures. The protection of cultural heritage in Europe should include the protection of landscapes as being long term expressions of human activities. It may be clear that for the protection of the cultural variety a large overlap with the protection of natural heritage exists. An accepted European typology for landscapes has not yet been developed.

12.4.3. Agricultural policy

Agriculture throughout Europe is facing a range of pressures, for example changes to world markets and changes in the Common Agricultural Policy. Evidently these changes will affect different farming systems in different ways, depending on the crops grown and livestock reared.
Within Europe, agricultural use is the main land use, therefore it is likely that much of the area to be designated as natural areas will be land from previous agriculture land use.

12.4.4. Improving the ecological network

The national governments and the European Commission acknowledge the problems of the natural heritage caused by the century long spatial developments leading to decrease of area and fragmentation. The initiative Natura 2000 seems to be an appropriate answer aiming at adding extra areas and at building a network. The implementation of Natura 2000 consists partly of changing an existing rural, most agricultural function into nature. So, the implementation of Natura 2000 results in a larger portion of natural elements in the rural land use.

In order to enhance the coherence of a network of natural areas, sites must be selected for protective measures or even acquisition. This should be done in a very responsible way taking into account all relevant interests in the rural areas. This can best be carried out in the framework of spatial planning activities at the regional level.

12.4.5. Integrated policy

Protection of the natural heritage requires actions that result in larger and better connected natural areas that provide space for more species and species higher in the biological hierarchy. A network of interconnected areas of natural value is expected to support biodiversity as part of an ecological system. This acknowledges the effect of a network of areas forming together one coherent ecological system that is more or less comparable with the effect of substantial increase in the total natural area. Such an extended area offers biotopes for more species and increases the biodiversity. Also exchange of genetic material between individuals of one species is increased, thus resulting in stronger / healthier individuals.

The EU policy initiative Natura 2000 aims to form such a network of protected natural areas throughout Europe, by connecting Special Protection Areas (SPA) and Special Areas for Conservation (SAC) designated under the Birds and Habitats Directives.

This ambitious policy responds to the general feeling of nature-under-threat and the awareness of the essential value of the natural heritage for mankind.

Natura 2000 promotes different actions with territorial consequences in order to meet the objective of enhancing the ecosystem:

- Increase the area under protection. This may include actions such as the decision to establish various degrees of protection or even to acquire land for establishing a natural area.
- Establish buffer zones. These aim at maintaining a distance between a vulnerable protected area and polluting activities by designating buffer zones for non-polluting activities.
- Establish corridors. Corridors are to be identified and implemented between two separated areas of natural value, connecting them. This does not always necessarily require direct physical connections, especially for birds. Often stepping stones will offer sufficient support to movement and migration patterns.

It must be emphasised here that the initiative Natura 2000 is a very promising policy that should be continued and enforced. Stronger integration into general rural policies and spatial planning, would enhance its effects.

But, at the same time, the implementation of Natura 2000 should not stop the existing efforts of the EU, national and regional levels aiming at the preservation of the natural and cultural heritage. Above all, timely including data and guidelines for natural heritage conservation in spatial planning procedures should be enhanced. This applies for all stages from strategic to execution, and implies trans sectoral co-operation.

A sustainable rural policy that widens the scope of the Leader Programme would be advisable. Such a policy should integrate policies with regard to the scarce resource of open space, agriculture, nature and culture aiming at the same time at a sound economic future of the region and the construction of an ecological network of natural areas. The experiences so far with implementing the Natura 2000 policy, should be evaluated in order to identify improvements to its effectiveness.

13. Recommendations

13.1. Relation to ESDP

This chapter aims at formulating ways in which the objectives of the ESDP, as related to the natural heritage of Europe, can be met. In other words, the question to be answered is:

- How can a more balanced, sustainable development towards a polycentric urban network be achieved by improved management of the natural heritage?

It is acknowledged that Natura 2000 is an agreed policy under realisation and that it aims at building a coherent ecological network throughout Europe. At the same time polycentric urban development aims at building a network of urban nodes. The spatial development combining these two policies must be regarded as the projection of two networks over each other on the geomorphological basis of Europe. This projection includes different aspects on the different scale levels, therefore the following recommendations are structured according to the macro, meso and micro distinction.

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 along development axes.
- 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 develop along improved east-west directed infrastructure, connecting the new union members and the existing, predominantly north-south axes.

13.2. 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.

3. Acknowledging forthcoming changes in the Common Agriculture Policy and the fact that agriculture is the largest land cover, requires close co-operation in formulating rural development policies.

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. The approach promoted by the Integrative Coastal Zone Management seems an adequate tool to be applied more generally.

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.

13.3. Recommendations, macro level

8. 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. Also the network of natural areas, as Natura 2000 aims at, may be expected to add to the attractiveness of regions for starting new activities.

