



Natura 2000 in the Macaronesian Region



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El Teide, Tenerife, the Canaries. Photo © Kerstin Sundseth

The Macaronesian Region – volcanic islands

far out at sea

Within the EU, the Macaronesian Region consists of three archipelagos: the Azores, Madeira (both belonging to Portugal) and the Canaries (Spain). All are of volcanic origin and this fact is reflected everywhere in the landscape. Large calderas, jagged mountains and vertiginous cliffs contrast sharply with wide valleys and sheltered bays.

These alternating landscapes, combined with the gentle climate, create an ideal environment for a particularly rich array of species and habitats, many of which are endemic. Despite representing only 0.2% of the EU territory, the Macaronesian Region hosts over a quarter of the plant species listed in Annex II of the Habitats Directive.

The surrounding seas are equally abundant in wildlife. Many marine animals, from whales to seabirds, seek shelter and food in the deep inshore waters and nutrient-rich upwellings emerging from the sea floor.

Looking at each of the island groups in turn, a number of distinguishing features stand out. The nine islands that make up **the Azores**, are, for instance, located far out to sea, a third of the way between the Iberian Peninsula and Newfoundland in Canada. They have a relatively wet climate and a different species composition than the other archipelagos, being more heavily influenced by Northern European, rather than Mediterranean, species. The islands also have a relatively gentle topography with undulating hills and peaks rather than abrupt precipices.

This makes them ideal for dairy farming. In fact, the Azores produce around a third of Portugal's dairy products, which in turn provides employment for over a fifth of the islands' inhabitants.

The archipelago of **Madeira** is situated 750 km further south and is much closer to the Portuguese mainland. It is made up of two main islands and a series of smaller uninhabited ones. Unlike the Azores, the topography of Madeira is precipitous and jagged. The highest peak rises quickly to 1,861 m. As a result, half the slopes have a gradient of 25% or more. This abrupt landscape has a strong influence on the local climate making it much wetter on the north facing slopes than on the southern ones. The tops of the mountains are also regularly shrouded in clouds. The smaller islands manage to escape these influences as they lie below the cloud belt.

Agriculture is the mainstay of Madeira's economy, although its rugged landscape means that this is mainly small-scale subsistence production. Tourism is also of major importance generating 10% of the island's GDP and employing a significant proportion of the quarter of a million islanders.

	Azores	Canaries	Madeira
N° of habitat types**	26	23	16
N° of animals**	2	6	17
N° of plants**	25	66	46
N° SPAs*	15	27	4
N° SCIs	23	173	11
Total Area (ha)	33,965	419,291	42,517
Land area	25,051	280,469	21,916
% of land	10.7	37.6	27.5

There is considerable overlap between SCIs and SPAs. Some will have been designated under both Directives for different species and habitat interests

