



Natura 2000 in the Alpine Region



**European Commission
Environment Directorate General**

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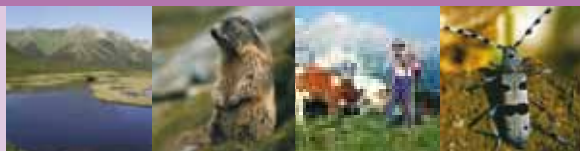
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On top of Kleinglockner mountain, Hohe Tauern National Park. Photo © Nationalpark Hohe Tauern

The Alpine Region

– the rooftop of Europe

Europe has several important mountain chains which stretch across the majority of the countries. Within the EU, seven of the longest and highest ranges have been included in the Alpine Biogeographical Region.

They comprise **the Alps** which lie at the heart of the European Union, **the Apennines** that run down the spine of Italy, **the Pyrenees** on the border between Spain and France, **the Scandes** which straddle Sweden, Finland and Norway, and **the Carpathians** that extend in an arch from Slovakia to Romania. With the Accession of Bulgaria to the EU in 2007, two new mountain ranges have been added to the Alpine Region. They are the **Balkan** mountain, and the **Rhodopes**.

Irrespective of their geographical location, all are characterised by a relatively cold and harsh climate, high altitudes and an often complex, varied topography. Forests and semi-natural grasslands envelop the lower slopes but, as the altitude increases and the temperature drops, trees become scarcer and eventually give way to alpine grasslands, fells and scrub heath communities. At the very top, amongst the rocks and snow, the vegetation is reduced to only a handful of highly adapted plants able to tolerate such extreme conditions.

Similar vegetation belts can be found on all mountain ranges within the Alpine Region but at differing altitudes. In the Scandes, for instance, the tree line is below 1,000 m whereas in the Pyrenees it is well above 2,000 m.

Because of their steep gradients, mountains have highly compressed latitudinal life zones. As a result, habitats and species alter rapidly with altitude. Moving 100 m upwards

in the mountains is equivalent to going 100 km north in the lowlands. The complex topography and differing exposures (sheltered south-facing slopes, snow pockets, wind-blasted crags and uneven rock screens...) also create a myriad of different micro-climates.

This helps explain why the Alpine Region has such a rich and diverse biodiversity. Almost two-thirds of the plants on the European continent are present here. The high peaks harbour many endemics whilst, on the lower slopes, species diversity is heavily influenced by its transition with other biogeographical regions and the long history of compatible human land uses. Altogether, 119 habitat types, 107 plants and 161 animal species listed in the Habitats Directive are found in the Alpine Region.

In terms of fauna, the area has become an important retreat for many species originally occurring in higher numbers in the lowlands. Large carnivores (wolves, bears, lynx) and raptors (eagles, falcons, vultures) have been drawn to the mountains because, unlike most other regions, they still harbour large unfragmented areas where human disturbance is limited.

There are also several true alpine specialists. They include species of rodents (eg snow vole, *Microtus nivalis*), ungulates (eg alpine ibex, *Capra ibex*) and many invertebrates. The Alpine Region is especially rich in beetles and butterflies: in Italy alone, around half of the butterfly species are found above the treeline.

In terms of human land-use and impacts, most mountain ranges are poorly populated, particularly above 1,000 m (or 500 m in the case of the Scandes) due to the harsh climate, difficult access and short growing seasons. Traditional pastoral farming practices have, nonetheless, been the mainstay of the mountain economy for centuries and have contributed further to the region's already rich biodiversity. These land uses are, however, now rapidly disappearing under the combined pressure of land abandonment and intensification.

Other more recent activities are also impacting on this particularly fragile environment. These include, amongst others, mass tourism, large scale afforestation and deforestation, the damming and channeling of alpine rivers and the construction of roads.

Climate change presents another major threat. Because of the tight ecological and climatic bands in the mountains a small change could have devastating effects on their ability to absorb and retain water. Already there is evidence that the glaciers are shrinking, if they diminish further one can expect significantly more drought in the lowlands and marked changes in vegetation in the mountains, particularly at the higher elevations.