9. Special attention should be given to the Europe large zone located near the former Iron Curtain. Here potentialities are still existing that should be considered as occasional opportunities for development of nature as well as other spatial developments.

10. 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 the ecological structure.

11. 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.

12. 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. Protecting natural areas may play an important role.

13. 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.

14. 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.

15. 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.

16. 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 they 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).

17. 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 apples to the concentration of natural areas at the former Iron Curtain.

18. 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, 13th CEMAT conference)*

19. 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.

13.4. Recommendations, meso level

20. 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.

21. 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.

22. Border crossing rivers, connecting natural areas and hydrological systems on both sides may be preferable parts of the cross border ecological network.

23. Within the countries, the ecological network should include 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.

24. Preferably these connecting zones can be related to larger geomorphologic features within the country, like mountain ranges, rivers and coastal zones.

25. 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.

26. 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.

27. 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.

13.5. Recommendations, micro level

28. 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.

29. 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 and opportunities.

30. 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.

31. These well accessed urban nodes offer opportunities for 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.

32. 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.

33. Less accessible locations in quieter, natural environments, may be attractive for residential functions, institutions for research and development, for specific education, cultural and tourism activities. This especially applies for peripheral and remote regions.

34. 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.

35. 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.

36. 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

37. Such regional development visions, that preferably result in spatial plans or even plans 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.

38. The future economic development of the FUA / regions should preferably be based on innovations in accordance with the Lisbon and Goteborg objectives.

39. 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.

40. 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.

41. Such integrated processes leading to spatial plans on the regional level, should under certain conditions be supported by national government and the EU.

13.6. 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 will come under pressure of urbanisaton.

- Priority to old industrial areas
  Although the community environmental policy aims at a general healthy quality of the environment, project to reconstruct and sanitate 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 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. 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.

14. Regional typology

14.1. 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.

14.2. 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.

14.3. 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.

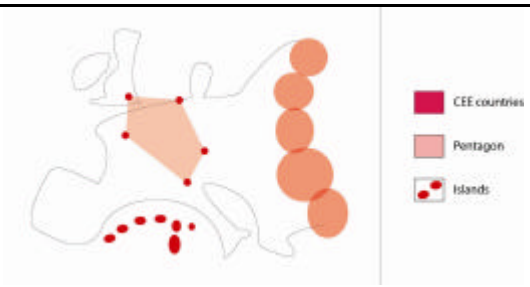
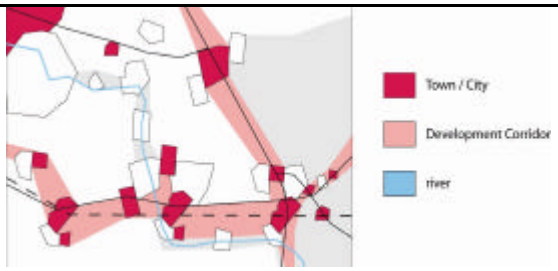
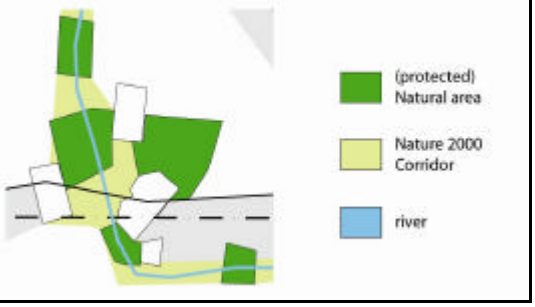
At the meso level, cross border co-operation towards more social economic and territorial cohesion is aimed at. This implies connecting development zones within the one country with that in the neighbouring country, as well as cross border connections of national ecologic networks. Investments that enhance 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.

	Socio / econ. / urban	Nature / environ./cultural
MACRO	Development pressure	Bio geographic region
	- Pentagon - Outside pentagon - In CEE - Island in periphery	- Boreal - Continental - Atlantic - Alpine - Mediterranean - Pannonian - Macaronesian
		
MESO	Urban network	Ecological network
	- In development axis - Outside development axis	- In Natura 2000 / Emerald network - Outside ecological network (- Agricultural intensification) (- Agricultural extensification / abandonment)
		
MICRO	Site related to urban area	Site related to nature / environment
	- In or close to MEGA - In or close to FUA - Rural area outside FUA - Old industrial site	- (Protected) natural area or cultural landscape - Open space with low or mediocre natural value
		

15. 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. Less than10 days before the projects deadline for the third interim report, first data allowing to analyse 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.
   The aspects of ecosystem diversity including the impacts of fragmentation has been discussed in chapter 4 on natural heritage.
   The aspect of biodiversity reflects species richness as well as rare species. A specific European accepted indicator for biodiversity has not yet been agreed. Acceptance of the IUCN definitions including its red lists of threatened species would support world wide coherence. The same applies for the IUCN lists of designated areas. Natural resources are including the total environment. The European Environment, the Third Assessment Report of EEA includes best available information. That information is still not complete, not covering all countries, not covering all aspects. Soil related problems as far as not directly related to local industrial and waste pollution could probably best be addressed by including these areas in a territorial category of protection. The conclusions of the Third Assessment Report are used for describing the environmental aspects throughout the text of the TIR.

