EUROPEAN OVERSEAS

REGIONAL ECOSYSTEM PROFILE

Macaronesia

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http://ec.europa.eu/best

Disclaimer: *The **Regional Ecosystem Profile** is a technical document with input from regional and local experts and other stakeholders, obtained in a participatory consultation process. The results of this background document were used to elaborate a **Regional Investment Strategy** in the same participatory manner, which may serve as a guiding document for future national and regional strategies. Neither document is politically binding or replaces a national or regional strategy authorized by the respective decision makers.*

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Abbreviations and acronyms

ABNJ	Area beyond national jurisdiction
ACAP	Agreement on the Conservation of Albatrosses and Petrels
ACCOBAMS	Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and contiguous Atlantic area
AEWA	Agreement on the Conservation of African-Eurasian Migratory Waterbirds
ASCI	Areas of Special Conservation Interest
ASCOBANS	Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas
AZE	Alliance for Zero Extinction
BEST	Voluntary Scheme for Biodiversity and Ecosystem Services in EU Outermost Regions and Overseas Countries and Territories
CAP	Common Agriculture Policy
CBD	Convention on Biological Diversity
CEPF	Critical Ecosystem Partnership Fund
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMS	Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention)
CR	Critically endangered (species)
CSO	Civil Society Organizations
DOM	Département d'outre-mer
EASIN	European Alien Species Information Network
EIA	Environmental Impact Assessment
EAP	Environmental Action Programme
EBA	Endemic Bird Area
EC	European Commission
EEC	European Economic Community
ECS	Extended Continental Shelf
EES	European Economic Space
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EIB	European Investment Bank
EN	Endangered (species)
EP	Ecosystem Profile
ERDF	European Regional Development Fund
EU	European Union
EUROBATS	Agreement on the Conservation of Populations of European Bats
FRCT	Fundo Regional para a Ciência e Tecnologia
GVA	Gross Value Added
IAS	Invasive Alien Species
IBA	Important Bird Area
IFCN, IP-RAM	Institute of Forests and Nature Conservation of Madeira
IPCC	Intergovernmental Panel on Climate Change

IUCN	International Union for Conservation of Nature
KBA	Key Biodiversity Area
MAB	UNESCO’s Man and the Biosphere Programme
MMA	Micro Marine Reserve
MNP	Madeira Nature Park
MPA	Marine Protected Area
NBSAP	National Biodiversity Strategy and Action Plan
NGO	Non-Governmental Organization
NOS	national Ocean Strategy (Portugal)
NT	Near threatened (species)
OCT	Overseas Countries and Territories
OSPAR	Convention for the Protection of the Marine Environment in the North-East Atlantic (OSPAR Convention)
OR	Outermost Regions
PA	Protected Area
PAF	Prioritised Action Framework
PMR	Plant Micro-Reserves
PORBIOTA	Portuguese E-Infrastructure for Information and Research on Biodiversity
POSEI	Programme d'Options Spécifiques à l'Éloignement et l'Insularité
PRESAA	Plan for Education and Environmental Awareness of Azores
REDBIOS	East Atlantic Biosphere Reserve Network
RR	Restricted-range (species)
SAC	Special Area of Conservation
SCF	Structural and Cohesion Funds
SCI	Site of Community Importance
SPA	Special Protection Area for birds
SPEA	Portuguese Society for the Study of Birds
TFEU	Treaty on the Functioning of the EU
UN CLCS	UN Commission on the Limits of the Continental Shelf
UNESCO	United Nations Educational, Scientific and Cultural Organization
VU	Vulnerable (species)
WWF	World Wide Fund for Nature

EXECUTIVE SUMMARY

The Macaronesian region comprises one of the seven regions in the world, in which European Union (EU) Overseas entities are located: from the Arctic to the Antarctic, in the Atlantic, the Pacific, and Indian Ocean, and even in parts of the Amazon. Combined their Exclusive Economic Zones (EEZs) make the largest marine area worldwide, covering 15% of the ocean. They are home to 20% of coral reefs and lagoons, provide the last refuge to 6% of globally threatened and endangered species and are acknowledged as biodiversity hotspots for their immense diversity of species, ecosystems and landscapes. Together, the 9 EU Outermost Regions (ORs) and 25 Overseas Countries and Territories (OCTs) host more than 70% of Europe's biodiversity.

The global importance of the rich, unique and valuable biodiversity in these regions as well as the ecosystems it depends on has been recognized internationally. Moreover, there is increasing awareness of the value of healthy ecosystems providing critical services that not only support local, regional economies and livelihoods but also offer cost-efficient climate change solutions. However, these ecosystems as well as the biodiversity are vulnerable and already affected by the impacts of climate change and other threats, as demonstrated in this ecosystem profile elaborated in a participatory approach with local and regional stakeholders under the **European BEST Initiative**[1].

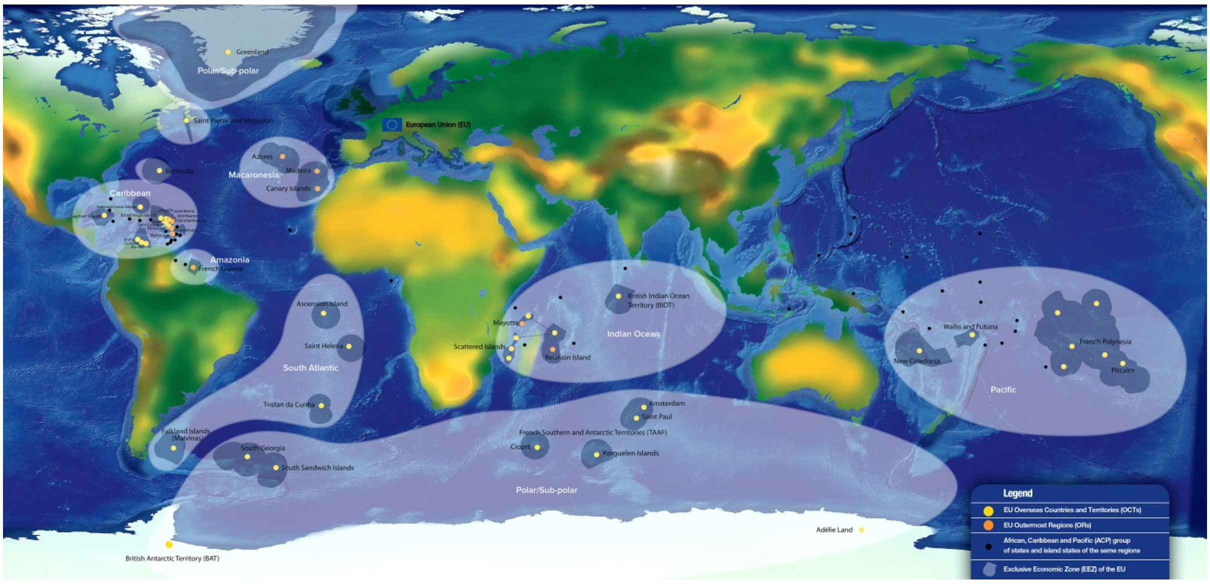

Figure 1: Map showing the 34 Overseas entities of the European Union, located in 7 regions of the world (Credit: Imre Sebestyén/UNITgraphics © IUCN)

BEST – an initiative to promote conservation in the European overseas

The European BEST Initiative aims to strengthen biodiversity conservation and climate change adaptation in the 7 European Overseas regions by raising awareness, profiling the

[1] BEST – Voluntary scheme for Biodiversity and Ecosystem Services in Territories of European Overseas. For more information visit: http://ec.europa.eu//best/

key biodiversity areas as priority areas for actions, supporting actions on the ground. To achieve these objectives knowledge hubs were established in the 7 EU Overseas regions and tasked to develop a regional ecosystem profile by assessing the current situation of the region's biodiversity, habitats and their threats based on the most recent scientific data and observation and present them in the socio-economic and political context. Each regional knowledge hub has mobilized during 3 years local and regional actors and authorities in order to compile and discuss in a very participatory manner the latest available data feeding into the analysis before agreeing on priority areas for action for the region based on the outcomes of the species and ecosystems and threats assessments. Each ecosystem profile also includes an analysis of current conservation activities and relevant investments in the region.

The Macaronesian hub is co-ordinated by the "Fundo Regional para a Ciência e Tecnologia" (FRCT), a science-funding agency of the Regional Government of the Azores with administrative and financial autonomy and project coordinating skills that makes the link with other departments within the Regional Administration and establishes the link with the regional scientific community.

Ecosystem Profiling Process

The profiling process follows the Critical Ecosystem Partnership Fund (CEPF) approach, adapted to the particular situation and needs of the EU Overseas. It uses a process of developing "Ecosystem Profiles" with the help of local actors to efficiently guide on the ground actions as well as to identify and articulate an investment strategy for each region to be funded. The regional participation process assures that the final outcome is owned and used by stakeholders in the region.

In 2010, an Ecosystem Profile was developed by CEPF for the extensive Mediterranean basin, including the three Macaronesian archipelagos in the Atlantic Ocean. However, the present EP – dedicated only on the Macaronesian region - allowed for much more in-depth stakeholder consultations and thus should not be understood as an "update" of the relevant parts within the 2010 CEPF document.

The Macaronesian ecosystem profile has been developed through a combination of a desk study and consultation and input from over 83 regional stakeholders, including government organizations, scientific community and NGOs. Seventeen workshops organized in two phases were undertaken in five cities of the three archipelagos. These workshops were supplemented by expert consultancies and specific interviews held by the profiling team.

The accompanying regional investment strategy to the ecosystem profile includes in detail the elaborated conservation priorities, niches for investment, funding opportunities and the recommended strategy - a critical step toward ensuring the future vitality of the natural values of the region.

By clearly outlining the challenges and needs of the region, this profile aims to increase awareness of European overseas biodiversity, as a foundation for further create support for development and implementation of mechanisms to improve policy and future investment strategies.

Biological importance of the Macaronesian region

The Macaronesian[2] biogeographical region is composed of 3 European Overseas Regions – the Portuguese archipelagos of Azores and Madeira and the Spanish archipelago of the Canary Islands. The three volcanic archipelagos are located on the northeast Atlantic, extending from the Azores (9 islands), in the northwest extreme, south to Madeira (2 islands) and the Canary Islands (7 islands), near the African coast. Macaronesia is one of Europe's most prominent biodiversity hotspots and the most important centre of biodiversity in the Mediterranean bioclimatic region[3], one of the 35 biodiversity hotspots recognized on the planet. Due to its geographical situation and the buffering influence of the Atlantic Ocean, this region was not affected by the Pleistocene glaciations. Large parts of the bryoflora of the Tertiary could survive here, especially in the laurel forest (Laurisilva). Because the Macaronesian archipelagos were never attached to any continent, they display particularly high levels of terrestrial animal and plant endemism - more than **5,600 endemic species among 23,000 marine and terrestrial species** are known at present, in about 10,600 km^2 that make up the 18 islands and several islets of these three archipelagos. Their complex and long geological history enabled a mix of colonization and speciation events, which led to the present blend of biological elements affiliated with those from the North Atlantic, the Mediterranean and Africa.

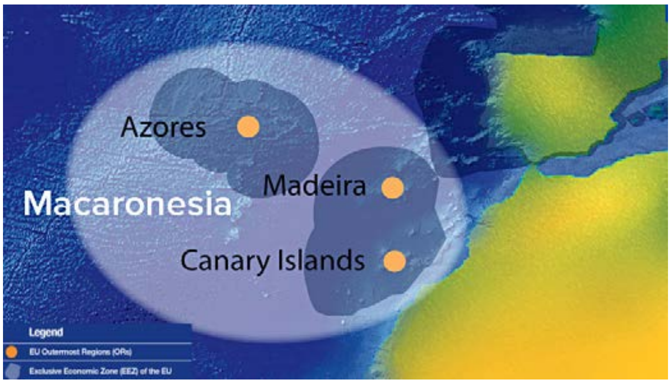

Figure 1 - European Macaronesia

The region is home to **three Natural World Heritages sites** (UNESCO, 1999):

- Laurisilva of Madeira is an outstanding relict of a previously widespread laurel forest type. It is the largest surviving area of laurel forest and is believed to be 90% primary forest. It contains a unique suite of plants and animals, including many endemic species such as the Madeiran long-toed pigeon.
- Next to the Laurisilva of Madeira (Portugal), Garajonay National Park, situated in the middle of the island of La Gomera in the Canary Islands archipelago, preserves an outstanding example of this unique vegetation that covers some 70% of the park's area.

[2] From the Greek words for blessed or fortunate islands.

[3] Martín, J. L., Arechavaleta, M., Borges, P. A. V., & Faria, B. (2008). *Top 100. Las 100 especies amenazadas prioritarias de gestión en la región europea biogeográfica de la Macaronesia: Consejería de Medio Ambiente y Ordenación Territorial, Gobierno de Canarias*.

- Teide National Park, situated on the island of Tenerife, features the Teide-Pico Viejo stratovolcano that, at 3,718 m, is the highest peak on Spanish soil. Rising 7,500 m above the ocean floor, it is regarded as the world's third-tallest volcanic structure and stands in a spectacular environment. Teide is of global importance in providing evidence of the geological processes that underpin the evolution of oceanic islands.

The Macaronesian region is also **home to 12 UNESCO's Biosphere Reserves**, of which 8 are whole islands. Additionally, the Desertas Islands (Madeira) have been granted a European Diploma for Protected Areas by the Council of Europe in 2014. This recognition acknowledges the European significance of the area, which harbours a large number of endemic, threatened or vulnerable species of flora and fauna and has unique and remarkable landscapes.

Conservation outcomes

The ecosystem profile defines a suite of measurable conservation outcomes - targets against which the success of investments can be measured - as the scientific basis for guiding conservation investments. These are framed by a situational analysis, including reviews of the policy, socioeconomic and civil society contexts in which conservation takes place. It also includes an assessment of patterns and trends in current conservation investment, which captures lessons learned from past investments in the region, as well as an overview of threats and drivers of biodiversity loss. The profile also identifies priorities for conservation investment within conservation outcomes.

Conservation outcomes can be defined at three scales - species, site, and landscape, reflecting a simplification of a complex hierarchical continuum of ecological scale. The three scales interlock geographically through the presence of species in sites and of sites in landscapes. Species outcomes identified in the Macaronesia include all those species and subspecies that are globally threatened according to the IUCN Red List (389 taxa) or sub-global lists following IUCN guidelines (164 taxa). In addition, restricted range taxa (endemics) listed as threatened in regional Red Lists (97 taxa) and congregatory taxa (6) are also included as species outcomes. Site outcomes were determined by identifying the sites that contain populations of at least one globally Critically Endangered (CR) and Endangered (EN) species; 5% of vulnerable or restricted range species; and 1% of congregatory species. In total, **194 Key Biodiversity Areas (KBAs) and one corridor were identified in the region**. These KBAs were then prioritized based on irreplaceability (whether the site contains taxa found in no other site); and vulnerability criteria in addition to site-based vulnerability.

Threats

Direct destruction of habitats, over-exploitation of resources and the introduction of exotic species have been appointed as the main threats to biodiversity and causes of species extinctions. Causes of habitat degradation, and in extreme cases of total loss, are of various kinds, such as the development of infrastructures, changes in land use, agricultural practises, urban development and pollution, among others. In the marine environment, main threats to biodiversity are associated to fisheries practices (e.g. bottom-set longline, by-catch), fast-growing tourism, shipping, pollution, and climate change.

As a result of cumulative threats over the years, the native laurel forest in Macaronesia occupies presently only 12.5% of its primitive range[4], having been nearly wiped out from the Azores and the Canaries. In addition, several species became extinct and many others are currently threatened and restricted to small areas in declining numbers.

The region's reliance on revenue from tourism and livestock production, in addition to expansion of invasive alien species is expected to continue to seriously threat species and their habitats, making the region and its biodiversity more susceptible to negative impacts from anticipated climatic changes.

Current investments

Most of the financial resources used for nature conservation and biodiversity are provided by the regional authorities, and there is also a long and effective tradition in the use of co-financing from European programmes such as LIFE, INTERREG and MAC. INTERREG IIIB and PCT-Mac are excellent demonstrations of cooperative projects involving Madeira, the Azores (Portugal) and the Canary Islands (Spain) dealing with nature conservation and biodiversity at a regional (Macaronesian) level, including in some cases the Cape Verde Islands in these projects. This cooperation has led to the establishment of common strategies and the use of common methods in the management of biodiversity in these islands. Exotic and invasive species, joint management and conservation of marine mammals, and a common database of endangered and endemic species are among the most visible results obtained.

But while there have been some successes in species conservation, the populations of many taxonomic groups continue to decline, and the status of most threatened species has not improved. The main positive results have been achieved within the boundaries of protected areas, but a significant proportion of native and endemic species remains endangered, with populations still in decline. Despite the EU efforts to address species and habitats of Natura 2000 Network, a large number of globally threatened species do not occur in these sites as they are not listed as 'priority species' under the Birds and Habitats Directives (and many priority species are not globally threatened), and therefore are not considered as priorities for conservation at the EU level. This highlights the need for financing beyond for the Natura 2000 to tackle further biodiversity loss in the Macaronesian region.

Priority areas for actions

The **geographic priorities** for investment in Macaronesia are defined in terms of priority sites. These were selected from among the full list of 194 KBAs in the region based on an initial biological prioritization, followed by the application of expert opinion to identify sites where investment could be expected to have the greatest impact. The **list of priority sites contains 46 KBAs, comprising six in the Azores, 7 in Madeira, and 33 in the Canary Islands**. These sites are the highest biological priorities for conservation in the region: they

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[4] Fernández-Palacios, J. M
Arévalo, J. R., & Whittaker, R. J. (2011). A reconstruction of Palaeo-Macaronesia,
reference to the long-term biogeography of the Atlantic island laurel forests. *Journal of Biogeography, 38(2)*, pp. 226-246

are the only known sites (globally) for one or more endemic CR or EN species and the loss of any of them would result in the global extinction of at least one species. Yet, from the 46 priority KBAs, eight are not covered by any protection figure and 16 are only partially protected.

The **thematic priorities** for conservation investment in the region were based upon an analysis of the main threats to biodiversity in the hotspot and their root causes. Lack of species threat assessment, alien invasive species, habitat destruction due to urbanization, tourism expansion and agriculture (including livestock grazing), were ranked as the highest threats by stakeholders consulted during the ecosystem profiling process. Thus, critical areas for action in the Macaronesian region include:

- Baseline data collection & species threat assessment
- Improving Biodiversity Databanks
- Invasive Alien Species control and eradication
- Conservation and recovery plans for native species
- Creation of Plant Micro-Reserves in areas of severely fragmented habitats
- Mapping and assessment of ecosystems and their services
- Information and environmental awareness campaigns
- Priority conservation actions addressing specific taxonomic groups and taxa

Conclusions

The ecosystem profile highlights that there are various opportunities for funders to support biodiversity conservation in ways that deliver significant and meaningful benefits to the region. Despite some progress in conservation, the profile identified a large number of **globally threatened species (553)** in addition to a number of restricted range (97) and important congregations (6) in the region; **90% of these species are endemic to the region.** Yet, conservation activities are, in many cases, under funded and protected areas currently insufficient to protect all identified globally threatened species.

The results of this inclusive and comprehensive ecosystem profile serve as the basis for the elaboration of the accompanying regional BEST strategy, which aims to give strategic directions as well as concrete suggestions for activities and projects in the region, which are in synergy with relevant ongoing activities. Taking into account the current and past investments as well as the capacity for the implementation of conservation projects in the region, the strategy includes in detail the elaborated conservation priorities, niches for investment over the next 5 years, funding opportunities and recommended strategy - a critical step toward ensuring the future vitality of the natural values of the Macaronesian region.

Building on this intense analysis, consultation and discussion with over **83 regional stakeholders, including government organizations, scientific community and NGOs**, the regional ecosystem profile and investment strategy aim to inform local, national, regional, European and international decision makers, politicians and investors when planning future developments and prioritizing sustainable investments.

1. INTRODUCTION

The European Union (EU) includes 34 overseas territories: 9 Outermost Regions (ORs) and 25 Overseas Countries and Territories (OCTs). They are linked to 6 Member States: Denmark, France, the Netherlands, Portugal, Spain and the United Kingdom. Found in every ocean, from polar to tropical latitudes, they are home to a unique diversity of species and ecosystems of global significance, around 70% of Europe's species (EEA, 2014), which are highly vulnerable to human impacts and increasingly the impacts of climate change.

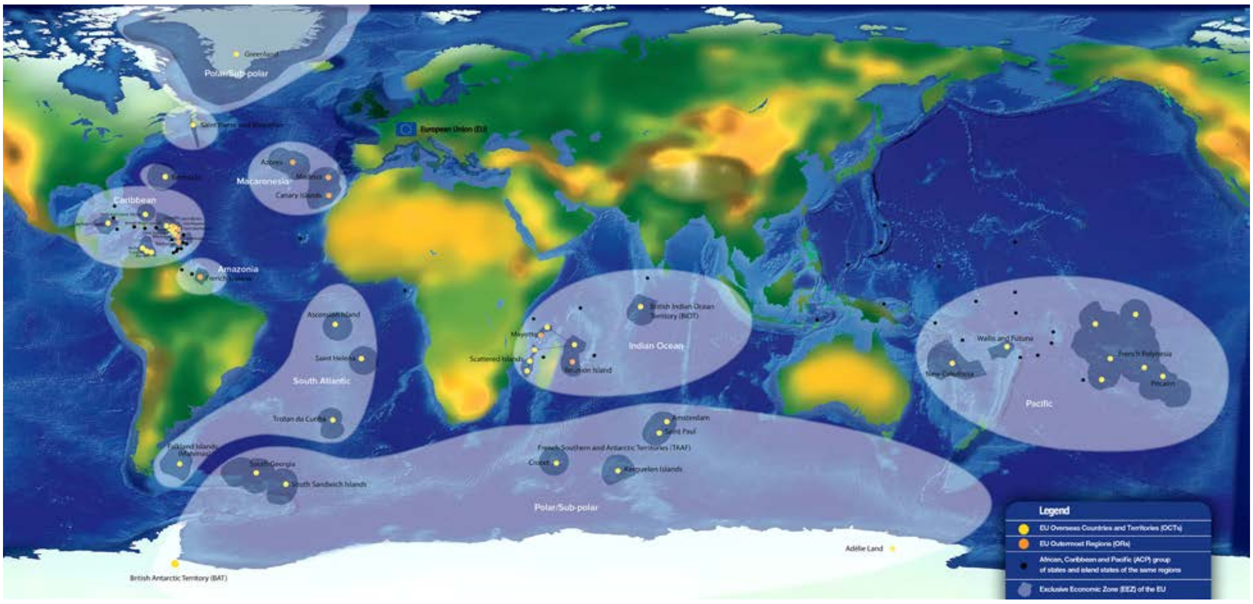

Figure 2 – The 34 EU Overseas entities in the 7 regional BEST knowledge hubs

The BEST Initiative

During the first conference on biodiversity and climate change in the EU overseas entities that took place on Reunion Island in July 2008, the need for a specific initiative to promote conservation of EU Overseas' biodiversity and ecosystems as well as to develop a political strategy has been recognized. The European Union's BEST Initiative (Voluntary scheme for Biodiversity and Ecosystem Services in Territories of European Overseas) is a tangible follow-up to concluding Message from Reunion Island (2008), stressing the urgency for the European Union and its Overseas Entities to counter climate change and biodiversity loss. The Message from the conference ("Message from Reunion Island"), adopted by conference participants, contains 21 proposals aimed at the ORs, the OCTs, and their regions of the world (Message from Reunion Island, 2008). It is strengthened by a portfolio of recommended actions and measures resulting from the 11 roundtables and workshops, in which more than 400 people participated.

Following-up to the recommendations of the Message from Reunion Island, the European Parliament adopted the BEST Preparatory Action in 2010 to address these challenges by promoting conservation and sustainable use of biodiversity and ecosystem services in EU ORs and OCTs and supporting local actors committing to relevant conservation measures on the ground, drawing on the experience gained with EU nature conservation legislation and programmes.

Implementing the BEST Preparatory Action (2011-2013), the European Commission had launched two open calls for proposals in 2011 and 2012, respectively, and selected 16 of the 84 submitted projects in the EU Overseas regions for funding. Among these was one Macaronesian project - "ECOSUBVEG-Changes in submersed vegetation: assessing loss in ecosystem services from frondose to depauperate systems dominated by opportunistic vegetation" (2013-2016). A first partnership with the French Agency for Development (AfD) allowed financing of two additional projects. The overwhelming demand for financial support – exceeding six times the available budget – and the high quality of project proposals demonstrated the need for funding directed to projects aimed at protecting EU Overseas biodiversity.

In 2013, the third and last year of the BEST Preparatory Action, it was decided by the European Commission to open a call for tender for optimizing the last year and undertaking measures for sustaining this European initiative. In this context, IUCN and partners (UICN France, TAAF, SAERI, WWF France, SPAW-RAC and FRCT) submitted a successful offer to the open call for tender for "Measures towards sustaining the BEST preparatory action to promote the conservation and sustainable use of biodiversity and ecosystem services in EU outermost regions and overseas countries and territories", through which the European Commission implemented the third year of the BEST Preparatory Action. The contract for this 4-year project was signed in December 2013.

The overarching aim of the BEST III project is to implement useful and critical measures for the future of BEST and sustaining the EU's BEST initiative. More specifically, the project aims to strengthen biodiversity conservation and climate change adaption in Europe overseas by raising Europe overseas' profile and generating support for action and proposing mechanisms to enhance biodiversity and climate change policies and programmes targeted at Europe overseas.

Seven knowledge hubs (Figure 2) coordinated by project partners (UICN France, TAAF, SAERI, WWF France, SPAW-RAC and FRCT) that are anchored and well established in the respective regions developed regional ecosystem profiles and investment strategies in cooperation with local actors. These regional ecosystem profiles and strategies provide a comprehensive overview of the threats to biodiversity and ecosystem services as well as current conservation activities and investment but also outline the challenges and needs in the ORs and OCTs.

The Ecosystem Profile

The ecosystem profiling process follows a methodology, established by the Critical Ecosystem Partnership Fund (CEPF), adapted to the particular situation and needs of the EU Overseas. At the heart of this profiling process is a field-based, participatory and scientific approach: using a combination of desktop review of existing information and a series of consultations with local actors and authorities each ecosystem profile is developed to efficiently guide actions on the ground as well as to identify thematic conservation priorities and future projects to be considered for funding. The regional participation process assures that the final outcome is owned and used by stakeholders in the region to allow focussing research and management efforts and directing future funds to where their application can have the highest positive impact.

Using a field based and participatory approach, these regional ecosystem profiles provide a rapid assessment of biological priorities and the underlying causes of biodiversity loss within particular ecosystems. The profile couples these two elements with an inventory of conservation related investment taking place within the region and other key information to identify how donors funding can provide the greatest incremental value.

The results of this Ecosystem Profile are the basis for the elaboration of the accompanying regional investment strategy, which aims to give strategic directions as well as concrete suggestions for activities and projects in the region, which are in synergy with relevant ongoing activities. This Investment Strategy provides a clear picture of what the conservation priorities are, identifying the niche where investment can provide the greatest incremental value for conservation, enabling donors and programmes to effectively target their efforts.

This ecosystem profile, coordinated by *Fundo Regional para a Ciência e Tecnologia* (FRCT), presents an overview of the Macaronesian region in terms of its biodiversity conservation importance, major threats to and root causes of biodiversity loss, and the socioeconomic, policy and civil society context in which conservation takes place. The profile also presents assessments of patterns of conservation investment in the Macaronesian region over the last decade. It defines a comprehensive suite of measurable conservation outcomes at species, site and corridor scales and identifies conservation priorities.

This report follows the above discussed main principles of ecosystem profiling and presents the biological and thematic basis for conservation investments in the Macaronesian biogeographical region composed of 3 European Overseas Regions - the Portuguese archipelagos of Azores and Madeira and the Spanish archipelago of the Canary Islands (Figure 2). Although Cape Verde is also part of the Macaronesian region, the area considered in this project is the European Macaronesian region for political consistency, to include only archipelagoes that are outermost regions (ORs) of the European Union, linked to Portugal and Spain.

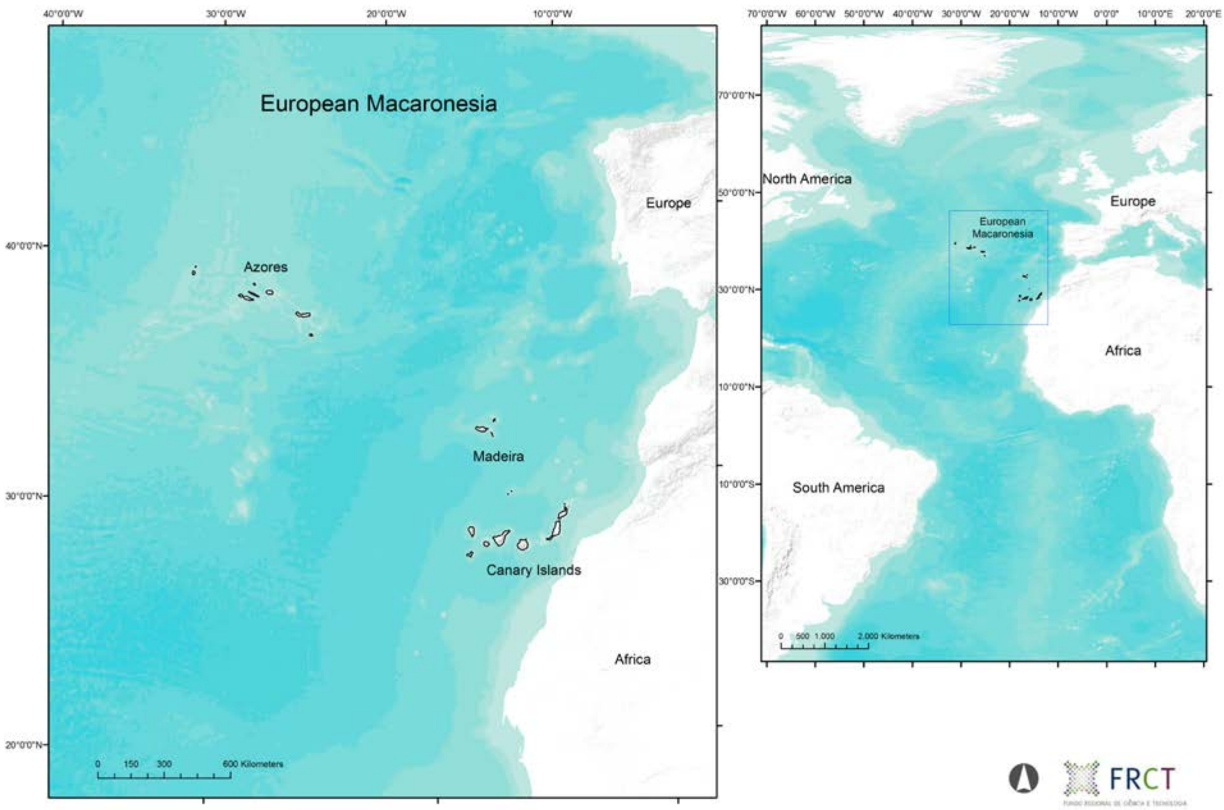

Figure 3 –European Macaronesia

These three archipelagos are the most important centres of biodiversity in the Mediterranean bioclimatic region (Martín et al., 2008), one of the 35 biodiversity hotspots recognized on the planet. As a result of their isolation and geological history, these islands shelter a large number of endemic taxa. In fact, more than 5,300 endemic species are known at present, in about 10,600 km2 that make up the 18 islands and several islets of these three archipelagos (Martín et al., 2008).

However, species populations in the region have become increasingly fragmented and isolated as a result of pressures caused by human activities. High population density and mountainous landscapes, originated by the volcanic origin of the islands, lead inhabitants to colonize all the available plains to the detriment of the wooden areas; coastal and low elevation ecosystems have been the subject of intensive urban development and agriculture and livestock breeding activities. In addition, many alien species have been introduced. Currently, the predominant economic model based on tourism involving an intensive use of natural resources, still represent a clear threat to the biodiversity of the islands.

The Ecosystem Profile allows a crucial assessment of priorities in biodiversity conservation in the region, highlighting its value in global terms. Simultaneously, the strategies developed are essential to focus research and management efforts and to direct funds to where their application can have the highest positive impact.

2. BACKGROUND

In 2010, an Ecosystem Profile was developed by CEPF for the extensive Mediterranean basin, including the three Macaronesian archipelagos in the Atlantic Ocean. However, the present EP – dedicated only on the Macaronesian region - allowed for much more in-depth stakeholder consultations and thus should not be understood as an "update" of the relevant parts within the 2010 CEPF document. Regional expert workshops are crucial for consolidating, synthesizing and, especially reviewing and interpreting data-driven conservation planning.

The Macaronesia Ecosystem Profile was coordinated by "Fundo Regional para a Ciência e Tecnologia", an autonomous body of the Azores Government with project coordination skills and management of financial resources in scientific research and technological development, in collaboration with the BEST Central team, CEPF experts and supported by a process of local stakeholders consultation.

The EP presents an overview of the Macaronesian biogeographical region in terms of its biodiversity conservation importance, major threats to and root causes of biodiversity loss, and the socioeconomic, policy and civil society context in which conservation takes place. The profile also presents assessments of patterns of conservation investment over the last decade. It defines a comprehensive suite of measurable conservation outcomes at species, site and corridor scales, and identifies priorities for conservation investment within these.

The profiling process took place between 2014 and 2016. An overview of the main stages of the development of the EP is described on Table 1.

Table 1. Main phases in the development of the Ecosystem profile for the Macaronesian region

Phase	Description
Preparatory work (Jun-Aug 2014)	- Preparation of work plans and reference lists for the profiling process - Compiling list of stakeholders - Desk review of data information for the Macaronesian entities; - List of Macaronesian threatened species - List of all Macaronesian areas under different protection status; - Gathering of geographic information on threatened species distribution
First contacting and promotion of BEST III (Jul-Oct 2015)	- Information on the BEST III initiative sent to local stakeholders and published in local newspapers - List of threatened species made available online (at http://goo.gl/CahYZT) and circulated for review by all stakeholders - List of all sites under different protection status made available online (at https://goo.gl/r9JhbZ). - Development of website (http://www.azores.gov.pt/Gra/BEST_III_Macaronesia/) to
First round of workshops and consultations (Nov 2014)	- Public presentation of BEST III and Macaronesian Hub - First workshop with local stakeholders: species distribution and protected areas - lists and mapping reviewed with local actors

Phase	Description
Consolidation of threatened species and their distribution	- Review of list of threatened species - Addition of geographic information on threatened species distribution
Analysis and KBA delineation (Apr-Sep2015)	- Species and sites analysis and preliminary KBA delineation - Development of the Macaronesian KBA geoportal (http://servicos-sraa.azores.gov.pt/best_iii_macaronesia/)
Second round of workshops and consultations (Oct2015 & Feb2016)	- KBAs identification and mapping reviewed with local actors in Madeira, the Canary Islands (October 2015) and the Azores (February 2016) - Discussion on the methodology to identify site vulnerability, necessary for KBA priorization
Promotion of BEST III in Brussels (Oct2015)	- Presentation of the Regional Ecosystem profile draft for the Macaronesian region at the European Commission in Brussels; - Internship (October 19-31) at the European Commission and IUCN in Brussels. Technical sessions on the EP methodology
Consolidation and validation of KBAs (Nov2015-Feb2016)	- Consolidation and priorization of KBAs - Validation of final KBAs with stakeholders
Development of EP (Dec2014-Apr2016)	- First draft of the EP (December 2015) - Final draft of the EP (April 2016)
Validation and review of EP (May-Jun 2016)	- EP draft shared with stakeholders for final validation - Integration of stakeholders' comments and suggestions - CEPF and IUCN review
Final Macaronesian EP (Jun 2016)	- Final Regional Ecosystem profile for the Macaronesian region
Promotion of Macaronesian EP results (Jul2016)	- Presentation of Macaronesian EP and its results on the International Conference Island Biology 2016 (Azores)

The preparation work was undertaken as a desk study during the first months of the ecosystem profiling process and included the compilation of an extensive list of references, relevant stakeholders for the consultation process, comprehensive databases on globally threatened species and sites under protection status in Macaronesia, and collection of distribution data of target species. At the same time, the project was disseminated to stakeholders by email and in local newspapers for a broader acknowledgment of BEST III in Macaronesia.

The consultation process included two main rounds of workshops. The public presentation of the BEST initiative and the first technical workshops of the BEST III project were carried out during November 2014 in five cities from the three Macaronesian archipelagos. In each place the work consisted of a session for the public presentation of the project and a technical workshop where the KBA definition methodology and the current state of data collection and analysis were presented, followed by a structured discussion around the workshop's objectives. In total the workshops brought together 80 people (Table 2), covering the public and research sectors (25% and 68% respectively), as well as the civil society (7%). From these, 33 people attended the public session and participated in the workshops, nine only participated in the workshops and the remaining 38 only attended the public presentation. The full list of participants is given in Appendix 1.

In each location the work consisted of a 30-minute general presentation of the project, followed by a period of discussion. The technical workshop consisted of a 30-minute presentation to introduce the methodology of KBA definition and to present the work done by the Macaronesian Hub and the objectives of the workshop, followed by a structured discussion around each of these objectives.

Evaluation sheets were provided in all sessions. The overall rating exceeded 4/5 (see Appendix 2). The opportunity for cooperation between institutions, the identification of knowledge gaps and the potential funding were some of the positive comments received. On the negative side, participants pointed out the low dissemination of the event and the reduced previous information received, and many questioned particulars of the KBA methodology used.

Table 2 – Public presentation and first round of workshops: locations, dates and attendance

Date	Location	Number of participants						
		Public session	Technical session	Know./research institution	NGO	Public/Gov. organization	Private sector	Total
10-11 Nov 2014	Azores	31	18	27	2	7	0	36
18-19 Nov 2014	Canary Is.	26	14	20	2	6	1	29
24 Nov 2014	Madeira	14	10	7	1	7	0	15
Total	Macaronesia	71	42	54	5	20	1	80

The main highlights of this series of meetings were:

- Consolidation of the visibility of the project, and of the stakeholder engagement with it. In particular, regional governments in all the 3 archipelagos became aware and supported BEST III.
- Perceived need to reinforce the buy-in of stakeholders (mainly researchers) who have invested in previous compilations of research and conservation needs and who may see this process as a redundancy, or even a menace to what was built previously.
- Secured access to distribution data and to maps of protected areas.

The outcome of this first consultation process was very positive. The key actors in biodiversity conservation were involved and became aware of the BEST III goals and of the methodology involved. Workshop participants have provided important information and suggestions, and have shown their motivation to continue collaboration with the project. From these actors it was possible to reach others, whose different competences and knowledge were needed for the subsequent phases of the project.

The second round of workshops, carried out between late 2015 and early 2016, was organized on 14 different sessions, each focused on one specific taxonomic group of each archipelago. The main objective was to assure that the proposed KBAs covered all important areas for all threatened species from each taxonomic group.

In total, the stakeholders consultation of this second phase mobilized 41 persons, well distributed by the three archipelagos: 14 in Madeira and in the Azores and 13 in the Canary Islands (

Table 3). Participants from knowledge/research institutions accounted for 53% of attendants, governmental representatives for 32% and civil society for 15%. The full list of participants is given in (Appendix 3).

Participants generally approved the KBA delineation but offered suggestions and additional data, which have contributed to improve the KBA results. Although no specific objections to the KBas have been put forward, stakeholders warned that the information base used does not accurately reflect all species distribution. In particular, comprehensive distribution data for marine species is lacking, most existing information resulting from studies focused on limited areas. In this case, the agreed strategy was to consider MPAs as KBAs as long as records exist to fulfil the definition criteria. An effort to collect and analyse this scattered information was therefore carried out, with the help of stakeholders.

Some participants were surprised by the large extension of the area covered by KBAs. A more conservative drawing of the KBAs, however, is dependent on improving the accuracy of the species distribution areas and on crossing that information with soil use and vegetation maps. This should be a priority for later versions of the EP if the information base is improved and is available.

Table 3 – Second round of workshops: locations, dates and attendance

Date	Location	Number of participants				
		Know./research institution	NGO	Public/Gov. organization	Private sector	Total
5-6 Oct 2015	Madeira	6	1	6	1	14
8-9, 13 Oct 2015	Canary Is.	7	3	3	0	13
2-5 Feb 2016	Azores	9	1	4	0	14
Total		22	5	13	1	41

Major steps were given in the assessment of the vulnerability of the KBA sites necessary for KBA priorization. A general methodology was put forward: given the large number of KBAs and that the implementation of major threats depend on the protection of the sites, it was agreed to define site vulnerability according to the protection level of each KBA.

Besides the discussion on proposed KBAs and priorization, threats, priority actions and financing needs were also discussed during the workshops.

Globally, the 20 workshops carried out in five Macaronesian cities during the profiling process mobilized 83 people (42 in the first round and 41 in the second) from the conservation community, including NGOs, scientists, public authorities and local governments and the private sector.

Besides bringing together the conservation community around the common goal of making a shared diagnosis to establish priorities and identify investment priorities, the consultation workshops allowed sharing data and knowledge. This was illustrated, for example, by the exchange among some scientists and the managers of online biodiversity databases in the Canaries: not only some stakeholders became aware of this biodiversity database, but also they could share some of their knowledge, thus contributing to the enrichments of the database after the workshops.

The consultations on workshops were supplemented by small group skype meetings with stakeholders, one-to-one interviews and email correspondence with local actors and experts. Moreover, a webpage on the FRCT website was created not only to promote the BEST III project but also to facilitate information sharing and communication with stakeholders (http://www.azores.gov.pt/Gra/BEST_III_Macaronesia/). In addition, regular consortium meetings and bilateral meetings were conducted between the BEST central team, CEPF experts and the regional hubs to provide information and support on regional workplans, EP methodology and progress.

Figure 4. Snapshots from the stakeholder consultation workshop held in Macaronesia

The final stakeholders consultation was made on the draft version of the present Ecosystem Profile, circulated in May 2016. Comments received were integrated into a final draft, which was then reviewed internally by the CEPF and IUCN coordination team.

3. BIOLOGICAL IMPORTANCE OF THE AREA

Geography

Macaronesia, which comprises in the volcanic archipelagos in the North Atlantic Ocean off the coast of Europe and Africa - Azores, Madeira, including the tiny archipelago of Salvages, and Canary Islands – (Figure 3), as well as Cape Verde (not belonging to the European Union), is a biogeographical rather than a political entity, based on the existence of many shared elements in the floras and faunas of the constituent archipelagos. From now on our comments will be referred only to the three northernmost (belonging to the European Union) archipelagos, living aside Cape Verde. This configuration has also been called European Macaronesia.

The region (Table 4) comprises 18 inhabited main islands (Azores: S. Miguel, Sta. Maria, Terceira, Graciosa, S. Jorge, Pico, Faial, Flores and Corvo; Madeira: Madeira, Porto Santo; Canaries: Lanzarote, La Gaciosa, Fuerteventura, Gran Canaria, Tenerife, La Palma, La Gomera and El Hierro). Furthermore, seven non-permanent inhabited islands larger than 1 km2 (Ilheu da Cal, Deserta Grande, Bugio, and Selvagem Grande in Madeira, as well as Alegranza, Montaña Clara and Lobos in the Canaries) and more than one hundred islets and rocks that do not reach that size. The archipelagos range across a considerable latitudinal range: between 27º N (El Hierro, Canarias) and 39º N (Corvo, Azores), and between 13º W (Roque del Este, Canaries) and 31º W (Flores, Azores). Moreover, the distances from the African and European mainlands vary hugely: Fuerteventura is only 96 km away from the African coast (Stafford point, Western Sahara), whereas São Miguel lies 1,369 km away from Cabo da Roca in continental Portugal. On the other hand, Corvo is virtually equidistant from Cape Race in Newfoundland, Canada and Lisbon, Portugal (about 1,900 km away from both).

Table 4. Geographic parameters of the Macaronesian archipelagos.

Parameter	Azores	Madeira	Canaries	Macaronesia
Country	Portugal	Portugal	Spain	**Portugal and Spain**
Nº of main islands	9	2	7	**18**
Land Area (km^2)	2,322	802	7,447	**10,571**
EEZ (km^2)	926,149	442,316	456,237	**1,824,702**
Maximum elevation (m)	2,351 (Pico)	1,862 (Madeira)	3,718 (Tenerife)	**3,718**
Continental isolation (km)	1,369 (São Miguel)	630 (P. Santo)	96 (Fuerteventura)	**96**
Mean intra-archipelago isolation (km)	220	32	196	**-**
Age of the oldest emerged island (My)	8 (Sta. Maria)	14 (P. Santo)	21 (Fuerteventura)	**27**
Last subaerial volcanic eruption	1957 (Faial)	25 Ky BP (Madeira)	1971 (La Palma)	**1995**
Latitude (°)	37- 39 N	33 N	27 - 29 N	**27 - 39 N**
Colonization date	1432 AD	1420 AD	ca. 2,500 BP	**-**
Human population (M)	**0.25**	**0.26**	**2.1**	**2.6**

Sources: J.M. Fernández-Palacios (2010); SREA (2015a); DREM (2015); ISTAC (2015c); Ministério da Defesa Nacional-Marinha (s.d); Suárez de Vivero (2011); ISTAC (2015a).

Azores

The Azores archipelago is an autonomous region of the Republic of Portugal and is formed by nine islands: Santa Maria, São Miguel (that make up the Eastern Group), Terceira, Graciosa, São Jorge, Pico, Faial (Central Group), Flores and Corvo (Western Group), including also some uninhabited islets. The three island groups are separated by 1000-2000 m deep sea channels, except for Faial and Pico islands, between which the channel is, in many parts, only 20 to 50 m deep.

Figure 5 – Map of the Azores

The Azores archipelago lies in the far out in the Atlantic Ocean between parallels 36°55' and 39°43' latitude North and meridians 20°00' and 31°16' longitude West. Their location gives them the distinction of being the most remote group of islands in the North Atlantic. The islands are distributed diagonally over approximately 66,000 km², with a marked Northwest - Southwest orientation along a length of approximately 600 km. At the Western end of the Archipelago is Flores Island (at a distance of approximately 1,900 km from Newfoundland, in the North-American subcontinent) and at the Eastern end is the Island of Santa Maria (at a distance of approximately 1,570 km from the West coast of the continent of Europe). Its strategic location midway between North America and Europe contributed to a historical role in trans-Atlantic navigation. Today, the maritime and oceanic dimension of the Azores, with a Economic Exclusion Zone (EEZ) of nearly one million km² (60% of the Portuguese EEZ), and its location at a crossroads between ocean routes and the European, African and American continents place the archipelago and Portugal in a position with important comparative advantages, as a platform and hub to mobilise and create value associated with the sea.

The Azores archipelago has quite varied dimensions (between 17 km² of Corvo and 745 km² of São Miguel), with a total surface area of 2,322 km². Pico Island holds the highest mountain of Portugal, at 2,351 metres above sea level.

The total length of the coastline of the nine islands is around 943 km and the region includes an Exclusive Economic Zone (EEZ) of 926,149 km². This surface area accounts for about 30 % of the European EEZ (Government of the Azores, 2014).

Madeira

The Madeira archipelago is also an autonomous region of the Republic of Portugal situated in the Atlantic Ocean to the west of Morocco. It consists of 2 main islands, Madeira (742 km², 90%

of the archipelago area) and Porto Santo (43 km²), surrounded by six inhabited islets (Ilheus da Cal, Cenouras, Cima, Fora, Ferro and Fonte de Areia) which form a nature reserve, three small islets known as Desertas (Ilhéu Chão, Deserta Grande and Bugio, uninhabited nature reserve of 14 km²) and the small sub-archipelago of Selvagens (uninhabited nature reserve of 3.6 km²), with its two small islands (Selvagem Grande and Selvagem Pequena) and several small islets (Ilhéu de Fora, Ilhéu Comprido, Ilhéus do Norte).The archipelago lies in the far out in the Atlantic Ocean between parallels 30°01' and 33°07' latitude North and meridians 17°15' and 15°51' longitude West. The capital of the archipelago, Funchal, is about 660 kilometres from the African coast and 980 kilometres from Lisbon.

Like the Azores, the Madeira archipelago was uninhabited at the time of its discovery by the Portuguese: the current population is descended from the colonizers, and mainly Portuguese.

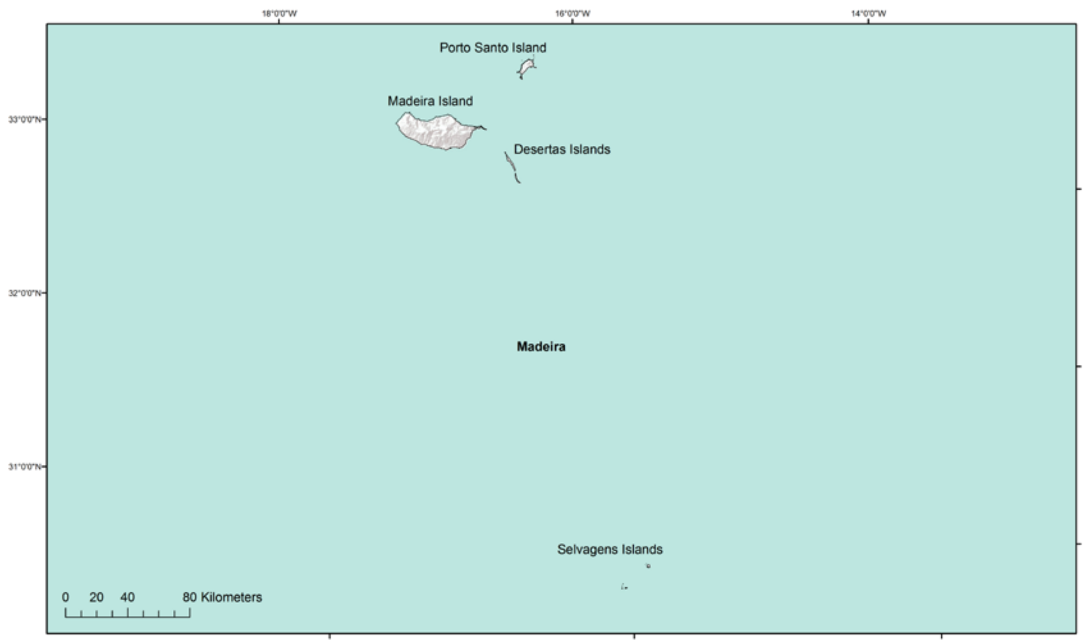

Figure 6 – Map of Madeira archipelago

Canary Islands

The Canary Islands, an autonomous region of Spain, are located in the Atlantic Ocean, between parallels 27º37’ and 29º25’ latitude North and 13º20’ and 18º10’ longitude West, lying off the Northwest coast of Africa at a distance of 96 km at their nearest point, this being Punta de La Entallada, situated on the Eastern coast of Fuerteventura.

Figure 7 – Map of the Canary Islands

The region consists of seven major islands divided into two administrative provinces: the Province of Las Palmas, formed by the islands Gran Canaria (1560 km2), Fuerteventura (1655 km2) and Lanzarote (807 km2), and the Province of Sta. Cruz de Tenerife with the islands of Tenerife (2038 km2), La Gomera (370 km2), La Palma (708 km2) and El Hierro (269 km2). There are also 4 minor islands larger than 1 km2, La Graciosa, Alegranza, Montaña Clara and Lobos, the first being the only inhabited one and lying to the North of Lanzarote. In addition there are a great number of small islets and rocks spread over the whole archipelago.The archipelago is nearly three times the area of the Azores, and 10 times larger than the Madeiran group (see Table 4). It occupies a total surface area of 7,447 km², unequally distributed over its 7 islands, these varying between the 287 km² of El Hierro and the 2,036 km² of Tenerife, and where only four islands exceed 1 km². It is the Spanish region with the longest coastline, 1,583 km. The El Teide volcano on the island of Tenerife, which culminates at 3,718 m, is the highest summit in Spain.

Unlike Azores and Madeira, which were uninhabited until the early 15th century, the Canary Islands have a relatively long history of human occupation. Although the precise timing of human colonization from northwest Africa is uncertain, the sparse archaeological evidence suggests a date of around 2500 BP by the Guanche people, an ethnic group related to the Berbers (J.M. Fernández-Palacios, 2010). Castilian Conquest and settlement followed in the 15th century, and today more than 2 million people inhabit the islands.

Geology

All Macaronesian islands share a number of common features, such as being oceanic and of volcanic origin, having formed over oceanic crust, and never having been connected to continental landmasses. Additionally, the Macaronesian islands present peculiar geological characteristics, such as some being formed by the merging of palaeo-islands, and islands within an archipelago not geographically arranged in chronological order of emergence. However, the mechanisms forming the different islands vary greatly from group to group, resulting in a highly dynamic and complex set of archipelagos.

The Macaronesian volcanic islands are formed from the ocean floor either in association with mantle-plume hotspots (Madeira and the Canaries, Geldmacher et al. 2005) or the spreading of the Mid-Atlantic ridge (Azores, França et al. 2005). The Canary Islands, in particular, differs markedly from the "typical" archipelagos of the Pacific, such as Hawaii and Galapagos, in that most of the islands are relatively close to continental source areas. For example, the easternmost Canary Island, Fuerteventura, is currently less than 100 km from the west coast of Morocco, and has been within 65 km during the sea level minima associated with the most extreme Pleistocene glacial stages (Fernández-Palacios et al., 2011).

The islands exhibit a comparatively old and broad range of geological ages, from 0.25 million years for Pico (Azores) to 27 My for Selvagens. However, if the seamount configuration and geological history is taken into consideration, the so-called Paleo-Macaronesia extends back to 60 Ma, at the start of the Tertiary (Fernández-Palacios et al., 2011).

In addition to the differences in their patterns of emergence from the oceanic crust, the geological complexity of the Macaronesian system is also apparent in the process of island construction. The location of the Macaronesian islands in zones with long active volcanic histories determines their rock substrata and has a great influence on their geomorphology. It also means that these environments are cyclically subjected to radical transformations associated with eruptions, involving the complete destruction of life followed by slow re-colonisation. Consequently, the landscapes of the islands are very heterogeneous. There are zones of ancient rock formations, unaffected by these phenomena, where erosive processes have had time to act and where living things have had a chance to evolve together, which has given rise to complex, diverse and stable ecosystems. Along with these, are zones affected by recent volcanic activity, lava flows that have completely altered the original topography and which are starting to be colonised by the vegetation (Triantis, Borges, Hortal, & Whittaker, 2010). The most recent additions to islands from volcanic activity are the ones resulting from the Capelinhos eruption of 1957-1958 in the Azores, and the Teneguía eruption of 1971 in La Palma, Canary Islands, when that island grew 4 km^2.

This is a particularly important feature of the Macaronesian Islands, since most of them (if not all) have suffered repeated volcanic episodes, some of them potentially capable of extinguishing multiple lineages while putting new terrain in place, thus replenishing area and habitat. Consequently, although the maximum age of each of the islands (i.e., their age of emergence from the sea) is more or less agreed upon, it is not always clear which estimate is most appropriate to describe the time available for the establishment, evolution and extinction of lineages and species, particularly when different taxa are considered (see e.g. Borges & Hortal, 2009; Whittaker & Fernández-Palacios, 2007)

These two described features - detachment from continental source areas and old and broad range of geological ages - contribute to several unusual patterns of colonization and diversification and to relatively high levels of genetic variation compared to other oceanic archipelagos.

Azores

Geologically, the Azores comprise a 20-36-million-year-old volcanic plateau; the oldest rocks (composing Santa Maria Island) emerged 8.120 million years ago, whereas the youngest (forming Pico Island) are about 250,000 years old. Some 50 Ky ago the volcanic activity merged together the palaeoislands of Sete Cidades and Nordeste-Povoação-Furnas to form today's São Miguel (Forjaz, 2002, in Borges et al., 2009). Finally, in the last glaciation sea-level fall Faial and Pico have merged together and some rocks (Formigas) and submarine banks (João Castro) emerged forming stepping-stones which enhanced intra-archipelago dispersal (Kämmer, 1982, in J.M. Fernández-Palacios, 2010).

Located on both sides of the Central Atlantic Submarine Ridge, the western and eastern extremes of the archipelago are actually drifting away. The geostructural environment of the Azores Plateau, defined by the 2000-m bathymetric contour line, is dominated by the confluence of the American, Eurasian, and African lithospheric plates. Thus the Azores archipelago is characterized by high volcanic activity typical of a ridge-hotspot interaction (i.e., a hotspot on a slow-moving plate). As opposed to the Hawaiian Islands, which are chronologically arranged, the Azorean islands do not show any correlation between their distances to the hotspot and their individual ages of emergence. The eastern parts of all Azorean islands are geologically the oldest, which is the result of the particular seism-volcanic mechanisms of this archipelago. This tectonic feature is responsible for many volcanic eruptions (e.g., Capelinhos, Faial Island, 1957-1958) and tectonic earthquakes (e.g., Terceira and S. Jorge islands, 1980; Faial and Pico islands, 1998).

As a result of several recent historical lava flows, there is a great concentration of lava tube caves and pits in the Azores. A total of 250 underground cavities, including lava tubes, volcanic pits, pit-caves, and sea-erosion caves, are known to exist on the Azores, creating many kilometres of cave passages, extraordinary geological formations, and unique fauna adapted to caves.

The recognition of the international significance of the Azorean geological heritage comes up with the establishment of the Azores Geopark in 2010 and its integration into the European and Global Geoparks Network in 2013, being the first archipelagic geopark. With the approval of the Programme for International Geoscience and Geoparks of UNESCO in November 2015, the Azores Geopark became a UNESCO territory, along with the World Heritage sites and Biosphere Reserves. There are 121 geosites in the Azores scattered throughout the nine islands and surrounding seabed.

Madeira

The Madeira archipelago comprises only one volcanic complex (the Madeira-Porto Santo) that is interpreted as being a long-lived "hotspot" rising from the mantle (Carvalho & Brandão 1991, in Borges et al., 2008). Porto Santo (14 My) is the oldest island of the archipelago and is in an advanced destruction stage, whereas Madeira, which experienced its last volcanic activity some 25 ky ago (Prada & Serralheiro, 2000, in J.M. Fernández-Palacios, 2010), is still high and full of cliffs and ravines, a feature that actually has served to enhance the conservation stage of its nature.

The Madeira Island properly is composed of seven geological units. The Pico Ruivo (1,861 m above sea level) is the highest point of the corresponding volcanic relief and rises to about 5,300 m above the Madeira abyssal plain from which this entire complex volcanic group has been built. The emerged part of the Madeira island dates back to the Post-Miocene, <5,6 Ma

(Geldmacher et al., 2000, in Borges et al., 2008) and the more recent volcanic activity took place 6,000-7,000 years BP (Ribeiro et al., 2005, in Borges et al., 2008). Porto Santo is much older with an estimated age of 14 million years. The volcanic activity in Porto Santo stopped 8 Ma. Whereas the older Porto Santo is in advanced destruction stage, Madeira island is still high and full of cliffs and ravines, a feature that actually has served to enhance the conservation of its nature (J.M. Fernández-Palacios, 2010).

The Selvagens islands have an estimated age of 27 My and were originated by the same hotspot of the Canary Islands. Today these islands are almost completely eroded back to sea level.

Canary Islands

The Canaries are the product of a mantel plume hotspot, which has been active for more than 60 million years, producing due to the slightly counterclockwise rotation of the Africa Plate an array of islands ordered in increasing geological age from West to East. The same hotspot has produced as well older seamounts (Palaeocanaries) that were former islands but are nowadays drowned beneath the sea level due to the erosion north to Lanzarote, forming together with the extant islands the Canarian Volcanic Province. The present location of the hotspot is between La Palma and El Hierro, the two westernmost and youngest islands of the archipelago (Carracedo, 2011).

Despite its age (21 My for Fuerteventura), the Canary Islands remain volcanically active, as proves the fact that four of its seven main islands have experienced historic volcanic activity (from the Castilian Conquest of the islands which happen between 1402 and 1496, to the present). Those are: i) Lanzarote, with the largest eruption we do know for the Canaries lasting from 1730 to 1736 and destroying one fourth of the island; ii) Tenerife with seven different eruptions in these last 6 centuries, the latest Volcán de Chinyero in 1909; iii) La Palma, with ten volcanic eruptions, the latest Volcán de Teneguía in 1971, by which the island increased its area in ca. 4 km^2, and finally, iv) El Hierro with the latest volcanic episode of the archipelago, the submarine eruption of La Restinga, which happen in 2014. Gran Canaria has had a large Holocene activity, with Caldera de Bandama, its latest eruption, some 2000 years ago. Fuerteventura has also recent volcanism, although not in the Holocene and finally, La Gomera is experiencing a hiatus that has already lasted ca. 3 million years

During their formation the islands also experienced catastrophic erosive events, with several huge landslides that have destroyed large parts of them in a very short time period, provoking tsunamis that affected nearby islands and the mainland.

Although the archipelago has never been connected to the mainland, the Pleistocene glaciation cycles have largely transformed their geographic configuration, for instance, reiteratively doubling and halving the archipelago area, with consequences as the fusion of nearby islands (Lanzarote, Fuerteventura and satellite islets) in a single landmass (today called Mahan), as well as the emersion of several submarine banks (Amanay, Dacia, Concepción), or the diminution of the distance to the African mainland (García Talavera, 1999, in J.M. Fernández-Palacios, 2010), all of which facilitating dispersal processes.

Climate

The climate of Macaronesia is influenced by the semi-permanent Azores high-pressure system, prevailing north-easterly trade winds, and the surrounding ocean, including the Azores and

Canary Current (Cropper & Hanna, 2014). The latitudinal spread and the morphology of the islands add further variability. Therefore, the climate is classified (Climate Atlas, 2012) as dry in many of the islands in the Canaries and also on Porto Santo and as Mediterranean (fresh, humid winters and warm, dry summers) in the remaining islands of the Canaries and in Madeira. An oceanic temperate climate (cool, wet) prevails throughout the year in the Azores. In the highest elevations the climate is cold (Teide, Canaries, 3,718 m) or even polar (Pico, Azores, 2,351 m).

Azores

The Azores' climate, heavily influenced by the Gulf Stream, is categorised as temperate maritime and is characterised by its mildness and its small thermal range (the average values vary between 14 ºC and 18 ºC in coastal areas and between 6 °C and 12 °C in the areas of higher altitude, except at Pico Mountain, where the temperature is below 2 °C), high levels of air humidity (with an annual average value of around 80%) and persistent winds (Climate Atlas, 2012; WWF, 2015d). The precipitation is more abundant in the Azores in November, December and January, registering on average during these months, amounts greater than 500 mm (up to 1 665.6 mm on the western group) (Climate Atlas, 2012).

Madeira

The general climate of the Madeira archipelago is greatly influenced by the subtropical anticyclone of the Azores and is mainly governed by the trade winds from the North and Northeast. The climate is temperate to sub-tropical, but the predominant winds lead to a clear north-south differentiation: the north slopes have high precipitation and a persistent cloud cover from 600–800 m up to 1600 m, while the south is dryer. Wind exposure and mountain peaks are prominent factors allowing the development of climax communities of native species and ever green forests by creating a cloud layer at ca. 1,000 m altitude by a combination of high dry winds and lower humid sea breezes. At higher altitudes, both frost and snow may occur.

Canary Islands

The Canary Islands span a transition zone between two climate types, temperate and subtropical, with mild temperatures in the coasts that vary between 18 and 21º C, and very small annual variations (WWF, 2015a). However, in function of altitude, exposition and orography, very different climates can be found. The values of annual average air temperature varies between 20 ºC and 21 ºC, for the areas located at sea level, while values below 4 °C are found on the "Pico de Teide" on the island of Tenerife (Climate Atlas, 2012). Areas with annual average temperatures below 10 °C in higher areas of the island of Palma are also found, while on the islands of El Hierro, in Gran Canaria and La Gomera, the average annual temperature values occur in the higher areas of the interior of the islands, around 12 ºC (Climate Atlas, 2012). In fact, despite their proximity to Africa (in latitudes similar to those of the Sahara, Egypt and Saudi Arabia), the Canaries show a wide range of different mesoclimates apart from sub-desert landscapes. This is caused by several factors such as elevation and orientation, but especially because of the influence of northeast to southwest sea winds, called *alisios* (trade winds). These relatively hot winds become cooler and more humid as they pass over the sea surface. The seas surrounding the islands are cool because of a current flowing north past the islands from cold southern latitudes. Once the *alisios* reach the northern parts of the higher Canary Islands, this moisture is trapped by the dense laurisilva and fayal-brezal (heath) vegetation on the mountain slopes. This vegetation acts as a sponge, condensing moisture in drops as large as 3 mm^3 and producing a phenomenon called horizontal rain (WWF, 2015a).

Most of the water is captured in the north, and the mountains function as natural barriers, so the southern parts of the islands are drier and have proportionally higher temperatures and lower humidity levels throughout the year. Low-lying islands with elevations under 750 m receive no rain from the passing *alisios* so that habitats and climate here are drier and similar to the southern parts of the higher islands (WWF, 2015a). Sometimes, the Archipelago experiences eastern dry winds from the Sahara. This phenomenon is locally called "calima" or "calina," and dust levels in the air become temporally high (Bacallado et al., González et al., Marzol, in WWF, 2015a).

The average annual rainfall of the Archipelago of the Canary Islands presents a very uneven distribution in which the dominant factors are altitude and exposure to the prevailing trade winds. The highest values, exceeding 1,000 mm, are observed in higher altitudes of the island of La Palma, while the lowest values, less than 100 mm, occur on Lanzarote and Fuerteventura as well as on the south coast of the islands of Tenerife and Gran Canaria (Climate Atlas, 2012). The average monthly precipitation also varies throughout the year, with remarkable seasonality. The rainiest months throughout the Canary Islands are December and January. In these months in the highest altitude of the interior of the island of La Palma the monthly average rainfall exceeds 200 mm (Climate Atlas, 2012). While to the contrary, in the coastal areas of southern Tenerife and Gran Canaria and in the east o Fuerteventura the values are less than 20 mm (Climate Atlas, 2012). The driest months of the year are July and August. In most of the Canary Islands almost not precipitation is recorded in July and only in some areas in the north of the islands of Tenerife, La Palma and Gran Canaria, reaching values greater than 5 mm of precipitation in this month (Climate Atlas, 2012).

Ecoregions, habitats and ecosystems

The Macaronesia is part of the Mediterranean Basin Hotspot, the second largest hotspot in the world and the largest of the world's five Mediterranean-climate regions (CEPF, 2015). Covering only 0.3 % of EU territory, the region is home to 19% of habitat types of EU concern (EEA, 2010).

Terrestrial ecoregions and ecosystems

The Macaronesian region integrates four Ecoregions as defined by the World Wildlife Fund (WWF) (Table 5). All four Ecoregions have a “Critical/Endangered” threat status.