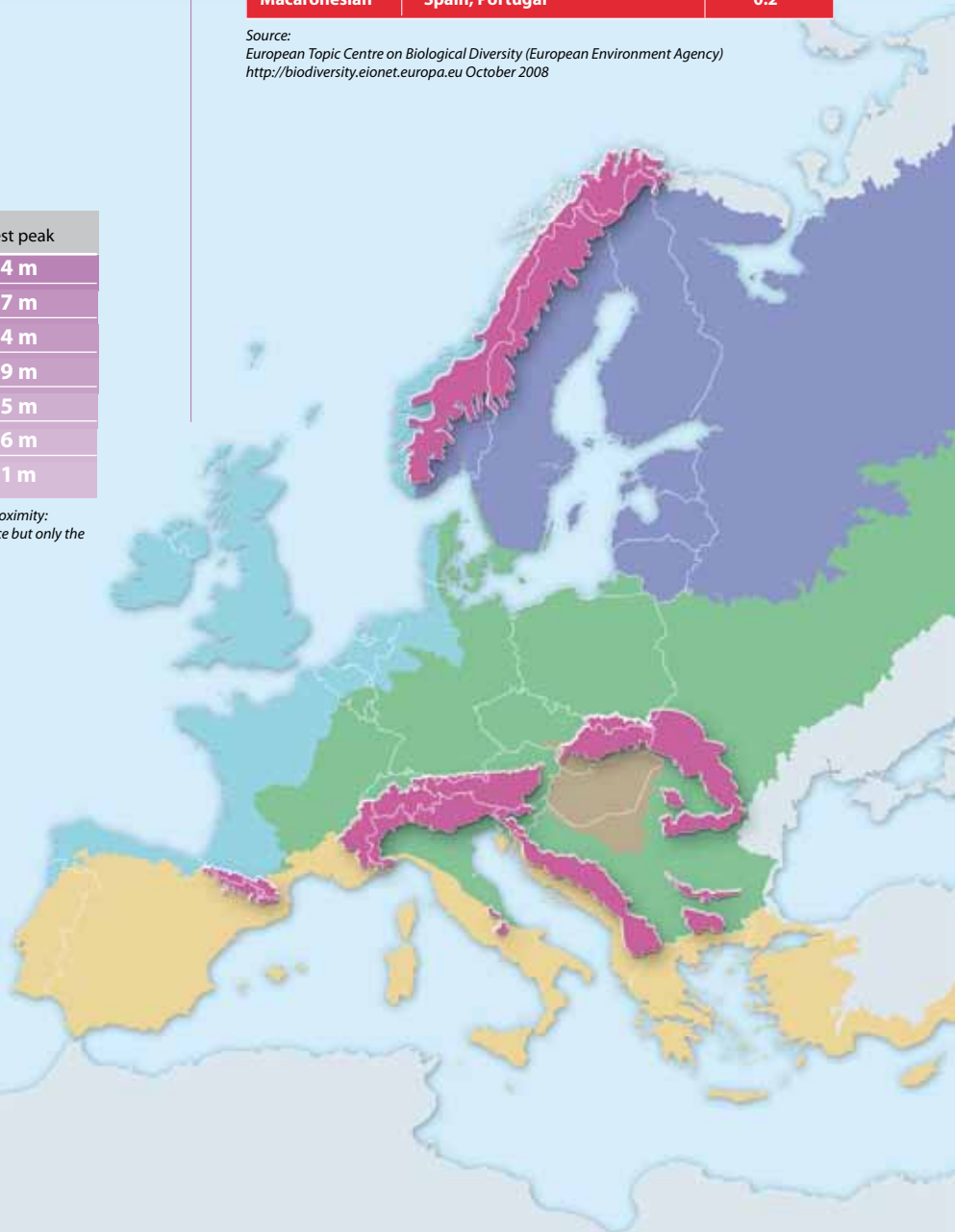
Region	Countries involved	% of EU territory
Atlantic	Belgium, Germany, Denmark, Spain, France, Ireland, Portugal, Netherlands, United Kingdom	18.4
Boreal	Estonia, Finland, Latvia, Lithuania, Sweden	18.8
Continental	Austria, Belgium, Bulgaria, Czech Republic, Germany, Denmark, France, Italy, Luxembourg, Poland, Romania, Sweden, Slovenia	29.3
Alpine	Austria, Bulgaria, Germany, Spain, Finland, France, Italy, Poland, Romania, Sweden, Slovenia, Slovakia	8.6
Pannonian	Czech Republic, Hungary, Romania, Slovakia	3.0
Steppic	Romania	0.9
Black Sea	Bulgaria, Romania	0.3
Mediterranean	Cyprus, Spain, France, Greece, Italy, Malta, Portugal	20.6
Macaronesian	Spain, Portugal	0.2

Source:
European Topic Centre on Biological Diversity (European Environment Agency)
<http://biodiversity.eionet.europa.eu> October 2008

Mountain ranges in the EU Alpine Biogeographic Region:

	Length of range	Highest peak
Pyrenees	430 km	3,404 m
Alps	1,200 km	4,807 m
Apennines	1,350 km	2,914 m
Scandes	1,400 km	2,469 m
Carpathians	1,450 km	2,665 m
Balkan	550 km	2,376 m
Rhodope	240 km	2,191 m

NB The Rhodopes consists of a massif with three mountains in close proximity: Rhodopes, Rila, Pirin. The first one continues over the border into Greece but only the Bulgarian section is included in the Alpine Biogeographical Region





The wooded slopes of le Canigou, eastern Pyrenees. Photos © Peter Creed

The Pyrenees

Stretching from the shores of the Mediterranean Sea to the Atlantic Ocean, the Pyrenees are amongst the smallest of the mountain ranges in the Alpine Region. The chain is just 430 km long and 10 km wide at its eastern end but expands to 150 km in the central zone. The highest summit is Pic D'Aneto, at 3,404 m.

Because the mountain is at the intersection of several climatic influences, it exhibits a complex range of landscapes. In the north, the mountain descends abruptly onto the broad plains of Aquitaine and Languedoc in France. Rainfall is abundant due to the permanent influence of the Atlantic Ocean and, as a consequence, much of the mountainside is covered in beech and fir.

The southern slopes, on the other hand, are much drier and have gentler gradients. This is better suited to Scots and mountain pine, juniper and, lower down, evergreen oak. There are also vast areas of Mediterranean scrub and Spanish broom.