4. Within the First Interim Report (FIR) the TPGs core group arrived to consensus about indicators required to develop a new database. These data include the natural heritage, geomorphology, spatial development and management aspect.
   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 indicators in the FIR were organised along the lines of geographic levels (macro, meso, micro). The first list of main requests to the European (not the national) statistical and mapping institutes was included. The TPG felt it to be too large and needed to be limited by critical considerations of the relevance with regard to essential hypothesis. This was done in the Second Interim Report (SIR).

The preliminary overview of concepts, methodology and hypotheses for further investigation was included in the First Interim Report (FIR), partly in the section called 'towards a second interim report'.

5. Within the SIR the time pressure on delivering useful recommendations for the third cohesion report influenced the contents, although preliminary results are presented showing maps of the existing spatial structure of the natural heritage. The first overview on concepts and methodology and possible final results however needed still more elaboration and better presentation in the report.
   In general, the problem of lacking data was increasingly influencing the progress of the study in this stage.
   This applies for natural areas on the local and regional level, the progressive erosion of natural areas and the impacts of changes on natural resources.

6. Appropriate tools for the creation of a database compatible with GIS requirements will be described in the final report. The notion of ecological sensitive areas will also be elaborated in the final report.
   Provisionally the definition of these areas will be: areas including natural values that are expected to come under threat of agricultural intensification, modification of water management (sub) urbanisation or fragmentation. Especially those areas are to be protected which location is of strategic importance for the coherence of the ecological network.

7. The four themes are diagnosed in the chapters describing the actual situation and analyse the developments in the bio geographical regions with some perspectives.

8. The long term past evolution has been described in chapter 3 in the form of a historic narrative.

9. Seven case studies have been carried out largely, but final analysis is not yet completed. This will be included in the final report. 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.

10. In order to highlight main points where policy responses might be brought to bear the five different aspects are addressed in the recommendations in chapter 13 as well as in the executive summary.

ANNEXES

16. Annex 1 Case studies

16.1. Introduction

There are three sources for finding explanations:
- analyses;
- results of the questionnaire on management;
- the case studies.

In order to develop a good understanding of the mechanisms of designation we also need to consider 'lower' scales of policy, to find out what mechanisms play a role at the scale at which implementation takes place.

By means of developing case studies and scenarios the understanding gained by the analysis of management policies on natural heritage can be refined. These studies will provide detailed information about the management, the implementation of management and the territorial local context to explain effectiveness of management of the natural heritage.

Methodology of the case study program
The rational followed, was to define the overall study needs, to find a way to explore the diversity and local dimension of the natural heritage management, together with the elaboration of a methodology for the prospective aspects of the case studies and with the selection process. It resulted in a checklist for gathering essential elements.
After the second interim report the case studies were selected and the case studies carried out.

Case studies issues and objectives
The case studies are being carried out using a harmonised checklist, designed to fit with different territorial scales, types of management, different territorial contexts and encompassing the following issues at local scale:
- Exploration of the territorial context
- State of the natural heritage
- Assessment of the spatial interrelations (the local or regional context, the relations to urban areas, infrastructure and to other natural areas)
- Assessment of the effectiveness of the management
- Assessment of the extent to which the case study supports ESDP objectives

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;
- Provide evidence to develop long term evolution scenarios.

Selection process
Besides covering as much of the territorial diversity of the European Union in relation to geography (from coastal to mountain areas) and to the urban/rural system as possible, the criteria for selection were:
- The area is 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;
- The contributor has easy and total access to the data (to make efficient the study program).

Overview of the cases territorial diversity:

Case studies differ or converge according to their scale, their settlement and productive land use context and the state of their natural heritage and management system.
They are spread over the enlarged European territory and relate to a large panel of territorial contexts found through the enlarged European territory. They vary from coastal regions to mountains by way of plains, they are shared among rural and urban territories, are either under development pressure or depression.

They relate to three basic territorial contexts:
- rural territories;
- territories under development pressure;
- ultra-peripheral territories.

Rural territories		
	Borsodi mezoseg	**Vallombrosa**
Scale	NUTS 4	NUTS 4
Settlement context	Rural area	Periurban to rural area
Productive landscapes (farming and forestry)	Decline of traditional practices and emergence of intensive systems	Forestry
State of the natural heritage	Saline marshlands and steps	Forest under ecological management
Management system	Pilot area for conservation	Nature reserve since 18.(year?)

