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Protected areas in Europe — an overview

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Foreword

Protected areas play a vital role in safeguarding Europe's biodiversity. It is for this reason that the Habitats Directive is so important for Europe. This Directive, which celebrates its 20th anniversary this year, established the Natura 2000 network of protected areas across Europe. Sites in the Natura 2000 network now account for 18 % of the EU's land territory, providing invaluable protection for vulnerable wildlife and habitats. Protected areas more generally (including nationally and locally designated sites) now cover 21 % of the land territory of the European Environment Agency's member countries and collaborating countries.

A common misperception is that the term 'protected area' means an area of wilderness stripped of all human influence. But Europe's protected areas encompass a wide variety of landscapes and management systems. Some of our protected areas are strict wildlife reserves, and even national parks, preserving the unique and precious biodiversity of Europe by means of strict regulations on development and building. Others are managed to ensure that European citizens are able to appreciate the great natural beauty of our mountains, forests and wilderness areas. And many protected areas are established in regions of privately-held land, with the goal of encouraging agricultural practices that respect the natural environment. Often, protected area sites are managed with the aim of achieving a combination of these goals. But at all times, they ensure a sustainable and coordinated approach to the stewardship of nature, our most precious resource.

This EEA report is the first publication of its kind to give a comprehensive survey of protected areas in Europe. It provides an account of the development of protected area policy in Europe, and gives a snapshot of the diversity of our protected areas, highlighting the wide range of benefits they provide.

Great progress has been made in the 20 years since the adoption of the Habitats Directive. However, there is still much more work to be done. Less than 20 % per cent of the species and habitats listed by the Habitats Directive have favourable conservation status. We look forward to continuing our working with our partners at European, national and local level in the coming years to help further improve our natural heritage.

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Executive summary

Protected areas today cover a relatively large part of Europe, with almost 21 % of the territory of EEA member countries and cooperating countries consisting of protected areas. In spite of this widespread presence of protected areas in all European countries, the topic has not received as much attention on a pan-European level as other environmental issues. We hope this report from the EEA — the first we have compiled on the subject — will go some way to redressing the balance. The report provides a comprehensive overview of the current state of protected areas and aims to assist policymakers and the wider public in understanding the complexity of the current systems of protected areas.

This report is especially timely, as 2012 marks the 20th anniversaries of the Convention on Biological Diversity and of the EU Habitats Directive. Both of these legal instruments consider protected areas to be key tools in the maintenance and restoration of biodiversity and ecosystems.

For the purposes of this report, a 'protected area' is any site with defined boundaries classified or designated by countries under legislation primarily aiming at nature conservation i.e. at the protection, management and restoration of species, habitats and ecosystems. A protected area can thus be any area of sea, lakes, rivers or land that has been identified as important for the conservation of nature, and managed for this purpose. It is important to recognise that protected areas differ greatly in the extent to which they limit human activity within their boundaries. Some protected areas allow industry, extensive agriculture or fishing to occur within their boundaries, while others prohibit all of these activities. The term is thus very broad in its application.

The report covers all 32 countries that are members of the EEA — 27 European Union Member States, Iceland, Liechtenstein, Norway, Switzerland and Turkey — as well as the seven cooperating countries — Albania, Bosnia and Herzegovina, Croatia, the former Yugoslav Republic of Macedonia, Montenegro, Serbia and Kosovo under the UN Security Council Resolution 1244/99. The overseas protected areas of European countries are not considered in this report.

In Chapter 1, we discuss the policy context of protected areas. Protected areas have taken many forms historically, from medieval hunting reserves, to more modern national parks and nature reserves. These different forms reflected the different needs that protected areas were created to serve, whether it was protecting the resource of wild game, preserving natural beauty or, more recently, safeguarding biodiversity. The last century has seen a great increase in both the number of protected areas and the total surface area that has received protected designation. This increase in the number of protected areas has been accompanied by new international rules and agreements and rules to protect biodiversity through the establishment of protected areas. The most important international legal agreements for protected areas in Europe are the UN Convention on Biological Diversity and the EU's Birds and Habitats Directives. These last two directives established the Natura 2000 network of protected areas.

Although the protection of biodiversity is one of the principal aims of protected areas today, there are a number of other benefits that protected areas bring. In **Chapter 2**, we examine these other benefits, and summarise the findings of several European studies on the matter. There is a variety of different approaches to calculating the benefits of protected areas and there is a debate over what precisely to measure when making these calculations. Nevertheless, society is increasingly recognising the social and economic values of protected areas. It is also becoming more aware of the environmental services that protected areas provide beyond preserving biodiversity, such as carbon sequestration, or mitigating the effects of natural disasters such as floods. Recent work done for the European Commission on the contribution of the Natura 2000 sites to the European economy indicates that the benefits of the network can be three to seven times the costs of implementing the network; this can be particularly important for local and regional economic development.

Protected areas encompass a wide variety of natural environments, from Black Sea shoreline to Alpine meadows and from arid shrub-land to rich pasture. In **Chapter 3**, we explore this diversity in

greater depth, in order to highlight the influence of biogeography and human activities in shaping the landscape and impacting on biodiversity. The European continent is characterised by eleven biogeographic regions, very little of which are wilderness: the mosaic of landscapes is the product of human intervention over many centuries. This context of diversity of biogeographical regions and history of human intervention explains the relatively large number of protected areas in Europe and their relatively small size compared to protected areas in Africa and the Americas. This human intervention has accelerated in recent decades, resulting in greater fragmentation of the landscape due to infrastructure and urbanisation, both of which have made the natural migration patterns of many species more difficult.

The environmental diversity of Europe's biogeographical regions is matched by the diversity in its protected areas, which vary in size, aim and management approach. In **Chapter 4**, we give a snapshot of this diversity, introducing the different national and supra-national protected area designations, and comparing them with protected area systems outside Europe. We draw attention to the system of categories developed by the International Union for Conservation of Nature (IUCN). This system describes the management categories of protected areas and the types of human activity that are permitted in each category. This diversity of protected areas has given rise to networks, where groupings of protected areas exchange information and manage their sites according to shared aims, geographies or principles.

Two of the most important European networks of protected areas are the EU's Natura 2000 and its close relative, the Emerald Network. In **Chapter 5**, we look in depth at these two networks and summarise their current status and progress in implementation. Natura 2000 currently covers close to 18 % of EU land, but only about 4 % of the marine waters under jurisdiction of EU Member States. Preliminary investigations into Natura 2000 suggest that that there is now good 'connectivity' — spatial and functional — among sites across national borders. However, the overall ecologic coherence could be further improved, namely through wider countryside measures; development of 'blue' (marine) and 'green' (terrestrial) infrastructures may also play a key role in improving the coherence and resilience of protected areas. The Emerald Network, which applies a Natura 2000-like approach to other countries beyond the EU, is still in its initial phase, and it is therefore too early to make any comprehensive assessment of it.

European designations such as Natura 2000 and the Emerald Network are not the only designation types for protected areas. European countries also have their own national and regional systems of protected areas. In **Chapter 6**, we look at the complementarity between these national designations and the implementation of Natura 2000. Natura 2000 covers about 70 % of the total surface area of protected areas in the EU, and we look at four country case studies (Austria, Estonia, France and Hungary) to illustrate the diversity of national approaches. We conclude that Natura 2000 has both increased the total surface area of lands with protected designation, and strengthened the management of existing protected areas. However, the manner in which this has happened has not been uniform across Europe. In some countries, there is a strong overlap between these nationally designated protected areas and Natura 2000, whereas in other countries, there are large areas with protected status that are not Natura 2000 sites.

There is also a range of protected area policy instruments that apply to the seas. In **Chapter 7**, we look at marine protected areas, covering the Natura 2000 marine designations, and the EU's Marine Strategy Framework Directive (MSFD). We also look at the four Regional Sea Conventions, which are smaller international agreements by countries sharing a sea that establish their own Marine Protected Areas (MPAs) outside the Natura 2000 framework. MPAs face a number of challenges. The greatest challenge is the lopsided location of the designations. There is a noticeable trend in locating protected areas close to the shore, with little protection for areas further from the coastline. This means that the network of MPAs as it currently stands omits important habitats and species (such as fish), and is therefore not ecologically coherent. We believe greater harmonisation between aspects of the MSFD and Natura 2000 could help in improving the coherence and representativeness of MPAs.

While progress has certainly been made in designating protected areas, there has been little in the way of comprehensive assessment of protected areas. In **Chapter 8**, we touch on some of the assessments that have been made so far. Most of these assessments are so-called 'gap' analyses, examining places that are important in terms of biodiversity, but which have not yet received protected area designation. However, there have been very few studies examining the actual effectiveness of protected areas themselves in maintaining and restoring biodiversity. This is largely due to the lack of available data on biodiversity status, and work is currently underway to establish new methodologies for the assessment of protected area effectiveness.

1 The policy and historical context of protected areas

Chapter summary

This chapter deals with the history of protected areas and with the most important policy frameworks that govern them today. It is divided into two main parts.

The first part (**Section 1.1**) discusses the history of protected areas. Protected areas have always existed in European history, and we argue that the evolution of the protected area is primarily the result of two main factors.

The first factor is the ownership or management of the protected area. Historically, ownership of the protected area was usually the domain of the monarch, who used the protected area for his or her personal benefit. But starting in the 19th century, protected areas began to be created by private associations purchasing parcels of land. In the 20th century, ownership of the protected area began to change again, with the modern state taking ownership of the protected area on behalf of its citizens.

The second main factor that determines the character of a protected area is the reason why a protected area is deemed to be of value in the first place. In Europe's early history, the protected area was valued for either its game or as a resource for timber. But by the 16th and 17th centuries, the natural beauty of an area began to take precedence over the utility of the resources it contained. In the late 19th and early 20th centuries, the logic for protecting areas shifted once more. This time the intrinsic value of nature was emphasised over strictly aesthetic concerns. After the Second World War, the emphasis on nature's intrinsic value began to give way to a new concern: the importance of maintaining biodiversity in protected areas. Finally, in the past 30 years or so, a more blended model has emerged, in which protected areas are valued for several reasons: as an aesthetic artefact, a repository of biodiversity, and a potential source of economic wealth (provided that wealth is sustainably used).

The second part of the chapter (**Section 1.2**) discusses the policy framework that governs protected areas today. It focuses on the two most important sources of protected area policy in Europe, the UN Convention on Biological Diversity, and the European Union itself.

Sierra de Guadarrama in the 1930s, Natura 2000 site, Spain

Photo courtesy of EUROPARC-España

Danube Delta National Park, Natura 2000 site, Romania

© Carlos Romão

Protected areas, coherence and connectivity: a note on terminology

The term **'protected area'** as used in this report covers a very wide variety of spaces and possible management regimes. The International Union for Conservation of Nature (IUCN) defines protected area as 'a clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long term conservation of nature with associated ecosystem services and cultural values'. It can include any area of sea, lakes, rivers or land that has been identified as important for conservation of nature, and managed for this purpose. It is important to recognise that 'protected areas' differ in the extent to which human activity is limited within them. Some protected areas allow industry, extensive agriculture or fishing to occur within their boundaries, while others prohibit all of these activities. The term is thus very broad in its application. The evolution of the concept of protected area and a definition of what it means today is discussed in greater detail in the rest of this chapter. A framework of the different types of protected area is discussed in Chapter 4.

Groups of protected areas are often brought together into different networks to facilitate nature conservation where species or habitats are found in more than one geographic location. One of the key goals in establishing such a network is making it **'ecologically coherent'**. For instance, the Natura 2000 network is ecologically coherent if it includes sufficient sites — in number and area — distributed over a wide geographic area to achieve favourable conservation status and covers the full range of variation of habitat types and species mentioned in the European Union's Habitats Directive.

In addition, migration, dispersal and genetic exchange of individuals between sites should be possible: this important additional feature of ecological coherence is **'connectivity'** between the sites of the network. Connectivity is here defined as a measure of how much continuity there is in both habitats and species in different protected areas. Connectivity has two components: spatial and functional. The first — often called connectedness — refers to links between elements of the spatial structure of a landscape, and can be described from mapped elements. Thus a network has spatial connectivity if a habitat area that straddles a border is designated a protected area on both sides of this border. The site would have poor connectivity if only the habitat on one side of the political border was protected. The second component of connectivity is functional connectivity, which measures the processes by which sub-populations of organisms are interconnected across protected areas into a functional demographic unit. An example of functionally connected protected areas would be a network of sites in different countries important to the different life stages of a migrating bird.

1.1 Historical context of protected areas

1.1.1 Early history of the protected area

The concept of protected areas has existed in Europe for several thousand years in the form of areas that were deemed to have significance for spiritual and religious reasons. However, the first formalised protected areas emerged in the feudal era, when land was set aside for the hunting of wild game. When William the Conqueror arrived in Britain from northern France in 1066 to become King of England, he brought the practice of creating hunting forests with him. In 1087, William formally declared a part of the current New Forest as a game-keeping forest.

With this action, William established the principle of drawing a line around an area of land on a map in order to provide for its special management and protection, including measures to punish those who transgressed the laws relating to such areas. Legislation to protect game and royal forests from illegal poaching was introduced widely across 15th century Europe.

Most of these protected areas in medieval and early modern Europe were conceived of as an isolated tool to conserve an individual resource, usually timber or game. For example, Sigismund, king of Hungary and Holy Roman Emperor, protected game in his forests in the 15th century, while many of the forests in Ottoman Turkey were protected to safeguard timber supplies for naval construction as early as the 16th century. The idea of territorial protection as a comprehensive method to preserve nature in a broader sense did not become widespread until much later. A critical step in this process was the emergence of the landscaped garden in the stately homes of the rich and powerful in 17th and 18th century Britain. These gardens mixed elements of 'wild' nature with some human design. In this,

they represented an important departure from the highly formalised garden designs that were then popular in contemporary France.

The landscaped garden presented nature in its more refined state as an object of beauty. This wild aesthetic was taken up enthusiastically by the European Romantic movement, which placed great importance on the beauty of such untamed places. In 1819, this romantic aesthetic led the German romantic Alexander von Humboldt to coin the term 'nature monument' (*Naturdenkmal*), for an area that should be protected due to its natural beauty.

The rest of the 19th century saw the emergence of an ever-growing number of civil society organisations, whose express purpose was to protect these areas of natural beauty. The first real protected areas were declared in Germany in the 1820s. This was followed by the creation of protected areas in what was then the Austro-Hungarian Empire (present day Slovenia and the Czech Republic).

1.1.2 Private and public

These initial steps toward the creation of protected areas in the 19th century were led mainly by privately funded organisations. But by the early 20th century, the state re-emerged as an actor in protected areas, leading to the creation of publicly funded protected spaces.

One of the early private organisations established to protect parts of the countryside was Britain's National Trust for Places of Historic Interest or Natural Beauty. The National Trust was founded in England in 1895 with the aim of conserving monuments and natural sites, which the association could acquire on behalf of the nation. The Trust was responding to the desire expressed by the poet William Wordsworth (1770–1850), to create a series of 'national properties'. Individual philanthropists also helped provide the money for protecting nature in Britain. In 1912, the Society for the Promotion of Nature Reserves (SPNR) was established in the United Kingdom by Charles Rothschild, and in 1910, the yet-to-be-constituted organisation purchased Wicken Fen in order to protect it as a nature reserve.

Similar, privately initiated societies were established in the Netherlands and Switzerland. In 1905 the two Dutch nature conservation pioneers, Jac. P. Thijsse (1865–1945) and Eli Heijmands founded the *Vereniging tot Behoud van Natuurmonumenten* (Society for preservation of nature monuments).

These private initiatives ran in parallel with early attempts to publicly manage protected areas. Gammelmosen near Copenhagen was made a protected area for scientific study under a Royal Resolution of 1844. Shortly afterwards, the Fontainebleau Forest near Paris was made a protected area in 1853 as a result of a campaign by bohemian artists and poets primarily to preserve its many ancient trees.

1.1.3 The era of the national park and the nature reserve

A new way of organising protected areas began to filter through to Europe in the early part of the 20th century. This was the idea of the protected area as a 'national park'. The concept of the national park was established in the 19th century in North America, where large parcels of undeveloped land were protected from human exploitation or habitation. As an intermediate step, many European countries experimented with creating national parks in their colonies, where the context was perceived to be comparable to that of the New World countries.

National parks were first created in the model of the smaller, privately owned protected areas that had emerged in the 19th century. The increasing popularity of the US-inspired national park concept led to pressure in Germany to create similar national parks. One private initiative led to the foundation in 1909 of the Nature Park Society (*Verein Naturschutzpark* or VNP). It planned to create parks in the Alps, the Central Uplands and in the north German Geest region. By 1913, the society already had 13,000 members with their associated membership income and donations. The Lüneburg Heath near Wilsede was selected as the location for the north German national park. Using the VNP's funds, more than 30 km^2 of heathland were purchased or rented by 1913.

Also in 1909, the *Ligue Suisse pour la protection de la Nature* (Swiss League for the Protection of Nature) was founded to finance the leasing of land for the future creation of the Basse-Engadine national park.

Both the Swiss and German examples were significant in that the organisations conceived of their project as one of creating a national park. However, in both cases, the organisations were privately run and managed. The first country to establish national parks that were owned by the state was Sweden, when it passed legislation to that end in 1909. Switzerland followed with similar legislation in 1914.

The creation of protected areas in the form of nationally-owned parks took on a new energy after the First World War. National parks were created in Spain in 1918 (Covadonga, Ordesa); Italy in 1922 (Gran Paradiso); Iceland in 1929 (Thingvellir); Poland in 1936 (e.g. Pieniny, Tatra, Babia Gora and Bialowieza); and Finland and Greece in 1938 (Olympe and Parnasse).

In Germany and Italy, the governmental responsibility for nature conservation had been a matter of ongoing debate in the early 20th century. But there was no resolution of the debate until 1935 when the *Reichsnaturschutzgesetz* (Reich Nature Protection Act) was passed and immediately implemented. After the annexation of Austria to Germany in 1938, the act also became relevant for that country. By 1940, more than 800 areas had been declared as protected based on this act. Even after the Second World War it still remained in power — more or less modified — constituting the *de jure* backbone of nature conservation in both Austria and Germany up to the 1970s. Nowadays, famous protected areas such as the 'Rhinedelta' at Lake Constance, which is an important site for bird migration, or the Karwendel Mountains in Tyrol, have the roots of their governance in the *Reichsnaturschutzgesetz* or its successors.

Most of the European national parks set up just before or shortly after the First World War were consciously following the US model of national parks. Like US national parks, they were originally established in less populated areas. However, the European national parks were typically smaller than those in the United States.

This period also saw the first tentative signs of an internationalisation of the protected area movement. In 1933, several colonial European powers signed the 'London Convention Relative to the Preservation of Fauna and Flora in their Natural State' to protect the wildlife and flora of Africa.

Although the number of national parks in Europe continued to grow in the early 20th century, they were not the only type of protected area. Throughout the first half of the 20th century, another way of organising a protected area existed in the form of the nature reserve. Like national parks, nature reserves were conceived as protected areas, but the nature reserve was especially singled out for the quality of its flora and fauna, whereas a national park was considered to be as important for its natural beauty as it was for its plant and animal life.

Thus the trend for creating nature reserves ran alongside that for creating national parks. In 1916, the first Finnish protected area — today called Malla Strict Nature Reserve — was established under Russian rule. In 1932, the first bilateral protected area between Poland and Slovakia was established, a Nature Park in the Pieniny Mountains. Letea Forest in the Danube River Delta was placed under protection in 1930. In 1938, it was declared a Nature Reserve in order to protect its flora and fauna. This is the oldest natural reserve in Romania and perhaps one of the oldest protected areas in Eastern Europe.

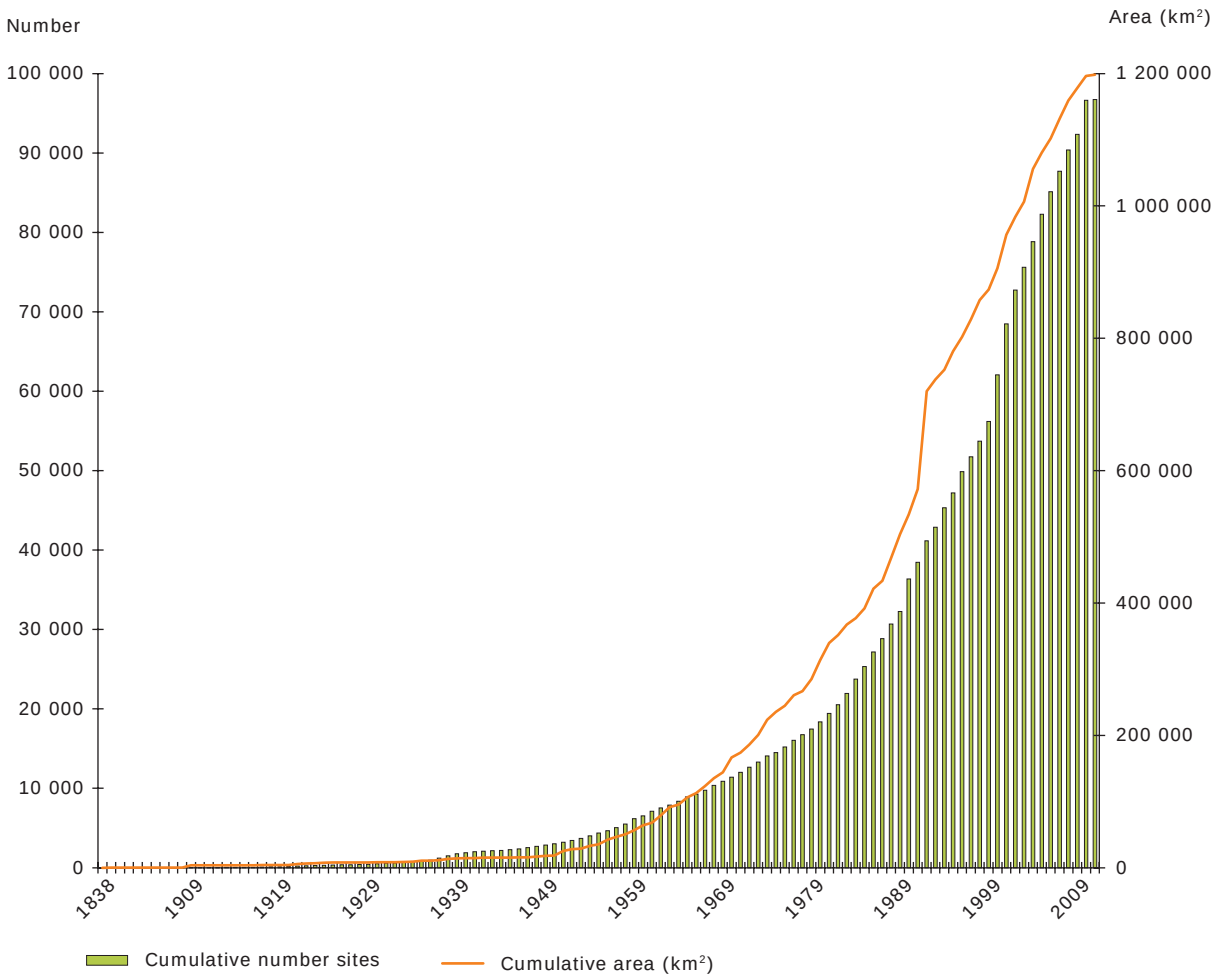
1.1.4 Changing perceptions of the protected area

After the Second World War, the biological uniqueness of a protected area began to take on greater policy significance than the simple idea of a protected area as a place of natural beauty. In 1948, the International Union for Conservation of Nature (IUCN) was set up to promote the conservation of nature worldwide and in 1969 they formally defined the term 'National Park'.

The post-war period also saw the greatest increase in the amount of land accorded protected area status. At the global scale, more than 80 % of the world's protected areas have been established since 1962, when the first World Parks Congress was held. In Europe, both the number of nationally designated protected areas as well as their total size has been growing exponentially ever since (Figure 1.1). In 2009, to commemorate 100 years of national parks in Europe, EUROPARC published a book 'Living Parks: 100 Years of Protected Areas in Europe', along with several other activities (EUROPARC, 2009).

The idea that a protected area's main role was to safeguard biological diversity led to corresponding beliefs about the best way to manage the protected area. Until the 1970s, protected areas were viewed as being independent from their surrounding landscape or seascape, as isolated 'jewels of the crown'. Societal benefits were mostly considered as incompatible with protected area objectives, and attempts to steer protected areas towards delivering social and economic benefits were largely viewed as compromising nature conservation and landscape protection objectives. Protected areas were primarily a government-driven enterprise — owned by national and sub-national governments, maintained and managed by government staff, and funded through taxes and annual government allocations.

Figure 1.1 Cumulative number and surface area of protected areas in the 39 EEA countries



Source: CDDA, June 2011.

But starting in the 1970s, this constellation of beliefs about the purpose of protected areas and the correct way to manage them began to change (Table 1.1). Planners of protected areas began to acknowledge the importance of local communities, and recognise governance models beyond government-run national parks. They also started to address the need for more systematically — and comprehensively — designed networks of protected areas, applying new ideas in the rapidly developing field of conservation planning.

Protected areas began to be viewed more as social enterprises to be managed with the needs of local communities in mind, often in partnership with social scientists, local communities and other stakeholders. At the same time, the stewardship of protected areas began to be opened up to new partners, including non-governmental organisations. This led to the creation of new forms of protected areas such as 'community-conserved areas'.

These changes have continued to shape protected area policy to the present day. In the emerging contemporary perception of protected areas, they are viewed as a critical component of a life support system, and they are expected to provide more than they ever have before. They are supposed to do more than simply protect biodiversity or provide habitats and refuges for species. They are now seen as nodes of environmental resilience, enabling humans and wildlife to adapt to the impacts of climate change, by mitigating climate change through the storage and sequestration of carbon. Protected areas are also relied on to provide so-called 'ecosystem services': the goods and services that an ecosystem provides such as clean water, temperature regulation and food provision.

Table 1.1 The changing perception of protected areas

	As it was (19th century) Protected areas were:	As it is becoming (21st century) Protected areas are:
Objectives	– Set aside for conservation – Established mainly for spectacular wildlife and scenic protection – Managed mainly for visitors and tourists – Valued as wilderness – About protection	– Run also with social and economic objectives – Often set up for scientific, economic and cultural reasons – Managed more with local people in mind – Valued for the cultural importance of 'wilderness' – Also about restoration and rehabilitation
Governance	– Run by central government	– Run by many partners
Local people	– Planned and managed against people – Managed without regard to local opinions	– Run with, for, and in some cases by local people – Managed to meet the needs of local people
Wider context	– Developed separately – Managed as 'islands'	– Planned as part of national, regional and international systems – Developed as 'networks' (strictly protected areas, buffered and linked by green corridors)
Perceptions	– Viewed primarily as a national asset – Viewed only as a national concern	– Viewed also as a community asset – Viewed also as an international concern
Management techniques	– Managed reactively within short timescale – Managed in a technocratic way	– Managed adaptively in long-term perspective – Managed with political considerations
Finance	– Paid for by taxpayer	– Paid for from many sources
Management skills	– Managed by scientists and natural resource experts – Expert led	– Managed by multi-skilled individuals – Drawing on local knowledge

Source: Phillips, 2003.

Protected areas are also expected to provide a host of social benefits, not only sustaining communities in and around their boundaries, but also by significantly contributing to the aims of the UN's Millennium Development Goals. They are also expected to do more economically, not only by generating revenue to sustain their own operation, but also by bolstering local and national economies through tourism and the supply of minor forest products, fish and other resources. This economic benefit also extends to the more indirect work of provision of ecosystem services such as the regulation of water supplies (Ervin et al., 2010). However, it should be noted that while these economic arguments have gained more weight in recent years, the intrinsic value of protected areas still remains a fundamental *raison d'être* for their continued protection and management.

The result today is a changed perception of protected areas, which contrasts in almost every respect with that which prevailed 40 or even 30 years ago. The drivers of change behind this contemporary model of protected areas include increased scientific sophistication and understanding, particularly in conservation biology and spatial ecology, as well as a heightened awareness of human rights, including through international conventions such as the *Declaration on the Rights of Indigenous Peoples* (UN, 2008). The change was also driven by new understandings of the role of civil society, and technological advances such as geographical information systems (GIS), remotely sensed data, and spatial modelling tools.

One international agreement stands out in this period for role in promoting transnational approaches to the conservation of sites: the 1971 Ramsar convention on Wetlands of International Importance, which created a framework for national action and international cooperation for the conservation and wise use of wetlands and their resources.

These changes in the understanding of what a protected area is for have been reflected also in changes of the definition of protected areas used by

many of the representative worldwide associations. In the IUCN's Guidelines for Protected Area Management Categories published in 1994, the definition of a protected area was: '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' (IUCN/WCMC, 1994). But in their new guidelines from 2008, the IUCN adds to the definition a role for the protected area in the provision of ecosystem services. The guidelines call a protected area: 'A clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values' (Dudley, 2008).

The changed perception of protected areas has also involved a shift away from conceiving of the protected area as an isolated space, and instead recognising it as part of an ecological network of other protected areas. Together, these networks are conceived of as forming a system of representative natural habitats that form core areas, corridors and buffer zones. The Pan-European Ecological Network (PEEN) set up in 2003 by the Council and Europe and UNEP aimed at providing a unifying framework across Europe to promote such concepts.

Networks of protected areas allow exchange of information and transfer of know-how and experiences. This is why there is an increasing number of social, institutional and learning networks of individuals and organisations involved in protected area establishment and management, either at regional (e.g. EUROPARC, ALPARC, MedPAN) or national level (e.g. Dutch national parks foundation).

At the global level, there are various networks of protected areas meeting certain pre-agreed criteria of excellence, management standards or significance for global conservation (e.g. the network of UNESCO World Heritage sites; or the Ramsar list of Wetlands of International Importance; or the World Network of Biosphere Reserves, created by the UN's Man and the Biosphere programme in 1977).

1.2 Recent policy developments

European policy regarding protected areas is mostly the product of initiatives from two main sources: the United Nations Convention on Biological Diversity, and the European Union itself. In what follows, we give a brief account of the most recent policy developments from these sources.

1.2.1 Protected area policy and the Convention on Biological Diversity

The UN Convention on Biological Diversity is an international treaty to which almost 200 countries are party. The Convention states that, as far as possible and appropriate, parties shall 'establish a system of protected areas or areas where special measures need to be taken to conserve biological diversity' (CBD, 2007).

Since the CBD came into force in 1993, the number of protected areas worldwide has almost doubled, and the surface area of all land and seas with protected status has increased by about 60 % (Gidda, 2010).

The 5th World Parks Congress, held in Durban in 2003 under the title 'Benefits Beyond Boundaries', aimed to consolidate the role of protected areas in conserving biodiversity, as well as encouraging debate on their role in human development, in the fight against poverty and in moderating the effects of global change. This led to the more formalised process of the CBD's Programme of Work on Protected Areas, adopted in 2004, and still relevant to policy today. The Programme provides an agreed and formalised framework for the development of ecologically representative and effectively managed systems of protected areas.

It triggered the launch of regional protected area initiatives, and facilitated the documentation of ecological, economic, social and cultural benefits of protected areas. The PoWPA succeeded in moving the international protected area community from policy discussions to implementation, focusing energy and resources on practical measures towards implementation (Gidda, 2010). As a result, protected areas have become a major instrument to reduce the rate of worldwide biodiversity loss, leading to the new subject of 'protected area management effectiveness' (PAME).

One of the specific goals of the PoWPA was to help countries meet specific targets on biodiversity. The first set of targets was the CBD 2010 Biodiversity Target agreed in April 2002. This agreement committed the parties to achieving a significant reduction of the current rate of biodiversity loss at the global, regional and national level by 2010. This target was subsequently endorsed by the World Summit on Sustainable Development and the United Nations General Assembly, and was incorporated as a new target under the Millennium Development Goals.

However, this goal was not met, leading to a reformulation of the Biodiversity Target. At a

meeting in Nagoya, Japan in 2010, the CBD adopted the Strategic Plan for Biodiversity 2011–2020, along with a series of new, so-called 'Aichi Targets'. These targets commit the almost 200 signatory countries to protecting the most biodiverse parts of their national territory, and those parts of their territory that are most crucial for protecting ecosystem services.

Under the targets, countries must ensure that by 2020 at least 17 % of their terrestrial and inland water areas, and 10 % of their coastal and marine areas are conserved through a system of protected areas. The Aichi Targets also envisage that these protected areas will create social benefits by sustaining communities in and around their boundaries, and by buffering humanity from the impacts of climate change. The protected areas are also expected to make an economic contribution by generating revenue to provide for their own upkeep. They will also make a less visible contribution and through the provision of broader ecosystem services.

1.2.2 Protected area policy in the European Union

At EU level, several directives of the European Council have been particularly important for the creation of protected areas. Like the policy of the CBD, these directives have also seen protected areas as a means of protecting biodiversity and providing a variety of ecosystem services. An early turning point for biodiversity conservation in the EU was the implementation of the Council Directive 79/409/EEC on the conservation of wild birds (more recently updated as 2009/147/EC) — the Birds Directive. The Habitats Directive (Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora) was also critical.

These two nature conservation instruments of the EU envisage the creation of protected areas as a means of achieving their objectives. The Special Protected Areas (SPAs) classified under the Birds Directive, and Special Areas of Conservation (SACs) designated under the Habitats Directive form the Natura 2000 network, an EU-wide ecological network of protected areas. The establishment of the Natura 2000 network has been an important milestone and a turning point in the history of European protected areas (illustrated and elaborated on in the following chapters). It is the most extensive protected area system worldwide, at the moment comprising more than 26 000 sites.

The Birds and Habitats Directives covered a broad swathe of territories including dry land, wetlands and seas. But the EU has also taken action specifically to protect water and marine environments and their ecosystems. The Water Framework Directive (WFD) (EC, 2000) sets the broad scope for action and ambitious goals for the protection of inland surface waters, transitional waters, coastal waters and groundwater. Article 6 of the WFD requires that all Member States establish a register of designated sites requiring special protection under specific Community legislation for the protection of their surface water and groundwater, or for the conservation of habitats and species directly depending on water.

For the marine environment, on top of the three directives mentioned above, the Marine Strategy Framework Directive (MSFD), which came into force in July 2008, establishes a framework within which Member States shall take the necessary measures to achieve or maintain good environmental status in the marine environment by the year 2020. Article 13 of the Directive states that the measures to be established shall include spatial protection measures, contributing to coherent and representative networks of marine protected areas. The MSFD is the first Community framework instrument aimed specifically at protecting and preserving the marine environment as a whole, and the first attempt by the EU to implement ecosystem-based management of human activities in the marine environment (Fleming-Lehtinen, 2011).

As part of its commitments to the CBD, the European Commission in 2011 also adopted a new biodiversity strategy 'Our life insurance, our natural capital: an EU biodiversity strategy to 2020' ([1]). The strategy also provides a framework for the EU to meet its own independent biodiversity objectives, and it sets out both a long-term vision and a short-term target as follows:

2050 vision

By 2050, European Union biodiversity and the ecosystem services it provides — its natural capital — are protected, valued and appropriately restored for biodiversity's intrinsic value, and for their essential contribution to human wellbeing and economic prosperity, and so that catastrophic changes caused by the loss of biodiversity are avoided.

([1]) http://ec.europa.eu/environment/nature/biodiversity/comm2006/2020.htm.

2020 headline target

Halting the loss of biodiversity and the degradation of ecosystem services in the EU by 2020, and restoring them in so far as feasible, while stepping up the EU contribution to averting global biodiversity loss.

Out of six targets in the biodiversity strategy, two are particularly important for protected areas. One of these targets relates to species and habitats protection and another one to ecosystem protection. The first target is that by 2020 100 % more habitat assessments and 50 % more species assessments under the Habitats Directive should show a favourable or improved conservation status compared to current assessments. This target also seeks to ensure that by 2020, 50 % more species assessments under the Birds Directive should show a secure or improved status. The second target is to maintain, enhance and restore ecosystems and their services by 2020, by establishing green infrastructure and restoring at least 15 % of degraded ecosystems.

Although the EU 2020 biodiversity strategy serves as the main vehicle for EU action to address biodiversity issues, reaching the 2020 headline target will require the full implementation of all existing EU environment-related legislation, as well as action at national, regional and local level.

Table 1.2 Environmental policy instruments important for the establishment of protected areas in Europe

Conventions at the global level		
The Convention on Wetlands of International Importance (Ramsar Convention) *	1971	The Convention on Wetlands is an intergovernmental treaty signed in Ramsar, Iran, and came into force in 1975. It is the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources.
The World Heritage Convention *	1972	The World Heritage Convention was adopted by the General Conference of UNESCO, and links nature conservation and the preservation of cultural properties.
The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention)	1979	The Convention on the Conservation of Migratory Species of Wild Animals was signed in Bonn, Germany and came into force in 1983.
United Nations Convention on the Law of the Sea	1982	The Convention has been ratified or acceded to by more than 150 states and the European Union. It governs all aspects of ocean space from delimitations to environmental control, scientific research, economic and commercial activities, technology and the settlement of disputes relating to ocean matters.
Convention on Biological Diversity (CBD)	1992	The objectives of the Convention are: conservation and sustainable use of biological diversity; and the fair and equitable sharing of the benefits arising out of the use of genetic resources. The CBD came into force in 1993.
Conventions at the pan-European level		
The Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) *	1979	The Bern Convention is a binding international legal instrument in the field of nature conservation, which covers most of the natural heritage of the European continent and extends to some states of Africa. It was opened for signing in Bern, Switzerland, and came into force in 1982.
Alpine Convention	1994	The Alpine Convention sets out the basic principles and general measures for sustainable development in the Alpine region and includes the Protocol for the Implementation of the Convention in the field of Nature Protection and Landscape Conservation. The Convention entered into force in March 1995.
European Landscape Convention (Florence Convention)	2000	The European Landscape Convention promotes the protection, management and planning of European landscapes, and organises European cooperation on landscape issues. The Convention was adopted in Florence, Italy, and came into force in March 2004.
Carpathian Convention	2003	The Carpathian Convention, signed in Kiev, Ukraine, provides the framework for cooperation and multi-sectoral policy coordination, a platform for joint strategies for sustainable development, and a forum for dialogue between all stakeholders in the Carpathian region.

Table 1.2 Environmental policy instruments important for the establishment of protected areas in Europe (cont.)

Conventions on pan-European seas		
Barcelona Convention *	1976	The Convention for the Protection Of The Mediterranean Sea Against Pollution came into force in 1978. It was revised in Barcelona, Spain, in June 1995 as the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean.
Convention on the Protection of the Marine Environment of the Baltic Sea Area (Helsinki Convention)	1992	The Convention entered into force in January 2000. The Helsinki Commission (HELCOM) is the governing body of the Convention, which works to protect the marine environment of the Baltic Sea from all sources of pollution through intergovernmental cooperation between countries.
The Convention for the Protection of the marine Environment of the North-East Atlantic (the OSPAR Convention)	1992	The OSPAR Convention is the current legal instrument guiding international cooperation on the protection of the marine environment of the North-East Atlantic. It unified, up-dated, and extended the 1972 Oslo Convention against dumping and the 1974 Paris Convention covering land-based sources and the offshore industry. The new annex on biodiversity and ecosystems was adopted in 1998 to cover non-polluting human activities that can adversely affect the sea.
The Convention on the Protection of the Black Sea Against Pollution (Bucharest Convention)	1992	The Convention was signed in Bucharest, Romania, and was ratified by all six Black Sea countries in the beginning of 1994. The Convention has given rise to many schemes for the protection of natural habitats. They include the Black Sea Environmental Programme, which organizes conservation work in habitats that are critical for populations of priority species.
Arctic Council	1996	The Ottawa Declaration formally established the Arctic Council as a high level intergovernmental forum providing the means for promoting cooperation, coordination and interaction among the Arctic States, with the involvement of the Arctic indigenous communities and other Arctic inhabitants on common Arctic issues, in particular issues of sustainable development and environmental protection in the Arctic.
Directives of the European Union		
Directive 79/409/EEC on the conservation of wild birds (Birds Directive) *	1979	The Birds Directive is the EU's oldest piece of nature legislation and one of the most important, creating a comprehensive scheme of protection for all wild bird species naturally occurring in the Union. Following numerous updates over the years, the codified version was published in 2009 (Directive 2009/147/EC).
Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (Habitats Directive) *	1992	The Habitats Directive forms the cornerstone of Europe's nature conservation policy. It is built around two elements: the Natura 2000 network of protected sites and the strict system of species protection.
Directive 2008/56/EC establishing a framework for community action in the field of marine environmental policy *	2008	The Marine Strategy Framework Directive identifies spatial protection measures as a tool for achieving good environmental status.
Other instruments		
The London Convention Relative to the Preservation of Fauna and Flora in their Natural State	1933	This Convention had objectives to protect species of value as hunting trophies and to create protected areas in Africa. For the first time at international level the Convention provided a definition of national parks and nature reserves.
European Diploma of Protected Areas	1965	This instrument of the Council of Europe is awarded to protected areas because of their outstanding scientific, cultural or aesthetic qualities; they must also be the subject of a suitable conservation scheme which may be combined with a sustainable development programme.
Man and the Biosphere Programme (MAB) *	1971	UNESCO's MAB Programme is an Intergovernmental Scientific Programme aiming to set a scientific basis for the improvement of the relationships between people and their environment globally, among which through the creation of Biosphere reserves.

Table 1.2 Environmental policy instruments important for the establishment of protected areas in Europe (cont.)

European Network of Biogenetic Reserves *	1976	The network of Biogenetic Reserves was started by the Council of Europe to encourage Member States to cooperate with a view to conserving representative examples of natural habitats that are especially valuable for nature conservation in Europe.
Global Geoparks Network *	1991	The Geoparks initiative was launched by UNESCO in response to the perceived need for an international initiative that recognises sites representing an earth science interest. For the purpose, a new internationally recognised label 'UNESCO Geopark' was developed.

Note: * Instruments marked with an asterisk lead to a specific designation of protected areas.

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2 Protected areas: the many visions of value

Chapter summary

The perception of protected areas has changed greatly in recent years. The earliest motives for protecting an area were probably to safeguard its spiritual significance or its status as a hunting ground. In Europe today, the most common motivation for protecting an area is a blended one and areas are rarely protected for a single reason. Often the rationale is a combination of valuing nature as an intrinsic good, valuing the biodiversity it provides and valuing the economic potential it contains.

This greater emphasis on the socio-economic benefits of protected areas has brought with it a requirement to measure these benefits, and to use these measurements in policy decisions. In this chapter, we examine the issue of how to place a value on nature. Our focus will principally be on monetary value, although we also consider non-monetary forms of valuation. We deal firstly with the theoretical approaches to valuing nature and the problems it presents (**Section 2.1**). We then turn to the more practical approaches that focus on: **what** specific benefits are valued, **where** in geographic terms these benefits are felt, and who receives the benefit (**Section 2.2**). By way of illustration, we finish with an example of a valuation exercise from the EU's Natura 2000 network of protected areas (**Section 2.3**).

Monfragüe National Park and Natura 2000 site, Spain

Photo courtesy of EUROPARC-España

The Burren (Black Head-Poulsallagh Complex Natura 2000 site), Ireland

© Otars Opermanis

2.1 Theoretical approaches to valuation

By defining boundaries around natural areas in order to control what happens inside those boundaries, society places implicit value on biodiversity. But distinguishing 'value' in this intrinsic sense from a more concrete or monetary value for nature is a complex challenge. The resulting juxtaposition of nature and development begged many questions about the monetary value of nature. Further European legislation also provided drivers for the valuation of nature. For example, the EIA Directive on Environmental Impact Assessment of the effects of projects on the environment was introduced in 1985. The EIA procedure ensures that the environmental consequences of projects are identified and assessed before authorisation is given. At national level, many countries have developed assessment methodologies within which biodiversity is a consideration (Jones-Walters and Mulder, 2009).

In response to these legislative developments, ecologists and environmental economists have developed an array of tools and methods to quantify and monetise the value of whole ecosystems and the goods and services that they provide. The debate on the monetary value of nature is a complex one. However, some of the main lines of argument can at least be explained relatively briefly.

One key distinction that runs through all attempts at ecosystem valuation is the difference between so-called use and non-use values. Use values provided by ecosystems include the production of goods such as seafood and timber, as well as the production of life-support processes or regulation functions, such as pollination or water purification. Cultural and religious functions are also a type of use value. Non-use values are related to the so-called 'bequest' and 'existence' functions that can be tied to an ecosystem. A bequest value is the benefit derived from knowing a resource will be passed on to future generations. Ecosystems have value in terms of conservation of options, such as genetic diversity for future use. An existence value arises when individuals value an asset even though they will never see or use it directly.

This variety of different motivations for valuing nature has given rise to a range of different methods for quantifying that value in monetary terms. There are two main approaches for quantifying nature's value (Jones-Walters and Mulder, 2009):

- The first of these is the stated preference approach. One example of the stated preference approach is the Contingent Valuation Method or 'willingness to pay' method. This method is frequently used to give nature an economic value by asking people to place explicit monetary values upon environmental goods.

- The second approach to quantifying nature's value is the revealed preference approach. This is a more indirect approach that makes it possible to value nature on the basis of consumer behaviour and choices. Examples of revealed preference approaches include: the Travel Cost method (TC), the Hedonic Pricing method (HP), the Averting Behaviour method (AB), the Production Function method (PF), the Prevention Cost method (PC), and the Shadow Pricing Method (SPM).

Both approaches have clear advantages and disadvantages. The advantage of stated preference tools such as CVM is that they can be used to economically measure the full spectrum of use and non-use ecosystem benefits. A disadvantage is that they are based on questionnaires. There is a difference between what people say they value in questionnaires and what people show they value through their daily actions. Also, it is difficult to place an economic value on an ecosystem service through a questionnaire when the general public may be ill-informed or unfamiliar with the subject.

Revealed preference methods also have shortcomings. They can only be used for a limited number of biodiversity value categories, as they do not allow a monetary assessment of non-use values.

Yet another way of calculating the value of an ecosystem is by looking at the monetary sum of all use and non-use values for a good or service provided by a given ecosystem. The so-called 'Total Economic Value' (TEV) framework is especially helpful because it focuses on how much of an ecosystem's economic value is actually reflected in the real economy at present, who are the beneficiaries, and how many jobs are directly and indirectly sustained by it. However, the TEV approach is also problematic in some respects. The principal problem is that the aggregate TEV of a given ecosystem's functions, or combinations of such systems at the landscape level, may not be equivalent to the total system value. The continued functioning of a healthy ecosystem is a complex process that represents more than the sum of its individual functions or components; there is therefore a hidden value attached to the 'completeness' of an ecosystem in terms of the composition of its species and habitats. This makes the TEV approach, like other economic valuation approaches, inherently imperfect in accounting for the full economic value of nature areas and landscapes.

In spite of the theoretical difficulties of valuing nature, researchers are in the process of developing several methodologies to place a financial value on natural assets, biodiversity and the ecosystem services that they provide. One such method is The Economics of Ecosystems and Biodiversity (TEEB) process, and specifically the recommendations within the TEEB for policymakers (TEEB 2011).

2.2 From theory to action

The debate over what methodology to use when attempting to value nature will continue. But in practice, only some of the values outlined above can be estimated in terms of money. This leaves policymakers in some difficulty: presented with

such a variety of theoretical valuation approaches, they are aware of the possible shortcomings in each method, but still need to act. Policymakers have thus typically chosen to adopt a less abstract approach, and accept that the final assessment of the overall value of the site is always likely to be a combination of estimates. These estimates are qualitative, quantitative and monetary, and cannot easily be merged into one single euro figure (Kettunen et al., 2009).

In order to assist the more qualitative work of valuing protected areas, we can choose to turn away from the question of the exact monetary benefits of a protected area, and instead examine how these benefits manifest themselves. This allows for a more practical — albeit necessarily imprecise — approach to valuing nature and protected areas. In what follows, we attempt to follow that practical course by looking at what the benefits of nature are, as well as where and who they accrue to. In this respect the recent paper by Larsen et al. 'Conserving critical sites for biodiversity provides disproportionate benefits to people' provides an interesting perspective on this issue.

2.2.1 What are the sectoral benefits?

Ecosystem services provided by protected areas consist of different types of benefits ranging from the provision of resources to the fundamental processes that underpin an ecosystem's whole existence. One of the most important perspectives on ecosystem services in the current European context is the concept of 'green infrastructure'. In the past, green infrastructure was used to describe natural, connected habitats within urban areas. However, it has recently been used in a broader sense in the European Commission's EU 2020 European biodiversity headline target and 2050 vision, aimed at halting and reversing the loss of biodiversity across the territory of the Member States, and as a response to the Aichi targets signed at the CBDs COP 10 (EC, 2011).

In this use of the term, green infrastructure describes an approach to the natural environment that recognises the importance of ecosystems, the services they provide and the complex ways in which they are connected to each other and to society. The term also refers to the processes in place to address and mitigate climate change and to improve resilience in the face of natural disasters. For example, a green infrastructure approach would seek to prevent flooding by using ecosystem-based approaches for coastal protection through marshes/flood plain restoration rather than constructing dikes. Green infrastructure helps ensure the sustainable provision of ecosystem goods and services while increasing the resilience of ecosystems. It also promotes integrated spatial planning by identifying multi-functional zones and by incorporating habitat restoration measures and other connectivity elements into various land-use plans and policies, such as linking peri-urban and urban areas or in marine spatial planning policy. Its ultimate aim is contributing to the development of a greener and more sustainable economy by investing in ecosystem-based approaches delivering multiple benefits in addition to technical solutions, and mitigating the adverse effects of transport and energy infrastructure (EC, 2012).

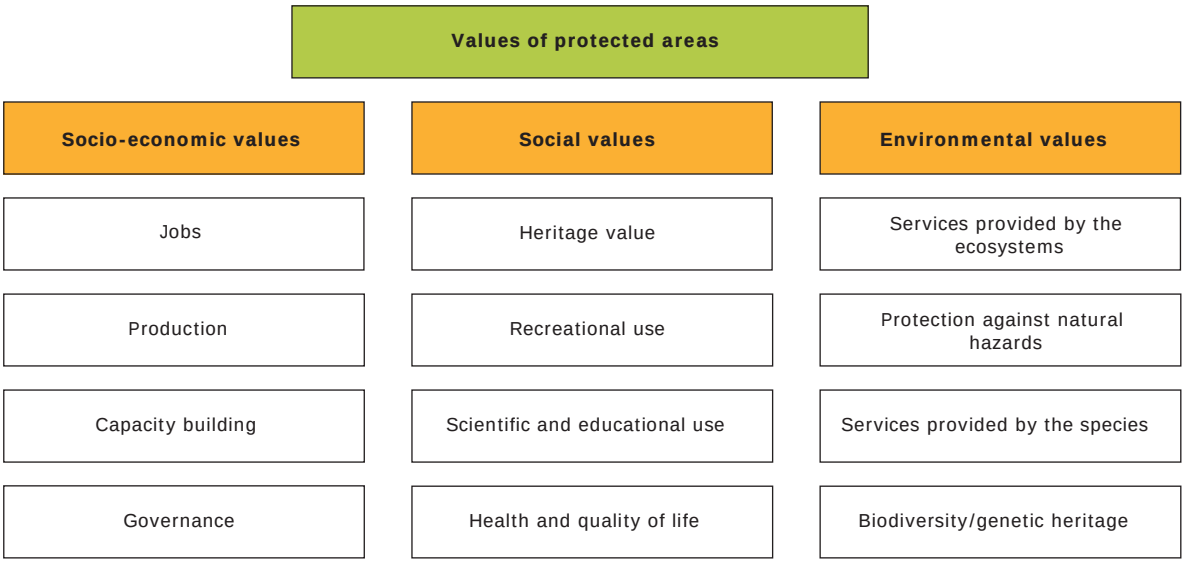
Components of a green infrastructure include protected areas, such as Natura 2000 sites (EC, 2010a). With protected areas at its heart, it can provide environmental, economic and social benefits, mainly by encouraging partnerships and the active involvement of relevant stake- and resource holders on the ground.

Dujin et al. (2008) identified three major types of values related to protected areas: socio-economic, social, and environmental (Figure 2.1). By way of caveat, it must be remembered that ecosystem services are often interlinked, and in many cases the existence of one service is dependent on the existence of some other services. Therefore, assessing the total economic value of a site by simply summing up the different available value estimates can lead to overestimating the total value, a problem called 'double counting'. Here are some of the sectoral benefits provided by protected areas.

- **Employment and economic support to weak regions:** Protected areas make a significant contribution to a regional economy, including job creation. Often this contribution comes through tourism (Stolton, 2009). The creation of infrastructure and the management of conservation sites also create new jobs. Properly managed Natura 2000 sites support long-term employment, contribute to an economically diverse local economy, and encourage skills retention and development. Many sites attract significant visitor numbers whose spending increases income diversification in economies often reliant on agriculture (BirdLife International, 2011).

- **Marketing agro-biodiversity and protected areas (labelling and branding):** Protected areas can foster biodiversity in agriculture,

Figure 2.1 Values of protected areas



Source: Adapted from Dujin et al., 2008.

also known as agrobiodiversity. There is tremendous marketing potential for biodiverse agricultural products. Organic production, regional fairs and markets, cooking competitions with regional products and publication of regional recipe books are examples of how conserving agrobiodiversity can be marketed. Protected areas are also important for the conservation of traditional breeds and local crop varieties, which in many cases are better adapted to local conditions and less susceptible to diseases (Grabrijan in Stolton, 2009). Grazing of traditional cattle breeds in protected areas under conservation management with restricted use of pesticides and fertilisers produces high quality meat, healthier and tastier than conventional meat (CEEweb, 2007).