Above the tree line (2,400–2,900 m), the vegetation is very similar to the Alps if somewhat less diverse. Dwarf willows hug the ground along with alpine heaths, thickets of alpenrose *Rhododendron ferrugineum* and windswept grasslands.

Altogether, 60 habitat types listed in the Habitats Directive occur in the Pyrenees, including a type of siliceous grassland dominated by *Festuca eskia*, which is unique to the area. The Pyrenees also have an abundance of torrents, cascades and lakes. There are over 1,500 lakes above 1,000 m.

Like in the Alps, plant diversity is very high. Some 3,000 species of vascular plants have been recorded in the

Pyrenees of which at least 120 species are endemic, including *Alyssum pyrenaicum* and *Aster pyrenaicus*, both of which are listed in the Habitats Directive.

The diversity of birds and other animals is equally impressive. Over 40 species of mammal are present including rare endemics like the curious looking Pyrenean desman *Galemys pyrenaicus* and the Pyrenean ibex *Capra pyrenaica pyrenaica*. Persecuted by over-hunting, rescue actions came too late to save the Pyrenean ibex from extinction. It now has the dubious title of being the first species listed on the Habitats Directive to have gone extinct.

As in other mountain ranges, the Pyrenees are also home to a rich array of rare birds and butterflies. Amongst them is the rare lammergeier or bearded vulture *Gypaetus barbatus* and the diminutive Tengmalm's owl *Aegolius funereus* which nests in holes in the ancient trees.

Also present is the dramatic looking Spanish moon moth *Graellsia isabellae* which is now largely restricted to the Pyrenees. It was once highly prized by collectors which brought it to the verge of extinction but, thanks to strict protection, the moth is now slowly recovering.

From a socio-economic perspective the Pyrenees are much less populated than the Alps although here too farming and shepherding were the mainstay activities until recently. The Pyrenees were also heavily deforested in the past. Traces of this exploitation can be seen in almost every valley. Beech, in particular, was used for firewood and to stoke furnaces for metal extraction. More recently, there has been a surge in tourism, especially for ski resorts.



Pyrenean desman.
Photo © Daniel Heudin/
NHPA



Alpine pasqueflower in the Alps. Photo © Attilio Venturato

The Alps

The Alps are amongst the highest mountain chains in Europe. They form a crescent 1,200 km long and 200 km wide across eight countries ranging from France, Switzerland and Monaco to Italy, Germany, Austria and Slovenia. Several peaks rise above 4,000 m, including Mont Blanc which, at 4,807 m, is the highest summit in Europe.

Originally formed by a powerful collision between the African and Eurasian continental plates, the exposed crystalline rock formations have since been extensively remodeled and sculptured by torrential alpine rivers, retreating glaciers and the relentless pressure of snowmelt and frost.

This has helped create an extremely complex labyrinth of mountain ranges interspersed by long deep valleys and alpine rivers. Several of Europe's most important rivers originate in the Alps such as the Rhine, Po and Rhône. They are a vital source of freshwater for much of Europe and, as such, provide a valuable service that extends far beyond their immediate surroundings.

The Alps also act as a bridge between the Mediterranean climate in the south and the more temperate weather in the north and this is reflected everywhere in the type of habitats and species present. Over half of the Alps are covered in forests. To the north, the lower slopes are dominated by deciduous trees whereas, in the south, they are mainly covered in evergreen forests. Conifers tend to dominate the higher altitudes and the drier inland areas where the rainfall is considerably lower.

In general, the forests are still in a relatively natural state, particularly at higher elevations, and so provide an important refuge and ecological corridor for many of the larger species, such as bears and birds of prey.

Grasslands and mountain meadows make up a further 25% of the alpine vegetation. Most are semi-natural, having been influenced by centuries of low-key farming practices. However, many are now under serious threat as more and more farmsteads are being abandoned.

Altogether, 84 habitat types listed in the Habitats Directive are present in the Alps, including several that are situated above the tree line such as the alpine heaths, siliceous grasslands or various types of rocky slopes and scree.

Mountains: the domain of the large birds of prey

Raptors reign supreme in the mountains of the Alpine Region. Many have sought refuge here to escape persecution and to benefit from the few remaining large remote areas left in Europe. None is more emblematic than the bearded vulture or lammergeier *Gypaetus barbatus*. It is amongst the largest birds of prey in Europe with a wing span of 3 metres. It feeds mainly off the bones of dead animals which it sometimes drops from a great height in order to be able to extract the juicy bone marrow with its unusual trowel-like tongue.

This species became extinct in the Alps at the turn of the century but has since been re-introduced. So far about 130 individuals have been re-released into the wild and a coordinated programme is now underway to conserve this endangered species across the mountain ranges of Europe.



Photo © F. Marquez



Alpe Veglia, Italy. Photo © Station Alpine Joseph Faurier

In terms of plants, the Alps are one of the richest places in Europe. About 40% of Europe's flora is present here. Many have adapted to the harsh conditions by growing into flat cushions, rosettes or ground-hugging carpets to protect them from the wind and snow or by developing hairs and saucer-like flowers to retain the heat. The Alpine pasque flower *Pulsatilla alpina* and edelweiss *Leontopodium alpinum* are prime examples.

Forty-seven plants species are included in the Habitats Directive in view of their restricted range or unfavourable conservation status. They include the pretty columbine *Aquilegia bertolonii*, the Alpine sea holly *Eryngium alpinum* and the dramatic looking ancient king *Saxifraga florulenta*.