Urban related territories			
	Lubjana	**Thames Basin**	**Nord pas de Calais**
NUTS or equivalent NUT of the case	NUTS 4	NUTS 4	NUTS 2
Settlement context	Urban and peri urban area of Lubjana	Urban and peri urban area	Urban, peri urban and rural areas
Productive landscapes (farming and forestry)	declining extensive farming and arable conversion	Surrounding farming countryside	Dominating Intensive farming
State of the natural heritage	Marshland and forests surrounded by Lubjana and 5 small scale cities	Fragmented heathlands surrounded by open spaces and urban areas	Fragmented semi-natural and natural areas (coastline, valleys, marshlands…)
Management system	Nature reserve	Fragmented protected areas.	Fragmented protected areas and protected landscapes

Ultra peripheral territories		
	Rondane region	**Lanzarote**
Scale of the case	NUTS 2	NUTS 4
Settlement context	Northern peripheral area : large, mountainous and low density territory	Coastal resort places
Productive landscapes (farming and forestry)	Extensive livestock	Diversified, mainly located in the coastline
State of the natural heritage	Northern wilderness area	Endemic ecosystems
Management system	Large National Park surrounded by protected landscapes	Biosphere reserve Network of protected areas

Location
Map of Europe + location of cases (to add)

Case studies progress
As the study program progressed, the case study methodology was refined, following the production of the second interim report. One of the major concerns was to ensure harmonisation in the analysis processes led by each contributor and to assist this questionnaire provided a guideline for each case study report.
Completion of requested information as well as the nature of that information is varied, however. Two case studies were delayed from the start on and could not provide the required information for the TIR.

The following sections synthesise the cases and the first conclusions they provide. In the perspective of the final report, a second phase has to be undertaken to refine information, maps, indicators and conclusions on the important issues they underline, to complete the crossed analysis and to build more in depth development scenarios. First complete reports are available, however.

16.2. Analyses and overlays of case studies

16.3. Case studies

Individual synthesis report:
The provisional case studies have been synthesised within the following themes provided by the questionnaire:

- Territorial context
- State of natural heritage
- Driving forces of natural heritage evolution
- State of the management
- Assessment of the management
- Scenarios (provisional)

Major issues in regard to the overall project are highlighted.

Borsodi Mezoseg area (provisional synthesis)
Territorial context The Borsodi Mezoseg is 32000ha sediment plain at North-east Hungary. More than 100 streams and rivers converge there. After a period of water management and farming developments (50 to 70') it has been included in the Bükk National Park, established in 1976. From the 90' serious economic changes resulted in landscape changes. **State of the natural heritage** The area is a diverse grassland habitat-complex scattered with wetlands and arable lands, shaped by agriculture in the recent centuries. It was drained and dried up in the 60's and the 70's and wetlands were reduced to a fraction of their original size. Only a few remaining streams ensure some water supply, but bio diverse habitats are still found and the area is suitable for large space demanding species. Several Red Book species are inventoried. **Driving forces** Land abandonment and farming intensification (corn and sunflower) are both negative with regard to the natural heritage. There is currently an increasing demand for both traditional farming practices and nature conservation. **Management** 25000ha are under the Pilot Area delineation. The Bükk National Park Directorate implements the management. Agri-environment schemes offer suitable solutions to overcome the problem of land abandonment and intensification. **Assessment of the management** No results at this stage

The Vallombrosa Forest (provisional synthesis)
Territorial context Situated at about 30 km south of Florence in a mid-mountain rural context scarcely inhabited. The forest of Vallombrosa is subject to heavy tourism and recreational pressures. The surrounding spaces 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-leaves species. The area contains one pSIC Natura 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 fauna growth could lead to slower forest regeneration. The main threatening driving force is uncontrolled tourism and recreational developments. **Management** The first management plan was established in 1876, in respect of the National Forest Law of 1866, which made management plans compulsory for all publicly-owned forests. At that time, management aimed at supporting wood production. Since 1977, it has become a biogenetic reserve. The last general multi-criteria plan was developed in 2000. The main objectives are forest diversity conservation and enhancement, natural heritage conservation, traditional forest work, culture conservation and rehabilitation. These objectives are taken up in regional and local plans which also aim at developing tourism. **Assessment of the management** Due to the specificity of the management plans (elaboration on the multi- criteria approach), the needs are accurately pinpointed and thus the objectives highly relevant, as well as the adopted measures and actions. Furthermore, the implementation of plan being legally binding, there is an obligation for every planned action to be carried out. A revision of the plan is to be done every ten years. The process implies a post evaluation of the planned operations with readjustment of strategies to the actual needs. Yet, insufficient finance in relation to the technical aspect of the planned actions weakens the effectiveness of the management. In addition, management has to face difficulties resulting from differences between the legal approach and implementation at technical level and administrative/bureaucratic constraints.