Table 5 – Ecoregions in Macaronesia

Ecoregion	Ecoregion category	Ecosystems/Habitats	Archipelago/islands
Canary Islands dry woodlands and forests (PA1203)	Palaearctic (biome: Mediterranean forests, woodlands and scrub)	Xerophytic shrub Thermophilous forest Laurel forest Pine forest High mountain shrub	Canaries: La Palma, Hierro, Gomera, Tenerife, Gran Canaria
Mediterranean acacia-argania dry woodlands and succulent thickets (PA1212)	Palaearctic (biome: Mediterranean forests, woodlands and scrub)	*Argania spinosa* forest *Euphorbia*-dominant succulent shrubland	Canaries: Fuerteventura and Lanzarote
Madeira evergreen forests (PA0425)	Palaearctic (biome: temperate broadleaf and mixed forests)	Coastal vegetation Evergreen dry forest Evergreen wet forest Upland vegetation	Madeira
Azores temperate mixed forests (PA0403)	Palaearctic (biome: temperate broadleaf and mixed forests)	Dark green shrub forest	Azores

Sources: WWF (2015a); WWF (2015b); WWF (2015c); WWF (2015d)

The main terrestrial ecosystems that form these Ecoregions are described below and summarized on Table 6.

Table 6. Distribution of Macaronesian main terrestrial ecosystems

Ecosystem	Azores	Madeira	Canaries	Main floristic elements
Coastal desert scrub		X	X	*Euphorbia*
Thermophilous woodland		X	X	*Dracaena, Sideroxylon, Olea, Juniperus turbinata*
Laurel forest	X	X	X	*Laurus, Picconia, Morella, Ilex*
Pine forest			X	*Pinus*
Summit heath	X	X		*Erica, Calluna*
Summit scrub			X	*Spartocytisus, Adenocarpus*
Lakes	X			*Littorella, Potamogeton, Lemn, Juncus*
Bogs	X			*Sphagnum*
Lava fields	X		X	*Stereocaulon*

Source: J.M. Fernández-Palacios (2010)

Coastal desert scrub

Absent from the Azores, but present in the rest of the archipelagos, the sub-desert succulent coastal scrub characterized by the dominance of endemic spurge shrubs (*Euphorbia piscatoria* in Madeira, *E. anachoreta* in Selvagens, E*. balsamifera, E. obtusifolia,* and *E. lamarckii* in the Canaries) is the African aspect of the Macaronesian islands. Due to their low altitude it is actually the unique ecosystem existing in the Selvagens, is well distributed on the Canaries and only close to the sea in Madeira.

In the Canary Islands, this low elevation arid woodland is present in all the islands at low altitude (0 to 400 m on southern slopes, and a predominant coastal distribution on northern slopes) (Francisco-Ortega, Santos-Guerra, & Bacallado, 2010). This zone is devoid of large trees and is mostly filled with small shrubs and perennial plants with succulent leaves and stems (e.g., *Euphorbia spp*., *Kleinia neriifolia, Ceropegia spp., Aeonium spp., Plocama pendula*) or coriaceous leaves (e.g., *Rubia fruticosa, Neochamaelea pulverulentum, Echium spp*.). Annual rainfall in this zone is below 250 mm (Francisco-Ortega et al., 2010).

In Madeira, the community of herbs and shrubs forming the coastal vegetation is found below 300 m across the archipelago and is dominated by *Euphorbia piscatoria*, *Echium nervosum*, and *Globularia salicina*, all endemic to Macaronesia (Aguin-Pombo & Carvalho, 2010).

Thermophilous woodland

Directly above the coastal desert scrub, but still absent from the Azores, an open thermophilous woodland exists, dominated by tree species of Mediterranean origin such as *Olea, Dracaena, Sideroxylon, Phoenix, Pistacia* (the latter two absent from Madeira), and *Juniperus* (J.M. Fernández-Palacios et al., 2008).

In the Canary Islands, dry sclerophyllous forests (*Rhamno crenulatae–Oleetea cerasiformis*) occur between 400 and 600 m (on southern slopes) and between coastal areas and 600 m (on northern slopes) on all islands (Francisco-Ortega et al., 2010). This plant community receives an average annual rainfall of 400 mm and has strong floristic links to the Mediterranean Thermophile forests, with those on northern slopes being floristically richer than those on southern slopes (Francisco-Ortega et al., 2010). Other than the already mentioned indicator plants for this ecosystem include trees such *Visnea mocanera* and small shrubs such as *Cheirolophus* spp., *Crambe* spp., *Echium* spp., *Rhamnus crenulata*, and *Sideritis* spp.

Laurel forest

Despite the differences in Ecoregions, the largest support for the European Macaronesia biotic relations is based on the existence in those archipelagos of the Atlantic laurel forest ("laurisilva"). This forest is actually an impoverished version of the Palaeotropical Laurisilva that occurred in Central and Southern Europe, as well as North Africa, from the Palaeocene until the late Pliocene glaciations (Barrón & Peyrot, 2006). These ancient forests have disappeared to a large extent but can still be found on all these archipelagos thanks to the thermoregulatory capacity of the surrounding ocean (Petit & Prudent, 2010). This is exactly one of the distinguishing features of Macaronesia, the persistence of species that are extinct on the continents.

Thanks to the remaining coverage of laurel forest in Macaronesia, two sites have been declared a UNESCO Natural World Heritage: the "Laurisilva of Madeira" (in Madeira island) and the "Garajonay National Park" (La Gomera, Canary Islands). The Laurisilva of Madeira, within the Madeira Natural Park, is the largest surviving area of laurel forest and is believed to be 90% primary forest (UNESCO, 1999). These forests display a wealth of ecological niches, intact ecosystem processes, and play a predominant role in maintaining the hydrological balance on the Island of Madeira. The property has great importance for biodiversity conservation with at least 76 vascular plant species endemic to Madeira occurring in the property, together with a high number of endemic invertebrates and two endemic birds. Next to the Laurisilva of Madeira (Portugal), Garajonay National Park preserves an outstanding example of this unique vegetation that covers some 70% of the park's area.

The laurel forest is a dense cloud forest, with a low canopy (5-10 m) in the Azores, but an important one (> 30 m) in Madeira and the Canaries (J.M. Fernández-Palacios, 2010). Laurisilva is extremely biodiverse, comprising mainly arboreal and perennial shrubs with dark green coloured leaves associated with a complex community of trees, bushes, ferns, mosses, lichens, mushrooms and fungi that thrive in damp conditions where water is abundant and the sub tropical climate results in high humidity levels and a relatively high average temperature.

The name "Laurisilva" derives from the fact that four Lauraceous species predominate: Barbusano (*Apollonias barbujana*), Til (*Ocotea foetens*), Laurel (*Laurus novocanariensis*, *Laurus azorica*) and Vinhático (*Persea indica*), all endemic to Macaronesia. The Azorean laurisilva differs from that found on Madeira and on the Canary Islands, as it includes a single species of Lauraceae, several species of sclerophyllous and microphyllous trees and shrubs, and luxuriant bryophyte communities, covering all available substrata. The dominant trees shared by the three archipelagos include genera such as *Picconia*, *Laurus*, *Ilex*, *Prunus* and *Morella*, whereas *Juniperus brevifolia* is exclusive from Azores and *Apollonias*, *Persea* and *Ocotea* are restricted to Madeira and the Canaries (E. Dias, Elias, Melo, & Mendes, 2007). However, other notable species are Aderno (*Heberdenia excelsa*), the Mocanos (*Visnea mocanera* and *Pittosporum coriaceum*) and Sanguinho (*Rhamnus glandulosa*). Associated with these, are large bushes such as Folhado (*Clethra arborea*). Important herbaceous plants are Leitugas (*Sonchus* sp), the geraniums (*Geranium maderense*, *G. palmatum* and *G. rubescens*), the Estreleiras (*Argyranthemum* sp.) and some small orchid such as the extremely rare Madeiran endemic *Goodyera macrophylla*.

In the Azores, the laurel forest is now only represented in small, fragmented patches on the summits of S. Miguel, Terceira, Pico and Flores (Fernández-Palacios et al., 2011).

In the Canary Islands, the humid evergreen forests (*Pruno hixa–Lauretea novocanariensis*) grows between 500 and 1400 m in elevation, with some species reaching more than 20 m in height (WWF, 2015a). Endemic Macaronesian heaths, also known as fayal-brezal, grow from 500 to 1,700 m, as transition vegetation between laurisilva and Canarian endemic pine forests, with which they share some species (*Ilex canariensis, I. perado, Larus novocanariensis, and Picconia excelsa*). There are three distinctive species *Morella faya, Erica arborea* and *E. platycodon*. Three different patterns of distribution can be seen. The first one is the contact zone with laurisilva, where *Morella spp*. are dominant, with some *Erica spp*.; the second one is the typical fayal-brezal association (*Morella-Erica*); and finally the third one is the contact zone with pine forests where *Erica spp*. are more common than *Morella spp*. (González, Rodrigo, & Suárez, 1986). The humid evergreen forests are not found on the most easterly islands of Fuerteventura and Lanzarote, although some small pockets were likely present in Fuerteventura prior to the arrival of European settlers (Francisco-Ortega et al., 2010). The humid evergreen forest has the highest number of endemic plants, invertebrates, and vertebrates (Francisco-Ortega et al., 2010).

In Madeira, the laurisilva forest can be divided into a dry evergreen component, found at lower altitudes with high mean temperatures and low annual precipitation (mostly on south-facing slopes), characterized by *Apollonias barbujana, Visnea mocanera,* and *Picconia excelsa* and a moist evergreen component, growing from 300 m to 1400 m in humid areas with mild temperatures, high precipitation, and frequent coastal fogs, mostly on north-facing slopes and gorges, where *Laurus novocanariensis, Ocotea foetens and Perse*a *indica* predominate (WWF, 2015c). The dry evergreen vegetation has been much reduced, but the evergreen wet laurel forest still occupies 20% of the island (Aguin-Pombo & Carvalho, 2010).

Pine forest

Canarian endemic pine forests (*Chamaecytiso–Pinetea canariensis alliance Cisto–Pinion canariensis*), dominated by the palaeoendemic Canarian pine (*Pinus canariensis*), are present at the higher Canary Islands (Gran Canaria, Tenerife, La Palma and El Hierro) in northern (1200-2000 m) and southern (600-2300) slopes (average rainfall 200-800 mm) (Francisco-Ortega et al., 2010). This vegetation type is absent in Lanzarote and Fuerteventura, and has few small natural pockets on the island of La Gomera.

Previously widespread in southern Europe, the Pine Forest disappeared from the continent with the last glaciations (Pliocene). In their limited range they are mixed with *Adenocarpus spp., Morella-Erica* associations, or even with laurisilva forest (northern), or with *Chamaecytisus spp., Spartocytisus spp.*, and *Ephedra spp*., or *Cistus spp*. or *Micromeria spp*. (southern). Pines can also be found mixed with *Juniperus cedrus* and *J. turbinate canariensis* at higher elevations. Although Canarian endemic pine forests contain a lower number of species compared with other vegetation formations in the Canaries, they have a large number of endemics in all plant groups, including fungi and lichens. Some of these Canarian endemic plants are *Bystropogon plumosus, Aeonium spathulatum, Asparagus plocamoides, Tolpis laciniata* and *Teline sp.* (González et al., 1986).

Summit (heath and scrub)

The more or less common scenario for Macaronesian coastal and mid-altitude ecosystems is absent when the summit ecosystems throughout the region are analysed, mainly due to the peculiar summit climates and dispersal filters. The summits of Pico (the single Azorean island high enough to trespass the laurel forest altitudinal distribution) and Madeira are characterized by a heath dominated by different *Ericaceae* species (J.M. Fernández-Palacios, 2010).

In the Canaries, most of the high islands (Gran Canaria, Tenerife, La Palma and El Hierro) present by contrast at the same altitudes an open, tall (> 30 m) pine forest (J.M. Fernández-Palacios, 2010). Only on La Palma and Tenerife the pine forest is substituted in height by a summit scrub characterized by endemic, cushion-like legumes (*Adenocarpus viscosus* on La Palma and *Spartocytisus supranubius* on Tenerife) and several other endemic species such as *Echium wildpretii* (J.M. Fernández-Palacios, 2010). However, in the past, this could have been an open forest where the Canary Island juniper, *Juniperus cedrus*, dominated. Having been almost driven to extinction for the extraction of timber, the Canary Island juniper is mostly relegated to inaccessible landscapes on Tenerife and La Palma. On the two islands high-elevation dry woodland (*Chamaecytiso–Pinetea canariensis* alliance *Spartocytision supranubii*) is confined to slopes over 2000 m with specific climatic attributes: very low humidity level, scarce rainfalls, very cool winters (-16ºC occasionally registered), warm summers (sometimes more than 46ºC), high isolation year-round, and big contrasts of day/night temperatures (WWF, 2015a).

In Madeira, at higher altitudes, the dry evergreen forest is replaced by an upland vegetation of herbaceous plants and shrubs, with *Erica arborea* being the dominant shrub species. Bryophyte and lichen communities, especially epiphytes, are highly diverse as well (WWF, 2015c).

Lakes

Whereas lakes and ponds are abundant in the Azores, by far the more humid system, the rest of the archipelagos lack them. Nevertheless, in Madeira this is only due to the absence of proper basins, because the water availability is high enough. The Canary Islands although without lakes or ponds keep some permanent water fluxes where fresh water arthropods, including endemic species, may be found.

Mires and bogs

Azorean mires, i.e. peatlands, are an important element of the Azores's volcanic landscape. Further, 74% of the terrestrial areas in the Azores belonging to the Nature 2000 conservation network of European Union are above 500 a.s.l., where mires are a dominant feature (Mendes & Dias, 2013). These peat formations are of most importance in the Macaronesian biogeographic region where peat formations are very scarce, due to inappropriate environmental conditions for peat formation and large human effect on the landscape. Mires hosts several endangered species, among them juniper (*Juniperus brevifolia*), Azorean heath (*Erica azorica*) and fern species (e.g. *Culcita macrocarpa*). In particular, peat bogs found on Flores and Terceira are very rich in endemic species and are also in immediate danger from overgrazing (WWF, 2015d).

Lava fields

With the exception of Madeira and Selvagens (without Holocene volcanism), young volcanic terrain is abundant in all the archipelagos with several historical eruptions, some of them with in the last years or decades, usually dominated in their first stages by the lichen *Stereocaulon Vesubianum* (J.M. Fernández-Palacios et al., 2008).

Marine Ecoregion

According to the MEOW (Marine Ecoregions of the World) classification, the marine Ecoregions proposed by a group of experts at the World Wildlife Fund (WWF) and The Nature Conservancy (TNC) are defined as relatively homogeneous areas that are clearly distinguishable on the basis of the species that inhabit them, as determined by oceanographical or topographical features and by the presence of specific ecosystems (Spalding et al., 2007). For the MEOW classification, the Azores, Madeira and the Canaries formed the Macaronesian Ecoregion, part of the "Lusitanian" marine province, included in the realm "Temperate Northern Atlantic", with an extension of 1,645,462 km^2 (Spalding et al., 2007).

Species Diversity and Endemism

The Macaronesian region is an extremely important centre of biodiversity and worldwide known for its outstanding endemic biodiversity, the highest of any other insular region within Europe, and comparable in endemism per area to the figures displayed in island show-cases such as Hawaii, Galápagos, New Zealand, New Caledonia or Madagascar (J.M. Fernández-Palacios, 2010). At present, more than 5,700 endemic species are known in about 10,600 km^2 that make up the 18 islands and several islets of these three archipelagos (Arechavaleta, Rodríguez, Zurita, & Gracía, 2010; Borges et al., 2008; Borges et al., 2010; Moro, Martín, Garrido, & Izquierdo, 2003). The big majority of the Macaronesian endemisms belong to a single archipelago, although there is also an important element of Macaronesian endemic species occurring in more than one archipelago, especially the Canarian-Madeiran element, where many laurel forest species (palaeoendemics) are shared (Sziemer, 2000 in J.M. Fernández-Palacios, 2010). This preponderance of endemic species - a result of the islands' isolation and range of geological ages - has made the Macaronesian region an outstanding area for studies of evolution and speciation. However, most Macaronesian island studies concern the fauna and flora of single islands or archipelagoes, and studies addressing the processes shaping differentiation in the Macaronesian islands as a whole are in need. Moreover, the number of evolutionary studies performed in the Macaronesian islands is clearly biased towards the Canary Islands and very little is known about the youngest and most remote of the Macaronesian archipelagoes, the Azores (Borges et al., 2008).

In order to overcome the 'Linnaean' shortfall, a thoroughly inventory of the Macaronesian terrestrial and marine biota has been finished and several checklists from all the archipelagos have been published and updated in the last years (Abreu & Teixeira, 2008; Arechavaleta et al., 2010; Barcelos et al., 2015; Borges et al., 2008; Borges et al., 2010; Borges, Cunha, Gabriel, Martins, L. Silva, et al., 2005; Borges, Cunha, Gabriel, Martins, Silva, et al., 2005; I. Izquierdo, Martín, Zurita, Arechavaleta, & (eds), 2004; Moro et al., 2003; R. S. Santos, Porteiro, & Barreiros, 1997).

Terrestrial biodiversity

Currently, a total of 6,164 terrestrial taxa has been reported for the Azores (from which 7% are endemics), 7,571 for Madeira (19% endemics) and 14,318 for the Canary Islands (27% endemics) (Table 7 and **Figure 8**). These figures do not include only the native species of those archipelagos, but also those introduced voluntarily or involuntarily by humans and that now grow wild there. The endemicity rates of the respective archipelagos are therefore actually higher than the ones given in Figure 8.

Table 7. Terrestrial species biodiversity of Macaronesian archipelagos

	Azores		Canaries		Madeira	
	Total Species	Endemic Species	Total species	Endemic species	Total Species	Endemic species
Fungi (*sensu lato*)	544	24	1,893	107	724	36
Lichens	788	10	1,548	40	758	12
Diatoms	536	7				
Amoebozoa	39					
Protozoa					19	
Bryophytes	480	7	503	6	512	11
Vascular plants	1,110	73	2091	539	1,204	154
Arthropods	2,298	266	7,599	2,898	3,891	979
Molluscs	114	49	286	236	295	210
Nematodes	131	2	116	9	63	1
Annelids	22		62		36	
Platyhelmints	31		60	1	7	1
Briozoans			2			
Nemertins			2			
Vertebrates	71	14	156	21	62	15
Total	6,164	452	14,318	3,857	7,571	1,419

(Sources: Arechavaleta et al., 2010; Borges et al., 2008; Borges et al., 2010)

Animals dominate the Macaronesian terrestrial diversity, arthropods being the majority (47% on average) of all recorded taxa. The animal phyla are also the most diverse in endemic taxa, namely Mollusca and Arthropoda, comprising about 50% of the Macaronesian endemics. The percentage of endemism within Mollusca is particularly remarkable, ranging from 43% in the Azores to 83% in the Canary Islands. Endemic vascular plants represent 25% of the overall endemic plant species while the remaining higher taxonomic groups are less diverse in terms of endemic forms: fungi – 5% on average; lichens – 2%; bryophytes – 2%; vertebrates 19%.

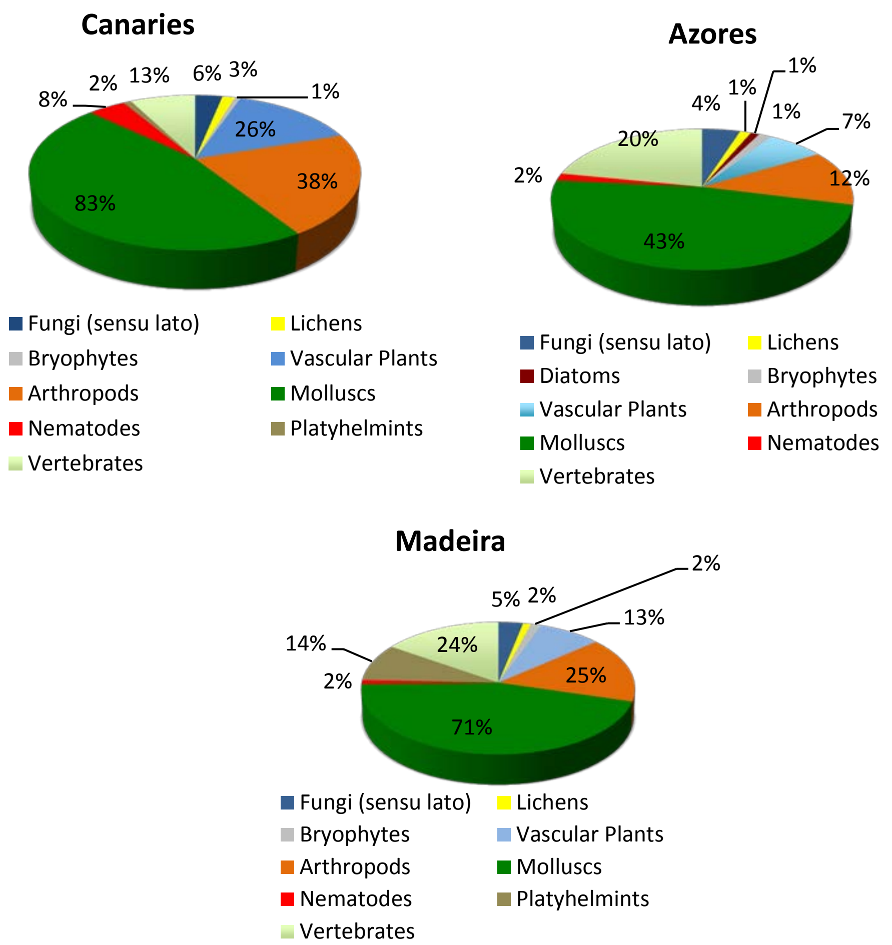

Figure 8. Proportion of endemic taxa (species and subspecies) in the terrestrial phyla of the Macaronesian archipelagos

Table 8. Largest radiations in the Macaronesian archipelagos

Group	Azores	Madeira	Canaries
Spermatophyta	*Agrostis* (5)	***Sinapidendron*** (6)	*Aeonium* **clade (52)**
	Ammi (3)	*Sedum* (4)	*Sonchus* **(32)**
	Carex (3)	*Helichrysum* (4)	*Sideritis* **(23)**
		Musschia (3)	*Echium* **(23)**
		Lotus (3)	*Argyranthemum* **(19)**
		Scrophularia (3)	*Limonium* **(19)**
		Geranium (3)	*Lotus* **(17)**
		Argyranthemum (3)	*Cheirolophus* **(15)**
			Micromeria **(15)**
Mollusca	*Oxychilus* (13)	*Leiostyla* (34)	*Napaeus* **(50)***

Group	Azores	Madeira	Canaries
	Napaeus (7)*	***Caseolus*** (27)	***Hemicycla* (35)**
	Leptaxis (7)	***Discula*** (25)	*Plutonia* **(21)***
	Plutonia (7)*	***Actinella*** (22)	***Canariella* (19)**
	Leiostyla (4)	*Leptaxis* (17)	*Monilearia* **(10)**
		Amphorella (12)	*Xerotricha* **(9)**
		Boettgeria (9)	***Ferussacia* (8)**
		Geomitra (9)	***Discus* (8)**
		Plutonia (8)*	***Cryptella* (6)**
		Craspedaria (7)	
Arthropoda	*Cixius* (11)	***Laparocerus*** (33)	*Laparocerus* **(106)**
	Trechus (9)	*Cylindroiulus* (28)	*Attalus* **(52)**
	Tarphius (8)	*Sphaericus* (26)	*Dolichoiulus* **(46)**
	Scoparia (4)	*Blastobasis* (22)	*Dysdera* **(47)**
	Calathus (4)	*Tarphius* (21)	*Oecobius* **(33)**
	Jaera (4)	*Geostiba* (19)	*Cardiophorus* **(33)**
	Atheta (4)	*Acalles* (17)	*Tarphius* **(30)**
	Clinocera (4)	*Trechus* (19)	*Acalles* **(29)**
		Nesotes (16)	*Calathus* **(24)**
		Chinacapsus (11)	*Cyphopterum* **(26)**
		Torrenticola (10)	*Spermophorides* **(24)**
		Caulotrupis (10)	*Hegeter* **(21)**
Chordata			***Gallotia* (7)**
			Tarentola **(4)**

(Endemic genera in bold. (*): Genera under taxonomic revision, in process of being split in single-archipelago endemic genera. Source: J.M. Fernández-Palacios (2010).

Consisting of nine relatively small oceanic islands of recent origin (between 0.3 and 8 million years) and with a great isolation from the closest mainland (about 1,600 km), the Azorean fauna and flora is characterized by a lower percentage of endemism when compared to the neighbouring Macaronesian archipelagos (Madeira and Canaries), that is, only about 7%, which contrasts with 19% for Madeira and 27% for the Canary islands. However, as in any oceanic archipelago, little diversity is not equivalent to a low interest from the point of view of conservation, since the Azores hosts many unique species. The total number of terrestrial endemic species and/or subspecies from the archipelago is about 452 (411 species). Animals are the most represented in this respect, with 331 *taxa* (Arthropoda = 266; Mollusca = 49; Vertebrata = 14; Nematoda = 2), that is, about 73% of the Azorean terrestrial endemics. The percentage of endemism within Mollusca (43%) is remarkable. Vascular plants have 73 endemic *taxa*, while Fungi (including Lichens) have 34, freshwater diatoms and bryophytes have seven endemic species each (Borges et al., 2010).

The Canaries archipelago is one of the biologically-richest temperate zones in the world (Petit & Prudent, 2010) and one of the areas with the highest endemism density within the Mediterranean bioclimatic region (Martín et al., 2008), which was considered one of the "hotspots" of biodiversity in the planet (Myers, Mittermeier, Mittermeier, Fonseca, & Kent, 2000). In these islands there are more than 14,300 terrestrial species (included in a total of 3,193 genera and 1,335 families) in a land area of only 7,500 km^2, from which about 3,800 species and 120 genera are endemic (Arechavaleta et al., 2010), being among them many examples of spectacular radiations of both invertebrates (*Laparocerus, Attalus, Dysdera, Napaeus,* *Hemicycla, Dolichoiulus*, etc.) and plants (*Aeonium, Argyranthemum, Cheirolophus, Echium, Limonium, Lotus, Pericallis, Sideritis, Sonchus*, etc.) (J.M. Fernández-Palacios, 2010). Moreover, a large part of endemic species is unique to a single island, which makes them of even greater importance. Noteworthy are the case of Gran Canaria and Tenerife islands where the proportion of island endemism exceeds 10 and 15%, respectively, of its native biota (Martín et al., 2008).

Madeira Island stands out as the second biodiversity richest island in all Macaronesia, only surpassed by Tenerife in the Canary Islands. However, Tenerife is clearly a much larger island, which confirms Madeira Island to be an obvious hotspot of biodiversity (Borges et al., 2008). The archipelago of Madeira is outstanding diverse in total species (ca. 7,571, from which 421 are subspecies) as well as endemic species (ca. 1,419, from which 182 subspecies), among those as much as 979 endemic arthropods, 210 endemic molluscs and 154 endemic vascular plants (Borges et al., 2008). Also the Selvagens islands, despite its minimum size, harbours more than 50 endemics species, and many other Macaronesian endemisms shared either with Madeira, the Canaries or both (J.M. Fernández-Palacios, 2010).

The mentioned figures may vary greatly due to the lack of many taxa in Madeira, as it is the case of flatworms, annelids and nematodes (José Jesus, Teixeira, Teixeira, Freitas, & Russo, 2009). There are other groups that even with many taxa referred to the Madeira Islands appear to fall short of the actual number, such as the case of arthropods (José Jesus et al., 2009). Also the introduction of new species and the naturalization of some should be considered.

Molluscs

Macaronesia has one of the highest rates of molluscan diversity in the world ranging from 43% in the Azores to 71% in Madeira and 83% in the Canary Islands (Table 7).

Azores

Of Palaearctic and Macaronesian origin, terrestrial molluscs of the Azores add up to only 114 species but contain the highest percentage of endemism in the archipelago (Borges et al., 2008). According to Prof. Frias Martins (pers. com., Feb. 2016), the figure for the Azores may also be increased to over 70% when discovered species that have not yet been described to science are included, placing the archipelago at the same level of diversity of Madeira and Canary Islands. Although these endemics are present in all the islands in a relatively homogeneous percentage in relation to all of their existing malacofauna, there are important differences when analysing the exclusive endemism of the various islands (Martín et al., 2008). Thus, only four islands have typical island endemics, standing out among them Santa Maria with 70% of unique endemic species (Martins, 1981, 2002; Martins & Ripken, 1991; Mordan & Martins, 2001 in Martín et al., 2008); then follows São Miguel and Terceira with just over 20% and Faial with about 10%. This disparity of Santa Maria richness in relation to other islands is even more worthy of record when taking into account the size of the island; S. Miguel, for example, about eight times bigger, has in total 76 species while Santa Maria has 62. The endemic wealth of Santa Maria can only be explained by this being the oldest island of the archipelago, with about 8 My. (Feraud et al., 1984 in Martín et al., 2008).

Madeira

In Madeira, 295 terrestrial mollusc taxa are listed in all the islands (187 on the island of Madeira, 104 in Porto Santo, 37 in Desertas and 8 in the Selvagens islands) (Borges et al., 2008). The percentage of endemism at the specific level is higher than 70%, with an occurrence of very localized endemics and specific to each island of the archipelago of Madeira (Borges et al., 2008). The archipelago, with only 800 km^2, belongs to the group of oceanic islands with the greatest diversity of terrestrial molluscs per unit area on our planet, in which the islands of Hawaii and Mauritius are also included (Waldén, 1983 in Martín et al., 2008). It should be noted that the island of Porto Santo, the oldest of the archipelago of Madeira is the island that contains more species and subspecies of terrestrial molluscs per unit area (104 taxa in only 43 km^2), 80% of which are endemic (Borges et al., 2008).

The most striking feature of Madeiran fauna is its pronounced relict character. Most of the endemic taxa belong to genera or subgenera which are now either extinct in Europe or have evolved from ancestors in Europe (Kay, 1995). The colonization of Madeira seems to have taken place largely in the mid-Tertiary and was probably facilitated by the presence of now sunken islands between Madeira and the Iberian Peninsula (Pastour et al. 1980 in Kay, 1995). Thus Madeira can be considered a living museum for a Tertiary molluscan fauna now extinct elsewhere.

Canary Islands

In the Canary Islands, endemism is outstanding for gastropods: about 83% of the 285 species are endemic (Arechavaleta et al., 2010), of which one genus alone, the Canarian snail genus *Hemicycla*, has 76 species and is the second most species-rich genus of invertebrates in the archipelago (Francisco-Ortega et al., 2010). Six mollusc genera are endemic to the archipelago.

Arthropods

Arthropods, which include crustaceans, centipedes and millipedes, spiders and insects, are the most diverse group of animals in Macaronesia and include species associated to a wide variety of ecosystems. Arthropod fauna displays a number of characteristics typical of oceanic islands, including a high degree of endemism, ranging from 12% for the Azores (Borges et al., 2010), to 25% for Madeira (Borges et al., 2008) and 38% for the Canary Islands (Arechavaleta et al., 2010). The major group of terrestrial invertebrates in the Macaronesia are insects, to which V. Wollaston dedicated much of his life to study, the Coleoptera in particular (Rego, Boieiro, Vieira, & Borges, 2015).

Table 9. Total area for the island systems studied and the respective richness of indigenous, archipelagic endemic and single island endemic species (SIE) of arthropods in general and beetles in particular.

Archipelago	Arthropods			Beetles		
	Indigenous species	Endemic species	Single-island endemics	Indigenous species	Endemic species	Single-island endemic
Azores	1 373	258	108	210	64	39
Canaries	6 826	3 079	1 757	1 954	1 250	796
Madeira	3 249	979	845	901	416	356
Total	**11 448**	**4 316**	**2 710**	**3 065**	**1730**	**1 119**

Source: Kostas A. Triantis et al. (2010a)

Azores

Arthropoda, represent the most diverse Phylum in Azores, encompassing 2,298 species and subspecies, about 37% of taxa (Table 7), a pattern that is common worldwide. A great proportion of the taxa existing in the archipelago are introduced (42%) and only 12% are endemic, while for 11% of the taxa there is not enough information to attribute a colonization status (Rego et al., 2015). However, both current and total rates of species description are the lowest of all Macaronesian archipelagos, indicating that the recent process of description of the most singular Azorean species[5] is far from being complete and that many species of terrestrial arthropods may be discovered in the near future (J. M. Lobo & Borges, 2010). The most important case of a 'Linnean' shortfall in the Azores is the inventory of Hymenoptera.

The richest terrestrial arthropod groups (=orders) in taxa are Coleoptera, Diptera and Hemiptera. This is in general accordance with what happens in terms of diversity worldwide, the exception being Hymenoptera a globally diverse order (comparable with Diptera), but poorly represented in the Azores (Rego et al., 2015). However, this difference could be only the reflection that this group has been less studied taxonomically in this archipelago (Borges et al., 2005b, 2010a; Lobo & Borges, 2010).

When considering only the endemic species the scenario is a little different of the one obtained for the overall diversity, as in the Azores the orders with more endemic taxa (species and subspecies) are the Coleoptera and Diptera, accounting for 27% and 19% of endemic taxa respectively, followed by Lepidoptera representing 14% of all endemic species, while the Hemiptera account for only 4% (Rego et al., 2015). But again, these findings may result from taxonomic bias; in Azores there are some taxonomic experts on Coleoptera, Araneae and Lepidoptera that have made a great effort during the last decades on the study of specimens from the several islands leading to new findings. However, for other groups, like *Diptera and Hymenoptera*, no such expertise is available (J. M. Lobo & Borges, 2010).

Box 1. Initiatives that have contributed to increase public awareness in terms of Azorean arthropod conservation

- Azorean Biodiversity Portal (www.azoresbioportal.angra.uac.pt)
- Azorean Biodiversity Gallery (http://galeria.azoresbioportal.angra.uac.pt)
- ATLANTIS database (http://www.atlantis.angra.uac.pt/atlantis/common/index.jsf)
- Azorean Spiders (http://www.jorgenlissner.dk/azoreanspiders.aspx)
- Termites from the Azores (http://sostermitas.angra.uac.pt)
- E.D.E.N – Azores Habitats (http://www.eden-azores.com)
- The Facebook page "Chama-lhe Nomes" ("Call them names") (https://www.facebook.com/Chama.lhe.Nomes)
- The exhibition "Insetos: vida nos Açores" ("Insects: wildlife ithe Azores") displayed in most Azorean islands (http://siaram.azores.gov.pt/centros-interpretacao/intro.html)
-

The Azores present a low number of endemic taxa when compared with other oceanic archipelagos. Further, when we consider the diversification that occurred in these islands, it is also very low as only 18 genera have 3 or more endemic taxa, representing 30% of the overall endemism, while genera with a single endemic species

[5] Despite the interest of Thomas Wollaston in the insect fauna of the Macaronesian archipelagos, he never collected in the Azores, probably because of his health problems that made the local climate unsuitable for him to do fieldwork (A. Machado, 1998).

account for 49% (134 species) (Rego et al., 2015). In this context the Coleoptera represent the group with higher diversification events, including five of the most speciose genera (Figure 9). The low diversification in Azores is probably due to the recent origin of this archipelago (a large proportion of the island areas is less than 1 My, even in islands with old terrain like São Miguel and Terceira) and its greater isolation from colonization sources, among other factors (e.g. Borges & Hortal, 2009; Triantis et al., 2012, in Rego et al., 2015).

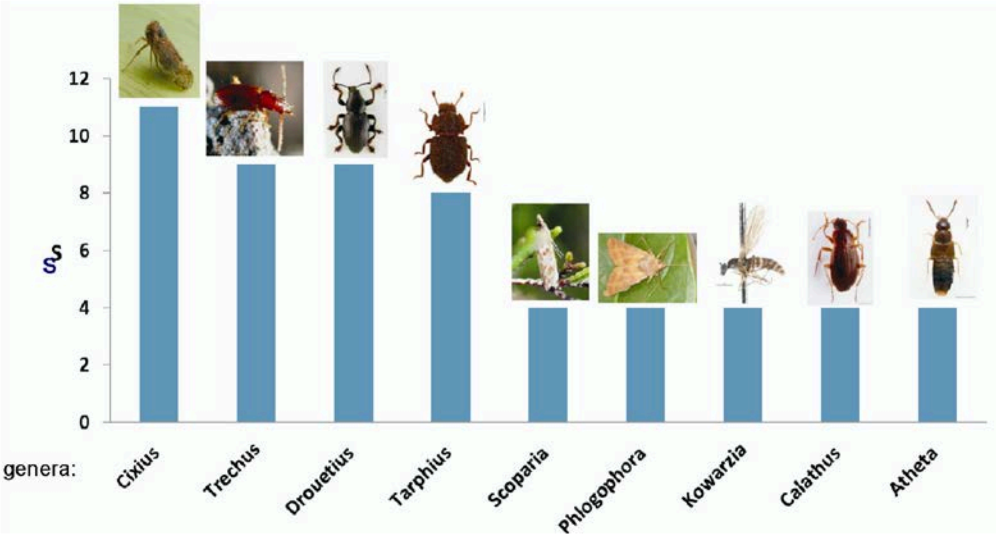

Figure 9. Number of endemic species and subspecies (S) of the most speciose genera of terrestrial arthropods from Azores

Source: Rego et al. (2015). Photos by Carla Rego, Paulo A.V. Borges, Javier Torrent, Enésima Mendonça and Virgílio Vieira

Madeira

According to Borges et al. (2008), 3,891 taxa (species and subspecies) of terrestrial arthropods belonging to 462 families and 2,118 genera were recorded for Madeira. Out of these, about 87% (3,393 taxa) are insects, from which 798 are endemic. And the number of newly described species grows steeply as a function of time, suggesting that many more species await discovery. The subphylum Hexapoda, which includes highly diverse insects, is by far the most diverse of all arthropod groups with 3,394 taxa (i.e. 87 % of all arthropods). If only true species are counted, there are 3,859 arthropod species in the archipelago of Madeira.

Madeira island, the largest island of the archipelago, is by far the richest with 3,542 species and 121 subspecies of arthropods, totaling 3,549 individual taxa (Borges et al., 2008). The most hyperdiverse orders worldwide are also the most diverse in Madeira archipelago: beetles (Coleoptera) with 1,040 taxa; wasps, bees and ants (Hymenoptera) with 610 taxa; flies (Diptera) with 555 taxa; and moths and butterflies (Lepidoptera) with 331 taxa. However, bugs, aphids and hoppers (Hemiptera) are also a diverse group with about 522 individual taxa. These five insect orders comprise 78% of all arthropod species and subspecies of the Madeira archipelago (Borges et al., 2008).

Radiation processes have been important only in invertebrate genera, nine of them with more than 18 endemic taxa, such as *Laparocerus* weevils (34 sp.) *Sphaericus* beetles (28 sp.) or *Cylindroiulus* millipedes (28 sp.) (Borges et al., 2008).

Madeira has about 979 individual taxa (species = 921; subspecies = 77). Most of these taxa are single island endemics. However, based on the steep slope of the cumulative new taxa' discovery curve, the current number of known endemic species and subspecies is certainly a poor estimate of its real number. The terrestrial arthropod fauna of the Madeira archipelago is dominated by indigenous taxa (68%) and only 28% of the taxa are considered exotic (Borges et al., 2008).

Thirty-one arthropod genera have 5 or more endemic species and subspecies. Surprisingly, these 31 dominant genera contain 34% of the endemic arthropod taxa from Madeira (Borges et al., 2008).

Madeira island presents unique spider diversity with a high number of endemic species, many of which are still poorly known. A recent biodiversity survey on the terrestrial arthropods of the native forest, Laurisilva, provided a large set of standardized samples from various patches throughout the island. Out of the 52 species recorded, approximately 33.3% are Madeiran endemics, many of which had not been collected since their original description. And new invertebrates species to science continue to be reported (e.g. *Ceratinopsis* n. sp. and *Theridion* n. sp.) (Luís C. Crespo et al., 2014)

The Desertas Islands are the sole home of one of the largest and rarest wolf spider species, *Hogna ingens*. This species is a strict endemic, being present in a single valley of an oceanic island (Crespo, Silva, Borges, & Cardoso, 2014)

Canary Islands

In the Canary Islands, it is in invertebrates that island specific endemicity is the most spectacular, such as beetles and butterflies (A. Machado, 1998). Tenerife harbours the highest number of endemic species of beetles (Francisco-Ortega et al., 2010). The Geometridae family (*Lepidoptera*) contains approximately 50% endemicity. Other groups like *Orthoptera* and *Diptera* species are almost 45% and 40% endemic respectively (A. Machado, 1998).

The Arachnida (spiders, pseudo-scorpions and mites) are represented by approximately 800 native species, half of which are endemic (Francisco-Ortega et al., 2010). Twelve of the genera in the Arachnida are endemic. With over 43 species, the non-endemic genus of spiders *Dysdera* has the highest number of endemics (Francisco-Ortega et al., 2010).

Most of the studies aiming to reconstruct the origin and evolution of certain groups of Canarian insects suggest a recent (Quaternary) origin for these organisms, although it has been suggested that species form the lowlands are older than those occurring at higher elevations, particularly on the humid evergreen forest and pine forest (Francisco-Ortega et al., 2010).

The extensive cave system, composed mostly of volcanic tubes, has one of the most peculiar ecosystems in the Canary Islands with a highly endemic invertebrate fauna and with roosting sites for bats. Approximately 168 endemic invertebrate thrive in this ecosystem; 124 of them are terrestrial, and the rest occur in aquatic environments (Francisco-Ortega et al., 2010). The vast majority of these invertebrates are insects (ca. 80%) and 27% of them are spiders. A great proportion of these species are blind, lack any body pigmentation and have large legs and antennae.

Plants

The remote and isolated location of the islands has allowed a whole series of the Tertiary subtropical flora to still exist in the Macaronesian region (EEA, 2002). This includes many tropical plant families, such as the palm family (*Arecaceae*), the sapote family (*Sapotaceae*) and the tea family (*Theaceae*) as well as a number of species in the laurel and olive families (*Lauraceae and Oleaceae*).

The Macaronesian region hosts a high number of plant species and especially endemics. In this region, the Canary Islands are outstanding in terms of endemism. Of the 2,091 vascular species, 539 are endemic, constituting a 26 % endemism (Table 7). A majority of the endemics are ancient relict endemics with their greatest affinities in the Tertiary flora. A characteristic feature of these species is that they are systematically isolated or have systematic relatives in remote geographical areas. A Macaronesian endemic, the Canary Island pine (*Pinus canariensis*) is closely related to chin pine (*P. roxburghii*) in the Himalayas (EEA, 2002). Further, the endemic aderno (*Heberdenia excelsa*) is closely related to H. penduliflora in Mexico. Most of the endemics are found among trees and shrubs and fewer among annuals.

Macaronesia is home of important cases of phylogenetic radiation (Table 8), and although usually the radiation is circumscribed to just one Macaronesian archipelago, with the Canaries clearly leading these statistics, there are several cases where different archipelagos contribute with their own endemic species to the global picture of the clade (J.M. Fernández-Palacios, 2010) (Table 10 and Table 11). Actually, one floristic monophyletic clade, the *Aeonium* group, include species distributed on all Macaronesian archipelagos, each one with their own endemic species, all of them included in four different genera (*Aeonium, Greenovia, Aychrison* and *Monanthes*) of the Crassulaceae family (J.M. Fernández-Palacios, 2010)

Table 10. Distribution among archipelagos of the Macaronesian plant endemic species.

Endemic species	Bryophytes	Pteridophytes	Spermatophytes	Total
Azores	9	7	61	**77**
Madeira	11	8	141	**160**
Canaries	9	3	613	**625**
Azores – Madeira	5	4	7	**16**
Madeira – Canaries	13	-	45	**58**
Azores – Madeira – Canaries	8	1	4	**13**
Single archipelago endemics	29	18	815	**862**
Multiple archipelago endemics	26	5	56	**87**
Macaronesia	**55**	**23**	**871**	**949**

Sources: Izquierdo *et al*., 2004; Arechavaleta *et al*., 2005; Borges *et al*., 2005, 2008 in J.M. Fernández-Palacios (2010).

Table 11. Examples of some multiple-archipelago monophyletic radiation flora events in Macaronesia

Clade	Azores	Madeira	Canaries	Macaronesia
***Aeonium* clade**	1	6	52	**59**
***Sonchus* clade**	-	3	32	**35**
Echium	-	2	23	**25**
Argyranthemum	-	4	19	**23**
Cheirolophus	-	1	15	**16**
Pericallis	1	1	12	**14**
Crambe	**-**	**1**	**12**	**13**

Sources: Izquierdo *et al*., 2004; Arechavaleta *et al*., 2005; Borges *et al*., 2005, 2008; Arnedo *et al.,* 2007; Machado, 2007, 2008, in J.M. Fernández-Palacios (2010)

The dominant trees of the Atlantic Laurel Forests shared by the three archipelagos include genera such as *Picconia, Laurus, Ilex, Prunus* and *Morella*, whereas *Juniperus brevifolia* is exclusive from Azores and *Apollonias, Persea* and *Ocotea* are restricted to Madeira and the Canaries (Santos, 1990; Capelo et al, 2007; Dias et al, 2007, in J.M. Fernández-Palacios, 2010)

With regard to Bryoflora, the number of taxa in Macaronesia is 792, from which only 64 are common to all of the archipelagos (Sérgio, Sim-Sim, Fontinha, & Figueira, 2008). The endemic taxa of mosses and liverworts-hornworts correspond to about 5% of the total Bryoflora. At a regional level, the archipelago with the highest Bryoflora diversity is Madeira (512), followed by the Canary Islands (503), and Azores (480) (Borges et al., 2008).

Table 12. Diversity of bryophytes in the Macaronesian archipelagos

	Azores	Madeira	Canaries
Mosses	311	333	356
Liverworts/hornwort	169	179	147
Total	**480**	**512**	**503**

Sources: (Arechavaleta et al., 2010) Borges et al. (2008); Borges et al. (2010).

Azores

In the Azores, vascular plants include over 1,100 taxa from which ca. 200 are native (Schaefer et al., 2011) and 73 are currently recognized as endemic (Table 7). The archipelago's flora shows affinities with Atlantic and Boreal Europe (*Juncaceae, Cyperaceae, Sphagnum*) and with Madeira and the Canaries (*Ilex, Juniperus, Laurus, Morella, Picconia, Prunus, etc.*) (Fernandes-Palacios & Dias, 2001; Schåffer, 2003 in J.M. Fernández-Palacios, 2010). In contrast with other archipelagos of the Macaronesian region, the Azores are lacking xerophytes of African origin. Instead the Azores show a significant number of associations with the Iberian flora (EEA, 2002). In addition, the Azores only has one endemic genus of vascular plants (*Azorina*) (Borges et al., 2009).

Madeira

In the archipelago of Madeira 1,204 taxa (species and subspecies) of vascular plants have been recorded (Table 7). From these, 154 (corresponding to 136 species and 21 subspecies) are endemic to the archipelago (13%), 74 are Macaronesian endemics (6%), 480 native taxa (40%), 66 probable native (6%), 29 likely introduced (2.4%) and 401 (33%) are introduced (Martín et al., 2008). Of special importance for Madeira is the high number of species of pteridophytes, with 75 species represented in the evergreen forest, 14 of them endemic (EEA, 2002).

The vascular flora comprises palaeo-endemics (e.g. *Laurus, Ocotea, Apollonias, Persea, Clethra*), neo-endemics, (many with adaptive radiation, e.g. *Aeonium, Sonchus, Echium, Sinapidendron, Euphorbia, Isoplexis, Musschia*), Mediterranean Flora (e.g. *Euphorbia, Olea, Maytenus, Myrtus, Teline, Genista*) and anthropic flora (plants introduced by man and naturalized (e.g. *Castanea, Pinus and Ulex*) (José Jesus et al., 2009).

Some of the vascular plants strictly endemic to Madeira are, for example, *Polystichum maderensis, Cerastium vagans, Armeria maderensis, Goodyera macrophylla, Viola paradoxa, Crambe fruticosa, Matthiola maderensis, Sinapidendron angustifolium, Saxifraga maderensis, Sorbus maderensis, Cytisus maderensis, Senecio maderensis, Phalaris maderensis, Pittosporum coriaceum,* and *Musschia wollastonii* (WWF, 2015c).

At present, the bryophytes of the Madeira archipelago comprise about 512 taxa, of which 333 are mosses and 179 are liverworts and hornworts (Borges et al., 2008), all widely distributed, occurring from the sea coast to the high mountains of the interior. According to Fontinha and Sim-Sim (2011), 15 of the endemic taxa of Macaronesia are unique to the archipelago of Madeira, corresponding to 11 mosses, of which the genus *Nobregaea* (*N. latinervis*) is endemic and monospecific, and 4 liverworts.

Canary Islands

The Canary Islands house a spectacular botanic diversity with over 1,300 species of native vascular plants found in approximately 102 families and 712 genera (Francisco-Ortega et al., 2010). It is in the terrestrial vascular plants that the complex evolutionary patterns of the Canaries have had one of its most visible manifestations: there are over 600 endemic species of seed plants, comprising 40% of a native flora with clear affinities with the Mediterranean region (Francisco-Ortega et al., 2010). At least 22 whole genera of seed plants are endemic to the Canaries, with seven belonging to the daisy family, *Asteraceae*. Some of these endemics are still considered to belong to ancient lineages that became extinct on the continent after the Tertiary period. However, most are now believed to have arrived and diversified on the islands relatively recently (Emerson, 2002). The evolutionary complexity created by crustal movements, changing sea levels and active volcanism as created mosaics within islands and between islands and archipelagoes. There are, for instance, about 60 native plants on the Canaries which are shared with at least one other Macaronesian archipelago, but are not known to occur on the continent (Francisco-Ortega et al., 2010). On the other hand, the endemic groups also show evolutionary patterns found in other oceanic islands such as the trend towards woodiness and arborescence (seen, e.g. in the *Bencomia* genus) and which has been related to competition-mediated selection for higher stature, or selection for longevity in an environment depauperated of pollinators.

Concerning non-vascular plants, approximately only 5% of the non-vascular native flora is endemic to the Canary Islands. There are 1,634 native species of fungi (107 endemics), over 1,294 of lichens (26 endemics), and 464 of mosses and liverworts (Francisco-Ortega et al., 2010).

Birds

Azores

In the Azores, 414 species of birds are listed in the recent checklist of the Birds of the Azores (Barcelos et al., 2015), including those that reproduce in the Azores as well as non breeding species and a smaller list of potentially breeding species.

The native birds from the Azores provide good examples of insular speciation, since two endemic species and 11 endemic subspecies are known (Barcelos et al., 2015). Moreover, many more endemic terrestrial species have gone extinct, possibly as a consequence of anthropic influence. A recent paper (J.C. Rando, Alcover, Olson, & Pieper, 2013), for example, describes an endemic species of owl (*Otus frutuosoi*), possibly extinct after human arrival.

Among the regular breeding species, there is the Azores bullfinch *Pyrrhula murina*, the only Azorean endemic passerine species and one of the most threatened European species, restricted to a 83 km^2 patch of cloud forest on the eastern part of São Miguel Island (Ceia, Ramos, Heleno, Hilton, & Marques, 2011).

The Azores also hold the canary *Serinus canaria*, a passerine endemic to Macaronesia which led Birdlife International to designate the Azores as a Secondary Endemic Bird *Area* (EBA). Several endemic subspecies of Passeriformes are also present in the archipelago, similarly to what happens in the majority of insular systems (Borges et al., 2010). The endemic passerines include three subspecies of the goldcrest *Regulus regulus* (*R. r. azoricus*, *R. r. inermis* and *R. r. sanctaemariae*), and also one subspecies of the grey wagtail *Motacilla cinerea patriciae*, the common blackbird *Turdus merula azorensis*, the blackcap *Sylvia atricapilla gularis*, the common starling *Sturnus vulgaris granti* and the common chaffinch *Fringilla coelebs moreletti*. There is also an endemic subspecies of Falconiformes, the Azorean common buzzard *Buteo buteo rothschildi*, the only bird of prey in the region, and one of Columbiformes, the Azorean wood pigeon *Columba palumbus azorica*.

Included in the species that sporadically nest in Azores, is the American black duck *Anas rubripes*. The Eurasian collared dove *Streptopelia decaocto* has greatly expanded in the last decades, having already arrived in the Azores, on São Miguel and Terceira islands. On the latter island, breeding was confirmed in 2009. The rose-ringed parakeet *Psittacula krameri* and the common waxbill *Estrilda astrild* were recently (and accidentally) introduced.

Madeira

In Madeira, birds are the class of vertebrates with more taxa, registering 38 species and subspecies (62%) (Martín et al., 2008). Moreover, the comparison of the proportion of endemics per class of vertebrates shows that birds account for 50% of all the endemics present in this archipelago (Martín et al., 2008). Four of these are endemic to the archipelago (a pigeon, *Columba trocaz*, two petrels, *Pterodroma madeira* and *P. feae*, and a passerine, *Regulus maderensis*), with an additional 2 species endemic to Macaronesia. In addition, there are also endemic subspecies such as *Fringilla coelebs maderensis (*Madeiran chaffinch).

Canary Islands

In the Canary Islands, 105 species and subspecies of breeding birds have been recorded (regular and occasional breeding), representing 67% of all vertebrates (Arechavaleta et al., 2010).

Together with Madeira, the Canaries have been designated an Endemic Bird Area by Birdlife International, and an urgent priority area for conservation. Most restricted-range species on the Canarian islands are dependent on laurel forest, with the majority being found on Tenerife. Four birds are endemic, Bolle's pigeon (*Columba bollii*), Laurel pigeon (*Columba junoniae*), Canary Islands finch (blue chaffinch *Fringilla teydea*), and Canary Islands kinglet (*Regulus teneriffae*). *Columba junoniae* prefers scrubbier areas above and below major stands of laurel, whereas *Fringilla teydea* is restricted to pine forest. The endemic *Fringilla teydea* is restricted to Gran Canaria (*F. t. polatzeki*) and Tenerife (*F. t. teydea*). However, a recent study carried out by Sangster, Rodríguez-Godoy, Roselaar, Robb, and Luksenburg (2015) shows that the blue chaffinches on Gran Canaria and Tenerife represent two distinctive species: *F. polatzeki*, considered as one of Europe's rarest passerine species and *F. teydea*, much more common.

Berthelot's pipit (*Anthus berthelotii*), plain swift (*Apus unicolor*), and common canary (*Serinus canaria*), all of them shared with Madeira and the last one with Azores, are near-endemic to the Canary Islands dry woodlands and forests (A. Machado, 1998).

Bird subspecies restricted to the Canary Islands include a subspecies of kestrel (*Falco tinnunculus teneriffae*), a grey wagtail (*Motacilla cinerea canariensis*), a long-eared owl (*Asio otus canariensis*), three subspecies of chaffinches (*Fringilla coelebs tintillon, F.c. ombriosa, F.c. palmae*), a Chiffchaff (*Phylloscopus canariensis*) and two subspecies of great spotted woodpeckers (*Dendrocopos major canariensis, D. m. thanneri*) (A. Machado, 1998). The archipelago's ecoregion "Mediterranean Acacia-Argania Dry Woodland and Succulent Thicket" contains the endemic Fuerteventura chat (*Saxicola dacotiae*), and the following endemic bird sub-species: kestrel (*Falco tinnunculus dacotiae*), houbara bustard (*Chlamydotis undulata fuertaventurae*), barn owl (*Tyto alba gracilirostris*), stone-curlew (*Burhinus oedicnemus insularum*), and the cream-colored courser (*Cursorius cursor bannermani*) (WWF, 2015b).

Other bird subspecies endemic to all the Canaries include the buzzard (*Buteo buteo insularum*), spectacled warbler (*Sylvia conspicillata orbitalis*), great grey shrike (*Lanius excubitor koenigi*), lesser short-toed lark (*Calandrella rufescens polatzeki*), and linnet (*Acanthis canabina harteri*) (WWF, 2015b).

A process of radiation, has occurred in many birds, such as the blue tit *Parus caeruleus* (Paridae) that has evolved into three different subspecies: *P. c. teneriffae* in Gran Canaria, Tenerife and La Gomera, *P.c. ombriosus* in El Hierro and *P.c. palmensis* in La Palma (Moreno 1988).

Because of the short distance to Africa, the Canary Islands are visited every year by many migratory bird species that fly south in autumn in search of warmer places and go back to Europe in the spring.

In addition, there are fossils from a poorly know giant flightless bird from Lanzarote (approximately 6 million years old). Other extinct flightless birds include a passerine (*Emberiza alcoveri*) and a finch (*Carduelis triasi* and *C. aurelioi*); it is believed that these two species became extinct recently, very likely linked to human activities.

Reptiles

The remote and isolated locations of islands in the Macaronesian region may contribute to the generally low diversity of species observed in the herpetofauna (EEA, 2002). The region lacks systematic units as snakes and amphibians, but recent introductions of – for instance marsh frog (*Rana perezi*) and tree frog (*Hyla meridionalis*) – have occurred. Isolation and low levels of flow of genetic material has caused a significant speciation in reptiles, especially so in the Canary Islands. The region now hosts endemic genera, species and subspecies.

Azores

The only species of reptile regularly found in Azores – *Lacerta (Teria) dugesii* – was introduced from Madeira, where it is endemic. In 2002, the *Tarentola mauritanica* was recorded for the first time and breeding and the establishment of natural populations has been confirmed since then (Borges et al., 2010).

Madeira

In Madeira, seven species and subspecies of reptiles occur, representing 11% of vertebrates in the archipelago (Martín et al., 2008) and contributing for 42% of all the endemics present in these archipelagos (Borges et al., 2008). Two species where introduced, the *Tarentola mauritanica* and *Hemidactylus mabouia*. The five native taxa are all endemic (**Erro! A origem da referência não foi encontrada.**): a gecko (*Tarentola bischoffi*) in the Selvagens islands and a small lizard (*Teira dugesii*, peculiar for having distinct sub-species in each of the 4 island groups) in the entire archipelago. The lack of dispersal abilities featured by this group is responsible for a small rate of gene flow, which allowed speciation to occur fast.

Canary Islands

In the Canary Islands, 13 species of reptiles are native, all of them endemic (Francisco-Ortega et al., 2010). In fact, reptiles (as well as other vertebrates), went through an evolutionary radiation as species adapted to the varied island habitats. As a result, each island has endemics in the families Gekkonidae, Lacertidae and Scincidae, i.e., its own species or subspecies of lizard, skink or gecko; there are even island endemic representatives of these three families. The reptiles include one endemic genus of lizard, *Gallotia* (seven living species), which exhibit gigantism, including the largest species of the family Lacertidae (fossil specimens of the extinct *G. goliath* reached more than one meter). Smaller relatives of these extinct reptiles are still living in cliffs and crevices of islands like El Hierro, La Gomera, Tenerife and probably La Palma (WWF, 2015a). On Gran Canaria, larger than average lizards can also be seen all around the island, and the Haría lizard (*Gallotia atlantica*) is endemic to the two larger islands (Fuerteventura and Lanzarote) and associated smaller islets in the eastern Canaries (Clarke & Collins 1996, in WWF, 2015b). Skinks are represented here by four different endemic species of the genus *Chalcides* (*C. coeruleopunctatus, C. sexlineatus, C. viridianus* and *C. simonyi*), whereas geckos by four endemic species of the genus *Tarentola* as well (*T. delalandii, T. gmerensis, T angustimentalis*, and *T. boettgeri*), this last one shared with Salvages.

Mammals

Except for the white-toothed shrew (*Crocidura canariensis*), endemic to the eastern Canarian islands, all native and endemic terrestrial mammals in Macaronesia are bats. This fact is related to the poor dispersal abilities over widespaces of sea by terrestrial mammals (Borges et al., 2008). Possibly by virtue of the relative proximity of the coasts of continental Africa, the archipelago of the Canaries is the only one in Macaronesia to have been characterised by a terrestrial mammalian fauna, whereas such elements do not appear to have been diffused on the other islands throughout the entire recent Quaternary (Masseti, 2010).

Today, 17 species of bats are reported from the islands of Macaronesia (Masseti, 2010), although this figure is not taken as certain. Three of these bats are regarded as endemic: the Madeira pipistrelle (*Pipistrellus maderensis*) endemic to Macaronesia, the Azorean bat

(*Nyctalus azoreum*), endemic to the Azores, and the Tenerife long-eared bat (*Plecotus teneriffe)*, endemic to the Canaries. Together with the Sardinian long-eared bat, *Plecotus sardus*, these are the only four bat species regarded as endemic to the entire territory of Europe (Masseti, 2010).

Azores

Of the 11 terrestrial mammal species occurring in the Azores, only one is endemic (*Nyctalus azoreum*), three are native (*Pipistrellus pipistrellus, P. madeirensis* and *Myotis myoti*, although the occurrence of the latter is yet to be confirmed (Rainho, Marques, & Palmeirim, 2002)) and the remaining seven were introduced (Borges et al., 2010).

Madeira

In Madeira, there are 12 species and subspecies of mammals, representing 20% of the vertebrates in the archipelago (Borges et al., 2008). Endemic taxa comprise *Nyctalus leisleri verrucosus,* endemic to the archipelago and *Pipistrellus maderensis*, endemic to Macaronesia. Native species include *Tadarida teniotis, Hypsugo savii* and *Plecotus austriacus*. However, there is no certainty as to the number of species that actually occur in the archipelago (Borges et al., 2008; José Jesus et al., 2009).

Canary Islands

In the Canary islands, 21 mammal taxa have been reported (Arechavaleta et al., 2010). Of these, nine are native, including two endemics: the white-toothed shrew (*Crocidura canariensis*) is endemic to the eastern islands, where it is currently found on Lanzarote, Fuerteventura, Lobos and Montaña Clara (Hutterer, 2008) and the Canary Big-eared Bat (*Plecotus teneriffae*). Other native bats species are *Tadarida teniotis, Barbastella barbastellus, Hypsugo savii, Nyctalus leisleri, Pipistrellus kuhlii and Pipistrellus maderensis*.

Marine biodiversity

Marine and coastal biodiversity of Macaronesia is also noteworthy but lack of information in this environment remains a significant challenge. However, given that terrestrial biota is much better known than marine biota, one can assume that a larger number of marine species will be added in the near future (e.g. Nematoda) (Borges et al., 2010).

The marine organisms currently listed make up about 23% of the Azorean biodiversity (Borges et al., 2010). The total number of marine *taxa* (species and subspecies) in the Azores is estimated in about 1,883 *taxa* belonging to 16 phyla (Table 13). However, the precise number of species in the Azorean coastal and marine ecosystems is very difficult to know given the incomplete state of taxonomic knowledge. (Borges et al., 2010). The list of phyla is not complete and for many of those listed the diversity figures are not representative.

So far, the most diverse groups are Pisces (543 *taxa*), Molluscs (353 *taxa*), Macro-algae (327 *taxa*) and Arthropods (291 *taxa*). The total number of marine endemic species and/or subspecies from the Azores is about 39. The majority of the Azorean marine biota comprises species that have arrived predominantly from the eastern Atlantic, chance survivors of episodic colonizing events (Morton & Britton, 2003). The geological youth of the islands and the greater connectedness of the marine realm apparently precluded a degree of endemism comparable to that reported on land. The current list of endemic marine taxa nevertheless includes 39 species (Borges et al., 2010). Most are littoral molluscs, but also included is one species of fish: the blue wrasse *Symphodus caeruleus*, a sister species of *S. trutta*, found in Madeira and the Canaries (Almada, Almada, Henriques, Santos, & Brito, 2002).

In the Canaries more than 5,265 marine species have been reported (Table 13), among which there are at least 164 endemic species to the archipelago (Moro et al., 2003). Unfortunately, these marine biodiversity data are not available for Madeira.

Table 13. Number of known species and subspecies in the Azorean and Canarian coastal and marine habitats

KINGDOM/ Phyla	Classes	Azores Total	Azores Endemics	Canary Is. Total
MONERA				83
Cyanophycota				63
Proteobacteria				17
Firmicutes				3
Protoctista		327	1	1,149
Chlorophyta		51		118
Rhodophyta		214	1	391
Heterokontophyta		62		
Dinoflagellata				231
Chromopyta				130
Bacillariophyta				279
Plantae				3
Magnoliophyta				3
Fungi				22
Ascomycota				19
Fungi imperfecti				3
Animalia		1,556	34	4,008
Porifera		95		157
Cnidaria		77		168
Ctenophora		1		4
Sipuncula		4		6
Echiura		1		2
Annelida		40		305
Arthropoda		291	4	1,113
Mollusca		353	29	1,188
Bryozoa		20		136
Phoronida		3		2
Entoprocta		1		-
Echinodermata		48		84
Brachiopoda				15
Chaetognata				22
Cephalorhyncha				1
Nemertea				1
Platyhelminthes				37
Protozoa				35
Chordata		622	5	732
	Ascidiacea	40		28
	"Pisces" Total	543		673
	Actinopterygii	483		587
	Chondrichthyes	60		86

KINGDOM/ Phyla	Classes	Azores		Canary Is.
		Total	Endemics	Total
	Reptilia	5		4
	Mammalia	34		27
TOTAL		1,883	39	5,265

Sources: Borges et al. (2010) and Moro et al. (2003)

Sea Birds

The Azores archipelago displays colonies of several seabird species of great importance in the European context, but its importance for the avifauna extends beyond breeding species, given that it is also possible to observe pelagic birds and a large variety of migratory birds, some of which are very rare Nearctic vagrants to the western Palearctic (Rodrigues & Michielsen, 2010).

Among the regular breeding species, there's the only Azores endemic seabird, the Monteiro's storm-petrel, (*Hydrobates monteiroi*), classified as vulnerable due to its small population size (a population of about 250-300 breeding pairs was estimated in 1999) and its restricted distribution (it is only known to breed on two islets, Baixo and Praia, situated off Graciosa Island) (BirdLife International, 2014). However, the actual population can be even higher because breeding is suspected on other islets of Graciosa (Baleia), althoug it cannot be confirmed due to its inaccessibility, as well as on further islets in the Azores (including some stacks off Flores and Corvo island), but proof is still lacking (Bolton et al., 2008).

The remaining populations of marine birds in the archipelago are among the most important of Europe. The Azores houses the largest population in the world of cory's shearwater (*Calonectris borealis*), with more than 180,000 couples, which corresponds to approximately four fifths of the European population (Bolton, 2001). Although the species is endangered, the population has a restricted distribution to the subtropical north-eastern Atlantic and the Mediterranean (Borges et al., 2010). Also important are the concentrations of angelito, *Hydrobates castro* (915-1240 couples, corresponding to 29% of the European population) and the Macaronesian shearwater, *Puffinus lherminieri*, (800-1500 couples, corresponding to 21% of the European population) and a residual population of Bulwer's Petrel, *Bulweria bulwerii* (about 50 to 70 pairs) (Miller et al, 1996, in Martín et al., 2008). Other two species nest in the Azores, which, although relatively common worldwide, are important populations at European and national level, respectively the roseate tern, *Sterna dougallii*, (about 1,000 couples, corresponding to 63% of the European population) and the common-tern, *Sterna hirundo* (about 2,000 couples, corresponding to 5% of the European population) (Gochfeld, 1983; Del Nevo et al., 1993, in Martín et al., 2008).