The majority of the mammal species in the Alps are small rodents, bats or ungulates. As in other mountain ranges, there are several Ice Age relicts which are evolving into distinct sub-species like the Bavarian vole or the Alpine ibex.

The Alps are also home to an immense diversity of invertebrates. Some are now so rare that they are included in the Habitats Directive such as the colourful *Rosalia alpina* or the iridescent *Carabus olympiae* which live in dead wood or holes in trees.

A number of rare butterflies have also found ways to survive at high altitude. Some are endemics like the Rätzer's ringlet *Erebia christi* which is only found in a dozen or so locations in Switzerland and Italy. Its preferred habitats are sunny alpine meadows between 1,300 and 2,100 m.

The Alps are equally important for birds, at least 200 species breed in the mountains and a further 200 migrate through or spend the winter here. Some birds have adapted well to the mountain environment and are now found predominantly at altitude like the rock ptarmigan *Lagopus muta*, though *Pyrrhocorax pyrrhocorax* and dotterel *Charadrius morinellus*. Many more birds stop over in the Alps during their long migration.

The Alps may be one of the richest mountain ranges in Europe in terms of biodiversity but they are also amongst the most intensively exploited. Over 11 million people live in the Alps, mostly in the increasingly urbanised valleys. A further 100 million people visit the mountains for tourism and recreation. All this puts immense pressure on the fragile environment.

The Alpine longhorn *Rosalia alpina*

The Alps are home to one of the most striking beetles to be found in Europe: the Alpine longhorn. This little insect has a very distinctive steely blue colouration with large black dots on the carapace and striped antennae that are sometimes twice as long as the actual body. Although not restricted to the Alpine Region, it is found most frequently in mountainous beech forests that have a relatively open canopy which lets the sunlight through.

Its presence is a tell-tale sign of a forest in good conservation condition as it can only survive in areas with mature, dead and dying trees. Unfortunately, changing forestry practices, large scale deforestation and the lack of dead wood or large mature trees have taken their toll on the species. It is now listed in the Habitats Directive in view of its poor conservation status.



Photo © J.Hlasek

Natura 2000 sites in the Alpine Region

The list of Natura 2000 sites in the Alpine Region was first adopted in December 2003 and later updated in January 2008 and again in December 2008. Altogether, within the Alpine Region there are 1,496 Sites of Community Importance (SCIs) under the Habitats Directive and a further 365 Special Protection Areas (SPAs) under the Birds Directive. There is often considerable overlap between some SCIs and SPAs which means that the figures are not cumulative. Nevertheless, it is estimated that together they cover around 40% of the land area in the Alpine Region.

Number of habitat types in Annex I and species or sub-species in Annex II of the Habitats Directive.

Region	Habitat types	Animals	Plants
Atlantic	117	80	52
Boreal	88	70	61
Continental	159	184	102
Alpine	119	161	107
Pannonian	56	118	46
Steppic	25	25	14
Black Sea	58	79	6
Mediterranean	146	158	270
Macaronesian	38	22	159

Source: European Topic Centre on Biological Diversity (European Environment Agency) <http://biodiversity.eionet.europa.eu>
 - the figures are not cumulative since many habitats and species occur in two or more biogeographical regions
 - Birds from Annex I of the Birds Directive are not listed as they are not categorized according to biogeographical region

Region	N° SCI	Total area covered (km ²)	Terrestrial area covered (km ²)	% of total terrestrial area	N° SPA	Total area covered (km ²)	Terrestrial area covered (km ²)	% of total terrestrial area
Atlantic	2,747	109,684	68,794	8.7	882	76,572	50,572	6.4
Boreal	6,266	111,278	96,549	12.0	1,165	70,341	54,904	6.8
Continental	7,475	150,014	135,120	10.8	1,478	147,559	128,432	12.4
Alpine	1,496	145,643	145,643	39.7	365	93,397	93,397	31.1
Pannonian	756	15,858	15,858	12.3	100	19,965	19,965	17.5
Steppic	34	7,210	7,210	19.4	40	8,628*	8,628	24.4
Black Sea	40	10,243	8,298	71.8	27	4,100	3,561	30.8
Mediterranean	2,928	188,580	174,930	19.8	999	147,358	142,350	16.0
Macaronesian	211	5,385	3,516	33.5	65	3,448	3,388	32.3
TOTAL	21,612	655,968	568,463	13.3	5,004	486,571	429,615	10.5

Source: European Topic Centre on Biological Diversity (European Environment Agency) <http://biodiversity.eionet.europa.eu> October 2008
 - SPAs and SCIs are not cumulative as there is considerable overlap between them
 - Some sites are on the border between two regions, the database does not allow for the possibility to split sites between regions, therefore some sites may be counted twice
 - Percentage of marine areas not available
 - SPAs are not selected according to biogeographical region
 - SPA area for the Steppic Region are calculated according to available GIS data

- SCIs
- SPAs
- SPA and SCI

Map based on site coordinates supplied by the European Commission through the University of Leuven, Division SADL, October 2008