The Ljubljana marshland
Territorial context The marshland is a 163km² area surrounded by the city of Ljubljana and small rural communes. **State of the natural heritage** Over the total area are 107km² of marshland and marshy meadows, 40km² of arable lands and 11km² of forests. It partly results from a century-long process of cultivation, breeding and floods prevention. The marshland is a breeding place for more than 100 bird species. **Driving forces** *Urban developments* Previously the marshlands were dedicated to city expansions, industries, infrastructures, waste and tailing disposals. Peat digging also played a negative role in the evolution of the area, but was abandoned after World War One. Aggressive developments over the marshland have encountering local community opposition. Urbanisation pressures occur especially on the urban fringes and along the transport system. Some settlements are illegal. *Farming* Farming practices tend to decline, seemingly due to a decrease of the rural population. Traditional practice is replaced by intensive monoculture of corns. Spontaneous forest redevelopments are considered as a secondary natural environment (with regard to migratory birds). *Recreation* Increasing recreational functions are considered an opportunity. **Management** The protection results from a process carried in the 90's by farmers and nature associations, coincidental with increased 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. 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's proposals. **Assessment of the management** Management seems to have positive effects on biodiversity maintenance, especially in the last decade. Conservation is a consensual (not sure what is meant here?) and efficient with regard to hard urban developments. Farming developments are not so regulated as is the case for the few illegal settlements. **Scenarios** The sustainable scenario would stop the one-sided interventions and to preserve the area for wildlife and unobtrusive human activities. It would mean to maintain the overall situation with an objective of slowly increasing biodiversity. Maintaining farming practices is of tremendous importance.

Thames Basin Heaths potential Special Protected area

Territorial context

The Thames Basin Heaths potential 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 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.

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 currently being produced. 35,400 dwellings are proposed to be accommodated in the mid term. Other strategic plans cover the area at county and local level, including waste and minerals plans, economic and transport plans, rural strategies.

State of Natural Heritage

Over the past one 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 e.g. low density grazing which slowly began to be 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 amongst 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.

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) 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.

Driving forces

Urbanisation

The residential development and associated access and recreation infrastructures represent the main driving force on Natural heritage. Considering the provision for dwellings stated in the regional and local plans, residential development is to 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 pSAP is likely to have contributed 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 to 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
The management includes protection through planning system and working with landowners and/or occupiers. The English Nature is the Agency particularly involved.

Protection through 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 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 a European site be 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 consistent with its status as 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 an inappropriate management and a voluntary solution cannot be reached, English Nature is able to employ more formal legal methods which include management schemes and management notices, voluntary or compulsory purchase of land.

Assessment of the management
The effectiveness of management should be assessed in the context of the difficulty of appreciating the effects of recent measures. Yet evidence of bird numbers holding over time suggests that management of the 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 developing "soft mitigation" approach certainly assist conservation and restoration of healthy habitats. Furthermore, the existence of European designations underpinned by powerful legislation have provided an effective basis for English Nature's intervention in planning system; yet, it tends to be prevail on a site by site basis rather than at the strategic planning level.
In addition, natural heritage management is weakened by difficulties in gaining a common understanding particularly amongst developers and planners and achieving commitment to common management objectives and practices.
The major limitation to ensuring that effective and appropriate management is undertaken is resources. Unless costs are minimal, management practices are often not carried out.

The North – Pas de Calais Region - France

Territorial context
Part of the North-West Europe Region, one of the most densely occupied and wealthy region's of Europe in terms of core-areas sharing economic command functions and global gateways, the North- Pas de Calais is at the cross-road of major communication infrastructures (Highways, HST) between these core-areas. Dominant land uses are urban areas and farming. 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 spaces structures and in terms of development trends.

In the early 1970's an integrated territorial development plan (OREAM) was produced, which mainly focused on economic issues, but did enhance 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 development. This will guide local policies, as much as local decisions will need to be coherent with the plan's orientations. At this stage the priorities and objectives have been defined. Environmental 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 includes 318 areas which have been defined as natural areas of ecological, floral and faunal interest (ZNIEFF) corresponding to high biodiversity value ecosystems: coastal, wetlands, rivers, meadows and boscage, and slag heap ecosystems. The Natura 2000 sites under study are likely to overlap with the ZNIEFFs but amount to 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 significant 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, by way of 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, farming dynamism, level of protection of open spaces and landscapes.
Yet, current trends indicate urban sprawl polarising around 23 centre towns, with 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 90 to 98, land use changes corresponding to new urban extensions (urbanisation of semi-natural land use classes) happen broadly in the metropolis region and at south toward Paris, in the rural east of the region with residential developments (with probable concentration around one forest due to its attractiveness) and on the coast (mainly retro-littoral due to legal and natural constraints).
The national statistical institute perspectives at 2030 show a concentration of the population in major cities, notably Lille; urban sprawl would continue to meet housing and economic development requirements. In addition, a more intense recreational use of the open spaces is anticipated.