Among the species that sporadically nest in Azores, there is the red-billed tropicbird *Phaethon aethereus*. The sooty tern *Onychoprion fuscatus* reaches the northern limit of its distribution in the Azores, where its presence has been known since 1902 (Borges et al., 2010). This species has been regularly breeding in the archipelago since 2002.

Madeira is also particularly important for breeding seabirds, including not only Zino's Petrel (*Pterodroma madeira*), the endemic breeder on Madeira itself but also Fea's petrel (*Pterodroma feae*), which nests on Bugio in the Desertas islands (BirdLife International, 2015) and has a population of about 160-180 breeding pairs (SRA, 2014). In particular, the Desertas islands are one of the most important nesting areas for seabirds in Macaronesia and the North Atlantic, having singular and unique conditions worldwide (SRA, 2014). The entire group of islands is classified as "Important Bird Area" (IBA). Besides the mentioned *Pterodroma feae*, endemic to these islands, other breeding species are the shearwater *Calonectris borealis*, Bulwer's Petrel

(*Bulweria bulwerii*), Band-rumped Storm-petrel (*Oceanodroma castro*) and the common-tern (*Sterna hirundo)*, all of European interest (SRA, 2014).

Because of the short distance to Africa, the Canary Islands are visited every year by many migratory bird species that fly south in autumn in search of warmer places and go back to Europe in the spring. Others, mainly marine birds, use the archipelago as a nesting point only in the breeding season and after that return to the sea. This is the case with species of shearwater, such as *Puffinus puffinus* (Procellariidae), which nest in gullies of laurisilva (WWF, 2015a).

Invertebrates

Taxonomic knowledge on marine invertebrates is very incomplete. Twenty nine endemic marine snails are listed for the Azores, but no comprehensive studies are known for this group in the other archipelagoes, or for the remaining molluscs, let alone other major invertebrate groups such as crustaceans or echinoderms.

Nevertheless, marine molluscs and arthropods are among the most diverse marine taxa in Macaronesia. Some marine gastropod molluscs, such as the Rissoidae, for instance (a group of mostly littoral, small marine gastropods) show a high percentage of endemism in Macaronesia and this has been related to its evolutionary capacity to lose the planktotophic larval stage (Ávila, Goud, & Frias Martins, 2012).

In the Azores 353 molluscs and 291 arthropods are recorded up to date (Table 13). In the Canaries, approximately 1,180 of invertebrates in the marine environment are molluscs (42%), and about 1,100 are arthropods (38%) (Francisco-Ortega et al., 2010). However, very few of these are endemic to the Canaries.

In line with terrestrial biota, marine molluscs show the highest rate of endemism from all taxonomic groups in the Azores: they represent 74% of all of marine endemic species and/or subspecies from the archipelago (29 species out of 39 in total) (Borges et al., 2010).

The rich marine biodiversity of Madeira has clear affinities with the Mediterranean and the tropical and subtropical eastern Atlantic (Segers, Swinnen, & Prins, 2009), recording . In specific groups the conditions were right for the evolution of endemic species. This is particularly the case of littoral shelled molluscs: from the about 750 species recorded from Madeira, 23 are endemic to the archipelago (mostly in the littoral Rissodae family), with an additional 23 species shared with other Macaronesian archipelagoes (Segers et al., 2009).

In the Canaries, animals clearly dominate the marine realm: molluscs are the most diverse marine taxa (1,170 species and 18 subspecies, from 227 families and 553 genera), followed by arthropods (1,096 species and 17 subspecies) and vertebrates (717 species and 15 subspecies) (Moro et al., 2003).

Flora

In the Azores, algae have been one of the most comprehensively studied marine groups in the more recent years. According to Borges et al. (2010), there are 327 macroalgae in the Azores (51 Chlorophyceae, 62 Phaeophyceae e 214 Rhodophyceae). The *Predaea feldmannii ssp. azorica* is the only known endemic taxa to the Azores. A few other species (*Codium elisabethae*, *Laurencia viridis, Gelidiella tinerfensis, Phyllophora gelidioides, Meristotheca decumbens, Botryocladia macaronesica)* are listed as endemic to the Macaronesian islands.

The Canarian marine flora has approximately 700 species, including over 23 species of blue-green algae and three species of flowering plants (Francisco-Ortega et al., 2010).

Approximately 16 of the algal species are endemic to the Canarian archipelago. The majority of the native flora (391 species) is red algae (Rhodophyta) Table 13). The island with the highest number of species is Tenerife (476 ssp.). In contrast, the western islands of La Palma and El Hierro have a poor flora with 196 and 189 species, respectively (Francisco-Ortega et al., 2010).

In Madeira, 374 algae have been listed, from which 68 Chlorophyceae, 68 Phaeophyceae and 238 Rhodophyceae (S. Ferreira et al., 2012).

Fish

At least 18 species of fish are known to have a distribution restricted to Macaronesia (Brito, Falcón, & Herrera, 2007). Among these are the island grouper *Mycteroperca fusca, the* barred hogfish, *Bodianus scrofa*, the Madeira rockling *Gaidropsaurus guttatus,* the wrasse *Symphodus trutta* (shared between Madeira and the Canaries), *Paraconger macrops* (shared between Madeira and the Azores), and *Gobius maderensis* (shared between Madeira and the Canaries).

In the Azores, only one of the known species of nearshore fishes is regarded as endemic, *Symphodus caeruleus* (Azevedo, 1999). In Madeira, a total of 226 species of littoral fish are recorded so far but no endemic species are known in the archipelago (SRA, 2014). The Canarian marine environment has a rich vertebrate fauna that includes 730 native species of fish.

Reptiles

From the seven species of sea turtles existing worldwide, six occur in Macaronesia: one of the family *Dermochelydae* (*Dermochelys coriacea*) and five in *Cheloniidae* family (*Caretta caretta*, *Lepidochelys kempii*, *Eretmochelys imbricata*, *Chelonia mydas, Lepidochelys olivacea*). Although juvenile animals attend regional waters during their migration as a point of rest and food, there are no nesting records in Macaronesia for any of these species (Cabral et al., 2005; Brongersma, 1982; Dearniyagala, 1952, in Loureiro, N, M, & O, 2008).

While *Caretta caretta, Chelonia mydas* and *Dermochelys coriacea* are common, the others are only sighted occasionally (WWF, 2015a). Only *Caretta caretta* is considered a visitor species in Macaronesia according to the IUCN data, the other being occasional (M. E. Oliveira et al., 2005).

Mammals

Macaronesia has a unique diversity of sea mammals, with 27 species of cetaceans observed in the Canary Islands (Borges et al., 2010). Most of these species are migrants, although at least three species (i.e. short finned pilot whales, *Globicephala macrorhynchus*), sperm whales (*Physeter macrocephalus*) and bottlenose dolphins (*Tursiops truncatus*) form permanent colonies in the region waters (Francisco-Ortega et al., 2010).

The only pinniped that occurs in the region is the Mediterranean Monk Seal (*Monachus monachus*), currently restricted to the Desertas islands. Once widely and continuously distributed in the Mediterranean and Black Seas (including all Macaronesian archipelagos), the monk seal was reduced to small numbers as a consequence of commercial hunting and human persecution, being virtually reduced to 3–4 isolated subpopulations (Karamanlidis, 2015). In the Macaronesia, there is a small colony with about 30-40 individuals on Desertas islands (Life Madeira Monkseal, 2014) that due to the legal protection of these islands have increased its population during the last years and expanded its presence along the coast of Madeira Island.

4. CONSERVATION OUTCOMES

Introduction

The Regional Ecosystem Profiles are built, in accordance with the CEPF EP methodology, based on Langhammer et al. (2007), around the concepts of conservation outcomes and key biodiversity areas (KBAs)[6]. Conservation outcomes are the entire set of justifiable conservation targets that need to be achieved to prevent species extinctions and biodiversity loss. They are used as the scientific underpinning for determining geographic and thematic focus for conservation investment. Indeed, the BEST funding niches and strategy will be based upon these outcomes, firstly to ensure that investments are directed at relevant projects, and secondly to enable measurement of the success of conservation investments. By presenting quantitative and justifiable targets against which the success of investments can be measured, conservation outcomes allow the limited resources available for conservation to be targeted more effectively, and their impacts to be monitored at the global scale. Therefore, conservation outcomes form the basis for identifying biological priorities for investment.

The selection of conservation outcomes relies on the understanding that biodiversity is not measured in any single unit. Rather, it is distributed across a hierarchical continuum of ecological scales that can be categorized into three levels: (1) the globally threatened species within the region, (2) the sites that sustain them (the key biodiversity areas, or KBAs), and (3) the landscapes necessary to maintain the ecological and evolutionary processes upon which those sites depend. These levels interlock geographically through the occurrence of species at sites and of species and sites within corridors. Given threats to biodiversity at each of the three levels, targets for conservation can be set in terms of “extinctions avoided” (species outcomes), “areas protected” (site outcomes), and “corridors consolidated” (corridor outcomes). Defining conservation outcomes is a bottom-up process, with species outcomes defined first, followed by site outcomes and, finally, corridor outcomes.

Species outcomes

The approach for setting conservation priorities is driven by species locality data to identify site-scale targets for biodiversity conservation. Therefore, the first phase of defining conservation outcomes is to identify and list the species that should be considered, based on technical criteria to ensure the appropriate global conservation interest (Table 14). According to Langhammer et al. (2007), two main variables determine how to prioritize conservation targets: irreplaceability and vulnerability:

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[6] The methodology used by CEPF for ecosystem profiling since 2008 is “Langhammer *et al.* (2007) “Identification and Gap Analysis of KBAs”. In 2012, SSC and WCPA embarked upon an extensive consultation process to consolidate a standard approach to KBA identification. As a result, KBA standard and methodology was launched at World Parks Congress in Sydney in November 2014. However, as BEST III started in January 2014, Langhammer *et al*. (2007) was still the methodology used in the present EP profiling for Macaronesia.

- Vulnerable species are those threatened with global extinction (i.e. globally threatened species). The sites that support them are priorities for conservation because action is urgently required to avert their extinction (i.e. there is limited time in which to take action).
- Irreplaceable species are those that occur at few or no other sites. The sites that support them are priorities for conservation because there are few or no other places where these species can be conserved.

Table 14. Criteria for conservation targets

Criteria	Sub-criteria
Vulnerability	Globally Threatened Species (CR, EN, VU)
Irreplaceability	a) Restricted-range Species (range < 50,000 km2)
	b) Large but dispersed population
	c) Globally significant congregations
	d) Globally significant source populations
	e) Bioregionally restricted assemblages

According to the CEPF's methodology, species outcomes for the Macaronesia equate to:

1) **389 globally threatened species and subspecies listed on the IUCN Red List** based on quantitative criteria under which the probability of extinction is estimated for each species. Species classified as threatened on the Red List have a high probability of extinction in the medium-term future. These include the three IUCN categories Critically Endangered (CR), Endangered (EN) and Vulnerable (VU). This definition excludes Data-Deficient species (DD), which, according to the methodology, are considered to be priorities for further research but not necessarily for conservation action. It also excludes those species that are threatened locally and may be high national or regional priorities, but not high global priorities.
2) **164 globally threatened species and subspecies listed on sub-global Red Lists** that sometimes incorporate higher quality data than are available at the global level. Within sub-global Red Lists, any species endemic to the assessment region that has been assessed according to the IUCN's Red List guidelines are also included in the application of the vulnerability criterion (for globally threatened species). If the IUCN guidelines were followed in a local Red List, then the species (existing nowhere else) would have, by definition, the same listing on the global Red List, pending evaluation by the appropriate Red List Authority. Sub-global Red Lists considered for the Macaronesia were the Red List of Vertebrates of Portugal (Cabral et al., 2005); the Reference List of Azores' fauna (Eduardo Dias, 2010); the threatened bryophytes in Madeira and Selvagens Archipelagos (Sim-Sim et al., 2014); the Red List of Spanish Vascular Flora (J. C. Moreno, coord., 2008); Atlas and Red Book of the Threatened Bryophytes of

Spain (Garilleti, 2012); Atlas of the Threatened Invertebrates of Spain (Verdú & Galante, 2009).

3) **97 restricted-range species**, i.e., species restricted to an area of less than 50,000 km^2 according to Langhammer et al. (2007), that do not meet the previous criteria. The majority of consulted stakeholders in Macaronesia agreed that this latter criterion is more appropriate for large or continental regions than for small islands, as it is the case of Macaronesia, that records a very high endemicism rate and covers a total land surface of 10,571 km^2, much inferior to the defined range of 50,000 km^2. The strict use of this criterion would lead to the inclusion of an excessive number of endemic species resulting in the delineation of KBAs covering nearly the total surface of the region. Therefore, only endemic species listed as threatened in local red books and checklists, using different criteria from IUCN, were considered. These Lists and Assessments include the Endemic Threatened Vertebrates and Flora of Madeira (R. Jardim, Fernandes, F., Carvalho, J., 2006), the Catalogue of Protected Species of the Canary Island (Gobierno de Canarias, 2010); TOP100 Priority Species of the Macaronesia (Martín et al., 2008).

4) **6 species with globally significant congregations**. Sites that hold large proportions of the global population of an individual species at a given time are often considered as irreplaceable. These may comprise the following:

   i. Breeding colonies and/or other sites used during the non-breeding season where large numbers of individuals gather at the same time (e.g. for foraging and roosting);

   ii. Bottleneck sites through which significant numbers of individuals of a species pass over a concentrated period of time (e.g. during migration)

Although the criterion “Threatened Species” has not yet been changed from to “Threatened Taxa” by the IUCN, subspecies were also considered in this EP, in the event that this changes in the near future[7]. Threatened subspecies in Macaronesia include 2 birds, 1 mammal and 38 plants, all endemic.

Table 15 summarizes the taxonomic breakdown of the 655 species outcomes in the region, while a full list is given in Appendix 4. A comprehensive database on Macaronesian species outcomes is available online at http://goo.gl/CahYZT.

[7] Under the original guidelines, sub-species (and other taxa below the level of species) do not trigger the KBA criteria, unless the species they belong to is itself a globally threatened (or locally endemic) species. However, under the new KBA standard, the A1 criterion has been changed from Threatened Species to Threatened TAXA. The proposed new language is "At the global level, the taxa that can trigger or meet KBA sub-criterion A1 encompass species, subspecies, plant varieties, and isolated subpopulations". Neverthless, Macaronesian subspecies were clearly identified in this EP (adding a suffix “ssp” to their threatened status), so they can be taken out of the data set in the event that this changes or the criterion is not formally adopted by IUCN.

Table 15 - Summary of Species Outcomes

Taxonomic group	Global threat status			RR	Congr	Total	Distribution by archipelago		
	CR	EN	VU				AZO	MAD	CAN
Arthropods	11	16	16	20		63	13	8	42
Birds	1	3	6	10	6	26	8	8	16
Crustaceans			1	1		1	1	1	1
Fish	7	7	29			43	25	29	38
Mammals	1	9	1			11	7	8	8
Molluscs	40	24	54	2		120	6	59	54
Plants	124	107	83	64		378	69	123	228
Reptiles	6	3	4			13	5	6	11
Total	190	169	194	97	6	656	138	246	400
Percentage	29%	26%	30%	15%	1%	100%	21%	38%	61%

(see full list in Appendix 4 and online at http://goo.gl/CahYZT)

Species outcomes mainly comprise terrestrial species (90%) but this is clearly biased due to scarse data on knowledge, conservation status and distribution of marine species.

Out of the 656 species outcomes in the Macaronesian Islands, 400 (61%) occur in the Canary Islands, including 313 endemic; 246 (38%) occur in the Madeira archipelago, including 166 endemic; and 138 (21%) occur in the Azores, including 72 endemic.

The Azores supports fewer globally threatened species than the other two archipelagos in the region but it remains a high priority for global biodiversity conservation, because of the significant number of globally threatened species that are found nowhere else.

The high number of critically endangered species (29%) should be highlighted. The CR species are, by definition, the ones most at risk of imminent extinction and, therefore, warrant greater attention than species in the lower threat categories of Endangered and Vulnerable. From all taxa, the largest proportion of CR species occurs within reptiles (46%), molluscs (33%) and plants (33%). The taxonomic group with the lowest proportion of CR species is the group of birds, with 4% (Figure 10).

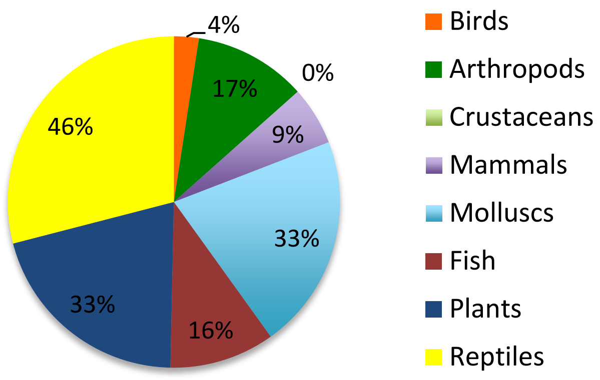


Figure 10 – Proportion of CR species by taxonomic group

In total, 90% of the species outcomes are endemic to Macaronesia (91% if Congregatory species are not considered in the total species outcomes). The level of endemicism is extremely high within molluscs (100%), arthropods (98%) and plants (99%) and very low within fish (5%) (Figure 11).

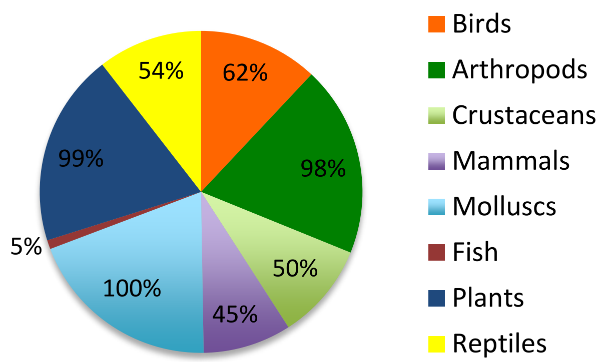


Figure 11 - Endemic species outcomes by taxonomic group

When analysing species outcomes, it should be stressed that the process of collecting and listing data on species is not made without challenges. First of all, it requires detailed knowledge of the conservation status of individual species, namely on the global threat status of each species, and on the distribution of globally threatened species at sites, and across corridors. Although this information has been accumulating in the global Red List of Threatened Species produced by IUCN and partners for about 50 years, knowledge of the population status of some threatened species is still incomplete or absent. Not only there are several species evaluated as “Data deficient” (DD), but also an important number of others are totally absent from the Global List. In fact, as stated by Pedro Cardoso, Borges, Triantis, Ferrández, and Martín (2012), “the IUCN Red List is the most useful list of species that are at risk for extinction worldwide, as it relies on a number of objective criteria. Nevertheless, there is a taxonomic bias that excludes species with small body sizes, narrow distribution ranges and low dispersal abilities, which constitute the vast majority of the planet’s biota, particularly local endemics”. This issue was also particularly stressed during the first round of workshops in the three Macaronesian archipelagos — there are gaps in the IUCN Red List with respect to the taxonomic representation in the region, especially on invertebrates, bryophyte and algae that play a crucial role in islands’ ecosystems*.* Acknowledging this gap, the IUCN is currently reviewing the list of threatened invertebrates with the support of local experts, an assessment that should be complete by 2020.

The same applies to sub-local Red Lists, as they do not cover all taxonomic groups. In particular, invertebrates (except for Spain) and marine species are not cover by any of those Red Lists and Assessments. Also in other Red Data books and checklists, marine species are highly sub-represented, as noticed, for example, by R. Aguilar et al. (2009): "only 12 marine species are considered in the Catalogue of Protected Species of the Canary Islands. Considering the 5,232 marine species in the archipelago, according to the report published in 2003 by the Autonomous Government, this means the protection of only 0.2%".

In addition to the shortfall of assessed species, there are some incongruities in the IUCN Red List for some of the already identified and assessed species. In some cases, species are listed as threatened although they are actually fossil species (e.g. mollusc *Leptaxis vetusa* listed as CR*)*. In other cases, species are described as threatened while the status and description refers in fact to only one of its subspecies. This is the case, for example, of a perennial evergreen shrub endemic to the Azores (*Euphorbia stygiana)*: listed as critically endangered for being restricted to a population of 50-60 individuals on a particular island; however, this assessment in fact refers to one of its subspecies, while another subspecies has a population of 30.000-40.000 specimens and is widespread throughout the archipelago, a situation known by local botanists for some time but not reflected yet in the listing status.

Furthermore, there are still controversial taxonomic discussions among experts concerning some species, as it is the case of some plants in the Azores: *Ranunculus cortusifolius* (Willd.); *Pericallis malvifolia* (L'Hér.) B. Nord.; the genus *Ammi*; the genus *Agrostis*.

Despite these considerations, defining outcomes is a fluid process and, as data become available, species outcomes can be expanded to include other taxonomic groups and species that have not previously been assessed, as well as restricted-range species.

The taxonomic groups that are covered as species outcomes in the present EP are highlighted below.

Arthropods

Out of the 63 threatened arthropods, 17% are CR species. All of them are endemic to Macaronesia, two to Madeira archipelago and nine to the Canary Islands. One of those is the possibly extinct Madeira Large White (*Pieris wollastoni*), restricted to the island of Madeira. It has not been reported since the 1970s despite several visits of lepidopterists to its former habitat. An adequate survey is needed to define if the species is extinct or not (van Swaay, 2010).

Another species that might be currently extinct is the *Paradeucalion desertarum* (António Franquinho Aguiar, pers. com.), an endemic species to the Desertas Islands, not yet assessed in the IUCN Red List but considered here as a RR species.

Birds

Within the 26 bird species outcomes, 54% are terrestrial and 46% are marine.

The only CR bird in Macaronesia is the "*Regulus regulus sanctae mariae*", an endemic subspecies of Golden Crest restricted to one single island of the Azores (Santa Maria).

Some threatened bird species have improved in status from CR to EN in the last decade thanks to conservation efforts funded by EU LIFE-Nature. This is the case of the Zino's Petrel (*Pterodroma madeira*) and the Azores Bullfinch (*Pyrrhula murina*), although they have highly restricted ranges. The Azorean Bullfich has a population of about 1,000 individuals restricted to a 83 km^2 patch of cloud forest on the eastern part of São Miguel Island (Ceia et al., 2011).

Among the RR bird species is the Gran Canaria blue chaffinch (*F. teydea ssp polatzeki*). The blue chaffinch *Fringilla teydea* is endemic to the Canary Islands where it is restricted to Gran Canaria (*F. t. polatzeki*) and Tenerife (*F. t. teydea*) and is listed as "Near Threatened" (NT) in the IUCN Red List. However, a recent study carried out by Sangster et al. (2015) shows that the blue chaffinches on Gran Canaria and Tenerife represent two distinctive species: *F. polatzeki*, considered as one of Europe's rarest passerine species and *F. teydea*, much more common. Therefore, the authors argue that Gran Canaria blue chaffinch is and should be classified as critically endangered as its long-term survival in the wild currently depends on a very small area (20 km2) in southwest Gran Canaria. Reclassification of Gran Canaria blue chaffinch as a species increases the urgency of ongoing conservation efforts.

Half of the marine bird outcomes (6) are species that, although not globally threatened, form important congregations in the region during breeding periods. Cory's Shearwater (*Calonectris borealis)* is a seabird species endemic to Europe, where it mainly breeds on the Azores and Madeira (nearly 90% of the global population) and on the Canary Islands. The population is estimated and projected to be increasing globally, so the species is classified as Least Concern. Bulwer's Petrel (*Bulweria bulwerii*), listed as LC, is a marine and highly pelagic species that breeds in the Azores, Madeira and the Canary Islands. Researchers estimate that about 50% of the roseae terns (*Sterna dougallii*, LC) in Europe nest in the Azores, where there are c. 35 colonies of this species, considered as one of the 30 rarest in Europe. Recently, Census 2015 on Birds of the Azores revealed that, in particular, the island of Graciosa holds the second largest colony of the species in Europe, with about 600 pairs.

Others congregatory species are the Band-rumped Storm-petrel (*Hydrobates castro*), the White-faced Storm-petrel (*Pelagodroma marina*), and the common tern (*Sterna hirundo*).

Crustaceans

There is only two crustacean species outcome: the European Spiny Lobster (*Palinurus elephas*), listed as VU in the Global Red List and present in all three archipelagos and the giant barnacle (*Megabalanus azoricus)*, a RR species that occurs in Madeira and the Azores.

Fish

Considerably more information concerning distribution and other facets of conservation status is necessary for many of the fish species known in Macaronesia before a more comprehensive global threat assessment can be made for the group in the region. It is probable that the region supports more fish species of the highest global conservation concern than were listed by July 2015.

The seven CR fish present in Macaronesia include one from the family *Rajidae* (*Dipturus batis*), three from the family *Squatinidae* (*Squatina aculeata; Squatina oculata*; *Squatina squatina*), one from the family *Squalidae (Squalus acanthia,* Northeast Atlantic subpopulation), one of the family *Lamnidae (Lamna nasus*-Northeast Atlantic subpopulation) and the European eel (*Anguilla anguilla*). The latter occurs in coastal waters and, although among the watercourses, lakes and ponds, is unlikely to remain and grow to maturity in Macaronesian islands due to the irregularity and small size of the water courses or, otherwise, remaining captive in those waters which prevents its reproductive migration.

Two of the threatened fish outcomes are endemic to Macaronesia: *Mycteroperca fusca* (EN) and *Bodianus scrofa* (VU).

Regarding the whale shark (*Rhincodon typus*, VU), the Azores, acting as a thermal boundary, has attracted seasonal numbers of individuals in the last years probably due to the large-scale temporal changes in the tropical climate. Yet, the relevance of this region as oceanic habitat and its connectivity with other habitats across the Atlantic still needs to be clarified and the reasons for the spatial variability within the region and, in particular, the local aggregations remain unknown, although local productivity related to seamounts appears to play a major factor role (Afonso P, 2014).

Mammals

Threatened mammals in the Macaronesia include four bats (all endemic), one Canarian shrew, five whales species and one seal. The only CR mammal is a subspecies of Leisler's Bat (*Nyctalus leisleri ssp. verrucosus*), endemic to Madeira island.

The Mediterranean Monk Seal (*Monachus monachus*) is the sole representative of the genus *Monachus* and the only seal that occurs in Macaronesia. It is regarded as one of the most endangered pinniped species in the world, with only approximately 600-700 surviving animals (Karamanlidis, 2015). Listed as CR in the IUCN Red List since 1996 until mid 2015, it has now an improved status of EN. According to Karamanlidis (2015) it is now thought that the previous assessment (Critically Endangered A2abc) “was an overestimate of the scale of decline in the global population over the previous 33 years, since most of the reduction in population size likely happened more than three generations ago”. However the Mediterranean Monk Seal population remains very small and highly fragmented (consists of 3–4 isolated subpopulations) and still faces many threats (Karamanlidis, 2015). In the Macaronesia, the species is extinct in the Azores and the Canary Islands, having survived only in the remote Desertas Islands of Madeira archipelago, with increased sightings in recent years also around the main island of Madeira

Except for the Sperm whale (*Physeter macrocephalus*, VU), the other threatened whale species known in Macaronesia are all EN. Macaronesia is considered as an important route where different species of baleen whales pass on their annual migration, although no breeding occurs in the region (Silva et al., 2014).

Molluscs

Of all animal groups, molluscs are the most numerous species outcomes in Macaronesia, with 120 taxa, representing 43% of all animals.

There are 40 described CR molluscs. Among these, some are already possibly extinct, but still pending confirmation: *Leiostyla cassida, Atlantica gueriniana, Geomitra delphinuloides, Discula lyelliana, Leiostyla simulator* in Madeira archipelago; *Monilearia arguineguinensis, Monilearia pulverulenta, Sculptiferussacia clausiliaeformis, Monilearia granostriata* in the Canary Islands.

In the Azores there are several endemic species not yet reported to science that might already be extinct due to habitat destruction (Antonio Frias Martins, pers. com.).

Plants

There are 368 plant species outcomes, from which 314 are threatened and 64 have a restricted range. Out of those, 33% are CR species. Some are already possibly extinct, such as the *Delphinium maderense*, and two Madeiran endemic Bryophytes*, Fissidens microstictus* and *Nobregaea latinervis* (Sim-Sim et al., 2014).

Reptiles

Reptiles are the taxonomic group with the highest proportion of CR species. In fact, 6 out of 13 reptile species outcomes known in Macaronesia are listed as CR in the IUCN Red List. This includes two species of marine turtles (*Lepidochelys kempii* and *Eretmochelys imbricate*) that occur occasionally in the region's waters, and four lizards from the genus *Gallotia*, endemic to the Canary Islands (*Gallotia auaritae, Gallotia bravoana, Gallotia intermedia, Gallotia simonyi*). *Gallotia auaritae* was believed to have become extinct in the last 500 years. However, it remains listed in the IUCN Red List as a CR species because "there are recent sightings and photographs of giant Gallotia lizards from northern La Palma (Mínguez et al. 2007; Jose Antonio Mateo Miras, pers. com. 2008). While the identity of these lizards needs to be verified through the capture of an individual, it is probable that there has only ever been a single species of large Gallotia on La Palma (Barahona et al. 2000; Mateo et al. 2003; Jose Antonio Mateo Miras pers. com. 2008)" (Miras & Martínez-Solano, 2009).

Site outcomes

Methodology

Because most globally threatened species are best conserved through the protection of a network of sites where they occur, the process of defining conservation outcomes also focuses on identifying a comprehensive set of Key Biodiversity Areas (KBAs) which are explicitly designed to conserve biodiversity at the greatest risk of extinction (Langhammer et al., 2007). Thus, KBAs are sites contributing significantly to the global persistence of biodiversity. Global implies that the contributions of a site to the persistence of a given biodiversity element are measured in relation to the worldwide extent of the element (Dudley et al., 2014).

KBAs are sites, in that they are relatively limited in extent, and could thus potentially be managed as protected areas or by other effective means to conserve biodiversity. They therefore differ from broad-scale approaches, such as Ecoregions, Endemic Bird Areas, Wilderness Areas and Biodiversity Hotspots, which identify large regions of interest, often spanning several countries. However, while identification of a KBA is recognition of a site's significance to biodiversity, it does not on its own imply any one management response. KBAs are thus a data set used to help processes such as systematic conservation planning and implementation and monitoring of intergovernmental commitments (Dudley et al., 2014).

KBAs are identified using globally standardised criteria and thresholds applied by national and international constituencies, based on irreplaceability and vulnerability:

- Vulnerability (or threat) refers to the likelihood that a site's biodiversity value will be lost in the future. A site meets the vulnerability criterion for KBAs if it holds one or more globally threatened species that occurs regularly (instances of vagrancy, marginal occurrence and historical records are excluded). The occurrence should be confirmed and not suspected.

- The irreplaceability (or uniqueness) of a site is the degree to which geographic options for conservation will be lost if that particular site is lost. In an extreme example, a site is completely irreplaceable if it contains one or more species that occur nowhere else. Sites regularly supporting significant populations of restricted-range species are global conservation priorities because there are few or no other sites in the world where conservation action for these species can be taken.

Some species trigger more than one KBA criterion, for example, because they are both globally threatened and geographically restricted. The defined criteria and thresholds for the identification of KBAs of global importance are summarized on Table 16. Only sites that meet these criteria and thresholds qualify as global KBAs.

Table 16 - Criteria for identifying Key Biodiversity Areas

Criteria	Sub-criteria	Provisional thresholds for triggering KBA status
Vulnerability Regular occurrence of a globally threatened species (according to the IUCN Red List) at the site	Globally Threatened Species	Critically Endangered (CR) and Endangered (EN) species: presence of a single individual; Vulnerable (VU) species: >10 pairs or 30 individuals
Irreplaceability Site holds X% of a species' global population at any stage of the species' lifecycle	a) Restricted-range Species (range < 50,000 km2)	> 5% of global population at site
	b) Large but dispersed population	5% of global population at site
	c) Globally significant congregations	> 1% of global population seasonally at the site (5% for marine species)
	d) Globally significant source populations	Site is responsible for maintaining >1% of global population
	e) Bioregionally restricted assemblages	To be defined

(Source: Langhammer et al., 2007)

The starting point for defining KBAs in the Macaronesian region was the Alliance for Zero Extinction sites (AZE) and the Important Bird Areas (IBAs). Sites for which such assessments exist qualify directly as KBAs. The same apllies to Important Plant Areas (IPA) but no IPAs have been identified in the Macaronesia so far. The two sites identified by the Alliance for Zero Extinction in Macaronesia, both triggered by EN bird species, are “Maciço Montanhoso Oriental” in Madeira island, triggered by the Zino’s Petrel (*Pterodroma madeira*) and “Pico da vara” in the island of São Miguel, triggered by the Azores Bullfinch (*Pyrrhula murina*) (Alliance for Zero Extinction, 2010). Both AZE sites have been included in the KBAs. The network of Important Bird Areas (IBAs) in each archipelago was identified by BirdLife International, partners and collaborating organizations, starting in 1993. The means by which IBAs are identified in the EU deliberately align with Special Protection Areas (SPA) selection criteria, established under the EU's Birds Directive (Council Directive on the conservation of wild birds).

However, as many IBAs in the Macaronesian region have been identified based on globally "Least concern" (LC) or "Near threatened" (NT) species only (or that its status have been changed to these categories since the IBA designation), it has been agreed with CEPF that only IBAs including also globally threatened trigger species should be considered as KBAs. Besides, and following the criteria of the used methodology, IBAs with congregatory birds selected by criteria A1 (globally threatened), A4i and A4ii (congregatory > 1%), were also considered as KBAs.

The guiding principle for the delimitation of KBA is to consider "management units". Therefore, the distribution of species has been overlapped with the protected areas ("effective" management units, already in place), as a second step for the delimitation of a preliminary set of KBAs. In Macaronesia, and in addition to protected areas designated under local legislation, there are also Natura 2000 sites, the ecological network of protected areas according to the Birds and the Habitat Directives of the EU, composed of Special Protection Areas for birds (SPA) and of Special Areas of Conservation (SAC) for other species and habitats. In many cases, these protection figures overlap and in the case of the Azores, they are totally included in the regional network of protected areas.

Geographic information on the distribution of threatened species in the region was collected from the existing Biodiversity Databases. These databases are available online for the Azores (http://www.atlantis.angra.uac.pt) and for the Canary Islands (http://www.biodiversidadcanarias.es/atlantis) aiming to disseminate the data to the public, allowing universal and unrestricted access. For Madeira, where no such Biodiversity Databank exists, distribution data was collected with the support of the governmental division on Nature Conservation and Biodiversity and local experts.

KBA boundaries were edited in ArcGIS based on species distribution and aided by map overlays of protected areas and bathymetry (except in the case of the Canary Islands where no bathymetry was available). A process of consultation among relevant stakeholders followed to elicit review, refine boundaries, incorporate further species records, and capture contextual data on threats for KBA prioritization.

Box 2. Criteria to extract distribution data from biodiversity databases

The criteria used to extract distribution data from the biodiversity databases of the Azores and Canary Is. was discussed and agreed among experts and databases' administrators:

a) Time frame: 1990 onwards

b) Precision:
- Plants and invertebrates: level 1
- Vertebrates: levels 1 and 2
- Aquatic taxa: level 1 for coastal species; levels 1 and 2 for fish and marine mammals

c) Spatial resolution: the best possible, but not lower than

In order to help discriminate among the large number of KBAs that were identified in the region, a biological prioritization process was undertaken, using the methodology set out in Langhammer *et al.* (2007). This methodology is based upon the principles of irreplaceability and vulnerability of species already mentioned in Table 14. Another consideration is vulnerability at the site level, regardless of the species that occur there. All things being equal, acutely threatened sites (due to, for example, commercial logging) are higher priorities for conservation action than sites not under severe, immediate threat, because action is more urgently required to avoid the loss of the site and the species populations it supports. These three criteria of irreplaceability, species-based vulnerability and site-based vulnerability will be combined to assign each KBA to one of five priority levels, as shown in Table 17.

Table 17 – Criteria for priorization of KBAs

Irreplaceability	Species-based Vulnerability	Site-based Vulnerability		
		High	Medium	Low
Extreme (species endemic to hotspot and not known from any other site)	Extreme (CR)	1	1	1
	High (EN)	1	1	1
	Medium (VU)	2	3	4
	Low (not CR, EN or VU)	3	4	5
High (species known only from 2-10 sites globally)	Extreme (CR)	2	2	3
	High (EN)	2	3	4
	Medium (VU)	3	4	5
	Low (not CR, EN or VU)	4	5	5
Medium (species known only from 11-100 sites globally)	Extreme (CR)	3		
	High (EN)	4		
	Medium (VU)	5		
	Low (not CR, EN or VU)	5		
Low (species known from more than 100 sites globally)	Extreme (CR)	4		
	High (EN)	5		
	Medium (VU)	5		
	Low (not CR, EN or VU)	5		

(Source: Langhammer et al., 2007)

In Macaronesia, site-based vulnerability was defined according to the level of protection and, consequently of conservation. Areas with a protection status are Protected Areas in the regional or local domain as well as Natura 2000 sites. Despite not being strictly protected, Natura 2000 sites must have site-specific management plans, which not only contributes to its sustainable management, but it is in many cases more than protected areas actually have. In addition, IBAs were also considered because in the EU these areas are being classified as Natura 2000 sites, more precisely as SPA-Special Protected Areas for birds[8]. As such:

- "Low" vulnerable sites: those mostly or totally protected, i.e., which surface is covered by protected areas, Natura 2000 sites and IBAs;
- "Medium" vulnerable sites: those witch are partly protected;
- "High" vulnerable sites: those with little or no protection.

Data and time constraints prevented the differentiation of protection levels within Protected Areas and Natura 2000 sites, as well the analysis of specific threats for site vulnerability.

Challenges and data constraints

Although the process of identifying conservation outcomes used the best available data, there are a number of limitations of the present analysis in addition to those already mentioned (shortfall of species assessments, in particular within invertebrates and marine species). The main limitations and issues that have prevented the consideration of all species outcomes to trigger KBAs are described below:

1. For species that have already been assessed, knowledge and availability of geographical data on their distribution may still be limited in the Macaronesian region. In fact, despite the existence of regional online databases on biodiversity for the Azores and the Canary islands, these unique and useful tools rely on the existing studies and information on species distribution, which are not only limited by research knowledge but also not always made available by the scientific community. As a result, 75% of endangered, restricted-range and congregatory species in Macaronesia are included in the Biodiversity databanks, with available shapefiles (Figure 2). Fish and reptiles (especially marine reptiles) are the taxa with the lowest rate of known distribution (26% and 62%, respectively).
   The scarcity of distribution data was more pronounced in Madeira archipelago, whereas the most complete is found in the Canary Islands.
   To overcome the gaps in distribution data a comprehensive literature review (e.g. Natura 2000 forms and published literature) and stakeholder consultation was carried out. As a result, it was possible to increase the threatened, restricted-range and congregatory species assigned to KBAs from 75% to 88% (i.e. 579 out of 655 species). However, for some of the species with no shapefile only partial distributions are known. In addition, and as geographic data for fish is extremely limited (Canary Islands) or non-existing (Azores and Madeira), Macaronesian MPAs (Marine Protected Areas) where threatened species occur and are listed in MPAs descriptions, were considered as marine KBAs.

[8] The European network of IBAs has formed an important scientific reference for the designation of special protection areas (SPAs) under the Wild Birds Directive of the European Union. It is now accepted BirdLife policy that in the EU, all IBAs should be classified as SPAs.

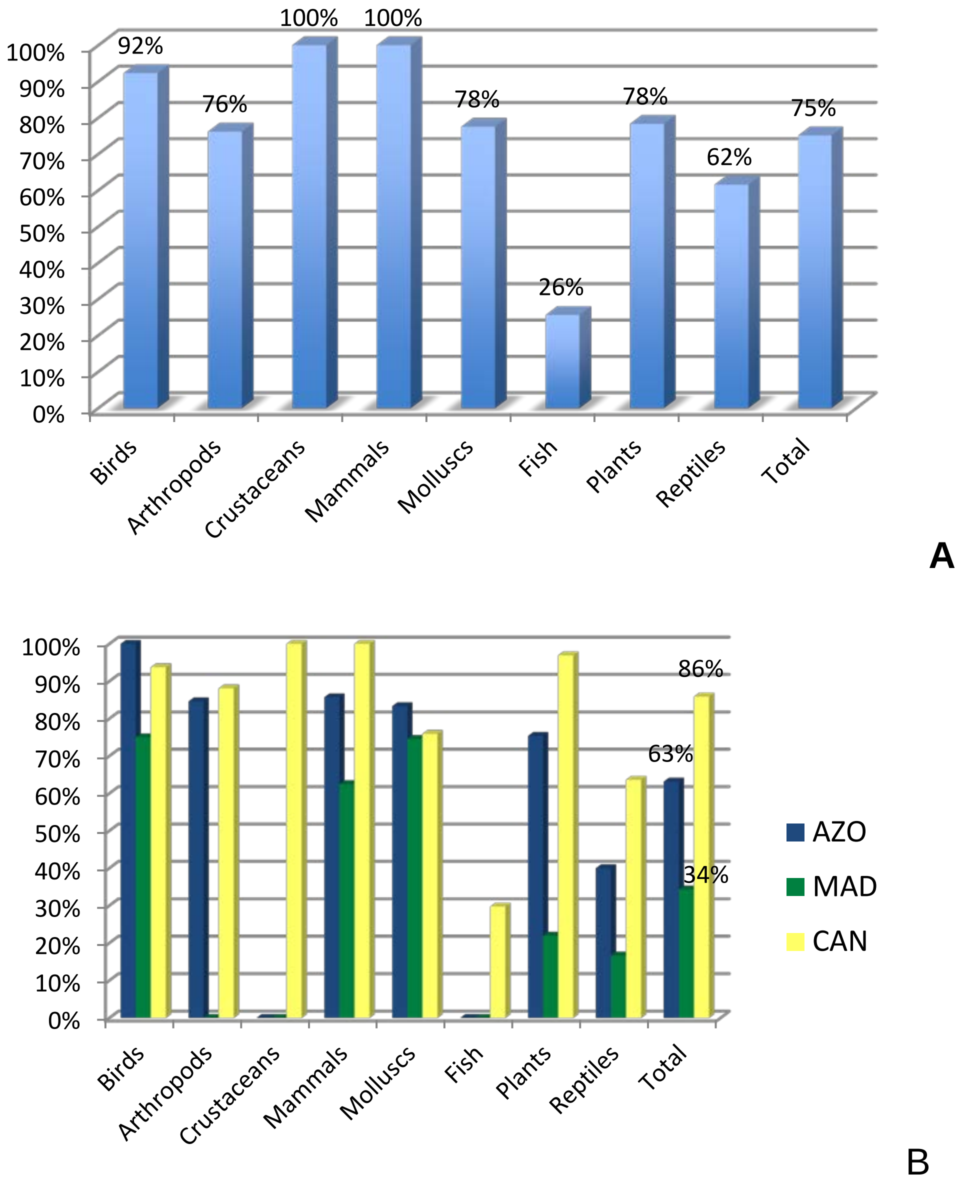


Figure 12 – Percentage of species with available cartographic distribution. Totals for Macaronesia (A) and by archipelago (B).

2. Even for species for which both assessment and distribution are known, the quality of the distribution data is not always the best. This is the case for the geographic data for plants in the Madeira archipelago (spatial resolution of 10 x 10 km for a total land territory of 802 km^2), the same as provided as per request to Natura 2000 Network. In addition, the available data is not always totally accurate. Despite the significant efforts made on regional online databases on biodiversity, it is not easy to keep it up to date, and experts detected some gaps and inaccuracies. In these cases, the used data was the one provided by experts during consultations instead of the available shapefiles from the Biodiversity Portal (e.g. *Pippistrellus madeirensis, Nyctalus azoreum, Plantathera micrantha, Hydrobates monteiroi*, for the Azores)

3. When all the above information is available, the lack of abundance data poses a problem to classify species as VU, RR or congregatory species. Thresholds with absolute values, such as VU species, were therefore replaced with relative values: a 5% threshold was used for VU species instead of "10 pairs or 30 individuals".

Apart from the already described data gaps, for widespread species it was not possible to assign specific Key Biodiversity Areas (Table 18). On the one hand, considering these species for the definition of KBAs would mean covering most, if not all, of the territories with KBAs. On the other hand, site-scale conservation is not the most effective approach for the conservation of these species. But, while not assigned to specific key biodiversity areas, these species will benefit from specific conservation actions. Those species were marked as trigger species in the existing KBAs where they occur, but no KBAs were delineated specifically for them.

Table 18 – Species with known but extremely large distribution

Taxa	Species	Status	Archipelago
Birds	*Anthus berthelotii berthelotii*	VU loc	Canary Is.
Birds	*Chlamydotis undulata*	VU	Canariy Is., Madeira, Azores
Birds	*Columba bollii*	RR	Canary Is.
Birds	*Columba junoniae*	RR	Canary Is.
Birds	*Corvus corax canariensis*	RR	Canary Is.
Birds	*Neophron percnopterus*	EN	Canary Is.
Birds	*Puffinus lherminieri baroli*	RR	Canary Is.
Birds	*Saxicola dacotiae dacotiae*	RR	Canary Is.
Birds	*Tyto alba gracilirostris*	RR	Canary Is.
Birds	*Buteo buteo rodshildi*	RR	Azores
Mammals	*Pipistrellus maderensis*	EN	Canary Is.
Mammals	*Plecotus teneriffae*	EN	Canary Is.
Mammals	*Balaenoptera borealis*	EN	Canary Is., Madeira, Azores
Mammals	*Balaenoptera musculus*	EN	Canary Is., Madeira, Azores
Mammals	*Balaenoptera physalus*	EN	Canary Is., Madeira, Azores
Mammals	*Physeter macrocephalus*	VU	Canary Is., Madeira, Azores
Reptiles	*Caretta caretta*	EN	Canary Is., Madeira, Azores
Reptiles	*Dermochelys coriacea*	VU	Canary Is., Madeira, Azores

In the case of whales and marine turtles indicated on Table 18, not only mobility is a major constrain to a site based conservation strategy, but also the distribution data extracted from the biodiversity databases of the Canary Islands and the Azores, refers to specific spots where the presence of the species has been confirmed, often provided from whale watching boats. Therefore, the available data for these type of species is not a fair representation of their actual distribution. Furthermore, despite being an important route where different species of whales pass on their annual migration, Macaronesia is not considered as reproduction or feeding area for these types of cetaceans - although a study by DOP/IMAR published in the scientific journal Plos ONE reveals that some blue and fin whales (*Balaenoptera musculus* and *Balaenoptera physalus*) suspend their spring migration to feed in the Azores waters (M. A. Silva, Prieto, Jonsen, Baumgartner, & Santos, 2013). Nevertheless, specific conservation actions must be considered for those species as whale watching and vessel collisions are increasing and significant threats to their conservation.

The same applies to marine turtles. Although juvenile animals attend regional waters during their migration as a point of rest and food, there are no nesting records in Macaronesia for all those species. Only *Caretta caretta* is considered a visitor species in Macaronesia according to the IUCN data, the others being marginal or vagrant occurrences (M. E. Oliveira et al., 2005). Even if the population might be at risk from decimation of its juveniles, a LIFE project, carried out in Madeira (Dellinger, 2000), found out that turtles are constantly on the move and no defined preferential area exists (although they seem to be influenced by seamounts and islands to some extent).

KBAs for bats were created in the Azores and Madeira archipelagos with the support from experts and based on scientific articles (e.g. Rainho et al., 2002). In the Canary Islands, however, the two existing species of bats (*Plecotus teneriffae* y *Pipistrellus maderensis*) have an extremely wide distribution, and as such no specific KBAs were defined for the species. *Pipistrellus maderensis* are found in all types of habitats, from high mountains to sea level, forest and anthropic areas, using all kinds of shelters. In the case of *P. teneriffae,* its presence is confirmed in high mountain areas, forested areas of pine forest, and is very rare in populated and anthropic areas as well as on coastal zones. However, much remains unknown (Silvia Fajardo Gonzalez, pers. com. 2016).

Other taxa not considered to trigger specific KBAs are species that formerly occurred in Macaronesia but are now believed to be regionally extinct (e.g. *Pieris wollastoni; Leiostyla cassida*; *Atlantica guerinianus*; *Geomitra delphinuloides*; *Leiostyla simulator*; *Monilearia arguineguinensis*; *Monilearia pulverulenta*; *Sculptiferussacia clausiliaeformis*; *Monilearia granostriata*; *Gallotia auaritae*; *Delphinium maderense; Paradeucalion desertarum).* Although possibly extinct, further research is still needed to confirm its extinction. Therefore, they are considered as research priorities and not necessarily as conservation priorities.

Results

In total, 194 KBAs were identified in the Macaronesian region, covering a combined area of approximately 16,245 km², from which 5,408 km² represent 51% of the total land area of the region (Figure 13 to). A full list of the KBAs is presented on Appendix 5 and can be found with a more detailed description at http://goo.gl/CahYZT.

Each KBA contains at least one trigger species, but most contain several globally threatened, restricted-range or congregatory species. One hundred fifty eight (81% of the total) were identified for bird species, 80 (41%) for arthropods, none for crustaceans, 88 (45%) for mammals, 59 (30%) for molluscs, 17 (9%) for fish, 145 (75%) for plants and 17 (9%) for reptiles (Table 19).

Table 19 - Summary of taxonomic triggers for Key Biodiversity Areas

Taxonomic group	Azores	Madeira	Canary Islands	Total *
Birds	30	14	114	158
Arthropods	19	3	58	80
Crustaceans	0	0	0	0
Mammals	33	10	45	88
Molluscs	5	16	38	59
Fish	5	3	9	17
Plants	32	11	102	145
Reptiles	0	1	16	17
All KBAs	44	18	132	194
Percentage	23%	9%	68%	100%

* The figures add up to well over 194 because most KBAs are triggered by species from more than one taxonomic group

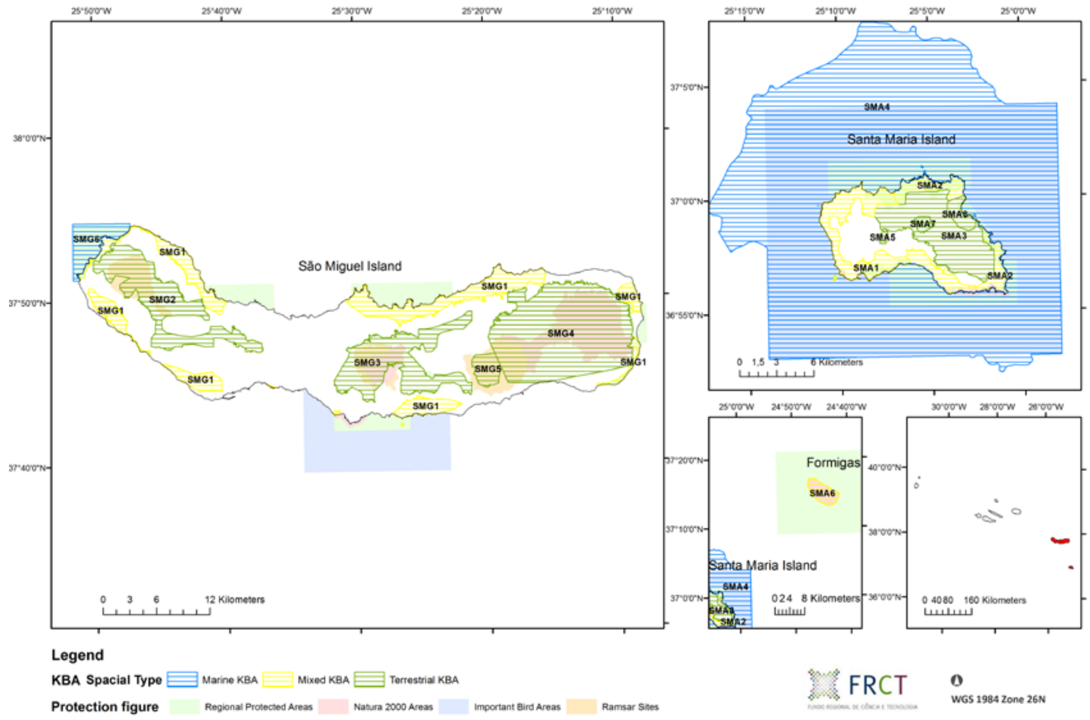


Figure 13. Site outcomes for the Azores- São Miguel and Santa Maria Islands.

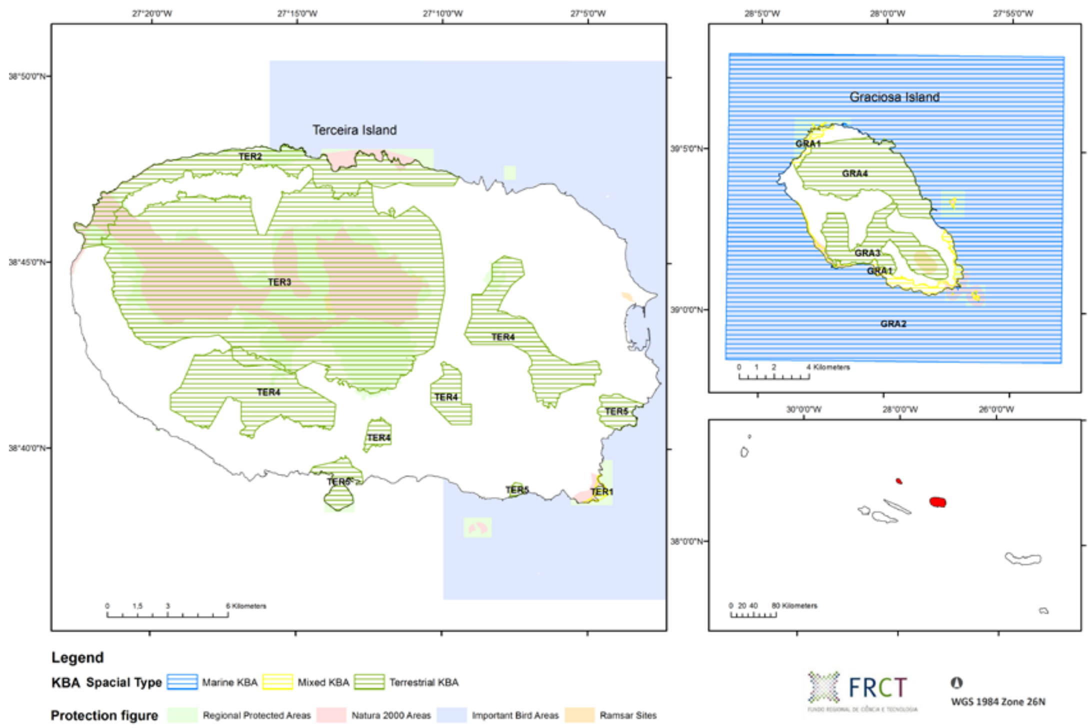


Figure 14. Site outcomes for the Azores- Terceira and Graciosa Islands

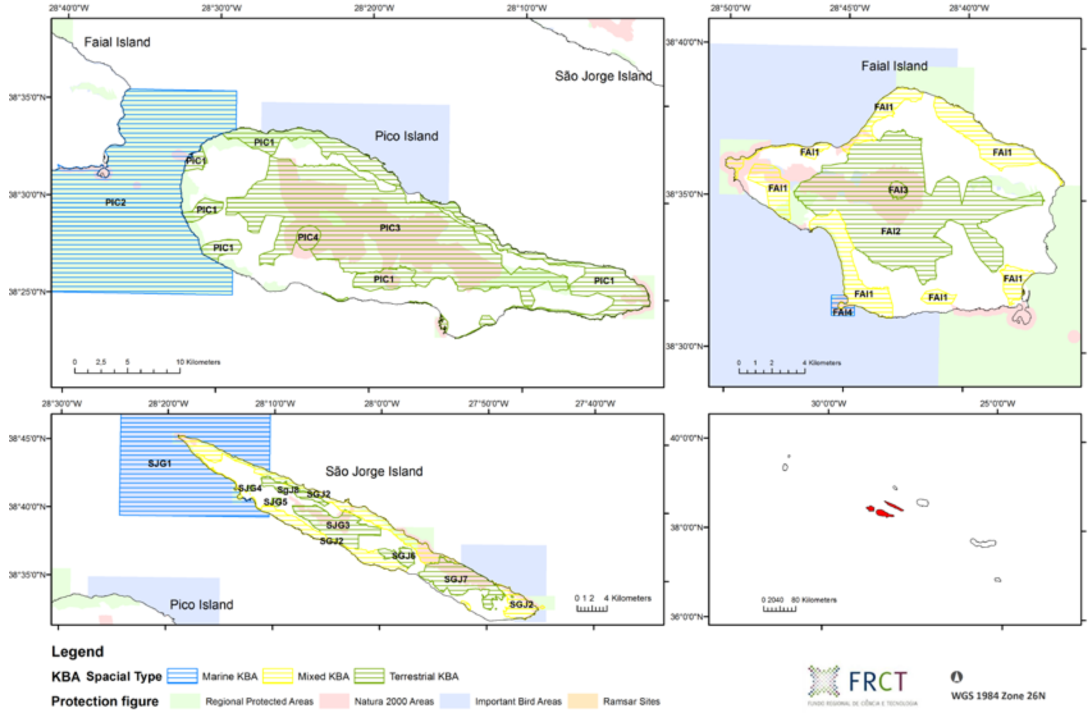


Figure 15. Site outcomes for the Azores- Pico, Terceira, São Jorge Islands

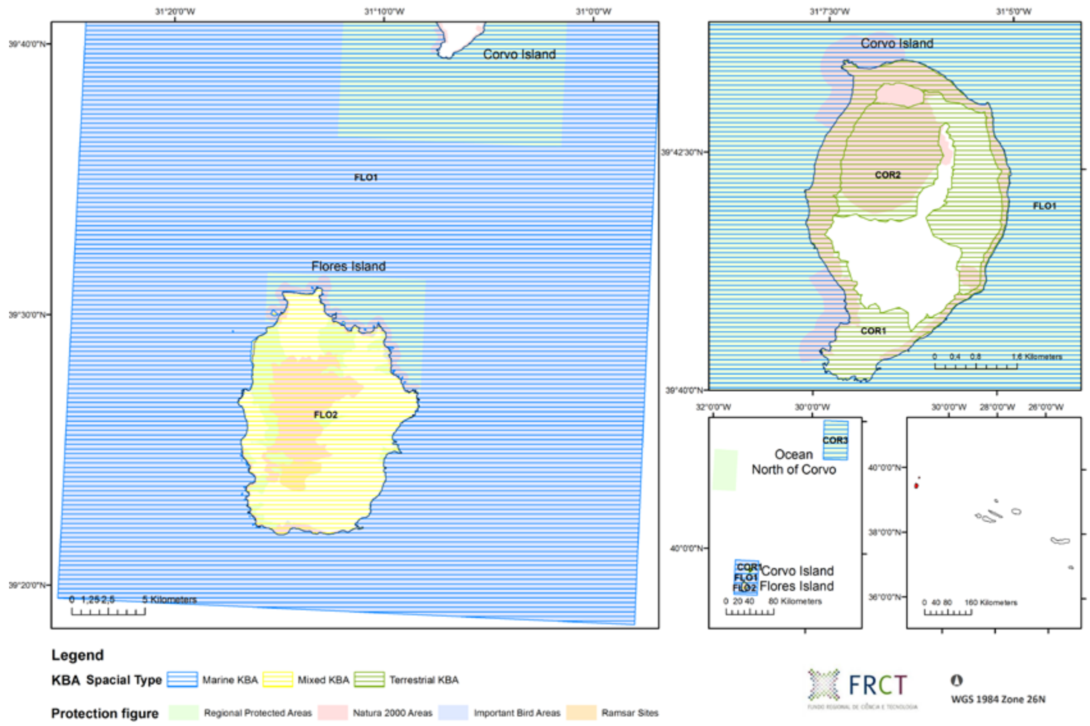


Figure 16. Site outcomes for the Azores- Flores and Corvo Islands

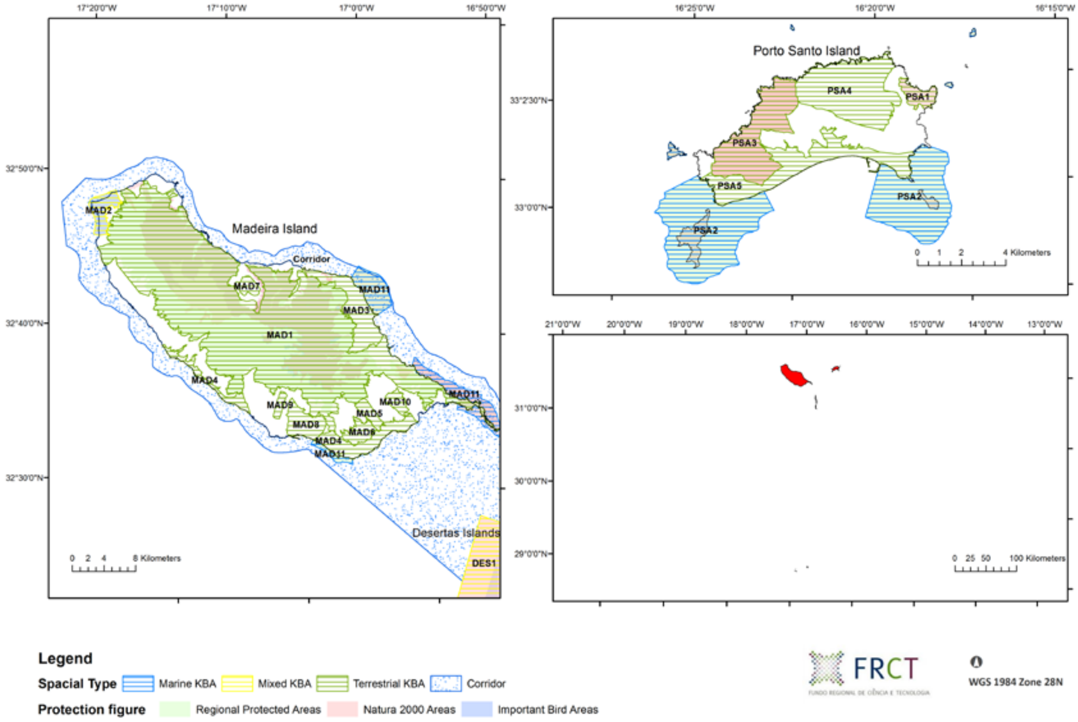


Figure 17. Site outcomes for Madeira- Madeira and Porto Santo Islands.

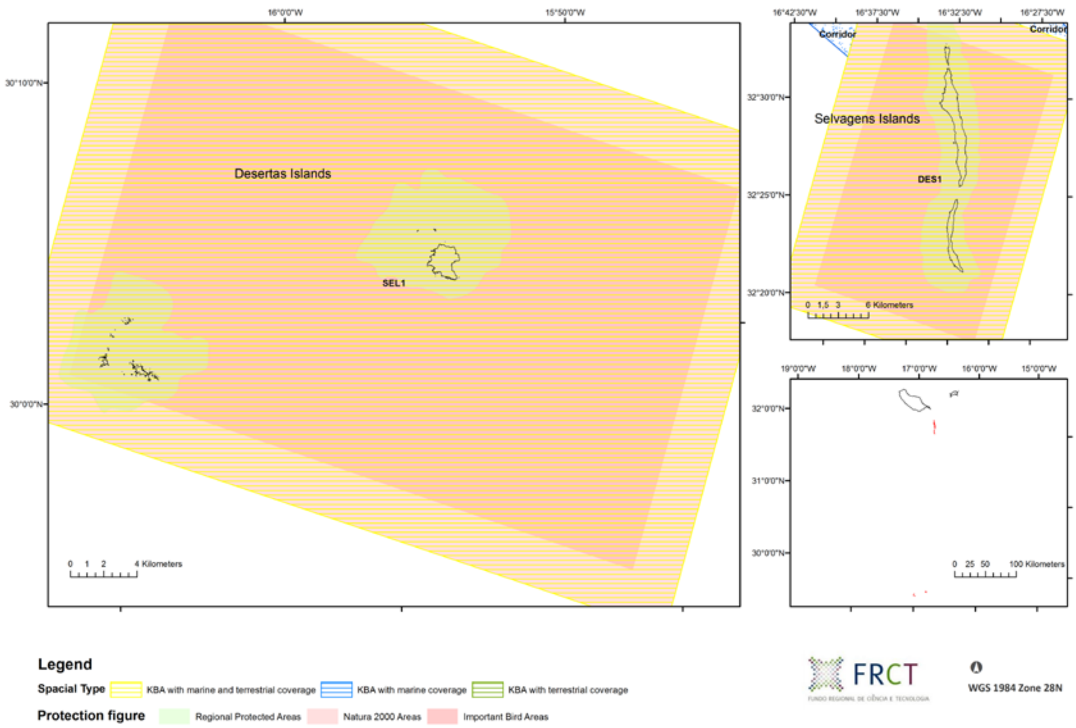


Figure 18. Site outcomes for Madeira- Desertas and Selvagens Islets

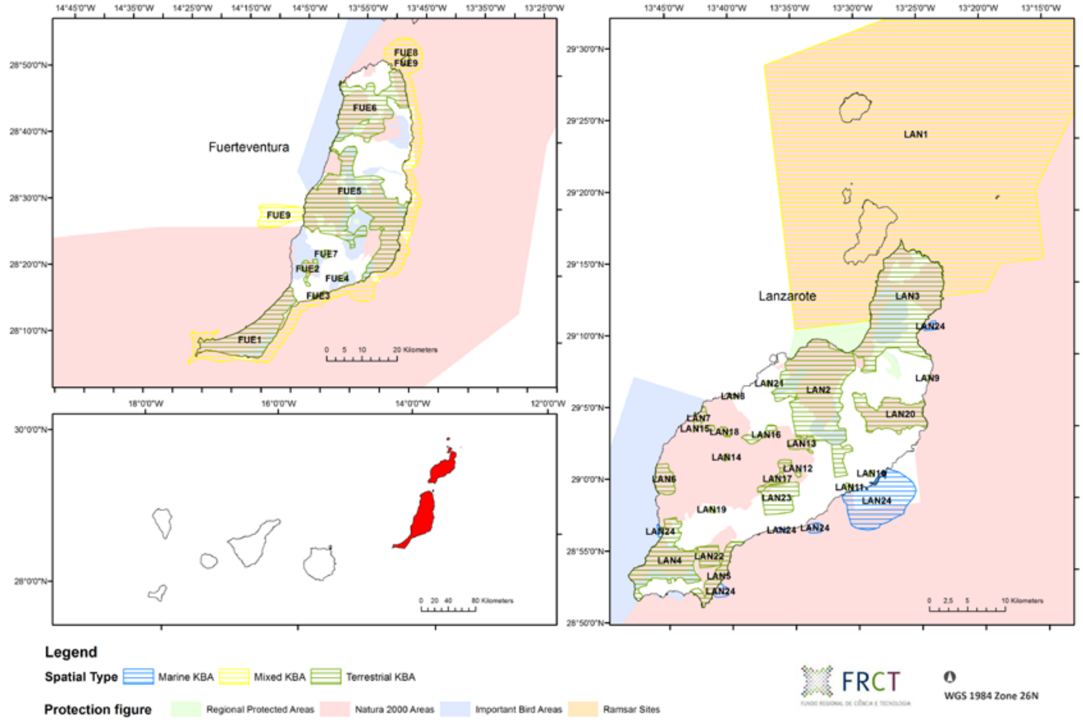


Figure 19. Site outcomes for the Canary Islands- Lanzarote and Fuerteventura Islands

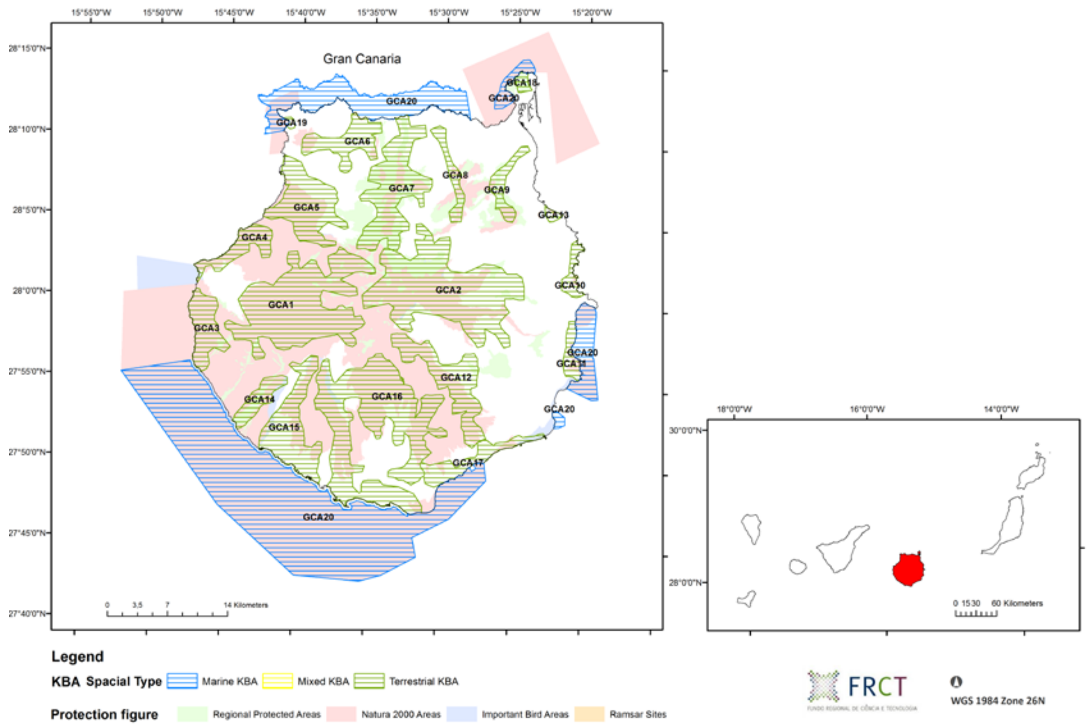


Figure 20. Site and corridor outcomes for the Canary Islands- Gran Canaria Island.