*** Listed in the Habitats Directive*

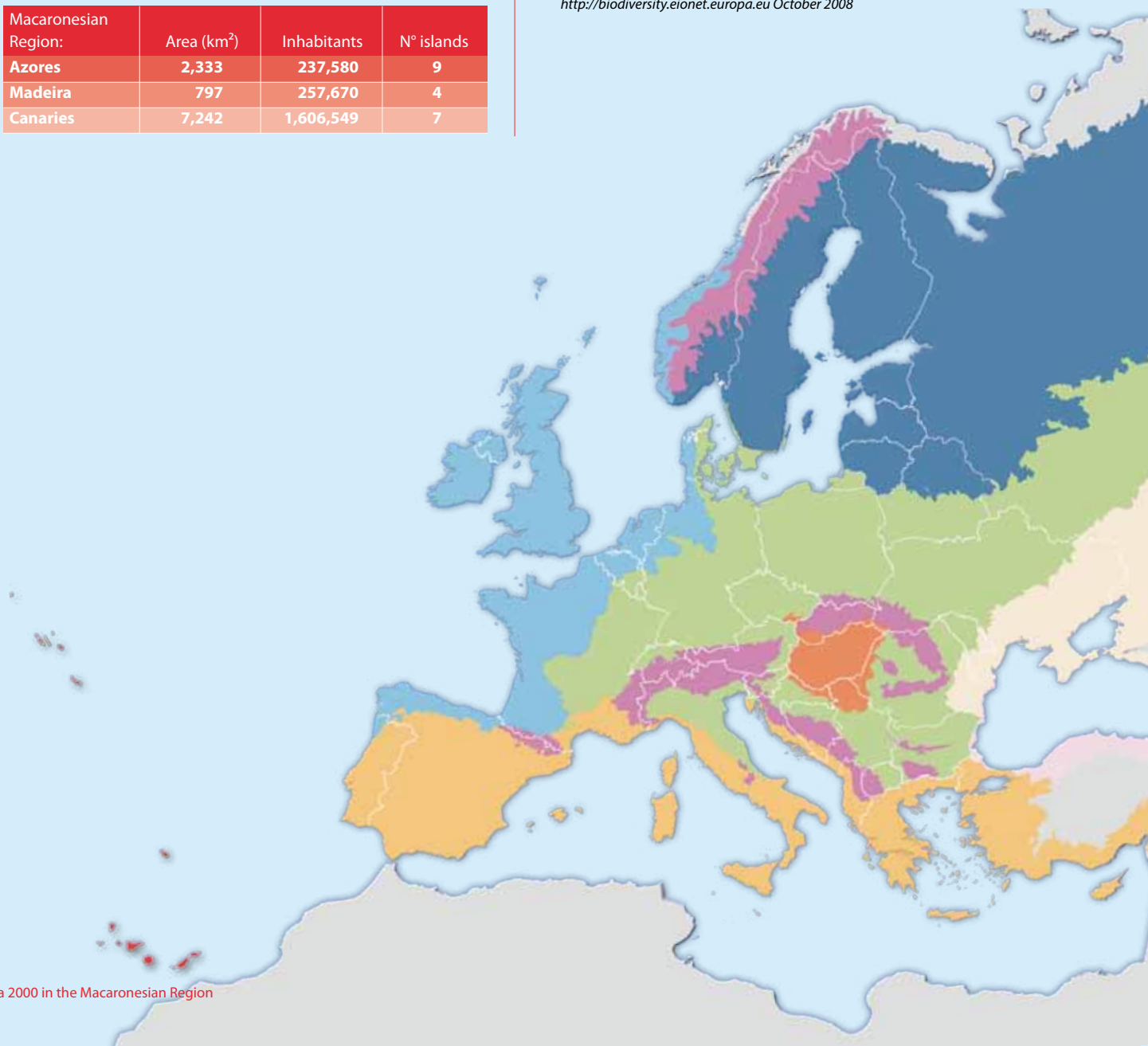
The third group, **the Canaries**, is by far the largest, covering a total surface area of around 7,000 km² and supporting over one and a half million inhabitants. These islands are also the most easterly, situated just 115 km away from the African continent. As a result, the weather is generally much warmer and drier, creating arid, almost desert-like, conditions on the low lying islands like Lanzarote or Fuerteventura. The more westerly islands by contrast have a more dramatic topography with high mountain peaks reaching up to several thousand metres. At 3,718 m. El Teide, on Tenerife, is in fact the highest mountain in Spain.

Tourism is the most important economic activity for the Canaries. With over 11 million tourists, this sector continues to expand, mainly along the coast. Mixed and terraced farming is still practiced inland but it is rapidly disappearing as more and more people abandon their land in search of better income elsewhere. In its place come the tropical and forced crops (pineapples, bananas, mangoes...) destined for the export market. Today, this accounts for almost three-quarters of today's agricultural production.

Macaronesian Region:	Area (km ²)	Inhabitants	N° islands
Azores	2,333	237,580	9
Madeira	797	257,670	4
Canaries	7,242	1,606,549	7

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





MAIN The island of Terceira in the Azores. Photo © S Vizinho, ImagoDop, INSET © The Azores bellflower. Photo Helder Fraga

Natura 2000 in the Azores

The Azores are spread out over a distance of 600 km in the middle of the Atlantic Ocean. Their climate is mainly oceanic with mild temperatures all year round and a high average rainfall. Being the wettest of the Macaronesian islands, they have an unusually high number of lakes, pools, temporary ponds and mountain streams. This abundance of water has also allowed for the formation of local mires and wet woods which do not exist on any of the other islands in the region.