- **Health:** Natural ecosystems are known to play an important role in supporting physical and mental health by providing possibilities for outdoor activities, recreation and relaxation. Recreation in wild areas provides physical health benefits through the prevention of disease associated with exercise, as well as mental health benefits such as the relief of stress, anxiety, and depression and contributing to improved self-confidence and self-esteem (McMorran et al., 2006). Protected areas can also function as 'green lungs' supplying clean air to towns and cities. This can in turn reduce incidents of respiratory diseases diminishing health related expenditure (Kettunen et al., 2009).

- **Fisheries:** Evidence is mounting that marine protected areas, where fishing and other human activities are restricted or prohibited, conserve habitats and populations. And by exporting biomass, they may also sustain or increase the overall yield of nearby fisheries (Balmford et al. 2004). Several case-studies on marine reserves suggest that the increase in fish catches in the fishing zone neighbouring the no-take zone can more than compensate for the negative impact of decreasing the size of the fishing zone. They can also reduce the recovery time of the stock after a negative shock and, over time, bring stability in catches by making fish stocks less vulnerable to overfishing. The implementation of a marine reserve may also have different consequences on the price of fish: an impact due to the variation of quantities landed; a 'quality' impact due to a shift in the size and species composition landing; and better marketing opportunities. Fisheries may also take advantage of the 'ecologically correct' image of the fishing zone of the marine protected area to sell the fish at a higher price (Alban et al., 2006).

- **Drinking water supply:** Well managed protected forests provide benefits to urban populations in terms of high quality drinking water. Ecosystems such as forests and wetlands play an important role in the hydrological cycle, including regulating the provisioning of water, i.e. 'capturing' quantities of water for human or other use (including both surface and ground

water) (Dudley and Stolton, 2005; Kettunen et al., 2009).

- **Pollination:** The importance of wild pollinators — principally bees, but also other insects — for agricultural production is becoming increasingly recognised. Evidence exists that wild pollination increases the size and quality of harvests for a number of crops. Wild pollinators may also interact synergistically with managed bees to increase crop yields. Furthermore, a diverse assemblage of native pollinators provides insurance against year-to-year population variability or loss of specific pollinator species, and might better serve flowers because of pollinator-specific spatial preferences to a flowering plant or crop field (Kettunen et al., 2009).

- **Climate change mitigation and adaptation:** Biodiversity is a fundamental component in the carbon sequestration process (i.e. the absorption of carbon from the atmosphere by plant tissue) and it plays an important role in mitigating climate change. The characteristics of different plant species determine how much carbon is taken up from the atmosphere and how much is released into it. Important characteristics are the speed of plants' growth, which governs carbon inputs, and woodiness, which enhances carbon sequestration (Kettunen et al., 2009). In addition to actively sequestering carbon, ecosystems (e.g. bogs and old forests) are also important stores for carbon captured in the course of time. Whilst undisturbed peat bogs take in and store carbon, damaged peat lands emit greenhouse gases into the atmosphere. When peat bogs dry out or when they are converted to other uses (e.g. agriculture) they quickly begin to lose the stored carbon in form of greenhouse gases, thus contributing to global warming. Conservation and restoration of peat bogs will help keep them in a good ecological state, maintaining carbon levels (CEEweb, 2007).

- **Disaster mitigation:** Protected areas can play a role in disaster mitigation, but the relationship is complex and still needs to be better understood. In terms of individual disasters, the role of protected areas includes mitigating the effects of: flooding; landslides; avalanches and rock falls; tidal waves and coastal erosion; drought and desertification; fire; hurricanes and typhoons; and earthquakes. When properly planned and budgeted, protected areas can play three direct roles in preventing or mitigating disasters arising out of natural hazards (Stolton, 2009):
  1) maintaining natural ecosystems such as coastal mangroves, coral reefs, floodplains and forest that may help to buffer against natural hazards;
  2) maintaining traditional cultural ecosystems such as agroforestry systems, terraced crop growing and fruit tree forests in arid lands can reduce water flow and soil erosion, thus mitigating extreme weather events;
  3) providing an opportunity for active or passive restoration of such systems where they have been degraded or lost.

  The management of protected areas plays an essential role in their capacity to mitigate natural hazards. The social impacts of disasters include loss of lives and livelihoods, injury and displacement, increased risk of disease, interruption of economic activities and loss of, or damage to, infrastructure, communications and important cultural values and heritage (Stolton et al., 2008).

- **Maintaining genetic and species diversity:** Food production and security depend on the conservation of crop and livestock biodiversity. Crops, livestock and their wild relatives have the genetic variability that provides the raw material for breeding new crop varieties, through classical breeding and biotechnological techniques. The conservation of genetic resources for food and agriculture relies on the preservation of both the variety of domesticated species and their wild relatives. One of the main threats to the genetic diversity of crops and livestock is the marginalisation of traditional production systems and associated local breeds. Protected areas can play an important role in preserving traditional extensive farming systems and supporting the maintenance of genetic diversity (Kettunen et al., 2009).

- **Tourism:** Protected areas are often important destinations for alternative forms of tourism, such as ecotourism (Stolton, 2009). If sensitively developed, ecotourism can help diversify economies, supplement incomes and maintain rural communities (BirdLife International, 2011). Large conservation areas play an important role in attracting day tourists and increasing the added value to the region. Protected areas are prized assets for the tourism industry based on the beautiful natural resources they sustain. The tourist sector is reliant on having beautiful and attractive places, which are a source of wealth for the wider economy. Protected areas provide these special places. Tourism is often

the most sizeable part of the local economy, and therefore protected areas can be regarded as a motor of sustainable regional and rural development (Blackman in Stolton, 2009).

- **Education:** Protected areas can provide an important education resource, both in terms of providing an outdoor laboratory for scientific study, and as a resource for physical activity. Wilderness has been found to promote team-building and cooperation and a greater respect for the environment. A large number of protected areas are engaged in a range of educational activities such as ranger-led walks, in-depth on-site and off-site interpretation, and on-site research and site visits by school groups as well as groups from colleges and universities (McMorran et al., 2006).

- **Spiritual and cultural values:** Several case studies show how important many protected landscapes and seascapes are for the cultural and spiritual values that they contain. Nature has intrinsic values and meanings, including spiritual, and is understood by followers of various faiths and spiritual traditions as a divine manifestation of some deeper, sacred reality. Spiritual values are reflected in a number of European landscapes that have been created and maintained by local communities sharing those values. Various processes have looked at the spiritual and cultural aspects of protected areas including: the year 2000 European Landscape Convention; the 2003 UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage; the 2003 World Park Congress (WPC) — Action Plan + recommendation 5.13; the 2008 IUCN Protected areas definition which includes 'associated cultural values' (Mallarach in Stolton, 2009).

2.2.2 *Geographies of value: where are the benefits of protected areas felt?*

According to Kettunen et al. (2009), the benefits created by protected areas can be enjoyed at multiple levels. The key levels where protected areas related benefits can occur are:

- local public benefits: a site's role in supporting local identity, local recreation, local non-market forest products, and the local 'brand', etc.;

- local private benefits: a site's support to natural water purification resulting in lower pre-treatment costs to the local water supply company, etc.;

- local public sector benefits: a site's ability to mitigate floods resulting in lower public investment in flood control and/or flood damage, etc.;

- regional and cross-border benefits: regulation of climate and floods, mitigation of wild fires, provisioning and purification of water in transnational river basins), etc.;

- international/global public benefits: a site's provision of a habitat for a migratory species at some point in its annual cycle, regulation of climate (carbon capture and storage), maintenance of global species and genetic diversity), etc.;

- international private benefits: new pharmaceutical or medicinal products derived via bio prospecting, etc.

2.3 Europe

Although the competing methodologies for valuing nature all have shortcomings, the European Commission nevertheless did make an attempt to place a value on some of its protected areas. Recent work undertaken on its behalf has sought to provide an overall monetary figure for the contribution of Natura 2000 sites to the European economy. This research has also investigated the financial benefits that the Natura sites deliver in relation to the tourism industry; and to demonstrate the economic benefits of conservation measures. The research found that the annual costs of implementing the Natura 2000 network were approximately EUR 5.8 billion for the EU-27. However, a number of examples, which considered the wide range of ecosystem services that Natura 2000 sites can provide, demonstrated that the benefits of the network can be between 3 to 7 times the costs. The work emphasised that Natura 2000 sites can be particularly important for local and regional economic development, as they help to attract financing, and offer an important source of direct and indirect employment (Gantolier et al., 2010).

The research also quantified the specific benefits provided by tourism, recreation and employment. Natura 2000 sites receive between 1.2 and 2.2 billion visitor days per annum. Around 21 % of the visitors to Natura 2000 are estimated to give importance to the Natura 2000 designation in choosing their destination. Visitor spending was estimated at between EUR 50 and 90 billion; this expenditure

generating additional income in the range of EUR 50 to 85 billion. Within the geographical area designated by Natura 2000, there are roughly 8 million full time equivalent (FTE) jobs. This corresponds to about 6 % of the total employment in the EU-27 (BIO Intelligence Service, 2011).

It is important to ensure that the full value of protected areas is incorporated into policy appraisal and decision-making mechanisms in order to ensure the sustainable use of their natural resources and the protection of their natural environments.

2.4 Conclusions

Protecting natural habitats is essential to halt the loss of biodiversity. Assigning a monetary value to nature in general and protected areas in particular is problematic in both theory and practice. Nevertheless, the wide variety of benefits provided by ecosystems in protected areas means that policymakers are at least aware of the importance of maintaining the services that these protected area ecosystems provide. These considerations are clearly timely for a number of reasons. The current financial crisis has placed greater focus on the value for money to be extracted from all public policy sectors, and protected areas will not be excluded from these calculations. Regardless of the ultimate political economic decisions made, there is an opportunity to factor in investments in ecosystems as part of the future expenditure programmes of all European countries.

However, this opportunity will only remain viable if results can be measured. Without having an adequate understanding of the net economic benefit of nature areas, a proxy for our global environmental infrastructure, and how many jobs are directly and indirectly sustained, it will remain difficult for governments to justify and incorporate investments in protected areas as part of these packages.

It is therefore to be hoped that the current undeveloped state of nature valuation methods can be addressed. The TEEB process in particular may establish new tools that can provide policymakers with easily digested information that they can trust (and which can contribute to the overall effort in relation to the valuation of ecosystem services). Better informed decision making will assist in the delivery of increasingly sustainable development and should result in an improvement in the outlook for biodiversity, ecosystems and the provision of goods and services, well into the future.

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3 The environmental context of protected areas in Europe

Chapter summary

Although they have clear boundaries on maps, protected areas exist as part of the continuum that is the natural environment of Europe. In some cases, they may represent islands of habitats in a highly fragmented landscape. In others, they may be the best parts of areas that are already of generally high nature conservation value. In both cases, they will be directly or indirectly affected by the land use and management practices around them. It is therefore important to give some consideration to the environmental context of protected areas in Europe.

This chapter is divided into three parts. We begin with a discussion of Europe's 'biogeography' — namely the different types of natural environments that exist in the continent's regions (**Section 3.1**). We then deal with the state of biodiversity in these areas (**Section 3.2**), before finally moving on to analyse the causes of declining biodiversity (**Section 3.3**).

Visiting blooming meadows in the regional nature park (PNR) of the Bauges, France

© Gordon McInnes

Encinares de la Sierra de Ávila, Natura 2000 site, Spain

Photo courtesy of EUROPARC-España (Javier Puertas)

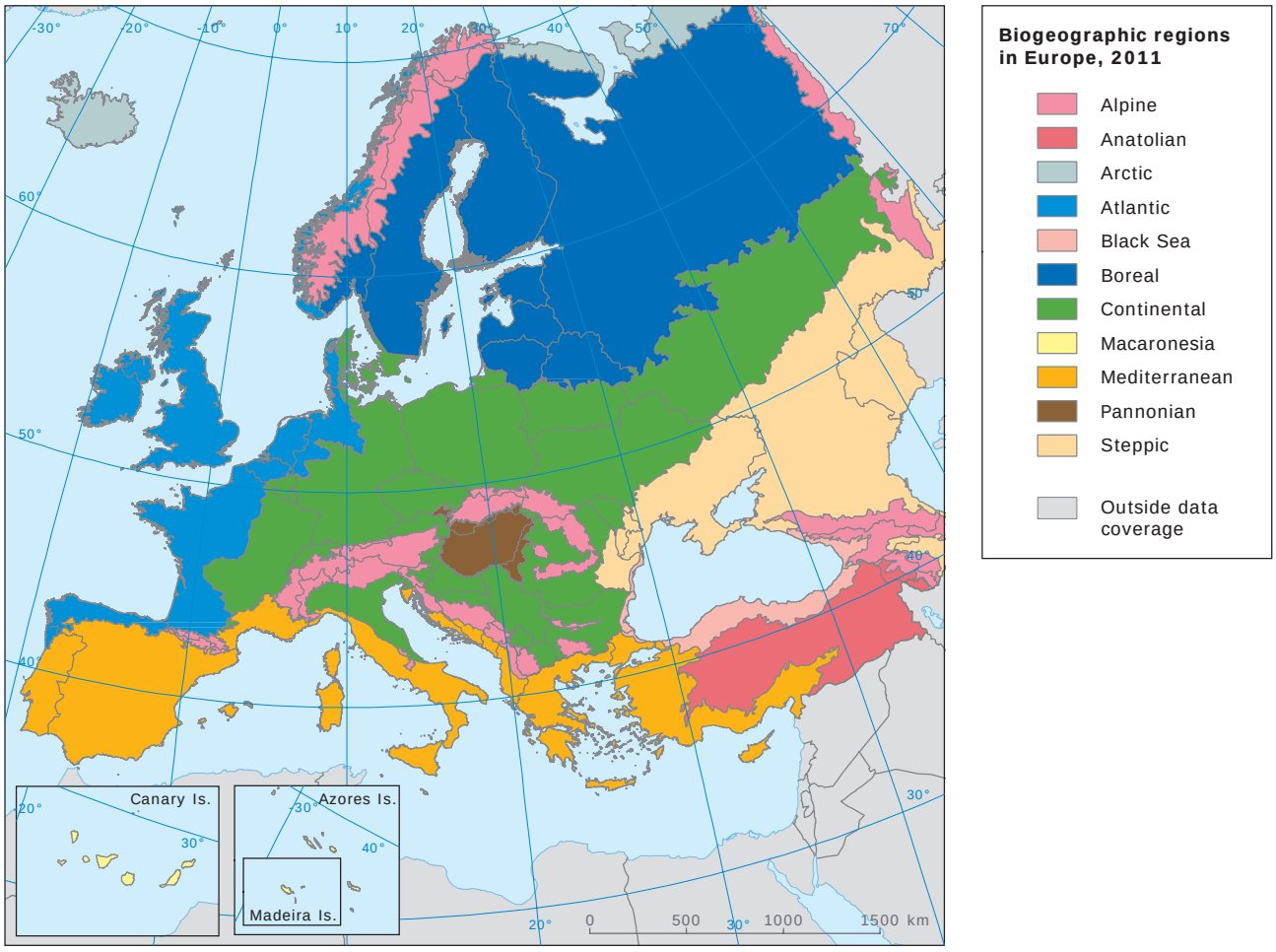
3.1 A mosaic of landscapes: biogeography and human influence

The European continent is characterised by great diversity in its geographical regions. This diversity includes Arctic polar deserts and boreal forests in the north, as well as the arid lands and dense mattoral of the south. It stretches from the steppic zones in the east to the extensive heathlands of the west. In total, the continent comprises eleven biogeographic regions (Map 3.1) of varying size, each of them reflecting specific climatic and geological conditions, all of which influence their characteristic biodiversity.

Europe's coastline is estimated to stretch along almost 185 000 km in 24 European countries (22 coastal EU Member States plus Iceland and Norway), providing large interfaces between land and seas (EEA, 2006).

Europe's mosaic of landscapes (Map 3.2) is also the product of intense human intervention over many centuries. In Europe, large scale human impacts began in Neolithic times (ca. 3000–1100 BC). Hunting, settlements, and cultivation of cereals, crops and fruits all altered natural ecosystems and shaped the continent's landscape (Vos and Meekes, 1999). Until the 18th century, however,

Map 3.1 Biogeographic regions in Europe, 2011



Source: EEA, 2012a.

European landscapes preserved many remnants and structures of the remote past. But this changed in the 19th century, when industrialisation and technical development fundamentally altered European economies. The corresponding changes in social relations were reflected in a different attitude towards the use of nature and rural landscapes, and in the disappearance of some of the remnants of the remote past. After the Second World War, land use intensified even further in many parts of Europe, and infrastructure development and urbanisation caused landscape 'fragmentation', where parts of the landscape were disrupted by roads, railways and canals (Antrop, 2005; Emanuelsson, 2009; Pedroli et al., 2007).

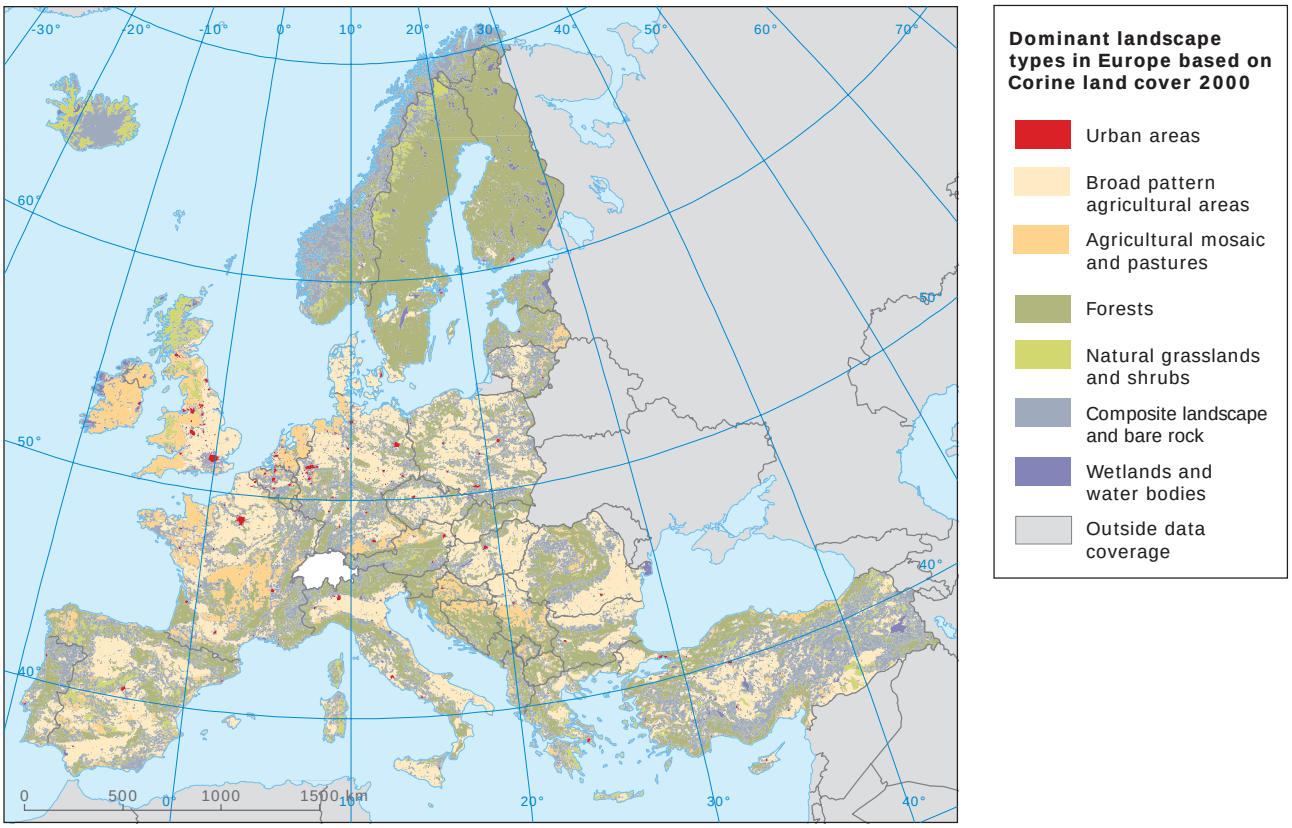
Another important characteristic of land use in Europe is that land often has multiple purposes, and is therefore intensively managed for different things at the same time.

The density of human population in Europe is another important factor that explains patterns and trends visible in the landscape. When compared with other large land areas of similar size (i.e. the Russian Federation, Australia and parts of North America), Europe's human population density is much higher. This has direct impacts on the type of landscapes and the corresponding biodiversity.

In those EU Member States that border the sea, coastal regions typically host almost half of the human population of those countries. The highest population density is found in the coastal regions of Malta, Belgium, Italy, the Netherlands, Portugal, Spain and the United Kingdom, whereas the lowest population densities are in Estonia, Finland, and Sweden (Eurostat, 2009).

Europe's mountain areas have lower population densities because much of their area is unsuitable for human habitation. However, densities in

Map 3.2 Dominant landscape types in Europe based on Corine Land Cover (CLC) 2000



Source: CLC, 2000.

valleys may be as high as in lowland areas. In total, 118 million people live in Europe's mountain regions (17 % of Europe's population), including 33 million in Turkey. In the EU, 63 million people (13 % of the population) live in mountain areas (EEA, 2010e).

Ten European countries have at least half of their population living in mountainous regions: Andorra, Austria, Bosnia and Herzegovina, the Faeroes, the former Yugoslav Republic of Macedonia, Liechtenstein, Monte Carlo, San Marino, Slovenia and Switzerland. With the exception of very small states with the highest population density (Andorra, Liechtenstein, Monte Carlo, and San Marino), population densities in the mountainous parts of countries are always less than those outside the mountains.

3.2 Biodiversity under pressure

Europe's biodiversity has been shaped by the same historical human influences that shaped many of our European landscapes, creating a large variety of so-called 'semi-natural habitats'. But more recently, some of this biodiversity has come under pressure due to recent drastic changes in land uses and practices.

3.2.1 Forestry

Although in the past, forests in Europe were cut down at a faster rate than they were allowed to grow back, this trend has reversed in recent years. In the past 20 years, forest area in Europe has expanded by 17 million ha, 5.1 million ha of which since 2005. Today, forest area in Europe amounts to 1.02 billion ha, of which 83 per cent is available for wood supply. Europe is the most forest-rich region in the world, with forests covering 45 per cent of Europe's total land area, mainly due to the forest cover in the Russian Federation.

Forest cover in Europe is very heterogeneous among countries. North Europe and the Russian Federation are the European regions with the greatest amount of forest cover, while south-east Europe is the least forested European region. Forest area has increased in all the European regions since

1990. And Europe is the only region in the world that has experienced a positive net change in forest area for the past 20 years.

Excluding the forests in the Russian Federation, about 87 per cent of European forests are classified as semi-natural. Undisturbed forests are those where the natural forest development cycle has remained or been restored, and that show characteristics of natural tree species composition, natural age structure, deadwood component and natural regeneration and no visible sign of human activity (MCPFE, 2007). In the EEA area, undisturbed forests account for 8 million ha or 4 per cent of the forest area total. In the EU undisturbed forests cover only 4 per cent of forest area or roughly 5.7 million ha. The largest undisturbed forest areas (over 100 000 ha) are found in Bulgaria, Estonia, Finland, Romania, Slovenia, Sweden, and Turkey.

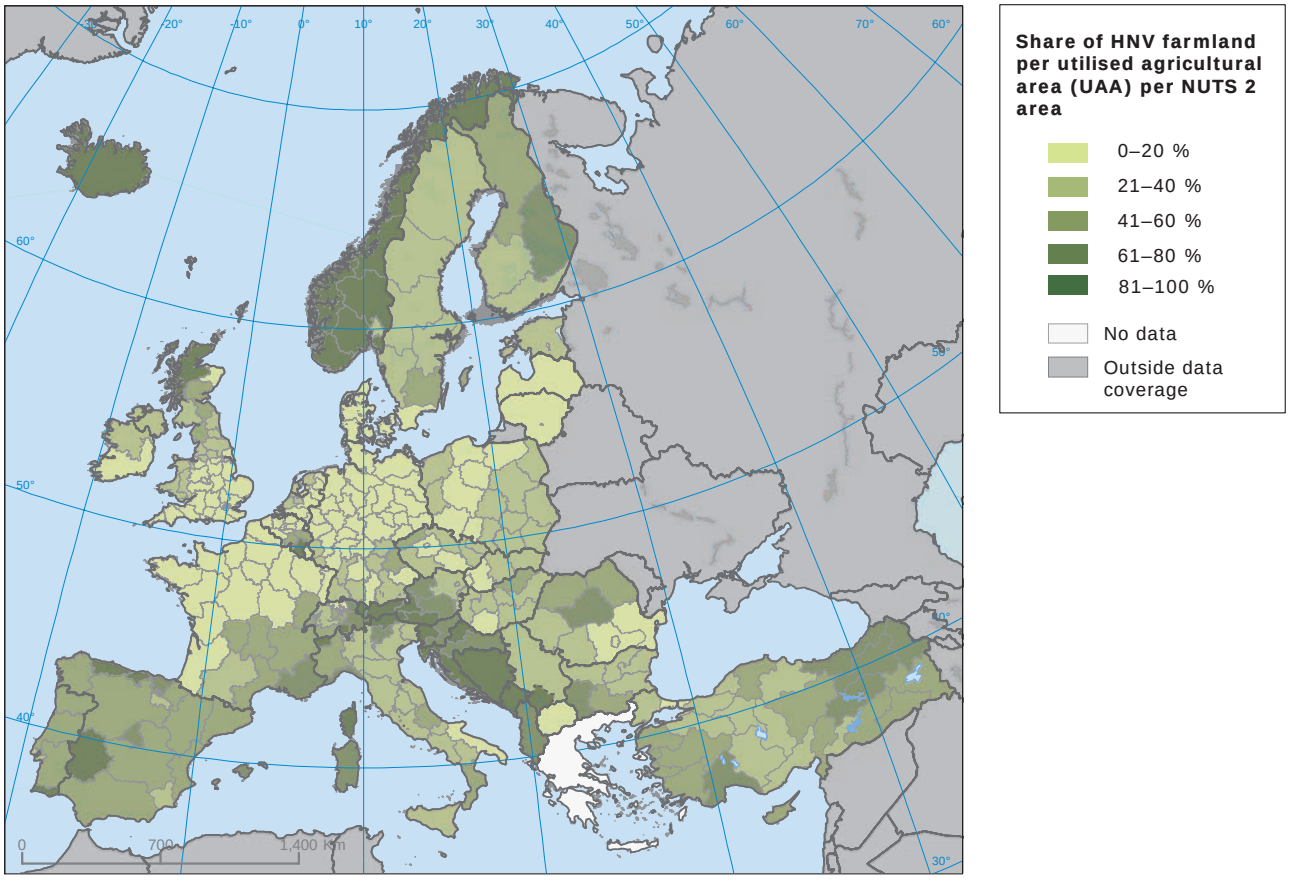
The highest share of undisturbed forests as a percentage of total forest area can be found in the Russian Federation (32 %) and in countries in northern Europe. The share of planted forests as a percentage of total forest cover is highest in the central-west European region (FOREST EUROPE; UNECE and FAO, 2011).

3.2.2 *Agriculture*

Approximately 47 % of land in the Member States is devoted to agriculture, making this sector a major element of land use across the EU (EC, 2010b). From prehistoric times onwards, agriculture and animal husbandry have spread gradually from south-east to north-west Europe. New habitats formed and species populations were enriched by animal and plant species migrating into these agro-ecosystems from neighbouring biogeographical areas such as the Asian steppes. New crop and livestock varieties were raised and actively introduced by humans for agricultural purposes (ELO, 2009). As a result, a large number of highly valued wildlife species and semi-natural habitat types in Europe are dependent on continuing low-intensity agricultural practices.

Although the exact definition may vary among the different countries, areas where farming

Map 3.3 Share of HNV farmland per utilised agricultural area (UAA)



Source: EEA, 2012b.

practices are associated with high biodiversity value are often qualified as High Nature Value (HNV) farmland (Map 3.3) (EEA, 2004; Paracchini et al., 2008). HNV may be farmland with a high proportion of semi-natural vegetation; or farmland dominated by low intensity agriculture. It may also be a mosaic of semi-natural and cultivated land and small-scale features; and/or farmland supporting rare species or a high proportion of European or world populations (Anderson et al., 2003).

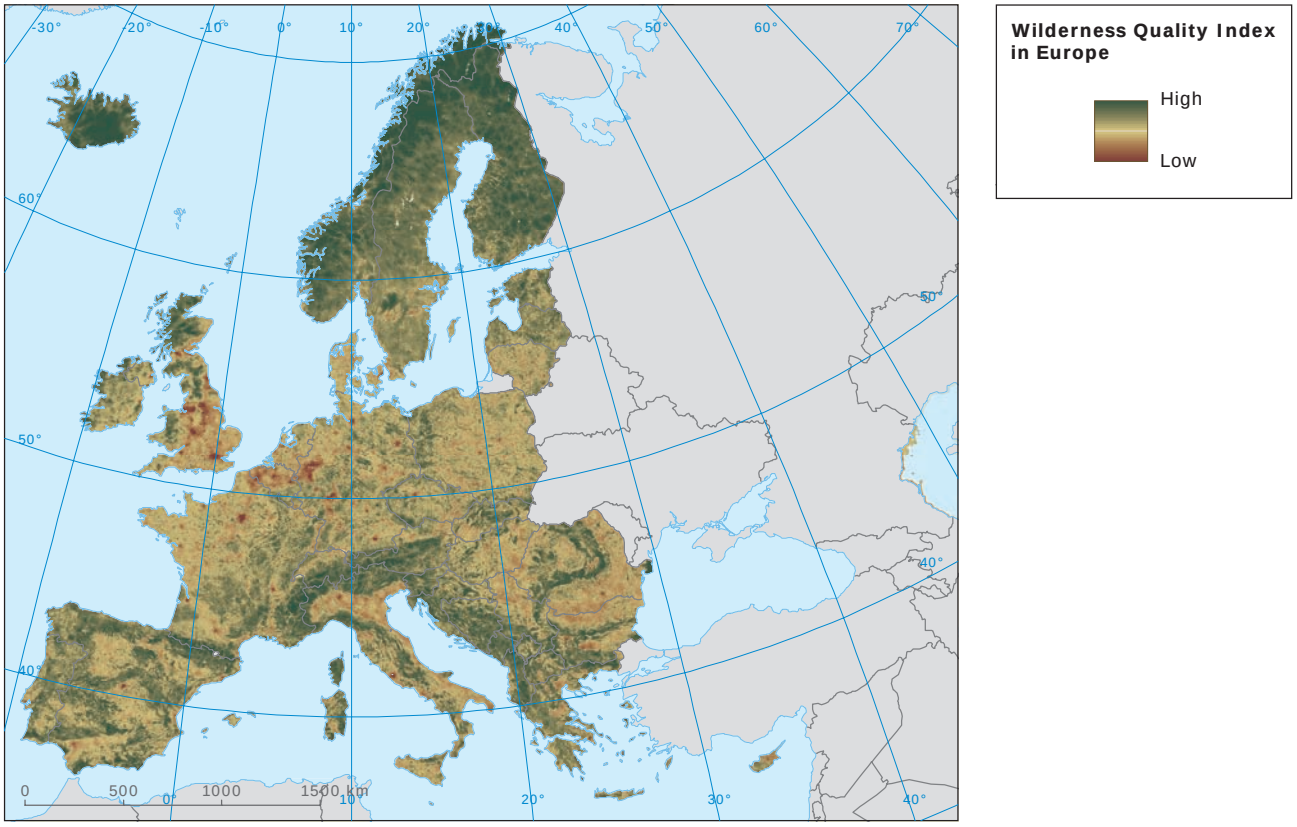
A large part of these HNV farmlands are also located in areas designated as 'less-favoured' from an economic perspective. Agricultural production or activity is restricted in these areas because of factors such as difficult climatic conditions, steep slopes in mountain areas, or low soil productivity. As a result of these difficult agricultural conditions, there is a significant risk of agricultural land abandonment in less favoured areas. There is therefore a possibility that the biodiversity that depends on this low intensity agriculture will be lost. If this land is abandoned there is also a risk that desertification and forest fires will increase, and that highly valuable cultural landscapes will be degraded.

Protected areas have an important role to play in such areas by enhancing rural development through taking into account their specific environmental and cultural contexts. This could be accomplished though the marketing of quality local farmland products.

3.2.3 *Areas of wilderness in Europe*

In an attempt to assess the extent of remote areas in Europe, Fisher et al. (2010) have developed the Wilderness Quality Index (Map 3.4), based on a combination of data on population density, road density, distance from nearest road, rail density, distance from nearest railway line, naturalness of land cover and ruggedness of the terrain, all of which are proxies for landscape wildness, rather than ecological wildness. In doing so, they make reference to the definition of wild areas and objectives as addressed during the Prague Conference 2009 *Wild Europe and Large Natural Habitat Areas* which is: 'large areas of existing or potential natural habitat, recognising the desirability of progressing over time through

Map 3.4 Wilderness Quality Index in Europe



Source: EEA, 2011b.

Box 3.1 Wilderness in the southern Carpathians

In Europe, with its long history of human settlement, the southern Carpathians present an anomaly. The area stretching from Djerdap National Park in northern Serbia across the Danube gorge at the Iron Gates, up to the Retezat, Romania's flagship national park, and across the Fagaras mountains almost to the bend that the Carpathian Mountains make at Brasov is surprisingly well preserved and almost untouched in comparison with most other parts of Europe.

The southern Carpathians represent one of Europe's very few remaining great wilderness areas. The area totals over 1 million hectares and includes the last intact forest landscape in continental Europe. It is home to abundant wildlife, including brown bears, lynx, wolves and chamois.

Source: Beckmann, 2009.

increased stages of naturalness — via restoration of native vegetation and a moving towards natural rather than built infrastructure.' (Coleman and Aykroyd, 2009).

Wilderness conditions can be seen in certain high-latitude and high-altitude areas, such as parts of Fennoscandia (Finland, Norway and Sweden) and the mountains of central and southern Europe. In addition, smaller, more fragmented areas with certain wilderness characteristics can be found over a range of intermediate landscapes across the whole of Europe (as indicated by the Wilderness Quality Index, Map 3.4). In these landscapes, the natural ecological conditions have only been slightly modified by grazing, forestry, recreation or isolated human developments (Fisher et al., 2010).

3.2.4 The conservation status of species in Europe

Although the threat of species extinction in Europe is lower than in other parts of the world (as many species have already disappeared) current trends are a concern. Assessments made by IUCN (and Birdlife International for birds) on all species from different taxonomic groups in the EU Member States are shown in Table 3.1.

The first EU-wide assessment on the conservation status of the habitat types and species of Community interest in the EU was published in 2009, and it gave valuable information on the health of many species and habitat types. The information is based on the 6-year period reports that all EU Member States are requested to send to the European Commission under the terms of the Habitats Directive.

The first round of reporting (2001–2006) by EU Member States (Romania and Bulgaria excepted) on the conservation status of 1 182 species targeted by the Habitats Directive showed favourable conservation status in only 17 % of cases, unfavourable status in 52 %, and in 31 % of the cases the status was unknown (Figure 3.1). Similarly, just 17 % of the assessments of the 216 European habitat types targeted by the Directive were favourable (Figure 3.2) (EEA, 2010d).

Marine species and habitat types show an even worse situation. In the same period, only 10 % of the assessments of the marine habitat types and 2 % of the marine species were favourable. Only the habitat types of coastal ecosystems, agro-ecosystems and grasslands were doing worse than marine ones.

The conservation status reports also revealed a particularly large gap in knowledge of marine ecosystems. Over 40 % of the habitat assessments and over 70 % of species assessments were considered unknown, with particularly large gaps in our knowledge of cetaceans such as whales and dolphins (ETC/BD, 2008). By way of comparison, the ecosystem sector with the second highest level of unknowns was the heath and scrub habitat types, where 26 % of the habitats and 40 % of the species had unknown conservation statuses.

There are also differences between the four marine regions (see Figures 3.3 and 3.4).

Pededze floodplains Nature Reserve, Natura 2000 site, Latvia

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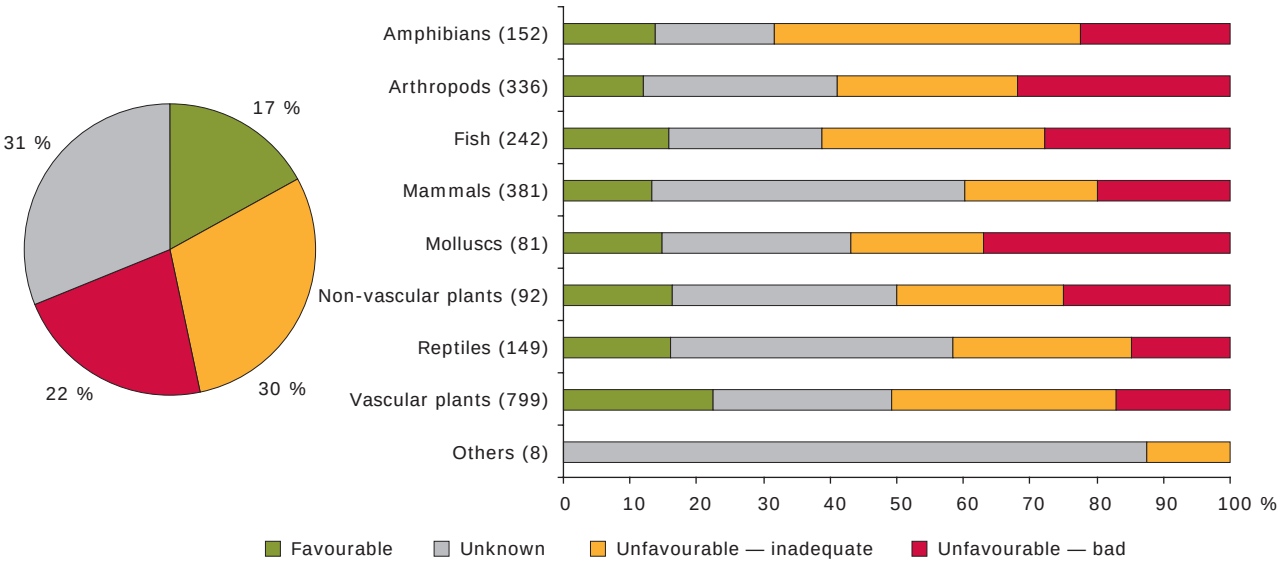
Table 3.1 Status of different taxonomic species in Europe

	IUCN red list category			Population trend
Group	**Threatened (EX, RE, CR, EN, VU) (%)**	**Data deficient (DD) (%)**	**Not threatened (NT and LC) (%)**	**Stable and increasing trend (%)**
Mammals — marine	22.2	44.4	33.4	40.0
Mammals — terrestrial	14.2	3.4	82.4	
Birds	12.0	0.0	88.0	62.0
Amphibians	22.9	1.2	75.9	38.0
Reptiles	19.4	1.4	79.2	45.0
Freshwater fish	37.0	5.3	57.7	7.0
Butterflies	8.5	1.0	90.5	59.0
Dragonflies	15.0	3.6	81.4	64.0
Saproxylic beetles	10.7	28.3	61.0	29.0
Molluscs — freshwater	43.7	24.7	31.6	< 1.0
Molluscs — terrestrial	20.0	10.1	69.9	
Vascular plants — policy species *	44.9	20.3	34.8	24.9
Vascular plants — crop wild relatives	11.5	29.0	59.5	40.9
Vascular plants — aquatic	6.6	16.0	77.4	65.6

Note: * Plants listed under European or global policy instruments such as the Habitats Directive, Bern Convention, Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and the EU Wildlife Trade Regulation.

Source: IUCN 2007, 2009, 2010, 2011 and BirdLife, 2004.

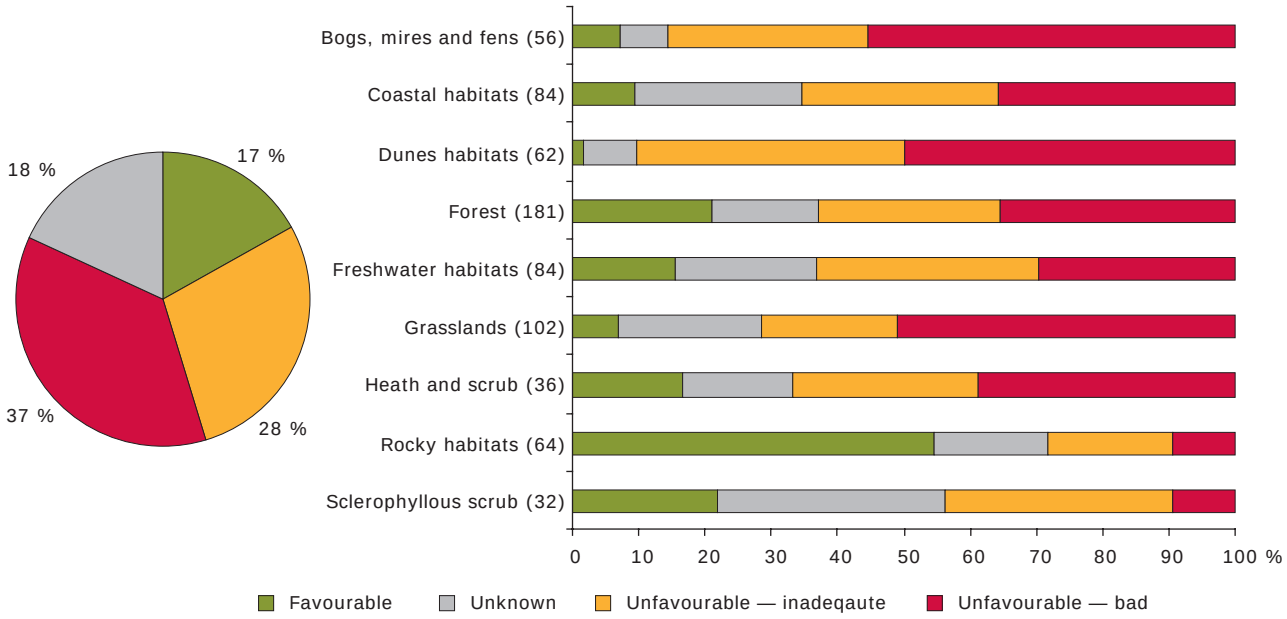
Figure 3.1 Conservation status of assessed species in the EU; left: overall statistics; right: per taxonomic group



Note: Geographical coverage: EU except Bulgaria and Romania.

Source: EEA, 2010d.

Figure 3.2 Conservation status of assessed habitats in the EU; left: overall statistics; right: per habitat category



Note: Geographical coverage: EU except Bulgaria and Romania.

Source: EEA, 2010d.

In the Marine Atlantic, Marine Macaronesian and Marine Mediterranean regions, more than 70 % of the assessments were reported as unknown.

In the marine Macaronesian region, 50 % of the assessments of marine habitat types were reported favourable, and it is the only marine region with favourable habitat assessments. In the Marine Atlantic and Marine Mediterranean region, 50–60 % of assessments are unknown.

When species assessments in marine ecosystems are divided between mammals, reptiles, fish, and invertebrates, more than 40 % of the assessments of each group give an unknown conservation status. Only a few per cent of the fish and mammal assessments report favourable conservation status.

Figure 3.3 Conservation status of assessed marine species in the EU; left: overall statistics; right: statistics by region

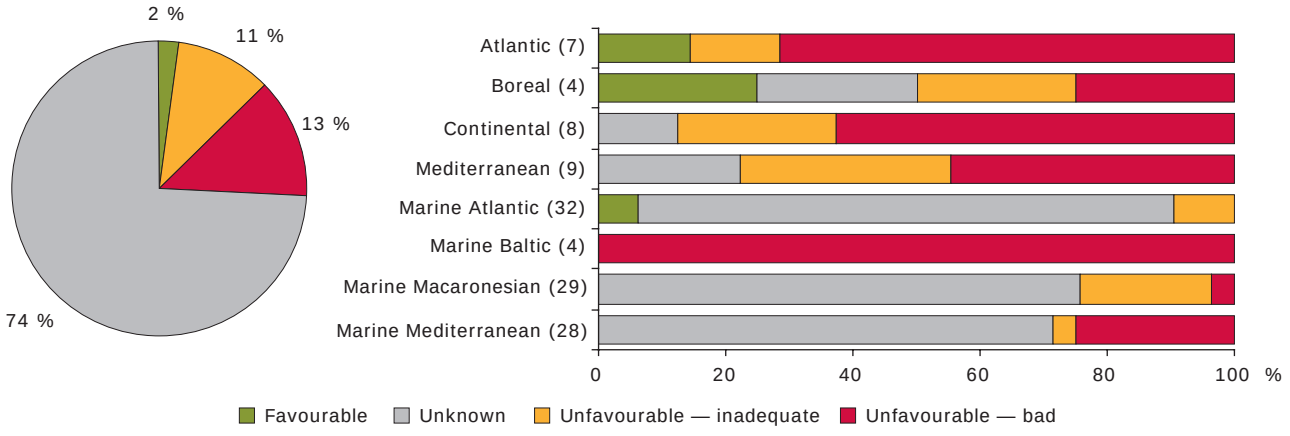
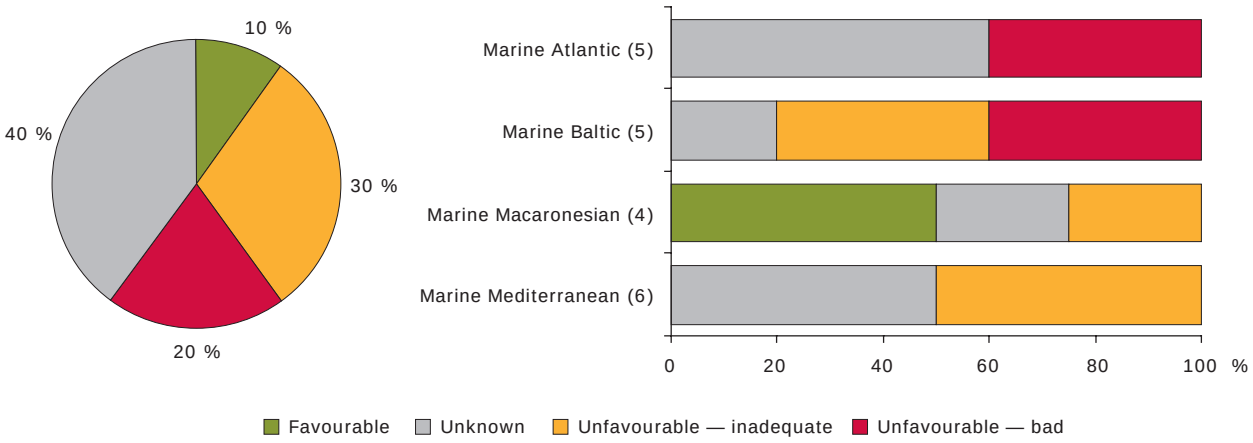


Figure 3.4 Conservation status of assessed marine habitat types in the EU; left: overall statistics; right: statistics by regions



3.3 Drivers and pressures impacting on biodiversity

This section is organised according to the HIPOC framework commonly used to summarise the main pressures and drivers causing biodiversity loss: habitat loss or change, introduced species, pollution, over-exploitation, and climate change.

The text below is not focused on protected areas, but it provides additional elements to understand their environmental context and the general pressures that biodiversity in protected areas is facing. It must be remembered that some of the pressures below have a different importance depending on whether they are measured inside or outside protected areas.

3.3.1 Habitat destruction/degradation

During the period 1990–2006, important net changes in land cover have occurred in the EU-27 as shown in Figure 3.5.

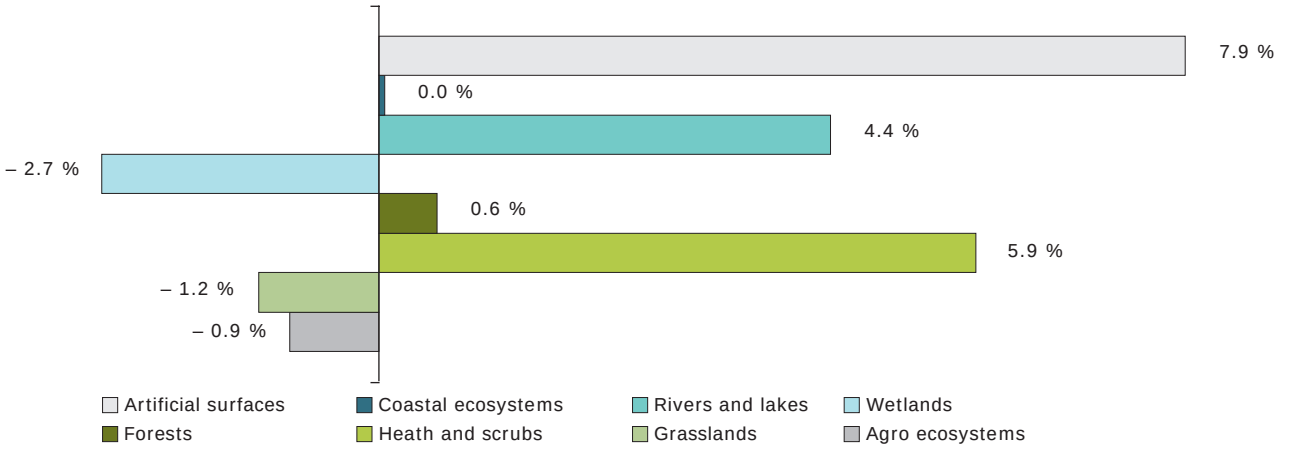
Grasslands and wetlands have continued to decline during the period 1990–2006. In the same period, there was an 8 % increase in artificial land surface cover (such as concrete or asphalt), due to urbanisation and infrastructure construction. The increase in land cover by heaths and scrub is partly due to spontaneous afforestation of abandoned lands, and possibly also due to spontaneous reforestation following large-scale tree felling.

Landscape fragmentation caused by transportation infrastructure and buildings has a number of ecological effects. It contributes significantly to the decline and loss of wildlife populations and to the increasing endangerment of species in Europe, for example through the dissection and isolation of populations. It also affects the water regime and the recreational quality of landscapes. Fragmentation has continued to increase during the last twenty years, and many more new transportation and energy infrastructure projects are planned — in particular in Eastern Europe — that will further increase the level of landscape fragmentation significantly (EEA, 2011).

In nearly 30 % of EU land, fragmentation is rated as either moderately high or very high, with the highest levels occurring in the lowlands of western Europe (Map 3.5). High land fragmentation has increased the vulnerability of ecosystems to diffuse external pressures such as drainage, eutrophication and acidification. In addition, isolated populations of animals and plants have become more vulnerable to local extinction due to disrupted migration and dispersal opportunities (EEA, 2010c). Other forms of fragmentation (e.g. due to intensification or change in land uses) are not captured in Map 3.5.

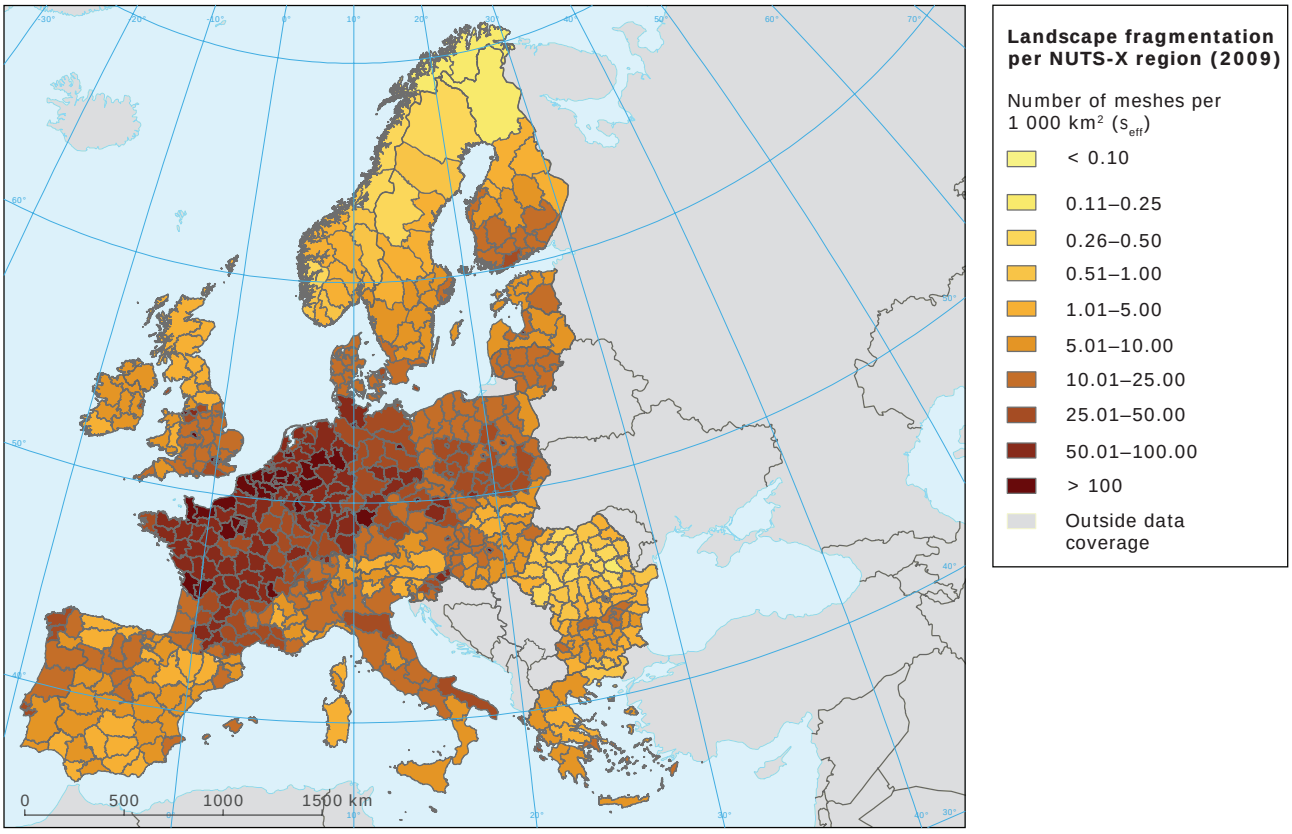
River ecosystems have also been affected by the fragmentation of waterways. Fish require free access to river systems, and healthy rivers that offer the different ranges of habitats required to fulfil their life cycles. River fragmentation is understood to be more threatening to fish than pollution (EEA, 2011a). Map 3.6 illustrates the loss of accessibility to rivers for migratory fish due to the building of large dams in the major European river basins in the last 150 years. The figure underestimates the actual inaccessibility of river basins, since it only includes dams more than

Figure 3.5 Land cover change between 1990 and 2006 — area change for major habitat classes



Source: EEA, 2010d.