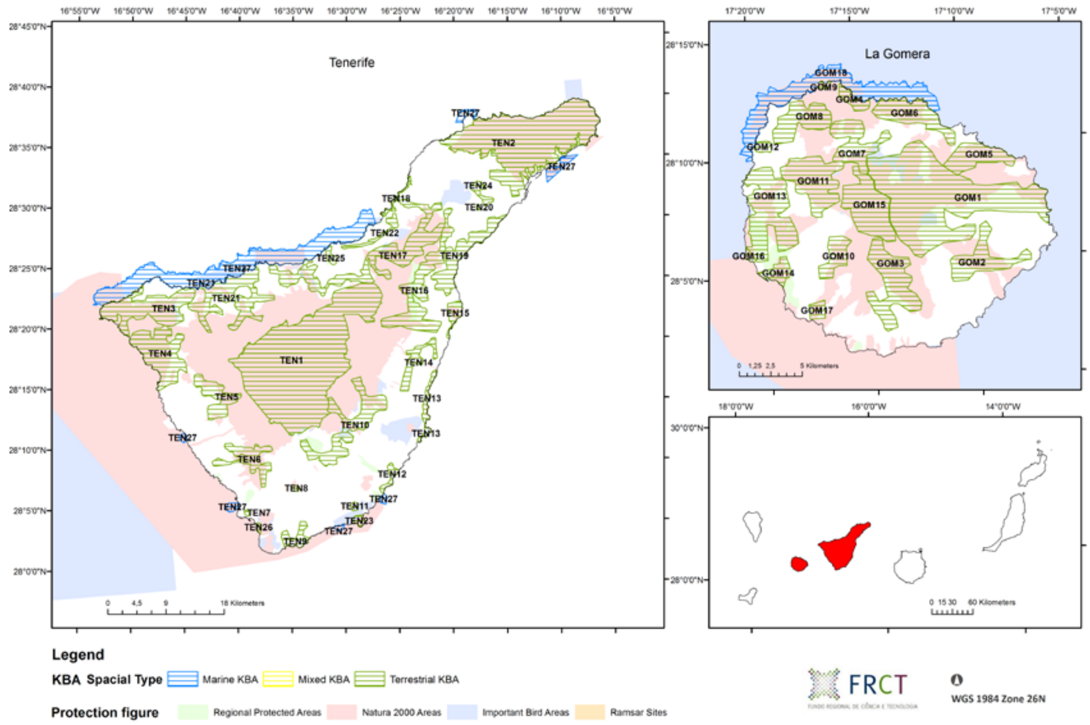


Figure 21. Site and corridor outcomes for the Canary Islands- Tenerife and La Gomera Islands.

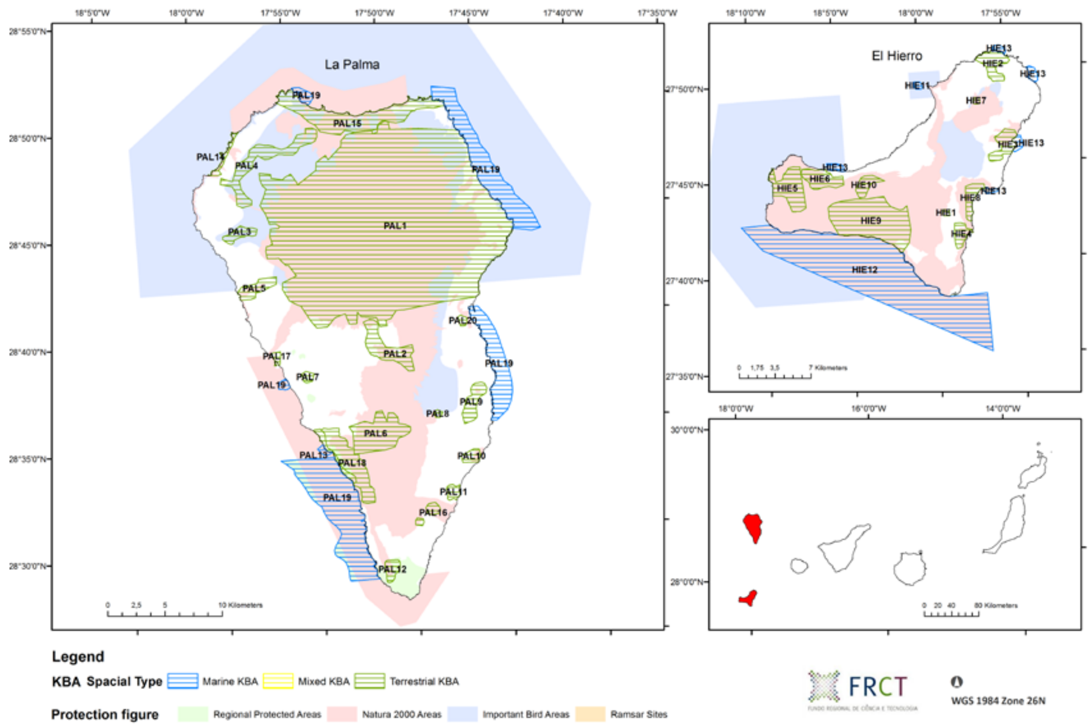


Figure 22. Site and corridor outcomes for the Canary Islands- La Palma and El Hierro Islands.

The number of KBAs identified for fish, invertebrates and plant species would have certainly been much higher if more detailed information had been available on the distribution of these species among sites. Nevertheless, as the comprehensiveness of available data on the distribution of globally threatened species among KBAs varies significantly among taxonomic groups, KBAs identified as being important for the conservation of one taxonomic group may also be important for other groups for which data are not yet available.

Of the 194 KBAs, 190 were identified for globally threatened species, either alone or together with restricted-range and congregatory species. The remaining 4 KBAs are not known to support any globally threatened species but were identified solely on the basis of the occurrence of restricted-range or congregatory species. Several KBAs were triggered by significant numbers of globally threatened species. For instance, sites with records of over 35 globally threatened species include: Central area of Pico island in the Azores; Garajonay-Chejelipes and Anága in the Canary Islands; and Madeira Nature Park in Madeira archipelago.

The Macaronesian region hosts two sites identified by the Alliance for Zero Extinction, both triggered by EN bird species: “Maciço Montanhoso Oriental” in Madeira island, triggered by the Zino’s Petrel (*Pterodroma madeira*) and “Pico da Vara” in the island of São Miguel, triggered by the Azores Bullfinch (*Pyrrhula murina*) (Alliance for Zero Extinction, 2010). Both AZE sites have been included as KBAs.

Two of the 194 KBAS cover the two AZE sites and 52% match or partially overlap IBAs in the region. Although an important number of KBAs are under some protection figure, 31% of them are not covered by any government-managed protected areas (or are covered only by a very little parcel).

After undertaking the biological prioritization, 46 KBAs were assigned to the highest priority level (level 1), representing 24% of total KBAs; 28% were assigned to level 2, 22% were assigned to level 3, 18% to level 4 and 9% to level 5 (Table 20).

Table 20. Results of the Biological Prioritization of KBAs in Macaronesia

Priority level	Azores	Madeira	Canary Is.	Total
1	6	7	33	46
2	15	6	33	54
3	10	2	30	42
4	9	1	24	34
5	4	2	12	18
All KBAs	44	18	132	194

The significant number of KBAs of priority level 1 should be stressed, as it reflects the high number of endemic threatened species. Each of the 46 KBAs assigned to level 1 are the only known site for one or more CR or EN species, and thus qualify as Alliance for Zero Extinction (AZE) sites. The list of sites and trigger species are given in Appendix 6. These sites have the highest biological priorities for conservation in the region, because the loss of any of them would result in the global extinction of at least one species. Six AZE candidate sites are located in the Azores, seven in the Madeira archipelago and 33 in the Canary Islands. Except for two Birds, all trigger species of those KBAs are Plants, Molluscs and Arthropods, numbering 130 in all Macaronesia. Several AZE candidates shelter various unique species: for example, KBAs sheltering at least five CR or EN species that occur nowhere else are Madeira Nature Park

(Madeira island); Garajonay-Chefelipes (La Gomera); Plains of Corona-La Hondura-Tegela Grande and Famara crag (Lanzarote); Jandía Peninsula (Fuerteventura), El Teide (Tenerife); Anága (Tenerife); Northern Buenavista (Tenerife); Los Canizales (Tenerife); La Solana (Gran Canaria); Los Marteles (Grand Canaria); Santo Andrés-Valle Seco (Gran Canaria). The island of Tenerife alone has 37 unique threatened species distributed across nine KBAs.

Since the AZE objective is to underline areas that constitute the last remaining refuge of at least one endangered or critically endangered species, this list of sites needs to be reviewed following the biodiversity outcomes underlined in the present profile.

Corridor outcomes

While the protection of a network of sites is sufficient to conserve many elements of biodiversity in the medium term, the long-term conservation of all elements of biodiversity requires the consolidation of interconnected networks of sites at larger spatial scales. CEPF framework uses the term conservation corridors to define broadscale planning units. In this context, the term does not adhere strictly to the biological definition of corridors (i.e. strips or patches of habitat designed to reduce habitat fragmentation or enable species movement by connecting protected areas or other priority sites). CEPF conservation corridors‖ refer to far larger areas through which to direct conservation investment at a landscape scale. These planning units include major clusters of KBAs and as much biophysical homogeneity as possible.

The definition of landscape-scale planning units, or conservation corridors, are particularly important where it is necessary to: i) have a maintained connectivity between two or more KBAs to meet the long-term conservation needs of landscape species; ii) increase the area of actual or potential natural habitat to maintain evolutionary and ecological processes (Schwartz, 1999). As such, one corridor was defined in Macaronesia for the conservation of the Monk Seal (*Monachus monachus*).

Conservation measures introduced over the last 30 years have helped to stem the decline of the population of the Monk Seal, estimated today at approximately 600-700 animals (Karamanlidis, 2015). One of the subpopulations is located in the archipelago of Madeira and numbers approximately 40 seals (Pires et al, 2008 in Karamanlidis, 2015). Once restricted to the remote Desertas Islands, Monk Seals have recently recolonized the main island of Madeira, where not only suitable habitat for the species still exists but where there are even strong indications of pupping (R. Pires, pers. com. in Karamanlidis, 2015).

Therefore, the marine corridor comprises two KBAs - Coastal marine area of Madeira Island and Desertas Islands - to meet the long-term conservation needs of the Monk Seal in the region.

5. SOCIO-ECONOMIC CONTEXT

This chapter provides an overview of the socio-economic context, and analysis of interactions between economic and social activities and biodiversity conservation.

Historical Context

Humans played a determining role in the present status of biodiversity conservation in Macaronesia. While the Canary Islands have a relatively long history of human occupation, Madeira and the Azores were uninhabited until the XVth century before the arrival of Portuguese navigators. The Canaries were first colonized by Moroccan Berbers within the first millennium BC (Maca-Meyer et al., 2004), giving rise to the Guanches. A second colonizing wave took place in the XVth century by Spanish settlers.

Since the arrival of the first settlers, the indigenous flora and fauna have been under severe pressure from habitat destruction, harvesting of living resources and the introduction of invasive species. In the Canaries, the initial impacts were associated with the use of fire and opening of forests for grazing, whereas in the Azores and Madeira the forests were cleared for agriculture and cattle. By the beginning of the XIXth century, practically all the mid and low altitude land had been converted to agriculture or urbanized. The native laurel forest that covered the islands before human colonization (estimated at 365,000 ha for the whole of Macaronesia) is now reduced to about 12.5% of the potential area (J.M. Fernández-Palacios & de Nascimento, 2011).

The rich volcanic soils and a favourable climate allowed a rapid expansion of areas used for agriculture production for export. By the end of the 15th century, Madeira was the worlds' leading producer and exporter of sugar (EEA, 2002). Other products included wheat, wine, maize and sweet potatoes. The expanding agricultural industry had a major impact on topography and original biodiversity. Large native areas, including forests, were transformed into cultivation (at places to monocultures of sugar cane) and extensive irrigation systems were constructed to bring water from mountainous areas to dry lowlands.

In the Canary Islands, the Guanches brought domesticated animals (goats, pigs, dogs and possibly sheep) and culture plants (barley, beans, peas) from the mainland to the islands about 4 000 years ago (EEA, 2002). After the Spanish colonization, trade with the Spanish American colonies, the European mainland and the British Isles, based essentially on raw materials exports, shaped the Canaries' economy and agriculture: sugarcane and rum in the early days, wine and cochineal later, and latterly, as from the 19th century, tomatoes, and bananas. After the conquest, the Castilians imposed a new economic model, based on single-crop cultivation: first sugar cane and then wine, an important item of trade with England. However, the sugar-based economy of the islands soon faced stiff competition from Spain's American colonies. Low prices in the sugar market in the 19th century caused severe recessions on the islands. A new cash crop, cochineal (*cochinilla*), came into cultivation during this time, saving the islands' economy. At the beginning of the 20th century, the British introduced a new cash crop - the banana.

In the Azores, the initial intensive conversion to agricultural and grazing land allowed the archipelago to go through several major economic cycles: the wheat, the crop of pastel (dye plant), the orange, the pineapple. Also the idea of using the Azores as an acclimatization centre of exotic species was implemented (Ramos, 1871). Most exotic ornamental plants was introduced for use in parks and private gardens, since the last quarter of the eighteenth century until the late nineteenth century. From the 1940's to the 1960's a huge effort, led or supported by public authorities, replaced the vegetation of most mid and high altitude areas with monocultures of the fast growing Japanese cedar (*Cryptomeria japonica*). A further negative impact originated from the expansion of dairy farms, which became the main economic activity in the Azores especially after Portugal's entry into the European Union in 1986. Aided by subsidies from the Common Agriculture Policy, pastures became the dominant landscape in low altitudes, especially in two of the largest islands, creating "green deserts" of low biodiversity and negatively affecting the water quality of the lakes.

Demographic and social trends

Macaronesia has 2.6 million inhabitants and a density of nearly 250 persons/km2, on average (Table 21). With a population of about 2 million people, the Canary Islands are the most populated European overseas entity (Petit & Prudent, 2010). But it's Madeira that records the highest population density of Macaronesia - 323 inhabitants/km2 - while the Azores stands with the lowest population density of 106 persons/km2. The small Desertas and Selvagens archipelagos remain uninhabited by humans and protected as Nature Parks.

Table 21 – Macaronesian archipelagos: socio-economic facts and figures

	Total population	Population density	GDP/per capita (€)*	Unemployment rate (%)**
Azores	246,353	106	15,111	12.8%
Canary Islands	2,104,815	283	19,581	29.1%
Madeira	258,686	323	15,710	14.7%

(* 2014 data; **2015, annual averages. Sources: ISTAC (2015a); ISTAC (2015b); ISTAC (2016d); DREM (2015); (DREM, 2016); SREA (2015a); SREA (2016))

The population distribution in each archipelago is also uneven, causing varying degrees of human pressure in the natural environments and resources of the different islands. Half of the nearly 250,000 inhabitants of the Azores live on the largest island, São Miguel (SREA, 2015a). Here the population density is 185,7 people/km^2 in contrast to about 27 in the most remote islands of Flores and Corvo. In Madeira, 41% of the population is concentrated in Funchal, the capital of Madeira island (DREM, 2015). This situation is even more pronounced in the Canary Islands: the islands of Gran Canaria and Tenerife account for over 80% of the total population in the archipelago (ISTAC, 2015a). In the two islands the population density is respectively 546 and 442 people per square kilometre, in opposition to 41 in El Hierro and about 60 in Fuerteventura and La Gomera.

The demographic behaviour observed in the three archipelagos since the beginning of the 20th century is also different. While the Azores recorded a stable population variation throughout the last century and until now (around 250,000 inhabitants), the Madeiran population had an increase of over 100,000 inhabitants since 1900 (Figure 23). In the Canary islands, the population increased nearly six times over the same period, reaching a total of over 2.1 million people today in comparison to 365,000 in 1900 (ISTAC, 2015a).

In terms of living standards, measured by GDP per capita, the Azores records the lowest one (15,111€), followed by Madeira (15,710€), while the Canary Islands stand with the highest (19,581€) (Table 21).

On the other hand, the Canaries record the highest unemployment rate of the region (29.1%). Moreover, while the Azores and Madeira have seen their unemployment rates severely increased only in the last years, especially as a result of the world economic crisis, the Canary Islands have had a persistent high unemployment, following the Spanish pattern.

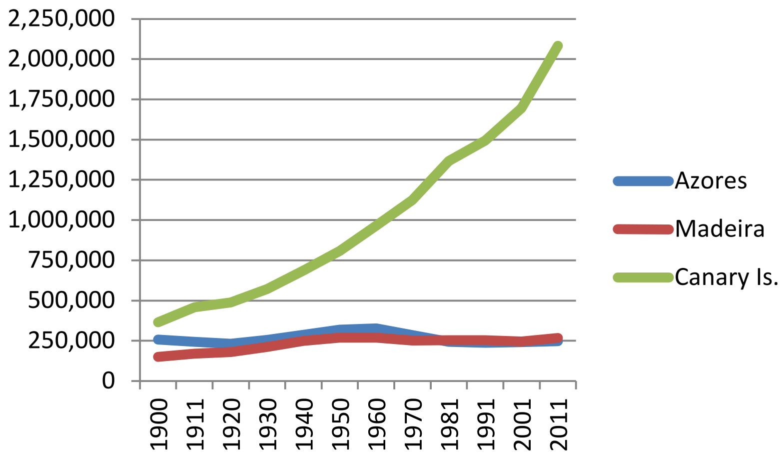


Figure 23. Evolution of the population in the Macaronesian archipelagos
(Sources: SREA (2015c), ISTAC (2015a), DREM (2012))

Economic trends

The Macaronesia's economy is strongly specialized in the services sector, where tourism has a prominent role, particularly in Madeira and the Canary Islands. Over the last few decades tourism has grown steadily as a source of income, though to varying degrees among the archipelagos and islands, while the secondary sector has remained largely undeveloped and the primary sector is in decline (Table 22), surviving with the support of public and European subsidies.

Table 22. Production and employment structure of the Macaronesian archipelagos

	Agriculture, livestock, forestry and fishing		Industry and construction		Services	
	% of GVA	% of employed population	% of GVA	% of employed population	% of GVA	% of employed population
Azores	10	13	13	16	77	71
Canary Is.	2	3	12	10	86	87
Madeira	2	13	13	12	85	75

(2014 preliminary data. Sources: ISTAC (2016a); ISTAC (2016b); DREM (2015); SREA (2015a). GVA- Gross Value Added)

The development of the primary sector in the Macaronesian islands is conditioned by climatic and orographic factors, as well as the scarcity of water and adequate surface for cultivation. The rugged topography and high average slope had influence on the reduced average size of farms and seriously hinder access and mechanization. Regarding the fishing sector, aquaculture is increasingly being promoted as an alternative to traditional fishing that is facing problems of overexploitation and limitations under agreements with third countries (PIC-INTERREG IIIB-2000/2006, 2001).

The industrial sector, dominated by traditional industries, especially food, beverages and tobacco, and the extracting and processing raw materials industries, shows a weak dynamism in the economy of the Macaronesian islands (PIC-INTERREG IIIB-2000/2006, 2001). The sector is subject to the market configuration based on a reduced internal demand and a high dependence on the external supply, which implies higher costs due to the remoteness of the islands. The majority of the low technological content of produced goods also does not encourage efforts in R&D. As regards to the construction industry, it is dependent on the evolution of other sectors and on the scarcity of substrate, due both to fragmentation of the territory and the large surface of protected areas.

In addition to activities directly linked to tourism, other branches of the services are gaining importance, such as trade and financial services.

Azores

The Azores economy is based mainly on agriculture, fisheries and tourism (Figure 24). The primary sector has traditionally accounted for the archipelago's economic activity and, although there's currently a growing concentration of activity in the tertiary sector, it remains relevant.

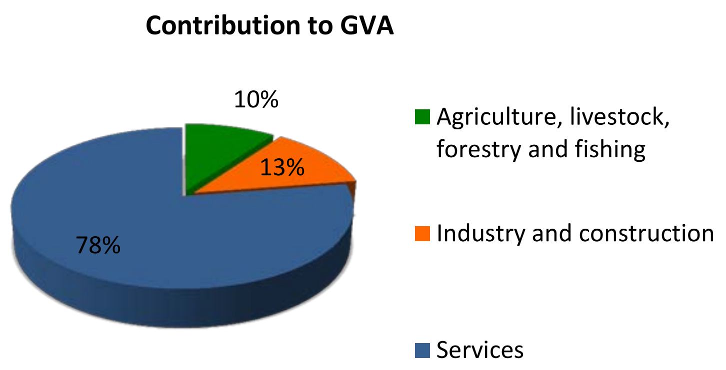


Figure 24. Productive structure of the Azores

Agricultural production in the Azores differs substantially from the Canary Islands and Madeira. Here, livestock and dairy production is the main trade using more than 100 000 hectares of the total farmland (EEA, 2002). Most of the farms are relatively small, hosting between 5 and 20 heads. The sector accounts for an annual production of over 500 million litters of milk (SREA, 2015b), or about 25% of Portuguese milk production. Some crops also deserve mentioning, as is the case of pineapples, vine plantations, potatoes, oranges, tobacco and tea (SREA, 2015a).

In turn, forests occupy more than 30% of the territory of the Azores, two-thirds of which consists of production forests, planted in public and private areas, consisting primarily of Cryptomeria (Autonomous Region of the Azores, 2013). The 'Cryptomeria Azores' brand has recently been created to promote the use of this timber and it represents an important incentive.

Although with a decreasing trend in recent years, fisheries are also an important economic activity on all Azorean islands, with 2,831 registered fishermen and 762 motor vessels in 2014

(SREA, 2015b). Although the Azores archipelago accounts for the largest sub-area of Portugal's EEZ it has a relative lack of biomass and is biologically fragile, especially in terms of demersal and deep water species, since it does not have a continental shelfand has high average depths. Only 2.2% of this total area can potentially be used up to a depth of 1 000 metres (Autonomous Region of the Azores, 2013). Fishing methods are highly traditional among Azorean fishermen, hook and line still being the major fishing gear used. This has allowed for a sustainable exploration of resources over centuries. Fishing brings in an average revenue of about € 35 million for the region, with 9 to 19 tons of fish extracted between 2010 and 2014 (SREA, 2015a, 2015d) from an Exclusive Economic Zone of about one million km².

As a result of the importance of the primary sector, the archipelago's main exports are based on the agricultural economy (dairy farms), through the production and sale of meat, milk, cheese and butter. Other exports are also important, such as tea, tobacco, pineapple, canned tuna and fish (PIC-INTERREG IIIB-2000/2006, 2001). Not surprisingly, industry in the Azores is also based mainly on the production of dairy products (milk, cheese) and transformation of fisheries products, such as tuna.

The tourist industry is far less well developed than those of Madeira or the Canary Islands, but is becoming of considerable importance to the economy of the archipelago, with an expressive contribution to wealth creation, employability and internationalization. The tourist infrastructure has grown markedly over the last years, with the accommodation capacity more than doubling between 2000 and 2006 (SREA, 2012), reaching nearly 10,000 beds. Since then the accommodation capacity of traditional hotels have recorded a slow increase, but rural tourism instead kept growing steadily, nearly tripling its accommodation capacity since 2000 (SREA, 2012, 2015c).

Nature, humanized space and intangible heritage of the Azores have resulted in the last years in more than 30 awards as a sustainable tourist destination from websites and internationally recognized magazines. However, the great efforts from the Azorean Government to promote the archipelago as a touristic destination in European and international markets and the arrival of low cost companies in 2015 are causing some increasing pressures, such as a growing interest in the construction of ports and harbours and in coastal development.

Madeira

Madeira's economy is also dominated by the tertiary sector, which concentrates 75% of the employed population, while Industry and Agriculture account for 12% and 13% respectively (Table 22 and Figure 25).

Favourable fiscal conditions have attracted many international finance companies. Besides, Madeira has been a tourist destination since the XIXth century and the tourist industry mobilized nearly 1.2 million visitors in 2014 (DREM, 2015).

There is little industry, most of it related to the production of artisanal goods, such as embroideries. The production of sugar, wine and bananas is the backbone of the agricultural economy of Madeira, together with numerous common European vegetables. Further, temperate fruits like oranges, lemons, guavas and mango together with pineapple and figs are cultivated for export.

Fisheries are of relatively low relevance in the archipelago. Some aspects linked to the surrounding natural conditions and characteristics of the available fish resources, are not conductive to increase productivity of fishing activity and related sectors. Thus, the sector's contribution to the Madeiran GDP is lower than what could be expected, corresponding to approximately 0.8% (SRA, 2014).

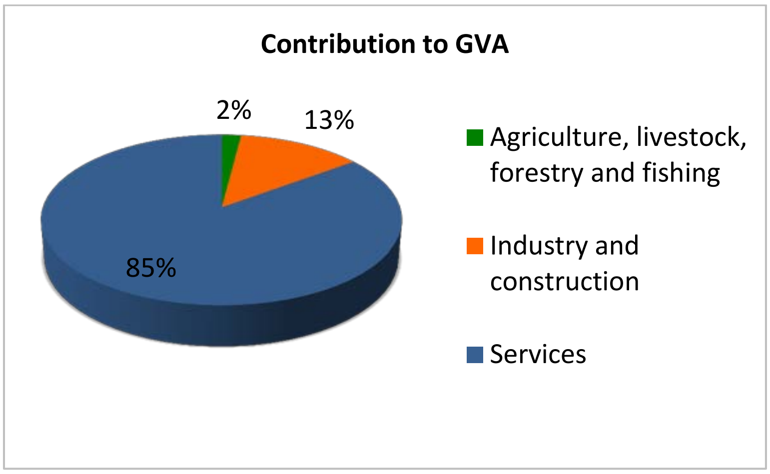


Figure 25. Productive structure of Madeira

Canary Islands

The tertiary sector and tourism in particular, with about 12 million visitors a year (ISTAC, 2016c), accounts for 86% of the economy of the Canaries and employs 87% of the population (Table 22 and Figure 26). The archipelago is the third-largest Spanish tourist region, only behind Catalonia and the Balearic Islands (European Parliament, 2011a).

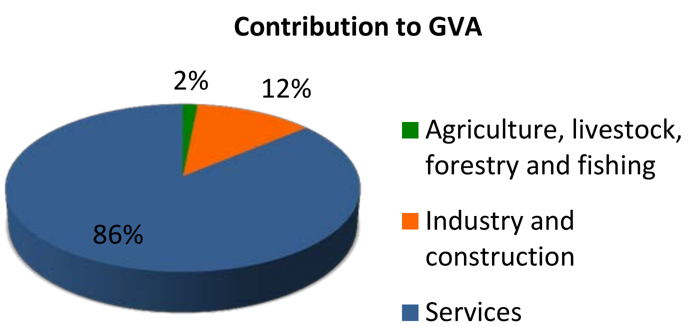


Figure 26. Productive structure of the Canary Islands

The expansion of tourism, especially after the 1970's, has promoted construction and services linked to tourism activity, also contributing to the primacy of services in the Canarian economy. Industry is scarce, representing about 12 % of GVA, and is mainly based on agricultural and food products and tobacco. The power subsector is also relevant, based essentially on oil refinery.

Agriculture, which during the 1960's still accounted for about 30% of GDP, today plays a minor role in the archipelago's economy (2% of GVA). Lack of water and land suitable for cultivation has been the main constraints to agricultural development. As a result, only 10% of the surface is farmed, to a large extent dry land farming (barley, wheat, vines and potatoes) and a minority of irrigation farming (bananas, tomatoes), targeted at the Spanish and European markets

(European Parliament, 2011a). Other crops for export include tropical fruits (avocados, pineapples, mangoes and other crops in green-houses) and flowers.

6. LEGAL AND POLITICAL CONTEXT

Overview of the Regional and National Political Situation

Madeira and the Azores are insular regions of Portugal with an autonomous political and administrative status under the Portuguese Constitution since 1976. Both have their own regional governments and parliaments and are responsible for the political and administrative decisions in all sectors except defence and foreign affair.

The Canary Islands form one of the 17 Spanish Autonomous Communities, divided into two administrative provinces. The capital of the Autonomous region is shared by the cities of Santa Cruz de Tenerife and Las Palmas de Gran Canaria, which in turn are the capitals of the provinces of Santa Cruz de Tenerife and of Las Palmas.

The autonomy was granted to the Canaries via a law passed in 1982, after the establishment of a democratic constitutional monarchy in Spain. Having its own government and parliament, it has exclusive competence in a number of fields including physical planning and land management, hunting, fisheries in inner waters, aquaculture, water management, scientific research (in coordination with the Spanish State), natural protected areas and coastal zone management.

On 1 January 1986, Spain and Portugal acceded to the European Economic Community, which thus became the ‘Europe of the Twelve’. Both Spain and Portugal were countries emerging from dictatorship and seeking to consolidate their newly restored democracies. Having long been marginalised in Europe both economically and politically, Spain and Portugal also suffered from out-dated industrial and agricultural sectors compared with the Member States of the European Economic Community (EEC). Membership of the EEC appeared to be the ideal solution to the problems facing these countries in transition.

Within the EU, the Macaronesian region is an ‘Outermost Region’ (OR). The first European text on specific programmes in favour of the outermost regions was a 1987 European Parliament Resolution on the French Overseas Departments (DOM- *département* d'*outre-mer*). Decision 89/687/EC of 22 December 1989 introduced the first programme in favour of the DOM, the true starting point of the POSEI (*Programme d'Options Spécifiques à l'Éloignement et l'Insularité*). A further step was taken in 1991, when, in addition to updating the POSEIDOM, programmes were introduced for Madeira and the Azores (POSEIMA) and the Canary Islands (POSEICAN). In 1999, the notion of ‘outermost region’ was enshrined in Article 299 of the Treaty of Amsterdam, with a specific reference to the Canary Islands. Finally, on signature of the Treaty of Lisbon, Articles 349 and 355 of the Treaty on the Functioning of the EU (TFEU) reiterated the Treaty of Amsterdam’s definition of ‘outermost region’ and its specific measures regarding the Customs Union, common trade policy, fiscal policy, free zones, common agricultural and fisheries polices, supply of raw materials and essential consumer goods, State aids and conditions of access to structural funds. According to the Treaty, the concept of 'outermost region' is based on the special socio-economic situation of a particular region, exacerbated by its remoteness, insularity, small size, topography, climate and economic dependence on a few products, factors that severely restrain its development.

Global and Regional Agreements

Portugal and Spain are signatories to a range of global and regional agreements of direct importance for biodiversity. Some of these agreements led to national and local legislative instruments and to the nomination of areas of biodiversity importance, such as the ones summarized on Table 23 and described below.

Table 23. Areas of biodiversity importance in Macaronesia, designated under regional and international conventions and agreements

	Man and Biosphere Reserves		Ramsar sites		OSPAR MPAs		Natural World Heritage Sites	
	Nr	Area (km^2)	Nr	Area (km^2)	Nr	Area (km^2)	Nr	Area (km^2)
Azores	4	1,951	13	129	11	107,126	0	0
Canary Is.	7	8,201	1	1	n.a.	n.a.	2	230
Madeira	1	152	0	0	n.a.	n.a.	1	150
Macaronesia	12	10,304	14	129	11	107,126	3	380

(n.a. = not applicable. Sources: OSPAR Commission (2015); Ramsar Sites Information Service (2016); UNESCO (2016); UNESCO (1999))

Global agreements

Convention on Biological Diversity (CBD)

Both Portugal and Spain have ratified the Convention on Biological Diversity in 1994. Effective since 1993, the Convention requires countries to prepare a national biodiversity strategy (or equivalent instrument) for implemention at the national level, and to ensure that this strategy is mainstreamed into the planning and activities of all those sectors whose activities can have an impact (positive and negative) on biodiversity. In addition, Parties should deliver national reports, providing information on measures taken for the implementation of the Convention and the effectiveness of these measures.

In 2010, the tenth meeting of the Conference of the Parties, held from 18 to 29 October, in Nagoya, Aichi Prefecture, Japan, adopted a revised and updated Strategic Plan for Biodiversity, including the Aichi Biodiversity Targets, for the 2011-2020 period. Parties agreed to translate this overarching international framework into revised and updated national biodiversity strategies and action plans within two years. Additionally, the Conference of the Parties decided that the fifth national reports, due by 31 March 2014, would focus on the implementation of the 2011-2020 Strategic Plan and progress achieved towards the Aichi Biodiversity Targets.

Portugal has elaborated an official National Biodiversity Strategy and Action Plan (NBSAP) in 2001, which acts as over-arching guides to biodiversity conservation in the country. However, no post-2010 NBSAP has been submitted so far. Despite its national scope, the Portuguese National Strategy does not cover the two autonomous regions of Madeira and the Azores specifically, and these two regions have not formulated their own strategy for nature conservation and biodiversity.

Spain has adopted a National Biodiversity Plan in 1999 (CBD, n.d.). A revised version followed in 2005 and an Action Plan in 2011. The Strategic Plan on Natural Heritage and Biodiversity 2011-2017, adopted by the Council of Ministers in September 2011 is the national response to the Strategic Plan for Biodiversity 2011-2020, as well as a fundamental element in support of the Law on Natural Heritage and Biodiversity 42/2007 adopted on 13 December 2007. It includes a number of goals, 39 objectives and 281 actions for the conservation and sustainable use of biodiversity and also considers the targets set out in the EU Biodiversity Strategy for 2020. The timeframe for implementing the Spanish Strategic Plan is from 2011 to 2017.

The Spanish National Strategy for the Sustainable Use of Biodiversity are applicable to the Canary Islands. As an autonomous region of Spain, the Canary Islands is able to approve its own regional/local strategy but no such strategy has been formulated.

The CBD was also followed by two supplementary agreements: the Cartagena and the Nagoya Protocols.

The Cartagena Protocol on Biosafety to the Convention on Biological Diversity is an international treaty governing the movements of living modified organisms (LMOs) resulting from modern biotechnology from one country to another. It was adopted on 29 January 2000 and entered into force on 11 September 2003. The Protocol was accepted and ratified by Portugal and Spain in 2004 and 2003, respectively.

The Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity is an international agreement, which aims at sharing the benefits arising from the utilization of genetic resources in a fair and equitable way. The Protocol establishes a clear, legally-binding framework determining how researchers and companies can obtain access to the genetic resources of a country and to the traditional knowledge associated with these resources. It also explains how the benefits arising from the use of these genetic resources and associated traditional knowledge will be shared. It entered into force on 12 October 2014, 90 days after the date of deposit of the fiftieth instrument of ratification. Portugal and Spain have also signed the Protocol, but until now only Spain has ratified it.

Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention)

The Convention on Wetlands, called the Ramsar Convention, is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. Ramsar is the oldest of the modern global intergovernmental environmental agreements. The treaty was negotiated through the 1960s by countries and non-governmental organizations concerned about the increasing loss and degradation of wetland habitat for migratory waterbirds. It was adopted in the Iranian city of Ramsar in 1971 and came into force in 1975.

Portugal and Spain ratified the Convention in 1981 and 1982, respectively. As Contracting Parties, both countries had to:

1) designate wetlands for inclusion in the List of Wetlands of International Importance. These sites are recognized from the ecosystem representativeness criteria, fauna and flora values and its importance for the conservation of waterfowl and fish;

2) develop planning and management plans for wetlands, with a view to sustainable use;

3) promote the conservation of wetlands and waterfowl by establishing nature reserves and provide their proper protection.

To date, 14 ‘Ramsar sites’, or wetlands of international importance, have been designated in the Macaronesian archipelagos, covering about 13,027 hectares (Table 24). Not surprisingly, the majority (13 areas; 12,900 ha.) are located in the Azores, while the other site is in the Canary Islands, namely in Las Palmas. Most of these sites are included in Protected Areas designated by the governments of each archipelago.

Table 24. Ramsar sites in Macaronesia

Site number	Name	Archipelago (island)	Total area (ha.)
1615	Fajãs das Lagoas de Santo Cristo e dos Cubres de São Jorge	Azores (S. Jorge)	87
1798	Caldeira da Graciosa (Furna do Enxofre)	Azores (Graciosa)	120
1799	Caldeira do Faial	Azores (Faial)	312
1800	Caldeirão do Corvo	Azores (Corvo)	316
1801	Complexo Vulcânico das Furnas	Azores (S. Miguel)	2 855
1802	Complexo Vulcânico das Sete Cidades	Azores (S. Miguel)	2 171
1803	Complexo Vulcânico do Fogo	Azores (S. Miguel)	2 182
1804	Ilhéus das Formigas e Recife Dollabarat	Azores (S. Maria)	7
1805	Planalto Central da Terceira (Furnas do Enxofre e Algar do Carvão)	Azores (Terceira)	1 283
1806	Planalto Central das Flores (Morro Alto)	Azores (Flores)	2 572
1807	Planalto Central de São Jorge (Pico da Esperança)	Azores (S. Jorge)	231
1808	Planalto Central do Pico (Achada)	Azores (Pico)	748
2099	Paúl da Praia da Vitória	Azores (Terceira)	16
1262	Saladar de Jandía o Playa del Matorral	Canary Is. (Fuerteventura)	127

(Source: Ramsar Sites Information Service (2016))

Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

Effective since 1975, CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora) is an international agreement to which States (countries) adhere voluntarily. Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival. Although CITES is legally binding on the Parties – in other words they have to implement the Convention – it does not take the place of national laws. Rather it provides a framework to be respected by each Party, which has to adopt its own domestic legislation to ensure that CITES is implemented at the national level.

Roughly 5,600 species of animals and 30,000 species of plants are protected by CITES against over-exploitation through international trade. They are listed in the three CITES appendices. The species are grouped in the Appendices according to how threatened they are by international trade. While the more charismatic creatures, such as bears and whales, may be the better known examples of CITES species, the most numerous groups include many less popularized plants and animals, such as aloes, corals, mussels and frogs.

In Portugal and Spain the Convention entered into force in 1981 and 1986, respectively.

Convention on the Conservation of Migratory Species of Wild Animals (CMS; Bonn Convention)

As an environmental treaty under the aegis of the United Nations Environment Programme, CMS provides a global platform for the conservation and sustainable use of migratory animals and their habitats. CMS brings together the States through which migratory animals pass, the Range States, and lays the legal foundation for internationally coordinated conservation measures throughout a migratory range.

As the only global convention specializing in the conservation of migratory species, their habitats and migration routes, CMS complements and co-operates with a number of other international organizations, NGOs and partners in the media as well as in the corporate sector.

Migratory species threatened with extinction are listed on Appendix I of the Convention. CMS Parties strive towards strictly protecting these animals, conserving or restoring the places where they live, mitigating obstacles to migration and controlling other factors that might endanger them. Besides establishing obligations for each State joining the Convention, CMS promotes concerted action among the Range States of many of these species.

Migratory species that need or would significantly benefit from international co-operation are listed in Appendix II of the Convention. For this reason, the Convention encourages the Range States to conclude global or regional agreements.

In this respect, CMS acts as a framework Convention. The agreements may range from legally binding treaties (called Agreements) to less formal instruments, such as Memoranda of Understanding, and can be adapted to the requirements of particular regions. The development of models tailored according to the conservation needs throughout the migratory range is a unique capacity to CMS (Table 25).

Table 25. Bonn Convention: ratification status of CMS agreements in Portugal and Spain

CMS Instrument	Portugal		Spain	
	Status	Status date	Status	Status date
CMS	Party	01.11.1983	Party	01.05.1985
AEWA	Party	01.03.2004	Party	01.11.1999
EUROBATS	Party	10.01.1996	Range State	
ACCOBAMS	Party	01.01.2005	Party	02.02.1999
Monk Seal in the Atlantic	MOU Signatory	18.10.2007	MOU Signatory	18.10.2007
Western African Aquatic Mammals	MOU Signatory	05.12.2008	Range State	
Birds of Prey (Raptors)	MOU Signatory	22.10.2008	MOU Signatory	01.06.2015
Aquatic Warbler	Range State		MOU Signatory	13.04.2003
Atlantic Turtles	Range State		Range State	
ASCOBANS	Range State		Range State	
Slender-billed Curlew			MOU Signatory	15.12.1994
Sharks	MOU Signatory	01.03.2016	Range State	
ACAP			Party	12.08.2003

(**ACAP**: Agreement on the Conservation of Albatrosses and Petrels; **ACCOBAMS**: Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and contiguous Atlantic area; **AEWA**: Agreement on the Conservation of African-Eurasian Migratory Waterbirds; **ASCOBANS**: Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas; **EUROBATS**: Agreement on the Conservation of Populations of European Bats. Source: (CMS, 2015))

Man and Biosphere programme

Launched in 1971, UNESCO's Man and the Biosphere Programme (MAB) is an Intergovernmental Scientific Programme that aims to establish a scientific basis for the improvement of relationships between people and their environments. MAB combines the natural and social sciences, economics and education to improve human livelihoods and the equitable sharing of benefits, and to safeguard natural and managed ecosystems, thus promoting innovative approaches to economic development that are socially and culturally appropriate, and environmentally sustainable.

The East Atlantic Biosphere Reserve Network (REDBIOS) was created in 1994. It comprises the Canary Islands (Spain), Cape Verde, Guinea Bissau, Madeira and Azores (Portugal), Mauritania, Morocco, Sao Tomé and Principe, and Senegal. The network fulfils an interregional mandate in enabling countries from the Macaronesian Region to co-operate and to exchange their experiences.

There are 12 UNESCO's Biosphere reserves in the Macaronesian region (Table 26). In the Azores, three islands (Corvo, Graciosa and Flores) have been proposed by the Azores Government and approved by UNESCO as Biosphere Reserves, with the purpose of promoting solutions to conciliate biodiversity and its sustainable usage. In addition, a new Biosphere Reserve, including the 'Fajãs' of S. Jorge island has recently been approved (March 2016). In the Canaries archipelago, all seven islands are totally (Lanzarote, Fuerteventura, La Palma, La

Gomera & El Hierro) or partly (Gran Canaria & Tenerife) UNESCO Biosphere reserves, thus contributing to biodiversity conservation on the archipelago. Madeira is also home to one Biosphere reserve that includes an area (Santana) of the Madeira island.

Table 26. Biosphere reserves in the Macaronesian region

Archipelago	Biosphere reserve	Total area (ha.)
Azores	Corvo	25 853
Azores	Fajãs de S. Jorge	98 114
Azores	Flores	59 000
Azores	Graciosa	12 172
Canary Islands	El Hierro	29 600
Canary Islands	Fuerteventura	353 500
Canary Islands	Gran Canaria (46%)	100 459
Canary Islands	La Gomera	84 522
Canary Islands	La Palma	80 702
Canary Islands	Lanzarote	122 610
Canary Islands	Macizo de Anaga	48 727
Madeira	Santana	15 218

World Heritage Convention

Effective since 1975, the World Heritage Convention has 189 member countries, including Portugal and Spain. The convention's aim is to identify and conserve cultural and natural monuments and sites of outstanding universal value, through the nomination of World Heritage Sites by national governments and their recognition by the United Nations Educational, Scientific and Cultural Organization (UNESCO).

As of 1986, three Natural World Heritage Site had been declared in the Macaronesian region (Table 27):

- "Laurisilva of Madeira" is the largest surviving area of laurel forest and is believed to be 90% primary forest. It contains a unique suite of plants and animals, including many endemic species such as the Madeiran long-toed pigeon.
- Next to the Laurisilva of Madeira (Madeira), Garajonay National Park, situated in the middle of the island of La Gomera in the Canary Islands archipelago, preserves an outstanding example of Laurisilva's unique vegetation that covers some 70% of the park's area.
- Situated on the island of Tenerife, Teide National Park features the Teide-Pico Viejo stratovolcano that, at 3,718 m, is the highest peak on Spanish soil. Rising 7,500 m above the ocean floor, it is regarded as the world's third-tallest volcanic structure and stands in a spectacular environment. Teide is of global importance in providing evidence of the geological processes that underpin the evolution of oceanic islands.

Table 27. Natural World Heritage sites in Macaronesia

Archipelago (island)	Natural World Heritage site	Year	Criteria	Total area (km^2)
Canary Is. (La Gomera)	Garajonay National Park	1986	(vii); (ix)	39.8
Madeira (Madeira)	Laurisilva of Madeira	1999	(ix); (x)	150
Canary Is. (Tenerife)	Teide National Park	2007	(vii); (viii)	189.9

(Source: (UNESCO, 1999))

European agreements

Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention)

OSPAR is the mechanism by which 15 Governments of the western coasts and catchments of Europe, together with the European Union, cooperate to protect the marine environment of the North-East Atlantic. The fifteen Governments are Belgium, Denmark, Finland, France, Germany, Iceland, Ireland, Luxembourg, The Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

OSPAR started in 1972 with the Oslo Convention against dumping and was broadened to cover land-based sources and the offshore industry by the Paris Convention of 1974. These two conventions were unified, up-dated and extended by the 1992 OSPAR Convention. The new annex on biodiversity and ecosystems was adopted in 1998 to cover non-polluting human activities that can adversely affect the sea.

At the Ministerial Meeting in Sintra in 1998, OSPAR Ministers agreed to promote the establishment of a network of marine protected areas. Following a period of preparatory work, the 2003 OSPAR Ministerial Meeting in Bremen adopted Recommendation 2003/3 on a network of marine protected areas with the purpose of establishing an ecologically coherent network of well-managed MPAs in the North-East Atlantic.

The Azores is included in the OSPAR Region V (wider Atlantic). Region V represents the deep waters of the North-East Atlantic extending across the abyssal plain and the Mid-Atlantic Ridge, and including many seamounts. There have been recent discoveries of a number of different fragile deep-sea habitats (such as hydrothermal vents, carbonate mounds, coral gardens and sponge communities).

Eleven of the 12 MPAS Portugal has nominated to OSPAR are part of the Marine Park of the Azores (Government of the Azores, 2015). The 11 OSPAR MPAs have a total area of about 107,126 km^2 (Table 28). Four of these MPAs, namely Altair Seamounts HS MPA, AntiAltair Seamounts HS MPA, Mid Atlantic Ridge Northern of the Azores (MARNA) HS MPA and Rainbow Hydrothermal Vent Field, occur on an area beyond national jurisdiction (ABNJ) subject to a submission by Portugal to the UN CLCS (UN Commission on the Limits of the Continental Shelf) for an ECS (Extended Continental Shelf).

Table 28. Number and coverage of OSPAR MPAs

OSPAR MPA	Area (km2)		
	Territorial waters	EEZ	Beyond EEZ
D. João de Castro seamount		365	
Menez Gwen hydrothermal vent field		264	
Lucky Strike hydrothermal vent		301	
Rainbow hydrothermal vent field			22
Sedlo Seamount		4,121	
Altair Seamount High Seas MPA			4,381
Antialtair Seamount High Seas MPA			2,855
MAR North of the Azores High Seas MPA			93,795
Faial-Pico Channel	241		
Formigas Bank	524		
Corvo Island	257		
Total	1,022	5,051	101,053

(EEZ: Exclusive Economic Zone. Source: Government of the Azores (2015); OSPAR Commission (2015))

In 2010, the Strategy of the OSPAR Commission for the Protection of the Marine Environment of the North-East Atlantic 2010–2020 (North-East Atlantic Environment Strategy) was adopted by the OSPAR Contracting Parties to halt and prevent by 2020 further loss of biodiversity in the OSPAR maritime area. Using the Ecosystem Approach to manage human activities affecting the maritime area, the Strategy aims to conserve marine ecosystems and safeguard human health and, when practicable, restore marine areas, which have been adversely affected in the North-East Atlantic by preventing and eliminating pollution and by protecting the maritime area against the adverse effects of human activities.

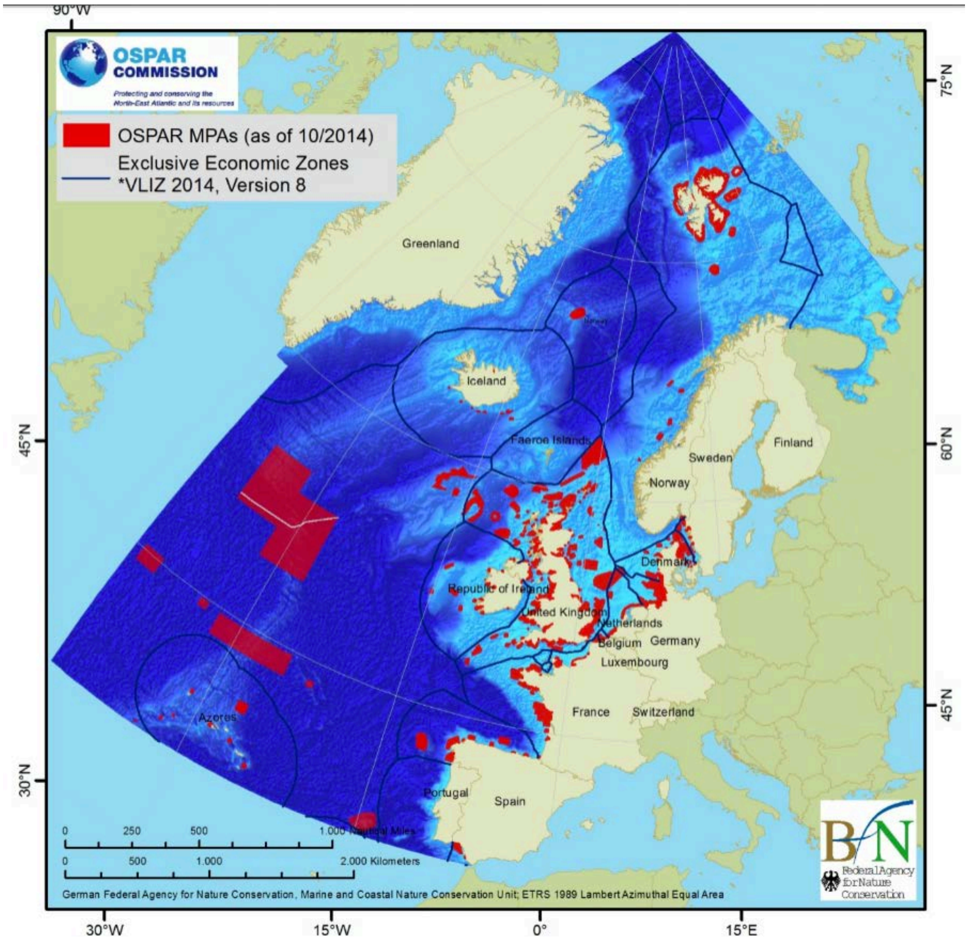


Figure 27. OSPAR MPAs and Exclusive Economic Zones of OSPAR Contracting Parties
(Source: OSPAR Commission (2015)

Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention)

The Council of Europe’s Convention on the Conservation of European Wildlife and Natural Habitats (1979), or Bern Convention is a binding international legal instrument in the field of nature conservation, covering most of the natural heritage of the European continent and extending to some States of Africa. The Bern Convention was the first international treaty to protect both species and habitats and to bring countries together to decide how to act on nature conservation and is the only regional Convention of its kind worldwide.

The treaty also takes account of the impact that other policies may have on natural heritage and recognises the intrinsic value of wild flora and fauna, which needs to be preserved and passed to future generations.

Fifty countries and the European Union have already signed up to the Convention, including Portugal and Spain that have concluded the ratification in 1982 and 1986, respectively.

The Standing Committee of the Bern Convention has shown in various ways (declarations, organization of joint seminars and other initiatives, etc.), their determination not to duplicate, but to bring together the efforts of various organizations and nature conservation instruments, as for example, with the Birds and Habitats Directives and the Pan-European Strategy for the Conservation of Biological and Landscape Diversity.

European Union strategies and policy instruments

Biodiversity and Ecosystem Services issues are either mainstreamed in EU environmental legislation, for example in water legislation, or specifically addressed through EU policies and legislation such as the EU's Biodiversity Strategy or nature directives.

From the broad set of EU strategies and instruments targeting or influencing biodiversity conservation, only the main ones are described in this section.

EU Environmental Action Programme to 2020

A framework for policy-making is set out in the Environmental Action Programme (EAP). The current seventh EAP covers the period 2012-2020 and has nine priority objectives. The three key areas are: to protect and enhance nature and biodiversity, boost resource efficient, sustainable growth and to improve environmental links with health. These goals will be achieved by better implementation of existing legislation, enhancing knowledge, larger investments and full integration of environmental issues into policy. The programme also proposes to make EU cities more sustainable and to work across boundaries on a global scale. This programme is the top environmental priority and will be regularly monitored until it is revaluated in 2020.

European Union Biodiversity Strategy

The EU 2010 biodiversity baseline indicated that up to 25 % of European animal species were facing extinction, and 65 % of habitats of EU importance were in an unfavourable conservation status, mainly due to human activities (European Commission, 2015b). Basic ecosystem services have continued deteriorating. As a response, in 2011, the EC adopted an EU strategy to halt the loss of biodiversity and ecosystem services in the EU by 2020, to restore ecosystems in so far as is feasible, and to step up the EU contribution to averting global biodiversity loss. The strategy is an integral part of the Europe 2020 strategy and the 7th Environmental Action Programme. The Strategy implements the global commitments made in Nagoya in October 2010, within the international Convention on Biological Diversity, providing a framework for action to enable the EU to reach its 2020 biodiversity target and set it on the right path to attain the 2050 vision. It builds on the results from the EU's fifth National Report as required under the Convention on Biological Diversity. The strategy is built around six targets, each supported by a set of actions:

Box 3. EU Biodiversity Vision and Target

2050 vision

By 2050, European Union biodiversity and theecosystem 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.

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.

- Full implementation of EU nature legislation to protect biodiversity
- Better protection for ecosystems, and more use of green infrastructure
- More sustainable agriculture and forestry
- Better management of fish stocks

- Tighter controls on invasive alien species
- A bigger EU contribution to averting global biodiversity loss

Since the shared EU and CBD targets need to be pursued through a mix of sub-national, national and EU-level action, close coordination is therefore needed to track progress in reaching the targets, including those addressed through policy measures outside the scope of this strategy, and to ensure consistency between EU and Member State action.

The 2015 mid-term review of the strategy assessed whether the EU is on track to achieve this objective. It shows progress in many areas, but highlights the need for much greater effort.

EU Regulation 511/2014 on the Implementation of the Nagoya Protocol

On 16 April 2014 the European Union adopted Regulation 511/2014 to implement the Nagoya Protocol in the EU and to enable Union-wide ratification of the Protocol ("Regulation No. 511/2014 of the European Parliament and of the Council of 16 April 2014 on compliance measures for users from the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization in the Union"). The Regulation applies to all use of genetic resources in the EU, and includes obligations on users of genetic resources in the EU. On 13 October 2015 the European Union published the Commission Implementing Regulation (EU) 2015/1866, which lays down detailed rules on the implementation of Articles 5, 7 and 8 of Regulation 511/2014. Furthermore, a document titled Guidance on the EU Regulation implementing the Nagoya Protocol is under preparation

The Regulation applies directly to and in all Member States of the EU, and as such can apply to all institutes, companies and citizens who use genetic resources falling within the scope of the Regulation. Its rules apply when genetic resources, and the traditional knowledge associated with them, are used in research and development for their genetic properties and/or biochemical composition, including through the application of biotechnology.

EC Birds and Habitats directives and the Natura 2000 network

Natura 2000 is a network of nature protection areas in the territory of the European Union, which legal basis comes from the Birds Directive and the Habitats Directive that form the backbone of the EU's internal biodiversity policy. Furthermore, the Natura 2000 network is the EU contribution to the "Emerald network" of Areas of Special Conservation Interest (ASCIs) set up under the Bern Convention on the conservation of European wildlife and natural habitats. Natura 2000 is also a key contribution to the Program of Work of Protected Areas of the Convention on Biological Diversity.

Under the EU's Birds Directive (Council Directive 92/43/EEC on the conservation of wild birds), Member States are required to designate and manage a network of Special Protection Areas (SPA) for 194 particularly threatened species and all migratory bird species. SPAs are scientifically identified areas critical for the survival of the targeted species. The Habitats Directive (Directive 92/43/EEC) aims to protect over 1,000 animals and plant species and over 200 so called "habitat types" (e.g. special types of forests, meadows, wetlands, etc.), which are of European importance. Member States must suggest a list of "Sites of Community Importance" (SCI), which, once adopted, should be designated as "Special Areas of Conservation" (SAC).

Member States are responsible for ensuring that all Natura 2000 sites are appropriately managed by conservation authorities in each country. These organisations often work in partnership with other authorities, voluntary bodies, local or national charities and private landowners. It is, however, important to note that Natura 2000 sites can vary considerably in character. They are not strictly protected in terms of how they are allowed to be used by people. Many sites are farmed, forested and some are even in urban areas. Other areas are much wilder.

The list of Natura 2000 sites for the Macaronesia region was the first to be adopted in December 2001 (European Commission, 2005). It is currently made up of 290 sites, covering about 32,500 km^2 of land and sea (Table 29).

While designation of sites may be near complete, the management and enforcement of protection on sites is less advanced and many sites lack management plans.

Table 29. Natura 2000 sites in the Macaronesian region

	SCI		SAC		SPA		Total	
	Nr	Area (km^2)	Nr	Area (km^2)	Nr	Area (km^2)	Nr	Area (km^2) *
Azores	3	307	23	336	15	162	41	802
Canary Is.	2	20,429	177	4,632	54	12,373	233	29,238
Madeira	0	0	11	500	5	2,219	16	2,452
Macaronesia	5	20,735	211	5,468	74	14,754	290	32,493

(* Totals do not add up because many SCI/SAC overlap with SPAs. Sources: Secretaria Regional da Agricultura e Ambiente, Azores; estimate based on GIS calculations, Canary Islands; Serviço do Parque Natural da Madeira)

EC Marine Strategy Framework Directive

The Marine Strategy Framework Directive (MSFD) constitutes the environmental pillar of the EU’s Integrated Maritime Policy. The Marine Directive aims to achieve Good Environmental Status (GES) of the EU's marine waters by 2020 and to protect the resource base upon which marine-related economic and social activities depend. It is the first EU legislative instrument related to the protection of marine biodiversity, as it contains the explicit regulatory objective that "biodiversity is maintained by 2020", as the cornerstone for achieving GES.

The Marine Directive was adopted on 17 June 2008, after several years of preparation and extensive consultation of all the relevant actors and the public, and came into force on 15 June 2008. It was due to be transposed into national legislation by 15 July 2010. The Commission also produced in 2010 a set of detailed criteria and indicators to help Member States implement the Marine Directive.

The Directive enshrines in a legislative framework the ecosystem approach to the management of human activities having an impact on the marine environment, integrating the concepts of environmental protection and sustainable use.

In order to achieve its goal, the Directive establishes European marine regions and sub-regions on the basis of geographical and environmental criteria. The Directive lists four European marine regions – the Baltic Sea, the North-east Atlantic Ocean, the Mediterranean Sea and the Black Sea – located within the geographical boundaries of the existing Regional Sea Conventions (OSPAR; HELCOM; UNEP-MAP; the Bucharest Convention). Cooperation between the Member States of one marine region and with neighbouring countries, which share the same marine waters, is already taking place through these Regional Sea Conventions.

In order to achieve GES by 2020, each Member State is required to develop a strategy for its marine waters (or Marine Strategy). In addition, because the Directive follows an adaptive management approach, the Marine Strategies must be kept up-to-date and reviewed every 6 years.

In compliance with the European Directive, Marine strategies have been developed by Portugal and Spain, including specific strategies for the subdivisions of Azores, Madeira and the Canaries, integrated in the Macaronesia sub-region. These strategies are the main planning tool aimed at the achievement of good environmental status of the marine environment in the Macaronesian archipelagos and constitutes the general framework to be met by the different sectoral policies and administrative actions with an impact on the marine environment in accordance with the relevant sectoral legislation.

EU Regulation 1143/2014 on Invasive Alien Species

The EU 2020 Biodiversity Strategy adopted in May 2011 also announced a dedicated legislative instrument on invasive alien species, which entered in force on 1 January 2015. This Regulation seeks to address the problem of invasive alien species in a comprehensive manner so as to protect native biodiversity and ecosystem services, as well as to minimize and mitigate the human health or economic impacts that these species can have. The Regulation foresees three types of interventions: prevention, early warning and rapid response, and management.

The European Commission is working together with several partners to develop an information exchange mechanism to facilitate the implementation of the EU policy on invasive alien species: the European Alien Species Information Network (EASIN) is an online platform that aims to facilitate the exploration of existing information on alien species from distributed sources.

EU Wildlife Trade Regulations

CITES is implemented in the EU through a set of Regulations known as the EU Wildlife Trade Regulations. Currently these are:

- Council Regulation (EC) No 338/97 on the protection of species of wild fauna and flora by regulating trade therein (the Basic Regulation);
- Commission Regulation (EC) No 865/2006 (as amended by Commission Regulation (EC) No 100/2008;
- Commission Regulation (EU) No 791/2012 and Commission Implementing Regulation (EU) No 792/2012) laying down detailed rules concerning the implementation of Council Regulation (EC) No 338/97 (the Implementing Regulation);
- Commission Implementing Regulation (EU) No 792/2012 of 23 August 2012 laying down rules for the design of permits, certificates and other documents provided for in Council Regulation (EC) No 338/97 on the protection of species of wild fauna and flora by regulating the trade therein amending Regulation (EC) No 865/2006 (the Permit Regulation).

In addition, a Suspensions Regulation is in place to suspend the introduction into the EU of particular species from certain countries.

EU Directive and Strategy on adaptation to climate change

The EU Strategy on adaptation to climate change, adopted by the European Commission in April 2013, sets out a framework and mechanisms for taking the EU's preparedness for current and future climate impacts to a new level. Complementing the activities of Member States, the strategy supports action by promoting greater coordination and information-sharing between Member States, and by ensuring that adaptation considerations are addressed in all relevant EU policies.

Spain adopted its National Climate Change Adaptation Plan (PNACC) in 2006, and work has been ongoing since then. The Climate Change Strategy for the Canary Islands was adopted in 2009 and followed by an Adaptation Plan for the Canary Islands.

The National Strategy for Adaptation to Climate Change (ENAAC) was adopted by Portugal in 2010. The Azores approved its Regional Strategy on Climate Change (ERAC) in 2011, which will be implemented through the Regional Plan for Climate Change (PRAC), expected in 2017. In Madeira, the development of an Adaptation Strategy to Climate Change is underway (European Commission, 2014b), being led by the Regional Government of Madeira and the Department for Spatial Planning and the Environment (under the project "CLIMA-Madeira").

Environmental Impact Assessment (EIA) Directive and Strategic Environmental Assessment (SEA) Directive

The Directives on Environmental Assessment aim to provide a high level of protection of the environment and to contribute to the integration of environmental considerations into the preparation of projects, plans and programmes with a view to reduce their environmental impact. They ensure public participation in decision-making and thereby strengthen the quality of decisions. The projects and programmes co-financed by the EU (Cohesion, Agricultural and Fisheries Policies) have to comply with the EIA and SEA Directives to receive approval for financial assistance.

The newly amended Environmental Impact Assessment (EIA) Directive (2014/52/EU) entered into force on 15 May 2014 and introduces, among other elements, a broader scope of the EIA covering new issues (climate change, biodiversity, risks prevention).

Local Policies and Legislation

Biodiversity conservation in the Macaronesian Autonomous Regions is set both at national and local level, and is either mainstreamed in the region's environmental legislation, for example in water legislation, or specifically addressed through policies and legislation such as the legislation on Protected Areas.