Photos © Peter Creed

13 Vallée d'Eyne

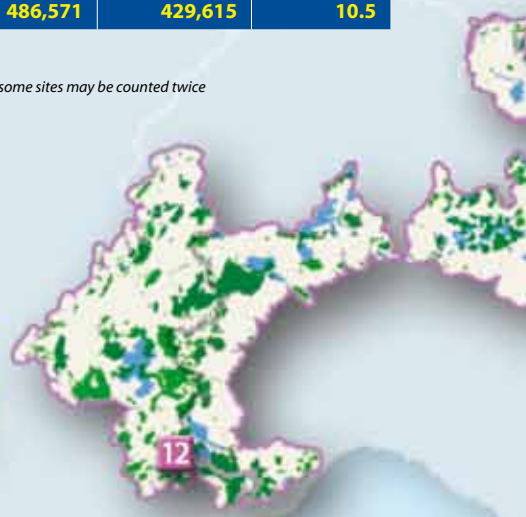


Photo © Peter Creed

12



Photo © Alejandro Torés

14

Aigues Tortes National Park



Photo © Bob Gibbons

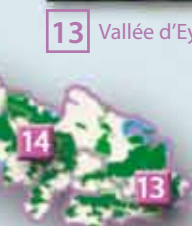


Photo © Florent Flavier

12 Mercantour National Park



Photo © Majella National Park

9

Majella National Park

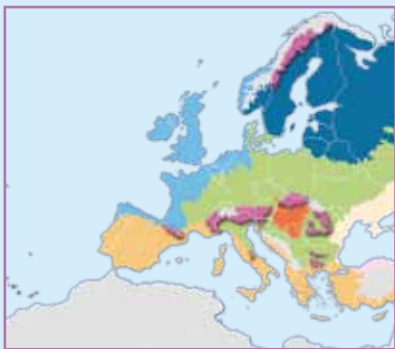


Photo © Lars Lilijemark

1

Vindelfjällen



Photo © Mats Eriksson

Photo © Keijo Taskinen



3

Kilpisjärvi



Photo © Mats Eriksson

2

Padjelanta



Photo © Keijo Taskinen



Photo © Marco Fritz



11

Lech valley

Photo © Archiv der Abteilung Umweltschutz, Amt der Tiroler Landesregierung

10

Julian Alps



Photo © Jože Mihelič



Photo © Jan Seifer

4

High Tatra National Park

Photo © Fero Bednar



Photo © Aleksandra Sylwester



5

Bieszczady



Photo © C. Cwikowski



Photo © Keijo Taskinen

6

Piatra Craiului

Photo © PCNC/Spencer Coca



Photo © J. Hlasek

7

Stara Planina



Photo © Dimitar Georgiev

8

Pirin Mountains

Photo © Stoyan Beshkov



Photo © Tomo Jesenicnik/TNP



9

Photo © Gino Damiani



Natura 2000 in the Alpine Region



Abruzzo Chamois on Gran Sasso mountain. Photo © Gino Damiani

The Apennines

The Apennines form the backbone of Italy. Most of the range is montane in character but only the central areas are high enough to be included in the Alpine Biogeographical Region. Several peaks rise above 2,000 m, the highest being Corno Grande (2,912 m). Europe's most southerly glacier – the Calderone – is also located here.

Much of the Apennines is made up of limestone and dolomite rocks which give rise to many karst phenomena, such as hollows, caves, underground water channels and deep gorges. This creates a dramatically beautiful landscape of gentle peaks and vast alpine plateaus interrupted every now and then by abrupt canyons and vertiginous rock faces.

The climate is heavily influenced by the Mediterranean lowlands and the winds from the Adriatic, providing an ideal environment for the characteristic Apennine beech forests. These cover large parts of the mountains at an altitude of 1,000–1,800 m. Often the beech is interspersed with other trees such as silver fir *Abies alba*, holly *Ilex* sp. and yew *Taxus baccata*. Most of these forests are still in a fairly natural condition. High up, patches of the relictual mountain pine *Pinus mugo* and dwarf juniper *Juniperus nana* grow above the tree line amongst the vast alpine grasslands and cushion scrubs.

In all, 44 habitat types listed in the Habitats Directive are present here. The floristic value is consequently also very high. Over 2,000 species of plants have been recorded in the Apennines, including many endemics such as the rock jasmine *Androsace mathildae* and the Apennine pheasant's eye *Adonis distorta*. Both are in the Habitats Directive in view of their rare status.

Isolated populations of the Apennine wolf and Marsican brown bear have also found refuge in the Apennines. These species were forced down to Italy by advancing ice sheets during the last Ice Age but once the ice melted, small populations got cut off from their more northerly cousins and began to evolve into sub-species of their own.

One of them, the Abruzzo chamois *Rupicapra pyrenaica ornata*, was almost hunted to extinction at the beginning of the 20th Century but is now slowly recovering thanks to the introduction of strict protection laws. Its population dropped to just 20 individuals in the 1930s which prompted conservation authorities to start up an intensive captive breeding and re-introduction programme. Today there are estimated to be around 450 individuals in the wild but in view of its small size the entire population remains highly vulnerable to genetic inbreeding and catastrophic events like disease.

Other typical species of the Apennines include the endemic spectacled salamander *Salamandra terdigitata* and the rare Orsini viper *Vipera ursinii*, which lives on the high grassy plains above 1,700 m.