Map 3.5 Landscape fragmentation in NUTS-X regions in 2009



Note: NUTS = Nomenclature of Territorial Units for Statistics ([2]).

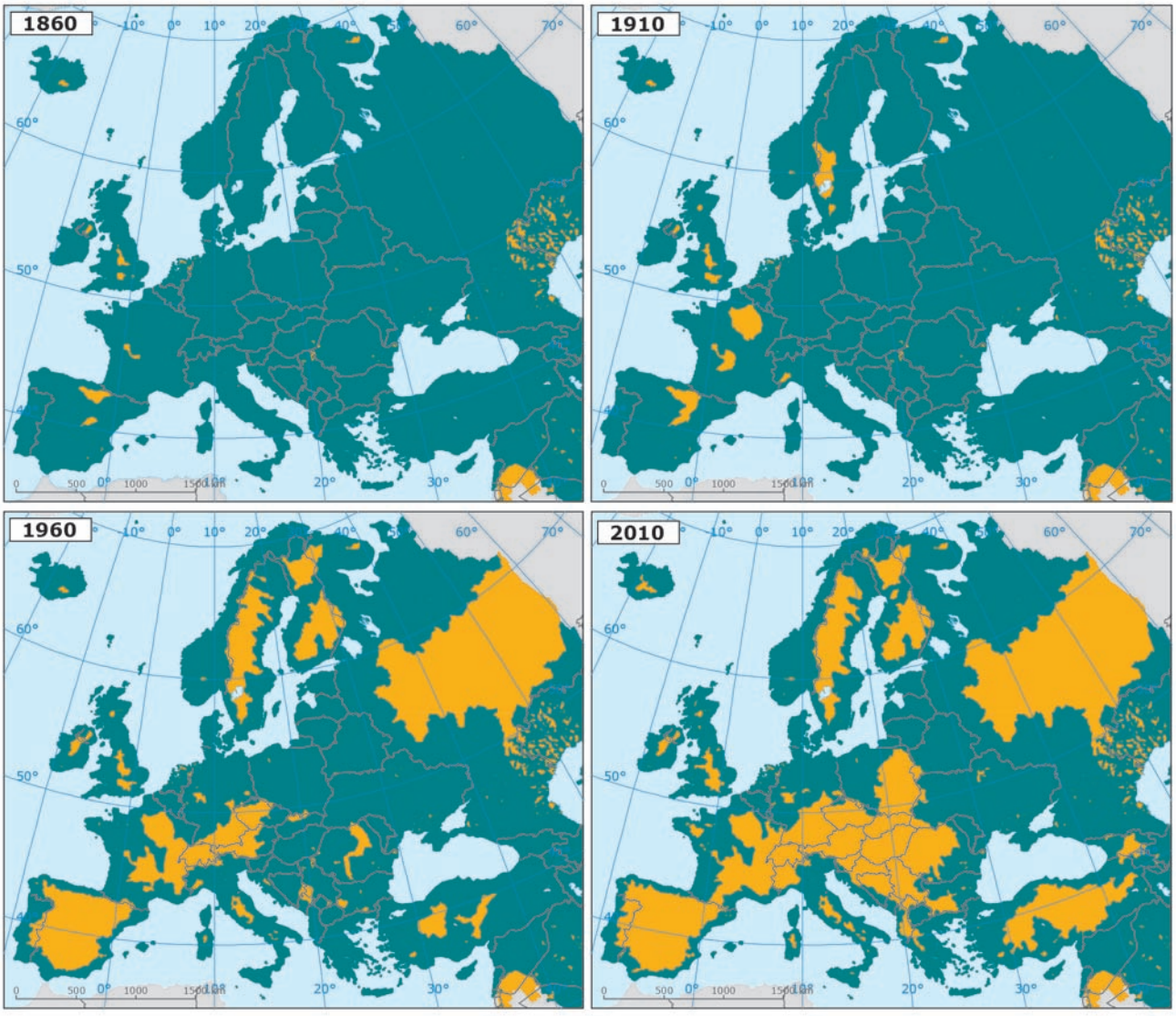
Source: EEA, 2011.

([2]) At the beginning of the 1970s, Eurostat set up the NUTS classification as a single, coherent system for dividing up the EU's territory in order to produce regional statistics for the Community. For around thirty years, implementation and updating of the NUTS classification was managed under a series of 'gentlemen's agreements' between the Member States and Eurostat. Work on the CommissionRegulation (EC) No 1059/2003, to give NUTS a legal status started in spring 2000. This was adopted in May 2003 and entered into force in July 2003. http://epp.eurostat.ec.europa.eu/portal/page/portal/nuts_nomenclature/history_nuts.

10 meters high, and smaller barriers are sufficient to affect fish migration. However, the figure does not take into account the existence of effective structures for fish passage in the large dams.

Habitats are also being degraded by agricultural intensification. Agricultural intensification was a major trend in west and north-west Europe as recently as 10 years ago. It is now mainly occurring in the Mediterranean region, as evidenced by the comparison between the Corine Land Cover (CLC) report in 2000 and the CLC report in 2006. Together with land abandonment, agricultural intensification remains one of the two greatest pressures on biodiversity in European agro-ecosystems (EEA, 2010a). These developments are driven by a combination of factors. On a 'macro' level, these factors include technological innovation, agricultural subsidies, international market developments, climate change, demographic trends and lifestyle

Map 3.6 Loss of accessibility for migratory fish due to dams in major European river basins in the last 150 years



Note: Orange: river basins with large dams (at least 10 m high) not allowing normal fish passage.

Source: EEA, 2012.

changes. On a 'micro' level, they are caused by reductions in the diversity of crops, simplification of cropping methods, use of fertilisers and pesticides, and the homogenisation of landscapes. The introduction of biofuel crops could lead to further intensification by means of fertiliser and pesticide use, resulting in further biodiversity loss. In addition, there is a fear that biofuel crops will be located on land that is currently marginal for agricultural production, but which has relatively high value for wildlife (EEA, 2008c).

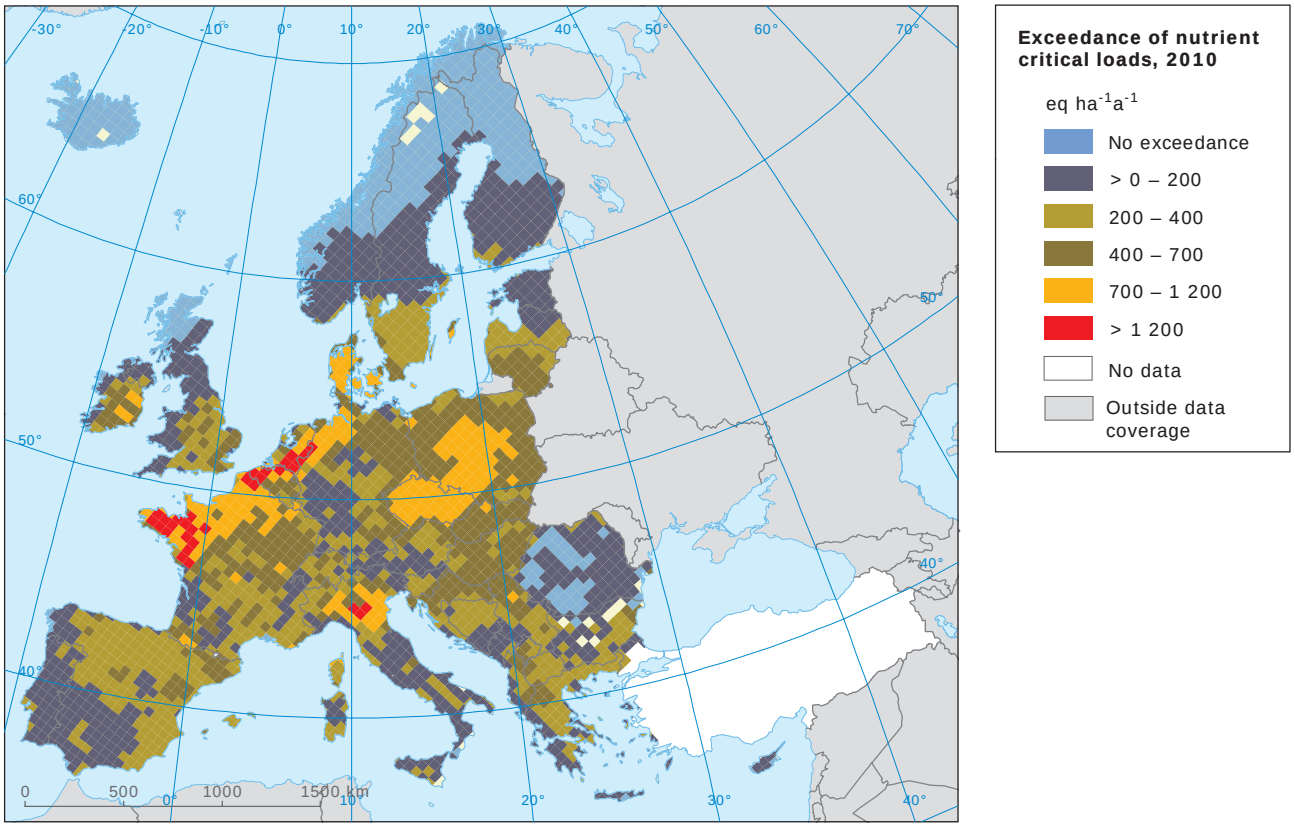
3.3.2 *Pollution*

Apart from the direct effects of land conversion and exploitation, human activities such as agriculture, industry, waste production and transport cause indirect and cumulative effects on biodiversity; notably through air, soil and water pollution. A wide range of pollutants, including excess nutrients, pesticides, microbes, industrial chemicals, metals, and pharmaceutical products end up in the soil. They also find their way into ground water and surface water. The air we breathe does not escape this indirect pollution either: atmospheric deposition of eutrophicating and acidifying substances, including nitrogen oxide (NO_x), ammonium plus ammonia (NH_x) and sulphur dioxide (SO_2) adds to the cocktail of pollutants.

The effects on ecosystems include damage to forests and lakes from acidification, as well as habitat deterioration and algal blooms, both caused by nutrient enrichment. Pollution in the form of pesticides, steroidal estrogens and industrial chemicals like PCBs also causes neural and endocrine disruption in species (EEA, 2010b).

Agriculture is a major source of eutrophication through emissions of excess nitrogen and phosphorous, both used as nutrients to increase the fertility of the soil. The agricultural nutrient balance for many EU Member States has improved in recent years. However, atmospheric nitrogen deposition from agriculture and other sources exceeds 'critical load' safety thresholds in more than 40 % of sensitive terrestrial and freshwater ecosystem areas (Map 3.7). Agricultural nitrogen

Map 3.7 Exceedance of critical loads for eutrophication due to the deposition of nutrient nitrogen in 2010



Source: EEA, 2010b; Data: RIVM-Coordination Centre for Effects.

loads are expected to remain high as nitrogen fertiliser use in the EU is projected to increase by around 4 % by 2020.

Much of the freshwater pollutant load is ultimately discharged to coastal waters, making agriculture (also) the main source of nitrogen loads in the marine environment. Nutrient enrichment is a major problem in the marine environment, where it accelerates the growth of phytoplankton. It can change the composition and abundance of marine organisms living in the affected waters and ultimately leads to oxygen depletion, thus killing bottom-dwelling organisms. Oxygen depletion has escalated dramatically over the past 50 years and it is expected to become more widespread with increasing sea temperatures induced by climate change (EEA, 2010b).

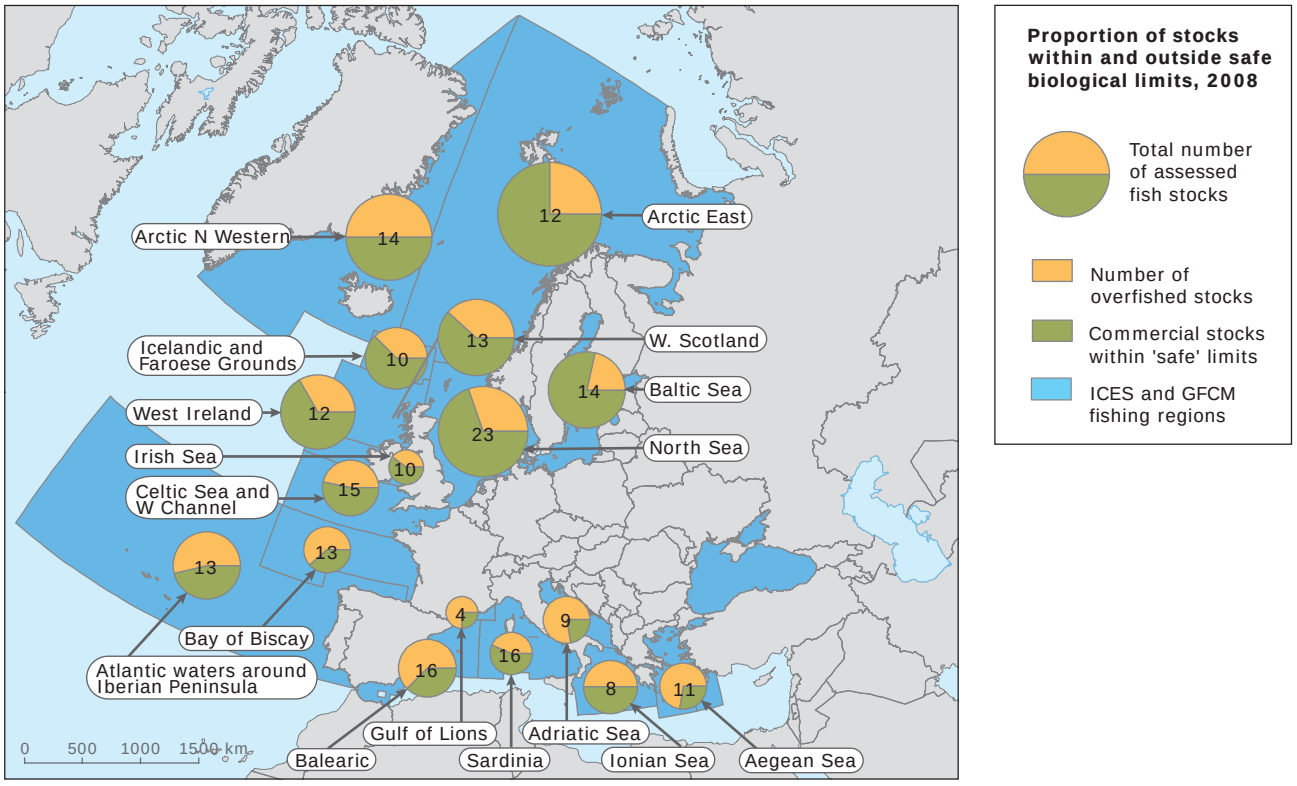
3.3.3 Over-exploitation

Over-exploitation causes the loss of genetic diversity within species, and it also reduces the absolute number of species in an area. It can lead to degradation of natural ecosystems and ultimately to the species extinctions. Examples of such phenomena include: the collapse of commercial fish stocks through overfishing, and the decline of pollinators (honeybees and other insects) due (at least in part) to the effects of agricultural intensification. Over-exploitation has also led to reduced water retention and increased flooding risks through the degradation or destruction of upland moorland (which can also lose its peat forming capacity).

Most of the oldgrowth forests in Europe are heavily exploited, particularly in the core forested regions of northern and eastern Europe. However, the total annual wood harvest in European countries has remained well below the annual re-growth, indicating that wood resources as a whole are being sustainably managed (SEBI indicator 17 in EEA, 2010c).

The marine environment is heavily impacted by overfishing (Map 3.8). Fish provide the primary source of income for many coastal communities, but overfishing is threatening the viability of both European and global fish stocks. Overfishing not only reduces the total stock of commercial species, but affects the age and size distribution within fish populations, as well as the species composition of

Map 3.8 Proportion of fish stocks within and outside safe biological limits



Source: SEBI indicators, 2010 — SEBI indicator 21; ICES, 2008. International Council for the Exploration of the Sea.

the marine ecosystem. The average size of the fish caught has decreased, and there has also been a serious decrease in the numbers of large predatory fish species (EEA, 2010b).

3.3.4 *Invasive alien species*

Invasive alien species (IAS) represent a threat to the native biodiversity of Europe and can also result in major disruption to ecosystem health, with a resulting loss of goods and services secured by that ecosystem. Ecosystems become more vulnerable to these invasions if they have been previously affected by habitat loss, degradation, fragmentation, over-exploitation and climate change. Globalisation, particularly increased trade and tourism, has resulted in an upsurge in the number and type of alien species arriving in Europe. According to the project *Delivering Alien Invasive Species Inventories for Europe* (DAISIE), more than 90 % of alien species in Europe are introduced unintentionally, mostly by shipping and other forms of transporting goods.

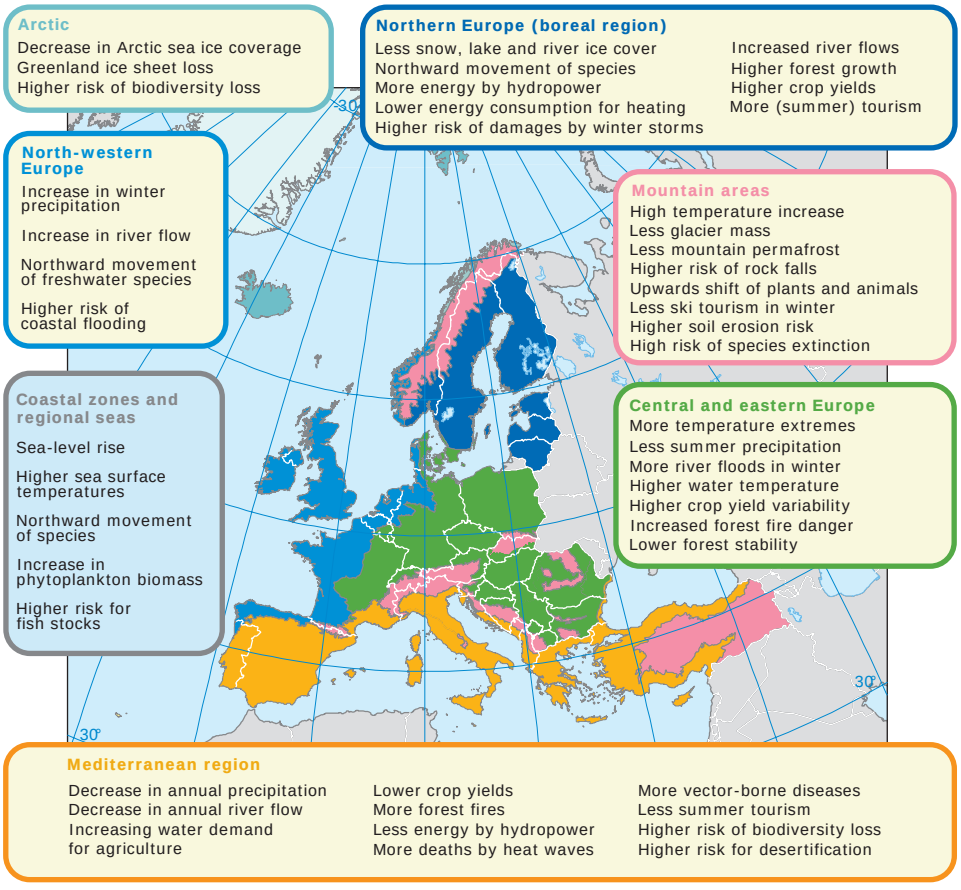
There are more than 10 000 non-native species present in Europe currently, 10–15 % of which are considered to have negative economic or ecological effects (DAISIE, 2008).

In order to gain a better understanding of invasive alien species and their impact on European biodiversity, a list of the worst invasive alien species threatening biodiversity in Europe has been compiled. The list currently contains 163 species or species groups. Species are added to the list if they are very widespread and/or if they create significant problems for biodiversity and ecosystems in their new habitats (EEA, 2009 and SEBI indicator 10 in EEA 2010c).

3.3.5 *Climate change*

The effect of climate change on biodiversity and ecosystems is now considered likely to be greater than initially forecast (Map 3.9). Although scientists indicate that ecosystems will be able to adapt to a

Map 3.9 Key past and projected impacts and effects of climate change for several biogeographical regions of Europe



Source: Adapted from EEA, 2010b.

certain extent, the combination of human-induced pressures and climate change will increase the risk of losing many ecosystems (TEEB, 2009).

Climate change affects biodiversity through a complex interaction of species and their habitats. Milder winters are responsible for the observed northward and uphill distribution shifts of many European plant species. The timing of seasonal events in plants is also changing, due mainly to changes in climatic conditions (EEA, 2008b). Most notable are changes in species composition in the Alpine region, in which roughly 20 % of all native vascular plants in Europe can be found (Väre et al., 2003).

Birds, insects, mammals, freshwater species and other groups are also moving northwards and uphill. Climatic warming has meant that each stage of the life cycles of many animal groups is happening earlier in the year. This trend has been noted in the spawning of frogs and fish, the nesting of birds, the arrival of migrant birds and butterflies and earlier spring phytoplankton blooms (EEA, 2008b).

3.3.6 More on pressures

All these pressures have a cumulative effect on European ecosystems and biodiversity. While ecosystems can buffer themselves from the effects of one impact, they may reach 'tipping points' where the cumulative impacts of several pressures interacting together disrupt their functioning in an irreversible way.

The increasing demand for energy is now emerging as a new source of pressure to Europe's biodiversity and ecosystems. Nor does the development of 'green energy' present an easy panacea to this problem. A balance will have to be found between the increased use of renewable energy, such as hydro-power, solar energy, wind farms or biofuels, and the conservation of land for biodiversity purposes (Biemans et al., 2008).

3.4 Conclusions

The European continent is characterised by eleven biogeographic regions. It stretches from the Arctic polar deserts and the boreal forests in the North to the arid or dense mattoral in the south, and from the Steppic zones in the east to the extensive heathlands in the West.

Europe's marine environment is also diverse from a biological, chemical and physical perspective, covering extensive areas of the north-east Atlantic and the Mediterranean, the totality of the Baltic and the Black Seas. Europe's coastline is estimated to stretch along almost 185 000 km in 24 European countries.

These geographical and biological features have combined with intense human occupation and intervention over several thousand years to shape Europe's landscapes and its biodiversity. Europe is characterised by the presence of a large variety of 'semi-natural habitats' (many of them fully dependent on human activities like mowing and grazing).

Wilderness or natural areas are limited in Europe, mostly to certain high-latitude and high-altitude areas, such as parts of Fennoscandia and the mountain ranges of central and southern Europe.

Fragmentation of the European landscape due to infrastructure and urbanisation has significantly increased in the last decades; however, fragmentation of rivers by dams started more than one century ago.

'Diversity', both natural and human-induced, and 'fragmentation' are the two main characteristics of Europe's past and current environmental conditions. This explains the relatively large number of protected areas and their relatively small size in Europe.

Despite the number of pressures that protected areas in Europe are exposed to, it should be stressed that they also have a crucial role to play in the mitigation of and adaptation to these pressures.

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4 Protected areas: diverse, multipurpose, multiscale

Chapter summary

European protected areas comprise a wide spectrum of ecosystems. The administrative frameworks and management processes for these protected areas are equally diverse.

As will be shown in the following pages, there are many types of site designations, each one with a specific aim, spatial boundaries and specific governance. As a consequence, certain sites of high biological value can be covered, partly or totally, by a number of different designation types applied at local, national, regional or international level ([3]).

In this chapter we will review the various classification and management systems for protected areas in Europe. The first part (**Section 4.1**) of this chapter involves a discussion of sites that have been designated as protected areas by national governments. This discussion takes up most of the chapter and touches on the diversity of national designation systems, and the size of these protected areas. It also introduces the classification schemes of the IUCN and CBD. These are international classification systems that national governments can use to describe the way they manage their protected areas. By assigning their protected areas a status according to one of these schemes, national governments can assist researchers and the public to gain an accurate picture of the state of protected areas worldwide. In addition, this section discusses the changes in ecosystems in protected areas, and the governance of nationally designated protected areas.

In the second part of the chapter (**Section 4.2**), we discuss internationally created networks of protected area. These networks can be organised on a regional or worldwide basis. Unlike the ICUN and CBD classification systems, these networks are established in a more formal way, typically by an international convention.

Marine protected areas as well as the Natura 2000 and Emerald networks have very specific characteristics and policy focus. We will therefore discuss these in more detail in two of the chapters that follow.

Information on protected areas in the overseas regions of European countries is not included in the analysis given the European scope of this report.

Skadar Jezero National Park, Montenegro

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([3]) For example, in the United Kingdom, parts of the Cairngorms National Park are also designated at national level as a Special Site of Scientific Interest, National Park, National Nature Reserve, National Forest park and as National Scenic Area. On an international level, parts of the park are designated as a Special Protection Area (under the Birds Directive), Special Area of Conservation (under the Habitats Directive) and Ramsar site.

The Camargue in France is designated at national level as a regional natural park, nature reserve, property of the 'Conservatoire du Littoral' and at international level as a Special Protection Area (under the Birds Directive), Special Area of Conservation (under the Habitats Directive), Ramsar site and Biosphere Reserve.

4.1 Nationally designated areas

4.1.1 A wide variety of designation-types

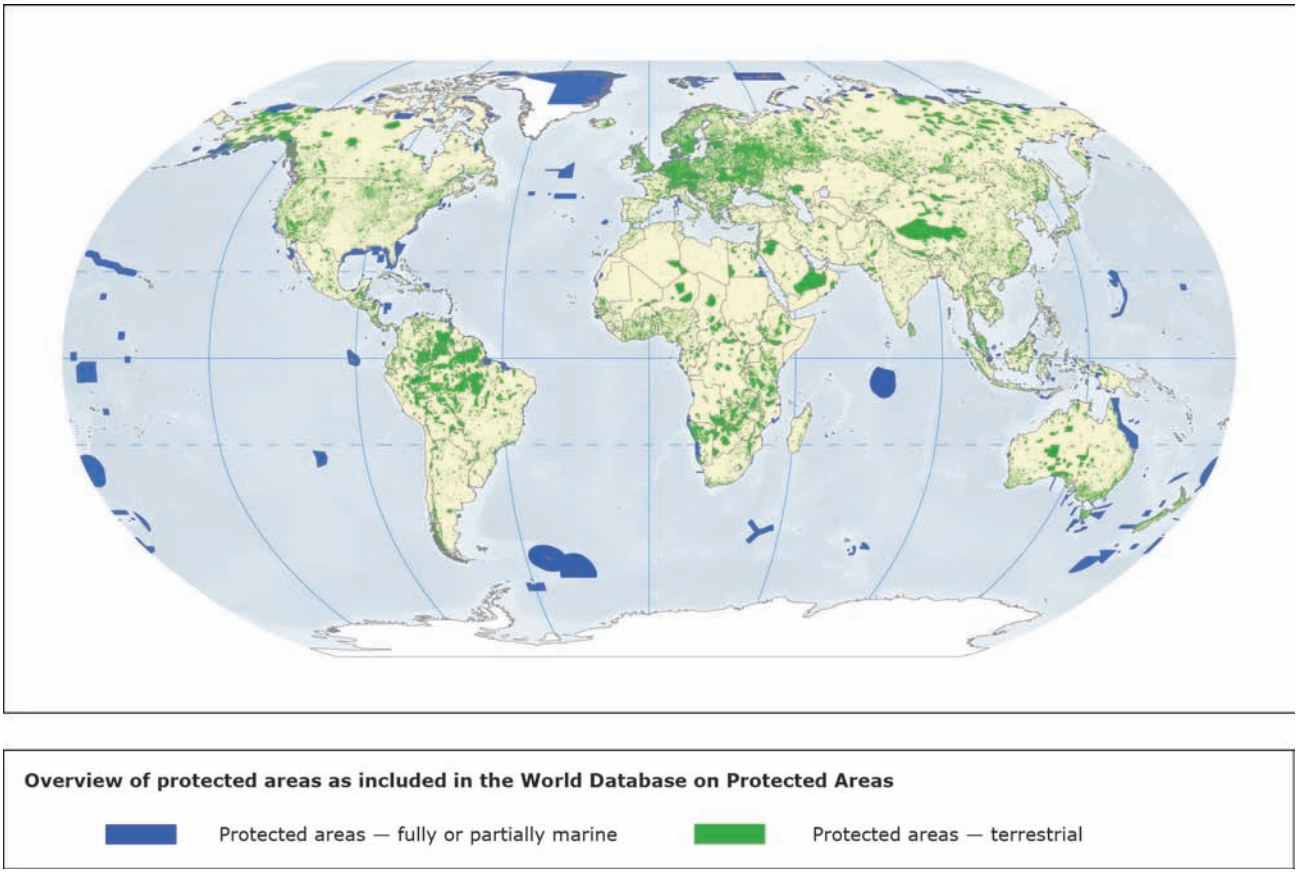
With more than 120 000 nationally designated sites ([4]) in 52 countries, including over 105 000 in the 39 EEA countries (this designation includes EEA member and collaborating countries), Europe accounts for more protected areas than any other region in the world: European protected areas represent 69 % of the records in the World Database on Protected areas managed by UNEP-WCMC (Map 4.1).

Europe, and the EU in particular, is among the regions of the world with a higher percentage of protected areas. Figure 4.1 compares Europe with other regions of the world in terms of area, population and population density.

The term 'protected area' covers a variety of designations given to parcels of land and bodies of water by national legislation. Some of the best known designations are: national park, regional park, nature park, nature reserve, biosphere reserve, wilderness area, wildlife management area, landscape protected area and community-conserved area.

More importantly, the term embraces a wide range of different management regimes, from highly protected sites where few if any people are allowed to enter, through to parks where the emphasis is on conservation but visitors are welcome. Other models of management have much less restrictive approaches where conservation is integrated into the traditional human lifestyles or even takes place alongside limited sustainable resource extraction. Some protected areas ban activities such as food collecting, hunting or extraction of natural resources, while for others it is an accepted and even a necessary part of management. The approaches taken in terrestrial, inland water and marine protected areas may also differ significantly.

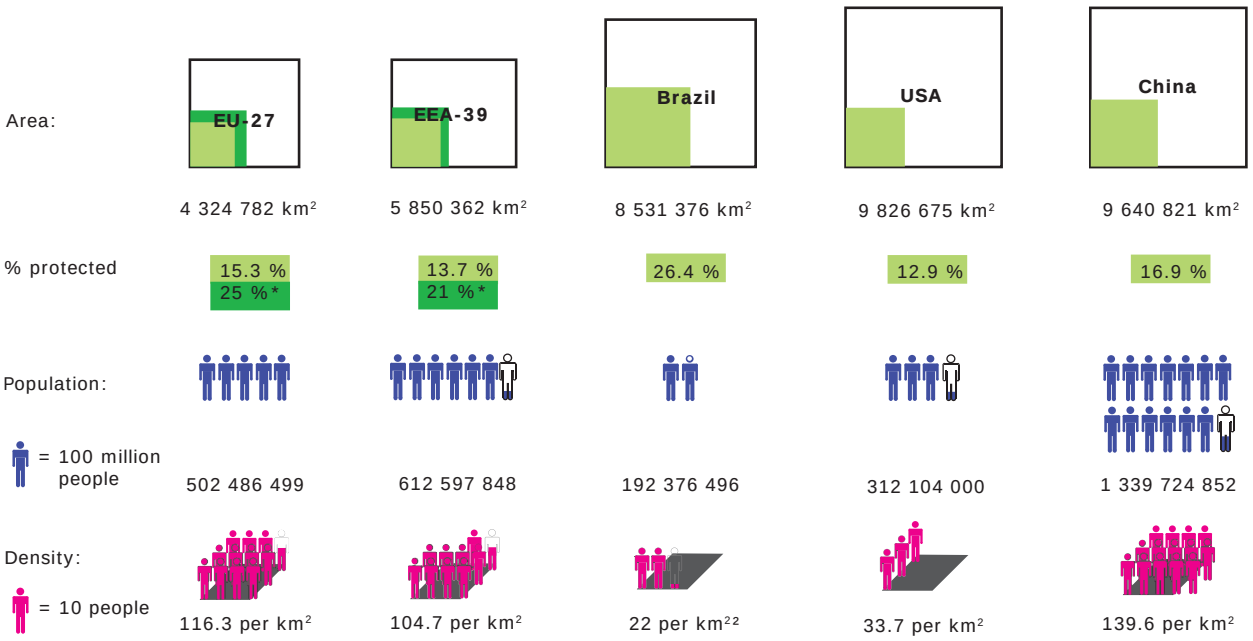
Map 4.1 Overview of protected areas as recorded in the World Database on Protected Areas



Source: IUCN and UNEP-WCMC (May, 2012), The World Database on Protected Areas (WDPA) Monthly Release. Cambridge, United Kingdom: UNEP-WCMC.

([4]) A given area can be designated under several designations, often with different boundaries. By 'site' we mean each individual record of a given area under a specific designation-type.

Figure 4.1 Protected areas in Europe compared to other regions in the world



*: Includes Natura 2000 sites

Note: Light green = nationally protected areas; dark green = nationally protected areas plus Natura 2000 sites.

Source: ETC/BD, based on CDDA, June 2011; Natura 2000, December 2011; protected planet accessed October 2011; Eurostat.

The extent of the diversity in protected areas can be seen by comparing the two different examples of landscape protected areas in Germany and plant micro-reserves in Valencia in Spain.

Landscape protected areas as applied in Germany cover 28.5 % of the country's land surface. Their aim is threefold. Firstly, they seek to maintain, develop or restore the functioning of the ecosystem and its services, or the regenerative capacity and sustained usability of natural assets. Secondly, they seek to protect the characteristic features and beauty of the area's natural scenery or its particular historical and cultural significance. Thirdly, they seek to protect the area's special significance for human recreation.

Plant micro-reserves were originally initiated in the Valencia region of Spain (Box 4.1) and have now been established in Bulgaria, Cyprus, Estonia, Greece (Crete), and Slovenia. They are areas of small size (less than 20 ha), that aim to protect a selected sample of the main subpopulations of the rarest, endemic or threatened plant species. Such micro-reserves may also sometimes be targeted at the conservation of populations of so-called 'Crop Wild Relatives'. Crop Wild Relatives are the wild ancestors of many of our modern staple crop varieties, and have great genetic and cultural value. Without the creation of these micro-reserves, the conservation of some of these crops would be problematic.

Many of the laws and regulations that govern protected areas have different names. In spite of this, some of these regulations have similar purposes across countries or regions. For example:

- In France, the purpose of regional natural parks is: 1) to protect and manage the area's natural and cultural heritage; 2) to contribute to spatial planning; 3) to enhance economic, social and cultural development, and quality of life; 4) to grant visitors a suitable welcome, and to provide them with education and information; and 5) to carry out relevant experimental actions and contribute to research projects.

- National parks in Scotland aim: 1) to conserve and enhance the natural and cultural heritage of the area; 2) to promote sustainable use of the natural resources of the area; 3) to promote understanding and enjoyment (including enjoyment in the form of recreation) of the special qualities of the area by the public; and 4) to promote sustainable economic and social development of the area's communities.

Box 4.1 Micro-reserves protecting genetic diversity in the Valencian Community (Spain)

In 1991, a proposal was made to the Generalitat Valenciana — the autonomous government of the Valencia Community in Spain, that a large network of small protected sites called Protected Micro-Reserves (PMR) should be created in order to ensure the future study and monitoring of the rich endemic flora within the three Valencia provinces: Castellon, Valencia and Alicante.

Studies on the botanical richness of this area, undertaken since 1987, have shown that its vascular flora consists of approximately 3 150 species, of which 350 are Spanish endemic species with 60 of those being exclusive to the Valencia region. However, both national and local policies on nature conservation have previously focused on endangered species. This has resulted in the important role of the non-threatened endemic flora being somewhat overlooked.

By the end of 1997, the legal declaration of the first Valencia PMR was completed. Since that date, 257 PMRs have been created by the Generalitat Valenciana as legally protected sites, covering a total of 1 786 ha. The sites are protected through Orders of the Council of Environment, published in the regional gazette, which incorporates the management plan for each PMR. The management plan designates a few priority plants in each PMR, which are targeted for conservation actions (census, management projects, population reinforcement if required etc.).

Since its creation, the PMR network has become a basic resource to develop plant conservation projects on all kinds of scientific topics such as population biology, plant diversity and reproductive biology.

In the case of countries with a federal-like distribution of powers to regions, such as Austria, Germany, Italy, Spain, and Switzerland, each region may have its own system of protected areas, thus adding regional designation-types to the national level. For instance, in Spain, many designation-types are specific to different autonomous regions (Table 4.1).

Table 4.1 Selected designation-types specific to different autonomous regions in Spain

Name of autonomous designation	Applying in
Área natural recreativa	Comunidad Foral de Navarra
Área natural singular	La Rioja
Biotopo protegido	País Vasco
Corredor ecológico y de biodiversidad	Extremadura
Espacio de interés natural	Cataluña
Humedal protegido	Galicia
Paraje natural	Communidad Valenciana Illes Balears Andalucia
Parque rural	Islas Canarias
Parque periurbano	Andalucía
Parque regional	Comunidad de Madrid Castilla y Leon Region de Murcia
Reserva fluvial	Castilla-La Mancha
Reserva de fauna	Comunidad Valenciana
Reserva natural concertada	Andalucía
Reserva natural de fauna salvaje	Cataluña
Reserva natural especial	Illes Balears
Reserva natural integral	Illes Balears

Source: Observatory of protected areas EUROPARC-Spain, 2009.

To assess the status of protected areas in Europe, it is thus first necessary to get a good overview of each of these designation-types within each country.

As part of their contribution to the activities of the European Environment Agency within the Eionet network, 39 European countries provide regular information on their nationally designated areas. This information makes up part of the so-called Common Database on Designated Areas (CDDA). This includes a list of the types of protected area designations applied in each country. So far, 685 designation-types have been recorded across the 39 countries concerned by this report.

These designations can be clustered into three main categories:

- statutory designations the main purpose of which is biodiversity conservation;
- statutory designations the main purpose of which is sectoral, for instance forest protection against fire or coastal protection against urbanisation. Although these designations may not aim at biodiversity conservation, they often have a positive effect on biodiversity;
- voluntary designation through private ownership, for instance by NGOs.

Examples of the designation-types are provided in Chapter 6 under specific country case studies.

The CDDA database mostly contains information on statutory designations and does not contain information on voluntary designations such as those areas protected by conservation trusts. This is mainly due to the difficulty of aggregating this type of information from national to European level. The CDDA database also does not include many sites that have local designations, such as those conferred by autonomous regions in Spain or by *départements* in France. Here too, the reason for exclusion is the difficulties in gathering the information at a European level. However, the importance of these voluntary and regional level protected areas should not be underestimated. They play a crucial role in enhancing connectivity across the territory, and thus potentially contribute to a 'green infrastructure'.

It should be noted that in some countries, specific ecosystem-types are protected by law throughout the national territory without being specifically mapped. This is the case for instance:

- In Croatia, where, according to the Croatian Nature Protection Act (Croatian Parliament, 2005), all wetland habitats should be preserved in natural or semi-natural conditions. All human activities that could compromise these conditions and/or the biodiversity of these habitats are forbidden.
- In Denmark, as a result of successive amendments to the Nature Conservation Act, beginning in 1969, the list of protected habitat types today includes (presuming they are larger than the size defined by law): public and private watercourses, natural lakes, peat bogs and marshes, wet meadows, dry grasslands, dry stone walls, heathland, salt meadows, and coastal marshes and meadows. The 1992 Act imposes a general prohibition on any modification to the state of these natural areas (Klemm, 2000).
- In Hungary, bogs, mires, alkaline lakes and all caves are protected *ex lege*.

4.1.2 The size of protected areas

While the number of protected areas in Europe is very high, their average size is quite low as compared to other regions of the world, as shown in Figure 4.2. This largely reflects the high degree of fragmentation of the land in Europe (see Map 3.5) due to urbanisation, transport infrastructure and general intensification of land use.

The vast majority of protected area sites in Europe (90 %) have an area of less than 1 000 ha and 65 % range between 1 and 100 ha (Table 4.2). However, there is still a wide range of sizes, ranging from 1 291 047 ha for the Vatnajokulsthjodgardur National Park in Iceland down to an individual tree, such as the Kaèja smreka in Godovic, Slovenia. Indeed, a number of the smaller sites below 1 ha are individual trees.

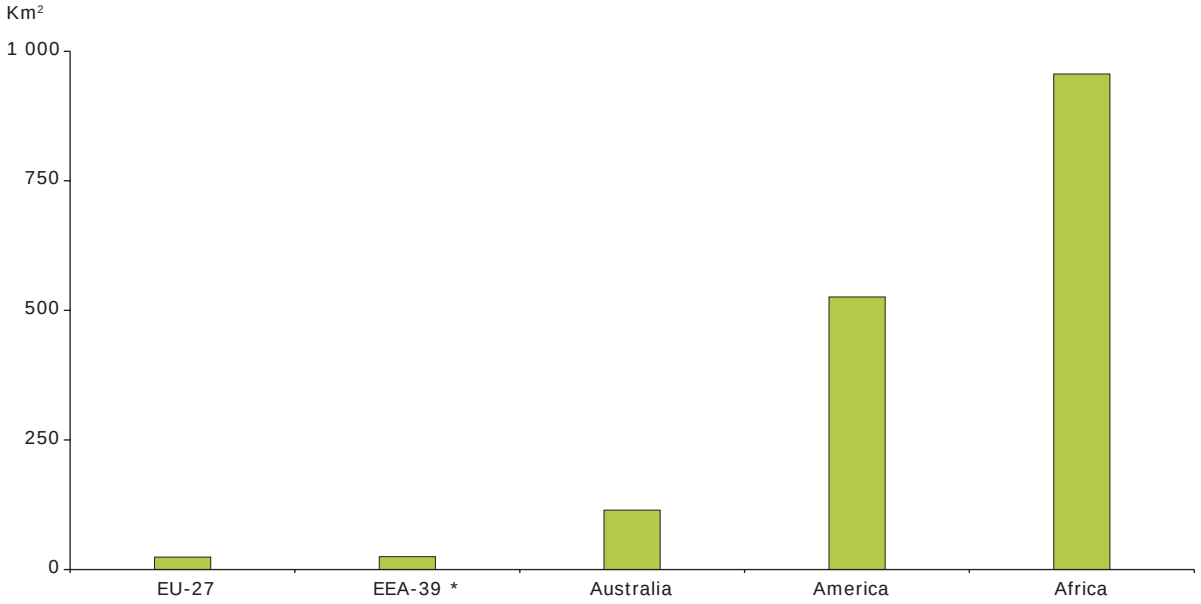
Table 4.2 Range of area of nationally protected sites (CDDA) in EEA countries

Area	Nationally designated sites in EEA countries
< 1 ha	12 %
1–100 ha	65 %
100–1 000 ha	16 %
1 000–10 000 ha	5 %
> 10 000 ha	2 %

Source: CDDA version 9, June 2011.

Figure 4.3 shows, for four contrasting EEA countries, the range of surface area covered by nationally designated areas: Bulgaria has 80 % of its protected areas under 100 ha and none over 1 000 ha, whereas Greece has 94 % of its protected areas above 100 ha and 7 % over 10 000 ha. Italy and Poland show the largest range of size of protected area between less than 1 ha (Italy: 0.7 %; Poland: 1.5 %) and more than 10 000 ha (Italy: 8 %; Poland: 13 %).

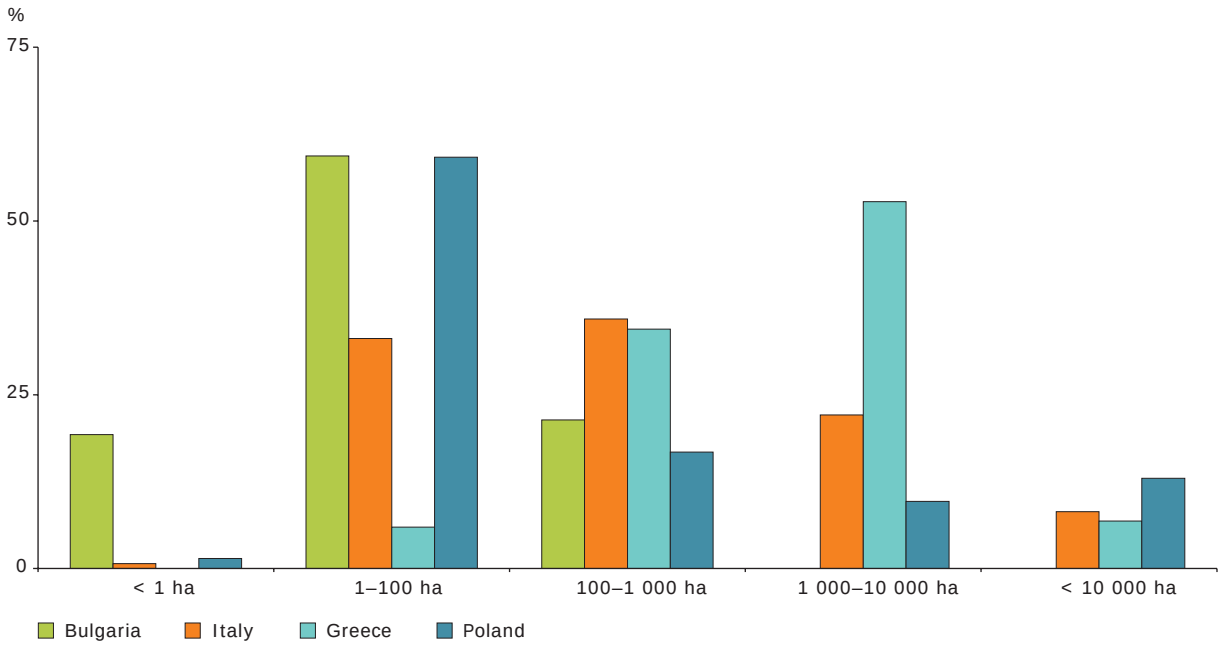
Figure 4.2 Average size of terrestrial nationally designated areas (in km²) in different regions of the world



Note: * EEA-39 includes the 32 EEA member countries and seven collaborating countries (http://www.eea.europa.eu/data-and-maps/figures/political-map-of-eea-member-and-collaborating-countries).

Source: Data from IUCN and UNEP-WCMC (2011) The World Database on Protected Areas (WDPA): January 2011. Cambridge, United Kingdom: UNEP-WCMC. http://www.wdpa.org/Statistics.aspx.

Figure 4.3 Share of the extent of designated areas in four EEA countries



Source: CDDA, June 2011.

4.1.3 The IUCN categories for types of protected area management

While a designation type often provides information about the purpose of a protected area (e.g. the protection of a group of species, or the sustainable management of resources), it does not provide information on the type of management applied in the individual site.

Depending on the specific context of the site (geographical, environmental, socio-economic), strict protection measures may be required. Other sites may apply much less restrictive management approaches. It is possible that two sites that are designated under the same legal instrument (for example a national park designation-type) would have a different degree of management or level of human settlement. Equally, within the same protected site, there may also be a zoning of different levels and types of management.

In an attempt to describe and categorise the different management approaches in individual sites, the International Union for Conservation of Nature (IUCN) has identified seven different protected area categories, based on management objectives (Table 4.3) (Dudley, 2008). The assigned category should be based on the primary management objective(s) of the protected area. The primary management objective should apply to at least three-quarters of the protected area.

Table 4.3 IUCN Protected Areas Categories System

IUCN category		Description
Ia	Strict Nature Reserve	Strictly protected areas set aside to protect biodiversity and also possibly geological/geomorphologic features, where human visitation, use and impacts are strictly controlled and limited to ensure protection of the conservation values. Such protected areas can serve as indispensable reference areas for scientific research and monitoring.
Ib	Wilderness Area	Usually large unmodified or slightly modified areas, retaining their natural character and influence without permanent or significant human habitation, which are protected and managed so as to preserve their natural condition.
II	National Park	Large natural or near natural areas set aside to protect large-scale ecological processes, along with the complement of species and ecosystems characteristic of the area, which also provide a foundation for environmentally and culturally compatible, spiritual, scientific, educational, recreational, and visitor opportunities.
III	Natural Monument or Feature	Protected areas set aside to protect a specific natural monument, which can be a landform, sea mount, submarine cavern, geological feature such as a cave, or even a living feature such as an ancient grove. They are generally quite small protected areas and often have high visitor value.
IV	Habitat/Species Management Area	Protected areas aiming to protect particular species or habitats, their management reflects this priority. Many Category IV protected areas will need regular, active interventions to address the requirements of particular species or to maintain habitats, but this is not a requirement of the category.
V	Protected Landscape/Seascape	A protected area where the interaction of people and nature over time has produced an area of distinct character with significant, ecological, biological, cultural and scenic value: and where safeguarding the integrity of this interaction is vital to protecting and sustaining the area and its associated nature conservation and other values.
VI	Protected area with sustainable use of natural resources	Protected areas that conserve ecosystems and habitats together with associated cultural values and traditional natural resource management systems. They are generally large, with most of the area in a natural condition, where a proportion is under sustainable natural resource management and where low-level non-industrial use of natural resources compatible with nature conservation is seen as one of the main aims of the area.

Source: IUCN (http://www.iucn.org).

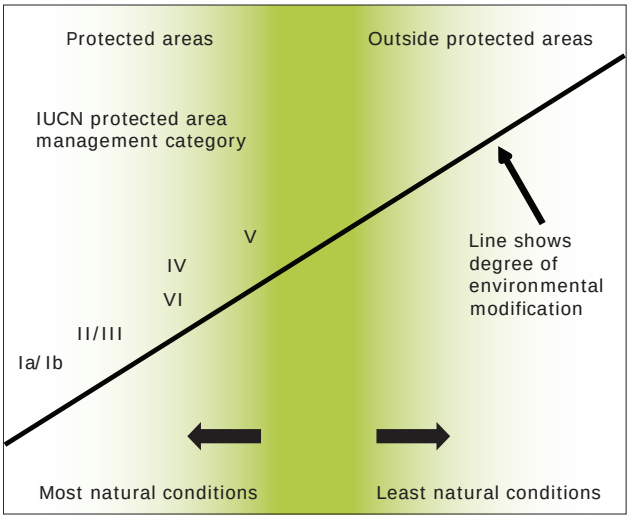
As suggested by Dudley (2008), IUCN categories can be mapped against a trend line of increasing degree of environmental modification against decreasing naturalness (Figure 4.4).

It should be stressed however, that the IUCN classification does not represent a hierarchy in relation to the value of the protected area categories that it describes. It is simply a categorisation that reflects the area's management style and goals. IUCN argues that a well-balanced protected area system should consider using all the categories.

IUCN has developed precise guidelines for how to assign these management categories to individual sites. However, the way individual countries apply these categories to their own context is quite variable and is the cause of much debate. For instance:

- As national parks are differently defined by the national legislation in various countries, protected areas called 'national parks' can be found in several of the IUCN protected area categories. Examples include (IUCN & UNEP 2012):
  - Swiss National Park, Switzerland (IUCN protected area category Ia);
  - Everglades National Park, the U.S.A. (IUCN protected area category Ib);
  - Białowieża National Park, Poland (IUCN protected area category II);
  - Victoria Falls National Park, Zimbabwe (IUCN protected area category III);
  - Vitosha National Park, Bulgaria (IUCN protected area category IV);
  - New Forest National Park, the United Kingdom (IUCN protected area category V);
  - Etniko Ygrotopiko Parko Delta Evrou, Greece (IUCN protected area category VI).
  - Estonia has its own interpretation of the IUCN categories. It considers category VI, to be much stricter in terms of biodiversity conservation requirements than category II, which Estonia regards as being a category focused on recreational purposes. The interpretation of category VI in Estonia is therefore much stricter than in many other countries.