In both cases, global and regional aggrements have been transposed into several plans, programs and strategions in the region (see 0). EU legislative instruments, in turn, must be transposed into national and local legislation. Whilst EU regulations have direct application in member states and do not have to be transposed into national regulations, the necessary enforcement provisions must be transferred into national legislation and supplemented with national laws, as these are matters that remain under the sovereignty of each Member State. EU directives, on the other hand, must be transposed into national legislation in order to give effect to European law. Directives set out results that all EU Member States must achieve and national authorities then have the choice of form and method to meet this result. The European

Commission closely monitors that transposition is timely, correctly done and implemented, so as to attain the results intended.

Despite its national scope, both the Portuguese and Spanish National Biodiversity Strategies do not address the autonomous territories of Madeira, the Azores and the Canaries specifically, and none of the three regions have formulated its own strategy for nature conservation and biodiversity. The main linkages with the CBD's goals and targets take place at the time of reporting at national level, when each region is called to cooperate with the respective national authorities and a detailed compilation of actions implemented in these regions is made and incorporated into Portugal's and Spain's national reports.

In the absence of comprehensive locally driven strategies, insufficient attention is being paid to the need for integrating and mainstreaming conservation in development planning, and conservation is approached as a distinct sector. Nature conservation and biodiversity are mostly perceived and approached as limited to protected areas or particular endangered species, and the value of mainstreaming biodiversity into development planning is not yet fully appreciated (Benzaken & Renard, 2011). Nevertheless, as all the archipelagos have a significant percentage of their territories classified as protected areas (40% of the terrestrial surface, on average), nature and biodiversity conservation is in effect being implemented in all main ecosystems.

In the case of the Canary Islands, conservation activities are also implemented by the insular governments (i.e., the governments of each island, known as Cabildo) and some city councils, since they have responsibilities for some aspects of nature conservation and biodiversity management. Some insular governments have indeed sought to formulate their own insular biodiversity strategies

Protected Areas Network

Protected Areas form the heart of biodiversity conservation strategies in the Macaronesia. Previously to Natura 2000 Network implementation, all Macaronesian archipelagos had a local legislation supporting the creation and management of network of protected areas. To date, a total of 289 protected areas have been designated in the region (235 land PAs, 46 MPAs and 8 mixed PAs), covering 118,208 km^2, from which 95% are marine sites in the Azores (Table 30).

Table 30 – Regional networks of protected areas in Macaronesia

	AZO		MAD		CAN		MACARONESIA	
	Nr	Area (ha)	Nr	Area (ha)	Nr	Area (ha)	Nr	Area (ha)
IUCN - I	24	533 804	5	25 658	14	82 809	35	642 271
IUCN - II					15	180 687	15	180 687
IUCN - III	10	733			52	29 812	62	30 545
IUCN - IV	53	10 650 880			34	15 506	87	10 666 386
IUCN - V	16	26 612			27	39 000	43	65 612
IUCN - VI	31	107 522					31	107 522
IUCN - V, VI					7	83 401	7	83 401
Several			1	44 396			1	44 396

Total	134	11 319 551	6	70 054	149	431 214	289	11 820 820

(Sources: DRAA, pers. com. (2014), Government of the Azores (2015); Institute of Forests and Nature Conservation, pers. com. (2014); Gobierno de Canarias: Consejería de Obras Públicas (2014); Ministerio de Agricultura (2014))

In addition, Natura 2000 sites cover more than a third of the total land area in the region (Table 29), although often overlapping with the network of regional protected areas. Macaronesia also accounts for 119 Important Bird Areas (IBAs), 11 Biosphere Reserves, 14 Ramsar sites and 11 OSPAR areas.

However, while the legal framework for biodiversity conservation in the region is robust, some issues exist in terms of coordination between institutions, and effective law implementation and enforcement.

Azores

In the Azores, Regional Decree Law 15/2012/A, of April 2nd, transposes international and EU policy, promoting and strengthening synergies between various international conventions on biodiversity, especially the Convention on Biological Diversity, Bern, Bonn and Ramsar, and also establishes the necessary measures for compliance with and implementation of CITES and associated Regulations, the EUROBATS and AEWA in the Azores territory.

The Azorean Network of Protected areas was first created in 1993, long before the Habitats and Birds Directives were transposed into a regional law in 2012.

In the Autonomous Region, protected areas, Natura 2000 sites and others designated under local, national or international frameworks (such as the Ramsar Convention and the Man and Biosphere UNESCO Programme) are integrated, for the purpose of administration and management, in a recent (2012) scheme of Nature Parks, one per island. The nine Island Nature Parks include all terrestrial protected sites located in the territory of the island as well as marine areas located within the limit of the territorial sea adjacent to the islands. The Protected Areas Network include 123 areas covering 560 km^2 on land (24 % of the terrestrial area of the archipelago) and 1,242 km^2 of the coastal sea (Table 30).

An additional management figure is that of the Azores Marine Park that includes all offshore MPAs (Government of the Azores, 2015). The Marine Park was created in 2011, following the approach expressed in the various high-level documents used as a guide to the management of the sea, with particular reference to the Green Paper and the Blue Paper on Maritime Policy, the Marine Strategy Framework Directive and the National Strategy for the Sea. It covers 111,393 km^2 of offshore waters (DRAA, pers. com.; Government of the Azores, 2015), including seven OSPAR areas within national waters and four outside national jurisdiction but within the limits of the areas proposed for legal continental shelf extension that Portugal submitted to the United Nations Commission on the Limits of the Continental Shelf (Calado, Ng, Lopes, & Paramio, 2011). Eight of these OSPAR MPAs incorporated the protection of the seafloor and sub-seafloor for two coastal areas, three seamounts and two hydrothermal vent fields within the EEZ, and for an additional hydrothermal vent field located outside the EEZ.

Additionally, other four oceanic MPAs have recently been proposed:

- MPA of Princesa Alice Bank (PMA15 on the attached figure, 370 km2)
- MPA of Condor Bank (PMA14, 242 km2)
- MPA of Meteor Submarine Archipelago (PMA12, 123,238 km2)

Box 4. Azores pioneerism on the implementation of a set of marine conservation instruments (Abecasis et al., 2015)

- The understanding that seamount fishing resources are particularly vulnerable and that industrial fishing may exert irrecoverable impacts on those has led the Azores to influence a non-trawling policy implemented by the EU, to establish several seamount MPAs within its EEZ and to promote the establishment of high-seas MPAs protecting large seamount areas under international agreements.
- The pioneering actions taken by the Azores to protect hydrothermal vents in deep-waters, potentially rich in these noble minerals, in a time of increasing interest in deep-sea mining, has resulted in the establishment of several untouchable sites.
- Some EU directives were applied to deep-water and offshore in the Azores before they were applied elsewhere in Europe. For example, seamounts were first protected under the Habitats Directive in the Azores (namely D. João de Castro, Formigas and Dollabarat). Also, in anticipation of the Natura 2000 revision to include habitats beyond 200 m deep, in 2005 the Azorean government proposed the inclusion of the deep-sea hydrothermal vents Lucky Strike and Menez Gwen in this network.
- The hydrothermal vent fields "Rainbow" was the first national MPA to have been proposed under the high seas and accepted by OSPAR. This made Portugal, and particularly the Azores, a pioneer in the protection of marine biodiversity at an international level and a progressive player that helped to progress the ground-breaking OSPAR high seas MPAs process.
- The collaboration between OSPAR and Portuguese entities toward the development of common management strategies for three MPAs located outside the Azorean EEZ (Altair, Antialtair, and the Mid-Atlantic Ridge North of the Azores) was also a ground-breaking step for the establishment of OSPAR's Network of High Seas MPAs and was welcomed as significant progress at the inter-ministerial OSPAR meeting in Bergen.

- MPA Southwest of Azores (PMA13, 11,030 km2)

All of Natura 2000 sites are included in the network of protected areas and have, in comparison, a relatively low coverage: three SCI, 23 SAC and 15 SPA cover a land and marine area of 802 km^2.

Madeira

The archipelago of Madeira has a network of 11 Natura 2000 sites covered by 2,452 km^2 (Institute of Forests and Nature Conservation, pers. com. 2014) that has been set up since 2002 (Table 29). However, regional protected areas exist since 1982, when the Madeira Nature Park (MNP) was created. This is still the largest protected area in the island, representing 60% of the surface of Madeira island (Institute of Forests and Nature Conservation, pers. com 2014), covering the Madeiran Central Massif and all the Laurisilva area. In addition to the Nature Park, the archipelago also has 5 Nature Reserves (one being a marine protected area). The Nature Park and the Nature Reserves cover about 701 km^2 that partially overlap the Natura 2000 sites.

Recently, the Autonomous Region has announced that soon a "Network of Marine Protected Areas" will be created. The draft Regional Legislative Decree is being outlined by the Regional Secretariat of Environment and Natural Resources and will soon be subject to the Government's Council (R. M. Oliveira, 2015). The proposed network will include marine nature reserves and four marine parks (Funchal, Cabo Girão, Ponta de São Lourenço, Achadas da Cruz).

In addition, a large MPA (132,999 km2) has been proposed on the Madeira-Tore geological complex, between Madeira and mainland Portugal, covering the submarine banks Tore, Ashton, Ormonde and Gettysburg (Gorringe), Josephine, HirondelleII, Lion, Unicorn, Seine and Dragon. Recognition by OSPAR will be sought. The component within the Portuguese EEZ will be designated as an SCI within Natura 2000 network.

The Service of the MNP is responsible for the management of all the terrestrial and marine protected areas of Madeira, reporting to the Regional Government. For this, it has its own executive, scientific, administrative and operational staff, as well as the necessary infrastructures and equipment. In addition to the regular activities of monitoring and controlling the archipelago's protected land area and more than 300 km that separate the Porto Santo and Selvagens islands, the Service carries out environmental education activities and coordinates and supports research projects, some in the context of the EU's LIFE programme. Since 2016, the Institute of Forests and Nature Conservation has been merged with the Regional Directorate of Forests and Nature Conservation giving place to a new Institute of Forests and Nature Conservation (IFCN, IP-RAM).

In addition to classified areas, Madeira's territorial waters have been, from 1987, a designated marine mammal sanctuary. Rationale is to protect the marine mammals of the Madeira islands, including the endangered Mediterranean monk seal.

Canary Islands

In the Canary Islands, 146 areas are safeguarded in a network of protected areas of which four have the status of national parks. Two of these, the national parks of Cañadas del Teide and of Garajonay, belong to the UNESCO World Heritage network. All seven islands are today totally (Lanzarote, Fuerteventura, La Palma, La Gomera & El Hierro) or partly (Gran Canaria & Tenerife) classified as UNESCO Biosphere reserves, thus contributing to biodiversity conservation on the archipelago. On the marine sector, three Marine Reserves with Fishery Interest cover the northern Lanzarote coasts and its offshore islets, the south-eastern sector of El Hierro, and the south-western coast of La Palma.

In total, 149 protected areas cover 4,312 km^2 (Table 30). In turn, Natura 2000 sites cover today a much large area of 29,238 km^2 (Table 29), especially since the recent (2014) extension that resulted from the LIFE+project INDEMARES. The resulting new SPAs and SCI added 13 more sites in the marine demarcation of the Canary Islands.

All Network of Protected Natural Areas is officially under the responsibility of the Canarian goverment, although the management is delegated to the “Cabildos” (island governments). The same would apply to the terrestrial Natura 2000 Network. However, as Natura 2000 planning is still delayed in comparison to protected areas and the Cabildos have not yet developed all necessary skills (except for specific actions), also the management remains with the Canarian government. In the case of marine Natura 2000 network, the management is made directly by the Government of Spain (Ministry of Agriculture, Food and Environment), unless there is an "ecological continuity" with a terrestrial site, in which case the management is carried out by the Canarian government.

In addition to the protected area instrument, Spanish and Canarian catalogues of protected species have been implemented. Inclusion on these catalogues imply the application of protection measures that range from preventing the capture to active management through conservation or recovery plans, which may include designating critical areas for biodiversity conservation. Recent changes in the Canarian catalogue of protected species have prompted critics from biodiversity experts (e.g. J.M. Fernández-Palacios & de Nascimento, 2011) which have since been addressed.

Mainstreaming of Environment into other sectors

The three Macaronesian autonomous regions have a comprehensive and consistent legislation on most environmental subjects, such as pollution, water management and sewage, Environmental Impact Assessment (EIA), fisheries, and energy, in which biodiversity issues play a determinant role (Table 31). This legislation is implemented by a diverse array of different ministries, agencies and institutions.

However, the lack of a local/regional biodiversity strategy aligned with the CBD’s Programme of work on Island Biodiversity reduces the opportunities to integrate biodiversity biodiversity concerns into other sectors and into the general decision-making process (Benzaken & Renard, 2011). Conservation is often approached as a distinct sector, with most of the efforts being concentrated on classical instruments such as protected areas.

Table 31. Examples of regional policies, strategic plans and programs in which biodiversity issues are integrated

Azores	Canary Islands	Madeira
Rural Development Program (PRORURAL) Spatial Planning for Tourism (POTRAA) Spatial Planning of the Coastal Zone (POOC) Spatial Municipal Planning (PMOT) Maritime Spatial Planning of the Azores (POEMA)	Spanish Program for Sustainable Rural Development (2010-2014) National Hydrological Water Plan Sector Plan of Nature and Biodiversity Tourism Spanish Business and Biodiversity Initiative	Land-use Plan of Madeira (POTRAM) Regional Plan on Environmental Policy (PRPA) Special Plans for the Management of Protected Areas (PEOGAP) Strategic Waste Plan of Madeira (PERRAM) Spatial Planning for Tourism Energy Policy Plan (PPERAM) Regional Water Plan (PRAM) Spatial Municipal Planning

(Sources: ICNF (2015); MAGRAMA (2014b))

While some of these policies and legislative frameworks are set strictly by the Governments' initiative, many others result from the transposition of global/regional agreements and European Directives.

In that context, and to ensure primarily, that spending under the EU budget has no negative impacts on biodiversity, and additionally, that spending under the EU budget is overall supportive to achieving the biodiversity targets, the European Commission has developed comprehensive guiding: the Commission's "Common Framework for Biodiversity proofing of the EU budget" provides a practical Common Framework for Proofing the EU Budget including general and fund-specific guidelines to be used by national and regional authorities as well as by Commission services (Common Framework for Biodiversity-Proofing of the EU Budget – General Guidance; Proofing Guidance for the Cohesion Policy Funds; Proofing Guidance for the Common Agricultural Policy funds (EAGF and EAFRD); Proofing Guidance for the Connecting Europe Facility (TEN-E and TEN-T); Proofing Guidance for the European Maritime and Fisheries Fund)[9].

[9] http://ec.europa.eu/environment/nature/biodiversity/comm2006/proofing.htm

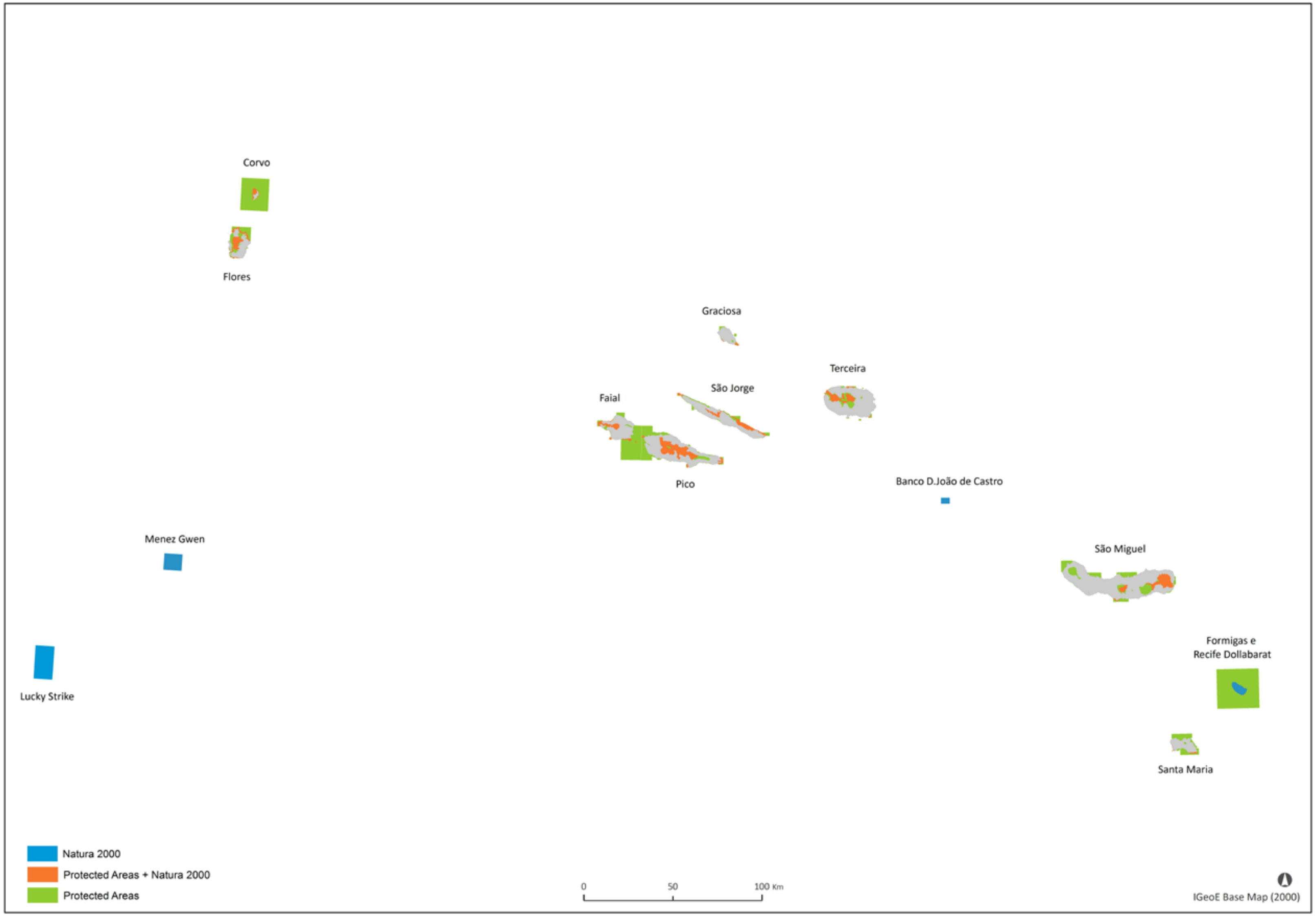


Figure 28. Regional protected areas and Natura 2000 sites in the Azores

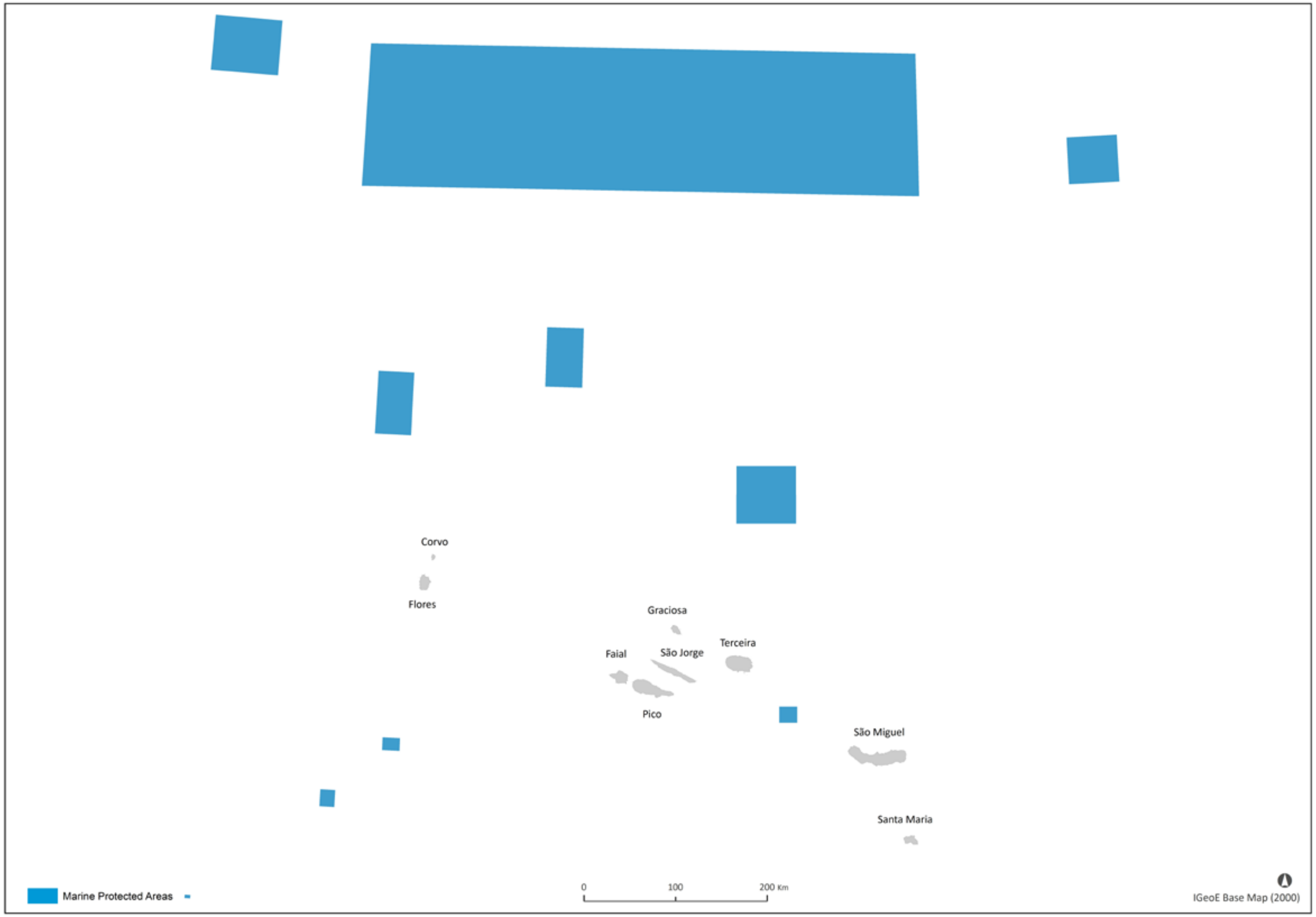


Figure 29. Marine Park of the Azores

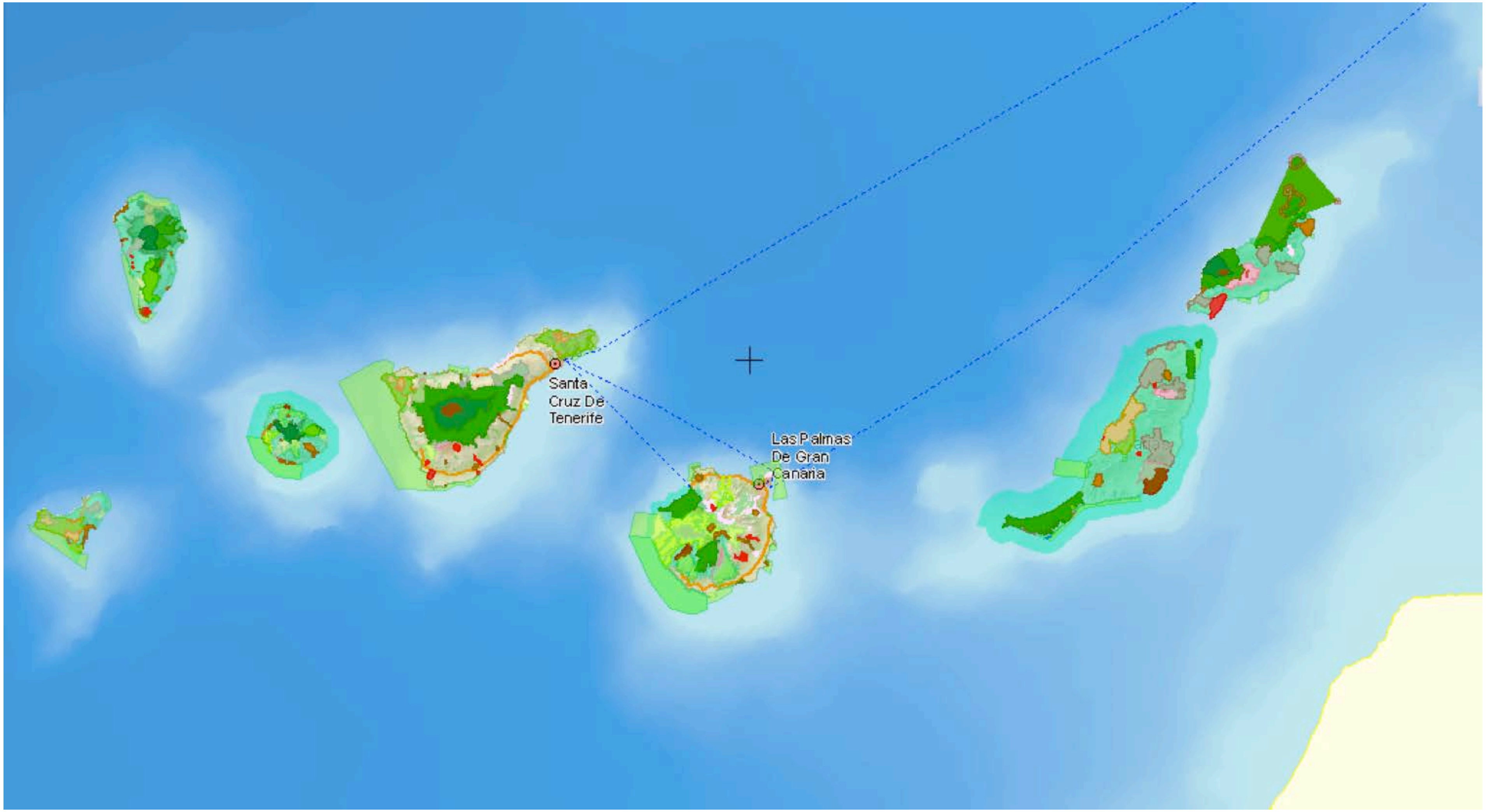


Figure 30. Regional protected areas and Natura 200 sites in the Canary Islands

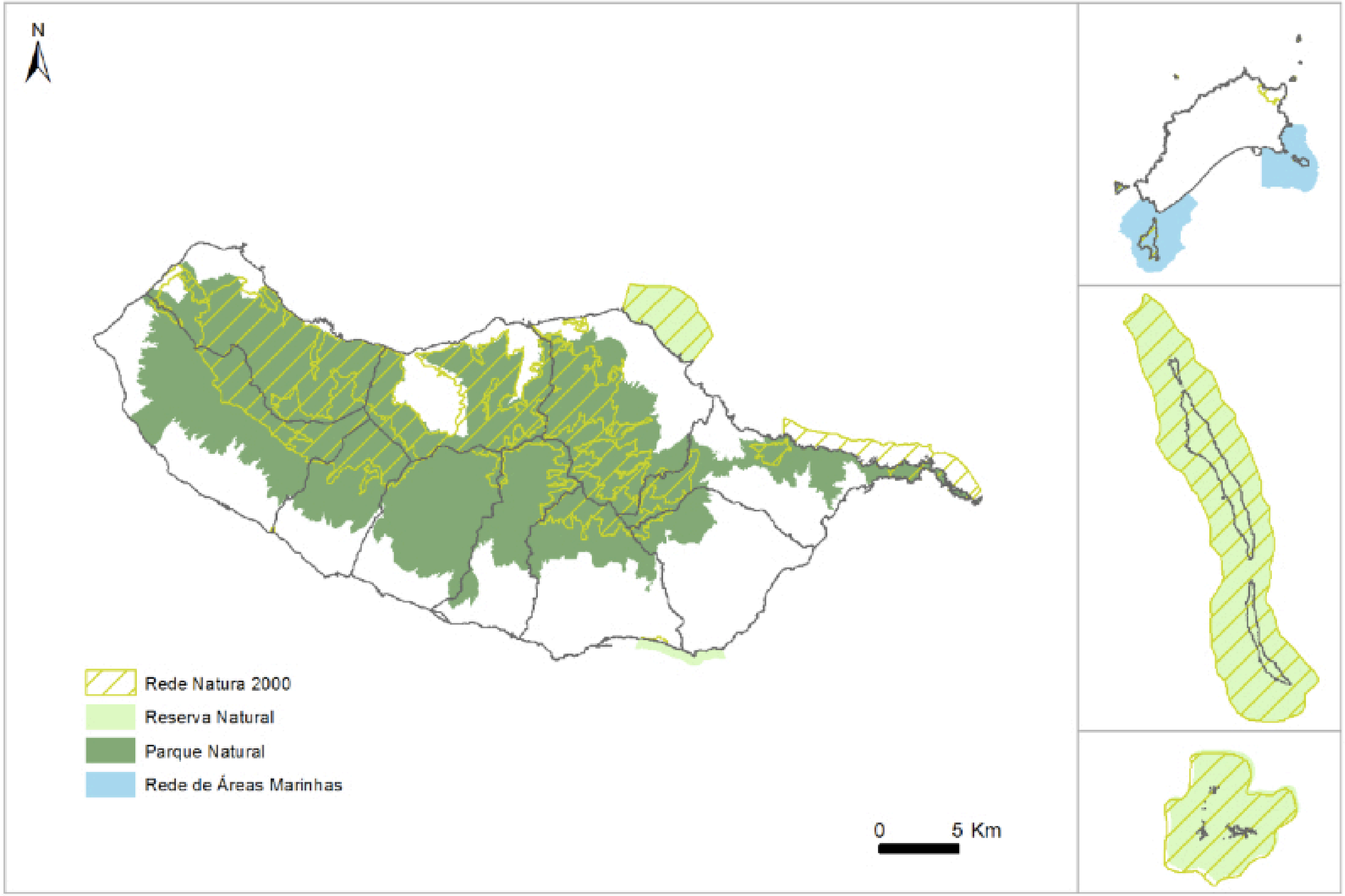


Figure 31. Regional protected areas and Natura 200 sites in Madeira

7. CURRENT STATUS OF THE CONSERVATION COMMUNITY

This chapter gives a general picture of the civil society situation and its capacity for the Macaronesian region. The focus is on the associative structures, but information is also provided on the research organizations and the private sector, which are considered by CEPF as part of the civil society.

Overview

While governmental institutions do most of the nature conservation activity in Macaronesia (e.g. creation and management of protected areas; legislative framework on biodiversity conservation), a number of important conservation programmes and research initiatives have been undertaken in the region involving different stakeholders, including from the civil society. Much of these initiatives have been collaborative between academic institutions, NGOs and government departments. This cooperation is well illustrated in the projects undertaken within the LIFE Nature Programme. The LIFE programme helps translate EU Nature and Biodiversity policy into practice at the local level supported by establishing partnerships between the different groups of people concerned with and directly affected by Natura 2000 network sites, and by the particular project's target species and/or habitats. The majority of LIFE Nature and Biodiversity projects in Macaronesia has been led by NGOs or regional authorities (see Table 37). These beneficiaries quite often establish partnerships with different stakeholders in order to fulfil the objectives of their projects. This has generated a wealth of practical experience and know-how regarding the most effective ways to work with stakeholders in order to successfully manage Natura 2000 network sites and ensure a favourable conservation status for protected species and habitats.

Another example of stakeholder cooperation for conservation is illustrated by the projects developed under the Interreg / MAC programmes funded by the European Regional Development Fund (ERDF) (see Table 36). The programme foresees the participation of the following beneficiaries (Figure 32):

- Regional and local public entities;
- Socioeconomic and professional bodies;
- Research centres, universities and polytechnics;
- Associations, foundations and agencies of local and regional development;
- Other non-profit entities.

The cooperative projects involve different entities from Madeira, Azores and the Canary Islands dealing with nature conservation and biodiversity at the Macaronesian level. This cooperation has led to the establishment of common strategies and the use of common methods in the management of biodiversity in these islands.

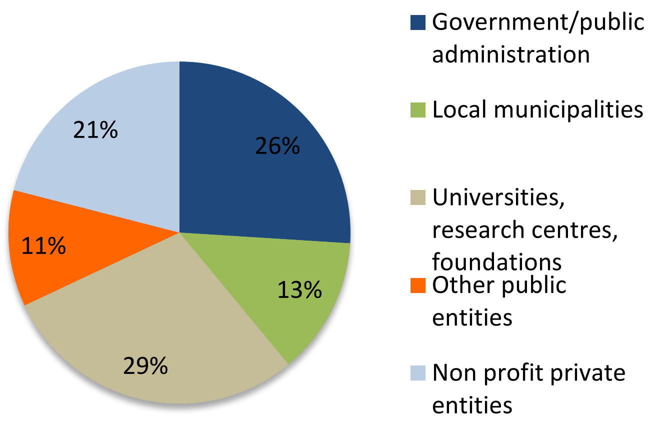


Figure 32. Involvement of different entities in projects under the MAC 2007-2013 programme (Macaronesia)

Source: (Government of the Azores, 2016)

Non-Governmental Organizations (NGOs)

Public participation and the development of a culture of environmental movements and associations in Portugal and Spain needs to be seen in the context of a string of social trends that characterized the countries throughout the twentieth century. The environmental movement in these countries is distinctively marked by their late emergence within a cycle of mobilization in opposition to a dictatorial regime and the transition to democracy in the 1970s. Until de mid-1980s, the environmental movement in this countries faced difficulties to establish itself within the countries, given that public opinion was still more focused on other priorities (e.g. consolidation of democracy and fight against poverty). In this sense, its organizational roots clearly differ from the New Social Movements (NSMs) that came into being during the 1960s and 1970s in other European countries (Jiménez, 2007).

NGO activity in Macaronesia is, thereby, still fragile and there is a limited consciousness of them and their work in the society of each region. While development NGOs account for the majority of these organizations in the region, there are few environmental NGOs, with local scope, not always skilled, operating under unstable financial conditions, with limited fundraising capacity, small membership and budget. Only a small number of the environmental NGOs in the Macaronesia are active in biodiversity issues and few are able to develop high-profile, long-term programs. Most of them are in need of qualified staff, consistent funding, and of improving cooperation with other NGOs in order to increase their ability to influence policy and cooperation with governments.

In the Canary Islands, the environmental movement has been organized in a more systematic way than in the other archipelagos. The Assembly of Environmentalist Movement Canarias (AMEC) was set up following a gathering of environmental groups around the archipelago in 1989 in Lanzarote. Later, in 1991 the Environmental Federation Canaria Ben Magec was created in La Palma de Gran Canaria to respond to the increasing complexity of environmental problems and make more effective the struggle in defence of the natural and cultural heritage of the Canary Islands.

Although NGOs in the Macaronesia are still frequently viewed as adversaries/critics rather than potential partners, in many cases they have begun to be included in policy development processes and consultations. In addition, there is, at the institutional level, a growing cooperation among actors working in the field of nature conservation and biodiversity in the region, including NGOs.

A list of NGOs contributing more actively to nature and biodiversity conservation is given on Table 32.

Table 32. NGOs contributing to biodiversity conservation in the Macaronesia

Archipelago	Organization	Web
Canary Is.	ADS Biodiversidad (Gran Canaria)	http://www.adsbiodiversidad.org/
Canary Is.	Asociación Amigos de la Pardela Cenicienta	http://www.amigosdelaspardelas.com/
Canary Is.	Asociación BalFin	www.balfin.org
Canary Is.	Asociación Gigante Azul	https://www.facebook.com/asociaciongiganteazul?fref=photo
Canary Is.	Asociación Montymar	http://asociacionmontymar.blogspot.com.es/
Canary Is.	AVANFUER - Asociación de Voluntarios de Ayuda a la Naturaleza de Fuerteventura	https://www.facebook.com/AVANFUER
Canary Is.	Ben Magec - Ecologistas en Acción	http://www.benmagec.org/
Canary Is.	Canarias Conservacion	www.canariasconservacion.org
Canary Is.	Colectivo Ornitológico de Gran Canaria	http://ornitologiadegrancanaria.blogspot.com.es/
Canary Is.	Ecooceanos -Ecología y cooperación	http://ecooceanos.blogspot.com.es/
Canary Is.	Federación Canaria de Desarrollo Rural	www.redcanariarural.org
Canary Is.	Fundación César Manrique	http://www.fcmanrique.org/
Canary Is.	Fundación Foresta	http://www.fundacionforesta.es/
Canary Is.	Fundación Neotrópico	http://www.neotropico.org
Canary Is.	GOHNIC - Grupo de Ornitología e Historia Natural de las islas Canarias	http://www.gohnic.org/
Canary Is.	Greenpeace Canarias	https://www.facebook.com/Greenpeace-Canarias-138542932935678/
Canary Is.	Grupo Ecológico La Vinca - Ecologistas en Acción	http://www.lavinca.org/
Canary Is.	Loro Parque Fundación	http://www.loroparque-fundacion.org/
Canary Is.	SECAC - Sociedad para el estudio de los cetaceos en el archipielago canario	http://www.cetaceos.org/
Canary Is.	SEO/Birdlife - Sociedad Española de Ornitología (delegación Canarias)	http://www.seo.org/canarias-delegacion/
Canary Is.	SOC - Sociedad Ornitológica Canaria	http://www.avescanarias.com/
Canary Is.	WWF Canarias	http://www.wwf.es/wwf_adena/donde_estamos/wwf_canarias/

Archipelago	Organization	Web
Azores	Ambiflores - Associação de Defesa do Ambiente da Ilha das Flores	https://www.facebook.com/Ambiflores-associa%C3%A7%C3%A3o-de-defesa-do-ambiente-da-ilha-das-Flores-442878962538845/
Azores	Associação Ecológica Amigos dos Açores	http://www.amigosdosacores.pt/
Azores	Azorica – Assciação de Defesa do Ambiente	http://www.azorica.org/
Azores	CADEP-CN - Clube dos Amigos e Defensores do Património-Cultural e Natural	http://natur-mariense.blogspot.pt/
Azores	Fundação Rebikoff-Niggeler	http://www.rebikoff.org/
Azores	GÊ-QUESTA - Associação de Defesa do Ambiente	http://ge-questa.blogspot.pt/
Azores	Os Montanheiros - Sociedade de Exploração Espeleológica	http://www.montanheiros.com/
Azores & Madeira	Quercus - Associação Nacional de Conservação da Natureza	http://www.quercus.pt/
Azores & Madeira	SPEA – Sociedade Portuguesa para o Estudo das Aves	http://www.spea.pt/
Madeira Madeira	Associação dos Amigos do Parque Ecológico do Funchal Associação Ecológica da Madeira	http://www.amigosdoparque.com/ aecomadeira@gmail.com

Private Sector

Several international treaties and many conservation initiatives have tried to stem the loss of biodiversity, but with limited success to date (European Commission, 2008). The Macaronesia region is no exception: to date, the engagement of the private sector in biodiversity conservation is very limited.

Some examples of collaboration between NGOs or the government and the private sector in the region are the following:

- Programme "Natural Park - Partner for Sustainable Development": is a partnership program between Island Nature Parks and regional companies in the Azores to disseminate the natural values and promote an economic development compatible with biodiversity conservation. These partnerships aim to create the necessary conditions to fulfil identified needs and promote the Azores destination, thus ensuring the growth of the tourism sector and its contribution to the economic and social development of the archipelago in addition to the preserving environmental excellence. All individual or collective organisations, either profit or non-profit, may become partners of Island Natural Parks as long as they develop their activities within Natural Parks and commit themselves to actively contribute to their sustainable development; these are typically travel agencies, tourism enterprises, agro-food producing entities, catering entities, local development associations, sports clubs, environmental NGOs, schools, local authorities and the media.

- Priolo (Azorean bullfinch) Brand: is a trademark registered by the Regional Government of Azores. This brand was created within the actions of the LIFE Sustainable Laurel Forest project aiming to be a quality seal for those companies that establish a partnership with the São Miguel Island Natural Park in order to contribute to the conservation of the protected areas in the councils of Nordeste and Povoação (Priolo Lands). This trademark aims, as well, to promote a sustainable tourism activity in these two councils, according to the objectives contained in the Strategy of the European Charter of Sustainable Tourism (ECTS) in the Lands of Priolo.

Box 5. Message from Lisbon on Business and Biodiversity (2007)

To tackle European biodiversity loss, the European Commission's 2006 Biodiversity Communication identified the engagement of the private sector in partnerships for biodiversity conservation as a key action. The engagement of the private sector will contribute to sustainable ecosystem services and goods upon which Europe's sustainable development depends. The Commission, Member States and many stakeholders have all identified the need for the integration of biodiversity criteria into business decision-making and corporate governance as a priority. This need was clearly expressed at a high-level conference on business and biodiversity in Portugal in 2007, which was attended by more than 400 decision makers. In the 'Message from Lisbon on business and biodiversity' (2007) the participants stated that "the primary need to promote an even greater awareness of the importance of biodiversity throughout the business sector as well as consumers, to make knowledge, information and relevant expertise available to business and assist companies in shaping their commitments to biodiversity". The message also emphasised that the major focus should be on micro-, small- and medium-size companies. Furthermore, the Commission committed to establishing a technical facility to support the European Business and Biodiversity Initiative, which was launched under the Portuguese Presidency of the EU in 2007.

- Biodiversity audits for the integration of biodiversity parameters and ecosystem services in the management of Spanish companies: the Global Nature Foundation, in collaboration with companies such as Cepsa, Ence, Herdade do Freixo do Meio, Cooperativa Agraria de Vive, Iberdrola and Red Eléctrica de España, has carried out audits (50% of the cost financed by the LIFE project and 50% by the Biodiversity Foundation) in which it conducts and analysis of the relationship between the company and the biodiversity that affects its business, then providing the basis for integrating biodiversity in the environmental management of the company and undertaking actions aimed at the sustainable use of resources and protection of nature. Following the implementation of the audits, the companies have developed actions to improve their business management of biodiversity, both in terms of communication with their stakeholders and with specific actions in the ecosystems related to their business activity. This has led to an improvement in terms of biodiversity conservation. As a recent example, Cepsa has financed a communication and awareness campaign on the conservation of bats in the Canary Islands, which extends the range of environmental actions undertaken by the company.
- Mapping of the flight paths of birds that interact with electricity transmission lines by Red Eléctrica de España: a project that aimed to study and search for solutions to the

problems arising from the collision of birds with power lines. The satisfactory results obtained in the pilot project (2010-2011) have led the company to undertake a second phase, in which the initiative was extended to a wider geographical area, including the Canary Islands.

- Spanish Business and Biodiversity Initiative: launched in 2013, it aims to increase the engagement of the business sector in order to achieve the international Aichi Biodiversity Targets. The Biodiversity Foundation, a public foundation of Spain's Ministry of Environment whose mission is to preserve natural heritage and promote biodiversity conservation, is the main actor of this initiative. Fifteen companies are signatories of the so-called Spanish Biodiversity Pact: ABB, BSH Electrodomésticos España, CEMEX España, CEPSA, Endesa, FCC, Ferrovial, Grupo Mahou San Miguel, Heineken España, Holcim España, ISS Facility Services, REE, Gas Natural Fenosa, Grupo Zeltia and Iberdrola.
- Micro Marine Areas (MMAs) are a marine management strategy in the Canary Islands that proposes coexistence between conservation, commercial fishing and ecotourism uses. It is an innovative model of coastal management proposed in conjunction with the Eco Oceans Association, based on small-scale protected marine areas, promoted by local governments and associations, monitored by the users and designed to promote the economic development of various sectors by encouraging ecotourism and recreational activities within the area. It also promotes traditional fisheries in adjacent areas, research and development of the local community and the culture of management through Protected Marine Areas (PMAs). Six micro marine areas are currently being worked on simultaneously and another six are being studied. The project is promoted by seven public institutions: Fundación Obra Social Caja Canarias, Canary Islands Government, Tenerife Inter-island Council, Gran Canaria Inter-island Council, Palmas de Gran Canaria University (ULPGC), UNESCO Chair in Sustainable Tourism, Fisheries Biology Research Group of the Canary Island Institute of Marine Science.
- Aena Aeropuertos supports the Programme for the Recovery of the Gomera Giant Lizard (*Gallotia bravoana*) and its range by authorizing the use and maintenance of the land near the La Gomera airport required for the future release and reintroduction of the species in the natural environment, as well as the appropriate modifications and new sections of fencing to prevent access to predators.
- Species transplantation by the FCC, a company operating in sectors such as environmental services, water, and infrastructure: the initiative aims to minimize the amount of vegetation that may be affected by the work and, in the event that for reasons of the project this vegetation has to be removed from its current location, to transplant it to other areas where it can continue to perform its photosynthetic and aesthetic functions and provide shelter for the wildlife associated with the habitat concerned.
- The LIFE Project "Conservation of *Tursiops* and *Caretta* on La Gomera" (LIFE03/NAT/E/000062) developed a management plan for the Special Area of Conservation that, by involving all stakeholders, has been able to persuade them that this status does not limit the socio-economic development of the area and of La Gomera. A sign of the positive response to the project has been the involvement of marine tourism companies and fishermen in data collection activities that have highlighted the complexity and richness of the protected marine area.

- The former Portuguese Bank “Espírito Santo” had established an annual biodiversity award scheme in recognition of Portuguese R&D and innovative projects focusing on biodiversity. The top prize was awarded to the LIFE-Nature project “Important bird areas for seabirds in Portugal” (LIFE04 NAT/P/000213) in addition to a prize of €75,000 for its survey and educational work improving knowledge about the protection of marine birds in the Atlantic Ocean. LIFE-Nature’s “PRIOLO” project (LIFE03 NAT/P/000013) also received commendations by the judges for its work restoring Bullfinch habitats in the Azores and won a prize of €3,000.

Public participation

Each of the autonomous territories of the Macaronesian region has developed a comprehensive system of environmental information, broadened by public participation. Most recent national policy frameworks include provisions for private sector and public stakeholder participation in environment and development decision-making, and stakeholder participation is promoted under many regional and international initiatives in which Macaronesian governments participate. However, active participation by citizens in decision-making is still limited and supported by a weak NGO movement. Government consultation processes are still criticized for poor disclosure and late involvement of the stakeholders.

Despite these considerations, there have been some initiatives to involve the public in conservation actions, contributing to raise awareness on biodiversity issues. In addition, social support for the development of conservation actions is also often appointed as a cost-saving measure (Martín et al., 2008).

Some examples of public participation in actions and projects in Macaronesia are the following:

- POSEIDÓN is a citizen science program, supported by scientific validation, for the sighting of marine species in the marine and coastal environment of the Canary Islands.
- RedPROMAR: the Observer Network of the Marine Environment of the Canary Islands is a tool of the Canarian Government for monitoring and surveillance of marine life in the archipelago. It is an information system that records the continuous changes that are occurring in the oceans, using the concept of "Citizen Science”.
- The LIFE+ project ECOCOMPATÍVEL (2010-2015) had as main objective the communication and provision of information to the public, for better implementation, management and conservation of Natura 2000 sites. Within the project several actions were undertaken involving the general public and stakeholders from different economic sectors.
- The Regional Plan for Education and Environmental Awareness of Azores (PRESAA) is in force since 2011 and combines all the campaigns, projects and actions promoted in this issue by the regional government. Authorities, businesses, NGOs and local associations also contribute to its implementation. The "Azorean Biodiversity Kit" was published in 2012 under this Plan and it was distributed in 1st cycle schools.
- Every year the program “Parque Escolar” is held In the Azores. It is a set of activities in the a class-room context with field trips to protected areas, with biodiversity, geodiversity, waste prevention, climate change and good practices of environmental citizenship as main themes.

- The portal “Sentir e Interpretar o Ambiente dos Açores - SIARAM” (to feel and interpret the environment of the Azores), created in the International Year of Biodiversity (2010), is regularly updated. Its content (multimedia, texts, videos, photos and audio, with testimonials from researchers from the University of the Azores and other experts) can be freely used for educational, non-commercial purposes.
- “Na minha ilha” (in my island) is a service provided by the government of the Azores in its website, through which any citizen or organization can report environmental crimes/occurrences in the archipelago.
- Long term monitoring programmes of common breeding birds and their habitats are undertaken in Spain (SACRE) and in Portugal (CAC - Common Bird Census), including in the Canary Islands, Azores and Madeira. The Census, carried out by SPEA and SEO (NGOs associated to Birdlife International) and integrated into the Pan-European Common Bird Monitoring Scheme (PECBMS), is supported by volunteer counters that take part in the surveys.
- Other census of birds (e.g. *Buteo buteo* rothschildi in the Azores and *Buteo buteo harterti* in Madeira) and of bats (Azores) are carried out in the region, gathering volunteers among the local population.
- *SOS Cagarro*: a government-led campaign carried out annually since 1995, with the objective of involving the public in saving the Cory’s shearwater (*Calonectris borealis*) juveniles when flying from the nest in Autumn and are disoriented by human activities, namely by urban public lights. Activities developed within the initiative include the: i) development of several activities in schools and libraries aiming at environmental awareness and education; ii) organization of evening rescue brigades to collect juvenile shearwaters in danger and to release them in the next morning; iii) development of joint actions with the police and scouts to raise drivers awareness; iv) development of promotional and educational materials to be distributed to the people engaged in the campaign (volunteers, etc.)

Research Institutions and Universities

All the Macaronesian archipelagos have established over the last decades research centres associated to universities and departments within the governments covering the most important areas of biodiversity. These research institutions provide an immeasurable service to biodiversity conservation in the region, namely with the baseline data, necessary to the designation of protected areas, development of legal regulations, as well as to specific conservation actions.

The main research centres and groups that are partially or fully involved in training and research activities related to biodiversity conservation are listed on Table 33. These research groups are only partially responsible for the scientific research in the region, since there are a number of public/governmental institutions and departments undertaking an important work in this field in all the archipelagos.

Table 33. Main research centres in Macaronesia

Institution	Description
Azores	
IMAR-DOP/UAç Department of Oceanography and Fisheries of the university of the Azores	Dedicated to the scientific knowledge and conservation of the marine life of the Atlantic Ocean in the Azores. Created in 1976, it participates since 1999 in the research network IMAR- Sea Institute, of which the University of the Azores is a founding member.
CITA-A (Research for Agricultural Technologies of the Azores)	Multidisciplinary research unit and service in the field of agricultural sciences and the environment, supported by the Foundation for Science and Technology (Portuguese Ministry of Science and Technology) and by the Azores Regional Government.
Azorean Biodiversity Group	Previously integrated in CITA-A, belongs now to the Centre for Ecology, Evolution and environmental change (cE3c), based in Lisbon. It undertakes research on ecological and evolutionary processes on oceanic islands, as well as in environmental risk assessment and pest control.
CIBIO Azores - Research Centre in Biodiversity and Genetic Resources, InBIO Associate Laboratory	Associated to CIBIO/University of Oporto and to the University of the Azores, it is a Research Unit in biological sciences conducting basic and applied research on the three main components of biodiversity: genes, species and ecosystems.
CIBIO Madeira - Research Centre in Biodiversity and Genetic Resources, InBIO Associate Laboratory	CIBIO Madeira Hub. Research Unit in biological sciences conducting basic and applied research on the three main components of biodiversity: genes, species and ecosystems.
Madeira	
OOM - Oceanic Observatory *of* Madeira	Research in Biodiversity, Fisheries and Aquaculture; Remote marine Animal Detection and Remote Sensing; Meteo-Oceanographic modelling and forecasting systems.
Banco de Germoplasma ISOPlexis	Research unit at the University of Madeira, developing fundamental and/or applied studies in the field of Genetic Resources and Biotechnology (in particular the study of agro-biodiversity, genetic resources and agrosystems).
CIIMAR - MADEIRA	Private, non-profit organization specialized on insular environments, which is currently involved in the development of fundamental and applied scientific research, both in atmospheric and marine sciences.
Canary Islands	
PLOCAN - Oceanic Platform of the Canary Islands	A multipurpose technical-scientific service infrastructure that provides support for research, technological development and innovation in the marine and maritime sectors, available to public and private users.

Institution	Description
BIOECOMAC - Biodiversity, marine ecology and conservation	A research unit of the University of la Laguna dedicated to research on animal and plant biology and ecology; fundamental and systems biology; livestock and fisheries.
University of La Laguna - Department of Plant Biology	Integrates various research groups, of which, Terrestrial non-vascular biota; Marine botany; Canarian flora and vegetation; Applied Plant Biology Group (GBVa); Systematics, biogeography and evolution of arthropods of the Canary Islands.
University of La Laguna, Department of Animal Biology, Soil Science and Geology	Research unit of the University of La Laguna dedicated to biology, soil science and geology.
Island Ecology and Biogeography Research Group	Research unit of the University of La Laguna dedicated to island ecology; island biogeography; paleoecology; forest dynamics; ecological restoration.
EIGI - Interuniversity Research Group on Invasive Species	Unit research of University of la Laguna dedicated to the ecology and distribution of invasive species.
IPNA-CSIC - Island Ecology and Evolution Research Group	Scientific research on the fields of ecology, evolution, biogeography and conservation biology of animals and plants on oceanic islands.
BIOGES – Research Centre on Biodiversity and Environmental Management	Research unit of the University of Las Palmas of Gran Canaria comprised by the research groups of Environmental Chemical Analysis, Environmental Quality and Biodiversity and Conservation. Research covers, among others, Systematics and Ecology of Marine Plant; Biodiversity Conservation; Paleoclimatology and Palaeontology of the Canary Islands; Management of Coastal Biological Resources; Fisheries and Fish Ethology.
IU-EcoAqua - University Research Institute on Sustainable Aquaculture and Marine Ecosystems	As part of the ERA Chair program, it integrates researchers in the Universidad de Las Palmas de Gran Canaria (ULPGC) to foster research excellence in Sustainable Aquaculture under an Ecosystem Approach.
BEA - Spanish Bank of Algae	It is a service of the Scientific and Technological Park Foundation of the University of Las Palmas de Gran Canaria (ULPGC), which aims at the identification, characterization, conservation and provisioning of microalgae and cyanobacteria.

8. THREATS AND PRESSURES ON BIODIVERSITY

Overview

Humans played a determining role in the present status of biodiversity conservation in Macaronesia. Following the human settlement of the islands (first millennium BC in the Canary Islands and XVth century in Madeira and Azores), the introduced animals (there were no mammals in the islands, with the exception of bats) and the agricultural and forestry practices (including the use of fire) caused marked decreases in the native habitats and species. A recent palaeoecological study in Flores and Pico Islands (Azores) demonstrated that there were widespread and persistent vegetation changes during the last 600 years of human occupation, which surpass the impact of Pleistocene climatic changes (Connor et al., 2012).

Direct destruction of habitats, over-exploitation of resources and the introduction of exotic species have been appointed as the main threats to biodiversity and causes of species extinctions (e.g. Illera et al., 2012; Petit & Prudent, 2010; J.C. Rando et al., 2014; J.C. Rando et al., 2012). Causes of habitat degradation, and in extreme cases of total loss, are of various kinds, such as the development of infrastructures, changes in land use, agricultural practises, urban development and pollution, among others. In the marine environment, main threats to biodiversity are associated to fisheries practices (e.g. bottom-set longline, by-catch), fast-growing tourism, shipping, pollution, and climate change.

As a result of cumulative threats over the years, the native laurel forest in Macaronesia occupies presently only 12.5% of its primitive range (Table 34), having been nearly wiped out from the Azores and the Canaries. In the Azores, the primitive forest is presently restricted to small, fragmented patches on the summits of four islands, but some of the endemic species that composed it or lived within it can be found in other habitats as well. However, it has been pointed out that there may be an extinction debt: it has been estimated, e.g., that more than half of the extant forest arthropod species might eventually be driven to extinction (K.A. Triantis et al., 2010); due to forest fragmentation, the area of the remaining forest patches may not be enough for long-term species persistence.

Table 34. Potential (i.e. pre-settlement) and present distribution of the Macaronesian laurel forest

	Potential area (10^3 ha)	Present area (10^3 ha)	Potential (%)
Azores	200	6	3
Canary Islands	105	19	18
Madeira	60	15	25
Total Macaronesia	365	40	12.5

(Source: Fernández-Palacios et al. (2011))

The preservation in Madeira of the largest extension of laurel forest in Macaronesia can be credited to the mostly inaccessible mountain systems that cover a large proportion of the island. In the more accessible areas many sensitive habitats were severely altered, leading to the extinction of species. This occurred, for instance, in humid habitats of Southern Madeira (where

Rupia maritima disappeared from brackish habitats and *Osmundia regalis* and *Dracunculus canariensis* vanished with the artificialization of riparian habitats).

In the Canary Islands, it is estimated that that forests once covered 291,251 ha (39% of the islands' surface) (M.-J. d. A. Aguilar, González-González, Garzón-Machado, & Pizarro-Hernández, 2010). Today they have been reduced to 36% of that former extent (14% of the islands' surface - 11% natural and 3% plantations). Thermo-sclerophyllous forest with a persistence of 8%, and laurisilva of 11.8%, are the most reduced. Pine woodland, with 54% of persistence, is the best conserved and most favoured by reforestation.

Vertebrates have been among the first to be unable to cope with the combined pressure of predation and competition from introduced species. In the Canary Islands evidence suggests that at least one species of giant rat (*Canariomys bravoi*), one species of giant lizard (*Gallotia goliath*), and two birds, the Canarian quail (*Coturnix gomerae*) and the shearwater (*Puffinus olsoni*), all endemic, were extinct in the pre-Hispanic period (Francisco-Ortega et al., 2010). Since the arrival of the Europeans, at least two further endemic vertebrate species went extinct, the lava mouse (*Malpaisomys insularis*) and an oystercatcher, *Haematopus meadewaldoi*. The lava mouse is known only from fossil remains but the shorebird was last recorded in 1913 and is believed to have been extinct as recently as the 1940s. Two additional native vertebrate species, the red kite (*Milvus milvus*) and the Mediterranean monk seal (*Monachus monachus*) have totally disappeared from the Canaries, further impoverishing the archipelago's biodiversity.

In the other Macaronesian archipelagos, six flightless bird species are confirmed to be extinct in the Azores, namely one *Otus* species (J.C. Rando et al., 2013) and five Rallus species (Alcover, Pieper, Pereira, & Rando, 2015), and at least one endemic subspecies of bird (*Columba palumbus madeirensis*) have become extinct in Madeira since the arrival of European colonizers 500 years ago (P. Oliveira & Menezes, 2004).

Table 35. Extinct taxa in the Canary Islands

Group	Species
Birds	*Carduelis triasi* Alcover & Florit, 1987 *Coturnix gomerae* Jaume, McMinn & Alcover, 1993 *Emberiza alcoveri* Rando, López & Seguí, 1999 *Haematopus meadewaldoi* Bannerman, 1913 *Phylloscopus canariensis exsul* Hartert, 1907 *Puffinus holeae* Walker, Wragg & Harrison, 1990 *Puffinus olsoni* McMinn, Jaume & Alcover, 1990 *Pyrrhocorax graculus* Linnaeus, 1766 *Saxicola dacotiae murielae* Bannerman, 1913
Mammals	*Canariomys bravoi* Crusafont-Pairo & F. Petter *Canariomys tamarani* López-Martínez & López-Jurado, 1987 *Malpaisomys insularis* Hutterer, López-Martínez & Michaux, 1988
Molluscs	*Canariella pontelira* Hutterer, 1994 *Hemicycla semitecta* (Mousson, 1872)
Reptiles	*Gallotia simonyi auaritae* Mateo, García-Márquez, López-Jurado & Barahona, 2001 *Gallotia goliath* (Mertens, 1942) *Geochelone burchardi* (Ahl, 1925) *Geochelone vulcanica* López-Jurado & Mateo, 1993

(Source: Arechavaleta et al. (2010)

Among plants, some Canarian species are considered recently extinct in the wild - *Solanum nava* and *Kunkelliela psilotoclada* - while others haven't been found in a long time and are also possibly extinct - *Viola plantaginea* and *Helianthemum cirae* (Francisco-Ortega et al., 2010)

Several invertebrate species have equally been recorded as extinct. In Madeira, fossil records show that at least nine terrestrial molluscs, disappeared in the last 600 years since human colonization (Goodfriend, Cameron, & Cook, 1994). One of them is the large *Pseudocampylaea lowii* extinct since the XIXth century (Cameron & Cook, 1992; Goodfriend et al., 1994). Possible recent extinctions include species as the *Leiostyla cassida* and *L. cassidula*, probably decimated by the fire on Madeira's central mountain massif in 2010 (Dinarte Teixeira, pers. com.).

In addition to extinctions, impacts of cumulative anthropogenic threats are also illustrated by available information on the current number of endangered species. As seen in Chapter 0, there are 650 threatened species in Macaronesia identified in the present Ecosystem Profile (Table 15). This number includes 553 globally threatened species and other 97 restricted-range species that are listed as threatened in sub-global Red Lists. While plants and molluscs account for the majority of threatened taxa (378 and 120 taxa, respectively), vertebrates have the highest proportion of threatened species in relation to the total number of existing species (Figure 33).

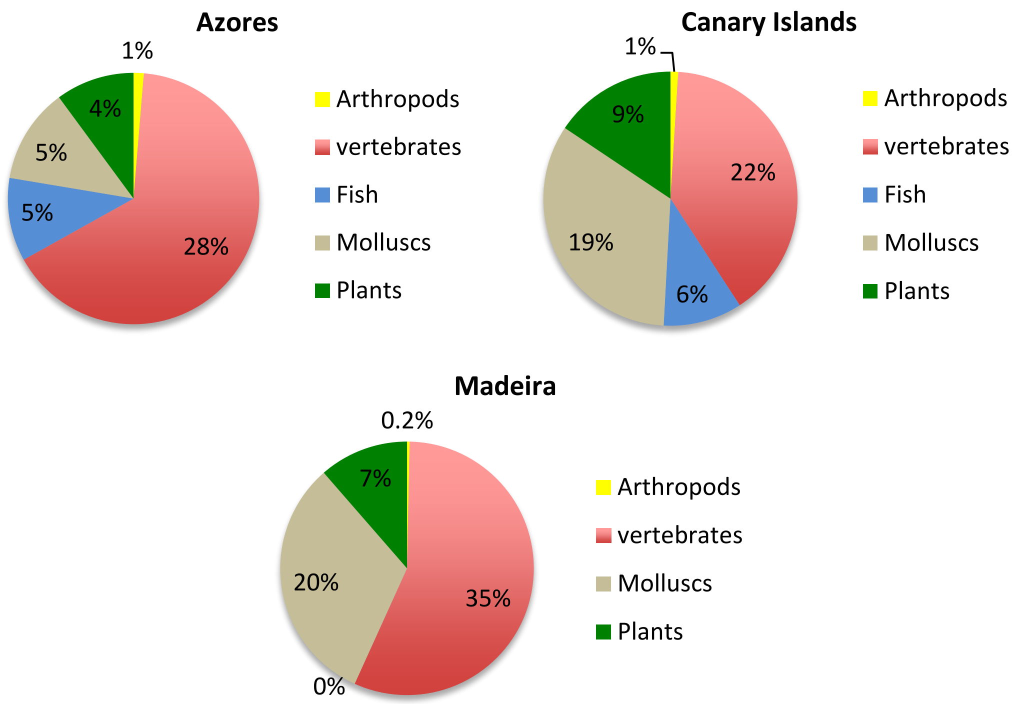


Figure 33. Percentage of threatened taxa in Macaronesia
(data from Tables Table **7**, Table 13 and Table 15)

Overexploitation of natural resources

Over-exploitation of the forests for wood has had a major impact on the Macaronesian ecosystems. Just about all the thermophilous forests and a large section of the Laurel forest have been lost to massive deforestation since the colonization of the islands.

Predation of species for human use has also impacted biodiversity. Marine birds were extremely abundant on the islands, due to the absence of terrestrial predators. Chronicles from the early colonizers mention egg collection (up to 500 tern eggs in one single event on a particular islet) and report how “bags full” of birds were killed with sticks for their oil and feathers. However, since human colonization, several bird species suffered a sudden decrease in population size due to their use as food and oil source for human consumption, as well as to the introduction of predators and the destruction of their habitat. The particular case of *Hydrobates monteiroi* is illustrative: this small ground nesting bird, endemic to the Azores, is reported to have been killed nightly by the thousands in the XVth century. It is now restricted to a population of about 300 pairs nesting only on two islets off the island of Graciosa (Bolton et al., 2008).

Another example of historical over-exploitation is that of the *Monachus monachus*. The species was reported as abundant at the time of the arrival of the first Europeans but has been exploited for its pelt and oil (M. Machado, 1979) nearly to the verge of its extinction in the region. Today, the population of the monk seal is eradicated from the Azores and Canary Islands and is restricted to the Desertas Islands of Madeira.

In more recent decades, fishing has caused the decline in major stocks of fish and shellfish, with impacts on their respective ecosystems. In the Azores, the species that inhabit the rocky coast, dominant in the Azorean littoral, are subject to any form of exploitation mainly because of their economic value (Martín et al., 2008). Among these, are species whose biology is known

(*Patella spp.*; *Scyllarides latus; Megabalanus azoricus*) as well as those whose ignorance of biology coupled with low population numbers and/or scattered populations greatly increase the risk, already high, of its disappearance. In the early 1980's, for instance, limpet fishing in the Azores went from a centuries-old self-consumption or door-to-door bartering activity to become the fifth or sixth most important commercial resource (R. Santos, Hawkins, Monteiro, Alves, & Isidro, 1995). Bowing to the huge fishing pressure, the stocks collapsed before the end of the decade, forcing a ban on fishing and the implementation of extensive regulation. In some islands, the stocks have never recovered (Ferraz, Menezes, & Santos, 2001).

Severe overfishing is also appointed as the main contribution to the creation of wide barren areas where complex and productive algal communities previously existed (Alves, 2001). Researchers have concluded that this transformation is caused by the reduction of fish predators by intense fishing, leading to an urchin population outbreak with serious consequences to the benthic community. This situation is well illustrated in the south coast of Madeira by the wide areas deprived of the typical macro algae which characterize the temperate rocky reefs of the Madeira littoral (Alves, 2001), and it has been linked to the overabundance of the *Diadema antillarum* sea-urchin. In the Caribbean, this urchin is beneficial because it prevents algal growth over the coral reefs. In temperate reefs, however, macro algal are a key biological element, and so-called "urchin barrens" have a negative impact on marine coastal biodiversity. Studies done in the Canaries (Tuya, 2004), where this phenomenon also occurs, suggest that the intensive fishing of parrot fish, known sea-urchin predators, is a causing factor of the sea-urchin barrens.

Invasive Alien Species (IAS)

Recent studies have shown that Macaronesia has considerable problems with alien species, particularly those considered as invasive, which threaten local taxa with foreign diseases, hybridization risks, competition and predatory effects. Several of the introduced species present in the Macaronesian archipelagos are even listed in the "100 worst invasive species of the world" (www.issg.org, e.g. *Hedychium gardnerianum; Linepithema humile; Rattus rattus; Felis catus; Capra hircus; Oryctolagus cuniculus*).

An assessment of the worst invasive species of Macaronesia was recently published (L. Silva, Ojeda-Land, & Rodríguez-Luengo, 2008). The authors analysed biological invasions in the European Macaronesia, including fauna and flora, and defined the top 100 invasive alien species (IAS) with management priority. The TOP 100 IAS, are mainly vascular plants, together with some invertebrate and vertebrate species (Figure 34).