The indented coastlines support a range of coastal habitats including rocky shores, saltmarshes, inlets, lagoons and vegetated sea cliffs. This latter is where many endemic species are found, such as the priority *Azorina vidalii*, a type of bellflower *Campanulaceae*. Other terrestrial habitats include ericaceous heaths, dry scrub, lava fields, rocky slopes and areas of laurel and juniper forest. Altogether there are 26 habitat types of the Habitats Directive in the Azores.

Because of their relatively gentle relief and rich soils, many of the islands have been used extensively for agriculture and are now heavily deforested. As a consequence, only 2%

of the original laurel forests remain. The endemic Azores bullfinch *Pyrrhula murina*, which lives in these forests, is also highly endangered as a result. Once a common sight, it is estimated that only 200–300 pairs remain on the island of São Miguel.

Generally speaking, the Azores are not as rich in species as either Madeira or the Canaries because of their distance from the mainland, their predominantly northern European influences and heavy land-use (half the vascular plants are introduced species). The marine life around the Azores is, by contrast, one of the most plentiful in the Atlantic, thanks to the nutrient rich upwellings from the seabed. Over 20 species of marine mammals – including bottlenose dolphins, sperm whales and pilot whales – frequent these waters.

The archipelago is also especially important for breeding seabirds as it represents a transition between the tropics and the temperate zones. At various times of the year, the twilight air is often filled with the raucous banter of thousands of Cory's shearwaters *Calonectris diomedea* returning to their nesting burrows from their daily fishing expeditions. During the breeding season, half the world's population can be found here. Other rare seabirds listed in Annex I of the Birds Directive also breed in the Azores in internationally significant numbers. They include the little shearwater *Puffinus assimilis baroli*, Madeiran storm-petrel *Oceanodroma castro* and the roseate tern *Sterna dougallii*.



Photo © Paulo Magalhães, ImagoDOP

The roseate tern *Sterna dougallii*

The roseate tern spends most of its life in Africa and at sea before coming onshore to breed during the summer. The Azores host up three quarters of the breeding population in Europe. The species rarely nests in isolation, preferring to seek the company of other tern colonies which are more aggressive and better able to defend their nests against predators. Its main threats come from human disturbance, predation and the deterioration of their cliff top breeding sites, for instance through overgrazing by rabbits. All EU breeding sites are now protected under Natura 2000 and populations are slowly recovering thanks to an international recovery programme for the species.

Map of Natura 2000 sites in the Macaronesian Region

The list of Natura 2000 sites for the Macaronesian Region was the first to be adopted in December 2001 and later updated in January 2008. Altogether, within the Macaronesian Region there are 211 Sites of Community Importance (SCIs) under the Habitats Directive and further 65 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 more than a third of the total land area in this 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



1 Fiercs
Cervo

2 Azores São Jorge
Graciosa

3 Azores Bogs and caldera
Terceira

4 Azores Bullfinch
Pico

5 Azores Marine park
Pico da Formosa

Costa Nordeste

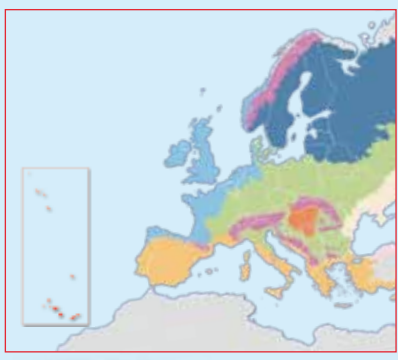
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Photo © S. Vizinho, ImagDOP

Photos © P. da Silva, ImagDOP

Photo © Robert Holfrichter, ImagDOP



10 Canaries Lanzarote

Photos © Carlos Ibero

- SCIs
- SPAs
- SPA and SCI

11 Canaries Jandia

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

12 Canaries Tamadaba

Photos © Consejería de Medio Ambiente del Gobierno de Canarias

7 Madeira Laurel Forests

6 Madeira Porto Santo

8 Madeira Desertas

9 Madeira Selvagens

6 Porto Santo

Photos © M. Freitas

Photo © Parque Natural da Madeira

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Photo © Cristina Abreu

Photos © Isabel Fagundes

Photos © Parque Natural da Madeira



MAIN Looking out over the central mountain range on Madeira. Photo © Kerstin Sundseth, INSET © Endemic Madeiran scilla *Scilla maderensis*. © Parque Natural da Madeira

Natura 2000 in Madeira

The Madeira Archipelago is the smallest of the three island groupings covering just 810 km². It is made up of two main islands, Madeira and Porto Santo, and a series of smaller uninhabited islands, Ilhas Desertas and De Selvagens.