Figure 4.4 Naturalness and IUCN protected area categories



Source: Adapted from Dudley, 2008.

In addition, there is a debate on the concept of the IUCN protected area categories V and VI. According to some authors (Locke & Dearden, 2005), these two categories undermine the creation of more strictly protected reserves, and exaggerate the amount of area under protection. They argue that only IUCN categories I–IV should be recognised as protected areas, and suggest that protected areas under category V and category VI should be reclassified as 'sustainable development areas'.

Other authors choose to take a different perspective, and analyse not the strictness of the category types, but the extent to which each category promotes interaction amongst stakeholders. For example, Mose and Weixlbaumer (2010) consider that Category V in particular represents a dynamic-innovation approach (also called an 'integration approach' by the authors), in which cooperation among various stakeholders is a key element. They contrast this integration approach with the static-preservation approach (also called the 'segregation approach'), which characterises other IUCN categories such as Ia and Ib, where human interaction with the protected area is strictly limited. In some countries, such as Finland, the older set of IUCN criteria is use: for example, large wilderness areas of the north of Finland have been classified as category VI (due to hunting and reindeer herding being permitted in those areas) although in many respects, they would better correspond to category Ib of the current classification.

Despite all these debates, the IUCN management categories framework has so far proved to be the

best tool for providing a comparative picture of protected areas across the world, and also across Europe. IUCN is now encouraging each country to develop a national framework for assignment of IUCN categories, where NGOs as well as national and regional authorities would be involved.

The CDDA database includes information on which IUCN management category applies to nationally designated sites in Europe. So far, this information has been provided for almost 70 % of the sites across the 39 EEA countries. However, in the case of the Flemish part of Belgium, parts of Greece, Slovakia, Slovenia, Spain and Turkey, the data are either lacking or incomplete. These data are also lacking or not used at all for very small sites in Scandinavia. In Estonia, IUCN management categories are allocated to each different management area within a designated site.

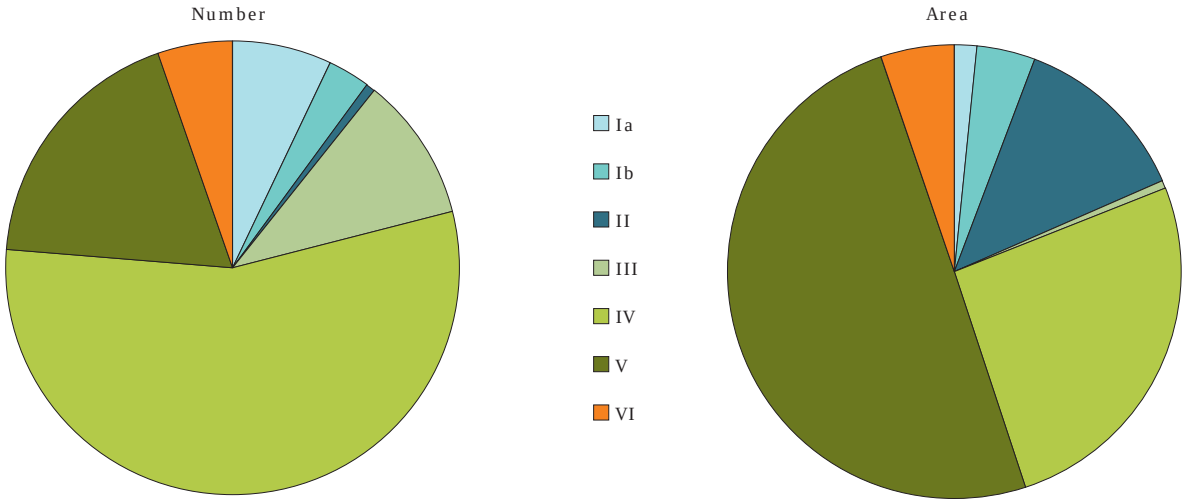
In spite of these gaps, it is still possible to sketch a general picture of the share of IUCN categories across EEA countries, as shown in the diagram below (Figure 4.5).

- IUCN category IV (protected area managed mainly for conservation through management intervention) accounts for the largest number of protected areas in the 39 EEA countries, with 36 551 sites in total, i.e. over 55 %. Category V (protected area managed mainly for landscape/

Box 4.2 Data quality issues in the CDDA database

- Ireland: The spatial aspect of the CDDA dataset is deficient. Less than 50 % of records in the tabular database have associated spatial boundaries.
- Luxembourg: There are no spatial boundaries for CDDA sites in Luxembourg. Therefore no analysis of the overlap with Natura 2000 can be undertaken.
- Spain: For approximately 50 % of the Spanish data, no IUCN category has been reported officially through the Eionet priority data flow.
- Finland: The vast majority of Finnish sites have 'NA' as the IUCN category — especially for sites below 1 000 ha (95+ % of sites have NA as the IUCN category) ([5]).
- For the west Balkan countries and Turkey, only a small number of spatial boundaries have been provided in CDDA.

Figure 4.5 Percentage of CDDA coverage per IUCN category; left: % of the number of sites; right: % of area



Note: Sites in the database without a management category are excluded.

Source: CDDA, June 2011.

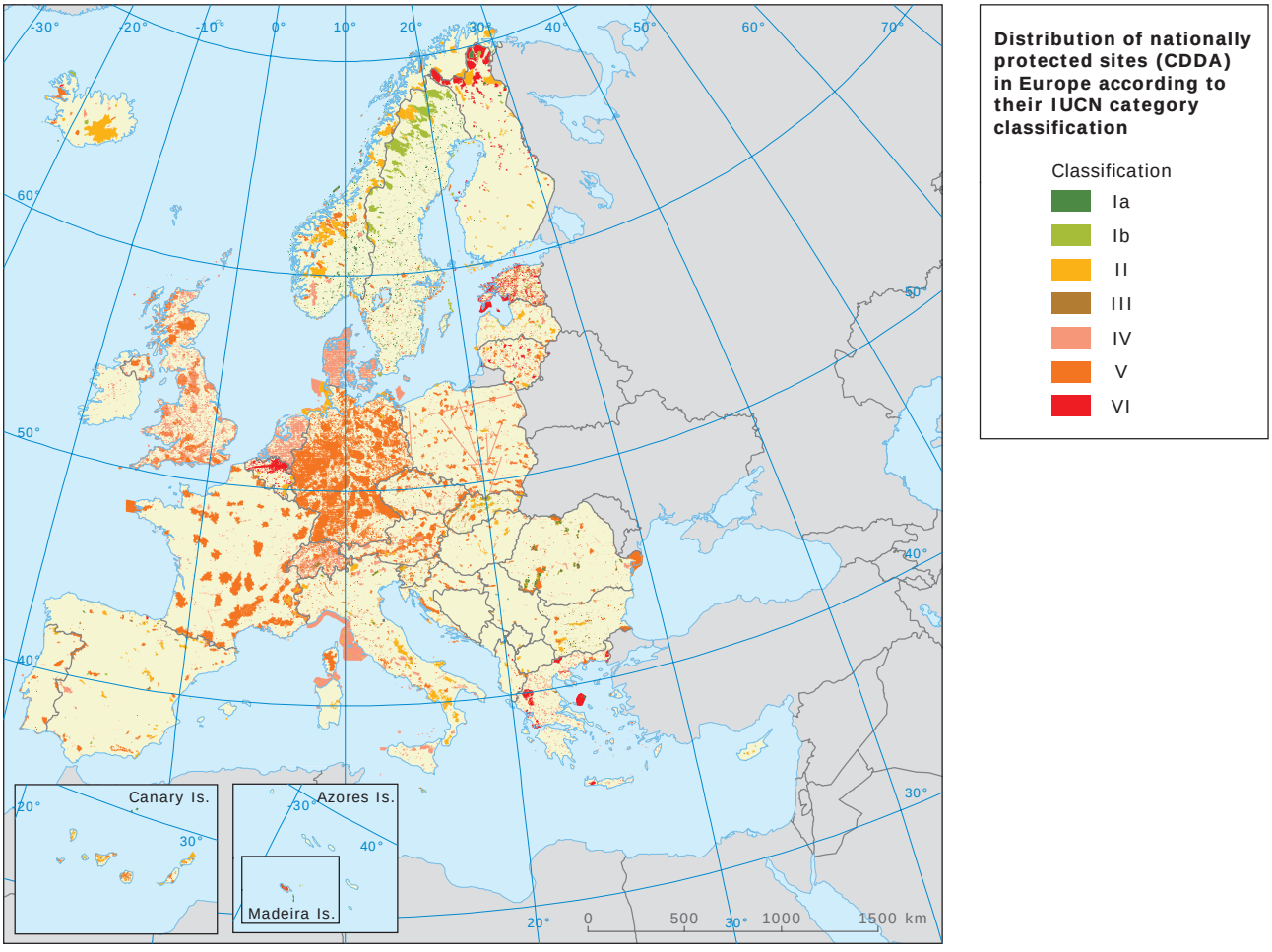
([5]) Finland started in early 2012 a process aiming to assign IUCN categories to all their designated sites.

seascape conservation and recreation) has the next largest number of protected areas with 12 141 sites (over 18 %).

- The largest IUCN category by surface area is category V (near 50 %), which accounts for more than 500 000 km^2. Category IV is the next largest with approximately 268 000 km^2, i.e. 26 %.
- IUCN category II (protected area managed mainly for ecosystem protection and recreation) sites cover the third-highest surface area with close to 13 %, but this category contains the smallest number of sites at 432.
- IUCN category VI (protected area managed mainly for the sustainable use of natural ecosystems) accounts for over 5 % of both the number and the area of sites (3 526 sites covering 54 100 km^2).
- Whilst IUCN category III (protected area managed mainly for conservation of specific natural features) contains 6 800 sites (ca. 10 %), the area covered is relatively low at only 5 800 km^2 (less than 1 %).
- IUCN categories Ia (protected area managed mainly for science) and Ib (protected area managed mainly for wilderness protection) number 4 676 (7 %) and 1 984 (3 %) respectively, covering 16 400 and 43 000 km^2, i.e. less than 2 % and close to 4 %.

The distribution of protected areas under the various IUCN categories shows different patterns across Europe (Map 4.2). While sites in IUCN categories V are predominantly located in France, Germany and the United Kingdom (countries with the largest population in the EU), IUCN categories Ib and Ia are predominantly distributed in Scandinavia. Although

Map 4.2 Distribution of nationally protected sites (CDDA) in Europe according to their IUCN category classification



Note: Grey colour means 'IUCN category not available or not applicable'.

Source: CDDA database, June 2011.

Box 4.3 Parco Lombardo del Ticino, (IUCN protected area category V — Protected Landscape)

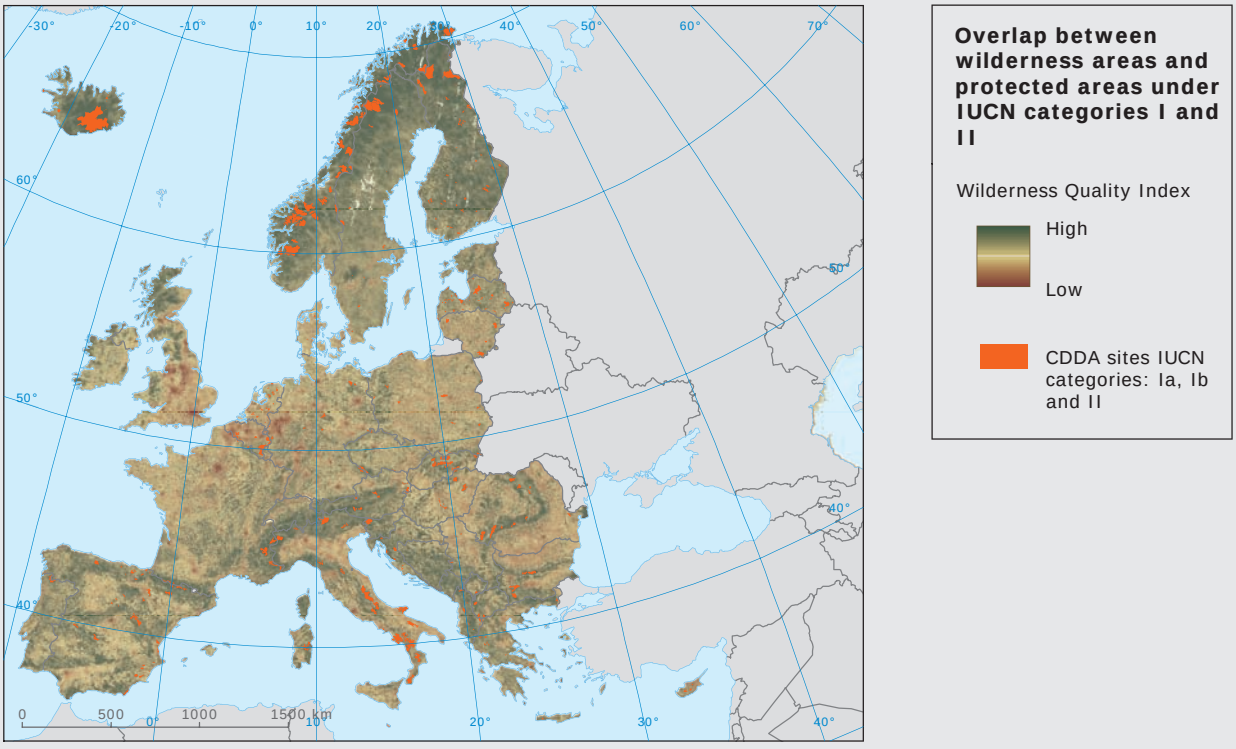
The Parco Lombardo del Ticino situated in the Lombardy region is the first regional park that was created in Italy. It was established in 1974 with the aim of protecting the Ticino Valley from the adverse effects of industrialisation and from greater urbanisation.

Valle del Ticino is an area characterised by a great variety of environments, including watercourses, conifer forests, plain woodlands, moorlands, wooded areas, wetlands, and agricultural fields, some of which are under very ancient cultivation systems. The consortium managing the park consists of 47 municipalities and three provinces. It controls a territory of over 91 000 hectares, by using a protection system with different rules for natural areas, agricultural and urban areas. The aim is to combine the needs of environmental protection with the social and economic demands of the communities living in the area, which is one of the most densely populated parts of Italy.

Box 4.4 Wilderness in Europe and IUCN categories

In comparing the degree of 'wilderness' in Europe as expressed by the 'Wilderness Quality Index' (WQI) with the distribution of IUCN protection categories, Fischer and al. (2010) found a high correlation with category I (a & b) and category II protected areas.

Map 4.3 Overlap between wilderness areas and protected areas under IUCN categories I and II



Source: Wildland Research Institute/University of Leeds, ETC/SIA, ETC/BD, CDDA, 2011.

In terms of overall number, Estonia, Norway, Slovakia and Sweden have the most protected areas classified as Category Ia and Ib, and Category II. Albania, Bulgaria, Estonia and Slovenia have the highest number of protected areas under Category III, but not all countries classify protected areas under this category. The United Kingdom is the only country within the 39 EEA member and collaborating countries that has no protected areas in categories I, II or III. No data available for Ireland.

Box 4.5 Retezat National Park (IUCN protected area category Ib — Wilderness Area)

Retezat National Park in Romania is the first Romanian national park, established in 1935. It is located in the Retezat Mountains in the southern Carpathians, encompassing Romania's highest mountain ranges and one of Europe's last remaining pristine forests. The Retezat Mountains contain more than 60 peaks over 2 300 metres in height, and over 100 deep glacier lakes. Today the park covers an area of 38 138 ha, of which 48 % are forests and 52 % alpine area, with dwarf-pine, alpine meadows, and peaks. The slopes are covered with scree and rocks or aquatic habitats. 14 215 ha (36.84 % of total area) of the park is considered wilderness area.

There are more than 1 200 superior taxa (1/3 from whole Romanian superior flora) found in the park, including 22 % of the endemic taxa of the country. The park is the genetic centre for the Hieracium and Poa genera. The fauna of the park consists of thousands of invertebrate species, including many butterflies; 11 species of freshwater fish, 11 species of amphibians (more than 50 % of Romanian amphibian fauna), 9 species of reptiles, 120 species of nesting birds, and 55 species of mammal. Altogether, these account for 23 % of European terrestrial species.

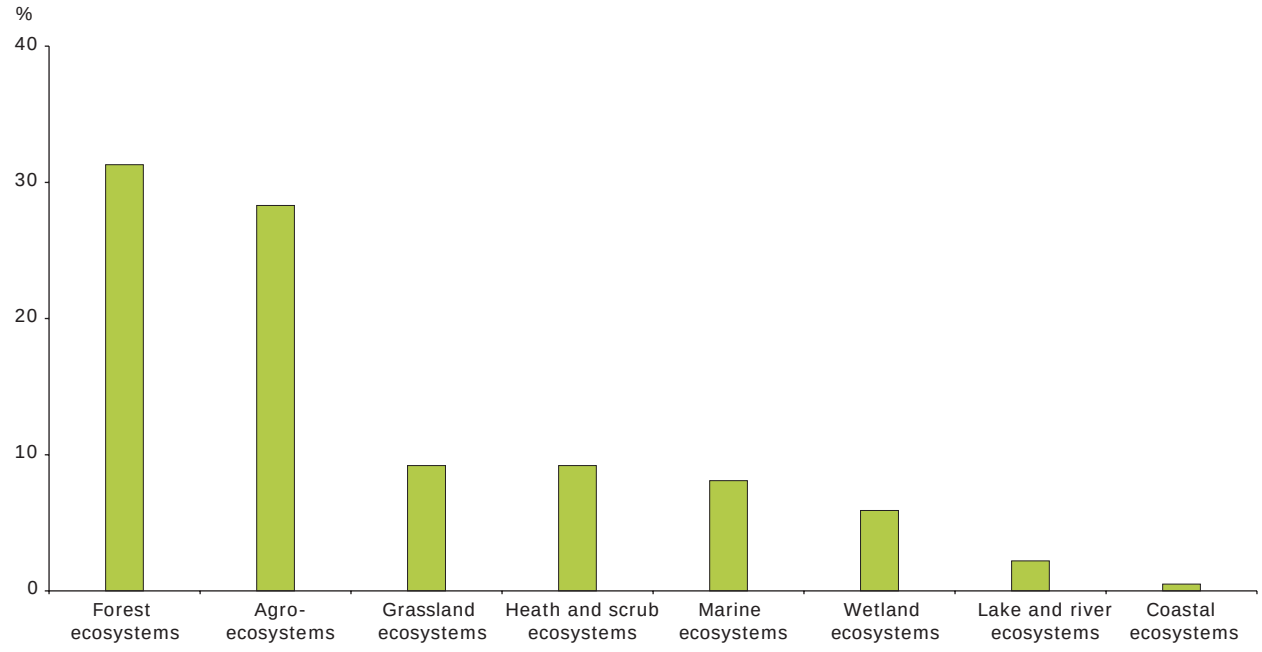
the data are not available in the CDDA for Spain, it is well known that IUCN category V is also very important in this country (EUROPARC Spain, 2008).

4.1.4 Main ecosystem-types in nationally designated areas

Based on information from CORINE Land Cover (CLC) 2006, it is possible to estimate the extent of broad ecosystem-types within the total area of protected sites in Europe (Figure 4.6). For this purpose, a clustering of different Corine land cover units was made according to the methodology applied for the EU Biodiversity Baseline 2010.

Forest ecosystems take up the largest share of nationally designated areas in EEA countries, with up to 31.3 % of the land cover. Agro-ecosystems are the next largest, making up about 28.3 % of protected areas. They are followed by grasslands with 9.2 %. Less than 8 % of the area under national

Figure 4.6 Proportion of the surface area of nationally designated sites per type of ecosystem



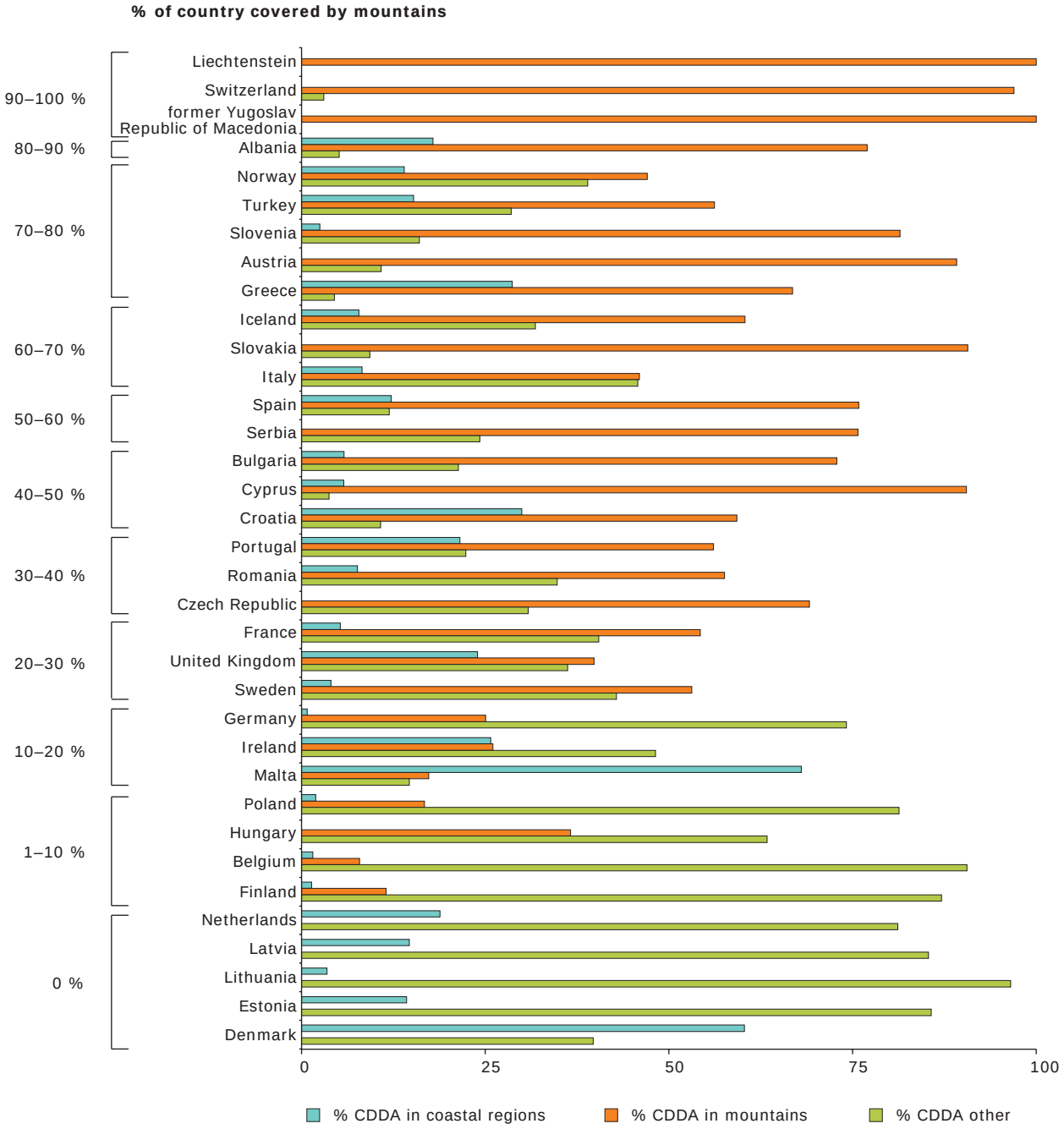
Note: These broad ecosystem-types represent different ways of clustering CLC units, so there are overlaps between them. For instance, 'grasslands' and part of 'heaths and scrubs' are included in 'agro-ecosystems'. Similarly, 'lakes and rivers' are included in 'wetlands'. This is why the sum of the ecosystems is over 100 %.

Source: CDDA, June 2011; and CLC, 2006.

designations is covered by marine ecosystems. Given that the EU has committed to designating 10 % of marine and coastal areas as protected areas, it appears obvious that significant additional efforts have to be made on this type of ecosystem.

Mountain areas generally offer greater opportunities for designing protected areas because competition for land use is much lower than in plains or in coastal areas. In addition, because they are generally more remotely located, mountain areas are important reservoirs of biodiversity. Figure 4.7 shows the extent

Figure 4.7 Share of terrestrial protected areas in mountainous, coastal and lowland inland area per country



Notes: Coastal areas defined as within 0–15 km, Mountain regions as defined by the European Environment Agency (2010).

In several countries, part of the coastal areas are also mountainous. Countries are ordered according to the percentage of each country covered by mountains.

Source: CDDA, June 2011.

to which countries with mountain areas preferentially designate their protected areas in these regions. The factors leading to the protection of coastal areas are different. They are usually the result of political will to protect areas against urbanisation and infrastructure development (ports, roads, industrial plots), or due to natural limits on land use due to strong natural dynamics such as erosion.

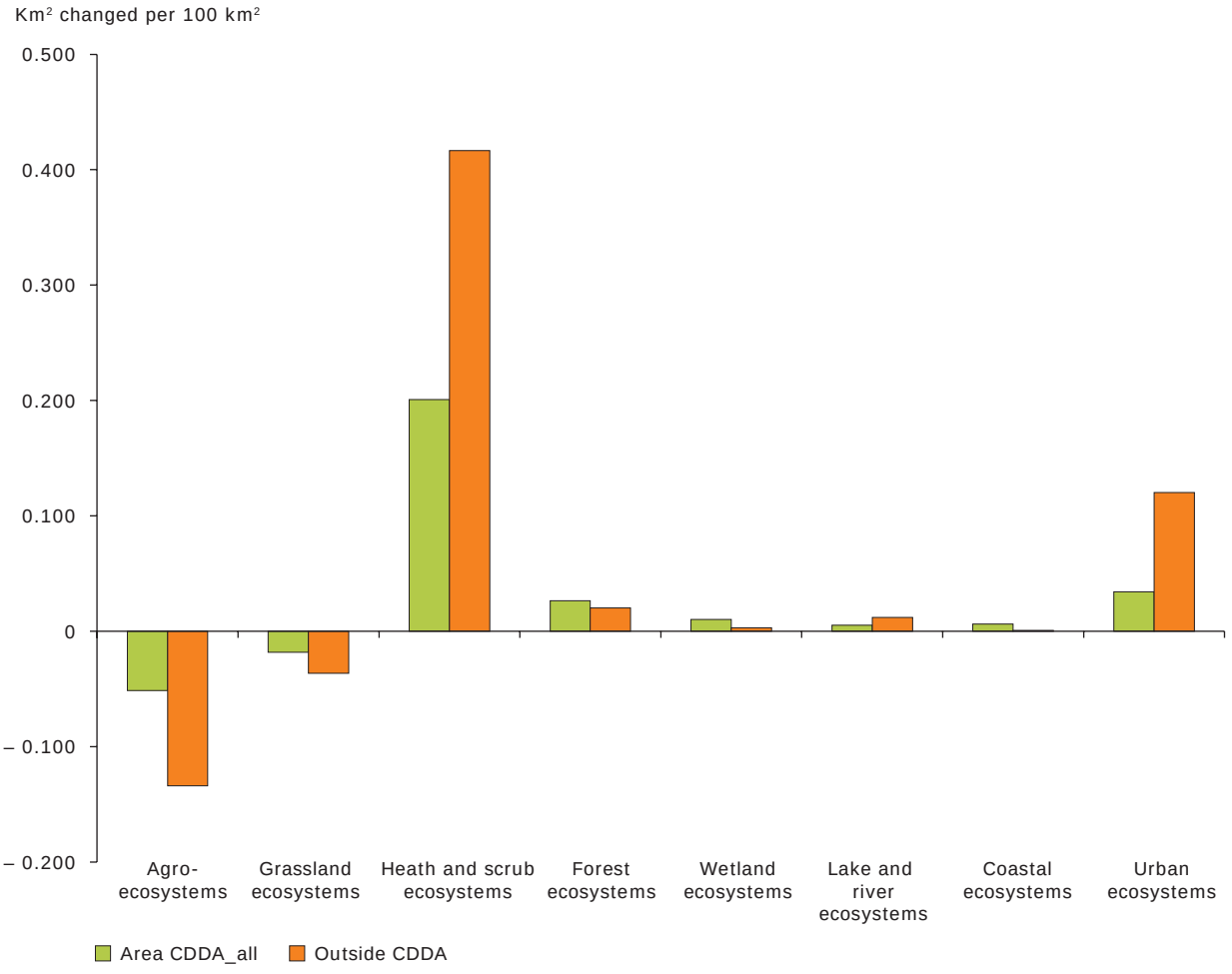
4.1.5 Land cover change in nationally designated areas

An analysis of changes in broad ecosystem-types for the period 2000–2006, both within and outside nationally designated areas, shows the buffering effect of protected areas (Figure 4.8). Decreases in agro-ecosystems including grasslands are more limited in protected areas than outside. The amount of land covered by wetlands, forests and coastal ecosystems increased slightly more in protected areas than outside in the period. The large increase of 'heaths and scrubs' during the period, more pronounced outside than inside protected areas, is mainly due to land abandonment (former agriculture areas becoming transitional woodland-shrub areas).

4.1.6 Governance and management of protected areas

The importance of governance in relation to protected areas was strongly recognised at the 5th IUCN World Congress held in Durban in 2003, and later within the CBD Programme of Work on Protected Areas. Although there are many different definitions of protected area governance,

Figure 4.8 Changes in broad ecosystem-types between 2000 and 2006 inside and outside nationally designated areas



Source: CLC 2000, CLC 2006, CDDA, June 2011.

there are five commonly agreed-upon elements (Borrini-Feyerabend et al., 2004; Graham et al., 2003):

- **Legitimacy and voice** in protected area management, particularly the level of participation by local stakeholders and the degree of consensus in decision making;
- **Accountability** of the protected area management to local communities, the public and other key stakeholders, including transparency of decision making;
- **Performance** of protected area management, including responsiveness, efficiency, and effectiveness;
- **Fairness** in decision making, including equitable benefit sharing among key stakeholders, and application of the rule of law;
- **Leadership** of protected area policymakers, including strategic vision and clear direction based on the ecological, historical and socio-cultural complexities of protected areas.

Both IUCN and the CBD recognise the legitimacy of a range of governance types. With respect to who holds management authority and responsibility for decision-making about protected areas, IUCN distinguishes four main types of protected area governance:

- **Type A:** Governance by government (at federal/state/sub-national or municipal level). A government body (such as a ministry or park agency reporting directly to the government) holds the authority, responsibility and accountability for managing the protected area. This body also determines its conservation objectives, and develops and enforces its management plan. It often also owns the protected area's land, water and related resources.

  Examples of Type A governance can be seen in several countries, notably in western Europe. These countries have vested most legislative and budgetary responsibilities for nature conservation at sub-national levels (e.g. Bosnia and Herzegovina's *subdivisions*, Belgian *regions*, German *Bundesländer,* Spanish *comunidades autónomas*, United Kingdom's *countries*). Many Central and Eastern European countries are still rather centralised, with the national level setting the legislative framework for the sub-national entities.

- **Type B:** Shared governance. Complex institutional mechanisms and processes are employed to share management authority and responsibility among a plurality of (formally and informally) entitled governmental and non-governmental actors. Shared governance, sometimes also referred to as co-management, comes in many forms. One example is 'collaborative' management, where decision-making authority and responsibility rest with one agency, but the agency is required — by law or policy — to inform or consult other stakeholders.

  Type B governance is visible in those European countries that provide a legal basis for protected areas categories that are designated, set up and managed by the local authorities in partnership with other stakeholders. Management in these cases tends to be locally accountable, with the limited contribution of national level organisations in framework legislation, coordination and capacity building. Examples of this approach include Dutch National Parks, French and Italian Regional Nature Parks, German Nature Parks, Polish landscape parks, all Swiss Parks, and the United Kingdom's Areas of Outstanding Natural Beauty.

- **Type C***:* Private governance. Private governance comprises protected areas under individual, cooperative, NGO or corporate control and/or ownership. In this scenario, the protected area is managed under not-for-profit or for-profit schemes. Typical examples are areas acquired by NGOs explicitly for conservation. Many individual landowners also pursue conservation out of respect for the land and a desire to maintain its aesthetic and ecological values.

  Type C governance can be seen in Belgium's *Natagora* and *Natuurpunt*, the Dutch *Natuurmonumenten*, the Swiss *ProNatura*, or the local wildlife trusts in the United Kingdom. It can also be seen in the partially privatised government enterprises (e.g. Finnish *Metsähallitus* and Dutch *Staatsbosbeheer*). In Central and Eastern Europe this approach is more often the exception rather than the rule.

- **Type D:** Governance by indigenous peoples and local communities. This type includes two main subsets: (1) indigenous peoples' areas and territories that are established and run by indigenous peoples and (2) community-conserved areas that are established and run by local communities.

Protected area management bodies, in the form of administrative entities that have responsibility for the direct management of a single site, exist in most of these European governance systems. They are usually established in relation to a protected area designation of a certain size or importance (such as national parks, nature parks, biosphere reserves or landscape protected areas). Smaller sites (e.g. natural monuments, nature reserves, Natura 2000 sites) tend to be managed by regional bodies in charge of managing a larger number of sites. There are some countries that have abandoned this system altogether (Albania, Estonia, Hungary, Latvia and Sweden) and are vesting direct responsibilities for the management of protected areas at the regional level.

The governance types above describe the different types of management authority and responsibility that can exist for protected areas, but it must be remembered that these do not necessarily relate to ownership. In some of the governance types, such as state- and private-protected areas, governance and ownership will often be the same. However, in other cases, this will depend on individual country legislation. For example, many indigenous peoples' protected areas and community-conserved areas are found on state-owned land. In large and complex protected areas, particularly in categories V and VI, there may be multiple governance types within the boundaries of one protected area, possibly under the umbrella of an overview authority. In the case of most marine protected areas, the ownership is with the state, which will either manage directly or delegate management to communities, NGOs or others. There are, however, many marine areas where the customary laws of indigenous peoples are recognised and respected by the broader society. In international waters and the Antarctic, where there is no single state authority, protected areas will inevitably need to be under a shared type of governance (Dudley, 2008).

Private land ownership in and of protected areas is a phenomenon that occurs throughout Europe. However, it is usually a characteristic of 'less strictly' protected sites that allow for a degree of sustainable land use (e.g. agriculture and forestry). In these places, the role of the competent authorities is mainly to provide guidance, to interpret legislation, to promote regional identity and to assist in fundraising for conservation activities. 'Non-intervention' is also a type of management used in many protected areas or in specific zones of larger protected areas: basically the areas are left to evolve without direct human intervention.

4.2 Different international and regional networks of protected areas

There are a number of frameworks that promote the organisation and cooperation of protected areas within networks. Each of these networks has a specific background and purpose, ranging from the protection of exceptional assets to the conservation of sites of high ecological and functional value, or to sites dedicated to scientific research and sustainable development. They all contribute to the enhancement of biodiversity conservation throughout Europe.

Natural areas are often shared by neighbouring countries making them a common responsibility. In order to effectively implement nature protection at the scale of the whole region, the countries involved often adopt regional Multilateral Environmental Agreements (MEAs) aimed at regional and transboundary cooperation. Neighbouring countries within a region often have different levels of technical expertise, knowledge, capacity and financial resources, and can therefore benefit by combining their respective strengths (Sandwith et al., 2001). Protected area networks allow for a more effective and harmonised management of the shared natural heritage, habitats and species. They also allow for the joint preservation and promotion of cultural values of the region in question. Such protected area networks are usually legally established on the basis of either global or regional MEAs, such as the Alpine or Carpathian Conventions (UNEP Vienna, 2010).

4.2.1 Specific international and regional designation-types

European countries participate and contribute to the three global networks of protected areas, supported by Multilateral Environmental Agreements (MEAs), many of which have significant transnational components to them:

- **Ramsar sites designated under the Ramsar Convention (1971)** are focused on the protection of wetlands, a specific type of ecosystem. These sites are deemed important for the conservation of global biological diversity and for sustaining human life through the maintenance of their ecosystem components, processes and benefits/services.

  Ramsar Sites are designated according to nine criteria — eight of which are related to biodiversity. The Convention also provides the tools for making the link between wetland

biodiversity and the ecosystem services upon which people depend such as fish, fruits, wood, medicines, etc.

As of 2011, 874 Ramsar sites have been designated within the 39 EEA countries, among which nine are formally designated transboundary Ramsar sites. These transboundary sites include the North Livonian Transboundary Ramsar Site between Estonia and Latvia, the Trilateral Ramsar Site Floodplains on the Morava-Dyje-Danube Confluence shared between the Czech Republic, Slovakia and Austria, and the Vallée de la Haute-Sûre shared between Belgium and Luxembourg. 20 other transboundary sites are under preparation.

- **World Heritage sites**, designated under the World Heritage Convention (1972) seek to protect and preserve the cultural and natural heritage around the world that is considered to be of outstanding value to humanity. 46 World Heritage sites have been designated so far by the 39 EEA countries. Remarkable examples of transboundary World Heritage sites are the Caves of Aggtelek Karst and Slovak Karst, consisting of 712 caves spread out over a total area of 55 800 ha along the border of Hungary and Slovakia, and the Monte San Giorgio, a wooded mountain at the border between Switzerland and Italy.
- **Biosphere Reserves** are designated as part of the UNESCO Man and the Biosphere Programme. They have three clearly defined functions that are complementary and of equal importance. The first function is conservation, preserving genetic resources, spaces and ecosystems, and landscapes. The second function is promoting sustainable economic and human development. The third function is logistical, supporting and encouraging research, monitoring, education and information exchange related to conservation issues. For this purpose, the Biosphere reserves are divided into three zones: a central zone whose legal status must ensure long-term protection, and where most human activities are prohibited; a clearly defined buffer zone, where only activities compatible with conservation are permitted; and a transitional zone, which does not usually have protected status, and which permits and promotes sustainable use of resources. As of 2011, 130 Biosphere Reserves have been designated by the 39 EEA countries. Six of these 130 are transboundary reserves. Several others are currently being developed, such as the transboundary Biosphere Reserve along the Mura, Drava and Danube rivers.

European countries also participate in networks of marine protected areas. These areas are being

Box 4.6 Project for 'Europe's Amazon'

On 25 March 2011, five neighbouring countries — Austria, Croatia, Hungary, Serbia and Slovenia — signed a declaration confirming their commitment to the establishment of a transboundary UNESCO Biosphere Reserve. The Declaration paves the way for creating the world's first five-country protected area, protecting biodiversity along the Mura, Drava and Danube rivers, 'Europe's Amazon', with an overall size of approximately 800 000 ha. This will create Europe's largest riverine protected area.

During the Cold War, the Mura and Drava Rivers formed part of the 'Iron Curtain' border and were a symbol of that divide. Over the last two decades, the transboundary river system has become a lifeline connecting the five countries. The five countries in this region have established a network of about 20 individual river protected areas. This includes the Danube-Drava National Park in Hungary, the Kopački Rit Nature Park in Croatia, the Gornje Podunavlje Special Nature Reserve in Serbia, and Natura 2000 sites along the Drava and Mura in Austria and Slovenia. Most recently, Croatia declared 88 000 ha of the Drava-Mura a Regional Park. A new transboundary UNESCO Biosphere Reserve will combine various protected areas for effective protection and management of this shared river ecosystem.

With rare floodplain forests, river islands, gravel banks and oxbow lakes, the new five-country protected area spans over 700 kilometres of rivers and 800 000 ha of unique natural and cultural landscapes. The area is home to the highest density of breeding pairs of white-tailed eagle in Europe, as well as to endangered species such as the little tern, the black stork, otters, beavers and sturgeons. It is also an important stepping stone for more than 250 000 migratory waterfowl every year.

The river ecosystem is also vital for the socio-economic wellbeing of the trans-boundary region. It is a major source of: drinking water; natural flood protection; sustainable forestry; agriculture and fisheries. It also has an important role in the promotion of eco-tourism, awareness raising and environmental education in the region (WWF website, 2011).

developed as part of regional marine conventions, which fully or partly cover European marine seas (See Chapter 7).

Two networks of protected areas are specific to Europe: the Natura 2000 network of sites designated under the Birds and Habitats Directives, which only apply to the 27 Member States of the European Union; and the Emerald Network of sites, which is under development as part of the Bern Convention (which applies to 45 European countries, see Chapter 5).

Many of the sites that are designated under these international and regional networks are also designated under one or several national instruments as described before. However, this is not compulsory and depends very much on the specific administrative and policy framework of each country.

Another European initiative for protected areas is the 'European Diploma of Protected Areas', an award by the Council of Europe that can be given to sites in 45 European countries. This award applies only to existing nationally protected areas, and may be given to natural or semi-natural areas in recognition of the diversity of their biology, geology or landscapes. It is also intended to recognise exemplary management of the areas that it is awarded to. As of 2011, the European Diploma has been awarded to 64 sites in 23 countries out of the 39 EEA member and collaborating countries.

4.2.2 Other regional networks of protected areas

Other policy instruments, although not leading to additional designation-types also seek coherence and cooperation between protected areas within regional networks. A description of these networks follows below.

The Alpine Convention framework for protected areas

The Alpine Network of Protected Areas (ALPARC) gathers all categories of protected areas larger than 100 ha within the Alpine Convention area. These include national, regional and natural parks, natural and biosphere reserves and various other types of protected area. Since 1995, ALPARC has promoted and enhanced intensive exchanges between the Alpine parks, nature reserves, biosphere reserves, tranquillity zones and many other kinds of protective designations. It has also promoted exchanges between nature protection institutions, local actors, local communities and scientists.

The signatory countries of this international treaty are Austria, France, Germany, Italy, Liechtenstein, Monaco, Slovenia and Switzerland.

The Carpathian Convention framework for protected areas

In 2006, the Contracting Parties of the Carpathian Convention officially founded the Carpathian Network of Protected Areas (CNPA) as a practical means for implementing the Convention's provisions on conservation. The CNPA coordinates joint projects designed to: improve cooperation between the seven Carpathian countries; facilitate exchanges between the Carpathian protected areas; raise awareness of the fragile ecosystems in the massif; and work to realise practical measures, such as the creation of an ecological network to ensure the survival of endangered species. There is a strong emphasis on cooperation with the Convention's Alpine neighbours (Map 4.4).

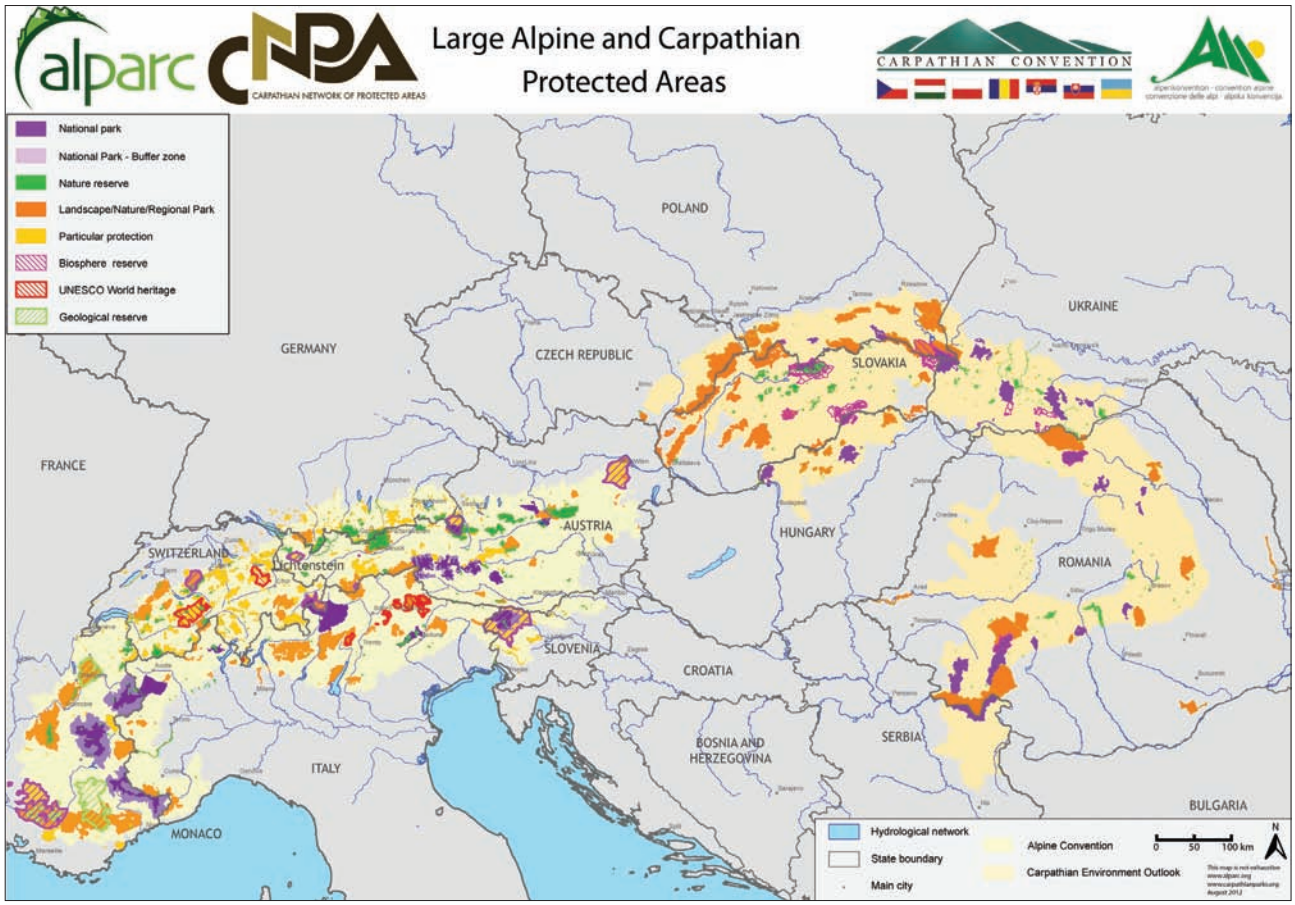
Danubeparks

In June 2009, directors of 12 protected areas within eight countries that border the Danube signed the Declaration of Vienna, which established the Danube River Network of Protected Areas. The Danube is one of the most international rivers of the world, and its catchment area includes 19 countries. As a first step, the partnership expands cooperation, coordination, and consultation between the national administrations of protected areas of Danube riparian countries. The protected areas within the network have different protection status and categories. They include: national parks, Biosphere Reserves, special protected areas, Special Zoological Reserves, and Protected Landscape Areas. Many of the areas include more than one category in that specific area. The aims of the network were consolidated by the Declaration of Tulcea (2007). More protected areas partners along the Danube River and its tributaries are invited to join the network.

The protected areas network in the Barents Euro-Arctic Region BPAN

This network was set up in 2010 by the Barents Euro-Arctic Council (BEAC), a forum for intergovernmental cooperation in the Barents Region. It involves four countries (Finland, Norway, Russia and Sweden at federal and regional level), and aims to maintain the dynamic biodiversity of the Barents Euro-Arctic.

Map 4.4 Large protected areas in the Alps and the Carpathians



Source: ALPARC (map produced by the Protected Areas Task Force — permanent secretariat of the Alpine Convention using several non-exhaustive national data sources).

Towards a Dinaric Arc and Balkan Network of Mountain Protected Areas

In 2009, UNEP and the Environment and Security Initiative (ENVSEC) launched an initiative for transboundary cooperation of mountain protected areas in south eastern Europe. They have called it 'Towards the Dinaric Arc and Balkan Network of Mountain Protected Areas' (ENVSEC-UNEP, 2010).

PAN Parks

The PAN Parks Foundation (Protected Areas Network Parks) is a European non-governmental organisation created under the initiative of WWF and supported by the Dutch tourist company Molecaten Group. The aim of this network is to improve nature conservation and the management of protected areas using sustainable tourism as a tool. PAN Parks create a network of protected areas certified in accordance with PAN Parks quality standards. These standards cover relevant wilderness protection, as well as social, economic and cultural aspects. Although PAN Parks seek to welcome visitors, they place greater importance on nature conservation in order to achieve effective habitat protection with the lowest environmental impact (Puchal, 2011).

MedPAN

MedPAN is a network of managers of marine protected areas in the Mediterranean. Set up as a legally independent structure since the end of 2008, MedPAN's main objective is to improve the effectiveness of marine protected area management in the Mediterranean. The network counts over 38 members, most of whom are managers of marine protected areas from the entire Mediterranean basin. It also includes 22 other 'partner' organisations that are keen to contribute to the strengthening of the network. These partners manage more than 30 marine protected areas and are working towards the creation of several new sites.

Box 4.7 Networks of people for protected areas management

Crucial to the functioning of these networks of protected areas are networks of people. These include:

- EUROPARC, which has over 400 members in 36 countries. It aims to facilitate international cooperation in all aspects of protected area management to further improve and conserve a shared natural inheritance.
- Eurosite, the aim of which is to exchange, enhance and promote expertise in the management of nature sites throughout Europe. It brings together governmental and non-governmental organisations, as well as private bodies, in active collaboration for the practical management of Europe's nature. There are currently 72 members of the Eurosite network from 23 European countries engaged in the delivery of this mission.

Note: These two organisations are discussing the possibility of merging.

MAIA
MAIA is a European cooperation project with the aim of creating a network of MPA managers and stakeholders for marine protected areas in the Atlantic arc.

European Geoparks Network
This network was established in 2000 in order to 'protect geodiversity, to promote geological heritage to the general public as well as to support sustainable economic development of Geopark territories primarily through the development of geological tourism'. The network involves managers from 43 territories across 17 European countries who seek to exchange ideas, experience and best practice in working towards common goals. Although the Geoparks network is principally concerned with protection of diversity in geology, the network also seeks to promote the natural and cultural heritage of the parks.

Eroded hills from Nallıhan, Central Anatolia, Turkey

4.3 Conclusions

The diversity of different protected area designations is the result of each country — or even regions within countries — having different cultural and administrative starting points to the process.

Although it results in a disparate group of organisations and designations, many of these designations have similar aims in terms of the protection and long-term management of land that has high value for nature.

The expanding role of protected areas as addressed in Chapters 1 and 2 is reflected in the large variety of IUCN management types, including an increased recognition of the role of IUCN category V in supporting the promotion of sustainable development practices. Whether they are in category VI, V, II or IV, protected areas are territories that benefit from a certain level of governance and dedicated management planning. They benefit from dedicated staff that can facilitate dialogue among stakeholders, including on conservation issues and sustainability. In that respect, protected areas are unique platforms for exchange and capacity building on sustainable practices, both within and beyond their boundaries.

The diversity of designations is indeed a strength of the European approach because it allows for a multitude of land uses and management regimes to be incorporated within the boundaries of our protected areas. Each of these land uses and management regimes has national, regional and local relevance. Within this context, there is still a clear desire for coherence to be established between protected areas across national boundaries in order to ensure 'ecological connectivity' — the facilitation of movement by species between areas. Such coherence would also provide for the exchange of experience and best practice between administrators and managers. These initiatives can clearly provide a basis for wider international collaboration, the end result of which will be to ensure the long-term sustainability of Europe's protected areas.

Another feature of protected area management that needs more attention is the appropriate monitoring and assessment of management of protected areas. This would allow for assessments to be made of the conservation outcomes, a practice that is currently difficult to achieve in a comprehensive way across Europe.

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5 The Natura 2000 and Emerald networks

Chapter summary

This chapter is divided into two parts, focusing on the two main pan-European networks of protected areas: Natura 2000, and its conceptually similar cousin, the Emerald Network. In **Section 5.1**, we discuss Natura 2000, focusing firstly on the methodology used to establish the network, its administrative features, and the research to which it has given rise. We then look at the current state of the network, with a brief survey of the number of sites it comprises, and their geographic distribution in Europe. Next, we look at the types of ecosystems in the network, the increase in the size of the network, and the challenge of creating various types of connectedness across the network. In **Section 5.2**, we discuss the far less developed Emerald Network, which incorporates a wider number of European countries and is still in the early stages of implementation. We discuss the network's history and recent progress that has been made so far in building the network.

North Vidzeme Biosphere Reserve and Natura 2000 site, Latvia

Vesitükimaa Islets Nature Reserve and Natura 2000 site, Estonia

5.1 The Natura 2000 network

5.1.1 The innovative approach of Natura 2000

The approach to designating sites under the Habitats Directive, building the Natura 2000 network and managing it is innovative, and includes several aspects that are unique for a piece of multi-national legislation on protected areas. As a matter of fact, the concept of Natura 2000 builds on, but goes beyond the 'traditional' definition of 'protected area': on the one hand it is based on strict provisions of an EU directive (hard law), on the other hand, it promotes the sustainable use of resources and the consideration of economic, social and cultural requirements for achieving the nature conservation goals.

The main goal of Natura 2000 is to contribute to the maintainance or restoration of a favourable conservation status for the target habitats (231 different types) and species (over 900 taxa). The notion and definition of 'favourable conservation status' is one of the most distinctive and key aspects introduced by the Habitats Directive in European nature conservation policy, and clearly contributes to an outcome-oriented policy.