As elsewhere in remote mountain areas, human populations in the Apennines are low and decreasing. Traditional agropastoral systems are disappearing as a result. But thanks to the fact that most of the central Apennines has now been included in a network of interlinking national parks, efforts are underway to revive the mountain villages through carefully planned eco-tourism initiatives.

Spectacled salamander.
Photo © Leonardo Ancillotto





MAIN Sarek, Northern Sweden INSET Ptarmigan. Photos © Keijo Taskinen

The Scandes

Shaped by successive periods of glaciation, the Scandes are the oldest mountains in the Alpine Region. They run 1,400 km down the spine of Scandinavia from the northernmost parts of Finland to southern Sweden and Norway. The average elevation is 500 m, although several peaks rise above 1,000 m and occasionally even above 2,000 m. Europe's largest mountain plateau – the Hardangervidda is also located here, stretching over 8,000 km².

Weather conditions are generally very harsh with temperatures around freezing for most of the year. The west is influenced by the ocean and the Gulf Stream whilst the east is more continental in nature with less wind and rainfall. Because of these difficult conditions, over half the Scandes are without trees, instead vast areas are covered in fell vegetation dominated by typical moorland species such as heather, grasses, and sedge.

Occasionally, rare buttercups like *Ranunculus lapponicus* and poppies like *Papaver laestadianum*, appear in pockets of rich soil and high humidity. They can be found growing alongside the tiny Lapland rhododendron *Rhododendron lapponicum* which is only 5–15 cm high. In areas of permafrost, pulsa mires appear here and there. Because of the extreme climate, these mires have a permanently frozen core which continues to grow over the years until the peat layer finally cracks and the raised mire collapses.

At higher elevations, the vegetation becomes so rare that much of the landscape is dominated by bare rock and boulders. Only a few vascular plants, such as the glacier crowfoot *Ranunculus glacialis*, can survive here. Lower down, patches of stunted birch and sub-arctic willow scrub appear around the tree line. Lower still the slopes become enveloped in mountain birch *Betula pubescens czerepanovii* which is the dominant forest type for the Scandes.

Compared to other alpine mountains, the Scandes have a relatively low species diversity. Yet the mountains are a vital component of Europe's biodiversity in view of their immense size and pristine nature. This is one of the few places left in Europe where one can still find true wilderness.

Altogether 44 habitat types, 29 plants and 18 animal species listed on the Habitats Directive are found here. Many of the animals present are restricted to the circumpolar region such as the Arctic fox *Alopex lagopus*, wolverine *Gulo gulo*, snowy owl *Nyctea scandiaca* and gyrfalcon *Falco rusticolus*.

Within the EU, the Arctic fox is restricted to Sweden and Finland where its population remains precariously low (just 150 individuals). Its life cycle is highly dependent upon the abundance of its main prey, the Norway lemming *Lemmus lemmus*, which undergoes a regular cycle of 'boom and bust', every 3–5 years. In peak years when the lemmings are abundant, the Arctic fox can raise litters of 12–20 cubs, but at other times the lack of food means that few cubs make it past the first few months. This is all the more worrying as the species is likely to be heavily affected by climate change in years to come.

Not surprisingly, human presence is very low in the Scandes. Some activities like river damming for hydroelectric power, increased reindeer herding, or loss of summer grazing have been damaging on a localised scale. However, most of the mountains remain undisturbed by human influences and are, as a result, amongst the largest unspoilt natural areas left in Europe.

Glacier crowfoot.
Photo © Keijo Taskinen





Mala Fatra, Slovakia. Photos © Josef Šibík

The Carpathians

The Carpathians are the youngest and most easterly of the mountains in the Alpine Region. They extend in a huge arc over 1,450 km from Slovakia to Romania. The range is twice as narrow as the Alps and the peaks are half as high. The highest peaks are located within the Tatras in the Western Carpathians.

On the outer slopes, the dominant bedrock is made up of sandstone and shale (flysch) whilst the interior contains a chain of volcanic mountains. The whole range is heavily influenced by the surrounding continental climate which is responsible for the large temperature variations between winter and summer (from -21°C to +35°C).

Because the Carpathians have a relatively low altitude, the upper alpine and nival zones are generally missing. In fact, only 5% of the land is above the tree line. Instead, montane forests cover more than half of the range in places. The foothills are dominated by oaks such as the sessile oak *Quercus petraea*, whilst beech forests prevail at mid altitude.

On the higher reaches they merge into mixed stands of beech-fir or beech-fir-spruce, eventually giving way to pockets of larch and Arolla pine.

These natural montane forests are amongst the most extensive in the EU. They contain the continent's largest remaining natural mountain beech and beech/coniferous forest ecosystems and the largest expanse of pristine forest outside of Russia. Having survived to this day without human interference, these virgin forests exhibit a very diverse structure where trees of all ages jockey for space amongst the heaps of dead and decaying wood that lie on the forest floor.

The Carpathians are also rich in wetland habitats. Important rivers like the Dniester, the Wisla and the Tisza all have their source in these mountains. Like most Alpine rivers they swell during early spring and summer when the snows melt causing sometimes serious floods in the surrounding lowlands. There are also some 450 small mountain lakes, mainly of glacial origin located between 1,350 and 1,970 m.