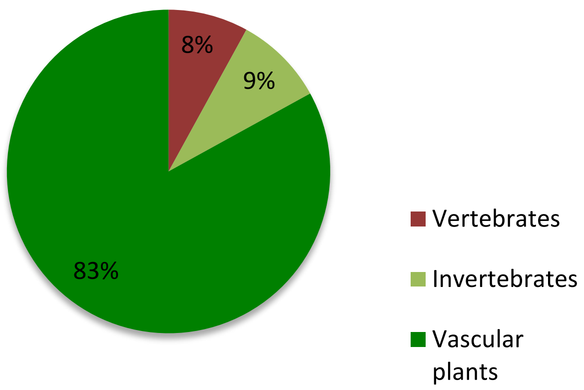


Figure 34. Taxonomic characterization of the Top 100 IAS in Macaronesia.
(Source: L. Silva et al. (2008)

The main conclusions from the “TOP 100 Invasive species in Macaronesia” can be summarized as follows.

Impacts:

- The large majority of the top IAS is expanding in different archipelagos and 83% still has the potential to further expand their distribution (i.e. they are not at equilibrium).
- The majority of the top IAS affects endemic, non-endangered species. However, more than one third affects endangered species.
- The large majority of the IAS affected high priority or listed habitats in the Habitats Directive.
- 95% of the top IAS affects legally protected areas with a high conservation value.

Control:

- It is difficult or impossible to control 42% of the top IAS with the presently available human and technical resources.
- The control of the large majority of the top IAS was considered to demand medium to long duration projects.
- The control of the large majority of the top IAS will demand specific projects requiring moderate to large financial investment.

Although invasive alien species (IAS) are important in all the Macaronesian archipelagos, knowledge and its laws differ among sub-regions and between different taxonomic groups. For example, in Madeira only 28% of arthropods are considered as exotic (Borges et al., 2008). This is in agreement with the pattern observed in the Canary Islands (I. Izquierdo, Martín, Zurita, & Arechavaleta, 2001), but contrasts with the results for the Azores archipelago, where exotic taxa dominate (58%) (Borges, Cunha, Gabriel, Martins, Silva, et al., 2005).

Azores

For the Azores, the introduction of many species, some of them cosmopolitan and others with an invasive potential, is related to the fact that, for centuries, the Azores have been (and still are) a strategic gateway for many boats coming from the Americas to Europe and vice-versa. Additionally, the Portuguese brought plants, often with associated fauna, from all over the world to their private gardens, particularly in the most populated islands. Today, the number of exotic species per square km is one or two times the number of indigenous species (L. Silva et al., 2008). Approximately 70% of the vascular plants and 58% of the arthropods found in the archipelago are exotic (Borges et al., 2009), and all the mammals (except the Azorean bats), amphibians and reptiles are introduced (L. Silva et al., 2008).

The impact of introduced species for agriculture, forestry, and aesthetic purposes – in particular, invasive vascular plants, which are disrupting native plant communities with unknown consequences for overall native biodiversity – can have dramatic consequences. A negative impact on the indigenous community of phytophagous insects is expected, as well as changes in vegetation structure, difficulties in the regeneration of endemic species, and competition for dispersal agents, leading to a reduction in the frequency and abundance of indigenous plant taxa (Borges et al., 2009).

The continuous expansion of some invasive plants like kahili ginger (*Hedychium gardnerianum*), sweet Pittosporum (*Pittosporum undulatum*) and *Hydrangea macrophylla*, is threatening several fragments of native vegetation, leading to the prediction that several communities of lichens, vascular plants, molluscs, and arthropods native and endemic to the Azores are under pressure (L. Silva et al., 2008).

Introduced fauna also poses an important threat to native species. The main islands were once important breeding places for seabirds, but now most sites are restricted to small islets or precipitous cliffs, probably due to predation by introduced mammals (Monteiro, 1999). Herbivory caused by wild goats is virtually eradicated, but the impact of rabbits in the native flora is considered important.

Furthermore, several exotic arthropods are considered as pests in the Azores, namely the Japanese beetle (*Popillia japonica*) which attacks pastureland and other crops, and is now expanding in several islands (Terceira, Faial and São Miguel); the armyworm (*Pseudaletia unipuncta*) in pastureland areas in several islands where it causes heavy annual damage in agriculture; the termites in urban areas, in particular Cryptotermes brevis, considered as the most dangerous dry wood termite in the world and that is presently considered as an urban pest in the cities of Angra do Heroísmo, Ponta Delgada and Horta (Borges & Myles, 2007).

Madeira

In the archipelago of Madeira there are 430 species and subspecies of plants considered as naturalized, representing 35.7% of the vascular flora (R. Jardim & Sequeira, 2008). Invasive species constitute an important threat, mainly at the lowest altitudes of laurisilva distribution, where species of Acacia, He*dychium gardnerianum* and *Pittosporum undulatum*, *Ailanthus altissima*, and *Acer pseudoplatanus* are widely distributed. These species also prevent the natural expansion of laurisilva on abandoned rural land. Higher regions are equally under pressure by other species such as Ageratina and Erigeron.

Among vertebrates, all the terrestrial mammals were introduced, with the exception of five species of indigenous bats (P. Oliveira, 2008). Among those, there are three rodent species (*Rattus rattus, R. norvegicus and Mus musculus*), two species of herbivores (*Oryctolagus* *cuniculus and Capra hircus*) and one felid (*Felis silvestris catus*) (P. Oliveira, 2008). The amphibians and reptiles are modestly represented, the indigenous taxa with a higher number of species than the introduced. The only species deserving attention are the frog (*Rana perezi*), due to its abundance and wide distribution and the geko (*Tarentola mauritanica*), the distribution area of which is in continuous expansion (J. Jesus, 2008).

Species like the black rat and the domestic cat (*Felis silvestris catus*) are known to have a strong negative impact on populations of native birds, which in turn are the main vectors for dispersal of seeds in the laurel forest. Seabirds and indigenous predators evolve a natural coexistence with indigenous predators, but introduced predators can cause severe reduction and even extinction of seabird populations.

The introduction of rabbit (*Oryctolagus cuniculus*) to Porto Santo in the Madeira archipelago caused a degradation of the natural vegetation, a situation that has remained due to continued grazing by both rabbits and livestock. Overgrazing by rabbits and livestock has also lead to severe regression of the endemic flora on Desertas and Salvages, which in turn has caused erosion of the coastline.

Canary Islands

In the Canaries, about 11% the terrestrial biota corresponds to alien species (Martín-Esquivel, M.C. Marrero, N. Zurita, M. Arechavaleta, & I. Izquierdo, 2005). The large majority of these species was introduced beginning in the 1960's; 43% of which have been recorded during the last three decades. Alien species of Canaries, invasive or not, are represented by 47% of invertebrates, about 46% of vascular plants, 4% of fungi and about 3% of vertebrates (Martín-Esquivel et al., 2005). The middle-oriental islands include the largest proportion of alien species, particularly Gran Canaria, where they represent 15.5% of the island biota. However the largest number of introduced species is found in Tenerife. Among those species, at least 151 are considered as invasive, of which 79 are phanerogmes, one is a fern, 45 are arthropods, and there are also three amphibians, one reptile, 10 birds and 12 mammals.

According to Nogales, Rodríguez Luengo, and Marrero (2006), within the IAS in the Canaries the negative effect originated by mammals should be emphasised, particularly that associated to the feral cat (*Felis silvestris catus*) and to alien herbivores like the mouflon (*Ovis aries*), Barbary sheep (*Ammotragus lervia*) and the rabbit (*Oryctolagus cuniculus*). The feral cat figures among the main factors threatening the survival of the giant lizards from El Hierro (*Gallotia simonyi*), La Gomera (*G. bravoana*) and Tenerife (*G. intermedia*), and its dramatic effects on the bird populations are well known. The above mentioned alien herbivores in conjunction with the effect of uncontrolled domestic sheep and goats are affecting the support, photosynthetic and reproductive parts of the native vegetation and disrupting the native seed dispersal systems (Martín et al., 2008).

The rodents introduced with the European settlers are credited with predation on seabirds and other animal species. *Rattus rattus*, in particular, may have been responsible for the extirpation of many seabird populations, even the extinction of the lava shearwater, *Puffinus olsoni* (J.C. Rando & Alcover, 2008). The voracious species is also adapted to climb trees and feed on wild fruits from native vegetation.

In addition to introduced mammals, the Barbary ground squirrel (*Atlantoxerus getulus*) has decimated numerous plant species on the island of Fuerteventura, and the growing colonies of very aggressive Argentine ant (*Linepithema humile*) are pushing out indigenous ants and other insects from their habitats (Petit & Prudent, 2010). Some other recent introductions originated some social alarm, namely the recent naturalization of a species of snake (*Lampropeltis getula*) in Gran Canaria.

Introduced plants also pose threats to the natural habitats. It is estimated that over 400 species introduced by humans (approximately 32% of the flora) are currently established and naturalized in the Canarian ecosystems (Francisco-Ortega et al., 2010). Among them, the grass *Pennisetum setaceum* represents one of the most immediate threats to the native vegetation of the lowlands. At higher elevations, the neotropical sunflowers of the genus Ageratina and the spiderwort *Tradescantia fluminensis*, are major concerns in the evergreen forests, while the California poppy, *Eschscholzia californica*, covers large areas of the open dry pine forests. An aggressive invader is a sedge (*Cyperus rotundus*), which has invaded fields and gardens. It spreads through seeds, bulbs and runners and is in banana plantations fought with special herbicides. The wild tobacco (*Nicotiana glauca*), introduced from South America has established well and is now being found even in the driest areas in the Canary Islands.

Urban and tourism development

The Macaronesian region has experienced a significant increase in human population since the beginning of the 20th century, namely in the Canary Islands and, to a less extend, in Madeira (see chapter 0), leading to intense urban development and road construction. In addition, the great expansion of tourism in recent years, especially in coastal areas, raises the question of the sustainability of this trend, especially considering the absence of a tourism sustainability strategy in the medium and long term (PIC-INTERREG IIIB-2000/2006, 2001).

The growing tourism industry of the region, and especially that of the Canary Islands and Madeira (described in chapter 0) has caused dramatic changes to coastal areas. The establishment of hotels, maritime infrastructures and other tourist facilities partly use rich agriculture lands and have pronounced negative impact on natural coastal habitats.

Urban and tourist development has had significant impacts, for example, in the vegetation of the dunes and coastal Tamarix forests of the Canary Islands, which have been destroyed or fragmented, especially after the 1970s (Petit & Prudent, 2010). Similarly, the sclerophyllus woods (thermophilous forest) have seen their surface areas considerably diminished, because of their proximity to human settlements.

Even within protected areas the growth in the numbers of visitors in recent years has led to degradation of vegetation and disturbance of fauna, due to carrying capacities being exceeded. Some groups of animals and plants are known to be particularly vulnerable, notably at breeding sites, such as nesting seabirds, and the iconic Mediterranean Monk Seal (*Monachus monachus*).

In the marine realm, one of the impacts of increasing tourism that has deserved some recent attention is that of the whale watching activity. Many cetacean species are known to inhabit or visit the Macaronesian waters (in the Canary Islands, as much as 30 species; *v*. Faes, in rev.), making the region an important area for cetacean observation.

As a result, whale watching, among other touristic activities, has had a great expansion in the region. However, numerous studies have shown have the activity can be detrimental to the target species due to engine's noise and vibration and direct interference from whale watching boats. Some studies shown that cetaceans exhibit behavioural changes in response to whale-watching boat traffic (e.g. Magalhães et al., 2013). Some of these behavioural changes involve inhibiting biologically important behaviours such as feeding and resting. There is convincing evidence for some species that these can translate into population-level effects such as reduced reproductive rates. The introduction of guidelines or regulations for whale watching has been the most common method of trying to mitigate the impacts of boat-based whale watching. However, there is great variety in the comprehensiveness of guidelines, and even if operators have guidelines, compliance with them can be poor, as it has been reported in the Canary Islands during consultation workshops.

Agriculture and forestry

Agriculture is an important feature of the Macaronesian region. Extensive areas of the Macaronesian islands have over time been deforested and used for agriculture purposes. While in the Canary Islands and in Madeira agriculture has recently been losing ground to the services sector, in the Azores it still remains relevant (see chapter 0). However, agricultural production in the Azores differs substantially from the Canary Islands and Madeira since there, livestock and dairy production is the main activity.

Azores

Agriculture has traditionally accounted for the archipelago's economic activity. The initial intensive conversion to agricultural and grazing land, coupled with the later development of timber (the fast growing Japanese cedar, *Cryptomeria japonica*) production, almost destroyed the laurel forest of the archipelago, which is now restricted to about 5% of the original coverage (Gaspar, Borges, & Gaston, 2008), represented only in small, fragmented patches on the summits of São Miguel, Terceira, Pico and Flores (Fernández-Palacios et al., 2011).

A further negative impact originated from the expansion of dairy farms, which became the main economic activity in the Azores especially after Portugal's entry into the European Union in 1986 and subsequent availability of agricultural subsidies, grants, and quotas for which it is eligible. Aided by subsidies from the Common Agriculture Policy, large areas of pastures became the predominant land use (Figure 35), accounting on average for 42% of each island area (Rego et al., 2015), creating “green deserts” of low biodiversity.

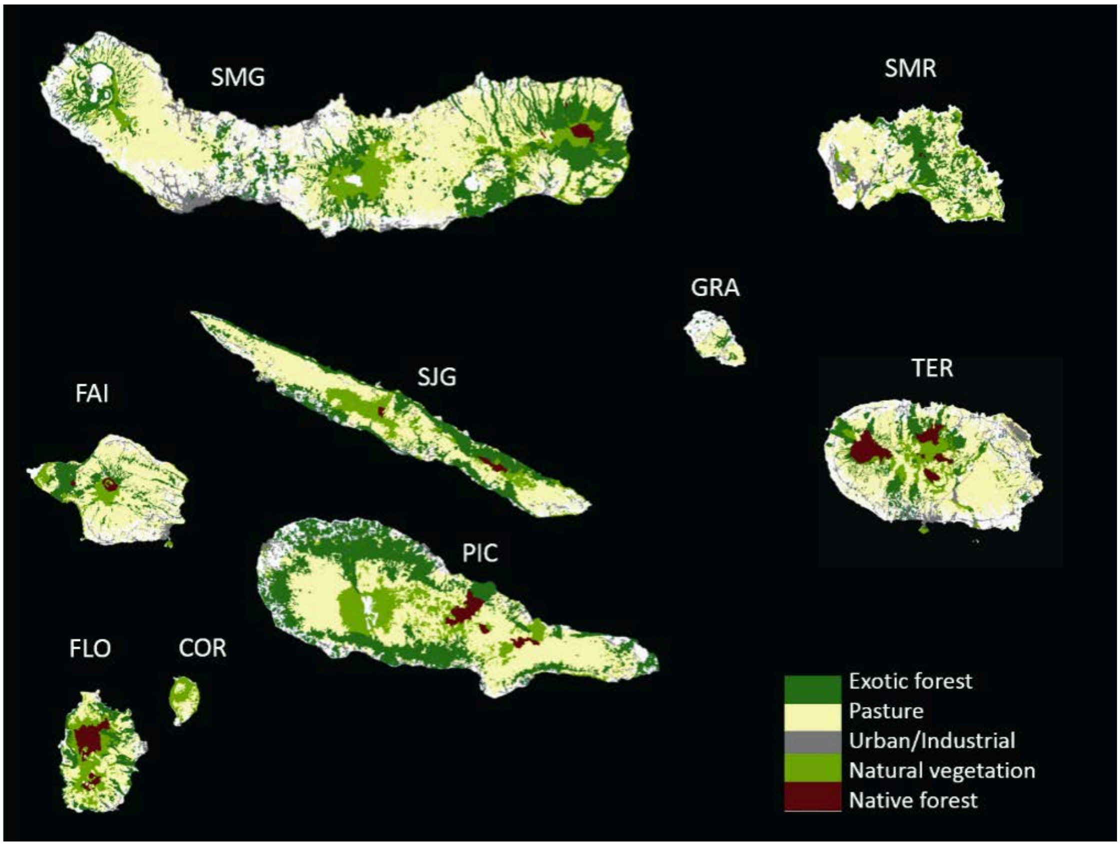


Figure 35. Land use in the Azores
(Source: Rego et al. (2015); maps drawn by Enésima Mendonça)

In some cases, the areas surrounding pastures are also vulnerable to grazing due to the lack of fences. This is the case, for example, of the "Cabeços" on Pico Island.

Additionally, the associated increase in fertilizer use and chemical applications compromise freshwater quality, leading to serious eutrophication problems in freshwater lakes, even affecting the water supply. Further, pesticide use, either in agricultural pest control, or to control livestock parasites (e.g. anthelmintics) contributes to reduce insect diversity and abundance. This is, moreover, one of the threats often associated with the conservation of bats (Rainho et al., 2002). Pesticides, in addition to decreasing the diversity and abundance of prey, can poison bats that eat contaminated insects.

There are, however, ways to reconcile agricultural practices with biodiversity conservations: the semi-natural pastures of mid and high altitude of some islands, for instance, allow the co-existence of endemic plant species and their associated invertebrate fauna (Borges et al., 2004).

Madeira

Most of the forest of Madeira has during the last 500 years, since its colonization, been destroyed through exploitation for agricultural purposes, ship-building, hydric resource exploitation and forestry management. The intensive sugar cane cultivation that took place until the XVII century, in particular, placed an enormous burden on the native forests because of the wood needed as fuel for boiling the cane juice. The ensuing deforestation, linked to the steep orography and the occurrence of flash rains, led to frequent mass floods, particularly serious in the XIX century: the worst disaster, the 1803 flood, killed hundreds of persons (Quintal, 2013).

More recently, the 2010 Madeira floods and mudslides resulted in the death of at least 42 people and damages were estimated at over € 1 billion (European Commission, 2010).

The native lowland vegetation and dry laurisilva are almost completely replaced by terraced agriculture, forest plantation of Acacia ssp. and Eucalyptus sp., as well as by urban development. Only the mountain slopes on the northern side of Madeira still retain areas of humid Laurisilva (Wakeham-Dawson, Aguiar, & Martin, 2002).

In high altitudinal areas of Madeira, intense unregulated grazing in areas spanning from the Ericaceous forest and thickets to the high mountain habitat resulted in degradation of vegetation and habitats in several areas (Sim-Sim et al., 2014). Restrictions beginning in the early XIXth century and culminating in a recent total ban give hope of restricting the degradation trend. However, as anthropogenic activity increased, fire and habitat fragmentation became more frequent with a clear cumulative impact on natural vegetation integrity, especially if we consider the island's relatively small size.

Canary Islands

More than 50% of the Canary Islands' area has over time been used for agriculture purposes (EEA, 2002). Sugar cane was the main cash crop of the islands during the fifteen and sixteenth centuries, causing a very negative effect on the dry and humid evergreen forests. In addition, the forests were severely exploited for timber, pitch and torch poles. Vast areas of indigenous forest have also been transformed to managed forest due to the use of young timber in banana plantations and by the plantation of California pine (*Pinus radiata*). Of special importance is also the cultivation of olive trees (*Olea* spp.) which form open woodlands on high south-facing slopes.

Accidentally and intentionally set for livestock grazing, crop planting, timber and real estate speculation, fires have also dramatically reduced forests in the last decades.

Marine traffic and ship-strikes

Intensive marine traffic causes serious injuries and mortalities in cetacean populations. Although ship-strikes are also of concern in the other Macaronesian archipelagos, it is considered a major threat in the Canary Islands.

The Canary Islands, known for their extraordinarily high cetacean species diversity, have witnessed a rapid expansion in fast and high speed ferry traffic during the past few years, which today are almost the only means to travel between the islands at sea. Ferries, fast ferries (travelling at approx. 25 knots), high speed ferries (HSC, reaching maximum velocities of 40 knots, including the largest ferry trimaran in the world) travel every year 1.48 million kilometres in Canary Island waters, often in areas with high density of cetaceans (R. Aguilar et al., 2009). The large catamarans are so called wave-piercing vessels and strongly dominate the inter-island traffic in the Canaries today.

According to R. Aguilar et al. (2009), the areas considered of high risk are:

- the channel between Tenerife and La Gomera, where 8,944 transects occur annually;
- the waters south and southwest of La Gomera with 2,184 transects/year;
- the channel between Tenerife and Gran Canaria with 6,760 transects/year;
- the area between Lanzarote and Fuerteventura with 9,568 transects/year.

It is also of concern the traffic around Santa Cruz de La Palma, with 1,352 transects/year; and the area of Valverde (El Hierro), with 1,040 transects/year.

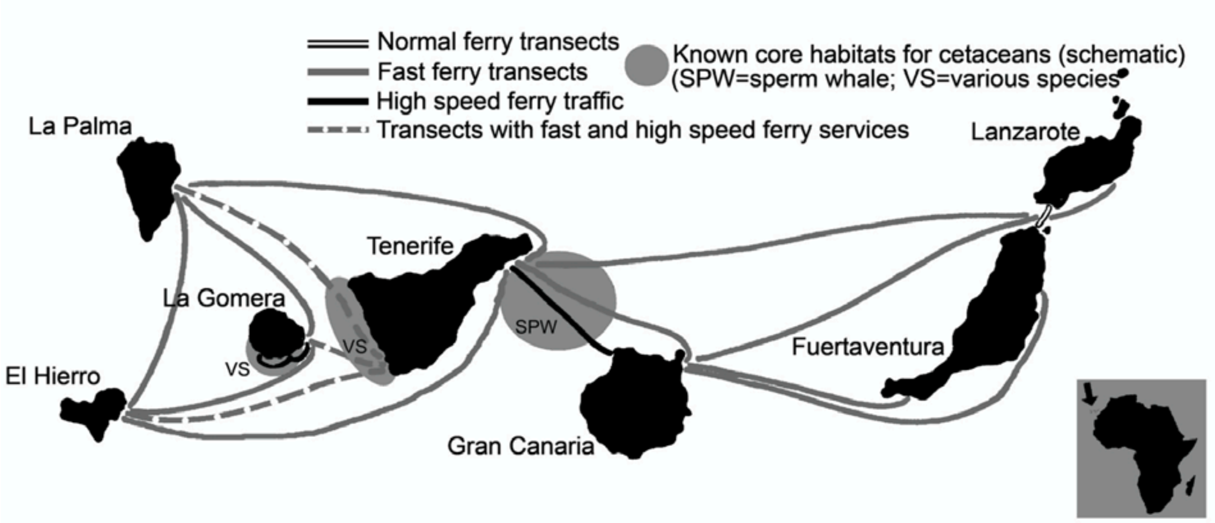


Figure 36. Ferry transects in the Canary Islands in 2007
(Source: Carrillo & Ritter, 2010)

During the period 1991-2007 a total of 59 strandings, from eight different cetacean species, were reported as showing signs of ship-strike in the Canary Islands (Carrillo & Ritter, 2010). Sperm whales comprise the majority of these stranding records: since 1999 an average of two sperm whales strand peras year with signs of ship-strike (Carrillo & Ritter, 2010), which makes the archipelago one with the highest reported rates of sperm whale ship-strikes in the world (Fais et al., 2016). But other species have also been affected, e.g., pygmy sperm whales (*Kogia breviceps*), Cuvier's beaked whales (*Ziphius cavirostris*), short-finned pilot whales (*Globicephala macrorhynchus*), fin whales (*Balaenoptera physalus*), Bryde's whales (*B. brydei*) and sei whales (*B. borealis*) (Carrillo & Ritter, 2010).

The occurrence and severity of ship-strikes in the area appears to increase with both the size and speed of vessels. According to Carrillo and Ritter (2010), reports of ship-strike have increased significantly since 1999, when a regular high speed craft service was introduced in the Canaries, therefore likely corresponding with the increase in both the mean speed and the number of ferry journeys.

The mentioned reports comprise ca. 11% of the total number of strandings. However, the true numbers of ship strikes remain largely unknown (Carrillo & Ritter, 2010; Natacha Aguilar, pers. com.). Not only collisions are intentionally not reported by ferry operators, but also many carcases from ship-strikes may pass unnoticed. As pointed out by N. Aguilar (pers. com.), most carcasses come ashore on Tenerife, because the currents and wind favour the stranding of whales that have collided with vessels in the channel Tenerife-Gran Canaria. If the same number of whales had been affected in the channel Tenerife-La Gomera-El Hierro, most carcasses would drift towards the Atlantic and pass unnoticed.

Fisheries by-catch and entanglements in fishing gear

Accidental entanglement in fishing gear currently poses serious threats to the survival of endangered species, namely sharks, the monk seal and marine turtles.

The intensification and expansion of fishing activities throughout the area of Madeira archipelago, and increased deliberate and accidental killings by entanglement, have accelerated the decline of the small surviving monk seal colony in the Desertas Islands of Madeira (Neves & Pires, 1999). Direct killings are related to persecution of competitor for fisheries resources or because the species produce actual and perceived damage to fishing gear. Prior to the establishment of a protected area, the extensive use of gill nets in particular constituted a major threat. A major clean-up operation of abandoned nets, coupled with an initiative to have fishermen convert from net gear to long line seems to have tackled the problem but occasional entanglements still occur.

In addition to pollution (of plastic, in particular), threatened marine turtles also suffer from accidental captures in fishing activities. In the Azores, consulted stakeholders appoint longline fishing as the main fishing threat affecting the species.

Climate change

Climate change is still considered a secondary threat to biodiversity in Macaronesia. The main threat, according consulted stakeholders, remains habitat destruction and fragmentation as a result of economic activities and introduction of IAS. Thus, expected consequences of climate change in the region are described in this section mainly based on literature review.

According to the IPCC the average annual temperature in Macaronesia is set to increase by 2.1°C (1.9 to 2.4) by the end of the century (Petit & Prudent, 2010). In addition, IPCC predictions point to a rise in the sea level of 0.35 metres between until end of the century, which is in line with the predicted global average.

Under the influence of climate change it is likely that the Azores anticyclone will move east during the summer months. This will probably serve to diminish the frequency and intensity of the north-east trade winds. These weaker trade winds may have different effects on the ecosystems of the different islands of Macaronesia. In the case of Madeira Island, it may allow for warmer temperatures to reach higher altitudes, pushing the “sea of clouds” further up. Laurel forest will likely migrate upwards, displacing high altitude vegetation such as Erica spp., and the mountain top vegetation would disappear (F. D. Santos & Aguiar, 2006). In contrast, the weaker trade winds will probably lead to a downward movement of the roof of the “sea of clouds” towards lower altitudes in islands such as Tenerife (Sperling, Washington, & Whittaker, 2004). This will be accompanied by an increase in the number of heat waves in this zone.

In any case, the direct consequence of these climatic changes will be, according to Sperling et al. (2004) a decline in the bio-climatic areas occupied by the laurel forest and as a result, an important reduction in this forest formation. Furthermore, the pine and eucalyptus species, which are also likely to migrate to lower altitudes for similar reasons, will probably encroach on the areas occupied by the Laurel forest. The disappearance of the Laurel forest will not only have dramatic consequences for the associated biodiversity but would also disrupt the hydric balance of the islands and water supplies for human consumption.

In Madeira, other terrestrial habitats considered even more vulnerable to climate change than the Laurisilva are the Central Mountain Massif, Madeira Zambujal and Matagal Marmulan (Cruz et al., 2014)

Likewise, in the Canaries other natural habitats could also be perturbed by a change in the wind direction as well as by the resulting changes in temperature and precipitation (Del Arco, 2008 in Petit & Prudent, 2010):

- The euphorbia shrubs could spread out, while the thermophilous forests will tend to contract. The latter already have a very weak resilience because of their high fragmentation and slow rate of growth.
- The pine forests could be more vulnerable to forest fires, which are likely to be more frequent because of the rise in temperatures and the drop in precipitation. During the summer 2007, a violent fire destroyed close to 35,000 hectares of forest, affecting practically the entire habitat of the Blue chaffinch (*Fringilla teydea*) on Gran Canaria Island.
- The high altitude ecosystems will also suffer the effects of rising temperatures, because they will be unable to migrate to higher altitudes. The subalpine *Bencomia exstipulata* or *Rhamnus integrifolia* for example, are already on the verge of extinction; drought would almost certainly make them disappear definitively.
- At the coastal level, a rise in sea levels could affect the vegetation of the dunes and beaches and bring about major changes in the coastal landscape.
- The change in wind directions might lead to a migration of numerous terrestrial plant species that spread using wind borne seeds. Those that are unable to migrate run the risk of declining. The endemic hydrophile species such as the Canary willow (*Salix canariensis*) or the Canary Island date palm (*Phoenix canariensis*) will be particularly affected.

With regard to species, a recent assessment of vulnerabilities and responses to climate change in Madeira (Cruz et al., 2014) concluded that terrestrial groups with more species identified as vulnerable to climate change were the groups of bryophytes, vascular plants and terrestrial molluscs. The project IMPACTBIO (Implications of Climate Change for Azorean Biodiversity), concluded that in the end of the century, in the two studied islands (S. Miguel and Terceira) vascular plants will have its distribution reduced by 93%, arthropods by 91% and bryophytes by 74% (Elias & Ferreira, 2015).

In addition, the introduction of invasive species and the extension of the spatial distribution of existing invasive species could also be among the major consequences of climate change. In particular, numerous species of African origin could settle in the Canaries, attracted by dryer climatic conditions. The African fountain grass (*Pennisetum setaceum*) for example, a grass that develops on high grounds, is already present in the Canaries, but is currently limited to the arid lands. It could see its area of spatial distribution extended.

Swarms of Pilgrim crickets (locusts) that affect West Africa could become more frequent in the Canary Islands as a result of the strengthening of the south-westerly winds from Africa, which are expected with higher temperatures (European Parliament, 2011b; Petit & Prudent, 2010). In 2004, a swarm of more than 10 million locusts descended on the coasts of Lanzarote.

The desertification of the island of Fuerteventura in the Canaries might have led to the establishment of several species of exotic birds, which were restricted to the Sahara desert region until now. More than 30 species of Saharan birds have already recently been observed for the first time in the archipelago (Petit & Prudent, 2010). A change in the migratory habits of some of Madeira's birds has also been observed recently. For example, a small number of

Pallid swifts (*Apus pallidus*) now spend the entire year in Madeira and no longer migrate towards Africa in the autumn.

In the marine ecosystems, the acidification of the oceans caused by an increase in the level of CO2 in the atmosphere leads to a drop in PH levels with considerable consequences to marine biodiversity. In the Macaronesia, the most vulnerable areas and systems to a rise in temperatures and acidification of the sea water are benthic communities, as the black corals and the populations of Zostera noltii (MAGRAMA, 2014b). Deep water coral reefs (consisting mainly of *Lophelia pertusa*, which develop at depths of 50 metres and are sometimes found as deep as 1,000 metres) are sensitive to the acidification of the oceans since a drop in PH levels reduces the rate of calcification of the corals and puts a brake on their growth and regeneration (Petit & Prudent, 2010). Coldwater corals are particularly threatened, because the depth at which they begin to dissolve (or the aragonite saturation point) could rise by several hundred metres (Doney, 2006).

Marine mammals are also expected to suffer from climate change impacts. The most vulnerable species of cetaceans are, according to Cruz et al. (2014) the Sperm Whale and the Fin Whale, followed by the pilot whale and the bottlenose dolphin.

Additionally, tropical fish species, which usually live further south, have recently been observed for the first time in the Macaronesian waters. Major movements of fish stocks could completely modify the equilibrium of marine food chains and lead to a decline in certain cold-water species that will not be able to migrate to higher latitudes.

In the Azores, the Spined pygmy shark (*Squaliolus laticaudus*) was first spotted in 1998 and the Lesser amberjack (*Seriola fasciata*) in 2006 (A. A. Silva, Duarte, Giga, & Menezes, 1998). These recent sightings could be explained by a change in the spatial distribution of these species brought about by a warming of the waters. Similarly, the establishment and development of the green algae *Caulerpa webbiana*, an invasive species recently detected in the Azores, could be facilitated by rising water temperatures (Cardigos et al., 2006).

In the vicinity of the Canary Islands, the ocean triggerfish (*Canthidermis suflamen*), a warm water fish, was also recently observed as a result of the rise in water temperatures (Petit & Prudent, 2010).

Likewise, in recent years, the occurrence and/or increase in frequency of several warm-water species around Madeira (e.g. crab *Platypodiella picta*, *Aluterus scriptus*, *Aluterus monoceros*, *Abudefduf saxatilis*, *Gnatholepis thompsoni*, *Canthidermis sufflamen*, *Caranx crysosmay*) may also be due to progressive warming of the sea water (Wirtz, Fricke, & Biscoito, 2008).

9. ASSESSMENT OF CURRENT INVESTMENTS

This chapter presents an assessment of recent and current conservation investments in the Macaronesian region. The purpose of this assessment is to assist in identifying funding sources that may be mobilized for the implementation of the regional investment strategy. The analysis of past and current funding will also contribute to define the strategy by identifying funding gaps in themes and sites that are currently funded.

EU financing instruments

Currently, two EU level instruments provide major financial support for conserving biodiversity: the European Regional Development Fund (namely the Interreg programme) and the LIFE programme. Other funding mechanisms relevant to biodiversity include the European Agricultural Fund for Rural Development and the European Fund for Maritime Affairs and Fisheries. However, the overall amount of EU funding that relates directly or indirectly to biodiversity purposes is difficult to assess and quantify (Kettunen, Baldock, Adelle, & al., 2009) and these financial instruments lack a coding system that would allow identifying biodiversity-relevant funding shares (Lung, Meller, Teeffelen, Thuiller, & Cabeza, 2014).

European Regional Development Fund (ERDF) and the Interreg Programme

European Territorial Cooperation (ETC), better known as Interreg, is one of the goals of cohesion policy and provides a framework for the implementation of joint actions and policy exchanges between national, regional and local actors from different Member States. Funded by the European Regional Development Fund (ERDF), it is designed to strengthen economic, social and territorial cohesion in the European Union by promoting cross-border (Interreg A), transnational (Interreg B) and interregional cooperation (Interreg C). Interreg differs from the majority of Cohesion Policy programmes in the way that it involves collaboration among entities of two or more Member States. Interreg measures are not only required to demonstrate a positive impact on the development on either side of the border but their design and implementation must be carried out on a common cross-border basis.

Interreg was launched as Interreg I for the programming period 1989-1993, and continued moving on for following periods. Interreg IV (2007-2013) introduced within its strand B (transnational cooperation) 13 different Operational Programmes, among which the MAC programme - Açores-Madeira-Canarias. MAC 2014-2020 is currently operational, supported by a budget of 130 million euros (85% financed by the ERDF) (ERDF, 2014).

Likewise the Interreg, the MAC programme falls within the framework of the European territorial cooperation objective, and includes among its specific objectives the development of sustainable management plans of natural areas and protected marine areas as well as strategies for the protection of biodiversity and natural resources, mainly of marine resources.

The Programme MAC and its predecessor Interreg III-B have been regarded as successful initiatives integrating the Macaronesia region for biodiversity and climate change related activities, mainly due to the management structures established to facilitate the programme and the substantial funding made available (Cooper, Benzaken, Collin, Renard, & Tyack, 2011).

Some examples of conservation initiatives funded by these INTERREG Funds, are summarized in Table 36.

Table 36. Conservation-related projects funded by INTERREG in the Macaronesian region

Project	Period	Budget (euros)	Beneficiaries
BIOVAL: Valorisation, control and management of marine resources of Macaronesia	2013-2015	Total: 237,883 ERDF: 192,001	University of Las Palmas of Gran Canaria; Canarian Institute of Marine Sciences; Technological Institute of the Canaries; Museum of Natural History of Funchal; Marine Biology Station of Funchal; University of Madeira; University of Cape Verde; University of the Azores
GESMAR: sustainable management of the marine resources	2009-2014	Total: 827,588 ERDF: 703,449	General Fisheries Directorate (Canarian government); *Cabildo* of Gran Canaria; City council of Funchal; Cabildo of Tenerife; University of the Azores; University of Madeira
MaReS: Macaronesia Research Strategy	2009-2013	Total: 549,725 ERDF: 467,266	Oceanic Plataform of the Canaries; Scientific and Techonlogical Hub of Madeira; Regional Fund for Science and Technology (FRCT, Açores)
BIOCLIMAC: Biotechnology and plant conservation in the face of climate change	2009-2013	Total: 650,301 ERDF: 552,756	Canarian Botanic Garden "Viera y Clavijo"; Association for the Local Development of the Azores islands; Regional Secretariat of Environment and Natural Resources of Madeira (Botanic Garden of Madeira)
DEMIURGO: Population genetic information banks and meta-analysis of the Macaronesian Flora	2009-2012	Total: 814,378 ERDF: 692,221	GRAFCAN; Regional Secretariat of Science, Technology and Equipment (Azores); several city councils of the Canary Islands and of the Azores
MACETUS: Study of the population structure, distribution, movements and habitat use of *Physeter macrocephalus, Globicephala macrorhynchus, Tursiops truncatus* and *Stenella frontalis* in the Macaronesian Region	2003-2006	Total: €470,588 ERDF: 311,629	

Also within the INTERREG VB, the Atlantic Area Programme 2014-2020 covers now an expanded area compared to the previous Programme (2007-2013) due to the inclusion of the three Macaronesian archipelagos. It supports transnational cooperation projects in 38 regions of five Atlantic countries: France, Ireland, Portugal, Spain and the United Kingdom, contributing to the achievement of economic, social and territorial cohesion. With a total budget of €185M, which comprises a fund allocation above EUR 140 million from the ERDF (European Commission, 2014a), the Programme aims to implement solutions to answer to regional challenges in the fields of Innovation & competitiveness; resource efficiency; territorial risks management; biodiversity and natural & cultural assets (€ 39,484 M). An annual call for projects will be organised from 2016 to 2020.

In the case of the Canary Islands, financing of the Ministry of Agriculture, Food and Environment in Natura 2000 under the ERDF in the period 2009-2012 accounted for €5.9 million (MAGRAMA, 2014a).

LIFE Programme

Several conservation projects in Macaronesia have been developed with support from the LIFE Programme, the EU's financial instrument supporting environmental, nature conservation and climate action projects throughout the EU. The LIFE programme is managed by the European Commission through DG Environment and DG Climate Action.

With regard to nature and biodiversity conservation, the LIFE programme remains a small but highly effective funding source (European Commission, 2015b). EU Member States are expected to pay for the management of the Natura 2000 Network sites in their country, but to help countries to pay for urgent or innovative conservation work, the European Union has set aside money under a fund called LIFE-Nature, which is managed by the Environment Directorate of the European Commission. LIFE-Nature (now called LIFE Nature and Biodiversity) co-finance action grants for best practice, pilot and demonstration projects that contribute to the implementation of the Birds and Habitats Directives and the EU Biodiversity Strategy to 2020.

Since the launch of the LIFE-Nature by the European Commission in 1996, a total of 14 LIFE Nature projects have been financed in the Azores, 23 in the Madeira archipelago and 32 in the Canary Islands (European Commission, 2015a). Accomplishments so far include, among others, the reintroduction of the giant lizard of El Hierro (*Gallotia simonyi machadoi*); management and conservation of the Laurisilva Forest of Madeira; and the conservation of endemic birds, such as the Gran Canaria blue chaffinch (*Fringilla teydea polatzeki*), dark and white tailed laurel pigeons (*Columba bolli, C. junoniae*), the Azorean bullfinch (*Pyrrhula murina*). A number of marine projects have been conducted including measures for the recovery of the monk seal (*Monachus monachus*) in the Atlantic; support projects for the conservation of the loggerhead turtle (*Caretta caretta*) and the bottlenose dolphin (*Tursiops truncatus*); management plans for the marine Natura 200 sites of the Azores ("Maré"). Some of the LIFE Nature and biodiversity projects that are currently underway in the Macaronesian region are briefly described in Table 37.

Table 37. Ongoing LIFE Nature and Biodiversity projects in the Macaronesian region

Period	Budget (€)	Coordinator and partners	Objectives	Main expected results
LIFE+ Pinzón				
2015-2020	Total: 1,123,860 EU contribution: 674,316	TRAGSA (Enterprise) Government of the Canaries Cabildo of Gran Canaria	Increase range expansion and population size of the priority species *Fringilla teydea polatzeki (*blue chaffinch)	Project of range expansion and population size of the priority species *Fringilla teydea polatzeki*: a partnership among to increase the restricted wild blue chaffinch population of Gran Canaria (*Fringilla teydea polatzeki);* Increase of the wild blue chaffinch population of Gran Canaria by up to 450 individuals, effectively doubling the size of the population; plantation of 80,000 Canarian pines in the ecological corridors in the central summit and Tamadaba.
LIFE+ GARAJONAY VIVE				
2014-2018	Total: 1,511,494 EU contribution: 755,747	TRAGSA (Enterprise) University of La Laguna	Ecological restoration of Garajonay National Park and its surroundings, after the great fire of 2012	Strategy to prevent and tackle wild fires in the Canary Islands; Strategy to support natural regeneration of affected laurel forest habitats; Long-term restoration of the affected priority habitats; Long-term recovery of the affected populations of endangered species.

Period	Budget (€)	Coordinator and partners	Objectives	Main expected results
LIFE Madeira Monk Seal				
2014-2018	Total: 1,143,364 EU contribution: 670,808	Fundación CBD para la conservación de la biodiversidad y su habitat (NGO) Regional Secretariat of Environment and Natural Resources (Madeira Government)	Protection and conservation of Mediterranean monk seal (*Monachus monachus*) in Madeira	An official Monk Seal Regional Conservation Plan in Madeira; Increased capacity of the Natural Park of Madeira to intervene along the coastline to tackle threats or emergency situations for monk seal individuals; Surveillance systems, indicators and baseline values for monitoring of the monk seal and its habitat.
LIFE Terras do Priolo				
2013-2018	Total: 3,363,260 EU contribution: 2,522,445	SPEA (Portuguese NGO) Regional Secretariat of Natural Resources (Government of the Azores)	Active protection of the population of the Azores bullfinch (Priolo) and its habitas and sustainable management of Pico da Vara/ Ribeira do Guilherme SPA's	Recovery of 102.4 ha of habitat, of 4 ha of water line areas and of 6.3 ha of landslide areas; Creation of 9.6 km of access rails for visitor use; Planting of 200,000 plant specimens from more than 25 native species grown in nurseries; Development of methodologies and strategies for growing natives and controlling IAS.
LIFE CWR				
2013-2018	Total: 2,213,312 EU contribution: 1,106,656	Council of Praia da Vitória	Ecological Restoration and Conservation of Praia da Vitória Coastal Wet Green Infrastructure	Increased biodiversity in the coastal area of Praia da Vitória; Establishment of a network of wetlands that integrates three areas with very different characteristics.

Period	Budget (€)	Coordinator and partners	Objectives	Main expected results
Life+RABICHE				
2013-2017	Total: 1,401,870 EU contribution: 700,935	Cabildo de Gran Canaria (Local Authority) GESPLAN (Canarian Government)	Expansion of the range of the white-tailed laurel pigeon (*Columba junoniae*) by re-introducing it to the island of Gran Canaria	Captive breeding and release on Gran Canaria of 15-30 white-tailed laurel pigeons per year; Creation of a viable population (75-100 pairs) of white tailed laurel pigeons on Gran Canaria; Restoration of 1,049 ha. of potential white-tailed laurel pigeon habitat in the area of Monteverde; Raised awareness amongst local people of the laurel forests.
LIFE+ GUGUY				
2013-2017	Total: 852,808 EU contribution: 426,404	GESPLAN (Gestión y Planeamiento Territorial y Medioambiental)	Recover of native forests with *Juniperus* spp, and its flora and fauna, in the Special Nature Reserve Güigüí	Not available
LIFE Fura-Bardos				
	Total: 1,629,198 EU contribution: 1,221,898	SPEA (Portuguese NGO) Regional Secretariat of Environment and Natural Resources (Madeira Government) SEO (Spanish NGO)	Conservation of Macaronesian Sparrowhawk and Laurissilva habitat in Madeira Island	Recovery of a significant area of Laurel forest habitat (76.20 ha), as a result of the eradication of invasive alien plants (re-establishment of 14.6 ha in Ginjas and 21.6 ha in Assumadores); Plantation of 40 000 native plants; Reforestation of 20 ha (distributed by 40 ha) of burned areas in Terra Chã with 22 000 native plants.

Period	Budget (€)	Coordinator and partners	Objectives	Main expected results
LIFE RECOVER NATURA				
	Total: 1,344,044 EU contribution: 658,798	Madeira Nature Park Service (Madeira Government) SPEA (Portuguese NGO)	Recovery of the species and land habitats of the Natura 2000 sites Ponta de São Lourenço and Desertas Islands	Removal or significant reduction of those agents contributing to poor ecosystem functioning; Approval of species action plans and revised management plans; Raised public awareness of the importance of these ecosystems; Evaluation of population densities and distribution of goats, rabbits, rats, mice, invasive and endemic plants, gulls, terrestrial molluscs and insects.
LIFE Maciço Montanhoso				
2012-2017	Total: 1,225,022 EU contribution: 658,798	Madeira Nature Park Service (Madeira Government) Regional Directorate of Forestry and Nature Conservation SPEA (Portuguese NGO)	Recovery and conservation of species and habitats on the Madeiran Central Massif (following a major fire in August 2010)	Conservation programmes: - for the regeneration of priority habitats in burned areas and in areas dominated by invasive species - of measures for species and habitats of Community interest with unfavourable conservation status Increased knowledge on the ecology of endemic and indigenous species of Community interest.

Source: http://ec.europa.eu/environment/life/

In addition to the direct investment in biodiversity projects since 2007 by LIFE+Nature and Biodiversity, many other LIFE projects have indirectly contributed to the EU's goal of halting biodiversity loss. This is the case, for example of “ECO-COMPATÍVEL-Communicating for the sustainability of socio economic activities, human use and biodiversity in Natura 2000 network sites in Madeira Archipelago”, financed by the Environment/Information and Communication strand.

Natural Capital Financing Facility

In recognition that halting the loss of biodiversity and adapting to climate change requires increasing investment in natural capital to complement the more traditional grant-based funding, LIFE project funding, will also, for the first time, be provided through innovative financial instruments. The LIFE Environment sub-programme contributes to one such instrument, the pilot Natural Capital Financing Facility (NCFF) financial instrument, which falls under the Nature and Biodiversity project area and will help finance biodiversity projects, amongst other things (European Commission, 2015b). The NCFF has recently been launched by the European Commission and the European Investment Bank (EIB) and aims to demonstrate that natural capital projects can generate revenues or save costs, whilst delivering on biodiversity and climate adaptation objectives. The NCFF will establish a pipeline of replicable, bankable operations that will serve as a "proof of concept" and that will demonstrate to potential investors the attractiveness of such operations. The available funding under the NCFF should finance some 9-12 projects over the 2015-2017 period.

Other key funding sources

- The Framework Programmes for Research and Technological Development, also called Framework Programmes or abbreviated FP1 through FP7 with "FP8" being named "Horizon 2020", are funding programmes created by the European Union/European Commission to support and foster research in the European Research Area. The specific objectives and actions vary between funding periods. In FP6 and FP7 focus was still in technological research, in Horizon 2020 the focus is in innovation, delivering economic growth faster and delivering solutions to end users that are often governmental agencies. Horizon 2020 is the biggest EU Research and Innovation programme ever with nearly €80 billion of funding available over 7 years (2014 to 2020) – in addition to the private investment that this money will attract.
- In the frame of the BEST Preparatory Action adopted by the European Parliament in 2010 and 2011 two open calls for proposals BEST-2011 and BEST-2012 were published and allowed the funding of 16 projects. One of these BEST projects was funded in the Macaronesian region: “ECOSUBVEG-Changes in submersed vegetation: assessing loss in ecosystem services from frondose to depauperate systems dominated by opportunistic vegetation”. Implemented from 2013 to 2013, the project compares the value of ecosystem services from seagrasses and large algae with these from opportunistic vegetation in Canaries, Azores and Guadeloupe to help guide

conservation and restoration of these ecosystems, currently declining worldwide.

- The transnational European project MISTIC'SEAS (Macaronesia Islands Standard Criteria and Indicators: Reaching Common Grounds on Marine Biodiversity Monitoring in Macaronesia), aims to meet the specific needs of the biogeographic subregion of Macaronesia under the Marine Strategy Framework Directive. Coordinated by the Government of the Azores (through the Regional Directorate for Sea Affairs and the Regional Fund for Science and Technology (FRCT) aims to review the current knowledge and conservation strategies for the Macaronesian populations of seabirds, sea turtles and cetaceans. The project will develop a standardized methodology to monitoring these groups of animals to be adopted in the Azores, Madeira and the Canary Islands. It will culminate in the approval of a common action plan for the monitoring of marine biodiversity in Macaronesia. Funded by the European Commission through DG ENVIRONMENT, with a budget of around 650 thousand Euros, the MISTIC'SEAS project has as partners the General-Directorate of Natural Resources, Security and Marine Resources (DGRM) of the Ministry of Agriculture and Sea, the Regional Secretariat for the Environment and Natural Resources (SRARN) of the Government of Madeira, the Spanish Institute of Oceanography (IEO), Fundación Biodiversidad (FB) and the Directorate-General of Sustainability la Costa y del Mar (DGSCM); the last two institutions are under jurisdiction of Ministerio Español de Agricultura, Alimentación y Medio Ambiente. This project will also include the provision of technical and scientific assistance by regional experts on birds, turtles and cetaceans.

Government expenditure

Government budgets are a critical source of biodiversity financing even though commitments are sometimes small. In the Macaronesia, the authorities responsible for environment coordinate the regional expenditure in nature conservation predominantly, but other divisions, such as the agriculture, fisheries, tourism or industry, can also make contributions in crossover or geographically localized issues. In addition, provincial and local government expenditure can also be significant in some cases. Apart from the direct investments in nature conservation, the governments can also support biodiversity NGOs' activities both by contracting projects and by annual grants to develop conservation strategies.

According to Benzaken and Renard (2011), it can be estimated that local governments of EU overseas entities allocate less than one percent of their budget to the staffing and work of their conservation departments. It was not possible to collect detailed and accurate information budgets that each of the three Macaronesian governments allocated to environmental and biodiversity issues. Nevertheles, receipts and expenditure of city councils, on the protection of biodiversity and landscape are published in the statistical yearbook of both Madeira and Azores archipelagos. These figures include activities related to the protection of ecosystems and habitats essential to the conservation of fauna and flora, the protection of landscapes for their aesthetic value, as well as the preservation of natural sites protected by law.

In addition to the already described financial contribution for LIFE and INTERREG projects and the effort on implementing and managing a comprehensive network of protected areas and Natura 2000 sites, a list of some recent conservation investments made by the governments of each of Macaronesian autonomous regions is given below.

Azores

- Azorean Biodiversity Databank: an Internet database for regional biodiversity outreach was developed in the course of the Atlantico (2003-2005) and Bionatura (2007-2008) projects and is currently managed by the University of the Azores with the financial support of the Government. It is an important resource for fundamental research in systematics, biodiversity, education and conservation management in the Azores. It also provides an original platform for biogeographical and macroecological research on islands.
- The Azorean Regional Government also provides online information on the archipelago biodiversity (http://siaram.azores.gov.pt). All multimedia content, videos, audios and photos can be freely used for educational purposes (but not commercial).
- *SOS Cagarro*: a government-led campaign carried out annually since 1995, with the objective of involving the public in saving the Cory's shearwater (*Calonectris borealis*) juveniles when flying from the nest in Autumn and are disoriented by human activities, namely by urban public lights. Activities developed within the initiative include the: i) development of several activities in schools and libraries aiming at environmental awareness and education; ii) organization of evening rescue brigades to collect juvenile shearwaters in danger and to release them in the next morning; iii) development of joint actions with the police and scouts to raise drivers awareness; iv) development of promotional and educational materials to be distributed to the people engaged in the campaign (volunteers, etc.); v) reduction of public lighting during the night. As a result of the 2015 campaign nearly 5,000 birds were saved.
- Public/Private Partnership financing schemes, such as MoniAves (Integrated monitoring of marine priority bird species in the Azores); MoniZEC (identification, recovery and certification of marine habitats in the Azores); monitoring activities in SACs.
- Erradication and control of invasive plant species: the strategic and operational plans "PRECEFIAS" (Regional Plan of Eradication and Control of Invasive Plant Species in Sensitive Areas; 2003-2008; €820,000) and "Mais endémicas – Plantar o futuro" (More Endemics - Planting the Future) are two complementary instruments with the common goal of improving the conservation status of species and habitats of the Azores, with direct influence on the recovery of the Azorean landscape.

- Initiative "Partnership for Sustainable Development": it is a partnership program between Island Nature Parks and regional companies to disseminate the natural values and promote an economic development compatible with biodiversity conservation.
- Botanical Garden of Faial is an ecological garden, component of the Faial Nature Park, established in 1986 to educate and protect the biodiversity of Faial. It has done much to collect and study native and endemic flora of the islands, and also propagate certain plants in project sites.

Madeira

- Atlas of the birds that nest in the Madeira Archipelago: it is the first Atlas of its kind in Madeira, an initiative of the service of Madeira Nature Park of Madeira, in partnership with the Portuguese Society for the Study of Birds (SPEA-Madeira).
- The city council of Funchal holds, under its Division of Nature Conservation and Natural Resources, three entities with recognised work in the field of scientific research and nature conservation: the Museum of Natural History of Funchal, the Marine Biology Station of Funchal and the Ecological Park of Funchal. Scientific initiatives conducted with own resources include (SRA, 2014):
    - Lepadogaster Project: collection and analysis of tissue samples from fish *Lepadogaster zebrina* and comparison with other *Lepadogaster lepadogaster* species, through DNA analysis.
    - Scientific expedition to the Selvagens Islands to celebrate the 50th anniversary of the first scientific expedition to these islands by the Museum.
    - Monitor_Ictio Project: monitoring Ichthyofauna through visual surveys to check which new species would appear, trying to relate this phenomenon to climate change.
    - Diadema Project: monitoring of the species *Diadema antillarum*, in collaboration with the Nature Park of Madeira and the Naval Club Diving centre of Funchal.
- The Whale Museum of Madeira: over the last years, the Museum conducted several projects to increase knowledge on the species of cetaceans that occur in the archipelago waters.
- Erradication of invasive alien species: since the early 1990’s, a longterm programme for the restoration of many different terrestrial habitats has been set up. Since then rabbits have been eradicated from Desertas and Selvagens, mice from the Selvagens and goats from the laurel forest of Madeira.
- Restoration interventions after the 2010 fire: the ecological Park of Funchal has been implementing plans for the recovery of natural habitats and species, such as the Manx-shearwater in order to restore the Park’s natural area after

the fire in 2010. Some of the activities are developed in partnership with the civil society.

- The Government of Madeira has also taken important measures to prevent forest fires and recover degraded areas. A total of 1,685 ha have been subject to planting and forest improvement measures, particularly in Funchal, Câmara de Lobos and Paul da Serra.

Canary Islands

- Canarian Biodiversity Databank: It was created as part of an ambitious program known as Project BIOTA whose implementation dates back to 1998, and developed in the course of the Atlantico (2003-2005) and Bionatura (2007-2008) projects. Both Databank Biodiversity as other facets of the BIOTA project resulted from the integration of two action groups, the academic sphere (universities and other research centers) and technical sphere (the Department of Public Administration with competence in the conservation and management of biodiversity). The databank is currently managed by the Biodiversity Service of the Canarian Government.

- Spanish Catalogue of exotic invasive species: in addition to the database on introduced species developed in the course of the Bionatura project, a national catalogue was also developed, associated with strict rules to prevent introduction and proliferation.

- National and regional catalogues of protected species have been implemented (in the form of laws), which imply the application of protection measures that range from preventing the capture to active management through conservation or recovery plans, which may include designating critical areas.

- National Biodiversity Inventory: a Spanish initiative developed by the Directorate General for Biodiversity of Spain that gave place to the development of several initiatives and Red Lists, later compiled in a database.

- Recovery and Conservation Plans of Species: in addition to the recovery plans developed by the Spanish government (e.g. giant lizard of El Hierro and of La Gomera), the Canary Islands have also prepared local plans for several species, such as the recovery plan for the flora species of the Canaries. In addition, national plans with restricted application in the Canary Islands, were also developed, namely for birds.

- RedPROMAR: the Observer Network of the Marine Environment of the Canary Islands is a tool of the Canarian Government for monitoring and surveillance of marine life in the archipelago. It is an information system that records the continuous changes that are occurring in the oceans, using the concept of "Citizen Science”.

- BIOCAN: a web platform that integrates different databases on biodiversity, such as the Biodiversity Databank of the Canary Islands, RedPromar and the Database on Alien Species in the Canaries. In addition, it provides for the development and integration into the platform of a new computer application

(CENTINELA) that brings together information on protected Canarian species under state and regional regulations, which will allow to consult data and documents on their distribution in the islands, their conservation status, follow-up studies, recovery and conservation plans, etc. This platform and the various databases that comprise it will have free access, facilitating its use by other governmental entities, non-governmental organizations, businesses and individuals, thereby contributing to the dissemination of the natural values of the archipelago and to greater efficiency in their management and conservation.

- Regional research strategy: it provides funding for a widespread range of projects in the archipelago. The Government of the Canary Islands manages the fund, which has 2 transversal instrumental areas (Technology of Information and Communications, and Biotechnologies) and 9 scientific-technological priorities sectors; among these sectors is Natural Resources and within this field, projects related to energy, water, climate change and biodiversity are funded.

Funds, Trusts and Foundations

Some national funds and private or public foundations and trusts are focussed on supporting biodiversity conservation projects. The most active in the Macaronesian region are given below.

- The Fund for the Conservation of Nature and Biodiversity (Portugal), defined within the Institute for Nature and Biodiversity Conservation (current ICNF) aims mainly at i) support projects for the conservation of nature and biodiversity; ii) Promote projects or studies that contribute to the enlargement of the areas included in the protected areas network; iii) Encouraging conservation projects of threatened species at national level. The Fund may establish coordination mechanisms with other public or private funds, of national, EU or international nature, related to the economic valorisation of ecosystem services through, inter alia, market instruments or biodiversity credits systems.
- The Biodiversity Foundation ("*Fundación Biodiversidad*"), funded by the Ministry of Environment of the Spanish government, grants biodiversity projects to Spanish NGOs, including an allocation for international proposals. A recent (2009) study by Oceana, the largest international ocean conservation organization, to propose Marine Areas of Ecological Importance in the Canaries, was financed by this Foundation. In addition, the Spanish Business and Biodiversity Initiative ("*Iniciativa Española Empresa y Biodiversidad*") was launched by the Foundation to channel private funding for biodiversity conservation. This initiative has as partners the *Fundación Global Nature*, a private national organization that focuses on nature conservation, environmental protection and sustainable development; Forética, a non profit multistakeholder organisation working on promoting ethical and socially responsible policies; Biodiversity in Good Company, the

B&B initiative; and the Club of Excellence in Sustainability, a non-profit association composed of large companies.

- BBVA Foundation (Spain) is a Spanish bank foundation, that every year launches a call for proposals for Biodiversity Conservation and Climate Change Awards. It also sponsors research on ecology and conservation biology and the editing of publications and conferences on these issues. SEO/BirdLife, WWF-Spain and Foundation Oso Pardo are three of the Spanish NGOs awarded on the Action on Biodiversity Conservation category.
- The Royal Society for the Protection of Birds (BirdLife Partner in the UK) has own funded country programs that provide strategic support to NGOs (other BirdLife Partners) and increase their capacity on nature conservation. In the Macaronesian region it is currently supporting BirdLife Partners in all archipelagos (SPEA Azores, SPEA Madeira; SEO Canarias).

Financing needs and gaps

Although there are important investments being made in conservation in Macaronesia, the general perception is that these are still low when compared to the needs.

The lack of a local/regional biodiversity strategic framework increases funding constraints, as there are less opportunities to seek resources specifically for the purpose of biodiversity management, and there are no clear investment priorities. Most of the efforts are concentrated on protected areas.

Within the EU the basis for the action of EU Member States to safeguard habitats and species is provided by the EU Birds and Habitats Directives, and a great effort is currently addressing Natura 2000 Network, as one of the primary instruments for nature and biodiversity conservation.

The Prioritized Action Frameworks (PAF) of Natura 2000 prepared by each of the regional authorities of the Macaronesian archipelagos[10] describe the priority areas of intervention in biodiversity and the Natura 2000 Network during the next period program 2014-2020, in compliance with policies and legal commitments related to the Natura 2000 network, as well as to biodiversity targets of the EU Biodiversity Strategy in 2020.

A list of strategic conservation priorities for the period, as well as a description of key measures to achieve priorities, are included in the PAF. Neither the estimates of the costs for the implementation of these measures, nor the potential financing sources are provided. An estimate of the current financial needs for the management of Natura 2000 in the territories is, however, given. For the whole Macaronesian region this estimates accounts for € 102.6 million per year for the whole region (Table 38).

[10] In the case of the Canaries, it is integrated in the Spanish PAF.

Table 38. Annual investment needs for Natura 2000 in Macaronesia

Archipelago	Current (€ Million)	Desirable (€ Million)
Azores	25	n.a.
Madeira	4.7	n.a.
Canary Islands	72.9*	159.4

(2013. “n.a."- not available. * Estimate based on V. Moreno, Picazo, Vázquez-Dodero, and Hidalgo (2013), corrected with the variation of CPI 2007-2003 of 16,6%. Sources: MAGRAMA (2014a); V. Moreno et al. (2013); RAA (2013); RAM (2014))

For the Canary Island the desirable investment was also estimated and accounts for €159.4 million, i.e., over twice the current investment.

In that context, the European Commission recently estimated that only around 20% of the financing needs for the existing N2K network are covered by current EU instruments (European Commission, 2011), let alone conservation needs beyond this network. Moreover, Lung et al. (2014) concluded that the current distribution of EU biodiversity funds is not well aligned with future needs under climate change. Climate change is expected to decrease the effectiveness of established protected areas (and in particular N2K areas) by inducing range shifts and biodiversity reshuffling (Araujo, Alagador, Cabeza, Nogues-Bravo, & Thuiller, 2011; Maiorano, Falcucci, Zimmermann, & al, 2011). An additional threat posed by climate change is thus a pressing need to expand biodiversity management beyond the currently protected sites.

Box 6. Compensation payments within Natura 2000 Network

The stakeholder consultation in Macaronesia has highlighted that compensation payments within Natura 2000 network are far too low. Natura 2000 payments to compensate beneficiaries for the additional costs and loss of income resulting from the application of the Birds and Habitats Directives and the agri-environment payments are aimed to provide positive incentives for the conservation and use sustainable biodiversity. However, in Portugal these payments range between €12-20/ha., depending on the size of the land and. The additional restriction on the intensification agricultural activity, increases the amount to €24-49/ha.

In addition to these considerations, the stakeholder consultation and KBAs delineation, carried out during the present Macaronesian profiling process, also highlight the need for financing beyond the Natura 2000 Network to tackle further biodiversity loss in the Macaronesian region:

- In the Azores and Madeira most protected species have this status as a result of the implementation at national level of European directives (Habitats and Birds Directives). The directives’ annexes include strictly protected species, so that their presence in a particular site forces the Portuguese state to some kind of preservation. These Directives are thus one of the main instruments for the effective protection of species. However, these directives were based on a set of subjective criteria that reflect above all the knowledge at the time and the existence of experts for the different groups and regions in Europe, so that the vast majority of species whose management is a priority are not legally protected, a fact which is also reflected in the archipelago of the Azores (Martín et al., 2008). Moreover, for terrestrial arthropods, for example, the efforts made in the European Community towards conservation priorities were based on the knowledge on Northern and Central Europe arthropod biodiversity, where a lot more information was available, including historical data. As a result some of the species protected under the Habitats Directive are species that in Portugal are relatively common, while Portuguese endemic species with restricted distributions (like those occurring on islands) received no consideration (Rego et al., 2015).

- Overlapping the distribution of globally threatened species and currently classified areas in the Macaronesian islands (N2K Network and Regional Protected Areas Network), an activity carried out during the delineation of Macaronesian KBAs, clearly shows that a large number of these species do not occur in protected sites. Further, many globally threatened species are not listed as ‘priority species’ under the Birds and Habitats Directives (and many priority species are not globally threatened), and therefore are not considered as priorities for conservation at the EU level. This highlights the need for tackling further biodiversity loss in the Macaronesian region by financing beyond the Natura 2000 Network.

10. PRIORITY AREAS FOR ACTION

Priority Key Biodiversity Areas

In total, 194 KBAs were identified in the Macaronesian region, of which 46 were assigned to the highest priority level (level 1), 54 were assigned to level 2, 42 were assigned to level 3, 34 to level 4 and 18 to level 5. The full list of KBAs is given in Appendix 5 and is summarized in Table 20 (chapter 0).

Although an important number of KBAs are under some protection figure, 31% of them are not covered by any protected areas (or are covered only by a minor parcel). Moreover, from the 46 KBAs assigned to level 1, eight are not covered by any protection figure and 16 are only partially protected (Table 39 and Appendix 6). However, these sites are the highest biological priorities for conservation in the region: they are the only known site (globally) for one or more endemic CR or EN species and the loss of any of them would result in the global extinction of at least one species. Thus, the current coverage of the protected areas network needs to be subjected to a more in-depth revision.

In addition, and since Alliance for Zero Extinction (AZE) objective is to underline areas that constitute the last remaining refuge of at least one EN or CR species, the mentioned 46 KBAs qualify as AZE, i.e., the current list of two AZE sites needs to be reviewed following the biodiversity outcomes underlined in the Macaronesian Ecosystem Profile.