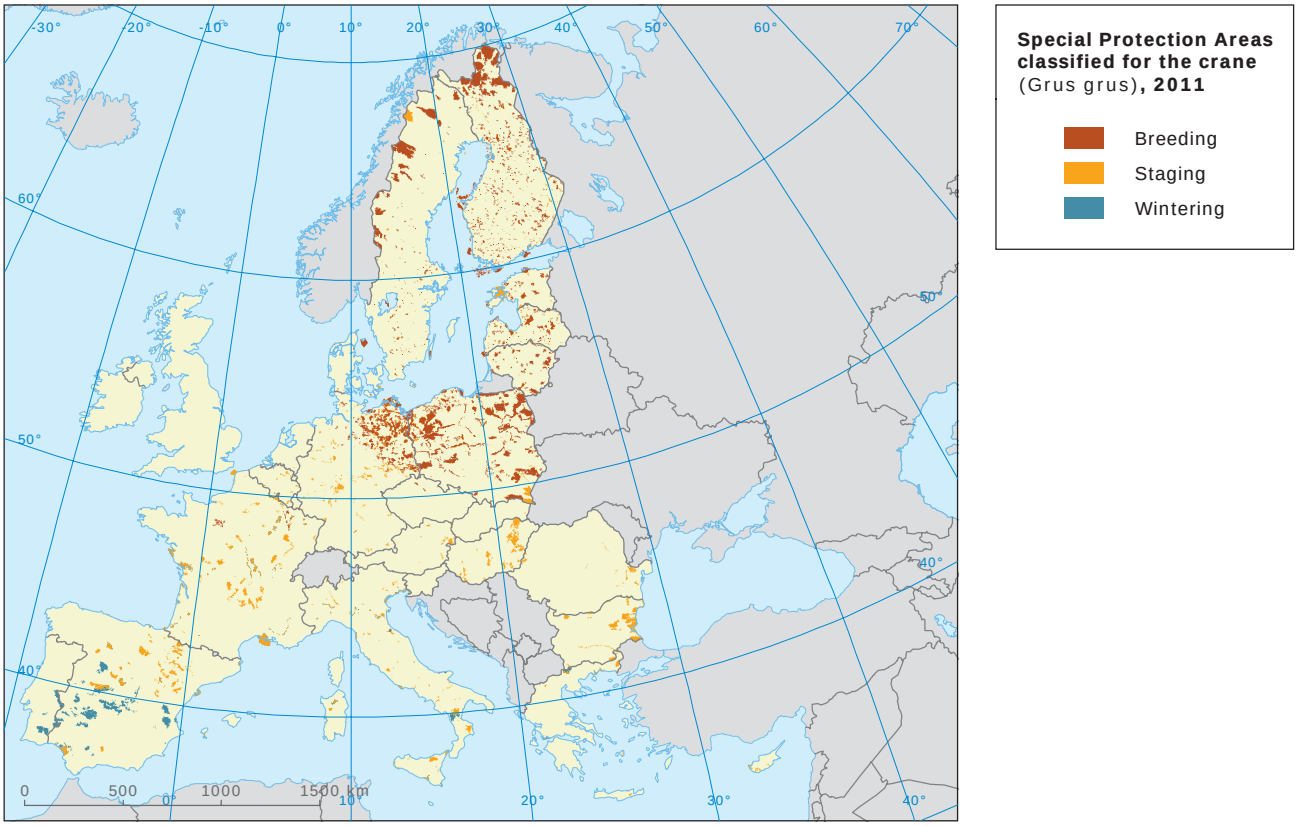
Another original aspect of Natura 2000 is its use of biogeographical regions. These biogeographical regions are used to both build the network and to identify target species and habitat types. This has been accomplished while recognising the ecological differences within and between EU Member States; a fact that was particularly important after the post-1992 EU enlargement, which greatly increased the geographical area covered by the directives and the network (to the North and the East). The EU now has nine biogeographic regions — Alpine, Atlantic, Black Sea, Boreal, Continental, Macaronesian, Mediterranean, Pannonian and Steppic. In addition to these EU biogeographical regions, there are two non-EU biogeographic regions in Europe: the Anatolian and the Arctic regions (see Map 3.1).

Building a network of sites across Europe on the basis of a common methodology, criteria and set of ecological features favours better ecological coherence than if the networks were only organised within each Member State. A European network helps migratory species, and allows for taking into account genetic diversity and ecological variability. It also facilitates the identification and designation of sites across borders that better take into account the natural distribution of species and habitat types.

This can be illustrated by the case of the crane (*Grus grus*) for which Special Protection Areas — the bird component of Natura 2000 — have been classified across its European range and flyways. These SPAs cover all key areas of the cranes' life cycle (Map 5.1). This issue of network 'connectivity' where protected areas are established and managed to facilitate all keys areas of their life cycle is discussed further ahead in this chapter.

Another unique aspect of the Natura 2000 network is the comprehensive set of provisions introduced by the Habitats Directive concerning conservation measures and assessments of impacts for projects likely to have a significant effect on the sites. The provisions are set in Article 6 of the directive, for which the European Commission has been issuing extensive guidance, from legal interpretation to practical guidance on specific sectors like wind

Map 5.1 Special Protection Areas classified for the crane (*Grus grus*) across EU



Source: Natura 2000 database, December 2011.

energy, port developments, etc. ([6]). In addition, the European Court of Justice has produced several rulings that further clarify the legal interpretation of these provisions ([7]). However, the practical implementation of the network at the national, regional and local level is flexible, and depends on the legal, administrative and cultural characteristics of each country, region or site.

Another distinct aspect of Natura 2000 compared to other regional networks of protected areas is the way it is financed through different EU mechanisms. The Member States estimate that a minimum of EUR 5.8 billion per year will be needed to effectively maintain and manage the network (EU, 2011). As part of the framework for the future EU budget beyond 2014, the European Commission is looking at the effectiveness of the approach to financing Natura 2000 that has been used so far, namely a mix of funds from the Member States and sectoral EU funds like Rural and Regional Development Policy and the LIFE regulation. Additional and updated information on the financing of Natura 2000 at the EU level can be found on a dedicated webpage from the European Commission ([8]).

Finally, Natura 2000 has been responsible for much research activity over the past twenty years. This research has comprised both applied research to help implement the directives, as well as research that studies the process of implementation itself.

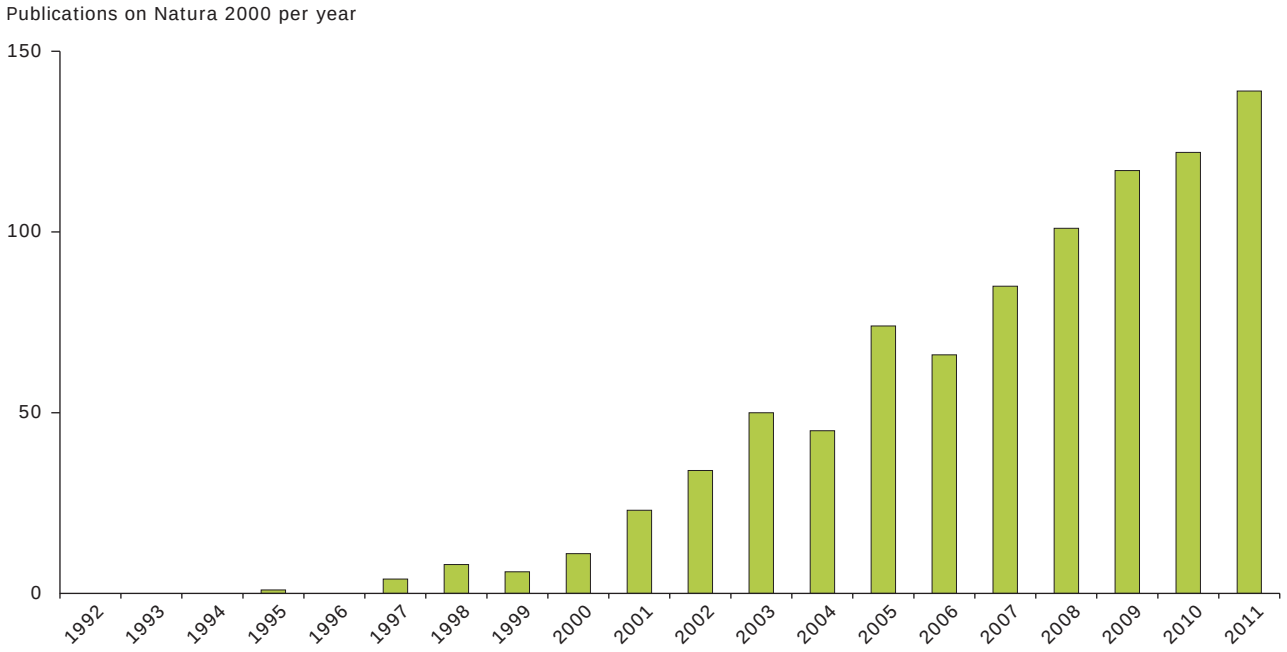
Figure 5.1, based on the Web of Knowledge database (http://wokinfo.com/), shows a clear increase in published papers making reference to Natura 2000, especially since 2000. A search using the phrase 'habitats directive' shows a very similar pattern (not shown).

Research related to Natura 2000 can be grouped under several themes. The following aims to give a few examples, but does not aim to be comprehensive.

- ***Research theme 1: Gap analysis and other assessments***
  This topic is addressed in Chapter 8 — Assessments related to protected areas.

- ***Research theme 2: Surveys and monitoring***
  Many countries carried out extensive surveys of both habitat types and species in order to select their Natura 2000 sites. Particularly

Figure 5.1 Publications on Natura 2000 per year — based on a search in Web of Knowledge for topic 'Natura 2000' (9/01/2011)



Source: Web of Knowledge database (http://wokinfo.com/) (5/04/2012).

([6]) http://ec.europa.eu/environment/nature/natura2000/management/guidance_en.htm.
([7]) http://ec.europa.eu/environment/nature/legislation/caselaw/index_en.htm.
([8]) http://ec.europa.eu/environment/nature/natura2000/financing/index_en.htm.

noteworthy are the programmes of habitat mapping in Spain and the Czech Republic, and the EUSeaMap project covering the Atlantic, Baltic and western Mediterranean. Our knowledge of the distribution of many species has increased markedly because of the Habitats Directive and the research it engendered, particularly for less well-known species groups such as insects and bryophytes. Monitoring, often linked to reporting requirements under Article 17 of the Habitats Directive, has also been a focus, with EU-funded research projects such as EUMON and EBONE helping to develop tools and common standards. Several groups have investigated the potential of remote sensing techniques for mapping and monitoring Annex I habitats. The Habistat project has published a useful overview of this (Vanden Borre et al., 2011). There has also been some study of the role played by taxa inventories and so-called 'long term ecosystem research' (LTER) sites in understanding long term changes (Metzger et al., 2010; De Biaggi et al., 2010).

- ***Research theme 3: Adapting to environmental change***
  There have been many studies of how Natura 2000 and other protected areas will be affected by changes in land use or climate, and also of how Natura 2000 may help biodiversity to adapt to such changes.
  At present, land use change is probably the single largest driver of biodiversity loss (CBD, 2010). Future changes in land use across Europe have been modelled by several studies (e.g. Rounsevell et al., 2006), and although the changes vary with the socio-economic scenario chosen, major changes are considered inevitable. There is some evidence that protected areas, including Natura 2000, are also being affected, especially by agricultural intensification or abandonment. However, many of the published studies (e.g. Bodesmo et al., 2011; Diogo & Koomen 2010) examine land use changes over periods that start well before the sites were designated as Natura 2000.

- As for how protected areas will be affected by climate change, there have also been studies and publications on how this will affect the species and habitats protected by Natura 2000 and on the consequences for the network itself (e.g. Araújo et al., 2011; Harrison et al., 2006; Verschuuren, 2010). In addition to these studies, several meetings have been dedicated to this topic, most recently in Vilm, Germany (Ellwanger et al., 2012). Vos et al. (2008) have modelled the combined effect of both land use change and climate change for a selection of species. They suggest that the Natura 2000 network will need increased connectivity to allow species to adapt to change and propose a method for identifying 'ecosystem hotspots', where climate refugia for a significant set of species coincide.

- ***Research theme 4: Implementation***
  Implementing Natura 2000 has created tensions in many countries. These tensions have been studied by social scientists, who have assessed problems in single countries, and also made comparisons across two or more countries. The implementation of Natura 2000 in France has been especially well documented (see e.g. Pinton et al., 2007). The governance of biodiversity, and in particular Natura 2000, has also attracted social and political scientists, often in the context of studies on EU enlargement (e.g. Kluvánková-Oravská et al., 2009).

- ***Research theme 5: Management***
  A better understanding of the ecology of species and habitats is often needed to inform managers of Natura 2000 sites, and there have been many studies of single species or groups of species or of habitat types, often funded by the LIFE programme. The European Commission has also published management guidelines for a limited number of habitat types.
  There are an increasing number of papers providing evidence-based recommendations on management. For example, Plassmann et al. (2009) show the importance of controlling grazing in the management of dune habitats. Site size, which varies greatly and often reflects national policy for site selection (Evans, 2012), also has implications for site management. Smaller sites tend to be less resistant to land use changes at a landscape scale and need particular attention, including measures that focus on the wider countryside (Maiorano et al., 2008).

5.1.2 Current status of the Natura 2000 network

While the sites classified by Member States under the Birds Directive (Special Protection Areas — SPAs) are automatically included in Natura 2000, the sites designated under the Habitats Directive follow a multi-step process before they are included in the network. The process proceeds as follows:

- Firstly, the sites are identified and proposed by the Member States based on scientific criteria set in the Directive. At this stage, they are called 'proposed Sites of Community Importance' (pSICs).

- Secondly, the European Commission assesses, by biogeographical region, the sufficiency of the proposed sites for each target species and habitat type.

- Thirdly, the Community importance of each individual site is assessed according to the criteria set in the Directive, and the European Commission adopts and publishes a Decision with the Union list of Sites of Community Importance (SCIs) for each biogeographic region.

- Finally, the Member States classify their SCIs as Special Areas of Conservation (SACs) after adoption of the required legal, administrative or contractual measures necessary for their management and conservation.

The above process, which has been under way since 1995, involves extensive consultation between the national authorities and the European Commission, with the technical and scientific support of the European Environment Agency and its European Topic Centre on Biological Diversity (ETC/BD). Scientists, nature NGOs, land owners and user organisations (farmers, foresters, hunters, anglers, etc.) are also involved, inter alia through the new process called Natura 2000 Biogeographical Seminars. Detailed information about this process and its outcomes is given in the dedicated web sites of the European Commission ([9]) and the EEA-ETC/BD ([10]).

Given that EU Member States are still classifying and designating sites for the Natura 2000 network, the reader is advised to consult the relevant webpage of the European Commission for the most up-to-date statistics ([11]). However, the number of new additions to the network is now falling — at least for terrestrial sites — as countries complete their proposals.

The figures, statistics, maps and graphs below are based on the status of the network (both SPAs under the Birds Directive and SCIs/SACs under the Habitats Directive) in December 2011 unless otherwise mentioned. Where relevant, statistics for SCIs/SACs and SPAs are given separately. More detailed information about the marine component of Natura 2000 is given in Chapter 7.

At the end of 2011, the network accounted for over 26 400 sites with a total surface area of about 986 000 km^2, comprising nearly 768 000 km^2 of land, and close to 218 000 km^2 of sea (see Map 5.2). The terrestrial component of the network represents 17.9 % of the EU-27 land territory, whereas the sea component covers only a small part of the marine waters under the jurisdiction of EU Member States (about 4 %).

Figure 5.2 shows that the coverage of the network, namely the sites designated under the Habitats Directive (SCIs and SACs), varies according to the biogeographic region. The Black Sea, Alpine and Macaronesian regions account for the highest coverage by the network (above 37 % of the region). The Atlantic, Continental and Boreal have the lowest coverage with less than 16 %.

Slovenia and Bulgaria account for the largest proportion of their national land territory covered by Natura 2000 sites, with respectively 35.5 % and 34 %, followed by Slovakia (with 29 %) and Cyprus (with 28 %). It is interesting to note that all four countries are among the more recent EU members. Spain and Greece follow closely, with about 27 % of their land territory covered (Figure 5.3). It should be stressed however, that in terms of absolute surface area covered, Spain provides by far the highest terrestrial surface area under Natura 2000. Approximately 139 000 km^2 of Spain is covered by Natura 2000 sites. The country with the next largest amount of territory covered by Natura 2000 is France, with about 68 000 km^2.

In terms of marine designations, the United Kingdom provides the highest surface area covered under Natura 2000 in absolute terms, with over 49 000 km^2 of its seas covered, followed by France with almost 42 000 km^2 and Germany with over 25 000 km^2 (Figure 5.3). The relative figures are given in Figure 5.4.

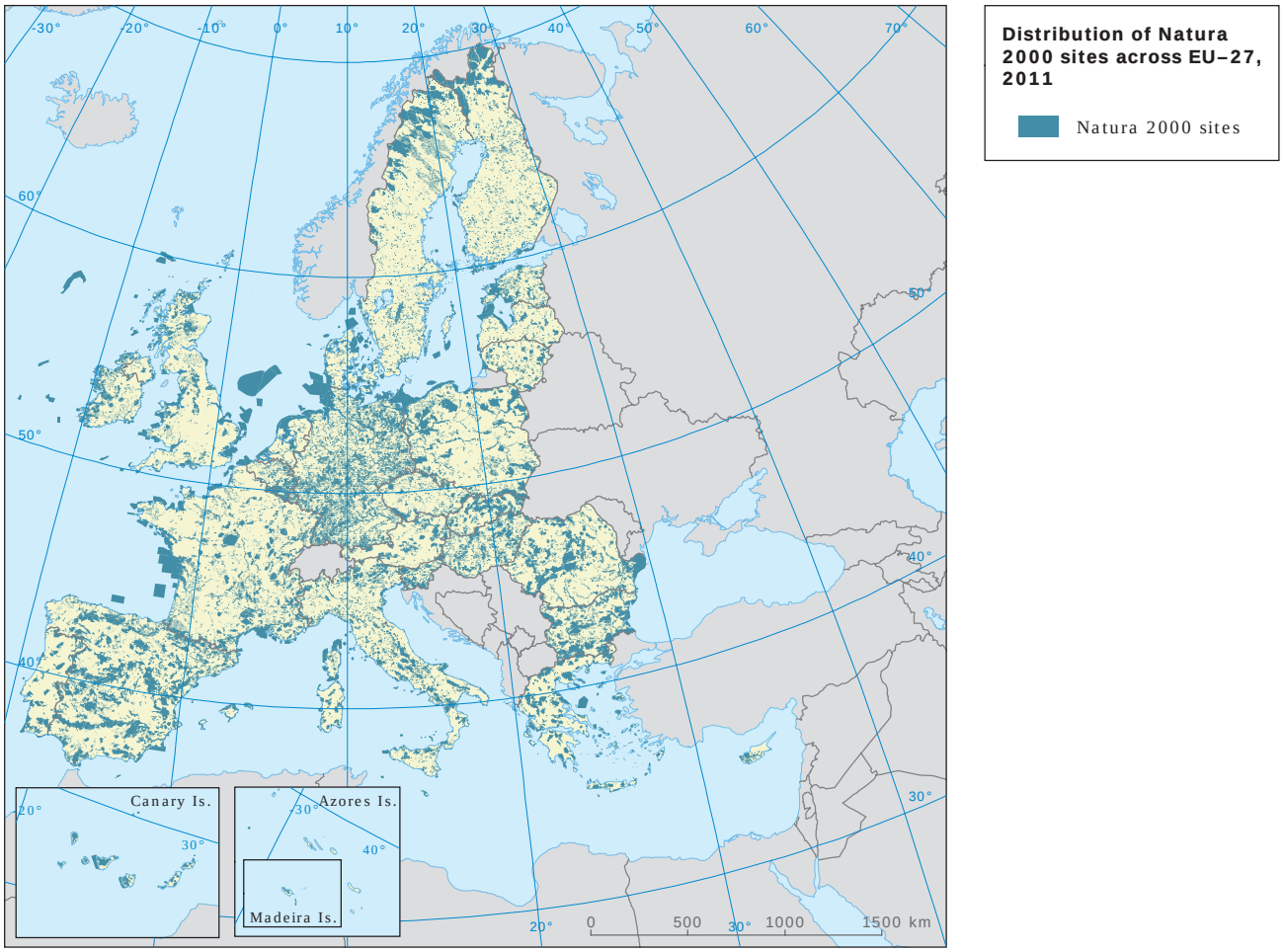
The size of the sites across Europe varies considerably, with almost a third of the sites bigger than 1 000 ha, another third smaller than 100 ha, and the rest between 100 and 1 000 ha. As a curiosity, the biggest marine site is Dogger Bank in the United Kingdom (1 233 115 ha), and the largest terrestrial site is *Vindelfjällen* in Sweden (554 675 ha).

5.1.3 Main ecosystems represented in the network

As shown in Table 5.2, the network covers various types of ecosystems. Forests account for nearly half of the network land cover, and agro-ecosystems for

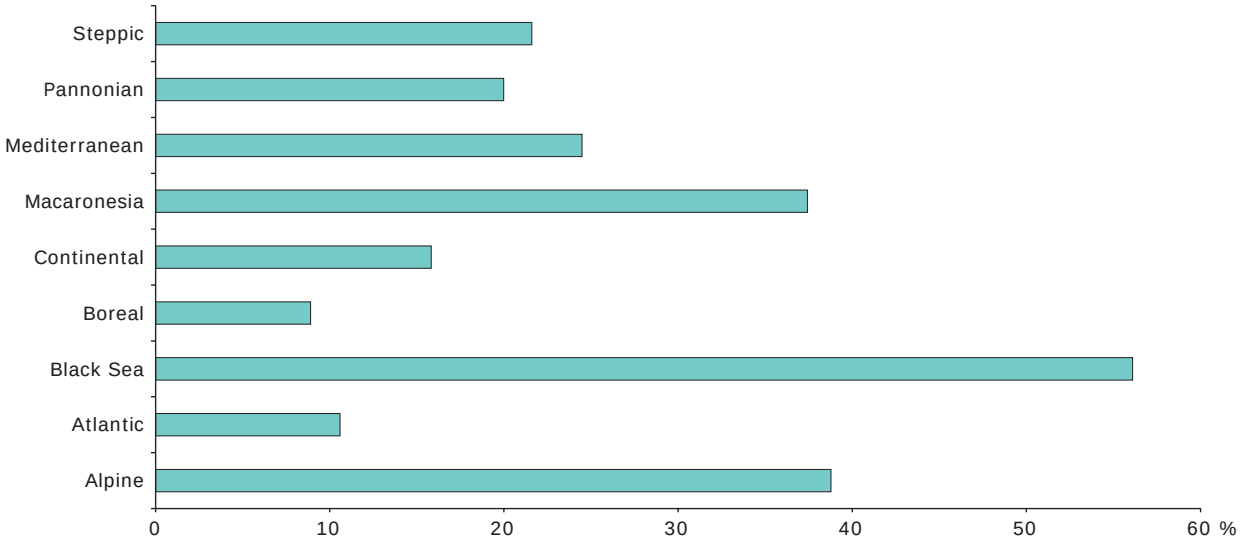
([9]) http://ec.europa.eu/environment/nature/natura2000/index_en.htm.
([10]) http://bd.eionet.europa.eu/activities/Natura_2000/index_html.
([11]) http://ec.europa.eu/environment/nature/natura2000/index_en.htm.

Map 5.2 Distribution of Natura 2000 sites across EU-27, 2011



Source: Natura 2000 database, December 2011.

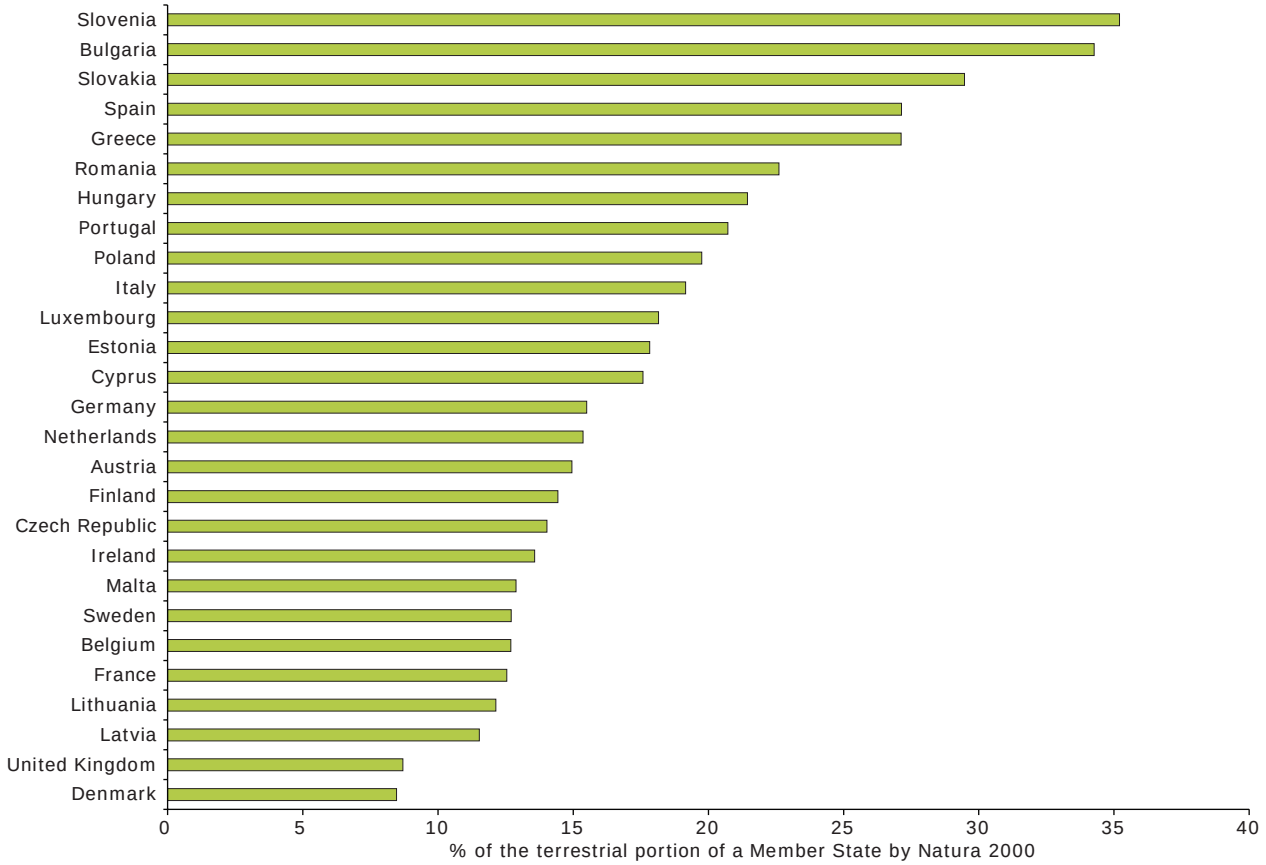
Figure 5.2 Proportion of each terrestrial biogeographical region covered by SCIs/SACs *



Note: * SCIs — Sites of Community Importance; SACs — Special Areas of Conservation.

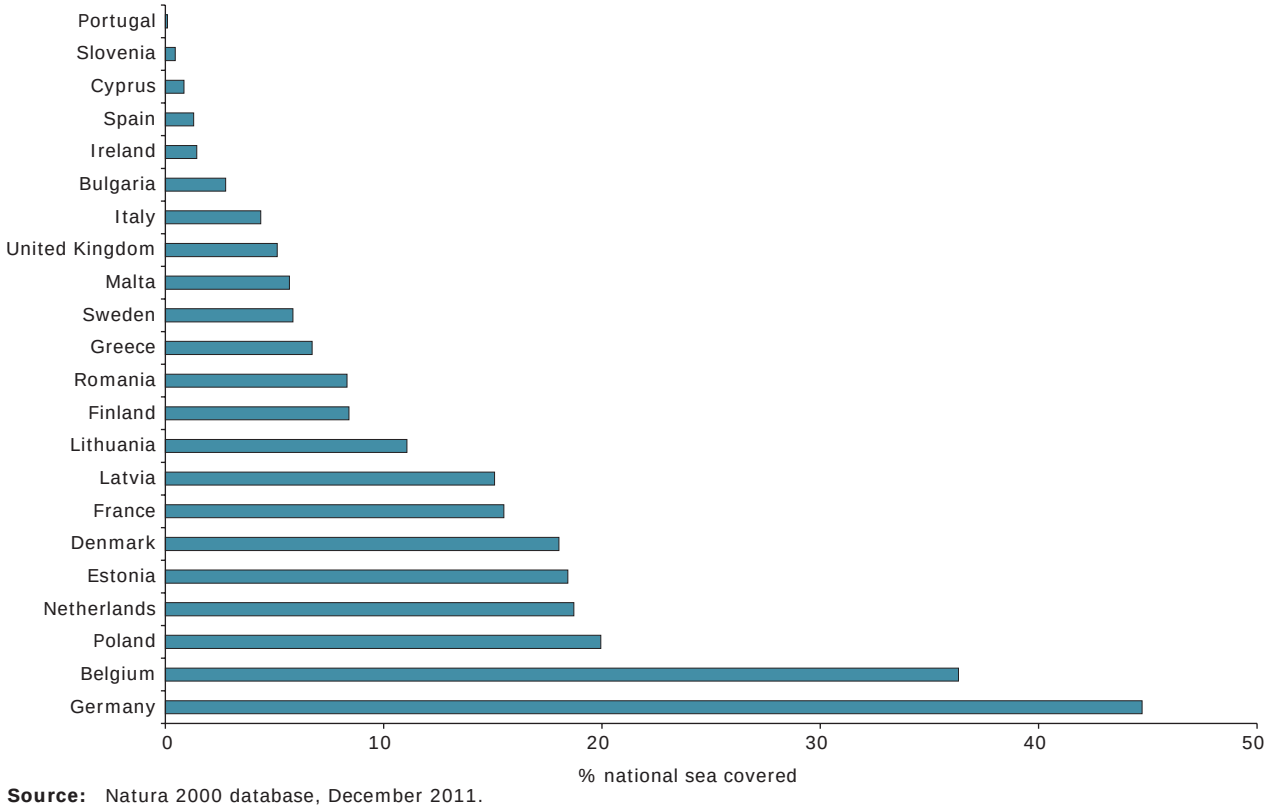
Source: Natura 2000 database, December 2011.

Figure 5.3 Proportion of terrestrial land covered by Natura 2000



Source: Natura 2000 database, December 2011.

Figure 5.4 Percentage of marine waters covered by Natura 2000



Source: Natura 2000 database, December 2011.

Table 5.1 Percentage of Natura 2000 sites in each area-size class

Area-size	Natura 2000 sites (%)
< 1 ha	2
1–100 ha	33
100–1 000 ha	33
1 000–10 000 ha	23
> 10 000 ha	9

Source: Natura 2000 database, December 2011.

more than one-third. These agro-ecosystems include a substantial proportion of regularly cultivated land. Wetlands and grasslands cover slightly more than 10 % each.

5.1.4 Progress in the amount of sites designated under Natura 2000

Figure 5.5 gives an overview of the increase in the number of Natura 2000 sites since 1996. Substantial increases between years are mainly due to the accession of new Member States.

Globally, the network is largely complete as far as the terrestrial environment is concerned, meaning that most countries have designated at least the minimum amount of land required of them under the Directive. The marine component of Natura 2000 is still very incomplete and most designations are in inshore waters. However, there have been substantial designations in recent years (see Chapter 7).

Figure 5.6 illustrates the progress in designation of sites under the Habitats Directive by biogeographical region in the last 10 years.

5.1.5 Connectivity across national boundaries

One of the main objectives set out in the Habitats Directive is to build an 'ecologically coherent' network. The network is ecologically coherent if it includes sufficient sites — in number and area — distributed over a wide geographic area, representing the full range of variation of the habitat types and species mentioned in the Habitats Directive. An ecologically coherent network should contribute to achieving favourable conservation status of those habitat types and species. An important additional feature of ecological coherence is 'connectivity' between the sites of the network (see box p. 10 'Protected areas, coherence and connectivity: a note on terminology' at beginning of Chapter 1).

An assessment was made of spatial and functional connectivity across 34 terrestrial political borders of the European Union by the EEA's Topic Centre on Biological Diversity (Map 5.3). This shows that both types of connectivity vary greatly among state boundaries, with good and bad examples in all parts of the European Union (Opermanis et al., 2012).

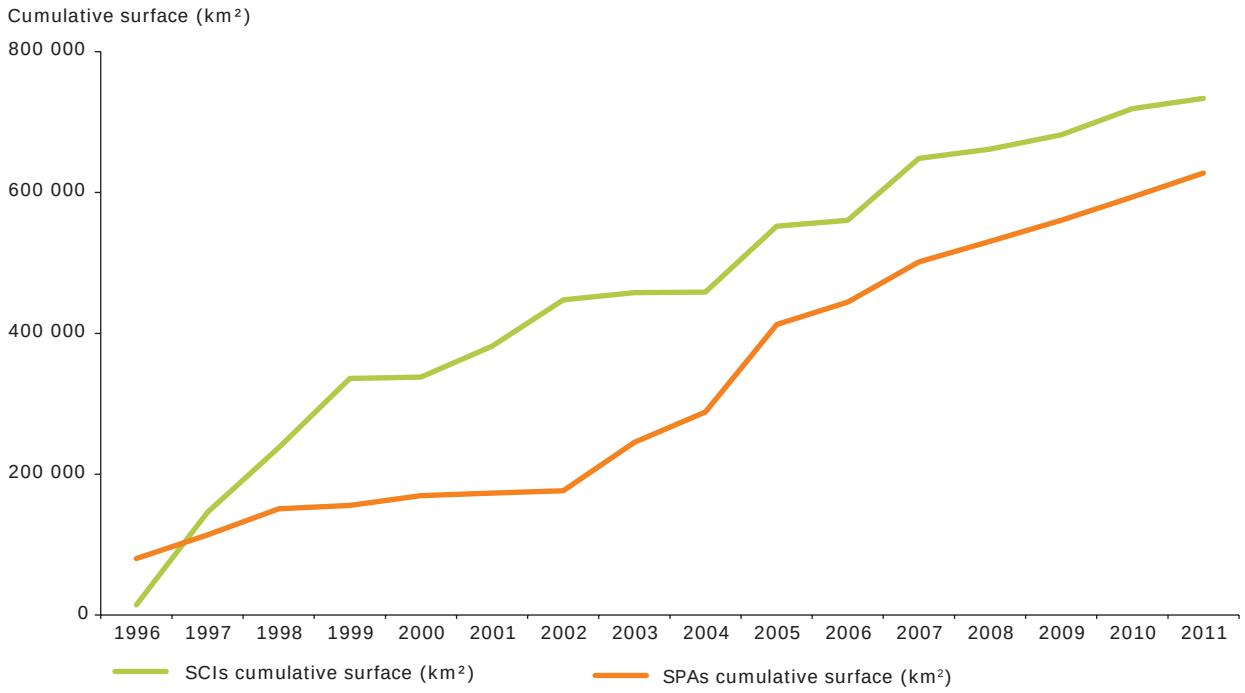
Table 5.2 Surface (%) of Natura 2000 (SPAs and SCIs together), SPAs (under Birds Directive) and SCIs (under Habitats Directive) covered by different ecosystems

Ecosystem type	Natura 2000	SPAs	SCIs
Agro-ecosystems	38.0	40.5	33.0
Regularly cultivated	17.5	20.0	11.5
Need extensive practice	14.0	14.0	15.5
Complex agro-ecosystems	6.5	6.5	6.0
Grassland ecosystems	11.0	12.0	10.5
Heath and scrub ecosystems	16.0	15.0	18.0
Forest ecosystems	46.0	43.0	48.0
Wetland ecosystems	11.0	12.0	13.0
Lake and river ecosystems	4.0	4.0	4.0
Coastal ecosystems	3.0	4.0	3.5

Note: It is not possible to add percentages of each column due to overlap between the different CLC classes used as proxies for the ecosystem types. For example some grassland ecosystems are also agro-ecosystems. This means a simple addition would 'double count' some areas.

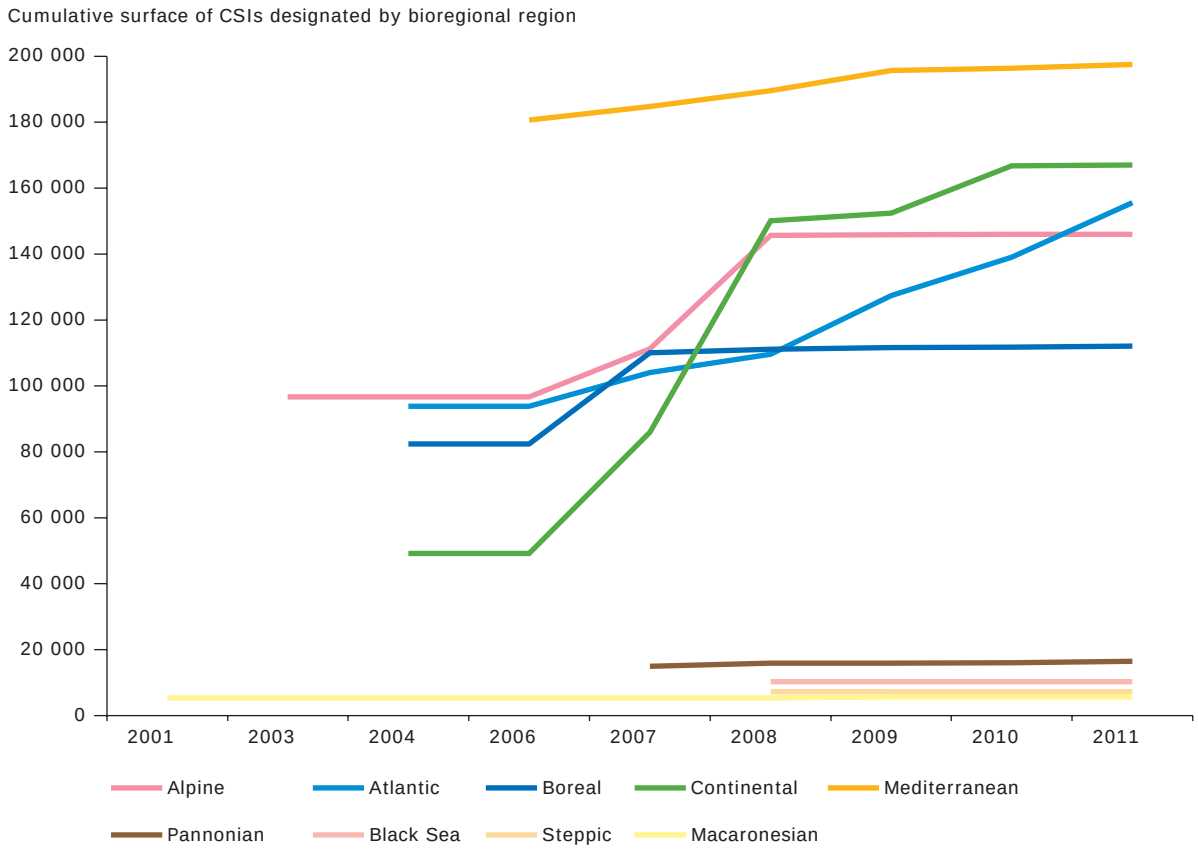
Source: Natura 2000, CLC 2006 for the EU except Greece and the United Kingdom (where CLC 2000 was used).

Figure 5.5 Cumulative surface area of sites designated under the Habitats (SCIs) and classified under the Birds (SPAs) Directives



Source: DG ENV, Natura 2000 Barometer, 2011.

Figure 5.6 Cumulative surface of SCIs designated by biogeographical region



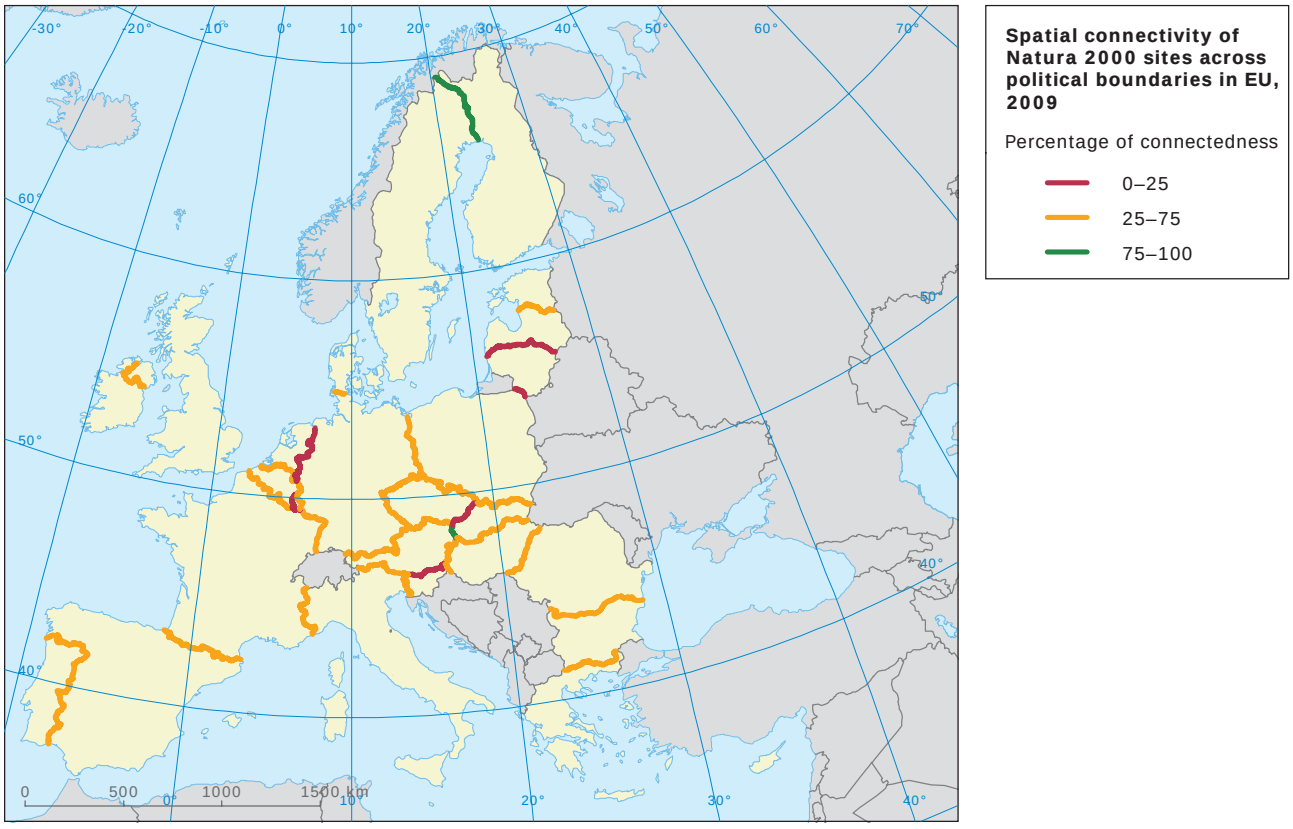
Source: DG ENV, Natura 2000 Barometer, 2011.

Spatial connectivity was measured by a quantified proportion of Natura 2000 sites on the both sides of a boundary against total border length. Functional connectivity was measured by the dispersal success of 192 reptile, amphibian, invertebrate and plant species listed in the Annex II of the Habitats Directive. The functional connectivity was judged to be present if the same species was present in selected site-pairs on political borders where each site represented a different country.

Spatial and functional connectivity was positively correlated. However, a few outlying examples showed that good spatial connectivity does not necessarily bring good functional connectivity and that good connectivity is not always possible because of different habitats and/or different management on both sides of border. In 13 out of 34 (i.e. 38 % of) borders, the connectivity measure was 100 % and in 11 other borders (i.e. 32 %) it was over 50 %. Among the possible geographical and political factors that could affect variation in trans-boundary connectivity, only the presence of rivers forming the border was clearly a significant predictor. We must be mindful that each political boundary has its own history with a unique subset of factors influencing Natura 2000 site selection and management, thus resulting in the near-absence of common patterns. Species occurring in a geographically restricted area (i.e. spread between only two or three member states) tended to show the highest levels of connectivity.

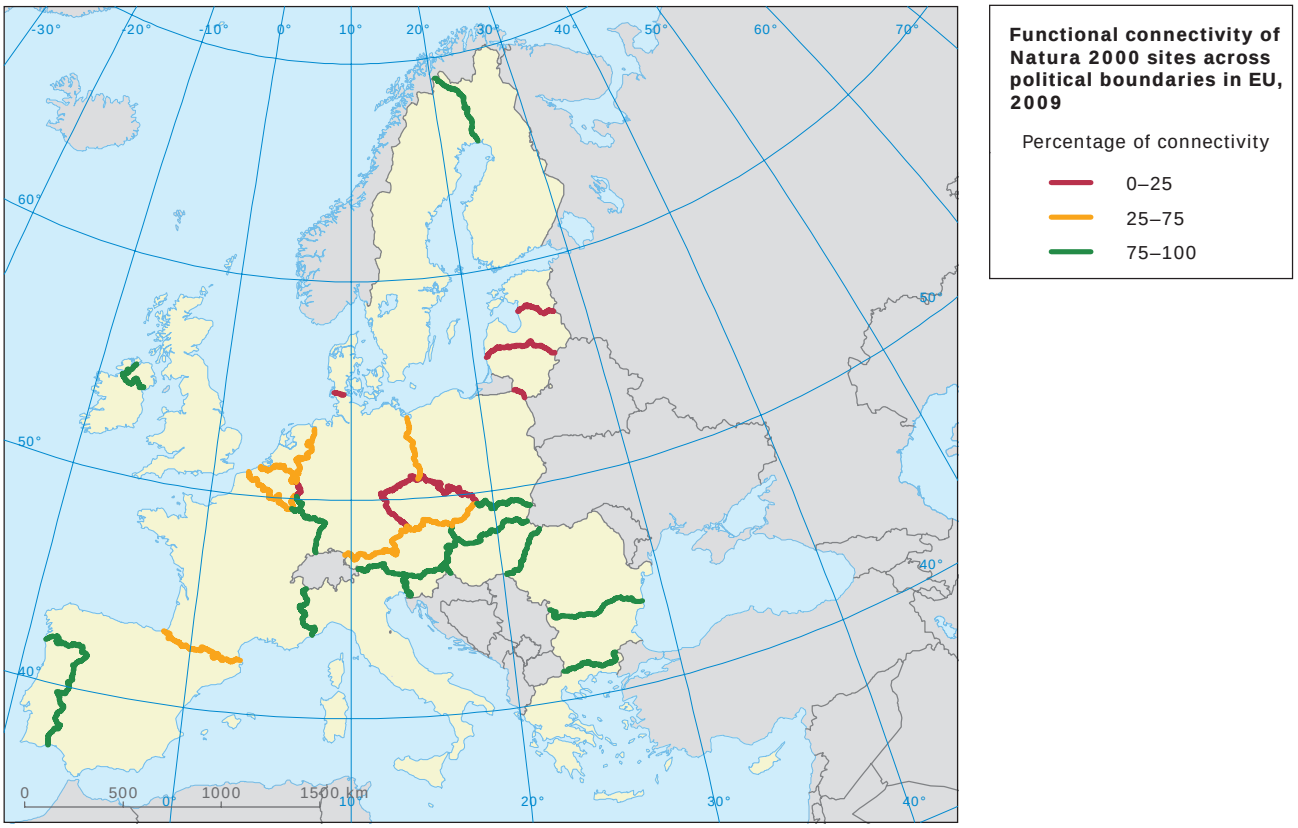
In conclusion, connectivity — spatial and functional — across national borders is relatively good, but the overall coherence of the network could be further improved. That would require greater analysis, principally on functional connectivity. The study above did not investigate connectivity for the birds component of Natura 2000.

Map 5.3a Spatial connectivity of Natura 2000 sites across political boundaries in different parts of the European Union



Source: Natura 2000 database, December 2009.

Map 5.3b Functional connectivity of Natura 2000 sites across political boundaries in EU, 2009



Source: Natura 2000 database, December 2009.

5.2 The Emerald Network

The Emerald Network is conceptually similar to the Natura 2000 network, but it incorporates a wider group of countries, including most of the members of the Council of Europe. It is an ecological network of Areas of Special Conservation Interest (ASCIs) set up by the Contracting Parties to the Bern Convention — the Convention on the Conservation of European Wildlife and Natural Habitats.
A network of this sort was envisaged as early as 1989 (Recommendation No 16), but it was actually only established in 1998 ([12]). As the European Union is also a signatory to the Bern Convention, the Natura 2000 network is in practice the contribution of the EU to the Emerald Network (Bonnin et al., Council of Europe, 2010a, 2011a).

The Emerald Network works as an extension to non-EU countries of Natura 2000: its concept and implementation aims at a high degree of synergy with the latter.

As well as helping to identify and conserve core areas of the Pan-European Ecological Network (PEEN ([13])), the Emerald Network also facilitates the establishment of national networks of protected areas.

The Emerald Network targets some 180 habitat types and over 630 plant and animal species (and sub-species).

According to the Calendar for the implementation of the Emerald Network of Areas of Special Conservation Interest 2011–2020 (Council of Europe, 2010b), there are three phases in developing the network:

a) Phase I — identifying the possible ASCI sites (1996–2014);

([12]) Convention on the Conservation of European Wildlife and Natural Habitats, Council of Europe, 1979.
([13]) Under the Pan-European Biological and Landscape Diversity Strategy (PEBLDS). http://www.coe.int/t/dg4/cultureheritage/nature/Biodiversity/default_en.asp.

b) Phase II — assessment of proposed Emerald sites during biogeographical seminars and bilateral consultations, followed by the declaration of the sites as Emerald candidate sites (2011–2017);

c) Phase III — official designation of the Emerald Network sites and implementation of management, monitoring and reporting tools within a coherent and effective pan-European network (2013–2020).

The implementation of the Emerald Network consists of an extensive programme of national projects established with a view to developing a pilot database of selected areas in each country. The selected areas in the database include ones that harbour the target species and natural habitat types. National projects also involve the establishment and appointment of national multidisciplinary teams, bringing together various state administration bodies, NGOs, scientific and technical/expert institutions, and other stakeholders.

For the Bern Convention Parties that are European Union Member States, the Emerald Network sites are the Natura 2000 sites. At present, Emerald Network national pilot projects have been implemented in 32 European countries. Before joining the European Union in the rounds of enlargement in 2004 and in 2007 respectively, 14 countries implemented Emerald pilot projects as useful preparatory work to consequently setting up the Natura 2000 network. The other countries engaged in the constitution of the Emerald Network in western Europe are: Iceland, Norway and Switzerland. In central and eastern Europe they are: Belarus, Moldova, the Russian Federation, and Ukraine. In south-eastern and eastern Europe, they are: Albania, Bosnia and Herzegovina, Croatia, the former Yugoslav Republic of Macedonia, Montenegro, Serbia, and Turkey. In the south Caucasus, they are Armenia, Azerbaijan and Georgia. In Africa, the development of the Emerald Network has started with the implementation of pilot projects in Burkina Faso, Senegal and Morocco (Council of Europe, 2011a, see below).

In December 2011, the Standing Committee to the Bern Convention officially nominated as 'Candidate Emerald sites' a number of sites proposed by Morocco and Switzerland, as well as six West Balkan countries (Table 5.3).

A three-year joint Council of Europe/European Union (CoE/EU) programme ([14]) was launched in 2009 with the intention of substantially developing the Emerald Network in the seven following countries: Armenia, Azerbaijan, Belarus, Georgia, Moldova, the Russian Federation (the European part), and Ukraine. The objective of this joint programme is to identify at the end of 2011 all potential sites of the Emerald Network in the three countries of south Caucasus and in Moldova. The objective set for Belarus and the Russian Federation is to identify 50 % of the potential Emerald sites, and in Ukraine, to identify 80 % of the potential sites. Table 5.4 provides an overview of the work done up to the end of 2010 (Council of Europe, 2011d).

Table 5.3 Candidate Emerald sites officially nominated under the Bern Convention

Country	Number of sites	Total area (km²)	% country coverage
Albania	25	5 224.3	18.2
Bosnia and Herzegovina	29	2 504.6	4.9
Croatia	957	26 667.6	38.7
former Yugoslav Republic of Macedonia	35	7 543.8	29.3
Montenegro	32	2 400.8	17.1
Morocco	11	5 728.2	1.3
Serbia	61	10 210.8	11.6
Switzerland	37	642.2	1.6
Total	**1 187**	**60 922.2**	

Source: Council of Europe, 2011c.

([14]) Financed by the European Neighbourhood Policy Instrument (ENPI).