With its vertiginous topography and high mountain peaks, the main island has a sub-tropical climate which is very heavily influenced by altitude. The northern slopes are consistently wetter than the south and the uplands beyond the tree line are often exposed to blistering winds, driving rain and even snow in winter. The other islands, by contrast, lie below the rain belt and are semi-arid as a result.

Madeira was once completely forested (hence the name Madeira = wood). Although now reduced to 20% of the land surface, the island still hosts the largest expanse of laurel forest in the world. Where the forest has been cleared, but not further developed, a Macaronesian heath landscape has developed, which is also of considerable ecological value.

One of key features of Madeira is that it is exceptionally rich in endemic species. Over 120 endemic plants have been identified so far. Forty-six are listed on the Habitats Directive such as the rare geranium, *Geranium maderense* and an endemic species scilla *Scilla maderensis*. The world's rarest seabird, the Zino's petrel *Pterodroma madeira* also nests here. The total world population (130–160 individuals) is confined to a series of inaccessible ledges 1,600 m above sea level. Despite best efforts to conserve the species, it remains under threat from overgrazing and predation from rats and cats.

The smaller island of Porto Santo is not as rich or diverse as its neighbour, largely due to its drier climate. Nevertheless, this tiny island hosts no less than 36 endemic land snails of which 13 are listed on the Habitats Directive. Its waters are also important for marine species such as the bottlenose dolphin and sea turtles.

The remaining two island groups are further offshore and considerably smaller. The Ilhas Desertas harbour one of the last populations of the Mediterranean monk seal *Monachus monachus* in this part of Europe and the only EU breeding colony of the globally threatened Fea's petrel *Pterodroma feae*, whereas the tiny De Selvagens (245 ha) are home to other large seabird colonies and many rare endemic plants. Both islands are included in their entirety in Natura 2000 and are now strictly protected.

Photo © Columba trocaz, Carlos Cabral



Laurel forests – emblems of the Macaronesian Region

Of all the habitats found in the Macaronesian Region none are more representative than the laurel forests. These ancient habitats were once widespread and covered large tracts of mainland Europe during the Tertiary Period. Now they are confined to a few islands in the Atlantic. It is estimated there are only 30,000 ha of the original laurel forest left in the Macaronesian Region, the majority of which is found on the island of Madeira. Most areas are now protected through Natura 2000 and efforts are underway across all three island groups to encourage their regeneration and expansion.

Because of their long evolution, laurel forests host a particularly rich array of species that are unique to this habitat type. They include numerous endemic plants as well as four species of laurel pigeon. The latter play an important role in habitat regeneration as they help disperse the laurel seeds. Like the forest though, the laurel pigeons are now also highly endangered.



Lava fields on the foothills of El Tiede, Tenerife, the Canaries. Photo © Carlos Ibero

Natura 2000 in the Canaries

The Canaries form the largest of the archipelagos, covering a total surface area of 7,242 km². They are also, biologically speaking, the richest and most diverse islands in the Macaronesian Region. The fresh moist trade winds from the west and the hot dry winds from the Sahara create many climatic contrasts which are reflected in the wide range of habitats present.

The western islands with their precipitous mountains and deep gorges regularly experience temperature inversions, leading to the formation of a band of cloud around the mountains at 900–1,500 m. In the space of a few kilometres, one can walk from a desert-like landscape along the seashore to a lush moist cloud forest in the mountains.

Typical habitats on the western islands include the laurel forests. Around 18,000 ha remain in the Canaries but most is highly fragmented and only 6,000 ha correspond to mature forest. The best example is found on La Gomera (3,000 ha). Two other forest habitats are unique to the Canaries: the palm groves of *Phoenix* and the Canarian pine

forests. The latter is usually located on dry montane slopes around 800–2,000 m and provides a last refuge for the globally threatened endemic blue chaffinch *Fringilla teydea*.