Infrastructures.
In the 70's, developing infrastructures (highways, waterways, ports) were established to assist economic development. 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 remains uncertain and unequal over the territory., At the same time the impact on natural heritage has been significant in terms of destruction, spatial fragmentation and pollution.
For various reasons such as a reactive response to the critical state of congestion on roads, the demand of more remote and depressed territories to have easy access to major cities, the current trend is set to continue developing road infrastructures. It does not appear this will change in the near future.
From 1990 to 1998, road-induced land use changes can be noticed (housing and economic activities).

Agriculture
Farming systems are predominantly intensive and industrial with simplified landscapes (open fields), although the Region includes two territories with extensive farming. Current intensive farming practices widely occupy lands, degrade soils and cause severe diffuse nitrogen and biocides contamination. Current trends show a reduction in the number of farms and growth in size with intensification, while non-profitable estates are abandoned. These trends should intensify in a global open market, in spite of efforts focused on financially sustaining organic farming, habitat management and water management. It is unlikely that public funding will cope with market trends in order to maintain sensitive agro-dependant ecosystems and to ensure soils and water resources are protected.

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 into territorial development strategies.

Specific tools:
Statutory protection covers 18 700 ha; most of the sites were designated after the 1970s in response to increasing environmental concerns. The French legislation sets mechanisms allowing public authorities to purchase land in natural areas for the purpose of their protection and valorisation, including pre-emptive. In the North / Pas de Calais Region, 2 policies rest on these mechanisms: the Sensitive natural areas policy of the 2 Departments and the coast protection policy of the Conservatoire du Littoral. 3 200 ha have been purchased.
Contractual protection results from the will of regional authorities and the concerned 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 3 600 sq km.

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 that all regional and local planning must endorse. Local strategies include an increasing number of measures (such as creation of a specific organisation, financial means) in favour of natural heritage conservation, valorisation and networking.

Assessment
The management of high value natural heritage is effective, in that the targets are clearly defined and management measures, mainly protective, rest on legal obligations.
Management of “ordinary” natural heritage is less efficient as it relies on local commitment to enhance protection and valorisation (through land use plans). At local level, the strategies will depend very much on the economic and social needs. For example, in economically depressed areas, local strategies will focus on economic development. Even if protection of the natural spaces and landscapes is integrated in the plans, they will not take priority over urban extensions. In areas densely inhabited, such as Lille agglomeration, the concern will be meeting the recreational demand of the population, protection, restoring, valorising and networking is subject of an ambitious plan.
The management of farming impacts is very limited and there are today no solutions to control urban sprawl.

Lanzarote island

Territorial context

Lanzarote Island (840 sq.km) is considered as an ultra peripheral territory of Europe. The canary island was an unhabited 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 fastly evolving, especially on the coast where protections are weaker.

State of the management

Since 1974 13 protected 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 covered by the EU Habitat and Bird directives. All levels of designations are translated into 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 has promoted 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 to 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 from tourism and residential development. From 1986 to 2001, resident population grew from 57,000 to 111,000. About 2 million tourists visit the island annually.
In a few years, it has radically modified the human/nature relationship, transformed the socioeconomic structure and the landscapes of the island. Continued growth along this path is expected to be the major driving 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 between management and development

Pressure and outstanding natural heritage have induced nature conservation protection mechanisms, 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 tourism growth because of the environmental recognition provided by the designations. Forms of eco-tourism are being developed.
New road design has taken into account ecological impacts. Urbanisation is concentrated on the coast which is of lesser ecological value.

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 non-implementation is not clear at this stage of the study.
Management is critical for achieving the ESDP objectives: sustainable and endogen (not sure what is meant by this term?) development of the island.

Scenarios (provisional)
Sustainable development does not depend so much on existing protection which is respected, but rather on complementary measures addressing socio-economic dimensions.
The contributor has provided an integrated scenario. Development objectives are based on a tangible set of quantitative indicators, which make current trends and sustainable scenarios comparable and what make possible to balance decision (not sure what is meant by this?).

The Rondane region

Territorial contex

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 unhabited 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 a national park.

Driving forces

Farming decline due to lower agricultural product prices and reductions in support to peripheral areas increases 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 to wild reindeer.

In the recent (?) decades the wild reindeer living area (defined as wilderness area) has gradually reduced and fragmented by outdoor recreation and infrastructures for tourism. It has caused 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 follow the same passages as migration routes.

Forestry practices (roads, management) are sometimes in conflict with nature conservation.

Climate changes have been observed (development of red fowl populations, detrimental to the protected white fox)

Management

The Nature Conservation Act provides the means for protecting natural areas; the Rondane region is to a large extent protected as National Parks (The Rondane National Park, 1962, 963km², and the Dovre National Park, 2002, 294km²), as protected landscapes (located at the fringe or between the national parks; major changes are not allowed) and as nature reserves (strict conservation; about 20km² 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 developments. 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 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 has been quite stable since the 60's and in the last decade it has 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 shortens 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 (do you mean reduction in farm product prices?) in an open world market is the major threat for the wilderness area (apparent paradox), as is forces farmers to look for other incomes (tourism and sail of plots for cabins).