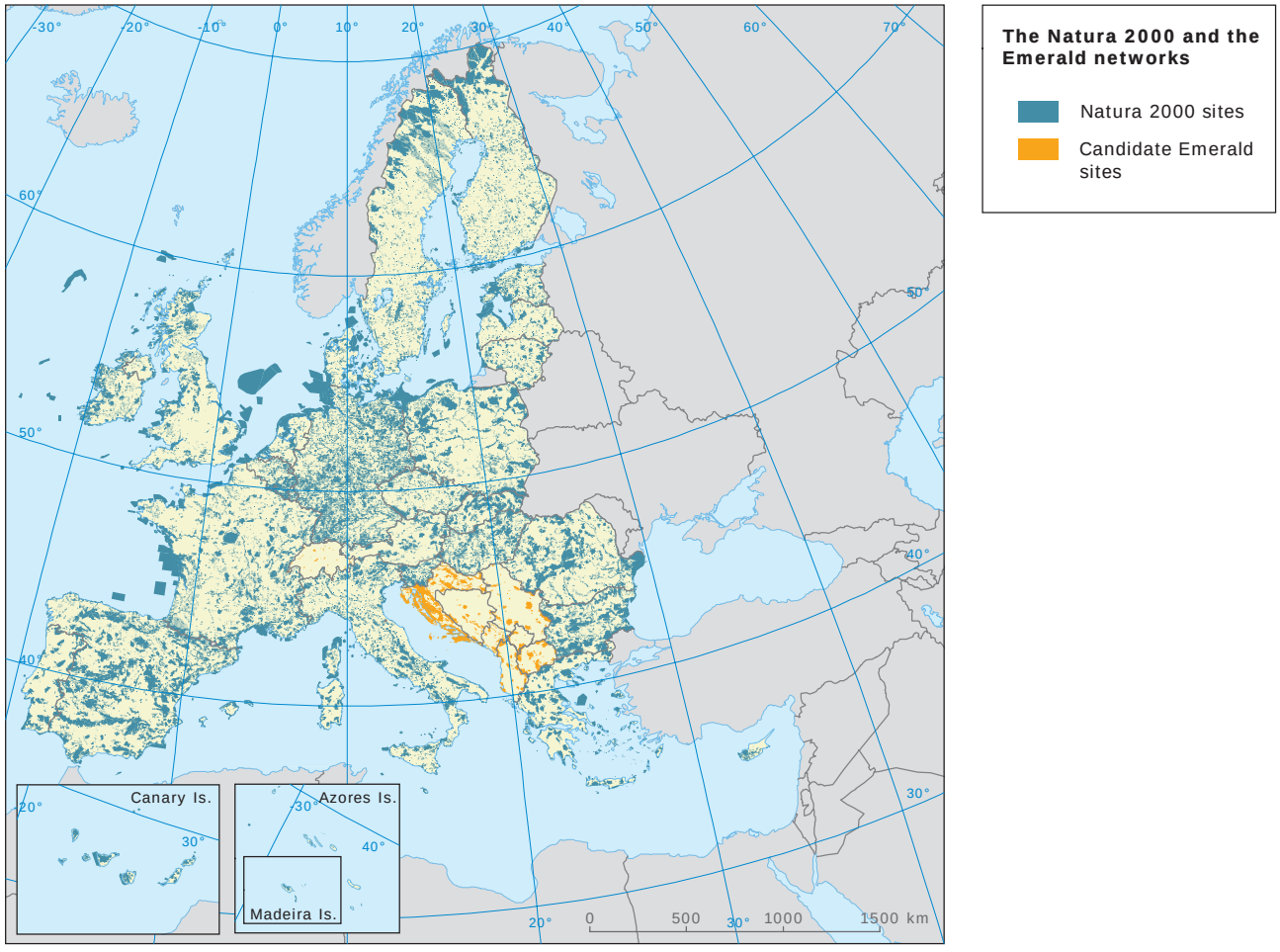
Table 5.4 Proposed Emerald sites identified under CoE/EU Joint Programme

Country	Number of sites	Total area (ha)	% country coverage
Armenia	9	2 288.1	7.7
Azerbaijan	10	9 925.2	11.5
Belarus	12	9 122.4	4.4
Georgia	20	5 968.3	8.4
Moldova	17	4 142.3	12.2
Russian Federation	740	282 254.1	7.1
Ukraine	149	43 484.3	7.2

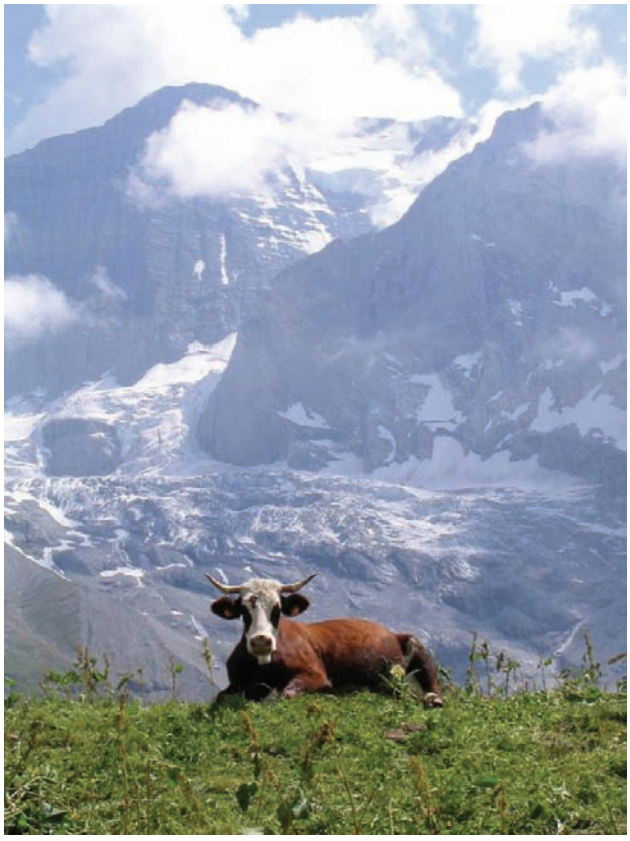
Source: Council of Europe, 2011d.

The Emerald Network and Natura 2000 are based on the same principles, and are thus fully compatible with each other, helping to develop a coherent approach to the protection of natural habitats in the European continent. Map 5.4 details the extent of Emerald and Natura 2000 sites.

Map 5.4 The Natura 2000 and the Emerald networks



Source: Natura 2000 database, December 2011. Emerald Network (CoE), December 2011.



Vanoise National Park, Natura 2000 site, France

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5.3 Conclusions

Since 1995, when the designation process began, the Natura 2000 network has grown to 26 400 sites with a total surface area of about 986 000 km^2, comprising nearly 768 000 km^2 of land, and close to 218 000 km^2 of sea. Natura 2000 is nearing completion, with the rate of new additions to the network now falling. However, this 'completeness' of the network is mainly a formal description to measure the amount of area designated to conserve certain habitat types (231 in total) and species (more than 900 species types in total). Other metrics used to assess conservation effectiveness, such as connectivity and coherence, indicate that the network could still be improved. For example, Natura 2000 sites cover just under 18 % of the EU-27 land area, but less than 4 % of the EU's sea area; and over 50 % of the Black Sea biogeographic region is covered by Natura 2000 sites, while less than 10 % of the Boreal region is covered.

Unlike the more mature Natura 2000, the Emerald Network is only at the beginning stages of a multi-year process of assessing sites and building out the network.

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6 Complementarity between national designations and Natura 2000

Chapter summary

As can be seen from previous chapters, the system of protected areas in Europe is complex, and in many cases, there is a complementarity and overlap between different designation-types at various levels. This chapter focuses on the overlap between Natura 2000 sites and protected areas that were designated by countries according to their own national procedures.

In **Section 6.1**, we begin with a general survey of these overlaps, discussing what countries have the largest and smallest degrees of overlap, and what types of areas are likely to be protected in each case. In **Section 6.2**, we look at four national case studies, examining features of the designation overlaps in Austria, Estonia, France and Hungary.

This chapter will only focus on the spatial overlap and complementarity between nationally designated areas in the EU-27 and the Natura 2000 network. Unfortunately, due to the current incompleteness of computer-modelled 'GIS' data on international designation-types (Ramsar, Biosphere Reserves, and World Heritage), it is not yet possible to assess the degree of spatial overlap between these designations and Natura 2000 or nationally designated areas.

Dovrefjell-Sunndalsfjella National Park, Norway

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Akamas Peninsula National Park, Natura 2000 site, Cyprus

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6.1 General overview

The relation between the Natura 2000 network and national systems of protected areas provides several avenues for analysis, including:

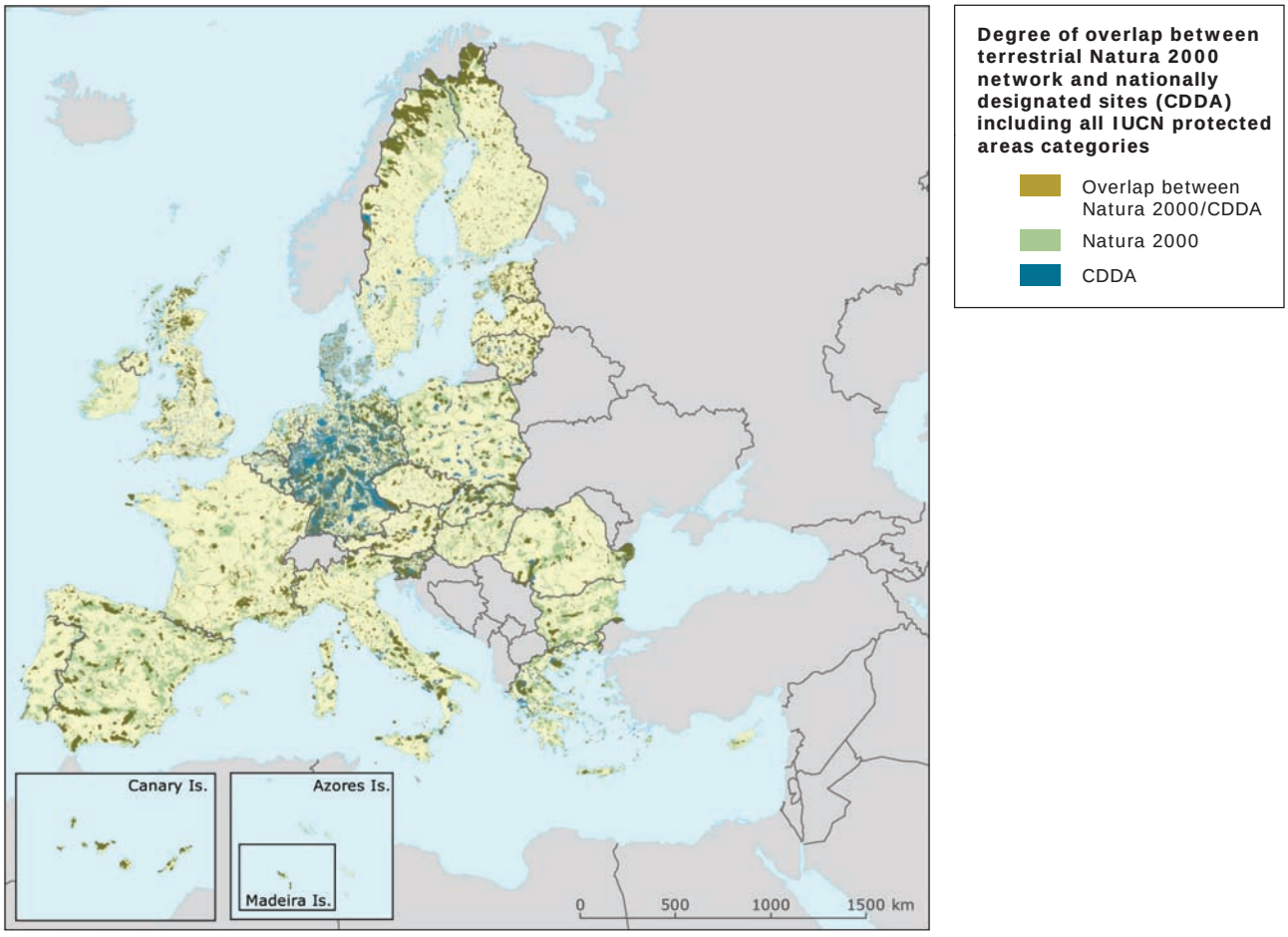
- the variety of approaches by different EU Member States, depending on their specific legal and administrative systems;
- the remarkable stimulating effect that Natura 2000 has had in increasing the area protected in Europe;
- the way in which national designations can complement, from a spatial point of view, the Natura 2000 network. This can potentially help ensure a more biodiversity-friendly EU territory outside the confines of Natura 2000 sites.

It is important to recall that while the conservation objectives for targeted species and habitats addressed by the Habitats and the Birds Directives are clearly a shared EU responsibility, the means to reach these objectives remain under each EU Member State's responsibility. And although Member States have the obligation to transpose the designation of Natura 2000 sites into their national system, they also have the flexibility to introduce new designation procedures, adapt existing ones, or underpin the designation by other legal acts. Member States also have a choice in the type of legal act they use, whether it is statutory, contractual or administrative. Finally, they have the freedom to decide at which administrative level (e.g. national or regional) it is most appropriate to formally designate Natura 2000 sites.

In the following sections, we will see to what extent EU Member States have made use of their existing nationally designated areas (which are registered in the Common Database on Designated Areas — CDDA) to underpin the designation of Natura 2000 sites. We will also see to what extent EU Member States have extended Natura 2000 sites to areas beyond these national systems.

The overlap of Natura 2000 boundaries with the boundaries of nationally designated sites shows very different patterns across the EU (Map 6.1, based on the June 2011 CDDA). But it should be stressed that while the Natura 2000 digital maps fully reflect the actual extension of the network, the CDDA digital maps only reflects what countries have reported on a voluntary basis to the European Environment Agency. Moreover, in the case of a few countries, there are issues regarding the completeness of some of the IUCN data they have included in the CDDA database.

Map 6.1 Degree of overlap between terrestrial Natura 2000 network and nationally designated sites (CDDA) including all IUCN protected areas categories



Note: CDDA boundary data missing for a large part of Ireland and Luxembourg.

Source: Natura 2000 database, December 2011; and CDDA, June 2011.

Overall, about 1 344 800 km² are protected across the EU-27's terrestrial and marine territory under a combination of Natura 2000 and national designations (all IUCN categories considered).

If only the terrestrial portion of the EU is considered:

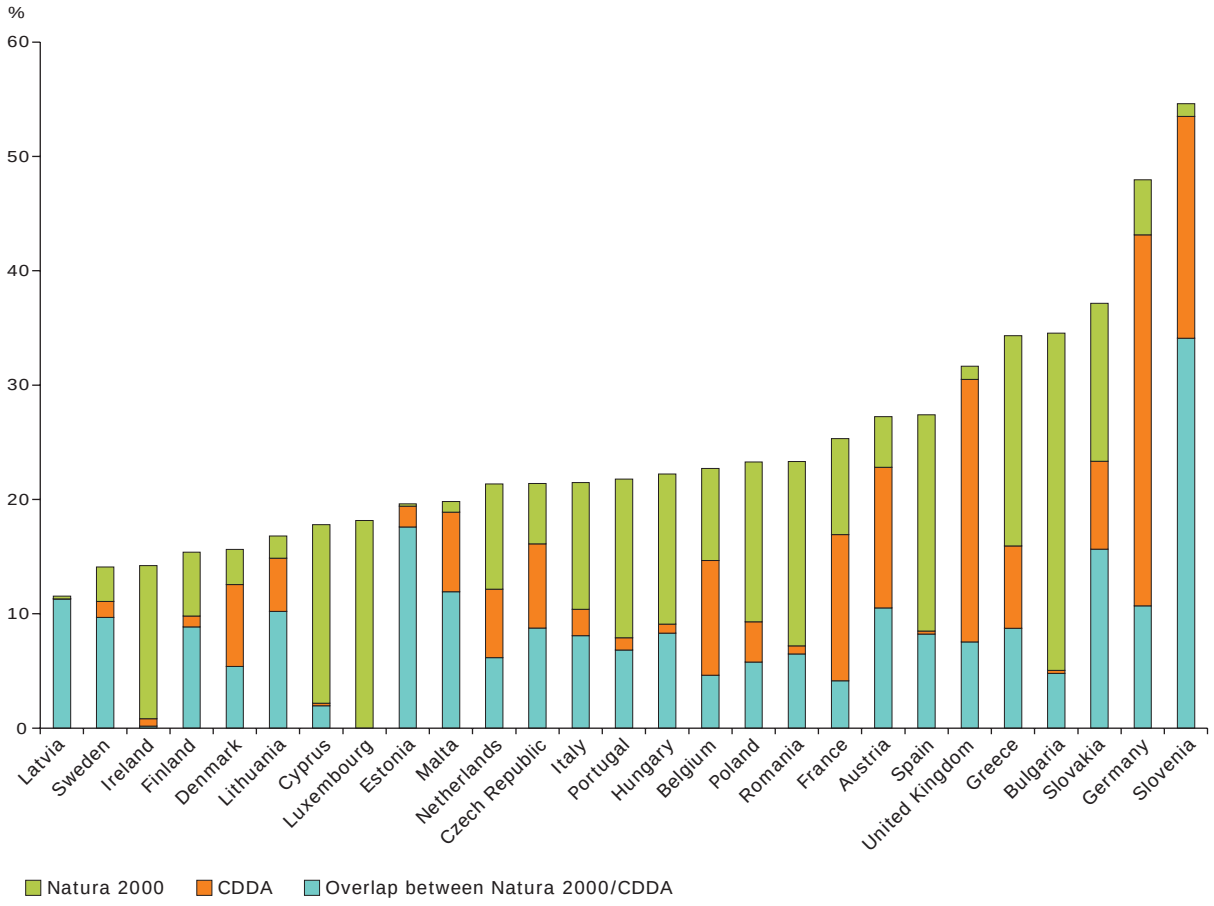
- about 1 096 800 km² or 25 % of the EU-27 terrestrial land is protected under either Natura 2000 or national designations or some combination of the two;
- Natura 2000 overlaps with nationally designated areas on 8 % of the EU land territory;
- Natura 2000 sites that do not overlap with nationally designated protected areas cover close to 10 % of the EU land territory;
- Nearly 8 % of the EU land territory is only covered by nationally designated areas.

This means that Natura 2000 constitutes 70 % of the total surface area of protected areas within the EU-27.

If the whole of the EEA territory is considered (i.e. adding the area covered under national designations in Albania, Bosnia and Herzegovina, Croatia, the former Yugoslav Republic of Macedonia, Iceland, Kosovo, Liechtenstein, Montenegro, Norway, Switzerland and Turkey), the land surface area of EEA countries protected under a combination of Natura 2000 and national designations is about 1 222 725 km². This represents 21 % of the EEA land territory, and is the equivalent of the surface area covered by Belgium, France, Luxembourg, the Netherlands, Portugal and Spain.

As shown in Figure 6.1, there are some countries (such as Austria, Denmark, Estonia, Germany Latvia, Lithuania, Malta, Slovenia, and the United Kingdom) where Natura 2000 nearly always

Figure 6.1 Share of terrestrial area designated in EU Member States under Natura 2000 and national designations



Note: Ireland and Luxembourg not represented due to incomplete GIS data in the CDDA.

Source: Natura 2000 database, December 2011; and CDDA, June 2011.

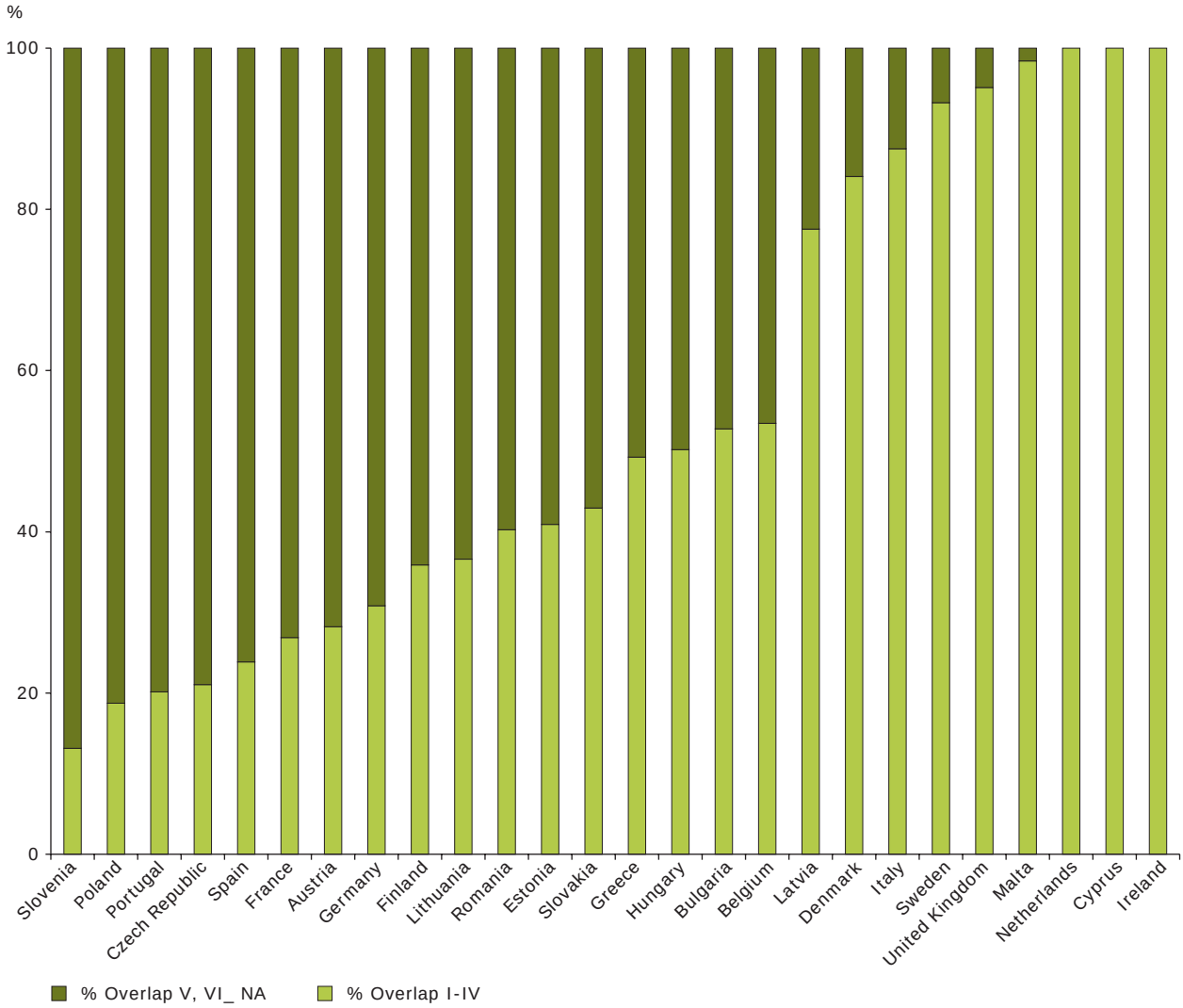
overlaps with national designations. These countries have few if any Natura 2000 sites that do not overlap with national designations. But the situation is quite different in Bulgaria, France, Greece, Hungary, Italy, and Portugal, where many Natura 2000 sites do not overlap with existing nationally-designated sites.

It is also remarkable to notice how, in some countries (Austria, Belgium, Estonia, France, Germany, Slovenia and the United Kingdom), national designations significantly complement the Natura 2000 network in terms of area covered. Although, as will be shown later, a large part of these national designations are targeted at landscape protection or sustainable territorial development (IUCN categories V and VI) and not specifically focused on biodiversity conservation, the main goal of Natura 2000 sites.

The above analysis was conducted by taking into account nationally designated areas covering all IUCN categories. A further analysis can be done showing the share of spatial overlap between, on the one hand, Natura 2000 and nationally designated sites under IUCN categories I to IV, and on the other hand, Natura 2000 and nationally designated areas under IUCN categories V to VI (Figure 6.2).

The purpose of the Natura 2000 network is primarily to ensure the conservation of targeted species and habitats of European interest. A reasonable supposition might therefore be that, in general,

Figure 6.2 Share of terrestrial area designated at national level under various IUCN categories overlapping with Natura 2000



Note: Ireland, Spain, and Luxembourg not represented due to incomplete relevant data in the CDDA.

Source: Natura 2000 database, December 2010; and CDDA, June 2011.

Natura 2000 sites would mostly overlap with nationally designated sites under IUCN categories I to IV (the categories that aim at protecting ecological processes and biodiversity). However, the Natura 2000 network, especially through the Habitats Directive, also provides the opportunity for sustainable development approaches within protected sites in full partnership with local communities and other stakeholders. This type of sustainable development corresponds more closely to the IUCN categories V and VI. It is thus interesting to see to what extent a significant area of Natura 2000 sites is underpinned by nationally designated areas under IUCN categories V and VI across EU Member States.

In countries such as Cyprus, Malta, the Netherlands, and the United Kingdom, the largest area of nationally designated sites overlapping with Natura 2000 is managed as IUCN categories I to IV. However, in the Czech Republic, Poland, Portugal and Slovenia, more than 60 % of the area designated at national level that overlaps with Natura 2000 is managed as IUCN categories V and VI.

We can conclude that close to 8 % of the EU-27 land territory is protected under an overlap between national designations and Natura 2000, out of which:

- Nearly 4 % of the EU-27 land territory is protected under an overlap between Natura 2000 and national designations under IUCN categories I to IV.
- Nearly 4 % of the EU-27 land territory is protected under an overlap between Natura 2000 and nationally designated sites under IUCN categories V to VI.

6.2 Different countries, different situations

The differences in approaches by EU Member States to make use of existing national instruments for the implementation of the Natura 2000 network reflects the diversity of historical, geographical, administrative, political and cultural circumstances among these countries. In the following section, we will focus specifically on the relationship between Natura 2000 designations and national designations in four EU Member States with quite different situations: Estonia, Hungary, France and Austria.

Box 6.1 Important dates in the history of nature conservation in Estonia are:

- 1297: Danish King Erik Menved IV prohibits tree cutting on four islands in the Tallinn Bay. This could be considered as the start of spatial nature conservation in Estonia.
- 1910: First protected area is established — a bird sanctuary on the islands of Vaika, western Estonia. The islands are still under protection today.
- 1935: First nature conservation act, mainly focusing on primeval natural assets.
- 1938: New nature conservation act, which also targets less remote areas.
- 1957: Adoption of the nature conservation act of the Estonian SSR under the Soviet regime.
- 1991: Estonia regains independence.
- 1994: Act on the protection of natural objects, ensuring the continuity of protected areas in the newly independent state (since 1991).
- 2004: Estonia joins the EU and implements the Birds and Habitats Directives.
- 2004: Adoption of new nature conservation act.

6.2.1 A small, new EU Member State: Estonia

Estonia joined the EU in 2004, and is one of the Union's smallest countries in terms of population. It is a lowland country that belongs entirely to the Boreal biogeographical region, with almost half of its terrestrial territory covered with forests. Peatlands account for about 22 % of the territory (EEA, 2010), and Estonia also has a long and varied coastline, with several islands.

Estonia has a very specific interpretation of IUCN categories. Unlike most European countries, it does not put national parks under IUCN category II (protected area managed mainly for ecosystem protection and recreation) but rather under category VI (protected area managed mainly for the sustainable use of natural ecosystems). In fact, sites classified under IUCN category VI represent by far the highest proportion of protected areas in this country.

As shown in Figure 6.3, there was a dramatic increase in the number of nationally designated areas prior to the Estonian accession to the EU in 2004. That increase is to a large part due to the designation of large marine protected areas. This suggests that preparation for the implementation of EU legislation has been a powerful catalyst for protected areas designation under national instruments in this country.

According to Estonian law, all Natura 2000 sites have to be supported by a national statutory designation. Sites proposed as Natura 2000 sites were thus designated at national level as national parks, nature reserves, protected landscapes, limited conservation areas or species protection sites. The two latter designation-types were created to fully comply with Natura 2000 requirements after gaps in national legislation were identified. Subsequent amendments to Estonian nature legislation and a large public campaign on Natura 2000 also allowed the country to add one more new designation at that time: natural object protected at municipal level.

Overall (Map 6.2):

- about 18 % of the Estonian land territory is protected under a combination of nationally designated sites and Natura 2000 sites.
- Natura 2000 sites cover about 17 % of the land territory in the country, and all terrestrial Natura 2000 sites fully overlap with nationally designated sites.
- About 1 % of the land territory is protected only under a national designation.

In addition to protected areas, another network of protected areas called the 'green network' has been planned at state level. It is now being implemented at different administrative levels through the spatial planning system. Map 6.3 shows the extent of this green network in the country.

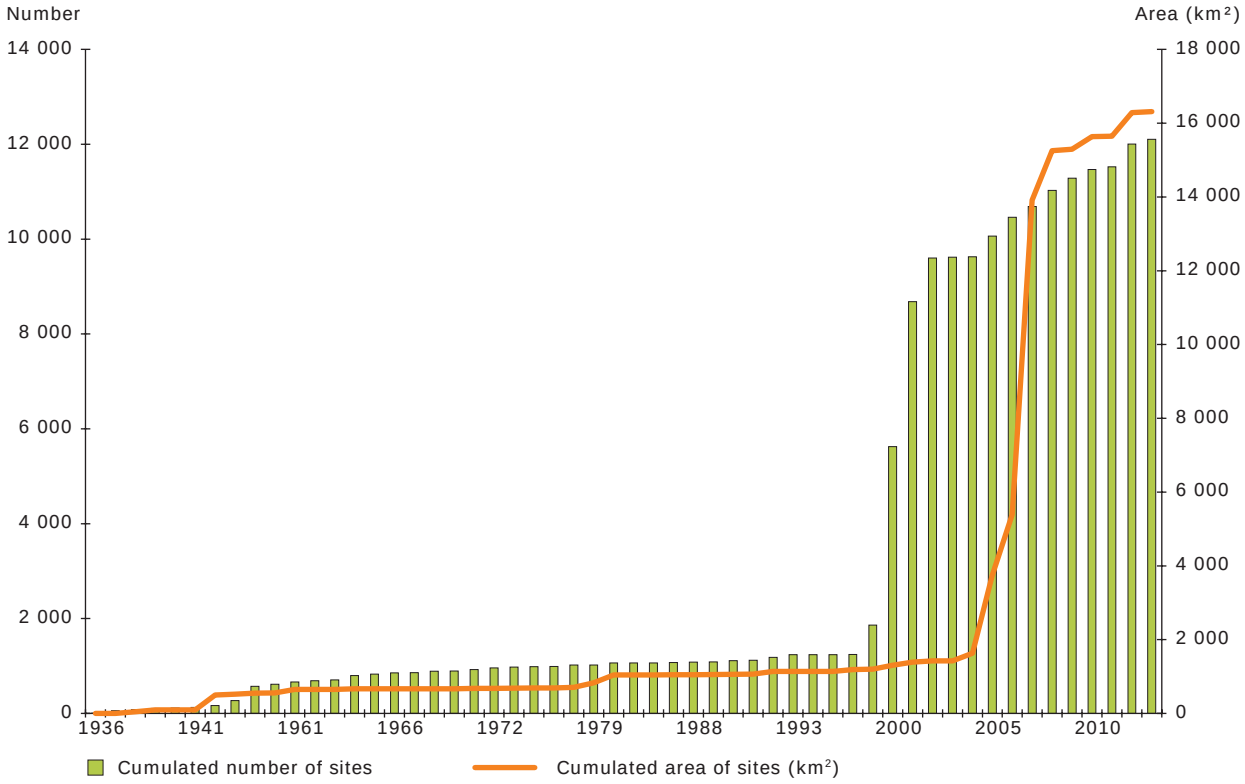
Table 6.1 Nationally designated areas in Estonia

Designation type	Number	Total area (ha)	IUCN category
Nature Reserves	131	258 489.68	Ia, Ib, IV, V, VI
National Park	5	196 809.70	Ia, Ib, IV, V, VI
Protected Landscape (nature park)	150	194 774.04	Ib, III, IV, V, VI
Unzoned Protected Area	318	30 293.60	III, V, N/A
Species Protection Site	1 206	93 992.46	Ib, IV, VI
Limited-conservation Area	344	762 155.56	VI
Protected Nature Monument	1 212	256.63	III, V
Woodland Key Habitat	4 867	9 833.44	N/A
Natural object protected at municipal level	20	3 527.38	N/A

Note: Estonia also reports in the CDDA IUCN management categories for individual management areas within each designated site. Only site designation types are reported here.

Source: CDDA, June 2011 amended by the Estonian Environment Information Centre.

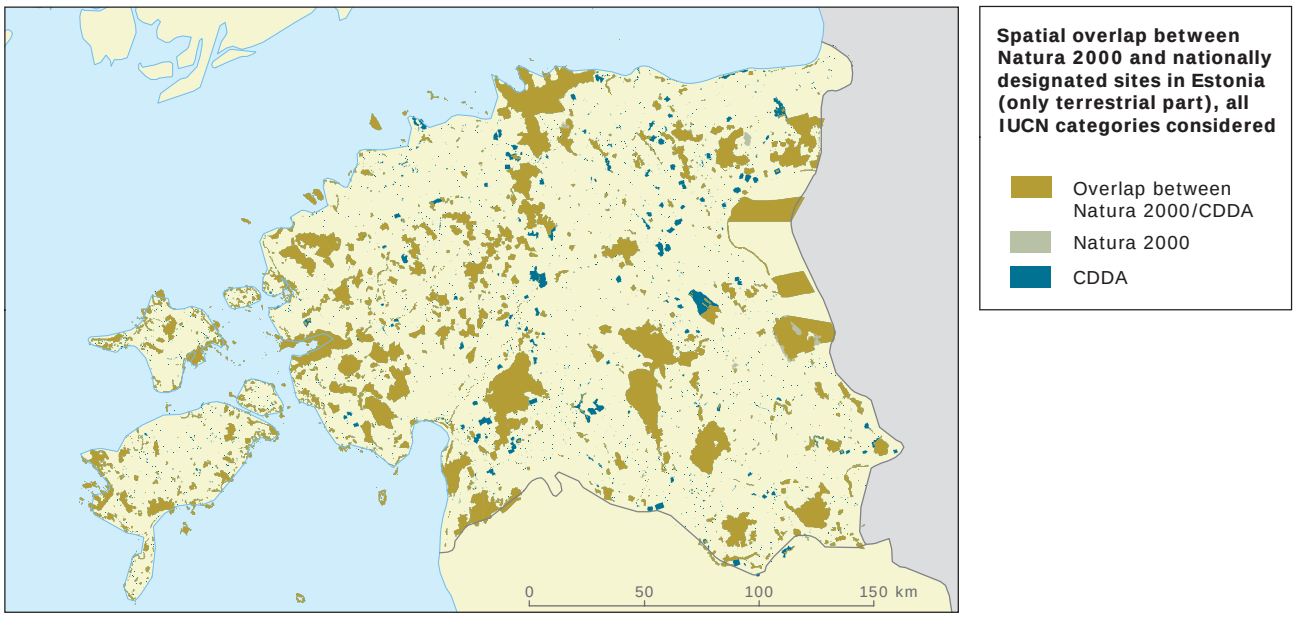
Figure 6.3 Cumulative number and area of nationally designated sites (under all IUCN management categories) in Estonia over time



Note: The surface area that is taken into account is the one at the year of designation of a site, it may have changed later on (decrease or increase) but this is not reflected in the graph.

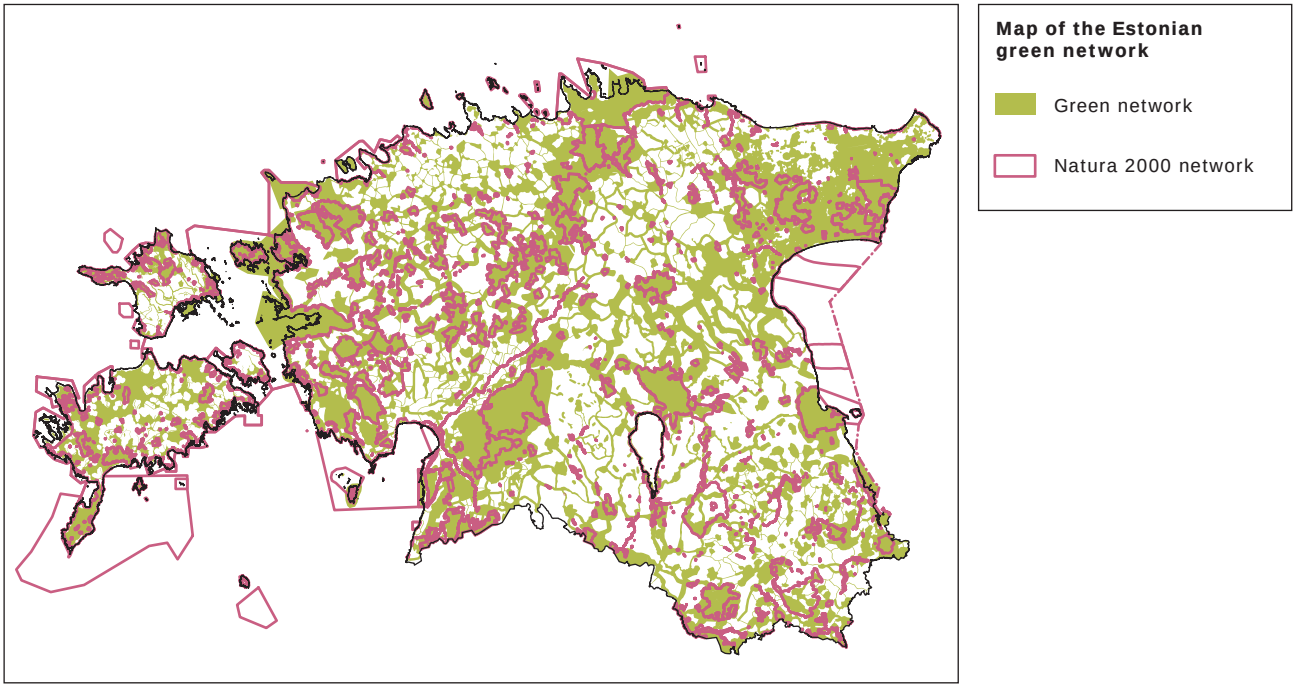
Source: CDDA, June 2011.

Map 6.2 Spatial overlap between Natura 2000 and nationally designated sites in Estonia (only terrestrial part), all IUCN categories considered



Source: Natura 2000 database, December 2011; and CDDA, June 2011.

Map 6.3 Map of the Estonian green network



Source: Estonian Environment Information Centre, 2012.

6.2.2 *A new EU Member State in a specific biogeographical context: Hungary*

Hungary also joined the European Union in 2004. It is situated in the Carpathian basin, a region that comes under various climatic influences. This variety of influences has resulted in the formation of a special biogeographical unit, namely the Pannonian biogeographical region, the largest part of which belongs to Hungary (MEW, 2009).

Slightly more than one half of Hungary's landscape consists of the flat or rolling plains of the Pannonian Basin. The most important plain regions include the Little Hungarian Plain in the west, and the Great Hungarian Plain in the centre and east. Close to 13 % of the country's territory is covered by grasslands of significant nature conservation importance. Forest area — mostly plantations — covers almost 21 % of the country. 37 % of this forest area is considered semi-natural (Hungarian Agricultural Office, 2011; and MEW, 2009).

Due to the special geographical situation and history of the country, the greater part of Hungary (over 60 %) is in agricultural use. Despite this

Box 6.2 Important dates in the history of nature conservation in Hungary are:

- 1426: Holy Roman Emperor Sigismund's forest protection decree is passed.
- 1935: The first act on forests and nature conservation is passed.
- 1939: First protected area is established.
- 1952: Tihany landscape protected area is created.
- 1973: First national park created at Hortobágy.
- 1989: Declaration of the Republic of Hungary.
- 1996: Nature conservation act passed.
- 2004: Hungary join the European Union and implements the Birds and Habitats Directives

Table 6.2 Nationally designated areas in Hungary

Designation type	Number	Total area	IUCN category
National Park	10	485 790	II, V
Landscape Protection Area	36	334 497	V
Nature Conservation Area	152	29 173	IV, V
Forest Reserve	63	13 101	N/A
Natural Monument	1	0	N/A
Naturpark	5	260 689	N/A

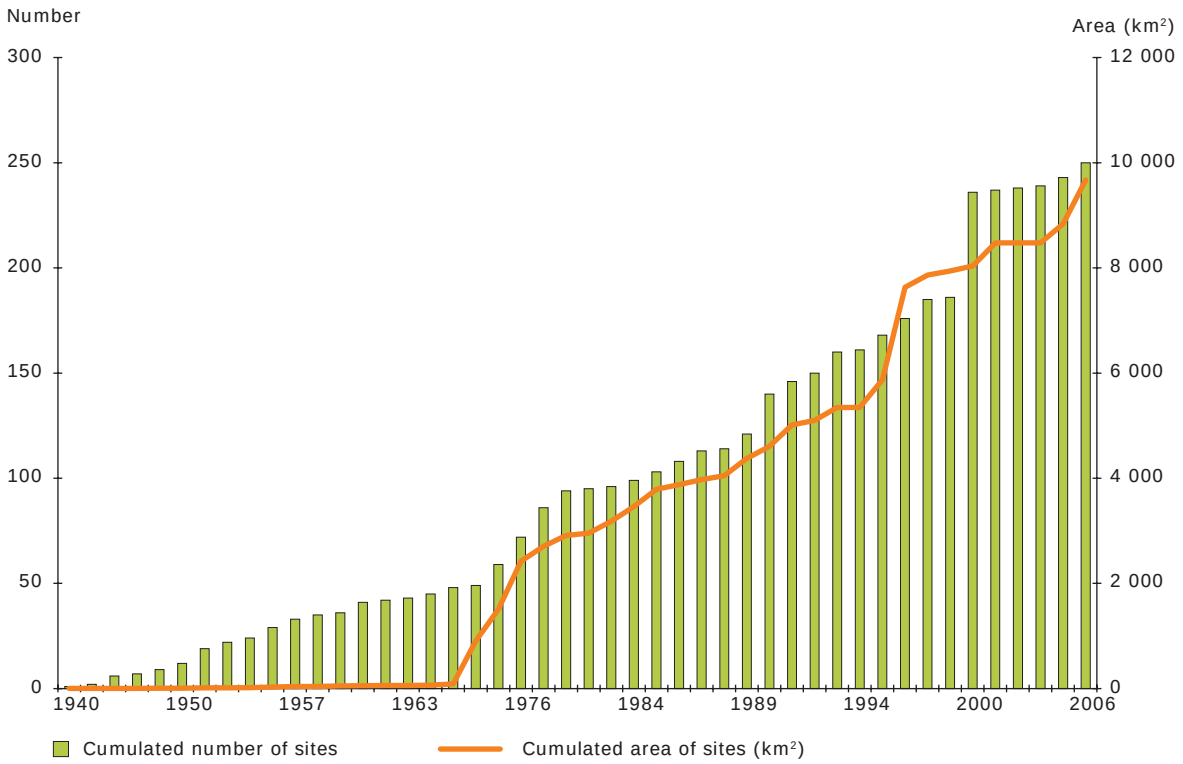
Source: EEA, CDDA, 2011, amended by Ministry of Rural Development (MRD).

fact, and partly owing to extensive agriculture, a unique natural heritage, which is also significant at EU level, has been preserved here. The dominance of agriculture in land use has had a strong influence on the country's natural habitats. This is the main reason why many Hungarian nationally protected areas are in IUCN category V.

The increase in the area under protection and the total number of protected areas is shown in Figure 6.4. Like Estonia, when Hungary was preparing for entry to the European Union in the mid-to-late 1990s, it saw a significant increase in the area and number of nationally designated areas. However, Hungary's rate of increase in number and area of nationally designated areas was lower than Estonia's.

In Hungary, the Habitats Directive is transposed into Hungarian law by two major pieces of legislation: *Act No. 53 of 1996 (amended) on the Conservation of Nature, and Government Decree No. 275 of 2004 on Nature Conservation Sites of Community Importance*

Figure 6.4 Cumulative number and area of nationally designated sites (under all IUCN management categories) in Hungary over time



Note: The surface area that is taken into account is the one at the year of designation of a site, it may have changed later on (decrease or increase) but this is not reflected in the graph.

Source: CDDA, June 2011.

(hereafter: Natura 2000 Decree). The actual list of parcel identification numbers falling under the scope of Natura 2000 network is published in *Decree No. 14/2010 (V.11.) of the Minister of Environment and Water on the List of Nature Conservation Sites of Community Importance.*

Unlike Estonia, in Hungary there is no obligation for a national statutory designation to accompany the site designation of a Natura 2000 site (Kruk et al., 2010; Sashalmi, 2008). However, management plans are being prepared to ensure that targeted species and habitats of European interest are well preserved.

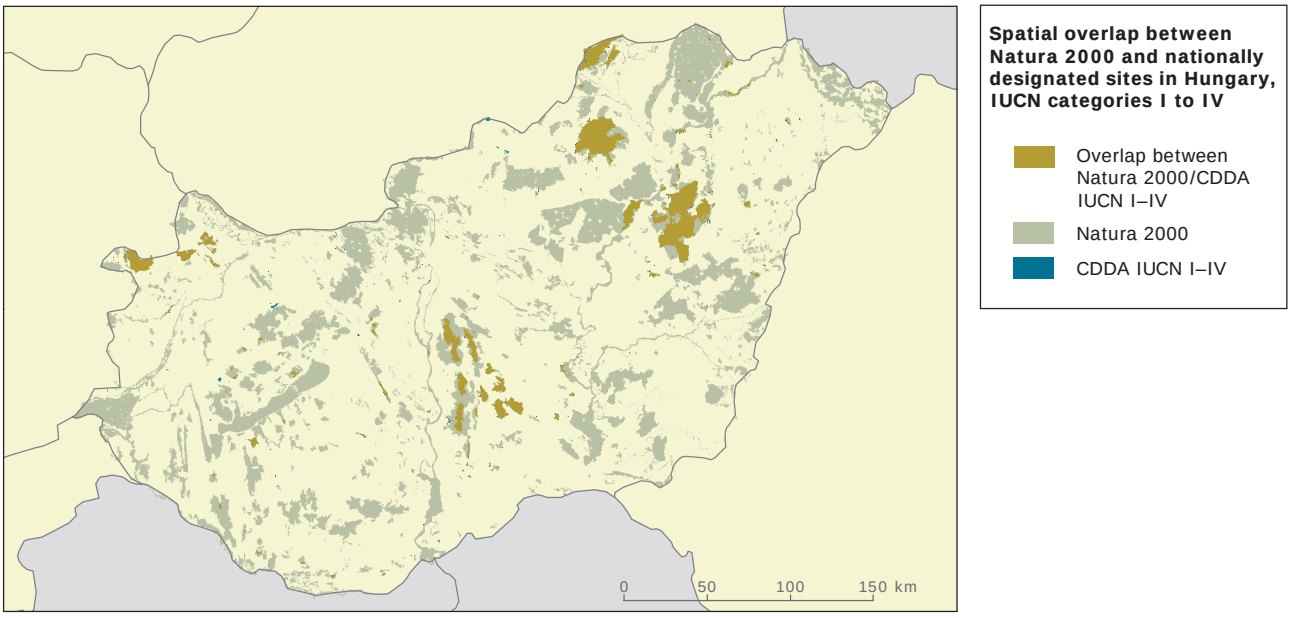
As can be seen from Maps 6.4a and 6.4b:

- About 22 % of Hungary's land area is protected under a combination of national designations and Natura 2000 sites.
- Nationally designated areas cover around 9 % of the land territory, out of which nearly 3 % of the land territory corresponds to IUCN management categories I to IV and just over 6 % of the land territory corresponds to IUCN category V (there are no category VI sites in Hungary).
- Natura 2000 sites cover over 21 % of the Hungarian territory.
- Natura 2000 overlaps with nationally designated areas on about 8 % of the national territory, of which nearly 3 % of the national territory is managed under IUCN categories I–IV and close to 6 % under IUCN categories V.
- This also means that about 13 % of the land territory is designated as Natura 2000 without being supported by a national site designation.

With less than 1 % of the land territory remaining only protected under a national designation, it is obvious that Hungary has made a broad use of existing national designations to underpin its Natura 2000 sites. Existing Nature Reserve Management plans as well as Forestry Management Plans are gradually being adapted to Natura 2000 objectives (Kruck et al., 2009).

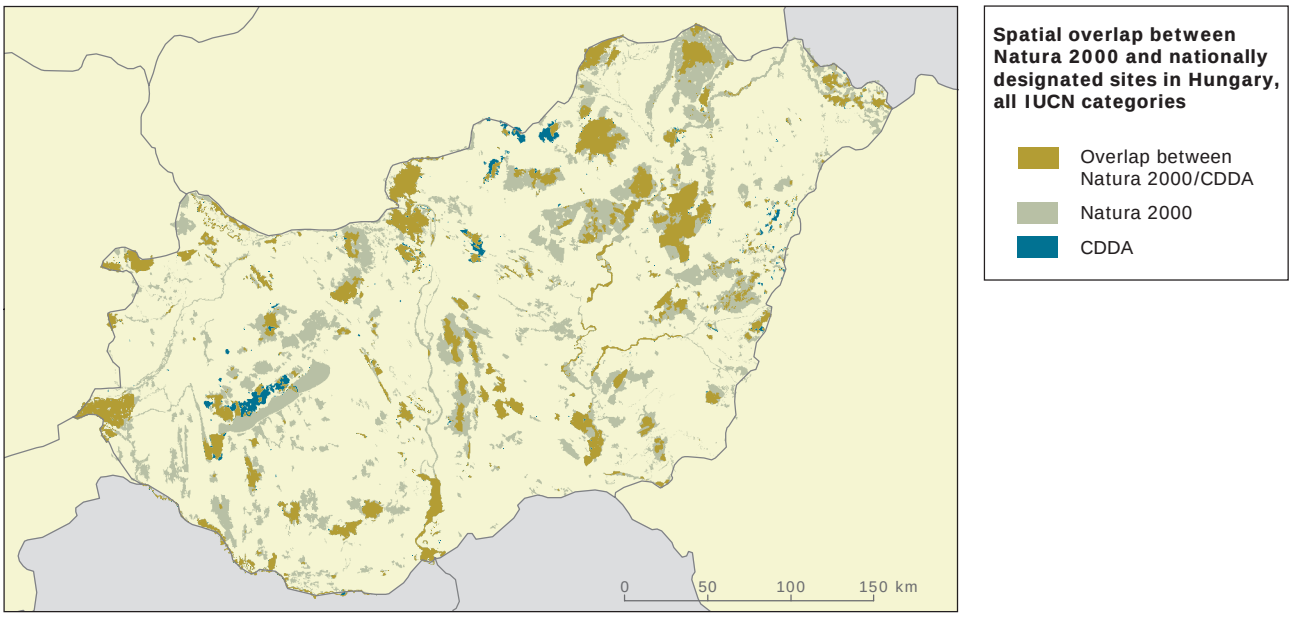
But the EU Nature Directives also had an important effect in expanding the area dedicated to biodiversity protection beyond existing national site designations (more than 13 % of the territory). These Natura 2000 sites are possibly supported by international site designations such as Ramsar sites, or by legally mandated protection of specific ecosystem-types that applies in Hungary for bogs, mires, alkaline lakes and all caves.

Map 6.4a Spatial overlap between Natura 2000 and nationally designated sites in Hungary, IUCN categories I to IV



Source: Natura 2000 database, December 2011; and CDDA, June 2011, amended by the Hungarian Ministry of Rural Development.

Map 6.4b Spatial overlap between Natura 2000 and nationally designated sites in Hungary, all IUCN categories



Source: Natura 2000 database, December 2011; and CDDA, June 2011, amended by the Hungarian Ministry of Rural Development.

6.2.3 The largest EU Member State: France

France is one of the oldest European Union countries, and with an area of 550 000 km², it is the largest country in the EU. It extends across four biogeographical regions (Atlantic, Continental, Alpine and Mediterranean), and is bordered by the North Sea to the north, the English Channel to the northwest, the Atlantic Ocean to the west and the Mediterranean to the southeast. Overall, about a quarter of the territory is mountainous, with two high mountain ranges (Pyrenees and Alps). Approximately 29 % of the territory is covered by forests, and the area of broad-leaved forest is the largest in Europe. Agricultural land covers about 53 % of the territory and is managed with contrasting intensity: extensive grasslands in mountain areas, intensive crop and vineyard productions on the plains.

The number and surface area of nationally designated sites in France has increased regularly since 1960, with large areas designated between 1963 and 1979 through six national parks. The subsequent increase in the surface area protected is mainly due to the creation of 21 natural regional parks (IUCN category V) since 1995. The potential influence of the implementation of the Birds Directive (1979) and the Habitats Directive (1992) on national designations is not clear from Figure 6.5, although these instruments have largely influenced nature conservation policy in this country.

As can be seen from Maps 6.5a and 6.5b:

- About 25 % of the French terrestrial land is designated under a combination of Natura 2000 and nationally designated areas (all IUCN categories considered).
- Nationally designated areas cover around 17 % of the land territory, out of which only a bit more than 1 % of the land territory corresponds to IUCN management categories I to IV, and more than 15 % of the land territory corresponds to IUCN categories V or VI (mainly Natural Regional Parks). The national strategy for creation of protected areas (SCAP) aims at raising the percentage of the national territory protected under categories I to IV to 2 % of national territory by 2020.
- Natura 2000 sites cover just over 12 % of the French land territory and overlap with nationally designated areas on about 4 % of the national territory. This overlap includes almost all nationally designated areas under IUCN categories I to IV.