Other characteristic habitats include cushion heaths dominated by broomlike plants (above 1,900 m) and unusual lava fields that surround the El Teide volcano on Tenerife. On the lower slopes, another type of vegetation, known as the 'cardonales', grows well on lava. This is recognised by its cactus-like plants, which are in fact part the *Euphorbia* family. Other more typical Mediterranean habitats are also present including the Mediterranean scrub formations, olive woodlands and ancient juniper forests.

The flat eastern islands of Lanzarote and Fuerteventura offer a complete contrast to the western isles. Their arid landscape is dominated by immense sand dunes which move far inland, eventually merging into extensive areas of pre-desert scrub and heath. The vegetation is, as a result, quite sparse and dominated by plants that are well adapted to desert conditions.

In terms of species diversity, the Canaries are without a doubt one of top biodiversity hotspots of Europe. Thousands of species have been identified so far and new discoveries are still being made. Around 45% of the fauna and 25% of the flora species are endemic.

Photo © Consejería de Medio Ambiente del Gobierno de Canarias



The Hierro giant lizard *Gallotia simonyi*

The Canaries host some of the largest and most unusual lizards in the world. The rare Hierro giant lizard is a prime example. Measuring 70 cm in length, this gentle giant was discovered as recently as 1999, high up on an inaccessible cliff on the island of Hierro. Its normal habitat is the juniper forest. However, the combined effects of habitat destruction and predation forced the species into less suitable areas and pushed it literally to the edge of extinction.

Five years on, the situation is looking much better thanks to the successful reintroduction campaign which put captive bred specimens back into the newly protected juniper forests. The island, too, has benefited from the influx of tourists drawn by this elusive reptile. Little wonder that the Hierro giant lizard is now the island's mascot.



Along the north coast of Madeira. Photo © Kerstin Sundseth

Managing sites in the Macaronesian Region

The insularity of the Macaronesian Islands makes them very fragile. Human activities have already destroyed and significantly transformed large areas. It is estimated that up to 20 million people visit the islands every year. As a result, tourism developments have sprung up almost everywhere around the coast. This in turn brings other problems like water shortages and pollution, forest fires and damaging recreational pursuits.

Further inland, the tourism pressure is reduced but large-scale deforestation, especially of laurel forests, has brought its own set of problems. Because these belts of evergreen forest are almost permanently shrouded in mist, they act like sponges soaking up the rain and

Laurel forest



Photo © Kerstin Sundseth



Photo © Parque Natural da Madeira

Eradicating alien species

'Garden escapes', such as ginger lily *Hedychium gardenerianum* are a major threat to indigenous habitats and species. First introduced in 1934, this Himalayan species has undergone a phase of rapid colonisation, and is now widespread. On the island of Madeira, it is invading the laurel forests, where it not only smothers other native plants but also prevents the forest from regenerating naturally.

Eradication is a very labour intensive job. *Hedychium* spreads like a thick blanket along the forest floor. There is no choice but to eradicate it by hand, a task made no easier by the fact that the terrain is very inaccessible. So far the Madeira National Park has managed to clear a sufficiently large area to act as a 'cordon sanitaire' preventing further invasion into the forest. This, however, requires constant monitoring and maintenance. Local farmers are helping too by cultivating plots immediately adjacent to the cordon sanitaire which prevents the ginger lily from re-establishing itself.

moisture from the clouds and filling the islands' aquifers, rivers and streams. They also prevent erosion which is an essential function for such steep sided islands.

This dual function of capturing rain water and preventing landslides, is particularly noticeable on those islands that have lost their forests. Here, rainfall is significantly lower than usual, leading to water shortages. When the rain does come, there is nothing to stand in its way so it sweeps down the mountainside gouging out huge scars and washing away much of the surface soil.

Agricultural practices are also changing rapidly across the region. Mixed subsistence farming in the form of terraces was once common place but is now being abandoned and replaced by more lucrative, intensive and industrial style exotic fruit production.