The sustainable scenario is primarily based on the hypothesis that farming product prices sustain farming practices, notably by means of an inclusion of the social and ecological costs in the product prices.

Second, tourism and the secondary home economy are sustained but adapted: cabin developments are stopped, effective means of controlling access by car are introduced and trails are redirected outside the wilderness area.

Toward cross-analysis: provisional conclusions

Following observation of the case studies, reference is again made to the causal DSIPR framework:

Driving forces	**geo physical processes** - climate change
Pressures	*geo physical pressures:* - changes in temperature and rainfall - punctual extreme events - River flooding
States	*natural heritage:* - biodiversity - landscape
Impacts	*Ecosystems response:* Ecosystems movement approach/ ecosystems modification approach
Policy response	*sustainable development:* - Conservation of biodiversity

Driving forces	**Settlement development** - increase of population - increase mobility of persons and goods - gentrification (secondary home, retirement home)
Pressures	*Urban pressure* Buildings and infrastructures developments
States	*natural heritage:* - biodiversity - landscape
Impacts	*reduction of natural areas* - Soil consumption, soil sealing and soil pollutions - Water consumption, disturbance of water run off, water pollution - Biodiversity consumption - Landscape fragmentation, decrease in landscape permeability, decrease in wilderness - Air pollution, micro climate and contribution to green house effect
Policy response	*sustainable development:* Protected areas and landscapes

Driving forces	Farming and forestry
Pressures	*Productive pressure* Private income plantations / wood production Cultivation (ploughing, use of fertilizers and biocides), livestock breeding (grazing pressure)
States	*natural heritage:* - biodiversity - landscape
Impacts	*reduction of natural areas:* - Soil sealing, soil leaching, soil pollution - Water consumption, disturbance of water run off, water pollutions - Biodiversity consumption - Landscape simplification, decrease in permeability *Maintenance of farming dependant semi-natural areas*
Policy response	*sustainable development:* - Agro-environmental schemes (funding to compensate for revenues losses - Support for organic farming - Protected areas

Driving forces	Recreation and tourism
Pressures	*Leisure use pressure*
States	*natural heritage:* - biodiversity - landscape
Impacts	- Site degradation, reduction of wilderness - Local economy input
Policy response	- Tourism support - Tourism control

Provisional conclusions

Case study experiences show that the most effectively protected natural heritage is the heritage under strong protection processes which mitigate if not overcome development pressures and tend to promote natural heritage conservation and eventually enhancement. These protection processes apply to areas designated as valuable whether this “designation” find its origin in national, European or international policies .
In fact, as local awareness of value of natural heritage has been growing, there are an increasing number of initiatives to protect natural heritage at the national, region and local levels. International and/or European initiatives in this field appear to be supporting local policies. For example, the proposal of the Ljubljana Marshland to integrate the Natura 2000 network, appears to support local action to preserve this natural reserve, in that it will help promote changes in land use planning. The example of the Thames Basin Heaths is also relevant in that it is clearly stated that local policies should consider potential SPAs and candidate SACs in the same way as classified SPAs and designated SACs.

Participation and local authorities' commitment are essential factors of effectiveness. In the case of Lanzarote Island, the high level of local participation is shown as best practice in developing strategy to integrate natural heritage as a protection issue. In the Rondane Region, local interest in the wild reindeer has been a major driving factor in achieving management of the area. The Thames Basin Heaths example illustrates the value of a partnership approach with landowners and occupiers.

But, even if the willingness to protect natural heritage grows stronger and becomes the priority for most European citizens, effective action is weakened by a lack of financial resources (stated in all cases), insufficient operational tools and/or difference between the legal approach and implementation at technical level (Vallombrosa forest).

In all cases, the relationship between natural heritage management (i.e. protection) and development pressure is clear. And in most cases Natural Heritage is characterised by its fragmentation.
Whereas sites designated as valuable and under protection policies are effectively managed; this is less the case for residual i.e. "undesignated " natural heritage. This could be a major issue for example in anticipating future evolution considering climate changes, but also to secure and enhance the designated sites (i.e. enlarge, and/or network them).
This portion of the European natural heritage, though significant, is not yet sufficiently recognized.

Protection gives added value to an area and in all cases stimulates development. Besides appearing as an undeniable attraction for residential development, protected sites are also "assets" for tourism and recreation development.
These are major driving forces within a tourism-based economy such as the Island of Lanzarote and also in regions where tourism and recreation are becoming alternative development forces. The case of the Rondane region is quite significant. In regions where farming systems can no more provide satisfactory income, farmers take up new ways of exploiting their land, selling plots for private cabins, providing hunting packages etc.