Box 6.3 Important dates in the history of nature conservation in France are:

- 1861: Imperial decree creates the first forest protected area based on artistic value (called 'séries artistiques').
- 1887: Law on conservation of monuments and art objects with historical and artistic value.
- 1948: The International Union for the Protection of Nature (further IUCN) is founded in Fontainebleau.
- 1906: Law on protection of natural sites and monuments of artistic value is passed.
- 1909: France hosts the first international congress on landscape protection.
- 1912–1935: creation by NGOs of two coastal and two mountain 'protected areas'.
- 1930: Law on classified sites is passed to allow the designation of a site even without the owners' agreement if it is in the public interest.
- 1960: Law on national parks passed, followed in 1963 by the creation of the first official national park at La Vanoise.
- 1967: Governmental decree on the creation of natural regional parks targets sustainable development and protection of natural and cultural heritage. The decree is further supported by the laws of the 7th of January and 22nd of July 1983.
- 1976: Law on nature protection.
- 1979: EC Birds Directive.
- 1992: EC Habitats Directive.
- 2002: Law on national, regional and Corsican reserves.
- 2006: Law on national parks, marine natural parks and natural regional parks.
- 2009: Law Grenelle I foresees the implementation of a national strategy for the creation of protected areas (SCAP), as well as of a green and blue infrastructure.

In addition to these key events, France has also created various specialised protection instruments. These instruments include forest reserves, biotope protection orders, land purchase in outstanding coastal areas by the 'Conservatoire du Littoral', land purchases in vulnerable natural areas by departments, and actions of regional conservation trusts known as 'Conservatoires régionaux des espaces naturels'.

- This also means that just over 8 % of the land territory is designated as Natura 2000 without being supported by a national site designation.
- Close to 13 % of the land territory is only covered by a national designation (mainly under IUCN categories V and VI).

France has made broad use of existing national designations to support the designation of Natura 2000 sites, but mainly for those sites that come under IUCN categories I to IV. A significant part of the territory is also designated under Natura 2000 without being underpinned by a national site designation (just over 8 % of the territory). In addition to the general national protected areas policy, there is the on-going national implementation of the *trame verte et bleue* (green and blue infrastructure) to ensure ecological connectivity across the territory beyond protected areas.

An important characteristic of Natura 2000 operational implementation in France is that it largely relies on a contractual, participatory and voluntary process, which involves land users and citizens. A new tool has been developed in support of this approach, the *Document d'Objectifs* (DOCOB). This provides a framework for coherent public and

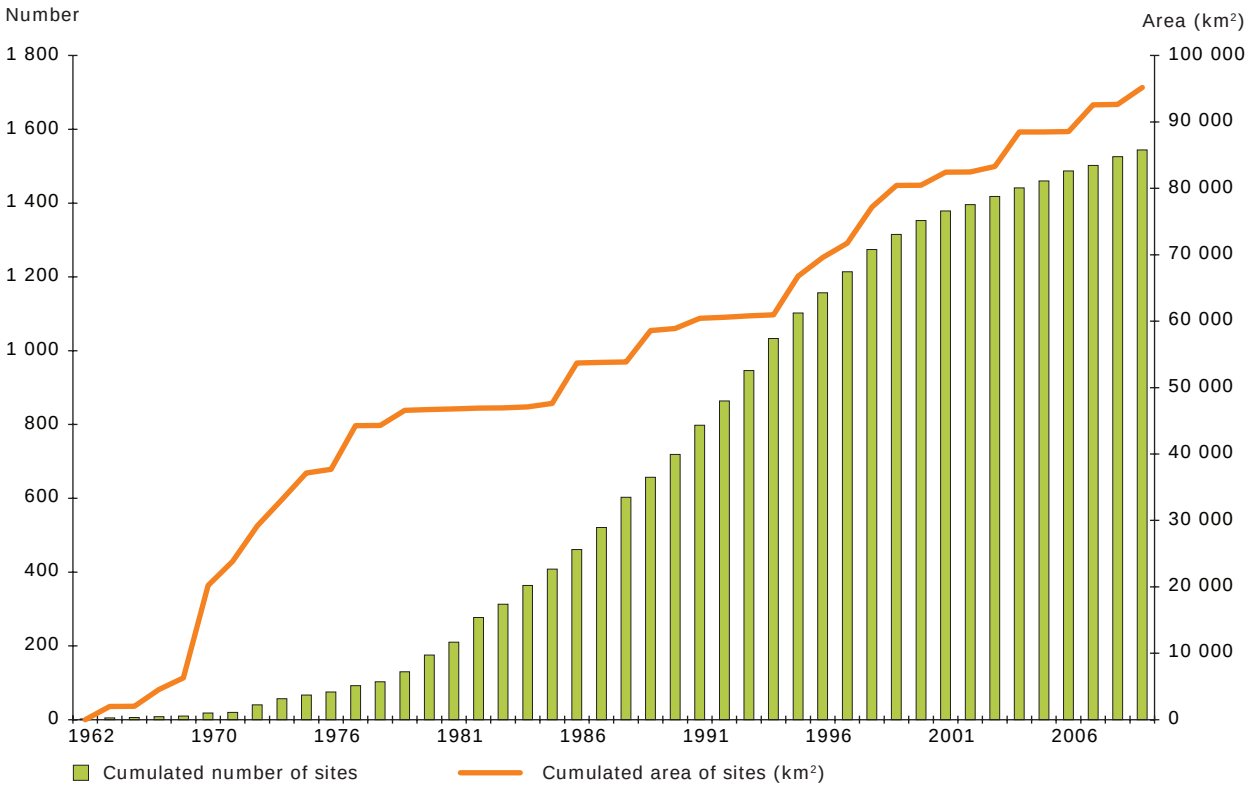
Table 6.3 Nationally designated areas in France

Designation type	Number	Total area	IUCN category
National Park — Core Area	9	2 506 140	II, V
National Park — Buffer Zone	8	2 628 857	V
National Park — Integral Reserve	2	752	Ia
National Nature Reserve	164	2 746 510	III, IV
Corsican Nature Reserve	6	83 175	IV
Regional Nature Reserve	81	17 506	IV
Biotope Protection Order	753	175 840	IV
Forest Integral Biological Reserve	46	130 759	Ia, Ib, IV
Forest Managed Biological Reserve	166	28 656	IV
Land acquired by 'Conservatoire du Littoral' (National seaside and lakeside conservancy)	652	134 081	IV
Regional Nature Park	46	7 661 147	V
National Hunting and Wildlife Reserve	9	36 173	IV
Marine Nature Park	2	7 174 628	V

Note: Some sites protected locally through land purchase or contractual agreements at department or regional level are not included in the CDDA due to difficulty of streamlining this information at national level.

Source: EEA, CDDA, 2011 amended by SPN-MNHN.

Figure 6.5 Cumulative number and area of nationally designated sites (under all IUCN management categories) in France over time

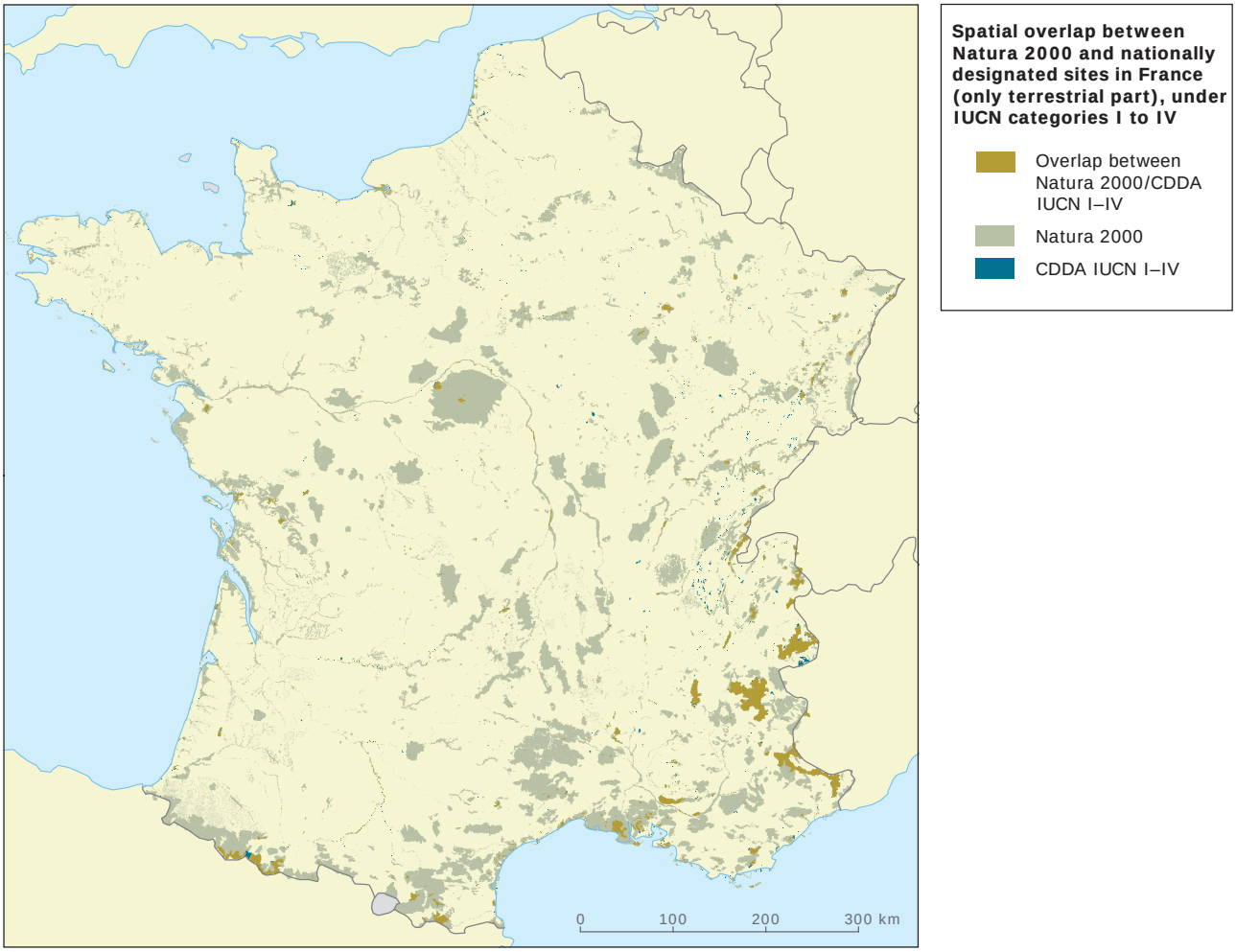


Notes: Only France's mainland territory is considered here, overseas departments and territories are not included.
The surface area that is taken into account here is that existing in the year the site was designated. This surface area may have changed later on (decreasing or increasing) but this is not reflected in the graph.

Source: CDDA, June 2011.

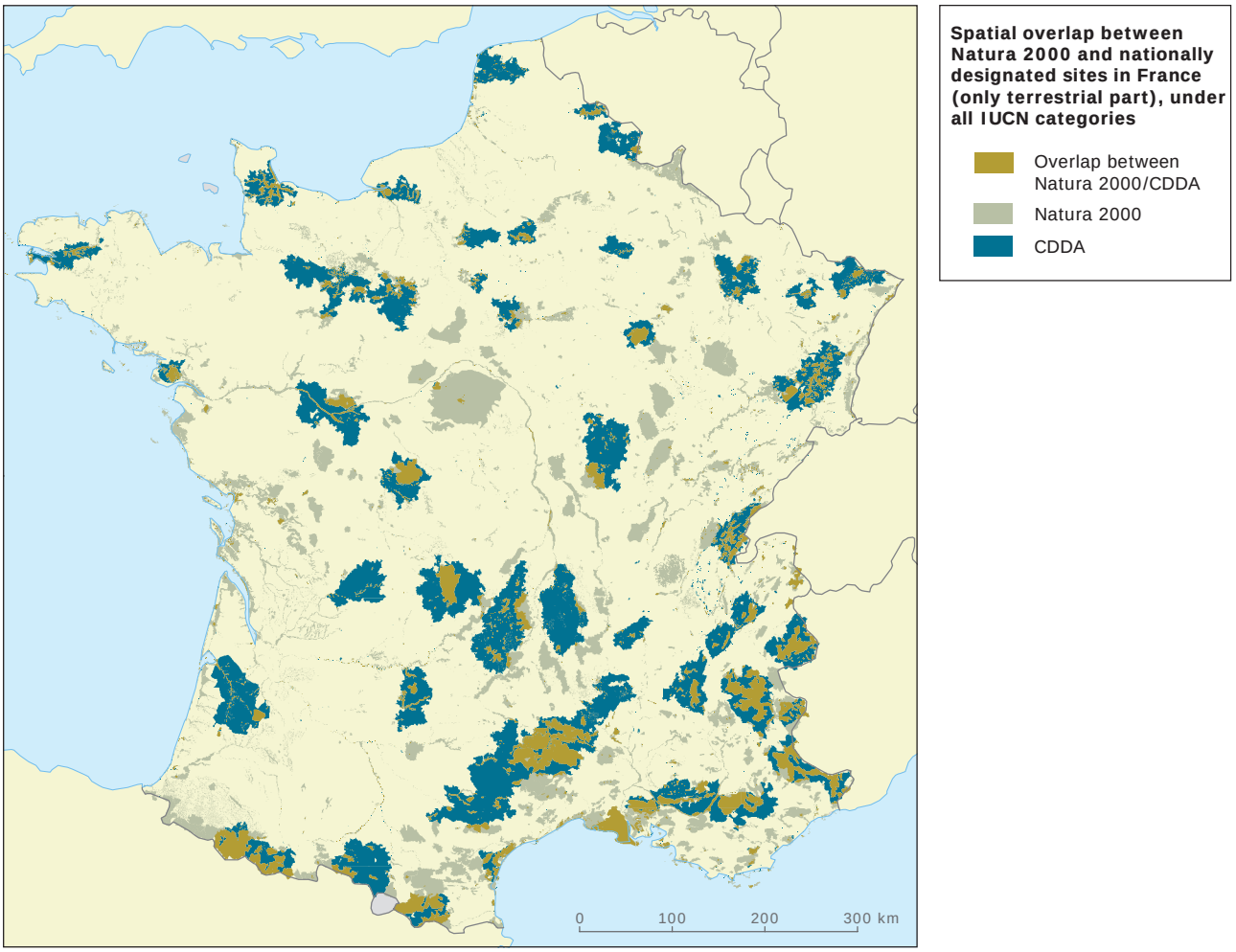
private conservation measures in each individual site and applies to all sites whether they are supported by an existing national site designation or not. These *Documents d'Objectifs* are not statutory or regulatory documents, but basic working guides to help those involved in managing and monitoring the sites, such as landowners, farmers, local elected representatives, forest managers, anglers/fishermen, hunters, NGOs, municipalities, etc. The *Documents d'Objectifs* constitute part of the terms of reference for a five-year site management contract that is signed between the local stakeholders and the state. In addition to the *Document d'Objectifs*, statutory instruments can be used to limit or restrain activities such as industry or certain types of leisure that might impact the site. A steering committee, set up for each Natura 2000 site, ensures the proper implementation of conservation objectives, as well as the promotion of sustainable development of the area.

Map 6.5a Spatial overlap between Natura 2000 and nationally designated sites in France (only terrestrial part) under IUCN categories I to IV



Source: Natura 2000 database, December 2011; and CDDA, June 2011.

Map 6.5b Spatial overlap between Natura 2000 and nationally designated sites in France (only terrestrial part) under all IUCN categories



Source: Natura 2000 database, December 2011; and CDDA, June 2011.

6.2.4 *A mountainous EU Member State with a federal status: Austria*

Austria is a federal country made up of nine federal provinces called *Bundesländer*. The country covers a large proportion of the Alps in central Europe. About 60 % of Austria's territory is mountainous, with only 32 % of the territory lying below 500 metres above mean sea level. This landscape has resulted in small yet distinct regions, and a close interdependence between natural and cultural landscapes. This interdependence has led to specific types of land use and management, which has direct consequences for the environment and nature conservation (EEA, 2010). Most of the country's territory is used for agriculture and/or forestry. Compared to other Member States in the EU, agriculture in Austria is small scale, and Austrian farmers are increasingly focusing on 'green' farming. With about 20 % of the agricultural area under organic farming, Austria has the highest density of organic farms in the European Union.

Nature protection policy, including the establishment and management of protected areas, primarily lies with the legal competence of the nine *Bundesländer*. As a consequence, various different categories of protected areas can be found in Austria. These categories have different criteria concerning the implementation and management of protected areas according to their respective provincial laws (Nouak, 2003).

Significant changes in the number and area of protected areas are noticeable in Figure 6.6.

Box 6.4 Important dates in the history of nature conservation in Austria are:

- 1870: The Vienna Woods or *Wienerwald* is saved from deforestation thanks to the actions of the local politician Josef Schöffel.
- 1924: First law on nature conservation in Austria including provisions for protected areas is proclaimed in the Province of Lower Austria. This is followed by laws passed in Tyrol in the same year, followed by Burgenland (1926), Upper Austria (1927), Salzburg (1929), Carinthia (1931), Vorarlberg (1932), Styria (1935) and Vienna (1935).
- 1938: Replacement of the provincial laws by the German *Reichsnaturschutzgesetz*.
- Post-1945: Each province drafts new nature conservation laws.
- 1970: First European Conservation Year. This triggers the designation of protected areas.
- 1981: Creation of the first Austrian National Park (National Park Hohe Tauern), followed by five others Neusiedlersee-Seewinkler (1993), Donau-Auen (1996), Kalkalpen (1997), Thayatal (2000) and Gesäuse (2002).
- 1995: Austria joins the European Union and implements the Birds and Habitats Directives.

Table 6.4 Nationally designated areas in Austria

Designation type	Number	Total area	IUCN category
Ex lege protection forest and meadows	2	3 019.21	V
Flora Protection Area	1	451.00	IV
Landscape Protection Area	249	1 254 633.47	III, IV, V
Marshes and springs	1	1 051.00	IV
National Park	10	274 169.81	II, V
Natural Caves	1	3 296.11	IV
Natural Monument or Site	66 *	42 267.87	III, IV, V
Nature Park	48	402 042.016	IV, V
Nature Reserve	453	300431.91	Ia, IV, V
Other Landscape section	1	7 702.32	IV
Poor grassland	2	6 880.89	V
Protected Greenbelt	1	3 795.13	IV
Protected Habitat	2	3.32	IV
Protected Landscape Section	342	8 269.76	III, IV, V
Protected Natural Objects of local importance	9	3 864.32	IV
Rest Area	1	37 669.32	IV
Riparian forests	1	2 950.00	IV
Special conservation areas	5	2 915.99	IV

Note: * There are many more sites but no longer integrated in CDDA.

Source: EEA, CDDA, 2011, partly amended by UBA Vienna.

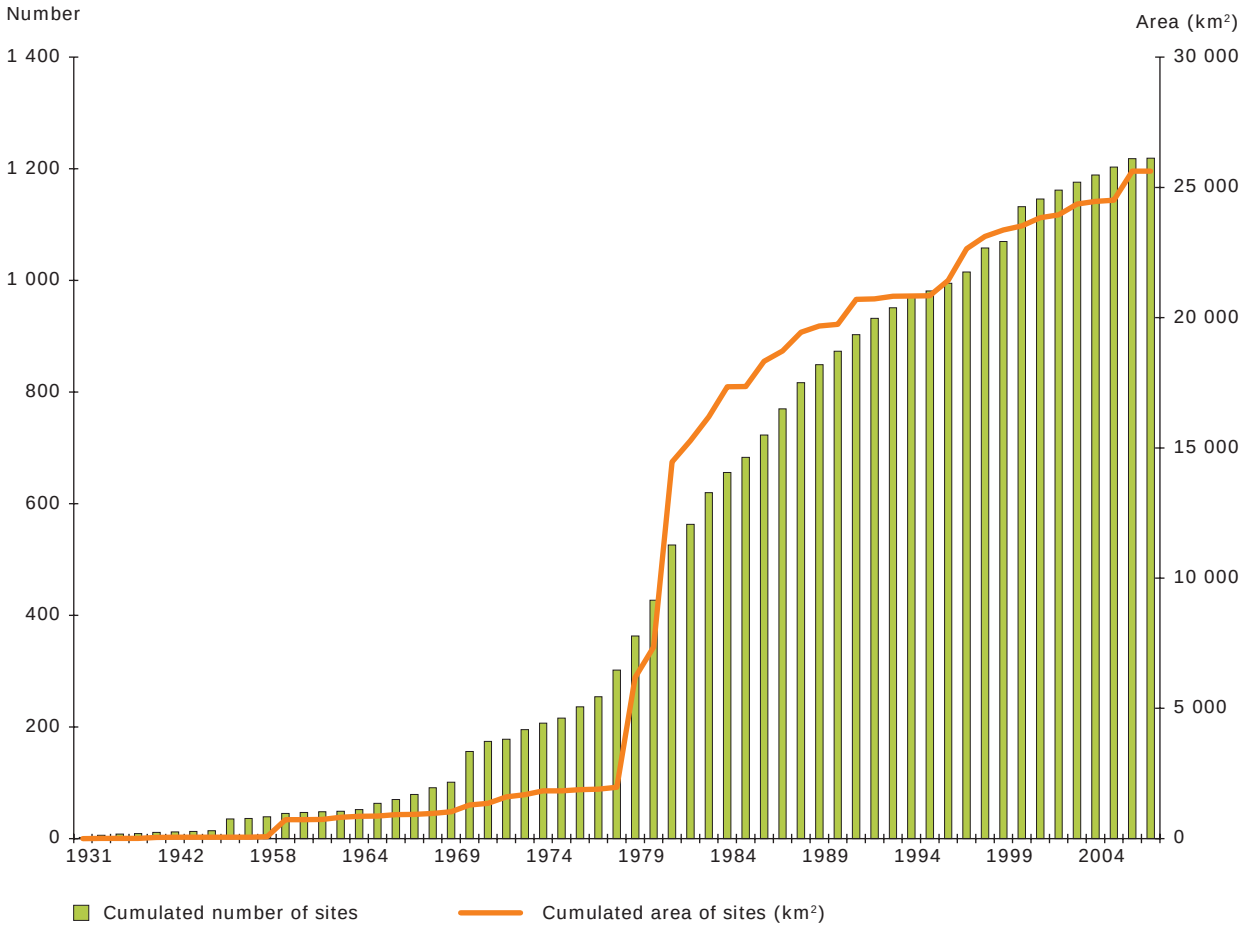
The surface area shown is the surface area of the site at the year of its designation as a protected area. The size of the site may have changed subsequently (either decreasing or increasing) but this is not reflected in the graph.

The spatial distribution of nationally protected areas and Natura 2000 sites is represented in Map 6.6.

In summary:

- About 27 % of the Austrian territory is designated under a combination of nationally designated sites and Natura 2000 (all IUCN categories considered).
- Natura 2000 sites cover nearly 15 % of the Austrian territory and overlap with nationally designated areas on about 11 % of the national territory. This overlap represents 73 % of the Natura 2000 network in Austria, of which about 45 % of the Austrian Natura network corresponds to 'low' IUCN management categories V and VI, and nearly 29 % of the Austrian Network corresponds to 'high quality nature protection' (national park or nature conservation area, i.e. IUCN categories I to IV).
- About 4 % of Austrian territory is designated as Natura 2000 without being supported by a national site designation. However, these sites are supported by a provincial designation.
- About 14 % of the territory is covered only by national designations, with just over 2 % under IUCN categories I–IV and 11 % under IUCN categories V–VI.

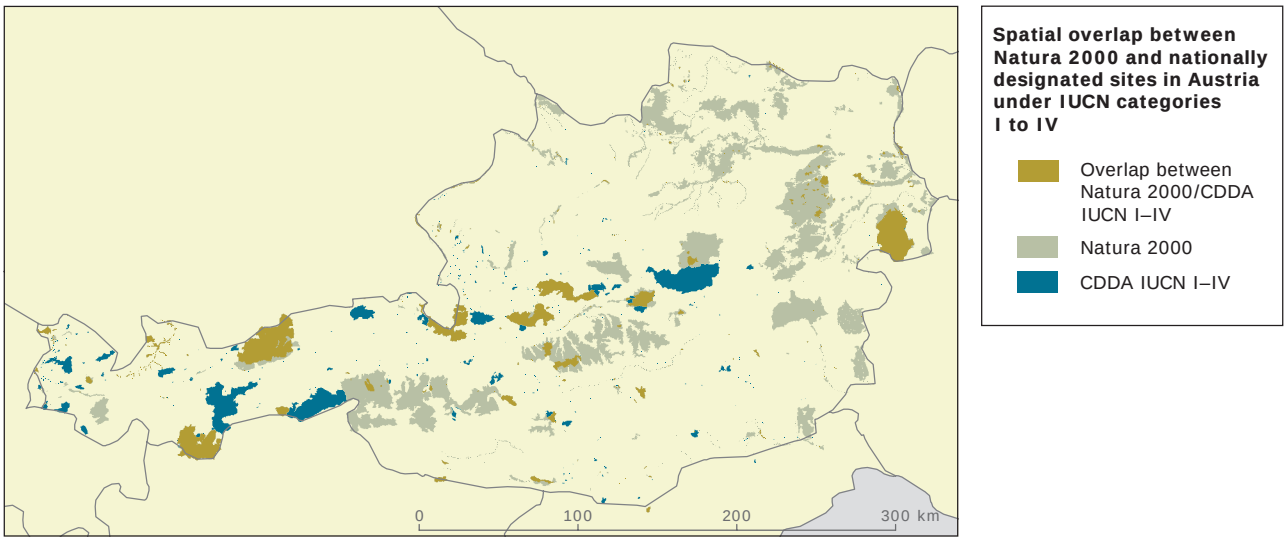
Figure 6.6 Cumulative number and area of nationally designated sites (under all IUCN management categories) in Austria over time



Notes: Due to the difficulty in streamlining information from provincial to federal level, the Common Database on Designated Areas in Austria is only fully updated every three to five years. The next complete update will be done in June 2012. Figures used are thus subject to further refinement.

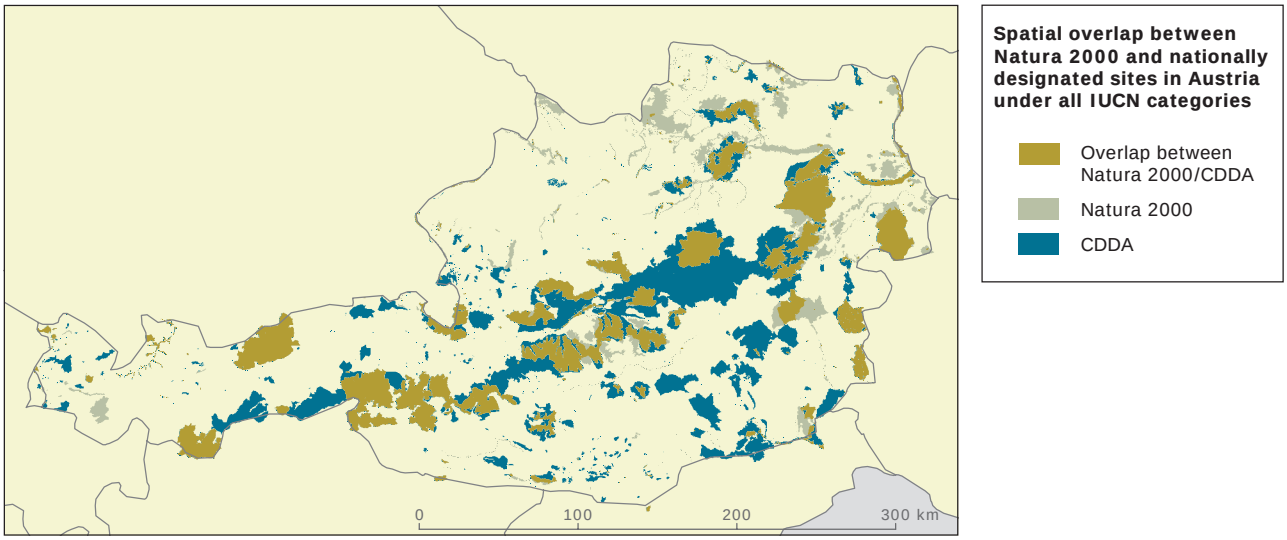
Source: CDDA, June 2011.

Map 6.6a Spatial overlap between Natura 2000 and nationally designated sites in Austria under IUCN categories I to IV



Source: Natura 2000 database December 2011, and CDDA June 2011 amended by UBA Vienna.

Map 6.6b Spatial overlap between Natura 2000 and nationally designated sites in Austria under all IUCN categories



Source: Natura 2000 database December 2011, and CDDA June 2011 amended by UBA Vienna.

The Birds and Habitats Directives in Austria are implemented through different provincial laws, such as those governing spatial planning, nature protection, fishing and hunting. The main content of the directives are implemented in the nature protection laws of all the federal states of Austria. However, the content of the laws differs among the nine federal states, and for this reason, the degree of implementation varies from federal state to federal state. For Natura 2000, new protected area categories have been implemented in the nature conservation laws. These protected areas are known as *Europaschutzgebiet* in eight provinces and 'Natura 2000' in Tyrol.

When Austria entered the European Union in 1995, only about 22 % of its territory was under any category of protection, out of which just over 4 % of the national territory fell under IUCN I to IV categories. With the accession to the European Union the number, area and quality of protected areas thus increased significantly.

Table 6.5 Summary table showing the proportion of the land territory that is protected in each four EU Member States under different regimes

	Natura 2000 + National desig-nations	National designations			Natura 2000	Overlap between Natura 2000 and national designations			Natura 2000 only	National designations only		
	% of land territory	% of land territory			% of land territory	% of land territory			% of land territory	% of land territory		
		Total	IUCN I–IV	IUCN V–VI		Total	IUCN I–IV	IUCN V–VI		Total	IUCN I–IV	IUCN V–VI
Estonia	18.0	18.0	Not relevant		17.0	17.0	Not relevant		0.0	1.0	Not relevant	
Hungary	22.2	9.0	2.6	6.4	21.4	8.3	2.6	5.7	13.2	0.7	N	0.7
France	25.3	16.9	1.4	15.5	12.5	4.2	1.4	2.75	8.4	12.8	N	12.8
Austria	28.3	24.4	6.7	17.7	14.7	10.8	4.2	6.6	3.9	13.6	2.5	11.1

Note: The distinction between IUCN categories I–IV and V–VI is considered as non-relevant in Estonia. N = Negligible.

Source: Natura 2000 database, December 2011; CDDA, June 2011 amended.

6.2.5 Comparing statistics from the four case studies

Table 6.5 above summarises the main statistics from the above case studies, and highlights the main differences between them.

Triglav National Park, Slovenia

6.3 Conclusions

From this analysis, it appears that the implementation of the Natura 2000 network has significantly changed the picture of protected areas in the EU Member States, by dramatically increasing the area of the sites. Natura 2000 has also forced countries to strengthen their management and protection systems for biodiversity conservation.

The way countries make use of their existing national instruments to support Natura 2000 designations varies. In some countries, Natura 2000 sites have to be supported by a statutory national site designation, which may involve the creation of additional 'designation-types' such as in Estonia or in the Austrian provinces. In the United Kingdom, most Natura 2000 sites have first to be designated at national level as Special Sites of Scientific interest (SSSIs) before they are proposed as Natura 2000 sites.

In general, the pre-existing nationally designated areas that focused on biodiversity conservation (IUCN categories I to IV, and also category VI in Estonia) have been broadly used in support of a Natura 2000 designation. However, the overlap between Natura 2000 sites and nationally designated areas under categories V and VI is also significant, particularly in mountainous regions. This supports the idea that the Natura 2000 network is not restricted to nature reserves, and is based on a much broader principle of conservation and sustainable use.

What is not visible from the above analysis is the extent to which other international designations (such as Ramsar, World Heritage, and Biosphere reserves) overlap with and support Natura 2000 designations. Nor is it clear to what

extent the protection at national level of specific ecosystem-types (as in Croatia, Denmark, Hungary) overlaps with these international designations.

What is also striking from the analysis is the important role played by IUCN categories V to VI in protected area sites that are not part of Natura 2000. This potentially provides a more biodiversity-friendly matrix of the territory surrounding Natura 2000 sites.

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7 A dive into marine protected areas

Chapter summary

As on land, protected areas in the seas of Europe are subject to several overlapping administrative structures. This chapter will discuss the current state of protected areas in European seas, and the multiplicity of policy instruments that covers them.

In **Section 7.1**, we introduce the context of marine protected areas. This section also discusses the clarification of the legal uncertainty surrounding the applicability of the Habitats Directive (and by implication, the possibility of Natura 2000 designations) to European marine areas. It also introduces a new instrument that has been developed to protect European seas: the Marine Strategy Framework. In **Section 7.2**, we move to a discussion of Europe's four marine regions and their protected areas. This section focuses on the Regional Sea Conventions that exist for each of these seas, and which are responsible for many of the Marine Protected Areas (MPAs) in each of the seas. We also discuss some of the Natura 2000 sites in these regions.

In the next two sections, we look in greater depth at two European Union administrative structures for MPAs. We look first at Natura 2000 marine sites in general, and at patterns of Natura 2000 marine designations in different sea regions (**Section 7.3**). We then look at the recently enacted MSFD, and discuss how its potential can be improved (**Section 7.4**).

The subsequent two sections aim to present an evaluation of MPAs in general. In the fifth section (**Section 7.5**), we discuss the problem of creating 'ecologically coherent' protected areas, namely protected areas whose boundaries correspond to areas of genuine biodiversity or ecological vulnerability. The lopsided allocation of protected area designations to inshore waters (with fewer designated sites further from coasts) indicates poor ecological coherence. In the final section (**Section 7.6**), we raise the issue of the effectiveness of marine protected areas. There is a dearth of comprehensive information about the extent to which marine protected areas are effective in restoring or protecting biodiversity.

School of Goldline fish, Portofino Marine Protected Area, Italy

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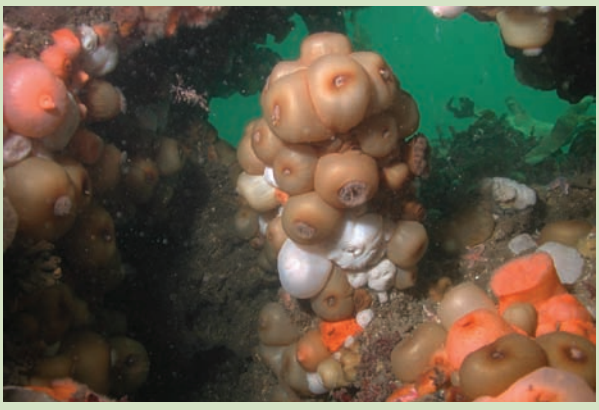


Sea anemones on submarine structure made by leaking gases, Natura 2000 site, Kattegat, Denmark

© Karsten Dahl

7.1 Policy developments for marine protected areas since 1992

In 1992, at the Earth Summit in Rio de Janeiro, the Convention on Biological Diversity (CBD) was opened for signature. One of the three main goals of the CBD is the conservation of biological diversity, and it emphasises that policies for the protection of nature must take into account the protection of habitats and ecosystems as well as species themselves.

Europe responded to this global agreement with amendments to its Regional Sea Conventions and by adopting Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora, also known as the Habitats Directive. This Directive is an EU-wide legal instrument that seeks to guarantee the protection of species and habitats through the establishment of the Natura 2000 network. This network consists of Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) across Europe.

However, the extent to which the Directive could be applied to marine territories became a subject of debate. During the mid- to late-1990s, many Member States argued that the Habitats Directive only applied to their territorial waters, i.e. only extending 12 nautical miles from their coasts. This argument was supported by the fact that very few marine habitats and very few marine species are mentioned in the Directive compared to the number of terrestrial habitats and species. The European Commission always argued that the Directive applied to all waters over which Member States exercised jurisdictional rights. This debate resulted in a court case brought by Greenpeace against the British government in 1999, which confirmed that the Natura 2000 Directive did indeed apply beyond 12 nautical miles under British law. In 2001, the European Council recognised the need for the Directive's Natura 2000 network to be implemented in the Member States' Exclusive Economic Zones (EEZ), an area that extends up to 200 nautical miles off a country's coast. This opinion was formally recognised by the European Court of Justice on 20 October 2005 in a judgement against the United Kingdom.

These intra-European developments occurred against a background of increased concern for marine environment beyond Europe's borders. In 2002, at the World Summit on Sustainable Development, the international community committed to slow significantly the rate of biodiversity loss by 2010 (CBD, 2002). In 2004, the Seventh Ordinary Meeting of the Conference of the Parties to the Convention on Biological Diversity put forth a global decision for major ecosystems (of which the marine ecosystem is one). The decision proposed that representative and effectively managed Protected Areas (PAs) networks should be established by 2010 so as to effectively conserve 10 % of each of the world's major ecosystems (CBD, 2004; CBD 2006). The EU responded to this commitment through the EU Biodiversity Action Plan (European Commission, 2006), which was replaced in 2011 by the EU Biodiversity Strategy to 2020 (European Commission, 2011).

In addition, the EU created a response that was specifically targeted at the marine environment by its adoption of Council Directive 2008/56/EC of 17 June 2008, which established 'A Framework for Community Action in the Field of Marine Environmental Policy' ([15]). This directive, discussed in greater detail below, establishes a framework within which Member States shall take the necessary measures to 'achieve or maintain good environmental status' in the marine environment by the year 2020 at the latest. These measures comprise two main components. The first is to protect and preserve the marine environment, preventing its deterioration or, where practicable, restoring marine ecosystems. The second component is to prevent and reduce inputs in the marine environment to ensure there are no significant impacts or risks to marine biodiversity, marine ecosystems, human health, and legitimate uses of the sea. One specific policy tool that has been adapted to achieve these aims is the establishment of a coherent and representative network of Marine Protected Areas.

7.2 Marine protected areas within European marine regions

The marine waters of the European Union are divided into four broad marine regions, the boundaries of which are defined according to coastal and EEZ boundaries as well as oceanographic/ biogeographic characteristics. The marine regions are: the north-east Atlantic Ocean, the Mediterranean Sea, the Black Sea and the Baltic Sea (Map 7.1). The north-east Atlantic Ocean and Mediterranean Sea are both further divided into four distinct sub-regions each (Section 7.3).

([15]) Marine Strategy Framework Directive, 2008.

Each of the four marine regions is covered by a Regional Sea Convention.

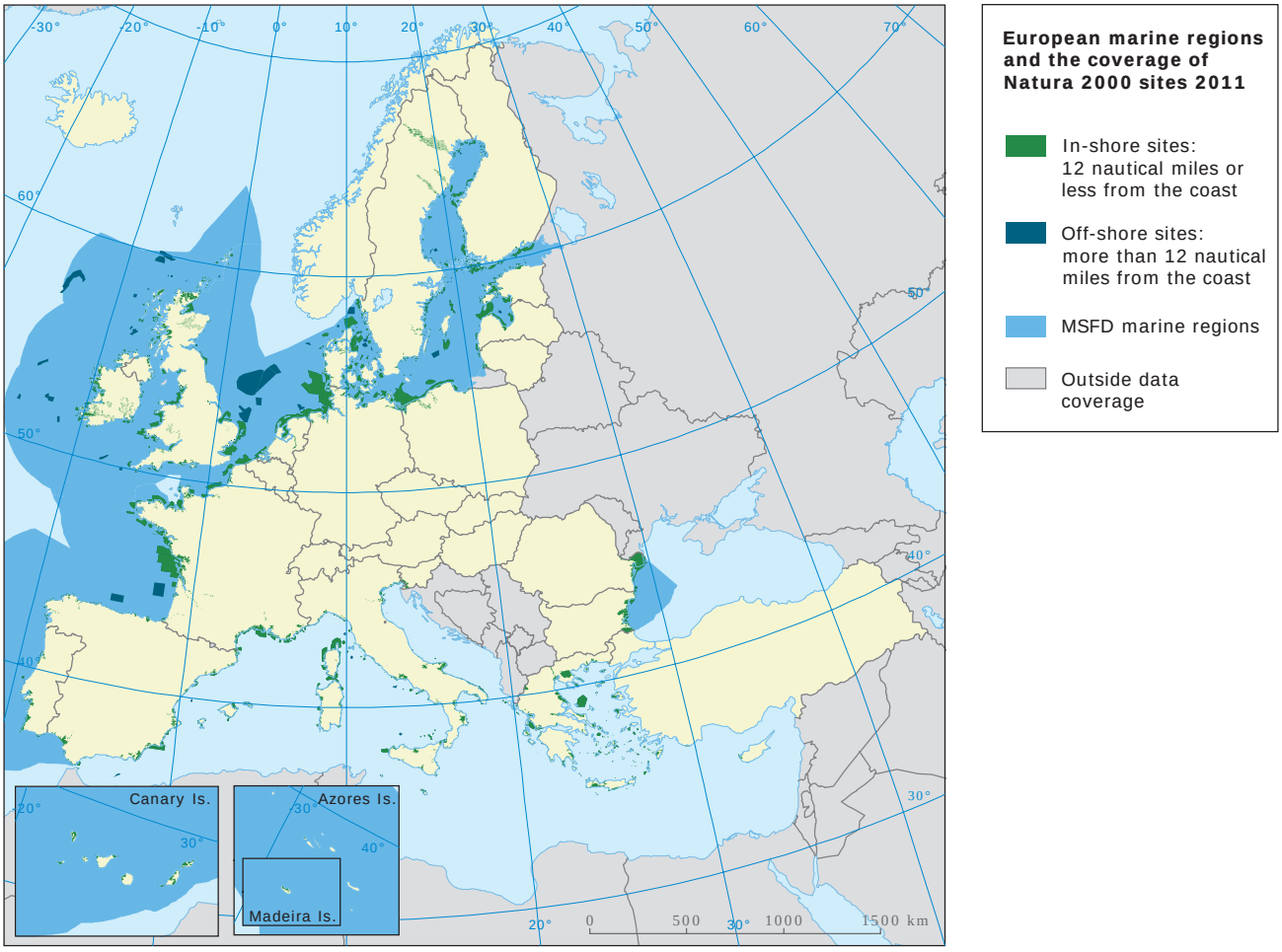
The Baltic Sea is covered by the 1974 Convention on the Protection of the Marine Environment of the Baltic Sea Area (Helsinki Convention; HELCOM), which was revised in 1992 and entered into force in 2000 (HELCOM, 2012).

The Convention for the Protection of the Marine Environment of the north-east Atlantic (OSPAR) was established at a joint meeting of the previously separate Oslo and Paris Commissions in 1992, although it did not enter into force before 1998 ([16]).

The Convention for the Protection of the Mediterranean Sea against Pollution (Barcelona Convention) was adopted in 1976 under the framework of the United Nations Environmental Program. An amended version was adopted in 1995 that renamed it the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean. A specific protocol was drawn up in the amended version of the convention. The Protocol deals with specific protection schemes for marine biodiversity in the Mediterranean.

The Convention on the Protection of the Black Sea against Pollution (also known as the Bucharest Convention) was adopted in 1992 and entered into force in 1994.

Map 7.1 European marine regions and the coverage of Natura 2000 sites *



Note: * Disclaimer: The marine regions and sub-regions shown in Map 7.1 and used for generating the statistics in Table 7.1 are identical to MSFD marine regions used for WG DIKE (Working Group on Data, Information and Knowledge Exchange) consultation of EU Member States on the 7 November 2011. A final decision regarding the map was not reached before the publication of this report and changes might occur. The map does not represent any official Member State marine boundaries.

([16]) In the case of the Kattegat sea region between Denmark and Sweden, there is an overlap between HELCOM and OSPAR.

Within the 200 nautical mile EEZ of EU Member States, the Regional Sea Convention designations of Marine Protected Areas supplement the designations of the Natura 2000 network. The Regional Sea Conventions can also designate MPAs in the High Seas areas beyond this 200 nm limit, as has been the case with OSPAR. Major overlap exists between Natura 2000 marine sites and sites designated under the Regional Sea Conventions in the national waters of EU Member States. But it is important to realise that EU legislation is only applicable for 54 % of the area of the regional seas around Europe ([17]). Hence, there is a need for strong regional cooperation with non-EU neighbours through the Regional Sea Conventions to achieve the necessary protection levels as well as to ensure healthy future oceans with a high diversity of habitats and species. Such cooperation should also include finding common grounds for protecting the High Seas as done by OSPAR.

Besides the focus on Regional Sea Conventions and the Natura 2000 network in the following sections, it should be mentioned that some Member States have designated, or are in the process of designating, additional national protected areas. These processes, such as Marine Conservation Zones in UK waters will improve overall protection levels. No coherent European overview exists for these national marine protection efforts, as not all Member States have reported such sites to the CDDA. They will therefore not be considered in detail here.

7.2.1 The Baltic Sea marine region

The semi-enclosed Baltic Sea (not including Kattegat) covers 392 000 km^2 of brackish waters, ranging from almost freshwater to more saline waters. With the exception of Russian national waters, it is almost entirely under the jurisdiction of eight EU Member States. In addition to the Natura 2000 network in the Baltic Sea, there are also the protected areas designated by HELCOM. These HELCOM-protected sites are known as Baltic Sea Protected Areas or BSPAs.

Natura 2000 sites cover just over 12 % of the Baltic Sea marine region, or 44 900 km^2 out of the 369 000 km^2 of the waters under EU legislation ([18]) (Table 7.1). Among all the marine regions' EEZ, the Baltic EEZ accounts for the highest coverage by Natura 2000 designations with only 5 %. In addition to these designations, there are two Russian BSPA designations comprising a total of 343 km^2. HELCOM estimates that MPA coverage in the region had increased from close to 4 % to just over 10 % in the six years from 2004–2012. In December 2009, there was a significant overlap between Natura 2000 sites and BSPAs, with 85 % of the BSPA network also designated under Natura 2000. But there are large areas designated as Natura 2000 that are not designated as part of the BSPA network. Despite the good overall coverage of protected areas across the Baltic Sea, HELCOM concluded that of the nine countries sharing the Baltic Sea, Germany is the only contracting party that maintained a balance between areas protected in coastal waters and areas protected in offshore waters. The network of MPAs in the Baltic Sea is thus still not considered to be ecologically coherent, and many of the MPAs still lack proper management (HELCOM, 2010).

7.2.2 The north-east Atlantic Ocean marine region

The north-east Atlantic Ocean marine region covers a staggering 7 034 000 km^2 within 200 nautical miles of coastline of its Contracting Parties. Of this, 4 190 000 km^2, or four of the seven regional seas inside the region, are (mostly) within the jurisdiction of EU Member States. This jurisdiction ranges from the Arctic cold waters of the Barents Sea in the north, to the warmer, sub-tropical waters around the Azores. Within the north-east Atlantic Ocean, just over 3 % of the waters under the jurisdiction of EU Member States (or 140 200 km^2 of 4 190 000 km^2) is protected by Natura 2000 sites.

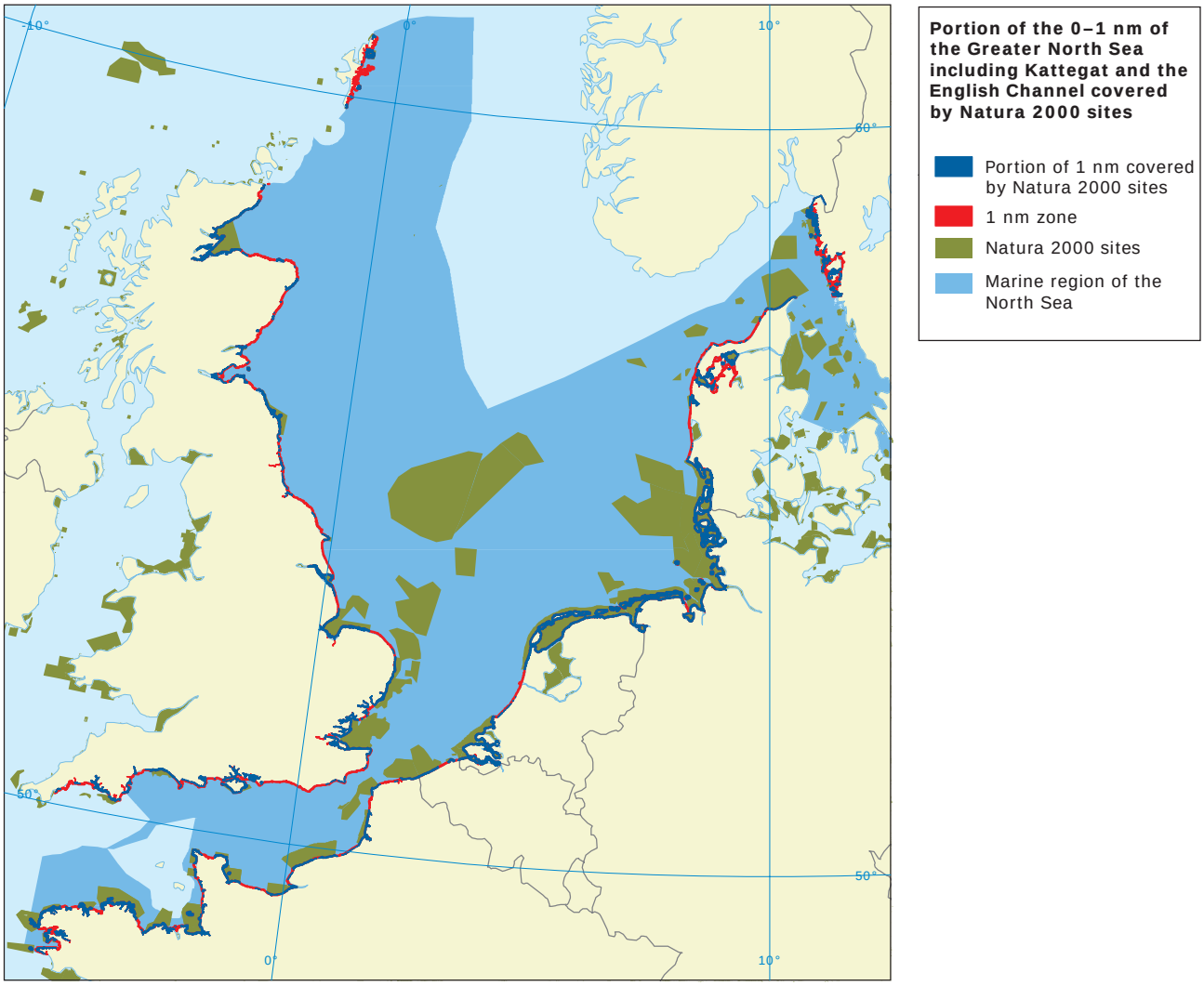
In general, EU Atlantic coastal waters ([19]) appear well covered, with nearly 42 % designated under Natura 2000 (Map 7.1), though there is some variation between the marine sub-regions (Table 7.1). In the territorial waters (between 1 and 12 nautical miles from the coast), Natura 2000 coverage is around 14 %, and thus above the CBD's target of protecting 10 % of marine ecosystems. However, the seas between 12 and 200 nm from Members State coastlines are far less covered, with less than 2 % of these waters under Natura 2000 designation, making them the largest single gap within the marine Natura 2000 network.

([17]) 'Regional seas' are calculated as the entire Black Sea, Mediterranean and Baltic Sea, and for the North-East Atlantic Ocean the OSPAR Convention area.

([18]) Please note that the MSFD Baltic Sea marine region does not include the Kattegat, whereas the HELCOM region does. This explains why the Baltic Sea marine region has a slightly higher coverage of protected areas compared to the HELCOM region.

([19]) For the purpose of analysis, coastal waters were defined as 0–1 nm (nautical miles) from the coast, territorial waters as 1–12 nm, and EEZ as 12 nm to the EEZ outer boundary.

Map 7.2 Proportion of coastal waters (0 to 1 nm from the coast) of the Greater North Sea including Kattegat and the English Channel covered by Natura 2000 sites



In addition to the Natura 2000 network, the OSPAR Commission is also active in the north-east Atlantic, working towards the establishment of an 'ecologically coherent network of well-managed MPAs' in the north-east Atlantic by 2012. As of 31 December 2010, the OSPAR Network of Marine Protected Areas comprised a total of 181 sites, including 175 MPAs situated within the national waters of Contracting Parties, and six MPAs in Areas Beyond National Jurisdiction (ABNJ). Collectively, these sites cover around 439 700 km², or just over 3 % of the OSPAR maritime area in the north-east Atlantic (OSPAR, 2011). The establishment by the OSPAR Commission in 2010 of a network of six MPAs in the High Seas of the north-east Atlantic beyond national jurisdictions, collectively covering 280 000 km², has been widely recognised, and set a global precedent. In 2009 for example, the NEAFC (North East Atlantic Fisheries Commission) agreed to temporarily close areas (collectively covering 323 900 km² of areas in the north-east Atlantic beyond national jurisdiction) to bottom trawling until 2015. Approximately 46 % of the six OSPAR High Seas MPAs are thus subject to the measures implemented by NEAFC. But despite the progress made, the OSPAR Commission in 2010 concluded that the distribution of MPAs across the five OSPAR regions is imbalanced, as is the balance of sites between coastal and offshore waters, resulting in major gaps of the OSPAR Network of MPAs. While the overall coverage of coastal waters by OSPAR MPAs is comparatively high at just over 14 %, coverage by OSPAR MPAs of offshore areas, i.e. the Exclusive Economic Zones of OSPAR Contracting Parties, remains very low at 0.5 % (OSPAR, 2011). If an ecologically coherent network of MPAs in the north-east Atlantic is to be created, further efforts must be made to establish MPAs in offshore areas as well as in the High Seas.