Other habitats in the Carpathian range, such as the alpine meadows and upland pastures, have a long tradition of human land use, having been grazed by sheep and cattle



Photo © Tomas Pasteka

Slovak laurel

Named after a nymph who changed herself into a beautiful bush to escape the Greek god Apollo, the Slovak laurel *Daphne arbuscula* is a very unusual plant indeed. It is one of the few ancient species to have evolved before the Carpathian Mountains even existed. Today, this attractive evergreen shrub, with its coral red shoots and bright flowers, is found only in a small area of the Carpathians in Slovakia. Because of its ancient origins the species is, morphologically and genetically, very isolated from other plants in the region, and extremely sensitive to environmental destruction and climate change. Though strictly protected under the Habitats Directive it remains highly threatened from trampling, tourists, collectors, attack by fungi and environmental change.



Glacial lake Tatra mountains. Photo © Jan Šeffler

for centuries. Although these grasslands cover a smaller area than the forests they are equally important for wildlife, especially for plants and invertebrates.

The Carpathians in general are extremely species-rich. This high level of biodiversity is partly accounted for by the fact that the mountains form a vital corridor for dispersal and migration between the North and South and between the East and West.

Over 3,500 species of plants have been found here including 481 species that are endemic to these mountains like the Slovak laurel *Daphne arbuscula*. It is amongst the 48 plant species in the Carpathians that are listed on the Habitats Directive in view of their precarious condition. The Carpathians are also a bastion for large carnivores as well as for a whole range of smaller mammals like the endemic Tatra pine vole *Microtus tatricus* and Carpathian marmot *Marmota marmota latirostris*.

Over 300 bird species breed, winter or migrate through the Carpathians, including the Ural owl *Strix uralensis*, white-backed woodpecker *Dendrocopos leucotus* and black stork *Ciconia nigra*. Thirty percent of the entire European population of the white-backed woodpecker

in Europe is present here along with 40% of the European population of the lesser spotted eagle *Aquila pomarina*. Typical mountain species include the Alpine accentor *Prunella collaris* and wallcreeper *Tichodroma muraria*.

Like the Alps, the Carpathians are populated by a variety of cultures and nationalities. Around 16–18 million people live here and most are still actively involved in extensive pastoral activities. However, the recent change towards a market economy poses a major threat to the continued viability of mountain farms and villages.

Carpathian marmot.
Photo ©
Pavol Ballo

Photo © J. Hlasek

Large carnivores

The Carpathians' role as a refuge for large carnivores is perhaps one of the most important aspects of its biodiversity. The mountains are one of the last areas in Europe to support viable populations of large carnivores. Around 8,000 brown bears *Ursus arctos*, 4,000 wolves *Canis lupus* and 3,000 lynx *Lynx lynx* still roam the forests, representing more than 40% of the total EU population. Their relative abundance is no doubt due to the vast areas of continuous natural forests present. The forests also provide a vital link between populations in the north and those of the west and south-west. They are in fact the main source for large carnivores in the rest of Europe and a major ecological corridor.



Stara Planina, Balkan Mountain. Photos MAIN © Evgeni Dinev/www.evgenidinev.com, INSET Wallcreeper © Mladen Vasilev/www.neophron.com

The Balkan and Rhodope Mountains

With the accession of Bulgaria to the European Union in 2007, two new mountain ranges were added to the Alpine Biogeographical Region: the Balkan Mountain and the Rhodope Mountain.

The Balkan Mountain range lies in the centre of Bulgaria. Although not physically connected, it forms a continuation of the Carpathian system that begins on the western extremity of the Transylvanian Alps, near the dramatic Iron Gates gorge on the border between Serbia and Romania. The range then runs through the middle of Bulgaria, dividing the country in two as it extends 560 km towards the Black Sea.

Skakavitsa waterfall, Rila Mountain



Photo © Evgeni Dinev www.evgenidinev.com

The average height of the Balkans is 900 m above sea level and varies in width from 19 km to 32 km. Despite its strategic location and proximity to Sofia (which is less than 100 km away), this is still a relatively pristine mountain range without major developments.

Further south, the Rhodope Massif consists of three distinct mountains in close proximity to one another: the Rila Mountain, the Pirin Mountain and the Rhodope Mountains. The latter stretches across the border into Greece, but only the Bulgarian part of the range is included in the Alpine Region. The Pirin Mountain is the most typically alpine in character. It has over 80 snow-capped peaks rising above 2,500 m, 176 emerald green lakes and numerous beautiful glacial valleys and cirques at high altitude.

The Rhodopes on the other hand, whilst being equally high, show a strong Mediterranean influence in terms of species composition. They are also particularly remote and wild with only limited human inhabitation.

Over 60 habitat types listed in the Habitats Directive are present in these two mountain ranges. Forests are especially well represented, forming large uninterrupted swathes of natural ancient woodland across most of the range. Many of the trees within these forests are endemic to the Balkans such as the Macedonian pine *Pinus peuce*, King Boris fir *Abies borisii-regis* and Bosnian pine *Pinus heldreichii*.

The mountains are also a hotspot for plants. Over 1,900 species have been identified so far in the Rhodopes alone. A significant number are endemic such as the Rhodope lily *Lilium rhodopaeum* or the Haberlia rock plant *Haberlea rhodopensis*. Because of their naturalness all of the mountains still hold significant populations of large carnivores as well as numerous rare birds of prey. The Eastern Rhodopes are said to have the highest aggregation of diurnal raptors in Europe, they include important populations of imperial eagle *Aquila heliaca*, peregrine falcon *Falco peregrinus*, Griffon vulture *Gyps fulvus* and Egyptian vulture *Neophron percnopterus*.