Table 39. List of KBAs of priority level 1

Code	Key Biodiversity Area	Archipelago	Total area (km2)	Land area (km2)	Protection	Nr trigger spp
DES1	Desertas Islands	Madeira	765	14	Whole	32
FAI3	Great crater of Faial	Azores	1	1	Whole	13
FUE1	Jandía Peninsula	Canary Is.	178	178	Most	34
FUE6	North area of Fuerteventura	Canary Is.	222	222	Some	14
FUE8	Island of Lobos	Canary Is.	5	5	Whole	10
GCA1	La Solana	Canary Is.	110	110	Whole	31
GCA2	Los Marteles	Canary Is.	124	124	Some	34
GCA4	Tamadaba - south	Canary Is.	18	18	Most	14
GCA5	Tamadaba - north	Canary Is.	47	47	Some	32
GCA7	Santo Andrés - Valle Seco	Canary Is.	61	61	Most	33
GCA8	Cruz de Pineda - Barranco del Pino	Canary Is.	11	11	Some	4
GCA9	Pino Santo	Canary Is.	11	11	Some	10
GCA13	Jinámar	Canary Is.	2	2	Little/none	4
GCA18	Las Palmas	Canary Is.	3	3	Most	6
GOM1	Garajonay- Chejelipes	Canary Is.	58	58	Some	50
GOM7	Los Chapines	Canary Is.	9	9	Some	20
GOM11	Epina	Canary Is.	13	13	Most	25
GOM13	Taguluche	Canary Is.	19	19	Some	17
GOM15	Garajonay - Central	Canary Is.	14	14	Whole	16
HIE1	Frontera - central area	Canary Is.	0.4	0.4	Most	27
HIE2	Echedo	Canary Is.	5	5	Little/none	4
HIE6	Valverde	Canary Is.	5	5	Most	10
LAN3	PLains of Corona - La Hondura - Tegala Grande and Famara crag	Canary Is.	106	106	Some	29
MAD1	Madeira Nature Park (enlarged)	Madeira	475	475	Most	95
MAD4	Coastal cliffs of Madeira island	Madeira	32	32	Little/none	15
MAD8	São João creek - Santa Luzia creek - João Gomes creek	Madeira	15	15	Little/none	8
PAL1	La Palma Central-northeast	Canary Is.	270	270	Most	41
PAL12	Teneguia Vucanos	Canary Is.	2	2	Most	2
PAL15	Coast of Garafía	Canary Is.	20	20	Most	12
PIC4	Pico mountain crater	Azores	4	4	Some	5
PSA2	Network of Marine Protected Areas of Porto Santo	Madeira	27	0	Whole	28
PSA4	Northeast area of Porto Santo	Madeira	11	11	Little/none	17
SEL1	Selvagens Islands	Madeira	1,246	3	Whole	29

Code	Key Biodiversity Area	Archipelago	Total area (km2)	Land area (km2)	Protection	Nr trigger spp
SJG3	Pico da Esperança	Azores	32	32	Some	24
SMA7	Pico Alto	Azores	1	1	Most	15
SMA8	São Lourenço	Azores	3	3	Little/none	14
SMG4	Pico da Vara	Azores	145	145	Some	19
TEN1	El Teíde	Canary Is.	252	252	Whole	21
TEN2	Anága	Canary Is.	159	159	Most	60
TEN3	Northern Buenavista	Canary Is.	50	50	Most	41
TEN4	Los Carrizales	Canary Is.	45	45	Some	31
TEN6	Adeje	Canary Is.	20	20	Some	16
TEN16	Guimar - La Esperanza	Canary Is.	47	47	Some	27
TEN19	La Viuda - Añaza	Canary Is.	30	30	Little/none	10
TEN21	Garachico - La Montañeta	Canary Is.	45	45	Some	26
TEN24	San Cristoval de La Laguna	Canary Is.	5	5	Little/none	3

Description of priority KBAs

Priority KBA are presented in alphabetic order within archipelagoes and islands.

AZORES

FAI3 - Great crater of Faial - Azores

Description

This terrestrial KBA on **Faial Island**, with a total area of 1 km^2, is totally covered by protective legislation, namely 1 protected area, 2 Natura 2000 sites and 1 Ramsar site. In this KBA a total of 13 trigger species were recorded (Table 40), of which 1 mammal and 12 plants. Of these 13 species, 12 are listed in IUCN's Red List, 3 of which as vulnerable, 5 as endangered and 4 as critically endangered.

Table 40. Trigger species for FAI3, Great crater of Faial, Azores.

Group	Species	Conservation	Endemic	Restricted
Plantae	*Ammi trifoliatum*	CR loc	AZO	
Plantae	*Euphrasia grandiflora*	CR loc	AZO	
Plantae	*Rumex azoricus*	CR loc	AZO	
Plantae	*Pericallis malvifolia caldeirae*	CR loc	AZO	Yes
Mammalia	*Nyctalus azoreum*	EN	AZO	
Plantae	*Lactuca watsoniana*	EN	AZO	
Plantae	*Frangula azorica*	EN loc	AZO	
Plantae	*Sanicula azorica*	EN loc	AZO	
Plantae	*Euphorbia stygiana stygiana*	EN loc	AZO	

Group	Species	Conservation	Endemic	Restricted
Plantae	*Isoetes azorica*	VU	AZO	
Plantae	*Juniperus brevifolia*	VU	AZO	
Plantae	*Ilex azorica*	VU loc	AZO	
Plantae	*Elaphoglossum semicylindricum*	ENDEM	MACAR	

Main trigger species

Pericallis malvifolia caldeirae (© Eduardo Dias)

Figure 37. Critically endangered species occuring only on KBA FAI3, Great crater of Faial, Azores.

Pericallis malvifolia (Figure 37) is an endemic Azorian species widespread in shaded and humid areas of most islands. The subspecies *P. malvifolia caldeirae*, however, is only found inside the central caldera of Faial Island. Its restricted habitat and the low populations density (less than 250 individuals, (Bilz, 2011b) makes it vulnerable to competition with exotic plants.

PIC4 - Pico mountain crater – Azores

Description

The Pico mountain crater, on **Pico Island**, has a total area of 4 km^2, totally covered by protective legislation, namely 1 protected area and 1 Natura 2000 site. In this KBA a total of 5 trigger species were recorded, all of them plants. Of these 5 species (Table 41), 4 are listed in IUCN's Red List, 3 of which as endangered and 1 as critically endangered.

Table 41. Trigger species of KBA PIC4, Pico mountain crater, Azores

Group	Species	Status	Endemic	Restricted
Plantae	*Silene uniflora cratericola*	CR loc	AZO	Yes
Plantae	*Frangula azorica*	EN loc	AZO	

Plantae	*Sanicula azorica*	EN loc	AZO	
Plantae	*Agrostis congestiflora oreophila*	EN loc	AZO	
Plantae	*Platanthera pollostantha*	ENDEM	AZO	

Main trigger species

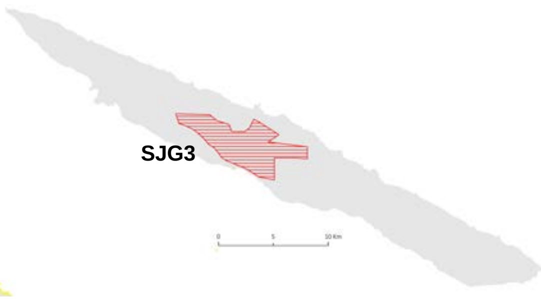
Silene uniflora cratericola (© Hanno Schaeffer)

Figure 38. Critically endangered subspecies, know only from KBA PIC4, Pico mountain crater, Azores

Less than 100 specimens exist of *Silene uniflora cratericola* (Figure 38), a subspecies restricted to the crater of Mount Pico (Schäfer, 2005), the highest peak in the Azores. *S. uniflora*'s other subspecies are adapted to strongly exposed, harsh coastal habitats. The gap in distribution within a single island makes this an interesting example of speciation in progress.

SJG3 - Pico da Esperança – Azores

Description



"Pico da Esperança" KBA, in **São Jorge Island**, has a total area of 32 km^2, all of it terrestrial. This KBA is partially covered by protective legislation, namely 1 protected area, 1 Natura 2000 site and 1 Ramsar site. In this KBA a total of 24 trigger species were recorded (Table 42), of which 1 arthropod, 2 mammals and 21 plants. Of these 24 species, a total of 22 species are listed in IUCN's Red List, 5 of which as vulnerable, 10 as endangered and 7 as critically endangered.

Table 42. Trigger species of KBA SJG3, Pico da Esperança, Azores

Group	Species	Status	Endemic	Restricted
Plantae	*Ammi trifoliatum*	CR loc	AZO	
Plantae	*Bellis azorica*	CR loc	AZO	
Plantae	*Chaerophyllum azoricum*	CR loc	AZO	
Plantae	*Diphasiastrum madeirense*	CR loc	MAC	
Plantae	*Euphrasia grandiflora*	CR loc	AZO	

Group	Species	Status	Endemic	Restricted
Plantae	*Platanthera azorica*	CR loc	AZO	Yes
Plantae	*Rumex azoricus*	CR loc	AZO	
Plantae	*Azorina vidalii*	EN	AZO	
Mammalia	*Nyctalus azoreum*	EN	AZO	
Mammalia	*Pipistrellus maderensis*	EN	MAC	
Plantae	*Platanthera micrantha*	EN	AZO	
Plantae	*Cardamine caldeirarum*	EN loc	AZO	
Plantae	*Euphorbia stygiana stygiana*	EN loc	AZO	
Plantae	*Frangula azorica*	EN loc	AZO	
Plantae	*Rumex obtusifolius obtusifolius*	EN loc	AZO	
Plantae	*Sanicula azorica*	EN loc	AZO	
Plantae	*Scabiosa nitens*	EN loc	AZO	
Plantae	*Platanthera pollostantha*	ENDEM	AZO	
Arthropoda	*Trechus isabelae*	ENDEM	AZO	Yes
Plantae	*Isoetes azorica*	VU	AZO	
Plantae	*Juniperus brevifolia*	VU	AZO	
Plantae	*Holcus azoricus*	VU loc	AZO	
Plantae	*Ilex perado azorica*	VU loc	AZO	
Plantae	*Picconia azorica*	VU loc	AZO	

Main trigger species

Platanthera azorica (© Richard Bateman)

Figure 39. Critically endangered species know only from KBA SJG3, Pico da Esperança, Azores

The genus *Platanthera* groups about 100 species of temperate orchids widely distributed throughout the Northern Hemisphere (Bateman et al., 2009). *P. azorica* (Figure 39) was recently rediscribed by Bateman et al. (2013), and its range narrowed to a single location within KBA SJG3. With only 250 individuals known, this is the rarest of the three Azorean *Platanthera*, and likely the rarest orchid in Europe. Its is threatened by habitat destruction and invasive alien plants.

SMA7 - Pico Alto – Azores

Description

The "Pico Alto" KBA, in **Santa Maria Island**, has a total area of 1 km^2, all of it terrestrial. This KBA is mostly covered by protective legislation, namely 1 protected area. In this KBA a total of 15 trigger species were recorded (Table 43), of which 1 bird, 1 arthropod, 1 mammal, 3 mollusks and 9 plants. Of these 15 species, a total of 14 species are listed in IUCN's Red List, 3 of which as vulnerable, 7 as endangered and 4 as critically endangered.

Table 43. Trigger species of KBA SJG3, Pico da Esperança, Azores

Group	Species	Status	Endemic	Pico Alto
Mollusca	*Plutonia angulosa*	CR	AZO	Yes
Plantae	*Ammi trifoliatum*	CR loc	AZO	
Plantae	*Cerastium azoricum*	CR loc	AZO	
Aves	*Regulus regulus sanctae-mariae*	CR loc	AZO	
Arthropoda	*Crotchiella brachyptera*	EN	AZO	
Mollusca	*Leptaxis minor*	EN	AZO	Yes
Mammalia	*Pipistrellus maderensis*	EN	MACAR	
Plantae	*Sanicula azorica*	EN loc	AZO	
Plantae	*Scabiosa nitens*	EN loc	AZO	
Plantae	*Tolpis succulenta*	EN loc	MACAR	
Plantae	*Viburnum treleasei*	EN loc	AZO	
Plantae	*Platanthera pollostantha*	ENDEM	AZO	
Mollusca	*Oxychilus agostinhoi*	VU	AZO	Yes
Plantae	*Picconia azorica*	VU loc	AZO	
Plantae	*Ilex perado azorica*	VU loc	AZO	

Main trigger species

Plutonia angulosa
(© António Frias Martins)

Leptaxis minor
(© Pedro Cardoso)

Figure 40. Critically endangered species know only from KBA SMA7, Pico Alto, Azores

Plutonia angulosa (Figure 40), a vitrinid slug known only from this KBA, is one of the six Azorean species of this transition group between shelled snails and real slugs, characterized by vestigial shells, into which the animal cannot retreat. This makes them competitively inferior to slugs and has resulted, in continental Europe, in the displacement of its activity period towards the cold season and its altitudinal distribution towards higher altitudes (Hausdorf, 2001). In Macaronesia vitrinid slugs evolved without competition with slugs, and this is reflected in the higher species diversity in this region (the highest in Europe, (Hausdorf, 2002)) and their adaptation to low altitude, warm habitats.

The snail genus *Leptaxis* is a case study of a pattern of colonization commonly observed in volcanic archipelagoes where islands are colonized, as they are formed, from source populations on older islands (Van Riel et al., 2005). *Leptaxis minor* (Figure 40) is one of the most basal taxa in the phlylogeny of the genus in the Azores and is correspondingly restricted to this KBA, in the heart of the oldest island of the archipelago.

Both species have limited ranges which, although included in a protected area, are threatened by habitat loss and climate change (Frias Martins, 2011a, 2011b).

SMA8 - São Lourenço – Azores

Description

The "São Lourenço" KBA has a total area of 4 km^2, all of it terrestrial. This KBA has little coverage by protective legislation, namely 1 protected area. In this KBA a total of 14 trigger species were recorded (Table 44), of which 2 birds, 1 arthropod, 1 mammal and 10 plants. Of these 14 species, a total of 12 species are listed in IUCN's Red List, 1 of which as vulnerable, 5 as endangered and 6 as critically endangered.

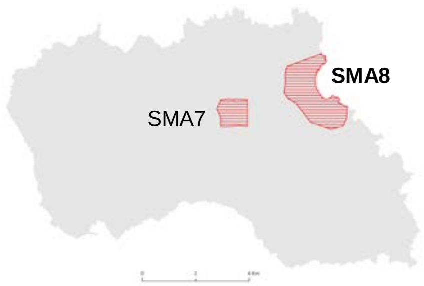


Table 44. Trigger species of KBA SMA8, São Lourenço, Azores

Group	Species	Status	Endemic	Restricted
Plantae	*Euphorbia stygiana santamariae*	CR	AZO	Yes
Plantae	*Aichryson santamariensis*	CR loc	AZO	
Plantae	*Ammi trifoliatum*	CR loc	AZO	
Plantae	*Lotus azoricus*	CR loc	AZO	
Plantae	*Pericallis malvifolia malvifolia*	CR loc	AZO	
Aves	*Regulus regulus sanctae mariae*	CR loc	AZO	
Plantae	*Azorina vidalii*	EN	AZO	
Arthropoda	*Crotchiella brachyptera*	EN	AZO	
Mammalia	*Pipistrellus maderensis*	EN	MAC	
Plantae	*Scabiosa nitens*	EN loc	AZO	
Plantae	*Tolpis succulenta*	EN loc	MAC	
Plantae	*Picconia azorica*	VU loc	AZO	
Plantae	*Platanthera pollostantha*	ENDEM	AZO	
Aves	*Puffinus lherminieri*	ENDEM	MAC	

Main trigger species

Euphorbia stygiana santamariae (© Hanno Schaefer)

Figure 41. Critically endangered species know only from KBA SMA8, São Lourenço, Azores

Euphorbia stygiana is endemic to the Azores, where two subspecies are known: one is common throughout the archipelago, the other, *E. stygiana santamarie* (Figure 41), is restricted to KBA SMA8. It is to this later subspecies that the critically endangered classification of Bilz (2011a) applies: only 50 individuals were counted in 2008, and the population trend was declining due to habitat changes and invasive species.

SMG4 - Pico da Vara – Azores

Description

"Pico da Vara", in **São Miguel Island**, has a total area of 145 km^2, all of it terrestrial. This KBA is partially covered by protective legislation, namely 3 protected areas, 2 Natura 2000 sites, 1 Alliance for Zero Extinction site, 1 Important Bird Area and 1 Ramsar site. In this KBA a total of 19 trigger species were recorded (Table 45), of which 2 birds, 2 arthropods, 1 mammal and 14 plants. Of these 19 species, a total of 16 species are listed in IUCN's Red List, 3 of which as vulnerable, 10 as endangered and 3 as critically endangered.

Table 45. Trigger species of KBA SMG4, Pico da Vara, Azores

Group	Species	Status	Endemic	Restricted
Plantae	*Diphasiastrum madeirense*	CR loc	MAC	
Plantae	*Prunus azorica*	CR loc	AZO	
Plantae	*Rumex azoricus*	CR loc	AZO	
Arthropoda	*Crotchiella brachyptera*	EN	AZO	
Mammalia	*Nyctalus azoreum*	EN	AZO	
Aves	*Pyrrhula murina*	EN	AZO	Yes
Plantae	*Cardamine caldeirarum*	EN loc	AZO	

Group	Species	Status	Endemic	Restricted
Plantae	*Frangula azorica*	EN loc	AZO	
Plantae	*Sanicula azorica*	EN loc	AZO	
Plantae	*Scabiosa nitens*	EN loc	AZO	
Plantae	*Smilax divaricata*	EN loc	AZO	
Plantae	*Viburnum treleasei*	EN loc	AZO	
Plantae	*Rumex obtusifolius obtusifolius*	EN loc	AZO	
Plantae	*Juniperus brevifolia*	VU	AZO	
Plantae	*Picconia azorica*	VU loc	AZO	
Plantae	*Ilex perado azorica*	VU loc	AZO	
Aves	*Buteo buteo rothschildi*	ENDEM	AZO	
Arthropoda	*Calathus lundbladi*	ENDEM	AZO	Yes
Plantae	*Elaphoglossum semicylindricum*	ENDEM	MAC	

Main trigger species

Pyrrhula murina (© Pedro Monteiro)

Figure 42. Endangered species know only from KBA SMG4, Pico da Vara, Azores

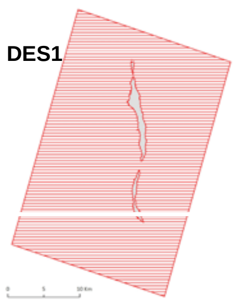
The priolo, or Azores bullfinch (*Pyrrhula murina*, Figure 42), is the most threatened and the second rarest bird in Europe. Presently confined to KBA SMG4, a protected area in São Miguel area, it was once widespread on the island, to the point of being considered a pest to orange orchards in the XIXth century. The large clearings of laurel forest to make way for exotic conifers in the 1960s, and more recently the habitat modification from introduced exotic plants led the Azores bullfinch to the brink of extinction (Ceia et al., 2011). Intensive conservation actions in the present century, mostly with LIFE support and including removal of exotic plants and laurel forest restauration have stabilized the population, which is nevertheless still considered Endangered.

MADEIRA

DES1 - Desertas Islands, Madeira

Description

The Desertas are a chain of three small islands with a total area of 14 km^2 extending for about 22 km in a north-south direction, starting 25 km from the southeast tip of **Madeira**



Island. They are the 5.1-1.9 million years old remains of the deeply eroded interior of a volcanic rift zone (Klügel, 2009). Desertas are unhabited except for a warden's house in Deserta Grande (altitude 442 m). This KBA has a total area of 765 km^2, of which 751 km^2 are marine and 14 km^2 terrestrial. This KBA is totally covered by protective legislation, namely 1 protected area, 2 Natura 2000 sites and 2 Important Bird Areas. In this KBA a total of 32 trigger species were recorded (Table 46), of which 6 birds, 1 arthropod, 1 mammal, 9 mollusks and 15 plants. Of these 32 species, a total of 23 species are listed in IUCN's Red List, 12 of which as vulnerable, 4 as endangered and 7 as critically endangered.

Table 46. Trigger species for DES1, Desertas Islands, Madeira

Group	Species	Emdemism	Conservati on	Restri cted
Plantae	*Beta patula*	MAD	CR	
Mollusca	*Discula lyelliana*	MAD	CR	Yes
Mollusca	*Discula tetrica*	MAD	CR	
Mollusca	*Geomitra grabhami*	MAD	CR	
Arthropoda	*Hogna ingens*	MAD	CR	Yes
Plantae	*Monizia edulis*	MAD	CR	
Plantae	*Aichryson villosum*	MAC	CR loc	
Mollusca	*Geomitra moniziana*	MAD	EN	
Mammalia	*Monachus monachus*	No	EN	
Plantae	*Sinapidendron sempervivifolium*	MAD	EN	
Mollusca	*Actinella laciniosa*	MAD	VU	Yes
Mollusca	*Amphorella hypselia*	MAD	VU	Yes
Mollusca	*Amphorella melampoides*	MAD	VU	
Plantae	*Chamaemeles coriacea*	MAD	VU	
Plantae	*Convolvulus massonii*	MAD	VU	
Plantae	*Heberdenia excelsa*	MAC	VU	
Mollusca	*Leiostyla macilenta*	MAD	VU	
Plantae	*Phalaris maderensis*	MAD	VU	
Aves	*Pterodroma deserta*	MAD	VU	Yes
Plantae	*Sideroxylon mirmulano*	MAC	VU	
Aves	*Anthus berthelotii berthelotii*	MAC	VU loc	
Plantae	*Frullania sergiae*	MAD	VU loc	
Aves	*Bulweria bulwerii*	No	CONGR	
Aves	*Calonectris borealis*	No	CONGR	
Aves	*Hydrobates castro*	No	CONGR	
Plantae	*Argyranthemum haematomma*	MAD	ENDEM	
Plantae	*Asparagus umbellatus lowei*	MAD	ENDEM	
Plantae	*Euphorbia piscatoria*	MAD	ENDEM	
Mollusca	*Patella candei*	MAC	ENDEM	
Aves	*Puffinus lherminieri*	MAC	ENDEM	
Plantae	*Teline maderensis var. paivae*	MAD	ENDEM	

Main trigger species

Desertas spider, *Hogna ingens*
(© Serviço do Parque Natural da Madeira)

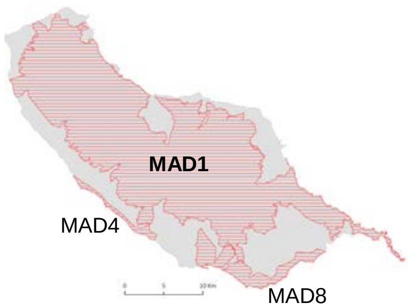
Desertas Petrel, *Pterodroma deserta*
(© Serviço do Parque Natural da Madeira)

Figure 43. Endangered species occuring only on KBA DES1, Desertas Islands, Madeira.

The Desertas Islands Protected Area was created in 1990 for the protection of the only remaing colony of monk seals in Macaronesia. Rescued from the brink of local extinction, the Madeira population of this critically endangered species has recovered thanks to timely and well directed conservation actions (Pires, Neves, & Karamanlidis, 2008). These islands are also home to 5 species of animals found nowhere else in the world, including (Figure 43) the Desertas wolf spider, *Hogna ingens* (the largest and rarest wolf spider species worldwide, (P. Cardoso, 2014) and the Bugio petrel, *Pterodroma deserta* (stabilized at 120-150 pairs breeding in the Bugio islet, (Ramírez et al., 2013).

MAD1 - Madeira Nature Park - Madeira

Description



The "**Madeira** Nature Park" has a total area of 475 km^2, all of it terrestrial. This KBA is mostly covered by protective legislation, namely 1 protected area, 7 Natura 2000 sites, 1 Alliance for Zero Extinction site and 3 Important Bird Areas. In this KBA a total of 95 trigger species were recorded (Table 63), of which 5 birds, 4 arthropods, 2 mammals, 22 mollusks and 62 plants. Of these 95 species, a total of 63 species are listed in IUCN's Red List, 30 of which as vulnerable, 18 as endangered and 15 as critically endangered.

Table 47. Trigger species of KBA MAD1, Madeira Nature Park, Madeira

Group	Species	Status	Endemic	Restricted
Mollusca	*Actinella arridens*	CR	MAD	
Plantae	*Aichryson dumosum*	CR	MAD	
Plantae	*Beta patula*	CR	MAD	
Plantae	*Geranium maderense*	CR	MAD	Yes
Plantae	*Goodyera macrophylla*	CR	MAD	Yes
Mollusca	*Leiostyla abbreviata*	CR	MAD	Yes
Mollusca	*Lemniscia galeata*	CR	MAD	
Plantae	*Monizia edulis*	CR	MAD	
Plantae	*Pittosporum coriaceum*	CR	MAD	Yes
Plantae	*Polystichum drepanum*	CR	MAD	Yes
Plantae	*Sinapidendron rupestre*	CR	MAD	Yes
Plantae	*Sorbus maderensis*	CR	MAD	Yes
Plantae	*Teucrium abutiloides*	CR	MAD	Yes
Plantae	*Echinodium spinosum*	CR loc	MAC	
Mammalia	*Nyctalus leisleri verrucosus*	CR loc	MAD	
Mollusca	*Actinella carinofausta*	EN	MAD	Yes
Plantae	*Bryoxiphium madeirense*	EN	MAD	
Mollusca	*Caseolus calvus*	EN	MAD	
Plantae	*Dracaena draco*	EN	MAC	
Mollusca	*Geomitra tiarella*	EN	MAD	
Arthropoda	*Gonepteryx maderensis*	EN	MAD	Yes
Plantae	*Juniperus cedrus*	EN	MAC	
Mollusca	*Lampadia webbiana*	EN	MAD	
Mollusca	*Leiostyla falknerorum*	EN	MAD	
Plantae	*Marcetella maderensis*	EN	MAD	Yes
Plantae	*Musschia wollastonii*	EN	MAD	Yes
Arthropoda	*Pararge xiphia*	EN	MAD	
Mammalia	*Pipistrellus maderensis*	EN	MAC	
Aves	*Pterodroma madeira*	EN	MAD	Yes
Plantae	*Sinapidendron frutescens*	EN	MAD	
Plantae	*Thamnobryum fernandesii*	EN	MAD	
Plantae	*Vicia capreolata*	EN	MAD	
Plantae	*Andoa berthelotiana*	EN loc	MAC	
Mollusca	*Actinella actinophora*	VU	MAD	
Mollusca	*Actinella armitageana*	VU	MAD	Yes
Mollusca	*Actinella giramica*	VU	MAD	
Mollusca	*Amphorella iridescens*	VU	MAD	Yes
Mollusca	*Caseolus leptostictus*	VU	MAD	
Plantae	*Chamaemeles coriacea*	VU	MAD	
Plantae	*Convolvulus massonii*	VU	MAD	
Mollusca	*Craspedopoma lyonnetianum*	VU	MAD	

Group	Species	Status	Endemic	Restricted
Mollusca	*Disculella spirulina*	VU	MAD	
Plantae	*Echinodium setigerum*	VU	MAD	
Mollusca	*Leiostyla arborea*	VU	MAD	Yes
Mollusca	*Leiostyla colvillei*	VU	MAD	Yes
Mollusca	*Leiostyla filicum*	VU	MAD	
Mollusca	*Leiostyla heterodon*	VU	MAD	Yes
Mollusca	*Leiostyla laurinea*	VU	MAD	
Mollusca	*Leptaxis furva*	VU	MAD	Yes
Arthropoda	*Meladema lanio*	VU	MAD	
Plantae	*Phalaris maderensis*	VU	MAD	
Plantae	*Picconia excelsa*	VU	MAC	
Mollusca	*Plutonia albopalliata*	VU	MAD	Yes
Plantae	*Prunus hixa*	VU	No	
Plantae	*Radula jonesii*	VU	MAC	
Plantae	*Riccia atlantica*	VU	MAD	
Plantae	*Sedum brissemoretii*	VU	MAD	Yes
Plantae	*Sideroxylon mirmulano*	VU	MAC	
Plantae	*Argyranthemum pinnatifidum succulentum*	VU	MAD	Yes
Plantae	*Aphanolejeunea azorica*	VU loc	MAC	
Plantae	*Brachymenium notarisii*	VU loc	MAC	
Plantae	*Tylimanthus madeirensis*	VU loc	MAD	
Aves	*Anthus berthelotii berthelotii*	VU loc	MAC	
Aves	*Bulweria bulwerii*	CONGR	No	
Aves	*Hydrobates castro*	CONGR	No	
Plantae	*Agrostis obtusissima*	ENDEM	MAD	
Plantae	*Anthyllis lemanniana*	ENDEM	MAD	
Plantae	*Arachniodes webbianum*	ENDEM	MAD	
Plantae	*Armeria maderensis*	ENDEM	MAD	
Plantae	*Asparagus umbellatus lowei*	ENDEM	MAD	
Plantae	*Asplenium trichomanes maderense*	ENDEM	MAD	
Plantae	*Berberis maderensis*	ENDEM	MAD	
Plantae	*Bunium brevifolium*	ENDEM	MAD	
Plantae	*Bystropogon maderensis*	ENDEM	MAD	
Plantae	*Cerastium vagans var. vagans*	ENDEM	MAD	
Plantae	*Ceterach lolegnamense*	ENDEM	MAD	
Arthropoda	*Chrysolina fragariae*	ENDEM	MAD	Yes
Aves	*Columba trocaz*	ENDEM	MAD	
Plantae	*Crepis vesicaria andryaloides*	ENDEM	MAD	
Plantae	*Deschampsia maderensis*	ENDEM	MAD	
Plantae	*Geranium rubescens*	ENDEM	MAD	

Group	Species	Status	Endemic	Restricte d
Plantae	*Helichrysum devium*	ENDEM	MAD	
Plantae	*Helichrysum monizii*	ENDEM	MAD	
Plantae	*Hymenophyllum maderense*	ENDEM	MAD	
Plantae	*Isoplexis sceptrum*	ENDEM	MAD	
Plantae	*Luzula seubertii*	ENDEM	MAD	
Plantae	*Melanoselinum decipiens*	ENDEM	MAD	
Plantae	*Normania triphylla*	ENDEM	MAD	
Plantae	*Orchis scopulorum*	ENDEM	MAD	
Plantae	*Parafestuca albida*	ENDEM	MAD	
Plantae	*Peucedanum lowei*	ENDEM	MAD	
Plantae	*Plantago malato-belizii*	ENDEM	MAD	Yes
Plantae	*Rubus grandifolius*	ENDEM	MAD	
Plantae	*Sambucus lanceolata*	ENDEM	MAD	
Plantae	*Viola paradoxa*	ENDEM	MAD	Yes

Main trigger species

Geranium madeirense
(©r Ramin Nakisa)

Goodyera macrophylla
(© A. Cabral)

Pittosporum coriaceum
(© Charles Boulanger)

Sinapidendron rupestre
(© Ben Rushbrooke)

Polystichum drepanum
(CC-BY-SA-3.0 Citron)

Sorbus maderensis
(© VisitMadeira)

Teucrium abutiloides
(©Jean-Michel Moullec, Jardin exotique et botanique de Roscoff)

Figure 44. Criticaly endangered plant species know only from KBA MAD1, Madeira Nature Park, Madeira.

This KBA encompasses large remnants of the Laurisilva Forest that in the XVth century covered most of the island. Presently restricted to high altitude and difficult access areas, this vegetation is extremely rich in endemic species. The extensive list in Table 47 is both a testimony of this high biodiversity and a reminder of the pressures and threats that still affect this World Heritage site.

All plant species in Figure 44 are known from less than 50 mature individuals in the wild. Two tree species are in this category: *Pittosporum coriaceum* (Carvalho, 2011a) and *Sorbus maderensis*. The later occurred in only two sites when the main one was destroyed in the huge fire of the summer of 2010 (Carvalho, 2011c). A LIFE project has supported the reintroduction of the species, removing invasive species and also restoring the pre-existing community (C. Lobo, 2014).

On the understory of the laurel forest many species evolved in isolated conditions and are now critically endangered by habitat destruction and invasive species. The pressures were particularly severe in low altitude habitats. Although widely planted in gardens, in Madeira and abroad, *Geranium maderense* is now very rare in its natural habitat, due to the profound habitat changes from urban and infrastructure development which have restricted its habitat in the low altitude Laurisilva (0 to 700 m) to small, scatered and inaccessible sites (Fernandes, 2011b).

But even in more extensive areas of high altitude Laurisilva many species are having difficulties in maintaining natural populations. Examples are: a species of fern endemic to the Laurisilva forest of Madeira Island, *Polystichum drepanum*, restricted to five sites within this KBA (Carvalho, 2011b); *Goodyera macrophylla*, a Madeiran endemic orchid, restricted to a few ravines in the central and northern part of the island, between 300 and 1400 m altitude (Rankou, 2011); the population of *Sinapidendron rupestre*, a small plant in the mustard family endemic to the Laurisilva of Madeira Island, recorded in only about five sites (Kell, 2011); and *Teucrium abutiloides*, presently reduced to a few mature individuals dispersed through less than 20 sites within the Laurisilva forest. The legal protection has been insufficient for the recovery of these species, which are threathened by invasive species, which greatly magnify the natural factors already affecting the species (Gouveia & Carvalho, 2009).

MAD4 - Coastal cliffs of Madeira island - Madeira

Description

The KBA "Coastal cliffs of Madeira Island" has a total area of 32 km^2, all of it terrestrial. This KBA has little coverage by protective legislation, namely 1 protected area and 1 Natura 2000 site. In this KBA a total of 15 trigger species were recorded (Table 48), of which 3 birds, 2 mammals, 5 mollusks and 5 plants. Of these 15 species, a total of 13 species are listed in IUCN's Red List, 4 of which as vulnerable, 2 as endangered and 7 as critically endangered.

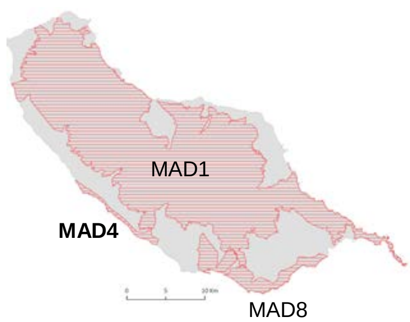


Table 48. Trigger species of KBA MAD4, Coastal cliffs of Madeira Island, Madeira

Group	Species	Status	Endemic	Restricted
Mollusca	*Actinella obserata*	CR	MAD	
Plantae	*Aichryson dumosum*	CR	MAD	
Plantae	*Andryala crithmifolia*	CR	MAD	Yes
Mollusca	*Discula tabellata*	CR	MAD	Yes
Plantae	*Jasminum azoricum*	CR	MAD	Yes
Plantae	*Sinapidendron angustifolium*	CR	MAD	
Mammalia	*Nyctalus leisleri verrucosus*	CR loc	MAD	
Plantae	*Cheirolophus massonianus*	EN	MAD	
Mammalia	*Pipistrellus maderensis*	EN	MAC	
Mollusca	*Actinella giramica*	VU	MAD	
Mollusca	*Caseolus leptostictus*	VU	MAD	
Mollusca	*Craspedopoma lyonnetianum*	VU	MAD	
Aves	*Anthus berthelotii berthelotii*	VU loc	MAC	
Aves	*Calonectris borealis*	CONGR	No	
Aves	*Columba trocaz*	ENDEM	MAD	

Main trigger species

Andryala crithmifolia
(© Instituto das Florestas e Conservação da Natureza)

Jasminum azoricum
(CC Daniel Feliciano)

Figure 45. Critically endangered species know only from KBA MAD4, Coastal cliffs of Madeira Island, Madeira.

Like all Macaronesian islands, the human impact on Madeira habitats and species is heaviest in the coastal areas, where human settlements and tourist developments are concentrated. Of the three critically endangered endemic species known only from this KBA (Table 48), images could only be found for the plants (Figure 45). The third species, *Discula tabellata*, is a sea-cliff living land snail restriced to a place called Garajau, where it is threatned by coastal construction and the resulting human pressures, compounded by invasive plants and fire. *Andryala* is a Mediterranean genus of the sunflower familiy, of which a single colonizing event likely led to a speciation radiation in Madeira and the Canaries into 8 different taxa (M. Z. Ferreira, 2016). *A. crithmifolia* is restricted presently to only two inaccessible localities in coastal cliffs, one of which has no legal protection (Fernandes, 2011a). The lemon-scented jasmine, *Jasminum azoricum*, is known in the wild from only two unstable locations, both included in MAD4 KBA, where it is threatned by invasive species and land use by humans (Fernandes, 2011c). However, its bright evergreen foliage, long flowering period and scented blooms led to its widespread cultivation by gardeners around the world.

MAD8 - São João creek - Santa Luzia creek - João Gomes creek - Madeira

Description

This KBA covers three creeks and its margins, for a total area of 15 km^2. It has no coverage by protective legislation. In this KBA a total of 8 trigger species were recorded (Table 49), of which 1 bird, 1 mammal and 6 mollusks. Of these 8 species, a total of 7 species are listed in IUCN's Red List, 2 of which as vulnerable, 1 as endangered and 4 as critically endangered.

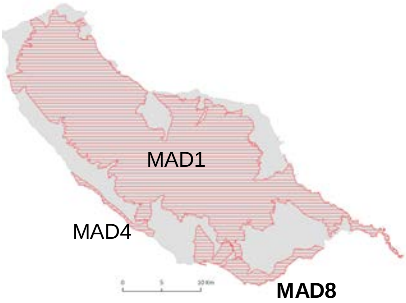


Table 49. Trigger species of KBA MAD8, São João, Santa Luzia and João Gomes creeks, Madeira.

Group	Species	Status	Endemic	Restricted
Mollusca	*Actinella arridens*	CR	MAD	
Mollusca	*Leiostyla cassidula*	CR	MAD	Yes
Mollusca	*Leiostyla gibba*	CR	MAD	Yes
Mammalia	*Nyctalus leisleri verrucosus*	CR loc	MAD	
Mollusca	*Leiostyla falknerorum*	EN	MAD	
Aves	*Columba trocaz*	ENDEM	MAD	
Mollusca	*Craspedopoma lyonnetianum*	VU	MAD	
Mollusca	*Leiostyla macilenta*	VU	MAD	

Main trigger species

As far as non-marine molluscs are concerned, the Bern Convention and the European Habitats Directive have been considered to be heavily biased towards Madeiran endemic snails (Bouchet, Falkner, & Seddon, 1999). This is a consequence of the drafting process of those documents, but it is also a reflection of the high diversity of land snails in the Madeira archipelago. *Leiostyla cassidula* and *Leiostyla gibba*, two endemic and critically endangered species, illustrate the threats and the unknowns still pending over this component of the Macaronesian fauna: *L. cassidula* is only known from a site of about 4km^2 included in MAD8 KBA with declining habitat quality due to a nearby road (Seddon, 2011c); *L. gibba*, on the other hand, has not been recorded alive for over 150 years, but still experts hesitate to consider it extinct (Seddon, 2011d).

PSA2 - Network of Marine Protected Areas of Porto Santo – Madeira

Description

The Network of Marine Protected Areas of **Porto Santo Island** has a total area of 27 km^2, of which 25 km^2 are marine and 2 km^2 terrestrial. This KBA is totally covered by protective legislation, namely 1 protected area, 1 Natura 2000 site and 1 Important Bird Area. In this KBA a total of 28 trigger species were recorded (Table 50), of which 4 birds, 1 mammal, 14 mollusks, 4 fish and 5 plants. Of these 28 species, a total of 24 species are listed in IUCN's Red List, 11 of which as vulnerable, 9 as endangered and 4 as critically endangered.

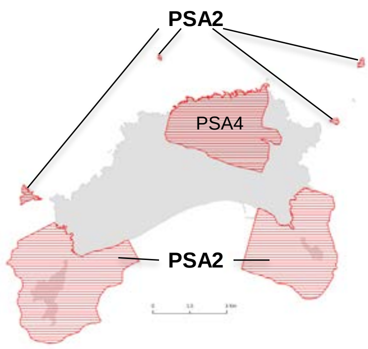


Table 50. Trigger species of KBA PSA2, Network of Marine Protected Areas of Porto Santo, Madeira

Group	Species	Status	Endemic	Restricted
Mollusca	*Cecilioides eulima*	CR	MAD	Yes
Mollusca	*Discula bulverii*	CR	MAD	
Mollusca	*Idiomela subplicata*	CR	MAD	Yes
Plantae	*Monizia edulis*	CR	MAD	
Plantae	*Cheirolophus massonianus*	EN	MAD	
Mollusca	*Discula pulvinata*	EN	MAD	
Mollusca	*Discula tectiformis*	EN	MAD	
Plantae	*Dracaena draco*	EN	MAC	
Fish	*Epinephelus marginatus*	EN	No	
Mollusca	*Lampadia webbiana*	EN	MAD	
Mollusca	*Leptaxis wollastoni*	EN	MAD	
Mammalia	*Monachus monachus*	EN	No	
Fish	*Mycteroperca fusca*	EN	MAC	
Mollusca	*Actinella littorinella*	VU	MAD	
Mollusca	*Amphorella cimensis*	VU	MAD	
Mollusca	*Amphorella melampoides*	VU	MAD	
Fish	*Bodianus scrofa*	VU	MAC	
Mollusca	*Caseolus calculus*	VU	MAD	
Plantae	*Chamaemeles coriacea*	VU	MAD	
Mollusca	*Hystricella turricula*	VU	MAD	Yes
Mollusca	*Leptaxis simia portosancti*	VU	MAD	Yes
Plantae	*Sideroxylon mirmulano*	VU	MAC	
Fish	*Sphyrna zygaena*	VU	No	
Aves	*Anthus berthelotii berthelotii*	VU loc	MAC	
Aves	*Calonectris borealis*	CONGR	No	
Aves	*Hydrobates castro*	CONGR	No	
Mollusca	*Geomitra turricula*	ENDEM	MAD	Yes
Aves	*Puffinus lherminieri*	ENDEM	MAC	

Main trigger species

Idiomela subplicata (© Porto Santo Verde)

Figure 46. Critically endangered species know only from KBA PSA2, Network of Marine Protected Areas of Porto Santo, Madeira

Porto Santo is home to several endemic terrestrial gastropods, many of them endangered (Table 50). *Cecilioides eulima* is a minuscule snail with a fragile shell. Its original habitat is grossly disturbed, and the species is not seen alive for over 70 years (Seddon, 2000). *Idiomela subplicata* (Figure 46), on the other hand, is quite large, but found only on two small islets in Porto Santo, where it is nevertheless threatned by predation from rodents and by competition with exotic species of snails (Seddon, 2011b).

PSA4 - Northeast area of Porto Santo – Madeira

Description

This terrestrial KBA has a total area of 11 km^2, with no coverage by protective legislation. A total of 17 trigger species were recorded here (Table 51), of which 2 birds, 1 mammal, 8 mollusks and 6 plants. Sixteen of these 17 species are listed in IUCN's Red List, 6 of which as vulnerable, 6 as endangered and 4 as critically endangered.

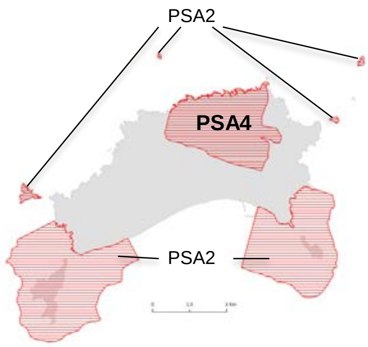


Table 51. Trigger species of KBA PSA4, Northeast area of Porto Santo, Madeira

Group	Species	Status	Endemic	Restricted
Mollusca	*Discula bulverii*	CR	MAD	
Mollusca	*Discula testudinalis*	CR	MAD	Yes
Plantae	*Monizia edulis*	CR	MAD	
Plantae	*Vicia ferreirensis*	CR	MAD	
Plantae	*Cheirolophus massonianus*	EN	MAD	
Mollusca	*Discula pulvinata*	EN	MAD	
Mollusca	*Discula tectiformis*	EN	MAD	
Mollusca	*Lampadia webbiana*	EN	MAD	

Group	Species	Status	Endemic	Restricted
Mollusca	*Leptaxis wollastoni*	EN	MAD	
Mammalia	*Pipistrellus maderensis*	EN	MAC	
Mollusca	*Amphorella melampoides*	VU	MAD	
Plantae	*Chamaemeles coriacea*	VU	MAD	
Mollusca	*Cylichnidia ovuliformis*	VU	MAD	
Plantae	*Saxifraga portosanctana*	VU	MAD	
Plantae	*Sideroxylon mirmulano*	VU	MAC	
Aves	*Anthus berthelotii berthelotii*	VU loc	MAC	
Aves	*Calonectris borealis*	CONGR	No	

Main trigger species

Discula testudinalis is a small gastropod known only from a small headland on dry stony ground. It is extremely rare, and threatned by fire and predation (Seddon, 2011a).

SEL1 - Selvagens Islands – Madeira

Description

The "**Selvagens Islands**" KBA has a total area of 1.246 km^2, of which 1.243 km^2 are marine and 3 km^2 terrestrial. It is totally covered by protective legislation, namely 1 protected area, 2 Natura 2000 sites and 2 Important Bird Areas. In this KBA a total of 29 trigger species were recorded (Table 52), of which 6 birds, 1 arthropod, 1 mollusk, 3 fish, 17 plants and 1 reptile. Of these 29 species, a total of 8 species are listed in IUCN's Red List, 3 of which as vulnerable, 4 as endangered and 1 as critically endangered.

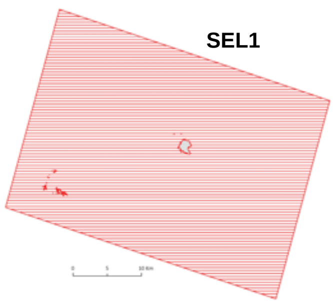


Table 52. Trigger species of KBA SEL1, Selvagens Islands, Madeira

Group	Species	Status	Endemic	Restricted
Plantae	*Beta patula*	CR	MAD	
Plantae	*Argyranthemum thalassophilum*	EN	MAD	Yes
Plantae	*Asparagus nesiotes*	EN	MAC	
Fish	*Epinephelus marginatus*	EN	No	
Fish	*Mycteroperca fusca*	EN	MAC	
Fish	*Bodianus scrofa*	VU	MAC	
Reptilia	*Tarentola bischoffi*	VU loc	MAD	Yes
Aves	*Anthus berthelotii berthelotii*	VU loc	MAC	
Aves	*Bulweria bulwerii*	CONGR	No	
Aves	*Calonectris borealis*	CONGR	No	
Aves	*Hydrobates castro*	CONGR	No	
Aves	*Pelagodroma marina*	CONGR	No	
Arthropoda	*Deucalion oceanicum*	ENDEM	MAD	Yes

Group	Species	Status	Endemic	Restricted
Plantae	*Euphorbia anachoreta*	ENDEM	MAD	
Plantae	*Limonium papillatum var.callibotryum*	ENDEM	MAD	
Plantae	*Lobularia canariensis rosula-venti*	ENDEM	MAD	
Plantae	*Lobularia canariensis succulenta*	ENDEM	MAD	
Plantae	*Misopates salvagense*	ENDEM	MAD	
Plantae	*Monanthes lowei*	ENDEM	MAD	
Mollusca	*Patella candei*	ENDEM	MAC	
Plantae	*Plantago afra var. obtusata*	ENDEM	MAD	Yes
Aves	*Puffinus lherminieri*	ENDEM	MAC	
Plantae	*Rumex simpliciflorus maderensis*	ENDEM	MAD	
Plantae	*Scilla madeirensis var. melliodora*	ENDEM	MAD	
Plantae	*Scrophularia lowei*	ENDEM	MAD	
Plantae	*Scrophularia racemosa*	ENDEM	MAD	
Plantae	*Sedum fusiforme*	ENDEM	MAD	
Plantae	*Siderites candicans var. crassifolia*	ENDEM	MAD	
Plantae	*Solanum patens*	ENDEM	MAD	

Main trigger species

Argyranthemum thalassophilum
(© Parque Natural da Madeira)

Tarentola bischoffi
(© Vanessa Gil)

Figure 47. Critically endangered species know only from KBA SEL1, Selvagens Islands, Madeira

Argyranthemum is the largest endemic plant genus of any volcanic archipelago in the Atlantic Ocean, including 24 species and 15 subspecies, having radiated into all major habitats in Madeira, Selvagens and the Canaries. The ancestor of these dill daisies originated from the Mediterranean basin in the late Tertiary, 1.5 to 3.0 million years ago (Francisco-Ortega, Jansen, & Santos-Guerra, 1996). *Argyranthemum thalassophilum* is endemic to the Selvagens Islands, where less than 250 individuals have been counted but the population is considered to be stable (Caldas, 2011).

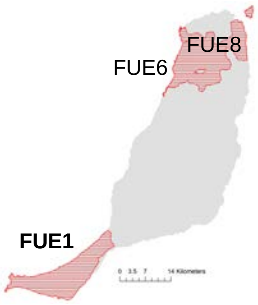
The Macaronesian geckos also have an interesting evolutionary history (Carranza, Arnold, Mateo, & López-Jurado, 2000). They originate in North Africa and share ancestors with geckos from Cape Verde and Cuba. The affinities of the Selvagens gecko, *Tarentola bischoffi* (Figure 47), are still debated but its small area of distribution led to a classification of Vulnerable in a Portuguese publication (Cabral et al., 2005). The population, estimated in 10,000 individuals divided in three main islets, is believed to be rising since the eradication of the exotic terrestrial mammals (Rebelo, 2010).

CANARY ISLANDS

FUE1 - Jandía Peninsula - Canary Is.

Description

This KBA in **Fuerteventura Island** is totally covered by protective legislation, namely 2 protected areas, 4 Natura 2000 sites, 2 Important Bird Areas and 1 Ramsar site. However, there are no real conservation measures in place (Scholz, 2013a). As most low altitude habitats, it is subject to intense human pressure, in this case mainly related to grazing by goats and trampling by animals and humans. Further threats from hotel developments and road linkages are feared (Groh & Alonso, 2013a).



A total of 34 trigger species were recorded (Table 53), of which 7 birds, 2 arthropods, 6 mollusks and 19 plants. Of these 34 species, a total of 30 are listed in IUCN's Red List, 9 of which as vulnerable, 11 as endangered and 10 as critically endangered.

Table 53. Trigger species for FUE1, Jandía Peninsula, Canary Is.

Group	Species	Conservation	Endemic	Restricted
Mollusca	*Canariella jandiaensis*	CR	CAN	Yes
Plantae	*Argyranthemum winteri*	CR	CAN	Yes
Plantae	*Echium handiense*	CR	CAN	Yes
Plantae	*Onopordum nogalesii*	CR	CAN	Yes
Plantae	*Carduus bourgeaui*	CR loc	CAN	Yes
Plantae	*Ononis christii*	CR loc	CAN	Yes
Plantae	*Aichryson pachycaulon pachycaulon*	CR loc	CAN	Yes
Arthropoda	*Trechus detersus*	CR loc	CAN	
Plantae	*Limonium bourgeaui*	CR loc	CAN	
Plantae	*Volutaria bollei*	CR loc	CAN	
Mollusca	*Canariella eutropis*	EN	CAN	Yes
Mollusca	*Obelus discogranulatus*	EN	CAN	Yes
Arthropoda	*Purpuraria erna*	EN	CAN	
Aves	*Neophron percnopterus*	EN	No	
Plantae	*Asparagus nesiotes*	EN	MAC	
Plantae	*Bupleurum handiense*	EN	CAN	
Mollusca	*Cryptella susannae*	EN loc	CAN	Yes
Plantae	*Orthotrichum handiense*	EN loc	CAN	Yes
Plantae	*Sideritis pumila*	EN loc	CAN	
Plantae	*Pulicaria canariensis canariensis*	EN loc	CAN	

Group	Species	Conservation	Endemic	Restricted
Plantae	*Echium decaisnei purpuriense*	EN	CAN	
Mollusca	*Napaeus lichenicola*	VU	CAN	Yes
Mollusca	*Obelus moratus*	VU	CAN	Yes
Plantae	*Euphorbia handiensis*	VU	CAN	Yes
Plantae	*Heberdenia excelsa*	VU	MAC	
Aves	*Chlamydotis undulata*	VU	No	
Plantae	*Asparagus arborescens*	VU	CAN	
Plantae	*Picconia excelsa*	VU	MAC	
Plantae	*Sideroxylon canariensis*	VU loc	CAN	
Aves	*Anthus berthelotii berthelotii*	VU loc	MAC	
Aves	*Calonectris borealis*	CONGR	No	
Aves	*Sterna hirundo*	CONGR	No	
Aves	*Corvus corax canariensis*	ENDEM	CAN	
Aves	*Saxicola dacotiae dacotiae*	ENDEM	CAN	

Main trigger species

Echium handiense (©' Chuck B.)

Argyranthemum winteri (© Krzysztof Ziarnek)

Onopordum nogalesii (© Anita Stridvall)

Figure 48. Selected critically endangered species occuring only on KBA FUE1, Jandía Peninsula, Canary Is.

This site is home to 8 species of plants and 6 species of molluscs that are found nowhere else. Two of the critically endangered species of plants (*Onopordum nogalesii* and *Echium handiense*, Figure 48) occur only on small, single locations and have numbers of mature individuals between 70 and 145 (Scholz, 2013a, 2013b).

FUE6 - North area of Fuerteventura - Canary Is.

Description

With a total area of 222 km^2, all of it terrestrial, this KBA is partially covered by protective legislation, namely 5 protected areas, 7 Natura 2000 sites and 5 Important Bird Areas. In this KBA a total of 14 trigger species were recorded (Table 54), of which 8 birds, 1 arthropod, 1 mammal, 3 plants and 1 reptile. Of these 14 species, a total of 9 are listed in IUCN's Red List, 4 of which as vulnerable and 5 as endangered.

Table 54. Trigger species for FUE6, North area of Fuerteventura, Canary Is.

Group	Species	Status	Endemic	Restricted
Mammalia	*Crocidura canariensis*	EN	CAN	
Aves	*Neophron percnopterus*	EN	No	
Reptilia	*Chalcides simonyi*	EN	CAN	
Arthropoda	*Maiorerus randoi*	EN loc	CAN	Yes
Plantae	*Pulicaria canariensis canariensis*	EN loc	CAN	
Plantae	*Aeonium balsamiferum*	VU	CAN	
Plantae	*Androcymbium psammophilum*	VU	CAN	
Aves	*Chlamydotis undulata*	VU	No	
Aves	*Anthus berthelotii berthelotii*	VU loc	MAC	
Aves	*Calonectris borealis*	CONGR	No	
Aves	*Sterna hirundo*	CONGR	No	
Aves	*Tyto alba gracilirostris*	ENDEM	CAN	
Aves	*Corvus corax canariensis*	ENDEM	CAN	
Aves	*Saxicola dacotiae dacotiae*	ENDEM	CAN	

Main trigger species

Maioreus randoi (© Pedro Oromí)

Figure 49. Critically endangered species occuring only on KBA FUE6, North area of Fuerteventura, Canary Is.

Maioreus randoi (Figure 491) is a blind opilione arachnid described in 1993 and known only from a 648 m long volcanic tube included in this KBA and formed nearly 1 million years ago. The site is not protected and is subject to frequent tourist visits (Oromí, 2009). Although considered in danger of extinction in the Spanish Catalog of Threatened Species, this species is not included in the Red List.

FUE8 - Island of Lobos - Canary Is.

Description

This KBA has a total area of 5 km^2, all of it terrestrial. It is totally covered by protective legislation, namely 1 protected area, 2 Natura 2000 sites and 1 Important Bird Area. In this KBA a total of 10 trigger species were recorded (Table 55), of which 6 birds, 1 arthropod, 1 mammal, 1 plant and 1 reptile. Of these 10 species, a total of 6 are listed in IUCN's Red List, 1 of which as vulnerable, 4 as endangered and 1 as critically endangered.

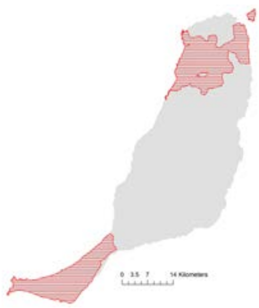


Table 55. Trigger species for FUE8, Island of Lobos, Canary Is.

Group	Species	Status	Endemic	Restricted
Plantae	*Limonium ovalifolium canariense*	CR loc	CAN	Yes
Mammalia	*Crocidura canariensis*	EN	CAN	
Arthropoda	*Purpuraria erna*	EN	CAN	
Aves	*Neophron percnopterus*	EN	No	
Reptilia	*Chalcides simonyi*	EN	CAN	
Aves	*Anthus berthelotii berthelotii*	VU loc	MAC	
Aves	*Calonectris borealis*	CONGR	No	

Aves	*Sterna hirundo*	CONGR	No
Aves	*Tyto alba gracilirostris*	ENDEM	CAN
Aves	*Corvus corax canariensis*	ENDEM	CAN

Main trigger species

Limonium ovalifolium canariense (© G.B. Kortleve)

Figure 50. Critically endangered species found only on KBA FUE8, Island of Lobos, Canary Is.

This is the only site where the halophite *Limonium ovalifolium canariense* (Figure 50) can be found, although it once had a much larger distribution in the islands of Lanzarote and Fuerteventura (Suaréz García, Roca, & Vilches, 2004).

GCA1 - La Solana - Canary Is.

Description

With a total area of 110 km2, all of it terrestrial, this KBA in Gran Canaria Island is totally covered by protective legislation, namely 4 protected areas, 8 Natura 2000 sites and 3 Important Bird Areas. In this KBA a total of 31 trigger species were recorded (Table 56), of which 4 birds, 3 arthropods and 24 plants. Of these 31 species, a total of 28 are listed in IUCN's Red List, 8 of which as vulnerable, 13 as endangered and 7 as critically endangered.

Table 56. Trigger species for GCA1, La Solana, Canary Is.

Group	Species	Status	Endemic	Restricted
Plantae	*Helianthemum bystropogophyllum*	CR	CAN	Yes
Plantae	*Limonium sventenii*	CR	CAN	
Plantae	*Dracaena tamaranae*	CR loc	CAN	
Plantae	*Helianthemum inaguae*	CR loc	CAN	Yes
Plantae	*Limonium vigaroense*	CR loc	CAN	Yes
Plantae	*Scrophularia calliantha*	CR loc	CAN	

Group	Species	Status	Endemic	Restricted
Plantae	*Sideritis sventenii*	CR loc	CAN	
Plantae	*Cheirolophus falcisectus*	EN	CAN	
Plantae	*Crambe scoparia*	EN	CAN	Yes
Plantae	*Dracaena draco*	EN	MAC	
Arthropoda	*Graptodytes delectus*	EN	CAN	
Arthropoda	*Hydroporus pilosus*	EN	CAN	
Plantae	*Isoplexis isabelliana*	EN	CAN	
Plantae	*Micromeria leucantha*	EN	CAN	Yes
Arthropoda	*Sphingonotus guanchus*	EN	CAN	
Plantae	*Teline rosmarinifolia*	EN	CAN	
Plantae	*Helianthemum tholiforme*	EN loc	CAN	
Plantae	*Micromeria pineolens*	EN loc	CAN	
Plantae	*Parolinia filifolia*	EN loc	CAN	
Plantae	*Echium onosmifolium spectabile*	EN	CAN	
Plantae	*Asparagus plocamoides*	VU	CAN	
Plantae	*Dendriopoterium pulidoi*	VU	CAN	Yes
Plantae	*Globularia sarcophylla*	VU	CAN	
Plantae	*Camptoloma canariensis*	VU loc	CAN	
Plantae	*Cheirolophus arbutifolius*	VU loc	CAN	
Plantae	*Convolvulus scoparius*	VU loc	CAN	
Plantae	*Lotus spartioides*	VU loc	CAN	
Aves	*Anthus berthelotii berthelotii*	VU loc	MAC	
Aves	*Calonectris borealis*	CONGR	No	
Aves	*Corvus corax canariensis*	ENDEM	CAN	
Aves	*Fringilla teydea polatzeki*	ENDEM	CAN	

Main trigger species

Helianthemum bystropogophyllum (© R.S.Almeida)

Figure 51. Critically endangered species restricted to KBA GCA1, La Solana, Canary Is.

This site harbours six plant species found nowhere else in the world. Three of these are critically endangered, including *Helianthemum bystropogophyllum* (Figure 51), a Red List species with an area of occupation smaller that 60 m^2 in the whole of its 3 subpopulations (Martín Osorio, Wildpret de la Torre, & Marrero Rodríguez, 2004).

GCA2 - Los Marteles - Canary Is.

Description

With a total area of 124 km^2, all of it terrestrial, this KBA is partially covered by protective legislation, namely 10 protected areas, 10 Natura 2000 sites and 2 Important Bird Areas. In this KBA a total of 34 trigger species were recorded (Table 57), of which 2 birds, 6 arthropods and 26 plants. Of these 34 species, a total of 31 are listed in IUCN's Red List, 7 of which as vulnerable, 14 as endangered and 10 as critically endangered.

Table 57. Trigger species for KBA GCA2, Los Marteles, Canary Is.

Group	Species	Status	Endemic	Restricted
Plantae	*Bencomia brachystachya*	CR	CAN	Yes
Plantae	*Onopordum carduelium*	CR	CAN	Yes
Plantae	*Pericallis hadrosoma*	CR	CAN	Yes
Plantae	*Solanum lidii*	CR	CAN	
Arthropoda	*Cionus canariensis*	CR loc	CAN	
Plantae	*Hypericum coadunatum*	CR loc	CAN	
Plantae	*Kunkeliella canariensis*	CR loc	CAN	Yes
Plantae	*Parolinia platypetala*	CR loc	CAN	Yes
Plantae	*Scrophularia calliantha*	CR loc	CAN	
Plantae	*Urtica morifolia*	CR loc	MAC	
Plantae	*Anagyris latifolia*	EN	CAN	
Arthropoda	*Calliphona alluaudi*	EN	CAN	
Plantae	*Crambe pritzelii*	EN	CAN	
Plantae	*Dracaena draco*	EN	MAC	
Arthropoda	*Graptodytes delectus*	EN	CAN	
Arthropoda	*Hydroporus pilosus*	EN	CAN	
Plantae	*Isoplexis isabelliana*	EN	CAN	
Arthropoda	*Sphingonotus guanchus*	EN	CAN	
Plantae	*Tanacetum ptarmiciflorum*	EN	CAN	
Plantae	*Teline rosmarinifolia*	EN	CAN	
Plantae	*Aichryson bituminosum*	EN loc	CAN	Yes
Plantae	*Argyranthemum adauctum jacobaeifolium*	EN loc	CAN	
Plantae	*Helianthemum tholiforme*	EN loc	CAN	
Plantae	*Malva canariensis*	EN loc	CAN	
Plantae	*Echium callithyrsum*	VU	CAN	

Group	Species	Status	Endemic	Restricted
Plantae	*Globularia sarcophylla*	VU	CAN	
Plantae	*Aichryson porphyrogennetos*	VU loc	CAN	
Plantae	*Camptoloma canariensis*	VU loc	CAN	
Plantae	*Cheirolophus arbutifolius*	VU loc	CAN	
Plantae	*Lotus spartioides*	VU loc	CAN	
Plantae	*Semele gayae*	VU loc	CAN	
Arthropoda	*Carabus coarctatus*	ENDEM	CAN	
Aves	*Corvus corax canariensis*	ENDEM	CAN	
Aves	*Fringilla teydea polatzeki*	ENDEM	CAN	

Main trigger species

Bencomia brachystachya
(© Antonie van den Bos)

Onopordum carduelium
(© Orlando Torres Sanchez)

Pericallis hadrosoma (© Orlando Torres Sanchez)

Figure 52. Some of the critically endangered species restricted to KBA GCA2, Los Marteles, Canary Is.

Of the six plant species found only on this location (Figure 52), 5 are classified as critically endangered, 3 of which are included in the Global Red List.

GCA4 - Tamadaba - south - Canary Is.

Description

This KBA has a total area of 18 km^2, all of it terrestrial. It is mostly covered by protective legislation, namely 2 protected areas, 3 Natura 2000 sites and 2 Important Bird Areas. In this KBA a total of 14 trigger species were recorded (Table 58), of which 3 birds, 3 arthropods and 8 plants. Of these 14 species, a total of 10 are listed in IUCN's Red List, 2 of which as vulnerable, 6 as endangered and 2 as critically endangered.

Table 58. Trigger species for GCA4, Tamadaba south, Canary Is.

Group	Species	Status	Endemic	Restricted
Arthropoda	*Dicrodontus alluaudi*	CR loc	CAN	
Plantae	*Limonium benmageci*	CR loc	CAN	Yes
Plantae	*Anagyris latifolia*	EN	CAN	
Plantae	*Argyranthemum lidii*	EN	CAN	
Plantae	*Lotus callis-viridis*	EN	CAN	
Arthropoda	*Sphingonotus guanchus*	EN	CAN	
Plantae	*Descurainia artemisioides*	EN loc	CAN	
Plantae	*Sideritis guayedrae*	EN loc	CAN	
Plantae	*Camptoloma canariensis*	VU loc	CAN	
Plantae	*Cheirolophus arbutifolius*	VU loc	CAN	
Aves	*Calonectris borealis*	CONGR	No	
Aves	*Sterna hirundo*	CONGR	No	
Arthropoda	*Carabus coarctatus*	ENDEM	CAN	
Aves	*Corvus corax canariensis*	ENDEM	CAN	

Trigger species

Limonium benmageci (©' Ben Magec - Ecologistas en Acción)

Figure 53. Critically endangered species known only from KBA GCA4, Tamadaba south, Canary Is.

Limonium benmageci (Figure 53) is another example of the exacerbation of threats caused by a reduction of suitable habitat. Although it is found within a protected area, it distribution is limited to an area of only about 500 x 50 m, where it is grazed by wild goats, trampled by nesting seagulls and detached by periodic land slides (Á. Marrero & Almeida, 2008).

GCA5 - Tamadaba north - Canary Is.

Description

This has a total area of 47 km^2, all of it terrestrial. It is partially covered by protective legislation, namely 2 protected areas, 2 Natura 2000 sites and 1 Important Bird Area. In this KBA a total of 32 trigger species were recorded (Table 59), of which 5 birds, 3 arthropods, 2 mollusks and 22 plants. Of these 32 species, a total of 28 are listed in IUCN's Red List, 5 of which as vulnerable, 17 as endangered and 6 as critically endangered.

Table 59. Trigger species for GCA5, Tamadaba north, Canary Is.

Group	Species	Status	Endemic	Restricted
Plantae	*Crambe tamadabensis*	CR	CAN	
Plantae	*Globularia ascanii*	CR	CAN	Yes
Mollusca	*Hemicycla saulcyi*	CR	CAN	
Plantae	*Limonium sventenii*	CR	CAN	
Plantae	*Tanacetum oshanahanii*	CR	CAN	Yes
Plantae	*Scrophularia calliantha*	CR loc	CAN	
Plantae	*Argyranthemum lidii*	EN	CAN	
Arthropoda	*Calliphona alluaudi*	EN	CAN	
Plantae	*Crambe pritzelii*	EN	CAN	
Plantae	*Isoplexis isabelliana*	EN	CAN	
Arthropoda	*Leipaspis pinicola*	EN	CAN	
Plantae	*Lotus callis-viridis*	EN	CAN	
Mollusca	*Napaeus myosotis*	EN	CAN	
Arthropoda	*Sphingonotus guanchus*	EN	CAN	
Plantae	*Sventenia bupleuroides*	EN	CAN	Yes
Plantae	*Teline rosmarinifolia*	EN	CAN	
Plantae	*Aichryson pachycaulon praetermissum*	EN loc	CAN	
Plantae	*Descurainia artemisioides*	EN loc	CAN	
Plantae	*Helianthemum tholiforme*	EN loc	CAN	
Plantae	*Malva canariensis*	EN loc	CAN	
Plantae	*Micromeria pineolens*	EN loc	CAN	
Plantae	*Schizogyne glaberrima*	EN loc	CAN	
Plantae	*Sideritis guayedrae*	EN loc	CAN	
Plantae	*Echium callithyrsum*	VU	CAN	
Plantae	*Pteris incompleta*	VU	No	
Aves	*Anthus berthelotii berthelotii*	VU loc	MAC	

Group	Species	Status	Endemic	Restricted
Plantae	*Cheirolophus arbutifolius*	VU loc	CAN	
Plantae	*Lotus spartioides*	VU loc	CAN	
Aves	*Calonectris borealis*	CONGR	No	
Aves	*Sterna hirundo*	CONGR	No	
Aves	*Corvus corax canariensis*	ENDEM	CAN	
Aves	*Fringilla teydea polatzeki*	ENDEM	CAN	

Main trigger species

Globularia ascanii
(© A. Marrero)

Tanacetum oshanahanii
(© Leif Stridvall)

Figure 54. Critically endangered species restricted to KBA GCA5, Tamadaba north, Canary Is.