7.2.3 The Mediterranean marine region

The Mediterranean marine region covers 1 534 000 km², further divided into four marine sub-regions (Table 7.1). Of these, 420 000 km² are within the national waters of EU Member States. No EEZ has been agreed for the Mediterranean, and only the 0–12 nm band beyond national coastlines is considered to be under national jurisdiction (Map 7.1). Any waters beyond this 12 nm threshold are considered as High Sea. This leaves large parts of the Mediterranean outside Natura 2000 protection schemes. Within the 12 nm coastal band, just over 6 % is designated under the Natura 2000 network.

Because the Mediterranean is recognised as a global hotspot for biodiversity, there are numerous MPA network initiatives that exist outside the Natura 2000 network. These include the Emerald Network, Ramsar sites, Man and the Biosphere Reserves, and the Agreement on the Conservation of Cetaceans in the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS). New MPA networks are still being formed. One such network is being established as part of an initiative by the Barcelona Convention to identify a *List of Specially Protected Areas of Mediterranean Importance*. This so-called 'SPAMI' list will feature sites within territorial waters and in High Seas (UNEP-WCMC, 2008). It will include sites:

- of importance for conserving the components of biological diversity in the Mediterranean;
- that contain ecosystems specific to the Mediterranean area or habitats of endangered species;

Table 7.1 Natura 2000 coverage in European Seas (using MSFD marine regions and subregions ([a]))

Marine regions and subregions	Sea surface area km²	EU part of sea km² ([b])	Area covered by N2K, km²	Total number of N2K sites	% of EU waters covered by N2K	% of 0–1 nm zone covered by N2K	% of 1–12 nm zone covered by N2K	% of 12 nm to EEZ covered by N2K
Baltic Sea	392 000	369 000	44 900	1 030	12.2	29	13	5
North East Atlantic Ocean (inside EEZ) ([d])	7 034 000	4 190 000	140 200 ([c])	1 806	3.4	42	14	2
Celtic Sea	906 000	906 000	28 300	631	3.1	31	8	2
Greater North Sea incl. Kattegat and English Channel	682 000	514 000	84 800	753	16.5	58	26	11
Bay of Biscay and the Iberian Coast	804 000	804 000	24 600	331	3.1	45	15	2
Macaronesia	1 966 000	1 966 000	2 400	91	0.1	15	2	0.02
Mediterranean ([e])	1 534 000	420 000	26 800	831	6.4	25	4	na
Western Mediterranean	843 000	159 000	18 900	525	11.9	42	9	na
Ionian Sea and Central Mediterranean Sea	724 000	62 000	2 900	122	4.7	27	2	na
Adriatic Sea	134 000	25 000	600	46	2.4	13	1	na
Aegean-Levantine Sea	808 000	174 000	4 500	138	2.6	13	1	na
Black Sea	434 000	55 000	2 600	87	4.3	75	19	0.1
Total ([f])	**9 395 000**	**5 034 000**	**214 600**	**3 754**	**4.3**	**33**	**10**	**2**

Note:
([a]) Natura 2000 information is based on information available from Member States September 2011.

([b]) EU part of the sea is the combined national waters of EU Member States excluding the areas of non-EU Member States. It is used to show how large a percentage of the sea is covered by EU legislation e.g. Natura 2000 directives.

([c]) North East Atlantic covers the Iceland Sea, Barents Sea, Norwegian Sea, Greater North Sea, Celtic Sea, Bay of Biscay and Iberian Coast and Macaronesia. It is measured from the coast to 200nm off the coast. High Seas — those areas more than 200 miles off the coast — are excluded.

([d]) It should be mentioned that OSPAR and NEAFC have protected large areas in the High Seas. These are not presented as part of the table.

([e]) For the Mediterranean, only 12 nm from the coast is considered EU waters as no EEZ has been agreed upon for the Mediterranean. Some states have declared EEZ for some zones extending beyond 12 nm. These have not been taking into account in this table, as no formally agreed, coherent map was available for the analysis.

([f]) National designations of MPAs are adding additional MPA coverage to the figures presented for the Natura 2000 network.

- with special scientific, aesthetic, cultural or educational interest.

In addition to these international networks, national protected sites have also been designated, adding to the total area covered by internationally agreed MPAs. For example, France operates several categories of MPAs in the territorial waters of mainland France (Mediterranean and Atlantic coasts, Table 7.2).

UNEP-WCMC (World Conservation Monitoring Centre) found in 2008 that the number of MPAs in the Mediterranean depended upon how individual MPAs were defined. The number varied from 21 MPAs on the SPAMI list to 252 MPAs in the World Commission on Protected Areas database, depending on the approach applied for defining the individual MPAs. The different definitions for MPAs used throughout the Mediterranean region, as well as the lack of an updated international database, make it difficult to produce a quantitative and objective assessment of the coverage of the MPA network. In March 2012, there were 32 SPAMI sites officially designated, an increase of 11 from 2008.

A tentative conclusion based on Table 7.1 is that there is progressively higher MPA coverage going from the east to the west, and better coverage in coastal waters compared to further off shore. A similar pattern has been observed from the south to the north, with better MPA coverage observed in northern waters (UNEP-WCMC, 2008). Whether the collective network is representative and ecologically coherent is difficult to assess with the information available, although the area covered by MPAs is larger than is indicated by the Natura 2000 analysis (Table 7.1).

7.2.4 The Black Sea marine region

The Black Sea marine region is shared by six countries and covers 434 000 km², of which 55 000 km² are within the EEZ of EU Member States. Of these, 2 600 km², or just over 4 %, has been designated as Natura 2000. However, almost 75 % of the Black Sea coastal waters of EU Member States (waters less than one nautical mile off the coast) are protected as well as just over 19 % of their territorial waters from 1 to 12 nautical miles off the coast. This makes the Black Sea coastal waters of EU states the best protected coastal waters and territorial waters (in terms of Natura 2000 site designations; Table 7.1) of the European regional seas. But more still needs to be done to protect offshore waters.

The regional sea convention for the Black Sea is the Convention on the Protection of the Black Sea against Pollution (also known as the Bucharest Convention). Among other objectives, it aims to preserve representative types of coastal and marine ecosystems, wetlands, and other habitats. A Strategic Action Plan for the Rehabilitation and Protection of the Black Sea was adopted in 1996 and revised in 2002, and in 2003, a Biological Diversity and Landscape Protection Protocol was added to the Convention. The Protocol encourages contracting parties to the Convention to protect and preserve areas of particular biological or landscape value, and to manage these in a sustainable and environmentally sound way. The Commission for the Protection of the Black Sea against Pollution and its Permanent Secretariat acts as the coordinating mechanism for the implementation of the Convention and SAP. The Commission has launched projects to establish and conduct studies on Specially Protected Areas and MPAs. The majority

Table 7.2 MPA categories in mainland French waters

Type	Number	Surface (km²)
Natura 2000	208	6 970
National Nature Reserve	26	1 220
Iroise Marine Nature Park (Atlantic)	1	3 550
Port Cros National Park (Mediterranean)	1	13
Coastal Conservatory's Marine Public Domain	4	55
Biotope Protection Decrees	3	13
Blue Coast Park (Local stakeholder)	1	91

Note: Geographic overlap exists between different types of MPA designations, and the total area designated is smaller than the sum of figures as indicated by Table 7.2

Source: Modified from Bellan et al.

of protected marine and coastal areas (93 %) were declared by individual countries bordering the Black Sea during the 1990s. Romania ranks first in terms of the surface area of protected areas designated during the 1990s (56 %). It is followed by Ukraine (22 %), Bulgaria (10 %) and Georgia (4 %), while Turkey did not declare any protected areas during this period. The dates of designation of Russian sites are not known, and are therefore excluded from these calculations. The total area of Black Sea marine and coastal protected areas by country and MPAs per unit shoreline by 2008 is given in the table below (see Table 11 of BS Biodiversity report, p. 57).

7.3 An in-depth look at patterns of marine Natura 2000 designations

The Natura 2000 network designated under the Birds Directive and the Habitats Directive provides a cornerstone for European designation of MPAs. Since the entry into force of the Habitats Directive in 1992, almost 4 % of European waters have been designated as part of the Natura 2000 network of MPAs (Table 7.1). The analyses on the distribution of Marine Protected Areas in European seas and comparisons with the CBD target and framework are presented in Map 7.1 and Table 7.1. Due to a lack of comprehensive information, namely digital maps with site boundaries, it has not been possible to include national sites in the analysis. Europe might therefore be closer to reaching the CBD target than indicated by the Natura 2000 analysis.

In spite of the strong policy visions and ambitions of the CBD, the global target of effective conservation of at least 10 % of each of the world's ecological regions by 2010 has not been met in the case of European seas. Global MPA coverage in 2010 stood at only 1 % (Toropova et al., 2010). Due to the implementation of Natura 2000, the situation is better in European seas, where almost 4 % were covered by Natura 2000 sites at the end of 2011 (Table 7.1). While the number of sites is steadily increasing, this global coverage has not been enough to prevent what the CBD considers to be a serious decline in global marine and coastal biodiversity and related ecosystem services. Recognising this, 193 CBD Contracting Parties recommitted in Nagoya in 2010 through the Aichi Targets to conserve at least 10 % of coastal and marine areas (CBD, 2011).

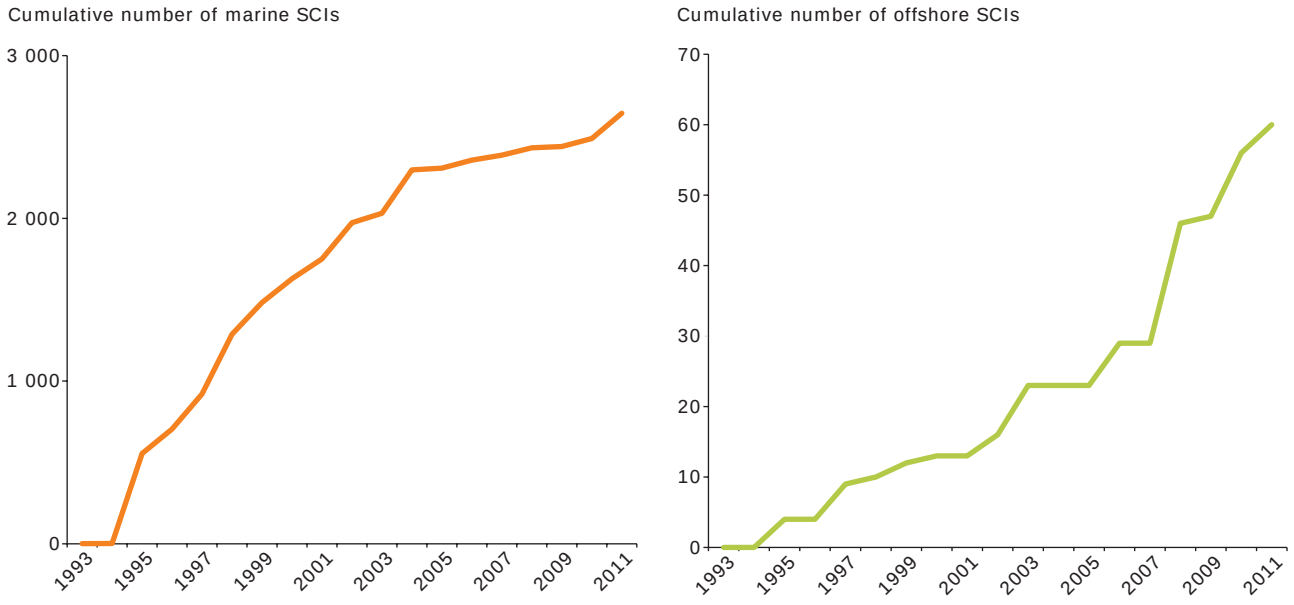
It is clear that progress in identifying, proposing and designating Natura 2000 sites varies greatly between marine regions of Europe ([20]) (Table 7.1). The Baltic region, the Greater North Sea and western Mediterranean sub-regions have reached the target of designating 10 % of the EEZ of EU Member States (or 10 % of the 0–12 nm coastal band in the case of Mediterranean countries), whereas the remaining regions are barely halfway towards the agreed target. It is also clear that the balance between the areas protected varies a lot between coastal waters, where there is a high degree of protection, and the less-extensively protected areas of territorial and offshore waters (Table 7.1; Figure 7.1).

In general, the coastal zone (less than one nautical mile from the coast of a country) has a high level of protection with an EU average of 33 % inside a protected area. The coastal zones between 1 and 12 nm from the coasts of EU Member States are also meeting the globally agreed targets with 10 %. However, the larger part of EU waters lies between 12 and 200 nautical miles offshore, and unfortunately, less than 2 % of this is covered by Natura 2000 sites. The exception to this is the Mediterranean, for which national jurisdiction in general only extends as far as 12 nautical miles from the coast as no EEZ has been agreed upon. This means that a large part of the Mediterranean is considered as High Seas, and is therefore not covered by the protection schemes offered by Natura 2000 legislation.

The explanation for the gap in offshore Natura 2000 designations is probably several-fold, but three main reasons are apparent. Firstly, offshore designations had generally been put on hold until the court case against the United Kingdom on the geographical extent of the Habitats Directive was resolved in 2005. This court case concluded with the judgement that the Habitats Directive should be implemented within the entire EEZ, extending as far as 200 nautical miles from the coast. Secondly, the Habitats Directive covers a limited number of marine habitat types. This makes it difficult to designate larger offshore MPAs on the basis of habitat types. However, it remains possible to designate large offshore MPAs on the basis of species protection. Thirdly, our knowledge of the distribution of benthic habitats in deeper, offshore

([20]) Marine regions are used according to the definitions of the Marine Strategy Framework Directive, as these have been defined according to marine biogeographic patterns. Marine biogeographic patterns are not the same as terrestrial biogeographic patterns, hence the need for Natura 2000 biogeographic regions. This decision has been made partly because it reflects an ecosystem-based approach and partly to support MSFD article 13 processes.

Figure 7.1 Progress in the proposal and designation of marine Sites of Community Interest (SCI) in Europe (left), and number of offshore SCIs (right)



Source: Natura 2000 database, December 2011.

waters is, despite huge efforts by individual Member States, still patchy. Extensive surveys need to be conducted on an area before it can be designated. This makes a formal designation process difficult and costly compared to surveys in coastal waters or on land.

Besides the differences between the marine regions in terms of area protected under Natura 2000, significant differences also exist between Member States. Only 0.1 % of the waters within the huge Portuguese EEZ are protected compared with 45.2 % of German national waters (Figure 5.4). However, through cooperation with OSPAR, Portugal has managed to establish four large protected areas in the High Seas. These are not Natura 2000 sites.

7.4 The Marine Strategy Framework Directive

The EU Marine Strategy Framework Directive is an example of how our understanding of nature conservation policy has changed over the last 20 years. Moving away from a species-specific focus, it aims to implement a whole-ecosystem-based approach to the management of human activities in the marine environment in order to achieve good environmental status for European marine waters.

The Directive's purview encompasses all organisms present in the marine environment, and all human activities influencing them.

One measure for achieving good environmental status that the Directive identifies is the establishment of a representative and coherent network of Marine Protected Areas. These MPAs should adequately cover the diversity of the constituent ecosystems together with existing MPAs, such as those designated under the Natura 2000 directives, the Regional Sea Conventions or as part of national initiatives. The Directive thus implies that something more comprehensive than the existing marine MPA network (in its current form of implementation) is needed, in order to deliver representative and ecological coherent networks of MPAs.

Another provision of the Directive is a requirement for Member States to coordinate efforts with states with which they share a marine region. The MSFD could thus provide a good opportunity for EU Member States and the Regional Sea Conventions to advance European marine nature protection by merging the Natura 2000 process with a more holistic approach, such as is being implemented in British marine waters (see below). Coherent networks in the waters of neighbouring countries would strengthen national designations, creating

mutual benefits for each Member State and the environment as a whole.

Technical and administrative constraints need to be addressed if such a process is to be successful. National marine designations should be made available by being shared through the CDDA, as there is presently no obligation to do so. In addition, existing reporting processes of the MSFD Marine Regions and sub-regions should be harmonised with the reporting processes for the biogeographic regions of the Habitats Directive. Sharing of experiences is also vital: species do not respect any administrative boundaries, and when striving to apply an ecosystem-based approach to management neither should our measures.

It is important to emphasise that spatial protection measures are just one tool. Other measures such as ensuring less physical disturbance of the seafloor as well as reducing nutrient loads, hazardous substances, and marine litter are also necessary to achieve healthy European Seas. Marine Protected Areas, whether they are Natura 2000, Marine Conservation Zones or some other designation, only help to safeguard specific ecosystem components, and perhaps increase overall resilience to climate change. They are not enough in themselves to halt the loss of marine biodiversity by 2020.

The MSFD thus provides a new opportunity to take the necessary measures to strengthen our MPA networks, and at the same time deal with pressures within and outside MPAs. However, implementing the MSFD will require Member States, environmental managers, and nature conservationists to overcome existing administrative traditions, and combine their efforts with new management practices under the MSFD. It will also require cooperation with the upcoming Common Fisheries Policy. By linking legislative tools and management practices, our chance to halt the loss of marine biodiversity will increase.

7.5 The challenge ahead: ecologically coherent MPA networks

As our knowledge of the seas has improved, our approach to marine nature conservation has changed. Marine conservation has broadened its scope, moving away from a focus on single species or species groups and towards the inclusion of marine habitats. In recent years, the scope has become even broader, including entire marine ecosystems.

But has this broader scope led to more ecologically coherent protected areas that protect areas rich in biodiversity or areas that are especially vulnerable to disruption by human activities? Comprehensive assessments of the ecological coherence of MPA networks has been completed for the Baltic Sea marine region (Andersson et al., 2008; HELCOM 2010), the north-east Atlantic Ocean (OSPAR, 2006; OSPAR, 2011) or parts hereof (Anon, 2010), and the western Mediterranean Sea (Cameron and Askew, 2011).

From these assessments of European waters two general observations are emerging. Firstly, inshore coastal waters have a better coverage of MPAs than further offshore. This conclusion supports the above analysis of the Natura 2000 network. Secondly, and as demonstrated for the western Mediterranean (Cameron and Askew, 2011) and the Baltic Sea (Al-Hamdani and Reker, 2008), habitats that are not recognised in Annex 1 of the Habitats Directive, such as mud habitats or sand/gravel habitats are significantly less well-protected than habitats that are mentioned in the Habitats Directive. Assessments made by the Regional Sea Conventions reach similar conclusions, arguing that more efforts are needed for existing MPA networks to be considered representative and ecologically coherent. Some Member States have responded to these findings. For example, the United Kingdom has initiated the Marine Conservation Zone Project and the Scottish Marine Protected Areas project (through 'The Marine and Coastal Access Act' 2009, and the Marine Scotland Act 2010 respectively). The aim of these projects is to design and designate an ecologically coherent network of MPAs to protect the full range of wildlife in the marine waters around the United Kingdom. These MPAs will be called Marine Conservation Zones (MCZs) in England and Wales, and Marine Protected Areas in Scotland. They will complement the existing MPA network coverage of European marine sites under the Natura Directive (SACS and SPAs).

For English waters, four regional projects initiated by the UK Government have identified a range of potential new Marine Conservation Zones (rMCZs). In the Irish Sea, 16 potential new sites covering 3 962 km^2, or 22 % of the project area, have been identified (JNCC/NE, 2011a). For the south-west of England, it could result in an increase in MPA area from the existing 3 174 km^2 to a potential of 19 078 km^2, covering 20.1 % of the total project area (Lieberknecht et al., 2011). For the south-east of England, 31 potential new sites were identified, covering a total of 4 213 km^2, or approximately 22.5 % of the total area (JNCC/NE, 2011b). Lastly, for

the North Sea, a potential 18 recommended MCZs covering a total of 12 594 km^2, or approximately 30 % of the area has been identified as potential MCZs (JNCC/NE, 2011c). The identification of sites is based upon a mixture of scientific guidance and strong involvement from stakeholders such as fishermen, leisure groups and shipping companies. At this stage, the resulting sites are still only under recommendation, and no final decision on actual designation has been made yet. These initiatives are supported by similar projects in Welsh and Scottish waters. It is thus premature to estimate the exact coverage of MPAs in UK waters.

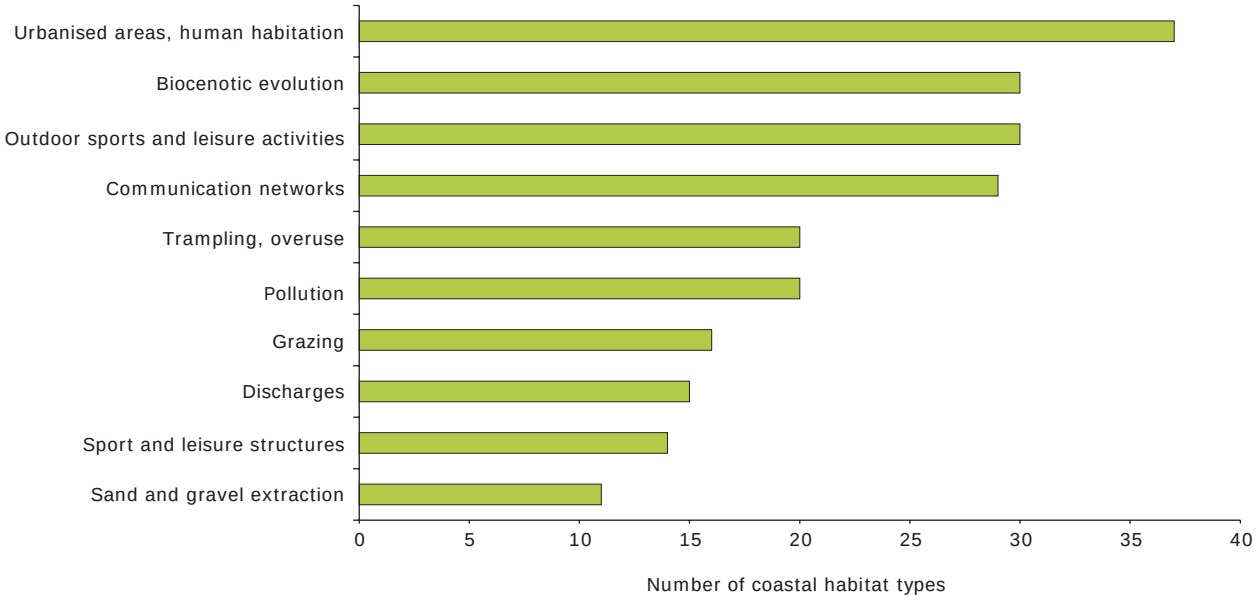
In conclusion, some Member States, like Belgium, Germany and Poland, have chosen to designate large areas under the umbrella of Natura 2000, whereas others, like France and the United Kingdom, have designated large areas using a mixture of international and national law in order to achieve an ecologically coherent network. Both approaches help achieve the CBD target and assist the efforts to halt the loss of marine biodiversity by 2020. However, in order to provide concise input to EU Policies like Horizon 2020, it would be very helpful if national marine designations were also reported to the CDDA in order to support EU policy advice and experiences shared among Member States sharing the same marine region.

7.6 Assessing the effectiveness of MPAs

At present, it is difficult to make an assessment of the management effectiveness of current protection schemes. No coherent objective information on management schemes or monitoring programmes of MPAs has been reported on a European level. There are also no agreed classification schemes for the protection level of individual sites such as the IUCN categories used for classification of terrestrial sites. For these reasons, we will not discuss the management of MPAs in depth, and only a few good examples will be presented.

In general, many different human activities are allowed inside MPAs, ranging from commercial fisheries to leisure activities. Combined with more diffuse pressures from hazardous substances and climatic change, these all add to the cumulative pressures occurring within the individual MPA. The most frequently reported pressures for Natura 2000 habitat types are pollution, outdoor sports and leisure activities, commercial fisheries and so-called 'biocenotic evolution', or changes in the composition of species within a habitat type (invasion by a species is the most often reported pressure). For marine species, the most frequently reported pressures are pollution and commercial fisheries (Figure 7.2).

Figure 7.2 Ten most frequently reported pressures by Member States for marine species according to 2001–2006 Article 17 reports under the Habitats Directive



Note: The pressures listed above were reported by at least 40 % of the countries where the habitat type occurs

In contrast to these multiple-use MPAs in the Natura 2000 network, it has been estimated that less than 1 % of European MPAs can be considered 'strict' reserves, where extensive limits are placed on human activity. This low number is despite the proven effects of reserves on biomass, age distribution, improved number of species inside the reserve and average size (Fenberg et al., 2012).

Some reserve management practices go beyond simply establishing no-take reserves and actually restore parts of the marine ecosystem. One such example is the LIFE funded BlueReef project (Box 7.1).

Besides individual restoration efforts inside specific Natura 2000 sites, more holistic management approaches are also appearing. These efforts aim to combine nature conservation with sustainable use of natural resources through the cooperation of authorities and local stakeholders, all in the context of international protection schemes and agreements. One such example is the Marine National Park of the Iroise Sea (see Box 7.2).

Such initiatives, whether focusing on a single reef area or spanning a large sea area, show that our understanding of the marine environment has changed. It is no longer perceived as being an inexhaustible resource and is now seen as an exhaustible, vulnerable and sensitive natural resource. This resource needs integrated management of the human activities it hosts in order to be sustained. Now that more and more marine regions are meeting the 10 % target, the focus of assessment will shift from the site designation process to evaluating whether Europe is actually getting the benefit from its network of MPAs. This will be considered both in terms of meeting the political ambitions for halting the loss of biodiversity, as well as in terms of maximising the potential socio-economic benefits of a coherent MPA network. While strict management measures could improve the benefits of specific sites, MPAs cannot deliver such ambitions on their own. Activities, pressures and impacts have to be addressed both within and outside MPAs. Such a holistic ecosystem-based approach is at the core of the Marine Strategy Framework Directive.

Box 7.1 Restoring cave-forming reefs in the Kattegat

The BlueReef project ran from 2006 to the spring of 2012, and aimed at restoring and maintaining favourable conservation status of offshore reef habitats and their associated species. The project had a total budget of EUR 4.8 million.

Denmark only has surface granite bedrock on the island of Bornholm. Historically, this has meant that mining for marine-related activities such as harbour jetties and coastal defence has often occurred on the cave-forming reefs in shallow waters. Conservative estimates suggest that by the time reef extraction was banned, approximately 34 km^2 of cave-forming reef had been extracted, with only 5–10 hectares of shallow cave-forming reefs left in Danish waters. Cave-forming reefs in general have a very high biodiversity per area unit, and also function as spawning grounds, juvenile areas, and feeding grounds for many species. The Danish government therefore decided to restore such habitats in a shallow area in the Kattegat, known as Læsø Trindel, located 12 km offshore from the island of Læsø. Læsø Trindel is a Natura 2000 site designated according to the Habitats Directive.

The project has restored 6.5 ha and stabilised another 6 ha of cave-forming reefs. This effectively doubles the amount of shallow cave-forming reef area in the inner Danish waters. The restoration of the reef has been carried out with approximately 60 000 m^3 of quarry rock (from Norway) of various sizes, each weighing between 1–6 tonnes. It is considered the first large-scale marine nature restoration project in Denmark.

The restored site in Kattegat will provide a significant contribution to maintaining the populations of species that are dependent on the cave-forming boulder reef in Danish waters. It will also function as a crucial steppingstone within a marine corridor, linking sites within the Natura 2000 network, as well as being a sanctuary for donor populations (i.e. populations that can colonise other areas).

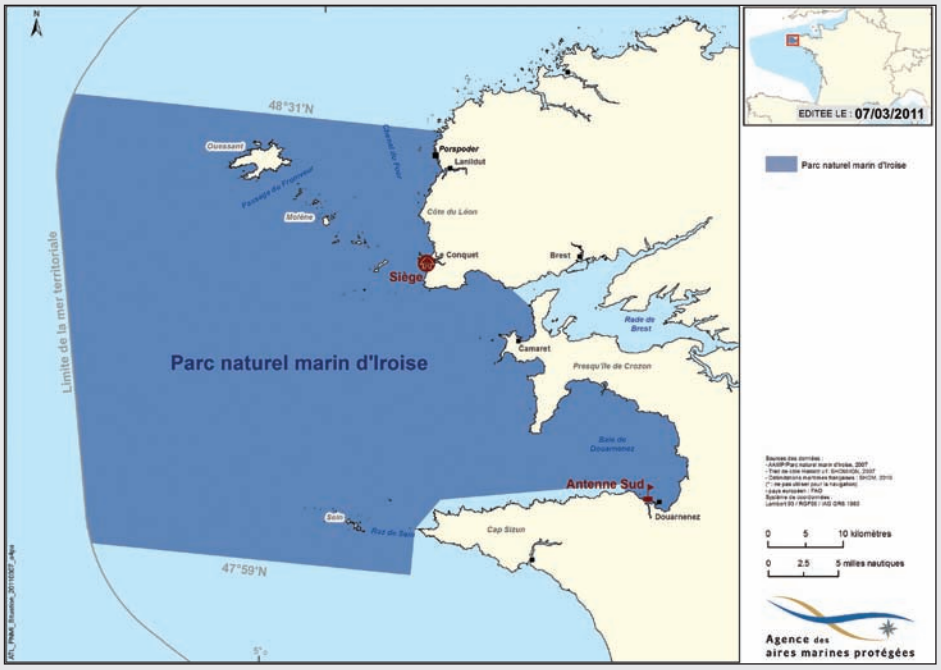
The BlueReef project is run by the Danish Nature Agency in cooperation with the University of Aarhus, and the National Institute of Aquatic Resources, Technical University of Denmark.

Source: www.naturstyrelsen.dk.

Box 7.1 The Marine Natural Park of the Iroise Sea

The Iroise Marine Natural Park was created in 2007 off the coast of Finistère between the islands of Ushant, Molène and Sein, and the coasts of the Crozon headland and Douarnenez. The legal category of the Marine Natural Park was created only in April 2006.

Map 7.3 Boundaries of the Marine Natural Park of the Irose Sea



The Iroise Marine Natural Park is a remarkable area boasting outstanding natural resources and rich biodiversity such as marine mammals, birds and dozens of species of algae. In addition to being listed as a marine nature park, it is also a Marine Protected Area under the Oslo-Paris convention (OSPAR), and a UNESCO biosphere reserve. A large part of it is also listed under the European Habitats and Birds Directives (Natura 2000 Directives).

The Iroise Marine Nature Park is not a mere technocratic framework: it relies on the long-term involvement of elected representatives in the Iroise, government departments, sea professionals, and civil associations, all of whom contribute to its operation. The management council of the Iroise Marine Nature Park is responsible for governance of the area and the implementation of its management plan.

The management plan details management actions to protect the area. These actions and measures are structured around four main themes:

- Improving knowledge of the marine environment and uses;
- Strengthening controls at sea;
- Adapting supervisory measures to the challenges of the Iroise marine environment;
- Facilitating the technical or financial project support measures that contribute to achieving the management plan objectives.

Beyond these management measures, the legislation places great emphasis on the responsibility for good management of the Iroise Sea. Thus, the management council is also required to express its opinion on activities that could significantly alter the marine environment of the Park (*).

Note: * Paragraph 5, Article L334-5 of the French Environmental Code.

Source: Extract from the Management Plan Summary 2012–2025, Pierre Maille, Chairman of the management council.

7.7 Conclusions

From this dive into marine waters it appears that the implementation of the Natura 2000 network has significantly changed the picture of marine protected areas in the national waters of the EU Member States by increasing the area dedicated to biodiversity conservation in these waters.

Adding to this success is the fact that the Baltic Sea region has reached the globally agreed targets of protecting at least 10 % of marine waters. And in the coastal waters of all regions (the waters less than one nautical mile from the coast) this target has not only been reached, it has been greatly exceeded (average 32 %). For territorial waters in the EU (those areas from one nautical mile to 12 nautical miles from the coast), the 10 % CBD target has also just been met. However there are significant differences between northern and eastern waters on the one hand and south-western European waters on the other. For offshore waters (areas beyond 12 nautical miles from the coast) no regions manage to get even halfway to 10 % coverage, leaving protection of EU offshore waters the single largest gap in the Natura 2000 network.

National MPA designations contribute to the area covered by the Natura 2000 network. But due to gaps in the information available in the CDDA, it is not possible to provide a quantitative estimate of the extent of this contribution. The current European network of Marine Protected Areas cannot be considered to be either ecologically coherent or representative of the European marine ecosystems and their habitats.

The conservation status of both marine habitats and species targeted by the Directives remains poor. Only 10 % of the assessments of the marine habitat types and 2 % of the marine species were favourable. The conservation status reports also revealed a particularly large gap in knowledge of marine ecosystems: over 40 % of the habitat assessments and over 70 % of species assessments were considered unknown.

Within the national waters of the EU Member States, there is a very high overlap between Natura 2000 designations and designated areas under the Regional Sea Conventions. At the same time, the national waters of the EU member States only cover 54 % of the area covered by the regional seas surrounding Europe, and even less if the High Seas are considered. In order to achieve an ecologically coherent and representative network of MPAs, strong regional cooperation within the regional sea conventions remains essential. This is especially true for the Mediterranean and Black Sea, where most of the countries sharing the waters are not members of the EU. It is also the case in the north-east Atlantic where approximately 40 % of the OSPAR Maritime area is covered by High Seas that are not subject to the Natura 2000 legislation.

In conclusion, while good progress has been made in terms of designating Natura 2000 areas, significant challenges still remain if the European Union and its Member States are to halt the loss of marine biodiversity by 2020. These challenges are:

- **Assessing effectiveness:** in order to evaluate the effectiveness of the European Marine Protected Area network and its management, improved efforts on assessing and reporting on the conservation status for marine habitats and species are needed.

- **Delivering ecological coherence:** the marine Natura 2000 network will not in its current form of implementation be able to deliver an ecologically coherent and representative network of MPAs. This is because it leaves significant elements of the marine ecosystem outside the Natura 2000 protection schemes. These elements include habitats (for example most muddy and deep sand/gravel habitats), as well as functional groups of species, such as fish.

- **Combining multiple approaches:** combining the current Natura 2000 measures with efforts under the MSFD could provide an opportunity to designate a coherent and representative network of MPAs by 2020. It would make it possible for Europe to meet the Aichi target (which is the same as the new EU biodiversity strategy 2020 target) of protecting 10 % of its marine waters. It will require a more holistic, ecosystem-based approach to preserving and protecting marine biodiversity rather than focusing on a few habitats and species.

- **Involving national authorities:** in order to achieve well-managed networks of MPAs in the European Seas, it is essential that National Authorities fulfil their protection responsibilities. In areas where activities cannot be regulated nationally, these national authorities must identify and contact the Competent Authorities, such as the IMO for maritime transport and the Common Fisheries Policy.

Europe is standing at a crossroads. It must decide whether to truly protect the marine ecosystem and

its constituent parts, or to continue to focus on specific areas and parts of the ecosystem. The choice we make now will define the legacy of the first 20 years of the new millennium.

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8 Assessments related to protected areas

Chapter summary

As indicated at the beginning of this report, while quantitative data are increasingly available on European protected areas, there is a lack of qualitative assessments. Such qualitative assessments could study the effectiveness of protected areas in protecting targeted species or habitats, or the representativeness of a network of protected areas. A representative network is one that includes in its sites a sufficiently large and diverse sample of the species and habitat types targeted by the network. But qualitative assessments could also investigate the degree of acceptance of protected areas by local populations/stakeholders, and the willingness of these stakeholders to participate in the governance of these protected areas. Furthermore, these assessments could ascertain the contribution of protected areas to raising public awareness of biodiversity.

This chapter looks at some of the qualitative assessments of protected areas that have so far been conducted. In **Section 8.1**, we look at the Convention on Biological Diversity's Programme of Work on Protected Areas and the impetus it has given to both assess more protected areas and to create new methodologies for these assessments. In **Section 8.2**, we briefly discuss some initiatives by national governments to assess protected areas on a Member State basis. In **Section 8.3**, we give a brief précis of recent academic assessments of protected areas.

High Tatras National Park, Natura 2000 site, Slovak Republic

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The Cuillins Natura 2000 site, Isle of Skye, Scotland, United Kingdom

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8.1 The CBD and new methodologies for assessing protected areas

Qualitative assessments of protected areas can be made a part of countries' national strategies in response to policy commitments such as national biodiversity strategies, or commitments to the Convention on Biological Diversity. Progress towards realising such assessments has been made after the CBD Programme of Work on Protected Areas with Contracting Parties committed itself in 2004 to take action and to report on 16 goals divided across four elements (as shown in Table 8.1).

One of the suggested actions to achieve goal 4.2 is to ensure that 'more than 30 % of the world's 120 000 protected areas should be assessed by 2010 (terrestrial) and 2012 (marine), respectively'.

Table 8.1 Elements and goals of the CBD Work Programme on Protected Areas

1) Direct actions for planning, selecting, establishing, strengthening, and managing, protected area systems and sites	
Goal 1.1:	To establish and strengthen national and regional systems of protected areas integrated into a global network as a contribution to globally agreed goals
Goal 1.2:	To integrate protected areas into broader land- and seascapes and sectors so as to maintain ecological structure and function
Goal 1.3:	To establish and strengthen regional networks, transboundary protected areas (TBPAs) and collaboration between neighbouring protected areas across national boundaries
Goal 1.4:	To substantially improve site-based protected area planning and management
Goal 1.5:	To prevent and mitigate the negative impacts of key threats to protected areas
2) Governance, equity, participation and benefit-sharing	
Goal 2.1:	To promote equity and benefit-sharing
Goal 2.2:	To enhance and secure involvement of indigenous and local communities and relevant stakeholders
3) Enabling activities	
Goal 3.1:	To provide an enabling policy, institutional and socio-economic environment for protected areas
Goal 3.2:	To build capacity for the planning, establishment and management of protected areas
Goal 3.3:	To develop, apply and transfer appropriate technologies for protected areas
Goal 3.4:	To ensure financial sustainability of protected areas and national and regional systems of protected areas
Goal 3.5:	To strengthen communication, education and public awareness
4) Standards, assessment and monitoring	
Goal 4.1:	To develop and adopt minimum standards and best practices for national and regional protected area systems
Goal 4.2:	To evaluate and improve the effectiveness of protected areas management
Goal 4.3:	To assess and monitor protected area status and trends
Goal 4.4:	To ensure that scientific knowledge contributes to the establishment and effectiveness of protected areas and protected area systems

Such an evaluation will be undertaken by the protected area managers and agencies in order to answer some or all of the following questions:

1) Are the management aims being achieved or could progress toward these aims be improved?

2) How can the effectiveness of management be assessed?

3) How can the required resources be secured?

4) How can management of protected areas secure the support of stakeholders? (Stolton, 2008).

In order to answer these questions, a number of assessment methodologies have been developed and are being applied, both at the European and national level. These methodologies include Rapid Assessment and Prioritization of Protected Area Management (RAPPAM), Management Effectiveness Tracking Tool (METT), and Integrative Protected Area Management Analysis (IPAM). A survey performed by Leverington et al. (2010) identified 40 different methodologies in use across Europe to assess protected area effectiveness. The more specific *Tool on Conservation Measures* was recently developed with support from the European Commission in order to appraise the economic impacts of conservation measures. It will also assess how conservation measures in Natura 2000 sites can influence ecosystem goods and services. This tool describes a process for carrying out an economic valuation of changes in ecosystem goods and services arising from those conservation measures, and was tested in some Natura 2000 sites (ARCADIS et al., 2011).

For its part, the World Commission on Protected Areas of the IUCN is currently working on the establishment of a 'Green List', a set of performance indicators to assess the management of individual protected areas.

Recently, the EU Member States reviewed and approved new formats for reporting under the

nature directives. The updates include additional information on the management of the Natura 2000 networks, as well as on the conservation measures implemented. The updated formats also require a broad evaluation of the management of Natura 2000 networks. This information will be available after delivery of the national reports in 2013.

8.2 National assessments of protected areas in Europe

Countries are currently in the process of reporting to the CBD Secretariat on progress in the implementation of the PoWPA. However, with regards to goals 4.2, 4.3 and 4.4, a number of initiatives are already known from a number of countries:

- In 2007–2008, the governments of Albania, Bosnia and Herzegovina, Croatia, Montenegro and Slovenia collaborated with WWF on a regional implementation of the CBD Programme of Work on Protected Areas. The basis of this implementation was the RAPPAM methodology (Rapid Assessment and Prioritisation of Protected Areas).

- In the Czech Republic, the first assessment of the protected areas network was carried out in 1962–1965, and it was repeated in 1982–1985. In 2002–2005, an assessment was completed in preparation for the proposal of Sites of Community Interest under the Habitats Directive, as the country prepared to join the European Union in 2004. A new assessment of the protected areas network is currently being prepared.

- In France, a Strategy for the Creation of Protected Areas is being implemented with the aim to ensuring that 2 % of the land territory is covered with strict national designations by 2020. To assist in this purpose, a gap analysis was performed by the *Muséum national d'Histoire naturelle*, to identify species and habitats for which France has an international responsibility, and for which protection through site designation is relevant but currently insufficient.

- In Germany, criteria and evaluation procedures were set up by the Federal Environment Ministry (BMU) in 2008 for all major protected areas, i.e. national parks, biosphere reserves and nature parks. Effectiveness assessments have revealed that often the landscape quality of 'nature parks' in Germany does not significantly differ from other unprotected landscapes (Leverington et al., 2010; Nolte et al., 2010). One reason is the relatively weak protection status of large parts of nature parks such as 'landscape protection areas' (Ellwanger et al., 2010). Aggregated analyses are clearly missing on the status of more than 8 000 'nature reserves' in Germany. These 'nature reserves' seem to be underrepresented in some federal states in Germany, and 'national parks' cover only 0.5 % of Germany's terrestrial area, amongst the lowest level of national park cover in Europe (Scherfose, 2011).

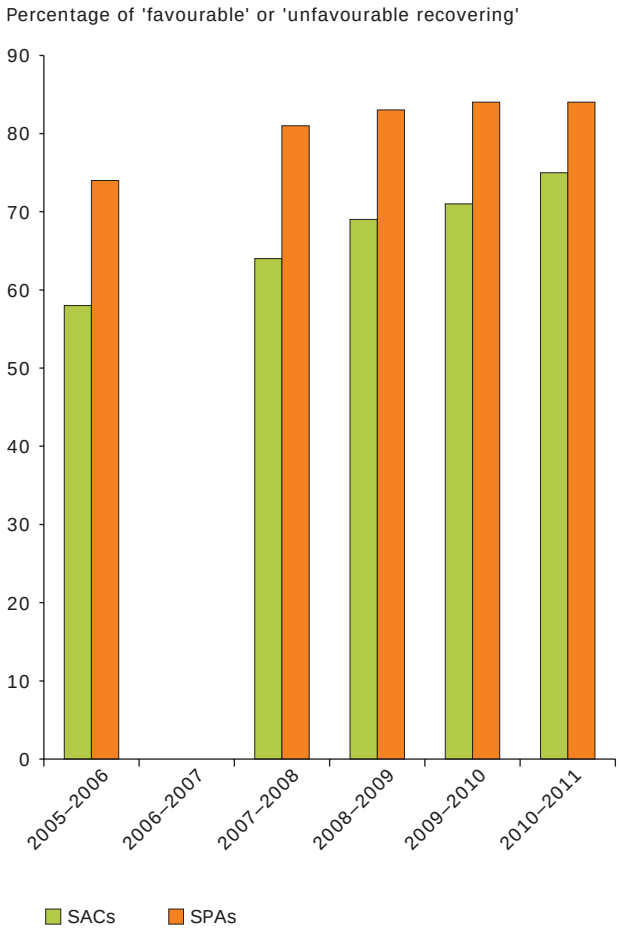
- In Slovenia, as well as the RAPPAM assessment performed as part of the Dinaric Arc network mentioned above, a project called *Designing an efficient system of protected areas in Slovenia* was implemented by the University of Primorska. Overall, 78 % of the surface area of Slovenian protected areas has been assessed.

Südost-Rügen UNESCO Biosphere Reserve and Natura 2000 site, Isle of Vilm, Germany

- As part of a UNDP project, the Turkish Ministry of Environment and Urbanisation has launched a programme called *Strengthening the System of Marine and Coastal Protected Areas of Turkey*. The project aims to facilitate expansion of the national system of marine and coastal protected areas and improve its management effectiveness.

- Since 2005 in the United Kingdom, indicators have been put in place to regularly assess the Special Sites of Scientific Interest (SSSIs), as well as the Natura 2000 sites (most of which are also SSSI) across the country. Four assessments have been published during the period 2005–2010, showing a slight but regular increase in the percentage of protected areas in 'favourable' or 'unfavourable but recovering' condition (Figure 8.1).

Figure 8.1 Cumulative proportion of Areas of Special Scientific Interest (Northern Ireland) and Sites of Special Scientific Interest (England, Wales and Scotland) in 'favourable' or 'unfavourable recovering' condition



Note: SACs — Special Areas of Conservation under the Habitats Directive; SPAs — Special Protection Areas under the Birds Directive.

Source: Adapted from JNCC, 2012.

8.3 Assessments of protected areas in academic research projects

An extensive analysis made by Gaston et al. (2008) critically assessed the way protected areas have been implemented in Europe against what is recognised by scientists as systematic conservation planning. The analysis looks at six main components: 1) compilation of biodiversity data, 2) identification of conservation goals, 3) review of existing protected areas, 4) selection of additional protected areas, 5) implementation of conservation actions, and 6) maintaining the values of protected areas. This study concluded that: (i) the availability of biodiversity data at the right scale remains a significant constraint on conservation planning; (ii) explicit quantitative goals for the representation and persistence of biodiversity are largely lacking; (iii) assessment of the effectiveness of existing protected area systems is patchy and not well developed; (iv) despite the above limitations, there has been a significant programme aimed at selecting additional protected areas, especially through the Natura 2000 process; (v) this programme, although taking much more time than foreseen is resulting in a substantial expansion of the protected areas system; (vi) there are major concerns about the capacity of existing protected areas to maintain their biodiversity values, mainly due to their small size and the likely impacts of climate change. The Gaston survey also makes use of a large number of scientific and policy papers related to these steps.

Most recent scientific assessments in terms of gap analysis and effectiveness of protected areas, (including within the context of large environmental changes), have been focused on Natura 2000. A selection of these is listed below:

- Through its programme of biogeographical seminars, the Habitats Directive already identifies gaps in national proposals for Sites of Community Interest (Evans, 2012). But the network has also been the subject of study by other groups. Typical recent papers examine the Natura 2000 network in relation to butterflies in Slovenia (Verovnik et al., 2011). This study concluded that Natura 2000 sites in Slovenia cover the majority of areas with high diversity, and also cover the distribution of all but one

Box 8.1 An NGO initiative to foster coordinated public action towards an efficient network of protected areas in the Mediterranean Sea

In 2011, the NGO Oceana completed a survey to assess the possibility of a comprehensive network of Marine Protected Areas for the Mediterranean Sea. This proposed network, called 'Oceana MedNet', includes 100 sites distributed throughout the Mediterranean, and covering over 200 000 km^2. Recalling countries' commitments to CBD goals and targets, Oceana argues that the current network of MPAs in the Mediterranean is neither representative nor coherent, being mostly concentrated in coastal areas (except for the 87 500 km^2 sanctuary in the Ligurian Sea) and the basin's northern shore. This leaves the high seas and the southern shore completely unprotected. Oceana's proposed sites aim to cover those gaps.

The sites for Oceana MedNet were selected systematically using the most important seamounts (mountains rising from the seabed) as reference points. The network was further complemented by the addition of other areas considered especially important in the Mediterranean due to exclusivity, productivity, vulnerability, biodiversity or presence of endangered or threatened species.

According to Oceana, 'despite being considered one of the planet's most important areas for marine biodiversity, the Mediterranean (2 500 000 km^2) is practically in the same state as the rest of the world's seas, and currently only 4 % of its area is protected. By adding the proposed area to the existing MPAs, 12 % of the Mediterranean would be protected, slightly exceeding the minimum of 10 % established by the CBD'.

threatened butterfly species. Another recent study looked at the effect of Natura 2000 sites on wetland species across Europe (Jantke et al., 2011). This study evaluated the performance of the Natura 2000 network in covering endangered wetland vertebrate species, and concluded that only two species were fully covered, 61 other species were somewhat covered, and seven species would need additional areas to cover their minimum area and/or habitat requirements).

- Most studies compare the Natura 2000 sites against data on the distribution of the target species or habitat(s). The simplest type of studies is gap analysis, which examines the network to see if all the target species/habitats are covered by the network (Jeenings, 2000). The extent to which a target species or habitat is covered by a network is dependent on the spatial scale used in the study. Most published studies are at a national scale.

- Some studies have a more ecological perspective, and consider aspects of connectivity and coherence. For example, Johnson et al. (2008) examined the connectivity of protected marine sites in the Atlantic, and suggested that the mean distance between sites was too great for species with small dispersal ranges.

- Authors such as Mariorano et al. (2007) highlight the over-representation of protected sites in highland areas as compared to lowland areas.

- The Habitats Directive aims to protect both habitats (listed in Annex I of the Directive) and species (listed in Annex II of the Directive). Several papers examine how the Natura 2000 network helps protect non-target species. This is important, because the annexes cannot include all species of concern, because many species are still not described by science. Several of the invertebrates listed on Annex II of the Habitats Directive were selected in order to try to protect groups of organisms sharing a given habitat. For example, listing species such as the beetles *Lucanus cervus* and *Osmoderma eremita* should help many other species dependent on old and decaying trees. Similarly, moves to protect the 231 habitat types in Annex I of the Habitats Directive, should not only protect the species in Annex II, but should also protect many non-Annex II species. A study of dung beetles (Copris species) in the Iberian Peninsula found that Natura 2000 protected these species better than the sites designated under national legislation. This is even though no dung beetles are listed on Annex II (Chefaoui et al., 2005). Similarly, Martínez et al. (2006) found that the Natura 2000 network in Spain comprises sites that represent most of the threatened species of lichen, although improvement would be possible. However, inclusion in the network (whether a species is named in the Annex, or the species simply happens to be found within a protected area) does not necessarily protect these species unless appropriate management measures are undertaken.

Box 8.2 Positive effects of Natura 2000 site designation on 'ordinary' nature in France

A recent survey in France (Pelissier et al., 2012) investigated the extent to which the Natura 2000 network contributes at a national level to the wealth of common bird species and bats. In essence, the study aimed to discover whether Natura 2000 has 'secondary effects' on 'ordinary' biodiversity beyond its main objective to ensure favourable conservation status of species and habitats of Community interest, i.e. species and habitats mentioned in the Directives. The main results of this survey are that:

- For many common bird species, their population is more abundant within Natura 2000 sites than outside.
- Within Natura 2000 sites, bird species communities are more 'specialised' than bird species communities outside Natura 2000 sites. 'Specialised' bird types are birds that consume a narrower range of foodstuffs. 'Non-specialised' bird species are those that will eat a far wider array of food types.
- Within Natura 2000, bird species communities are also more 'functional' than bird species communities outside Natura 200 sites. 'Functional' bird species are those that play a more critical role within an ecosystem. The decrease of functional bird species would ordinarily have greater knock-on effects in an ecosystem than a similar decrease in non-functional or 'generalist' species.
- Across Europe, both inside and outside Natura 2000 sites, there has been an overall increase in generalist species, indicating the homogenisation of landscapes. However, this trend towards generalist species has recently levelled off in Natura 2000 sites.
- Bat numbers are greater within Natura 2000 sites than would have been expected randomly.

- An alternative approach was used by Donald et al (2007), who assessed the functional response of bird populations to conservation measures (i.e. Natura 2000) rather than merely looking at a proportion of populations included within the network. Results of the assessment showed that the species targeted by Annex I of the Birds Directive had benefited from sites designated under this directive.
- Other surveys, such as by Cantarello et al. (2008) and Wätzold et al. (2010) investigated respectively cost-effective indicators to assess the conditions for maintaining and restoring habitats in a favourable conservation status, and the cost-effectiveness of Natura 2000 site management. The first study suggests that it may be difficult to develop a general EU approach to monitor Natura 2000 sites, and that it would be better to develop a framework that could be tailored to the specific needs and characteristics of individual sites. The second study investigated the cost-effectiveness of the design and implementation of management measures in Natura 2000 in four countries. It makes recommendations for improving the cost-effectiveness of management in the network sites (e.g. guaranteeing the availability of funds for longer periods, ensuring an appropriate allocation of funds between activities, etc.)

There have also been several studies at the global level, looking at the contribution of protected areas to the maintenance of biodiversity. A recent paper by Butchard et al. (2012) examined areas of comparable biodiversity both within and outside protected areas. The paper argues that species in sites with greater coverage by protected areas experienced smaller increases in extinction risk during the last decades than species in sites not so covered. For instance, the increase was a third lower for birds, mammals, and amphibians restricted to the protected 'Alliance for Zero Extinction' sites, compared with partially or totally unprotected sites of the same network.

8.4 Conclusions

As shown in previous chapters, there has been much progress in the designation of protected areas across Europe over the last decades. But only now are the tools to perform qualitative assessments of these protected areas becoming available. A European overview of protected areas is not yet possible.

This progress in designating protected areas is largely due to countries' commitments to

international frameworks, such as the CBD Programme of Work on protected areas. But for EU Member States, the implementation of the Natura 2000 network has also had a catalytic effect on revisiting pre-existing networks of protected areas, assessing their gaps, and providing a framework for the monitoring and assessment of their effectiveness in conserving species and habitats.

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