Naturpark Lechtal, Austria. Photo © www.lechtal.at

Management issues in the Alpine Region

Europe's mountain areas have been inhabited since Neolithic times despite their difficult topography and inhospitable climate. Extensive farming practices, transhumance and small-scale forestry have all contributed to a complex mosaic of different cultures and landscapes which has considerably enhanced the already rich biodiversity of the region. Until recently such activities formed the mainstay of mountain economies across Europe.

These traditions are however now rapidly disappearing. Unable to expand or intensify, most farmsteads at high altitude are gradually being abandoned. Tourism on the other hand has become a major industry but can also put tremendous strain on the mountain environments. Most activities to date focus on winter skiing requiring massive infrastructure development.

At least 10% of the Alps have been transformed into winter ski resorts so far but their impact, in terms of pollution, soil compaction, changes in local vegetation etc... is felt well beyond their boundaries. Similar developments are starting up in the Pyrenees, the Carpathians and Pirin or Rila Mountains in Bulgaria.

Increased traffic is another major problem. Both old and new roads present a major barrier to species migration. It is estimated that 150 million people travel across the Alps every year, 83% by road. The mountain ranges represent important transport corridors across Europe.

Another major concern in the mountainous regions has been the damming and channeling of most major alpine rivers for hydroelectricity or agricultural intensification. This has considerably altered the natural environment both within and outside the Alpine Region and caused unwanted side effects in terms of lower groundwater levels, bank erosion and sedimentation.

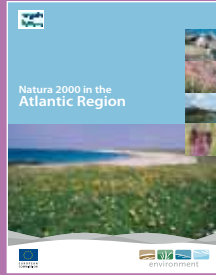
Many of these problems are further exacerbated by the general lack of coordinated land use development across the mountain range as a whole. Most mountains are located on the border between different countries and are often considered peripheral or marginal. Recognising this, several initiatives have recently been launched to promote a more coherent management approach at the level of individual mountain ranges, such as the Alpine and Carpathian Conventions.

Mountains: water towers of Europe

Mountains supply the European continent with much of its freshwater resources. They intercept water from air masses and store it as snow or in the lakes, glaciers and reservoirs before disbursing it into the lowlands via some of Europe's major rivers (Rhine, Po, Tisza ...). In spring and summer especially, the mountains play a vital function in supplying water for agricultural irrigation and human consumption across much of Europe.

However, most alpine rivers have been canalised, deepened, dammed or straightened to control floods, provide hydroelectricity and to create or protect farmland in the valleys. This has not only had a devastating effect on the natural environment but it has also had a number of negative effects on the local economy. Disrupting the natural processes has led to an unexpected drop in groundwater levels, the drying out of agricultural land, unpredictable floods, mud slides etc. Several water authorities are now looking to softer engineering solutions on alpine rivers to help address these concerns.

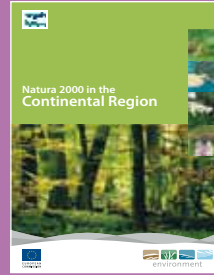
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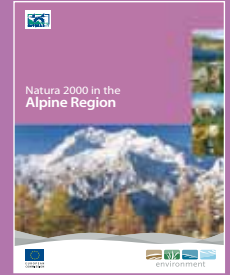
Natura 2000 in the Atlantic Region



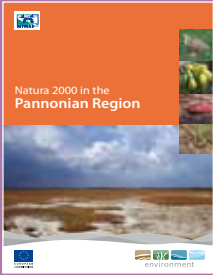
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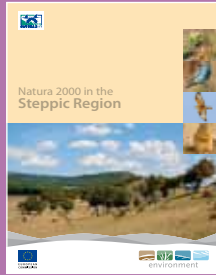
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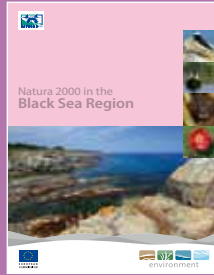
Natura 2000 in the Alpine Region



Natura 2000 in the Pannonian Region



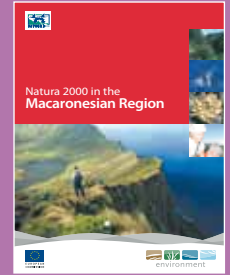
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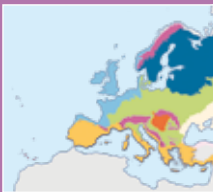
Natura 2000 in the Black Sea Region



Natura 2000 in the Mediterranean Region



Natura 2000 in the Macaronesian Region



The European Union has nine biogeographical regions, each with its own characteristic blend of vegetation, climate and geology. Sites of Community Importance are selected according to each region on the basis of national lists submitted by each Member State within that region. Working at this level makes it easier to conserve species and habitat types under similar natural conditions across a suite of countries, irrespective of political and administrative boundaries. Together with the Special Protection Areas designated under the Birds Directive, the Sites of Community Importance selected for each biogeographical region make up the ecological Natura 2000 network which spans all 27 countries of the EU.