The islands in the Azores in particular suffer from heavy pollution and eutrophication due to the large numbers of cattle used for dairy production. Livestock grazing in general is a problem for the islands as indigenous plants have not had time to evolve appropriate defence mechanisms against such pressures. As a result, even 'normal' levels of grazing can have a very negative impact on the survival rates of many endemic plants and animals.

The high number of invasive alien species is another major concern. Introduced rats and cats predate on ground nesting birds, causing their populations to fall rapidly. Rabbits and goats prevent the natural regeneration of the native vegetation. Exotic plants out compete and eventually dominate endemic species.

In spite of these threats, all three autonomous governments have demonstrated a strong political commitment to biodiversity conservation by including a large proportion of their territories within the Natura 2000 Network (in some cases over a third of the island is included.) Not only does this provide the necessary impetus to address the above threats, but it also opens up a whole range of new opportunities for the islands, for instance through eco-tourism.

All three island groups are ideally placed to capitalise on this growing niche market. They benefit from a warm climate all the year round, flights are generally cheap and they are able to offer a whole range of different activities to suit every taste – from hiking through mountains of the Canaries, whale watching in the Azores or walking the levadas of Madeira (ancient watercourses that carry rainfall from the mountains to irrigate the cultivated terraces).

Most of the islands have already begun to see the benefits of these alternative forms of tourism. What is more, unlike with mass tourism, the revenue from nature tourism stays on the islands and in the hands of the small tourism enterprises.



Photo © R Prieto, ImagDOP



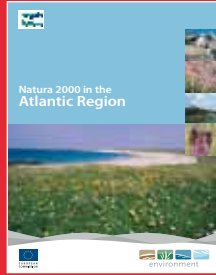
Photo © R Prieto, ImagDOP

Whale watching codes of conduct

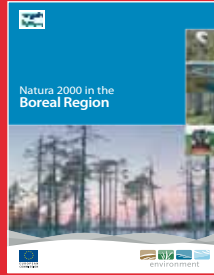
Situated almost in the middle of the Atlantic, the deep waters of the Azores are well known for their abundance of whales and dolphins. In recent years, several whale-watching operations have sprung up, encouraged by the general growth in tourism to the islands. In order to ensure that their activities are compatible with the marine mammals and the provisions of Natura 2000, the Azores government developed a mandatory code of conduct for whale watching in close cooperation with the operators.

In exchange for respecting the regulations, local businesses are given valuable training in business management and marine conservation. Today, the Azores are rapidly gaining an international reputation for sustainable whale watching and local businesses are booming as a result.

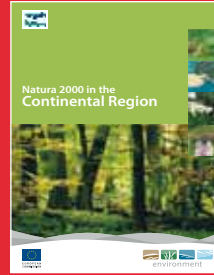
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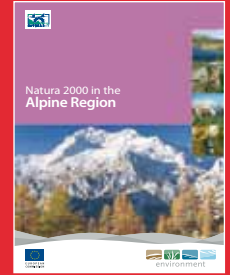
Natura 2000 in the Atlantic Region



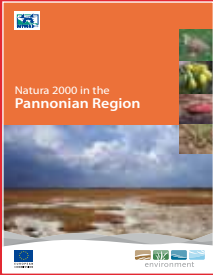
Natura 2000 in the Boreal Region



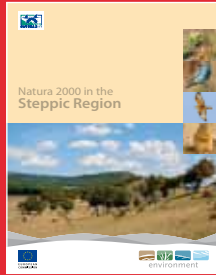
Natura 2000 in the Continental Region



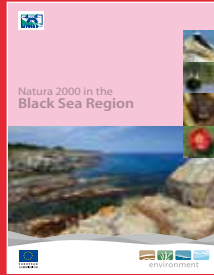
Natura 2000 in the Alpine Region



Natura 2000 in the Pannonian Region



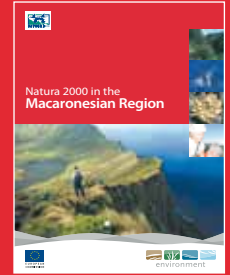
Natura 2000 in the Steppic Region



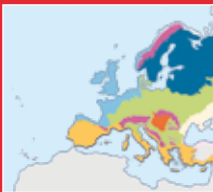
Natura 2000 in the Black Sea Region



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.