The evolution of agricultural activity, and consequently of rural areas is a major issue.

European enlargement and globalisation of the world market will put pressure on farming systems which typically respond in with of two ways:
- estate concentration/modernisation/intensification of production, which may threaten landscapes and increase pollution
- land abandonment which may both induce a new loss of farming-dependant rich ecosystems and provide opportunities for forest development.

Besides this, it is likely that a problem of funding for environmental schemes will arise, due to the social needs of eastern countries.

Natural heritage management is not self-sufficient. Market, environmental and planning regulations are necessary to regulate socio-economic factors such as agriculture and urbanisation.
But taken up under sectoral approach, the efficiency of such regulations is weak. In all cases, it is pinpointed that there is a need for more integrated strategies at all levels.

(Final sections 6.4-6.6 still to be completed)

16.4. Scenarios

The scenarios will focus on the main question of this project: what is the influence of management of natural heritage, comparing two possible territorial evolutions:

- Evolution in line with current trends
- Evolution under a scenario of effective protection and valorisation of natural heritage.

To build realistic scenarios the following steps will be taken:

1. Identify the main factors influencing the evolution of the studied system. These factors evolve and interact, causing changes over time;
2. Analyse the possible evolutions of each driving force and their influence on the studied system;
3. Consider different combinations of sub-scenarios to create **global scenarios**.

The evolution regarding the current trends is based on the mainly economic driving forces, such as urban and infrastructure developments and farming / forestry, consuming space which place great pressure on natural heritage.

The evolution regarding effective management of natural heritage will be based on the following system of influences:

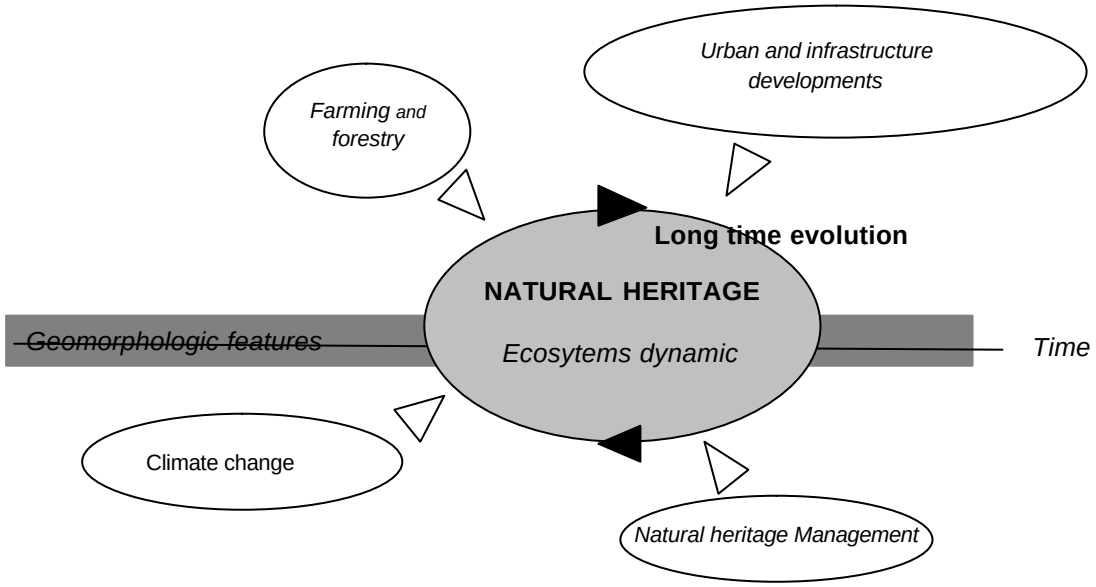


Figure 16.1: Influences on natural heritage

- *The dynamics of the natural heritage* in this view consist of geomorphologic features, climate and the internal dynamics of the natural ecosystem.
- *Farming and forestry* can be external to the natural heritage, determining the space left for natural heritage, or they can be internal to the natural heritage, as agro-dependent ecosystems and forest ecosystems.
- *Urban and infrastructure developments* shape the landscapes and natural heritage structures. They cause fragmentation, soil consumption and soil sealing. These processes have negative impacts such as decreasing potential for food production, increasing run-off and decreasing the area of natural heritage.
- *The management of the natural heritage* influences the natural evolution of the natural heritage through planning regulations, site management and ecological farming incentives.

16.5. Questionnaire on management

Next to the case studies at the local and regional level a questionnaire at the national level is carried out. This activity aims at refining the understanding in the processes of law making and transferring European legislation to the national level. Therefore representatives of national governments and of non-governmental-organisations (NGO's) will be asked to respond to a set of questions with regard to the management of the natural heritage. The kind of information we expect to gather from this activity is complementary to that coming from the analysis of data and the case studies.