The two Red List plant species on Figure 54 have their whole world distribution contained within this KBA. Both have less than 50 individuals surviving in the wild, and severely fragmented populations (Febles Hernández, Naranjo Suárez, & Fernández-Palacios Acosta, 2013; Marrero Rodríguez & Almeida Pérez, 2013). Common threats are grazing by wild goats, trampling by humans and low capacity to resist competition from other species. Imbreeding may be a causative factor in the later threat. The full list of trigger species can be found on Table 59.

GCA7 - Santo Andrés - Valle Seco - Canary Is.

Description

This KBA has a total area of 61 km^2, all of it terrestrial. It is mostly covered by protective legislation, namely 6 protected areas and 5 Natura 2000 sites. In this KBA a total of 33 trigger species were recorded (Table 60), of which 1 bird, 7 arthropods, 3 mollusks and 22 plants. Of these 33 species, a total of 31 are listed in IUCN's Red List, 8 of which as vulnerable, 11 as endangered and 12 as critically endangered.

Table 60. Trigger species of KBA GCA7, Santo Andrés - Valle Seco, Canary Is.

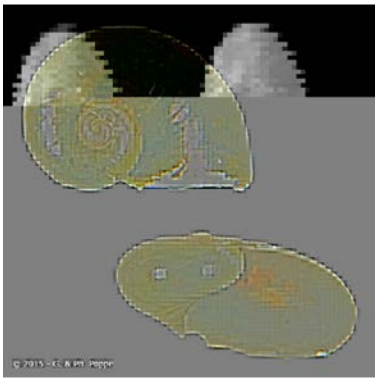
Group	Species	Status	Endemic	Restricted
Plantae	*Isoplexis chalcantha*	CR	CAN	Yes
Mollusca	*Napaeus osoriensis*	CR	CAN	Yes
Plantae	*Patellifolia webbiana*	CR	CAN	
Mollusca	*Plutonia machadoi*	CR	CAN	Yes
Plantae	*Sideritis discolor*	CR	CAN	Yes
Arthropoda	*Cionus canariensis*	CR loc	CAN	
Arthropoda	*Dicrodontus alluaudi*	CR loc	CAN	
Plantae	*Dorycnium broussonetii*	CR loc	CAN	
Plantae	*Hypericum coadunatum*	CR loc	CAN	
Plantae	*Scrophularia calliantha*	CR loc	CAN	
Plantae	*Urtica morifolia*	CR loc	MAC	
Plantae	*Solanum vespertilio doramae*	CR loc	CAN	Yes
Arthropoda	*Calliphona alluaudi*	EN	CAN	
Plantae	*Crambe pritzelii*	EN	CAN	
Arthropoda	*Graptodytes delectus*	EN	CAN	
Arthropoda	*Hydroporus pilosus*	EN	CAN	
Plantae	*Isoplexis isabelliana*	EN	CAN	
Mollusca	*Napaeus myosotis*	EN	CAN	
Arthropoda	*Sphingonotus guanchus*	EN	CAN	
Plantae	*Tanacetum ptarmiciflorum*	EN	CAN	
Plantae	*Sambucus nigra palmensis*	EN	CAN	
Plantae	*Aichryson pachycaulon praetermissum*	EN loc	CAN	
Plantae	*Argyranthemum adauctum jacobaeifolium*	EN loc	CAN	
Plantae	*Echium callithyrsum*	VU	CAN	
Plantae	*Picconia excelsa*	VU	MAC	
Plantae	*Pteris incompleta*	VU	No	
Plantae	*Aichryson porphyrogennetos*	VU loc	CAN	
Plantae	*Camptoloma canariensis*	VU loc	CAN	
Plantae	*Cheirolophus arbutifolius*	VU loc	CAN	
Plantae	*Gesnouinia arborea*	VU loc	CAN	
Plantae	*Semele gayae*	VU loc	CAN	
Arthropoda	*Carabus coarctatus*	ENDEM	CAN	
Aves	*Corvus corax canariensis*	ENDEM	CAN	

Main trigger species

Isoplexis chalcantha
(© Leif Stridvall)

Sideritis discolor
(© Leif Stridvall)

Napaeus osoriensis
(© Robert Reuselaars)



Plutonia machadoi
(©' Guido Poppe)

Figure 55. Red List species restricted to KBA GCA7, Santo Andrés - Valle Seco, Canary Is.

Two plant species are restricted to this KBA (Figure 55). *Isoplexis chalcantha* has a highly fragmented and restricted geographic range. Main threats include droughts and predation by rabits on seedlings and young individuals (Marrero Rodríguez & Naranjo Morales, 2013). The severely fragmented population of *Sideritis discolor,* with an area of occupancy of only 1.25 km^2, suffers drastic annual and seasonal fluctuations which have caused the reduction of its effectives to dangerously low levels (Marrero Rodríguez, 2013).

Two species of land snails are also restricted to single sites in degraded laurisilva forest within this KBA, where conservation practices are counteracted by agriculture-related pressures (Groh, 2013; Groh & Alonso, 2013c).

GCA8 - Cruz de Pineda - Barranco del Pino - Canary Is.

Description

This KBA, with a total area of 11 km^2, all of it terrestrial, is partially covered by protective legislation, namely 1 protected areas and 1 Natura 2000 site. In this KBA a total of 4 trigger species were recorded (Table 61), of which 1 arthropod and 3 plants. All 4 species are listed in IUCN's Red List, 2 of which as endangered and 2 as critically endangered.

Table 61. Trigger species of GCA8, Cruz de Pineda - Barranco del Pino, Canary Is.

Group	Species	Status	Endemic	Restricted
Plantae	*Teline nervosa*	CR	CAN	Yes
Arthropoda	*Dicrodontus alluaudi*	CR loc	CAN	
Plantae	*Crambe pritzelii*	EN	CAN	
Plantae	*Dracaena draco*	EN	MAC	

Main trigger species

Teline nervosa (© Peter Schönfelder)

Figure 56. Critically endangered species restricted to KBA GCA8, Cruz de Pineda - Barranco del Pino, Canary Is.

Teline nervosa (Figure 56) is a rupicolous species which grows in degraded and steep sites within thermophile forests. Known only from two sites within this KBA, its 300 mature individuals are threatened by seed predation from insects and by habitat degradation from human activities (Navarro Denis, Navarro Valdivielso, & Naranjo Suárez, 2013).

GCA9 - Pino Santo - Canary Is.

Description

KBA "Pino Santo" has a total area of 12 km^2, all of it terrestrial. It is partially covered by protective legislation, namely 3 protected areas and 2 Natura 2000 sites. In this KBA a total of 10 trigger species were recorded (Table 62), of which 2 birds, 1 arthropod, 2 mollusks and 5 plants. Of these 10 species, a total of 8 species are listed in IUCN's Red List, 1 of which as vulnerable, 4 as endangered and 3 as critically endangered.

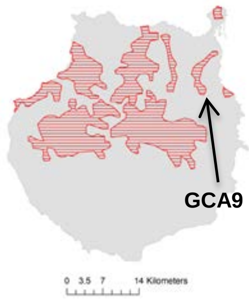


Table 62. Trigger species of GCA9, Pino Santo, Canary Is.

Group	Species	Status	Endemic	Restricted
Mollusca	*Napaeus exilis*	CR	CAN	Yes
Plantae	*Parolinia glabriuscula*	CR loc	CAN	Yes
Arthropoda	*Dicrodontus alluaudi*	CR loc	CAN	
Mollusca	*Napaeus myosotis*	EN	CAN	
Plantae	*Anagyris latifolia*	EN	CAN	
Plantae	*Crambe pritzelii*	EN	CAN	
Plantae	*Dracaena draco*	EN	MAC	
Plantae	*Camptoloma canariensis*	VU loc	CAN	
Aves	*Calonectris borealis*	CONGR	No	
Aves	*Puffinus lherminieri*	ENDEM	MAC	

Main trigger species

Napaeus exilis
(© Robert Reuselaars)

Parolinia glabriuscula
(© James Steakley)

Figure 57. Critically endangered species restricted to KBA GCA9, Pino Santo, Canary Is.

Napaeus exilis (Figure 57) is an endemic land snail restricted to Jardin Canario, a garden conserving Canarian plants (Groh & Alonso, 2013b). The fragile looking *Parolinia glabriuscula* (Fig. x) is only found in the wild on a single rock ledge from where land slides are frequent. In both cases the sites have tourist interest and this adds to the negative pressures on the surviving populations (O. Fernández-Palacios, Vilches, & Ortega, 2004).

GCA13 - Jinámar - Canary Is.

Description

The "Jinámar" KBA has a total area of 2 km^2, all of it terrestrial. It is partially protected by 1 protected areas and 1 Natura 2000 site. In this KBA a total of 4 trigger species were recorded (Table 63), of which 2 birds, 1 mollusk and 1 plant. Of these 4 species, a total of 3 species are listed in IUCN's Red List, 1 of which as vulnerable, 1 as endangered and 1 as critically endangered.

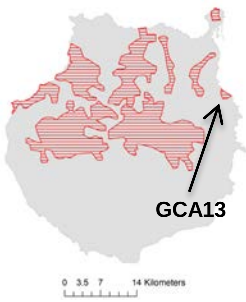


Table 63. Trigger species for GCA13, Jinámar, Canary Is.

TAXA	Species	Status	Endemic	Restricted
Plantae	*Lotus kunkelii*	CR	CAN	Yes
Mollusca	*Napaeus myosotis*	EN	CAN	
Aves	*Anthus berthelotii berthelotii*	VU loc	MAC	
Aves	*Calonectris borealis*	CONGR	No	

Main trigger species

Lotus kunkelii (© J. Naranjo)

Figure 58. Critically endangered species restricted to KBA GCA13, Jinámar, Canary Is.

Only 41 mature individuals of *Lotus kunkelii* (Figure 58) remained on Jinámar beach in 2013 (Navarro Denis, Navarro Valdivielso, & Naranjo Suárez, 2004), threathened by construction and trampling by humans. Since then, conservation actions carried out by the Gran Canaria Council, including *ex-situ* conservation, *in situ* re-planting and removing invasive species (Cabildo de Gran Canaria, 2015), have allegedly improved the situation.

GCA18 - Las Palmas - Canary Is.

Description

This fully terrestrial KBA has a total area of 3 km^2 most of it covered by protective legislation, namely 1 protected area. In this KBA a total of 6 trigger species were recorded (Table 64), of which 2 birds and 4 mollusks. Of these 6 species, a total of 4 species are listed in IUCN's Red List, 1 of which as endangered and 3 as critically endangered.

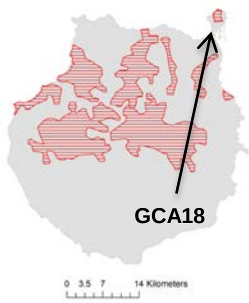


Table 64. Trigger species for KBA GCA18, Las Palmas, Canary Is.

Group	Species	Status	Endemic	Restricted
Mollusca	*Hemicycla saulcyi*	CR	CAN	Yes
Mollusca	*Monilearia tumulorum*	CR	CAN	Yes
Mollusca	*Napaeus isletae*	CR	CAN	Yes
Mollusca	*Theba grasseti*	EN	CAN	Yes
Aves	*Calonectris borealis*	CONGR	No	
Aves	*Puffinus lherminieri*	ENDEM	MAC	

Main trigger species

Hemicycla saulcyi (© María Rosario Alonso y Miguel Ibáñez)

Figure 59. One of the critically endangered land snails restricted to KBA GCA18, Las Palmas, Canary Is.

Four species of snail (including *Hemicycla saulcyi*, Figure 59) are known only from this location, from a much larger distribution before the construction surge in the littoral of Gran Canaria Island. They are threatned by the actions connected with the military base in which they occur, but will most likely go extinct when the base is inactivated, if the land is turned over for urban expansion.

GOM1 - Garajonay- Chejelipes - Canary Is.

Description

"Garajonay-Chejelipes" covers a total area of 58 km^2 on **La Gomera Island**, all of it terrestrial. This KBA is mostly covered by protective legislation, namely 6 protected areas, 13 Natura 2000 sites and 3 Important Bird Areas. In this KBA a total of 50 trigger species were recorded (Table 65), of which 7 birds, 3 arthropods, 1 mammal, 1 mollusk and 38 plants. Of these 50 species, a total of 44 species are listed in IUCN's Red List, 21 of which as vulnerable, 14 as endangered and 9 as critically endangered.

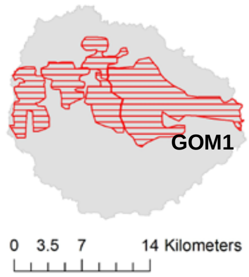


Table 65. Trigger species of GOM1, Garajonay- Chejelipes, Canary Is.

Group	Species	Status	Endemic	Restricted
Plantae	*Echium acanthocarpum*	CR	CAN	Yes
Plantae	*Ilex perado lopezlilloi*	CR	CAN	
Plantae	*Limonium dendroides*	CR	CAN	
Mollusca	*Plutonia falcifera*	CR	CAN	Yes
Plantae	*Sideritis marmorea*	CR	CAN	Yes
Plantae	*Convolvulus subauriculatus*	CR loc	CAN	
Plantae	*Helichrysum alucense*	CR loc	CAN	Yes
Plantae	*Sonchus wildpretii*	CR loc	CAN	
Plantae	*Urtica morifolia*	CR loc	MAC	
Plantae	*Aeonium gomerense*	EN	CAN	Yes
Plantae	*Anagyris latifolia*	EN	CAN	
Plantae	*Asparagus fallax*	EN	CAN	
Arthropoda	*Calliphona alluaudi*	EN	CAN	
Arthropoda	*Calliphona gomerensis*	EN	CAN	
Plantae	*Ceropegia dichotoma krainzii*	EN	CAN	
Plantae	*Cistus chinamadensis*	EN	CAN	
Plantae	*Juniperus cedrus*	EN	MAC	
Mammalia	*Pipistrellus maderensis*	EN	MAC	
Plantae	*Ruta microcarpa*	EN	CAN	
Plantae	*Sambucus nigra palmensis*	EN	CAN	
Plantae	*Androcymbium hierrense hierrense*	EN loc	CAN	
Plantae	*Convolvulus volubilis*	EN loc	CAN	
Plantae	*Limonium redivivum*	EN loc	CAN	
Plantae	*Aeonium saundersii*	VU	CAN	
Plantae	*Arbutus canariensis*	VU	CAN	
Plantae	*Asparagus arborescens*	VU	CAN	
Plantae	*Asparagus plocamoides*	VU	CAN	
Plantae	*Canariothamnus hermosae*	VU	CAN	
Plantae	*Crambe gomerae*	VU	CAN	

Group	Species	Status	Endemic	Restricted
Plantae	*Euphorbia bourgeana*	VU	CAN	
Plantae	*Ferula latipinna*	VU	CAN	
Plantae	*Heberdenia excelsa*	VU	MAC	
Plantae	*Ilex perado platyphylla*	VU	CAN	
Plantae	*Picconia excelsa*	VU	MAC	
Plantae	*Pteris incompleta*	VU	No	
Aves	*Anthus berthelotii berthelotii*	VU loc	MAC	
Plantae	*Cololejeunea schaeferi*	VU loc	MAC	
Plantae	*Euphorbia bravoana*	VU loc	CAN	
Plantae	*Fissidens coacervatus*	VU loc	MAC	
Plantae	*Gesnouinia arborea*	VU loc	CAN	
Arthropoda	*Pimelia fernandezlopezi*	VU loc	CAN	Yes
Plantae	*Plagiochila maderensis*	VU loc	MAC	
Plantae	*Sideroxylon canariensis*	VU loc	CAN	
Plantae	*Tortella limbata*	VU loc	MAC	
Aves	*Calonectris borealis*	CONGR	No	
Aves	*Sterna hirundo*	CONGR	No	
Aves	*Columba bollii*	ENDEM	CAN	
Aves	*Columba junoniae*	ENDEM	CAN	
Aves	*Corvus corax canariensis*	ENDEM	CAN	
Aves	*Puffinus lherminieri*	ENDEM	MAC	

Main trigger species

Echium acanthocarpum
(© Manuel Gil)

Sideritis marmorea
(© biodiversia.es)

Figure 60. Critically endangered species restricted to KBA GOM1, Garajonay-Chejelipes, Canary Is.

Echium acanthocarpum is a large shrub growing in platforms, enclaves or overhangs. It occurs in the central sector of the island but in the last 15 years several of its subpopulations have disappeared, of which only 3 remain (M.V. Marrero Gómez, Carqué Álamo, & Bañares Baudet, 2006). *Sideritis marmorea* grows in cracks and ledges of steep cliffs in one single location within this KBA (Reyes Betancort, González González, León Arencibia, & Pérez de Paz, 2013). Both species (Figure

60) are threathened by trampling and grazing pressures from domestic livestock and by invasive species.

GOM7 - Los Chapines - Canary Is.

Description

This KBA has a total area of 9 km^2, all of it terrestrial. It is partially covered by protective legislation, namely 3 protected areas, 6 Natura 2000 sites and 1 Important Bird Area. In this KBA a total of 20 trigger species were recorded (Table 66), of which 5 birds, 1 arthropod, 1 mammal, 2 mollusks and 11 plants. Of these 20 species, a total of 16 species are listed in IUCN's Red List, 6 of which as vulnerable, 6 as endangered and 4 as critically endangered.

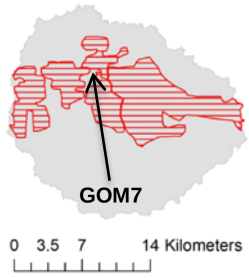


Table 66. Trigger species of GOM7, Los Chapines, Canary Is.

Group	Species	Status	Endemic	Restriced
Mollusca	*Hemicycla efferata*	CR	CAN	Yes
Plantae	*Morella rivas-martinezii*	CR	CAN	
Plantae	*Sonchus wildpretii*	CR loc	CAN	
Plantae	*Urtica morifolia*	CR loc	MAC	
Plantae	*Asparagus fallax*	EN	CAN	
Arthropoda	*Calliphona gomerensis*	EN	CAN	
Plantae	*Juniperus cedrus*	EN	MAC	
Mammalia	*Pipistrellus maderensis*	EN	MAC	
Plantae	*Ruta microcarpa*	EN	CAN	
Plantae	*Convolvulus volubilis*	EN loc	CAN	
Plantae	*Canariothamnus hermosae*	VU	CAN	
Plantae	*Euphorbia bourgeana*	VU	CAN	
Mollusca	*Napaeus rupicola*	VU	CAN	
Plantae	*Pteris incompleta*	VU	No	
Plantae	*Sideroxylon canariensis*	VU loc	CAN	
Aves	*Anthus berthelotii berthelotii*	VU loc	MAC	
Aves	*Calonectris borealis*	Other - CONGR	No	
Aves	*Columba bollii*	Other - ENDEM	CAN	
Aves	*Columba junoniae*	Other - ENDEM	CAN	
Aves	*Puffinus lherminieri*	Other - ENDEM	MAC	

Main trigger species

Hemicycla efferata (© Julio Talavan)

Figure 61. Critically endangered species restricted to KBA GOM7, Los Chapines, Canary Is.

This KBA includes the single, unprotected, site where the land snail *Hemicycla efferata* (Figure 61) is know to occur. Subfossil remains indicate that this species, the largest of this Canarian genus, was once more widespread on la Gomera, from where it is endemic (Groh, 2011).

GOM11 - Epina - Canary Is.

Description

KBA "Epina" has a total area of 13 km^2, all of it terrestrial. This KBA is mostly covered by protective legislation, namely 2 protected areas, 4 Natura 2000 sites and 1 Important Bird Area. In this KBA a total of 25 trigger species were recorded (Table 67), of which 4 birds, 1 arthropod, 1 mammal and 19 plants. Of these 25 species, a total of 22 species are listed in IUCN's Red List, 10 of which as vulnerable, 6 as endangered and 6 as critically endangered.

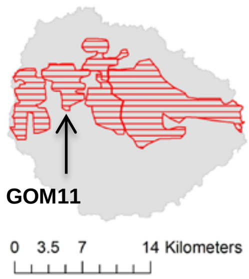


Table 67. Trigger species of GOM11, Epina, Canary Is.

Group	Species	Status	Endemic	Restricted
Plantae	*Apollonias barbujana ceballosi*	CR	CAN	Yes
Plantae	*Crambe wildpretii*	CR	CAN	
Plantae	*Myrica rivas-martinezii*	CR	CAN	
Plantae	*Carex perraudieriana*	CR loc	CAN	
Plantae	*Sonchus wildpretii*	CR loc	CAN	
Plantae	*Urtica morifolia*	CR loc	MAC	
Plantae	*Asparagus fallax*	EN	CAN	
Arthropoda	*Calliphona alluaudi*	EN	CAN	
Plantae	*Cistus chinamadensis*	EN	CAN	
Mammalia	*Pipistrellus maderensis*	EN	MAC	
Plantae	*Ruta microcarpa*	EN	CAN	
Plantae	*Sambucus nigra palmensis*	EN	CAN	
Plantae	*Euphorbia bourgeana*	VU	CAN	

Group	Species	Status	Endemic	Restricted
Plantae	*Picconia excelsa*	VU	MAC	
Plantae	*Pteris incompleta*	VU	No	
Plantae	*Ilex perado platyphylla*	VU	CAN	
Plantae	*Cololejeunea schaeferi*	VU loc	MAC	
Plantae	*Fissidens coacervatus*	VU loc	MAC	
Plantae	*Gesnouinia arborea*	VU loc	CAN	
Plantae	*Plagiochila maderensis*	VU loc	MAC	
Plantae	*Sideroxylon canariensis*	VU loc	CAN	
Aves	*Anthus berthelotii berthelotii*	VU loc	MAC	
Aves	*Columba bollii*	ENDEM	CAN	
Aves	*Columba junoniae*	ENDEM	CAN	
Aves	*Corvus corax canariensis*	ENDEM	CAN	

Main trigger species

Apollonias barbujana ceballosi (© A. Bañares)

Figure 62. Critically endangered species restricted to KBA GOM11, Epina, Canary Is.

Apollonias barbujana is a tree of the laurel family. It is the only species of this Macaronesian genus, with a former wide distribution in Madeira and the Canary Islands. The subspecies *ceballosi* (Figure 62) is endemic of La Gomera Island. Its dark timber was highly appreciated, leading to its overexploitation. It is presently restricted to a small and inaccessible area within KBA GOM11, where it is nevertheless threatened by cattle and the possibility of fire (Mesa Coello, Marrero Gómez, Romero Manrique, & Oval, 2004).

GOM13 - Taguluche - Canary Is.

Description

This KBA has a total area of 19 km^2, all of it terrestrial. It is partially covered by protective legislation, namely 2 protected areas, 5 Natura 2000 sites and 1 Important Bird Areas. In this KBA a total of 17 trigger species were recorded (Table 68), of which 5 birds, 1 mammal, 1 mollusk and 10 plants. Of these 17 species, a total of 13 species are listed in IUCN's Red List, 6 of which as vulnerable, 3 as endangered and 4 as critically endangered.

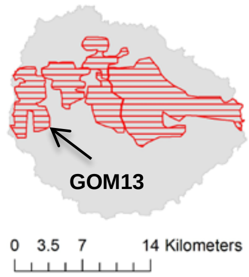


Table 68. Trigger species of GOM13, Taguluche, Canary Is.

Group	Species	Status	Endemic	Restricted
Plantae	*Crambe wildpretii*	CR	CAN	
Plantae	*Convolvulus subauriculatus*	CR loc	CAN	
Plantae	*Helianthemum aganae*	CR loc	CAN	Yes
Plantae	*Limonium relicticum*	CR loc	CAN	Yes
Plantae	*Ceropegia dichotoma krainzii*	EN	CAN	
Mammalia	*Pipistrellus maderensis*	EN	MAC	
Plantae	*Ruta microcarpa*	EN	CAN	
Plantae	*Aeonium saundersii*	VU	CAN	
Plantae	*Cheirolophus satarataensis*	VU	CAN	
Plantae	*Euphorbia bourgeana*	VU	CAN	
Mollusca	*Napaeus ornamentatus*	VU	CAN	
Aves	*Anthus berthelotii berthelotii*	VU loc	MAC	
Plantae	*Sideroxylon canariensis*	VU loc	CAN	
Aves	*Calonectris borealis*	CONGR	No	
Aves	*Columba junoniae*	ENDEM	CAN	
Aves	*Corvus corax canariensis*	ENDEM	CAN	
Aves	*Puffinus lherminieri*	ENDEM	MAC	

Main trigger species

Helianthemum aganae
(© R. Mesa Coello)

Limonium relicticum
(© R. Mesa Coello)

Figure 63. Critically endangered species restricted to KBA GOM13, Taguluche, Canary Is.

This KBA is home to two recently described and highly threatened plants (Figure 63). Neither the species nor the sites where they occur have any legal protection. Described in 2003, *Helianthemum aganae* has not been seen since 2007 (M.V. Marrero Gómez, Carqué Álamo, & Bañares Baudet, 2010). Another La Gomera endemic, *Limonium relicticum*, was described in 2001 and is also known only from a single location, where it is reduced to about 50 individuals in almost innacessible rock ledges (Mesa Coello, Marrero Gómez, Carqué Álamo, & Bañares Baudet, 2008). For both species, the main threat is the intense herbivory pressure from uncontrolled goat grazing and trampling.

GOM15 - Garajonay - Central - Canary Is.

Description

With a total area of 14 km^2, all of it terrestrial, this KBA is totally covered by protective legislation, namely 2 protected areas, 4 Natura 2000 sites and 1 Important Bird Area. In this KBA a total of 16 trigger species were recorded (Table 69), of which 3 birds, 3 arthropods, 1 mammal and 9 plants. Of these 16 species, a total of 14 species are listed in IUCN's Red List, 7 of which as vulnerable, 4 as endangered and 3 as critically endangered.

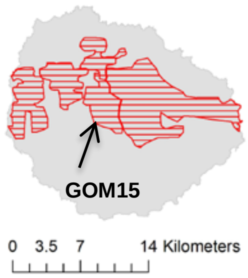
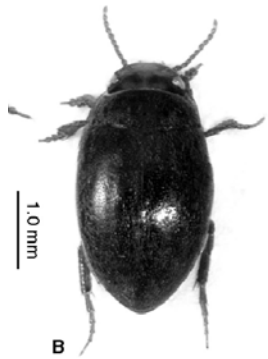


Table 69. Trigger species of GOM15, Garajonay - Central, Canary Is.

Group	Species scientific name	Status	Endemic	Restricted
Arthropoda	*Hydroporus compunctus*	CR	CAN	Yes
Plantae	*Ilex perado lopezlilloi*	CR	CAN	
Plantae	*Urtica morifolia*	CR loc	MAC	
Arthropoda	*Calliphona alluaudi*	EN	CAN	
Arthropoda	*Calliphona gomerensis*	EN	CAN	
Plantae	*Cistus chinamadensis*	EN	CAN	
Mammalia	*Pipistrellus maderensis*	EN	MAC	

Group	Species scientific name	Status	Endemic	Restricted
Plantae	*Euphorbia bourgeana*	VU	CAN	
Plantae	*Ilex perado platyphylla*	VU	CAN	
Plantae	*Picconia excelsa*	VU	MAC	
Plantae	*Pteris incompleta*	VU	No	
Aves	*Anthus berthelotii berthelotii*	VU loc	MAC	
Plantae	*Cololejeunea schaeferi*	VU loc	MAC	
Plantae	*Fissidens coacervatus*	VU loc	MAC	
Aves	*Columba junoniae*	ENDEM	CAN	
Aves	*Corvus corax canariensis*	ENDEM	CAN	

Main trigger species



Hydroporus compunctus
(© Ribera et al. 2003)

Ilex perado lopezlilloi
(© A. Hernández)

Figure 64. Critically endangered species restricted to KBA GOM15, Garajonay - Central, Canary Is.

Hydroporus compunctus (Figure 64) is an endemic aquatic beetle, one of three species native to Macaronesia (Ribera, Bilton, Balke, & Hendrich, 2003). Its conservation status needs to be updated (Foster, 1996).The world population of the Laurisilva tree *Ilex perado lopezlilloi* (Figure 64) was reduced to only two specimens but thanks to the intervention of the Garajonay National Park there are now nearly two dozens other plants within the protected area (M. V. Marrero Gómez, E. Carqué Álamo, & A. Bañares Baudet, 2004).

HIE1 - Frontera - central area - Canary Is.

Description

This KBA on the **El Hierro Island** has a total area of 0.4 km^2, all of it terrestrial. It is mostly covered by protective legislation, namely 2 protected areas, 5 Natura 2000 sites and 2 Important Bird Areas. In this KBA a total of 27 trigger species were recorded (Table 70), of which 7 birds, 1 arthropod, 2 mammals, 1 mollusk, 15 plants and 1 reptile. Of these 27 species, a total of 21 species are listed in IUCN's Red List, 6 of which as vulnerable, 7 as endangered and 8 as critically endangered.

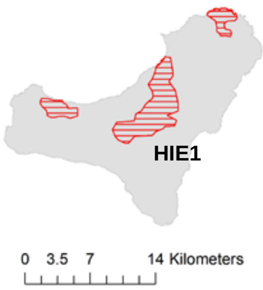


Table 70. Trigger species of KBA HIE1, Frontera - central area, Canary Is.

Group	Species	Status	Endemic	Restricted
Plantae	*Bencomia sphaerocarpa*	CR	CAN	Yes
Plantae	*Cheirolophus duranii*	CR	CAN	
Plantae	*Crambe feuillei*	CR	CAN	Yes
Reptilia	*Gallotia simonyi*	CR	CAN	
Plantae	*Morella rivas-martinezii*	CR	CAN	
Plantae	*Sonchus gandogeri*	CR	CAN	
Plantae	*Urtica morifolia*	CR loc	MAC	
Plantae	*Argyranthemum adauctum erythrocapon*	CR loc	CAN	Yes
Plantae	*Adenocarpus ombriosus*	EN	CAN	
Plantae	*Cerastium sventenii*	EN	CAN	
Plantae	*Cistus chinamadensis*	EN	CAN	
Arthropoda	*Leipaspis pinicola*	EN	CAN	
Mammalia	*Pipistrellus maderensis*	EN	MAC	
Mammalia	*Plecotus teneriffae*	EN	CAN	
Plantae	*Limonium brassicifolium brassicifolium*	EN loc	CAN	
Mollusca	*Canariella bimbachensis*	VU	CAN	Yes
Plantae	*Picconia excelsa*	VU	MAC	
Plantae	*Gesnouinia arborea*	VU loc	CAN	
Plantae	*Pelekium atlanticum*	VU loc	MAC	
Plantae	*Sideroxylon canariensis*	VU loc	CAN	
Aves	*Anthus berthelotii berthelotii*	VU loc	MAC	
Aves	*Calonectris borealis*	CONGR	No	
Aves	*Sterna hirundo*	CONGR	No	
Aves	*Columba bollii*	ENDEM	CAN	
Aves	*Columba junoniae*	ENDEM	CAN	
Aves	*Corvus corax canariensis*	ENDEM	CAN	
Aves	*Puffinus lherminieri*	ENDEM	MAC	

Main trigger species

Bencomia sphaerocarpa (© Krzysztof Ziarnek)

Figure 65. Critically endangered species know only from KBA HIE1, Frontera - central area, Canary Is.

Two critically endangered plant species occur only in particular sites on El Hierro Island, all within KBA HIE1. Once known also in La Palma Island, the perennial 2-4 m high bush *Bencomia sphaerocarpa* (Figure 65) is restricted today to 3 sites with a population of a little over 20 individuals. A typical Laurisilva plant, it is threatened by habitat degradation and goat predation (Martín Osorio, Wildpret de la Torre, & Hernández Bolaños, 2011). The more modest *Crambe feuillei* also occurs in shaded and humid habitats in two sites of the north coast of El Hierro Island, but it is threatened by road construction and maintenance and by land slides (Santos Guerra, 2011).

HIE2 - Echedo - Canary Is.

Description

"Echedo" has a total area of 5 km^2, all of it terrestrial. This KBA has no coverage by protective legislation. In this KBA a total of 4 trigger species were recorded (Table 71), of which 2 birds and 2 plants. Of these 4 species, a total of 3 species are listed in IUCN's Red List, 1 of which as vulnerable and 2 as endangered.

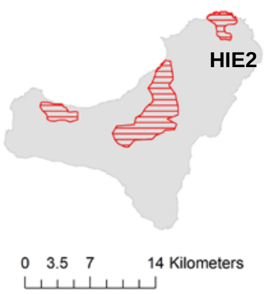


Table 71. Trigger species of KBA HIE2, Echedo, Canary Is.

Group	Species	Status	Endemic	Restricted
Plantae	*Adenocarpus ombriosus*	EN	CAN	
Plantae	*Teucrium heterophyllum hierrense*	EN loc	CAN	Yes
Aves	*Anthus berthelotii berthelotii*	VU loc	MAC	
Aves	*Calonectris borealis*	CONGR	No	

Main trigger species

Teucrium heterophyllum hierrense (© Markus von Gaisberg)

Figure 66. Endangered species know only from KBA HIE2, Echedo, Canary Is.

Teucrium heterophyllum ssp*. Hierrense* (Figure 66) is a low altitude plant known only from a few sites in El Hierro, all whithin KBA HIE2. It has a small recruitment rate which, coupled with herbivory and competition with exotic plants is probably linked to its reduced distribution (M.V. Marrero Gómez, Mesa Coello, Bañares Baudet, & Carqué Álamo, 2010).

HIE6 - Valverde - Canary Is.

Description

This KBA has a total area of 5 km^2, all of it terrestrial. It is mostly covered by protective legislation, namely 2 protected areas, 3 Natura 2000 sites and 2 Important Bird Areas. In this KBA a total of 10 trigger species were recorded (Table 72), of which 3 birds, 2 arthropods, 2 mammals and 3 plants. Of these 10 species, a total of 7 species are listed in IUCN's Red List, 2 of which as vulnerable, 4 as endangered and 1 as critically endangered.

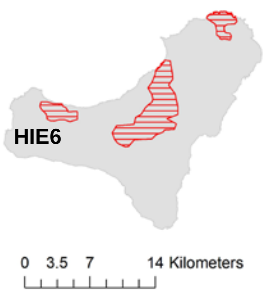


Table 72. Trigger species of KBA HIE6 - Valverde, Canary Is.

Group	Species	Status	Endemic	Restricted
Plantae	*Cheirolophus duranii*	CR	CAN	
Mammalia	*Pipistrellus maderensis*	EN	MACAR	
Mammalia	*Plecotus teneriffae*	EN	CAN	
Plantae	*Silene sabinosae*	EN loc	CAN	Yes
Plantae	*Limonium brassicifolium*	EN loc	CAN	
Arthropoda	*Delagrangeus schurmanni*	VU	CAN	
Arthropoda	*Hipparchia bacchus*	VU	CAN	Yes
Aves	*Columba bollii*	ENDEM	CAN	
Aves	*Columba junoniae*	ENDEM	CAN	
Aves	*Corvus corax canariensis*	ENDEM	CAN	

Main trigger species

Silene sabinosae (© Manuel Gil)

Hipparchia bacchus (© Martin Wiemers)

Figure 67. Endangered and vulnerable species know only from KBA HIE6 - Valverde, Canary Is.

One plant and one arthropod are found only on KBA HIE6 (Figure 67). *Silene sabinosae* is found on a single location where its numbers have decreased from 117 plants in 2002 to only 37 in 2006. The main threats are foraging and trampling by goats (Decreto 82/2007, 2007). The endemic butterfly *Hipparchia bacchus* occurs in grassy clifs and the vineyards at the basis of them. It is threathened by habitat changes and intensification of vineyard management.

LAN3 - Plains of Corona - La Hondura - Tegala Grande and Famara crag - Canary Is.

Description

This prioritary KBA on **La Palma Island** has a total area of 106 km^2, all of it terrestrial. It is partially covered by protective legislation, namely 3 protected areas, 4 Natura 2000 sites and 2 Important Bird Areas. In this KBA a total of 29 trigger species were recorded (Table 73), of which 7 birds, 2 arthropods, 1 mammal, 18 plants and 1 reptile. Of these 29 species, a total of 24 species are listed in IUCN's Red List, 5 of which as vulnerable, 14 as endangered and 5 as critically endangered.

Table 73. Trigger species of KBA LAN3, Plains of Corona, La Hondura, Tegala Grande and Famara crag, Canary Is.

Group	Species	Status	Endemic	Restricted
Plantae	*Plantago famarae*	CR	CAN	Yes
Plantae	*Helianthemum bramwelliorum*	CR loc	CAN	Yes
Plantae	*Helianthemum gonzalezferreri*	CR loc	CAN	Yes
Plantae	*Limonium bourgeaui*	CR loc	CAN	
Plantae	*Volutaria bollei*	CR loc	CAN	

Group	Species	Status	Endemic	Restricted
Plantae	*Asparagus nesiotes*	EN	MAC	
Plantae	*Atractylis arbuscula*	EN	CAN	
Plantae	*Bupleurum handiense*	EN	CAN	
Reptilia	*Chalcides simonyi*	EN	CAN	
Plantae	*Convolvulus lopezsocasii*	EN	CAN	Yes
Mammalia	*Crocidura canariensis*	EN	CAN	
Plantae	*Helichrysum monogynum*	EN	CAN	
Aves	*Neophron percnopterus*	EN	No	
Arthropoda	*Purpuraria magna*	EN	CAN	
Plantae	*Echium decaisnei purpuriense*	EN	CAN	
Plantae	*Limonium puberulum*	EN loc	CAN	Yes
Plantae	*Malva canariensis*	EN loc	CAN	
Plantae	*Pulicaria canariensis lanata*	EN loc	CAN	
Plantae	*Sideritis pumila*	EN loc	CAN	
Plantae	*Aeonium balsamiferum*	VU	CAN	
Plantae	*Androcymbium psammophilum*	VU	CAN	
Aves	*Chlamydotis undulata*	VU	No	
Plantae	*Helichrysum gossypinum*	VU	CAN	
Aves	*Anthus berthelotii berthelotii*	VU loc	MAC	
Aves	*Calonectris borealis*	CONGR	No	
Aves	*Corvus corax canariensis*	ENDEM	CAN	
Arthropoda	*Morlockia ondinae*	ENDEM	CAN	Yes
Aves	*Puffinus lherminieri*	ENDEM	MAC	
Aves	*Tyto alba gracilirostris*	ENDEM	CAN	

Main trigger species

Plantago famarae
(© Manuel Gil)

Helianthemum bramwelliorum
(© Gerardo García Casanova)

Helianthemum gonzalezferreri
(© Gerardo García Casanova)

Figure 68. Critically endangered species know only from KBA LAN3, Plains of Corona, La Hondura, Tegala Grande and Famara crag, Canary Is.

The Famara site, located within KBA LAN3, is an excepcional stronghold of endemic plants of the Canary Islands. Within its small area, included in Natural Park Archipiélago Chinijo (also part of Natura 2000 network), there are not less than 3 critically endangered plant species found nowhere else on the planet (Figure 68). They belong to the genus *Plantago* and *Helianthemum*, both important food sources for butterfly larvae (see, e.g., (Wahlberg, 2001) and (Robinson, Ackery, Kitching, Beccaloni, & Hernández, 2016). The area is however subject to heavy grazing and trampling by free-range goats, and this is the main threat to the survival of its endemic flora (A. Marrero & Migueles, 2004; Reyes Betancort, Martín Cáceres, Marrero Gómez, & Santos Guerra, 2011)(Marrero & Mígueles, 2004).

PAL1 - La Palma Central-northeast - Canary Is.

Description

This KBA on **La Palma Island** has a total area of 270 km^2, all of it terrestrial. It is mostly covered by protective legislation, namely 7 protected areas, 18 Natura 2000 sites and 3 Important Bird Areas. In this KBA a total of 41 trigger species were recorded (Table 74), of which 6 birds, 4 arthropods, 2 mammals and 29 plants. Of these 41 species, a total of 35 species are listed in IUCN's Red List, 13 of which as vulnerable, 15 as endangered and 7 as critically endangered.

Table 74. Trigger species of KBA PAL1, La Palma Central-northeast, Canary Is.

Group	Species	Status	Endemic	Restricted
Plantae	*Cheirolophus santos-abreui*	CR	CAN	Yes
Plantae	*Lotus pyranthus*	CR	CAN	Yes
Arthropoda	*Meladema imbricata*	CR	CAN	
Plantae	*Morella rivas-martinezii*	CR	CAN	
Plantae	*Carex perraudieriana*	CR loc	CAN	
Plantae	*Echinodium spinosum*	CR loc	MAC	
Plantae	*Argyranthemum adauctum palmensis*	CR loc	CAN	
Arthropoda	*Calliphona palmensis*	EN	CAN	
Plantae	*Cerastium sventenii*	EN	CAN	
Plantae	*Cicer canariense*	EN	CAN	
Plantae	*Crambe microcarpa*	EN	CAN	
Plantae	*Echium pininana*	EN	CAN	
Plantae	*Himantoglossum metlesicsianum*	EN	CAN	
Plantae	*Juniperus cedrus*	EN	MAC	
Arthropoda	*Pieris cheiranthi*	EN	CAN	
Mammalia	*Pipistrellus maderensis*	EN	MAC	
Mammalia	*Plecotus teneriffae*	EN	CAN	
Plantae	*Sambucus nigra ssp. palmensis*	EN	CAN	

Group	Species	Status	Endemic	Restricted
Plantae	*Andoa berthelotiana*	EN loc	MAC	
Plantae	*Asplenium anceps*	EN loc	MAC	
Plantae	*Cheirolophus arboreus*	EN loc	CAN	
Plantae	*Limonium imbricatum*	EN loc	CAN	
Plantae	*Bencomia exstipulata*	VU	CAN	
Plantae	*Echium gentianoides*	VU	CAN	Yes
Plantae	*Ferula latipinna*	VU	CAN	
Plantae	*Genista benehoavensis*	VU	CAN	Yes
Arthropoda	*Hipparchia tilosi*	VU	CAN	Yes
Plantae	*Picconia excelsa*	VU	MAC	
Plantae	*Pteris incompleta*	VU	No	
Plantae	*Cololejeunea schaeferi*	VU loc	MAC	
Plantae	*Gesnouinia arborea*	VU loc	CAN	
Plantae	*Grimmia curviseta*	VU loc	CAN	Yes
Plantae	*Pelekium atlanticum*	VU loc	MAC	
Aves	*Anthus berthelotii berthelotii*	VU loc	MAC	
Plantae	*Echium wildpretii trichosiphon*	VU loc	CAN	
Aves	*Calonectris borealis*	CONGR	No	
Aves	*Sterna hirundo*	CONGR	No	
Aves	*Columba bollii*	ENDEM	CAN	
Aves	*Columba junoniae*	ENDEM	CAN	
Aves	*Corvus corax canariensis*	ENDEM	CAN	
Plantae	*Viola palmensis*	ENDEM	CAN	Yes

Main trigger species

Cheirolophus santos-abreui
(© Arnoldo Santos)

Lotus pyranthus
(© Manuel Gil)

Figure 69. Critically endangered species know only from KBA PAL1, La Palma Central-northeast, Canary Is.

The PAL1 KBA includes the known area of distribution of two plant species found only on La Palma Island (Figure 69). *Cheirolophus santos-abreui* occurs only in two high altitude ravines overlooking the city of Santa Cruz de La Palma (Martín Cáceres, Mesa Coello, & Santos Guerra, 2004b). *Lotus pyranthus* has a single natural population of only two individuals, and efforts at reintroduction have mixed results, with no evidence of reproduction(González González, Pérez de Paz, León Arencibia, & Reyes Betancort, 2011a). For both species predation by feral goats has been a key factor in reducing the populations to such small units, exacerbating the effects of competition with exotic species and chance events like landslides.

PAL12 - Teneguia Vucanos - Canary Is.

Description

With a total area of only 2 km^2, all of it terrestrial, this KBA is totally covered by protective legislation, namely 2 protected areas and 1 Natura 2000 site. In this KBA a total of 2 trigger species were recorded (Table 75), of which 1 bird and 1 plant. Both species are listed in IUCN's Red List, 1 of which as vulnerable and 1 as endangered.

PAL12

Table 75. Trigger species of KBA PAL12, Teneguia Vucanos, Canary Is.

Group	Species	Status	Endemic	Restricted
Plantae	*Cheirolophus junonianus*	EN	CAN	Yes
Aves	*Anthus berthelotii berthelotii*	VU loc	MAC	

Main trigger species

Cheirolophus junonianus (© Anita Stridvall)

Figure 70. Critically endangered species know only from KBA PAL12, Teneguia Vucanos, Canary Is.

Cheirolophus junonianus (Figure 70) is a low altitude species, growing in dry rocky areas. Its seedlings have a low surviving rate, and the species is found only in two sites, both within this KBA. Its population is small but stable, although threathened by human activities, mainly trampling by tourists (Rodríguez Delgado, García Gallo, Cruz Trujillo, & Pérez de Paz, 2011).

PAL15 - Coast of Garafía - Canary Is.

Description

"Coast of Garafía" has a total area of 20 km^2, all of it terrestrial. This KBA is mostly covered by protective legislation, namely 2 protected areas, 5 Natura 2000 sites and 2 Important Bird Areas. In this KBA a total of 12 trigger species were recorded (Table 76), of which 5 birds, 1 arthropod and 6 plants. Of these 12 species, a total of 8 species are listed in IUCN's Red List, 2 of which as vulnerable, 5 as endangered and 1 as critically endangered.

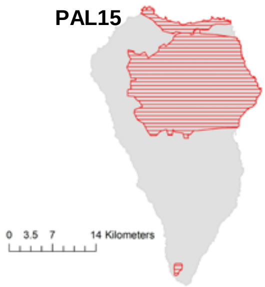


Table 76. Trigger species of KBA PAL15, Coast of Garafía, Canary Is.

Group	Species	Status	Endemic	Restricted
Plantae	*Lotus eremiticus*	CR	CAN	Yes
Plantae	*Anagyris latifolia*	EN	CAN	
Arthropoda	*Calliphona palmensis*	EN	CAN	
Plantae	*Sambucus nigra palmensis*	EN	CAN	
Plantae	*Limonium imbricatum*	EN loc	CAN	
Plantae	*Androcymbium hierrense hierrense*	EN loc	CAN	
Plantae	*Ferula latipinna*	VU	CAN	
Aves	*Anthus berthelotii berthelotii*	VU loc	MAC	
Aves	*Calonectris borealis*	CONGR	No	
Aves	*Columba bollii*	ENDEM	CAN	
Aves	*Columba junoniae*	ENDEM	CAN	
Aves	*Corvus corax canariensis*	ENDEM	CAN	

Main trigger species

Lotus eremiticus (© Dario I. Ojeda Alayon)

Figure 71. Critically endangered species know only from KBA PAL15, Coast of Garafía, Canary Is.

The *Lotus* genus groups a diverse assemblage of over 150 species. It has an intercontinental distribution, with diversity centers in the Mediterranean and western North America. There are several endemic species in Macaronesia, all of them tracing their ancestors to North African colonizations (Allan, Francisco-Ortega, Santos-Guerra, Boerner, & Zimmer, 2004). A group of four Macaronesian *Lotus* underwent adaptation to bird pollination, visible in their large, upward oriented flowers of a distinctive red-orange colour, contrasting with the smaller yellow flowers of the insect pollinated species (Ojeda et al., 2012). *L. eremiticus* (Figure 71) belongs to this bird pollinated clade, but its population is critically endangered, being restricted to less than ten individuals occurring in a single, small area of less than 1 km^2 (Martín Cáceres, Mesa Coello, & Santos Guerra, 2011).

TEN1 - El Teíde - Canary Is.

Description

The "El Teíde" KBA, on **Tenerife Island** has a total area of 252 km^2, all of it terrestrial and including the highest peak in all Atlantic islands, at 3718 m above sea level. This KBA is totally covered by protective legislation, namely 3 protected areas, 3 Natura 2000 sites and 3 Important Bird Areas. In this KBA a total of 21 trigger species were recorded (Table 77), of which 4 birds, 4 arthropods, 2 mammals and 11 plants. Of these 21 species, a total of 17 species are listed in IUCN's Red List, 6 of which as vulnerable, 9 as endangered and 2 as critically endangered.

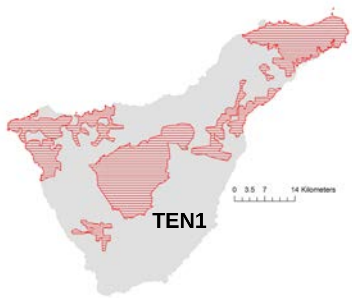


Table 77. Trigger species of KBA TEN1, El Teíde, Canary Is.

Group	Species	Status	Endemic	Restricted
Plantae	*Silene nocteolens*	CR	CAN	Yes
Plantae	*Helianthemum juliae*	CR loc	CAN	Yes
Plantae	*Cerastium sventenii*	EN	CAN	
Plantae	*Himantoglossum metlesicsianum*	EN	CAN	
Plantae	*Juniperus cedrus*	EN	MAC	
Mammalia	*Pipistrellus maderensis*	EN	MAC	
Mammalia	*Plecotus teneriffae*	EN	CAN	
Plantae	*Stemmacantha cynaroides*	EN	CAN	Yes
Plantae	*Cistus osbeckiifolius osbeckiifolius*	EN loc	CAN	
Plantae	*Dactylis metlesicsii*	EN loc	CAN	Yes
Plantae	*Laphangium teydeum*	EN loc	CAN	Yes
Plantae	*Bencomia exstipulata*	VU	CAN	
Arthropoda	*Colletes dimidiatus*	VU	CAN	
Arthropoda	*Gonepteryx cleobule*	VU	CAN	
Plantae	*Rhamnus integrifolia*	VU	CAN	
Aves	*Anthus berthelotii berthelotii*	VU loc	MAC	
Arthropoda	*Canarobius oromii*	ENDEM	CAN	
Aves	*Columba bollii*	ENDEM	CAN	
Aves	*Columba junoniae*	ENDEM	CAN	

Aves	*Corvus corax canariensis*	ENDEM	CAN
Aves	*Fringilla teydea teydea*	ENDEM	CAN

Main trigger species

Silene nocteolens
(pedido Alberto Gil Chamorro)

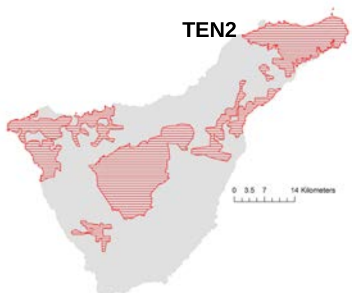
Helianthemum juliae
(em poster. pedido a Manuel V. Marrero-Gómez)

Figure 72. Critically endangered species know only from KBA TEN1, El Teíde, Canary Is.

The El Teide volcano is home to a host of endemic species, many of them endangered. Five endangered species of plants occur only within the limits of Teide Natural Park. Figure 72 illustrates those with the most critical conservation status. *Silene nocteolens* populations are fragmented and the quality of its habitat degraded by predation by rabits and mouflon. The last counts registered less than 600 adults. Conservation measures are in place, but the population trend is still declining (Bañares Baudet, Carqué Álamo, & Marrero Gómez, 2011b). *Helianthemum juliae* is also criticaly endangered, with less than 200 adults restricted to a small area of 500 m^2, almost half of which were replanted. In adition to threats posed by herbivores, this species has a narrow ecological plasticity, with low resilience to dry periods (M. V. Marrero Gómez, E. Carqué Álamo, & Á. Bañares Baudet, 2004), which is a cause of concern in terms of climate change (M. V. Marrero Gómez, Oostermeijer, Carqué Álamo, & Bañares Baudet, 2007).

TEN2 - Anága - Canary Is.

Description



KBA "Anága" has a total area of 159 km^2, all of it terrestrial. This KBA is mostly covered by protective legislation, namely 4 protected areas, 5 Natura 2000 sites and 2 Important Bird Areas. In this KBA a total of 60 trigger species were recorded (Table 78), of which 7 birds, 5 arthropods, 1 mammal, 6 mollusks, 40 plants and 1 reptile. Of these 60 species, a total of 54 species are listed in IUCN's Red List, 25 of which as vulnerable, 17 as endangered and 12 as critically endangered.

Table 78. Trigger species of KBA TEN2, Anága, Canary Is.

Group	Species	Status	Endemic	Anága
Plantae	*Lotus maculatus*	CR	CAN	
Plantae	*Micromeria glomerata*	CR	CAN	Yes
Plantae	*Micromeria rivas-martinezii*	CR	CAN	Yes
Plantae	*Monanthes wildpretii*	CR	CAN	Yes
Plantae	*Patellifolia webbiana*	CR	CAN	
Mollusca	*Plutonia reticulata*	CR	CAN	
Plantae	*Argyranthemum sundingii*	CR loc	CAN	Yes
Plantae	*Carex perraudieriana*	CR loc	CAN	
Plantae	*Dorycnium broussonetii*	CR loc	CAN	
Plantae	*Radula wichurae*	CR loc	MAC	
Plantae	*Solanum vespertilio vespertilio*	CR loc	CAN	
Plantae	*Urtica morifolia*	CR loc	MAC	
Plantae	*Anagyris latifolia*	EN	CAN	
Plantae	*Asparagus fallax*	EN	CAN	
Plantae	*Cistus chinamadensis*	EN	CAN	
Plantae	*Dracaena draco*	EN	MAC	
Arthropoda	*Graptodytes delectus*	EN	CAN	
Arthropoda	*Hydroporus pilosus*	EN	CAN	
Mollusca	*Napaeus doliolum*	EN	CAN	Yes
Mammalia	*Pipistrellus maderensis*	EN	MAC	
Plantae	*Pleiomeris canariensis*	EN	CAN	
Plantae	*Sambucus nigra palmensis*	EN	CAN	
Plantae	*Tolpis glabrescens*	EN	CAN	Yes
Plantae	*Andoa berthelotiana*	EN loc	MAC	
Plantae	*Convolvulus volubilis*	EN loc	CAN	
Plantae	*Limonium imbricatum*	EN loc	CAN	
Plantae	*Malva canariensis*	EN loc	CAN	
Plantae	*Salvia broussonetii*	EN loc	CAN	
Plantae	*Telaranea azorica*	EN loc	MAC	
Plantae	*Asparagus arborescens*	VU	CAN	
Arthropoda	*Calliphona koenigi*	VU	CAN	
Mollusca	*Canariella fortunata*	VU	CAN	Yes
Mollusca	*Canariella hispidula*	VU	CAN	
Mollusca	*Canariella leprosa*	VU	CAN	Yes
Plantae	*Cheirolophus tagananensis*	VU	CAN	Yes
Plantae	*Crambe scaberrima*	VU	CAN	
Plantae	*Euphorbia bourgeana*	VU	CAN	
Arthropoda	*Gonepteryx cleobule*	VU	CAN	
Plantae	*Heberdenia excelsa*	VU	MAC	
Plantae	*Ilex perado platyphylla*	VU	CAN	
Arthropoda	*Leipaspis lauricola*	VU	CAN	
Mollusca	*Napaeus esbeltus*	VU	CAN	Yes
Plantae	*Picconia excelsa*	VU	MAC	
Plantae	*Prunus hixa*	VU	No	
Plantae	*Pteris incompleta*	VU	No	
Plantae	*Radula jonesii*	VU	MAC	
Aves	*Anthus berthelotii berthelotii*	VU loc	MAC	

Group	Species	Status	Endemic	Anága
Plantae	*Cololejeunea schaeferi*	VU loc	MAC	
Reptilia	*Gallotia galloti insulanagae*	VU loc	CAN	Yes
Plantae	*Gesnouinia arborea*	VU loc	CAN	
Plantae	*Lejeunea canariensis*	VU loc	MAC	
Plantae	*Limonium macrophyllum*	VU loc	CAN	Yes
Plantae	*Sideroxylon canariensis*	VU loc	CAN	
Plantae	*Teline pallida pallida*	VU loc	CAN	Yes
Aves	*Calonectris borealis*	CONGR	No	
Aves	*Sterna hirundo*	CONGR	No	
Aves	*Columba bollii*	ENDEM	CAN	
Aves	*Columba junoniae*	ENDEM	CAN	
Aves	*Corvus corax canariensis*	ENDEM	CAN	
Aves	*Puffinus lherminieri*	ENDEM	MAC	

Main trigger species

Micromeria glomerata
(© Tsaag Valren)

Micromeria rivas-martinezii
(© R. Mesa)

Monanthes wildpretii
(© Beneharo Hernández)

Argyranthemum sundingii
(© R. Mesa)

Figure 73. Endangered species know only from KBA TEN2, Anága, Canary Is.

Anaga is one of three paleo-islands constituting the island of Tenerife, formed 4-12 million years old and connected 1 million years ago by the eruption that gave rise to the present day Teide volcano (Ancochea et al., 1990). This geological history can be retraced on the distribution of some of the endemisms of Tenerife: the four species in

Figure 73, for instance, are all restricted to the Anaga peninsula. *Micromeria* is a cosmopolit genus, found in all temperate regions of the world except Australia. Macaronesia is one of its centers of diversity (Morales Valverde, 1993), where it underwent an adaptive radiation from a single colonizing event led to 16 species and 13 subspecies, most of them restricted endemics. Predation by rabits and goats has led to the restriction of *M. glomerata* and *M. rivas-martinezii* to small areas in inaccessible places, increasing the risks due to chance events, like storms or volcanic ativity (González González, Reyes Betancort, Pérez de Paz, & León Arencibia, 2011; Martín Osorio & Wildpret de la Torre, 2004). *Monanthes wildpretii* is a small-sized rupicolous species growing in fissures, crevices and small paths in steep rocky basaltic slopes. Is occurs in a single location, where only about 500 individuals have been counted. Its perennial nature and ability to reproduce vegetatively gives some stability to the population, which is nevertheless threatened by proximity to a road and the consequent degradation of its habitat (Bañares Baudet, Carqué Álamo, & Marrero Gómez, 2011a). *Argyranthemum sundingii* is a biologically unique species: it occurs in mid-valley habitats, having evolved from a fertile hybrid between a montane and a coastal species. A further aspect of interest is that it occurs in only two valleys, and the chloroplast donor species was different in each of the valleys (Brochmann, Borgen, & Stabbetorp, 2000). It is unfortunately threatened by overgrazing and habitat changes leading to hybridization with other species (Martín Cáceres, Mesa Coello, & Santos Guerra, 2004a).

TEN3 - Northern Buenavista - Canary Is.

Description

This KBA has a total area of 50 km^2, all of it terrestrial. It is mostly covered by protective legislation, namely 3 protected areas, 4 Natura 2000 sites and 2 Important Bird Areas. In this KBA a total of 41 trigger species were recorded (Table 79), of which 7 birds, 1 arthropod, 1 mammal, 3 mollusks, 28 plants and 1 reptile. Of these 41 species, a total of 35 species are listed in IUCN's Red List, 15 of which as vulnerable, 13 as endangered and 7 as critically endangered.

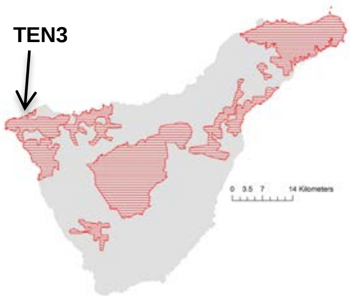


Table 79. Trigger species of KBA TEN3, Northern Buenavista, Canary Is.

Group	Species	Status	Endemic	Restricted
Reptilia	*Gallotia intermedia*	CR	CAN	
Plantae	*Hypochaeris oligocephala*	CR	CAN	Yes
Plantae	*Teline salsoloides*	CR	CAN	Yes
Plantae	*Dorycnium broussonetii*	CR loc	CAN	
Plantae	*Solanum vespertilio vespertilio*	CR loc	CAN	
Plantae	*Teline pallida silensis*	CR loc	CAN	Yes
Plantae	*Tolpis crassiuscula*	CR loc	CAN	Yes
Plantae	*Anagyris latifolia*	EN	CAN	
Plantae	*Dorycnium spectabile*	EN	CAN	
Plantae	*Dracaena draco*	EN	MAC	
Plantae	*Limonium fruticans*	EN	CAN	Yes

Group	Species	Status	Endemic	Restricted
Arthropoda	*Pieris cheiranthi*	EN	CAN	
Mammalia	*Pipistrellus maderensis*	EN	MAC	
Plantae	*Pleiomeris canariensis*	EN	CAN	
Plantae	*Sambucus nigra palmensis*	EN	CAN	
Plantae	*Convolvulus volubilis*	EN loc	CAN	
Plantae	*Limonium imbricatum*	EN loc	CAN	
Plantae	*Malva canariensis*	EN loc	CAN	
Plantae	*Micromeria densiflora*	EN loc	CAN	Yes
Plantae	*Sideritis nervosa*	EN loc	CAN	Yes
Plantae	*Arbutus canariensis*	VU	CAN	
Plantae	*Asparagus arborescens*	VU	CAN	
Plantae	*Asparagus plocamoides*	VU	CAN	
Mollusca	*Canariella pthonera*	VU	CAN	
Plantae	*Crambe scaberrima*	VU	CAN	
Plantae	*Euphorbia bourgeana*	VU	CAN	
Mollusca	*Napaeus elegans*	VU	CAN	
Mollusca	*Napaeus roccellicola*	VU	CAN	
Plantae	*Picconia excelsa*	VU	MAC	
Plantae	*Pteris incompleta*	VU	No	
Plantae	*Rhamnus integrifolia*	VU	CAN	
Plantae	*Sideroxylon mirmulano*	VU	MAC	
Aves	*Anthus berthelotii berthelotii*	VU loc	MAC	
Plantae	*Gesnouinia arborea*	VU loc	CAN	
Plantae	*Sideroxylon canariensis*	VU loc	CAN	
Aves	*Calonectris borealis*	CONGR	No	
Aves	*Sterna hirundo*	CONGR	No	
Aves	*Columba bollii*	ENDEM	CAN	
Aves	*Columba junoniae*	ENDEM	CAN	
Aves	*Corvus corax canariensis*	ENDEM	CAN	
Aves	*Puffinus lherminieri*	ENDEM	MAC	

Main trigger species

Hypochaeris oligocephala
(© Manuel Gil)

Tolpis crassiuscula
(© Manuel Gil)

Teline pallida silensis
(© A. Hernández)

Teline salsoloides
(© G. Mannaerts)

Figure 74. Endangered species know only from KBA TEN3, Northern Buenavista, Canary Is.

The four critically endangered species illustrated in Figure 74 all have less than 200 remaining individuals restricted to very small marginal areas of its potential habitat by a combination of human-induced habitat degradation and predation by rats and rabits (Acevedo Rodríguez, Rodríguez Martín, & Siverio Hernández, 2011; Acevedo Rodríguez, Rodríguez Martín, Hernández Luís, & Rodríguez Martín, 2004; Martín Osorio & Wildpret de la Torre, 2011; Santos Guerra, Martín Cáceres, & Marrero Gómez, 2004).

TEN4 - Los Carrizales - Canary Is.

Description

This KBA has a total area of 45 km^2, all of it terrestrial. It is mostly covered by protective legislation, namely 2 protected areas, 6 Natura 2000 sites and 2 Important Bird Areas. In this KBA a total of 31 trigger species were recorded (Table 80), of which 7 birds, 2 arthropods, 2 mammals, 4 mollusks, 15 plants and 1 reptile. Of these 31 species, a total of 25 species are listed in IUCN's Red List, 9 of which as vulnerable, 8 as endangered and 8 as critically endangered.

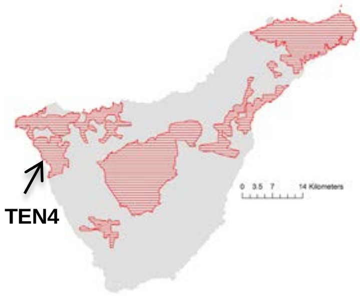


Table 80. Trigger species of KBA TEN4, Los Carrizales, Canary Is.

Group	Species	Status	Endemic	Restricted
Arthropoda	*Acrostira tenerifae*	CR	CAN	Yes
Reptilia	*Gallotia intermedia*	CR	CAN	
Mollusca	*Hemicycla mascaensis*	CR	CAN	Yes
Plantae	*Kunkeliella psilotoclada*	CR	CAN	Yes
Plantae	*Limonium spectabile*	CR	CAN	Yes
Plantae	*Limonium sventenii*	CR	CAN	
Plantae	*Sideritis cystosiphon*	CR	CAN	Yes
Plantae	*Urtica morifolia*	CR loc	MAC	
Plantae	*Anagyris latifolia*	EN	CAN	
Plantae	*Crambe laevigata*	EN	CAN	Yes
Plantae	*Dracaena draco*	EN	MAC	
Plantae	*Himantoglossum metlesicsianum*	EN	CAN	
Mammalia	*Pipistrellus maderensis*	EN	MAC	
Mammalia	*Plecotus teneriffae*	EN	CAN	
Arthropoda	*Calathus amplius*	EN loc	CAN	Yes
Plantae	*Salvia broussonetii*	EN loc	CAN	
Plantae	*Asparagus arborescens*	VU	CAN	
Plantae	*Asparagus plocamoides*	VU	CAN	
Mollusca	*Canariella pontelirae*	VU	CAN	Yes
Mollusca	*Canariella pthonera*	VU	CAN	
Plantae	*Limonium perezii*	VU	CAN	Yes
Mollusca	*Napaeus elegans*	VU	CAN	
Plantae	*Rhamnus integrifolia*	VU	CAN	
Plantae	*Convolvulus scoparius*	VU loc	CAN	
Aves	*Anthus berthelotii berthelotii*	VU loc	MAC	
Aves	*Calonectris borealis*	CONGR	No	
Aves	*Sterna hirundo*	CONGR	No	
Aves	*Columba bollii*	ENDEM	CAN	
Aves	*Columba junoniae*	ENDEM	CAN	
Aves	*Corvus corax canariensis*	ENDEM	CAN	
Aves	*Puffinus lherminieri*	ENDEM	MAC	

Main trigger species

Acrostira tenerifae
(© Pedro Oromí)

Hemicycla mascaensis
(© Miguel Ibañez)

Kunkeliella psilotoclada
(© A. Santos)

Limonium spectabile
(© Pete Favelle)

Sideritis cystosiphon
(© A. Santos)

Figure 75. Endangered species know only from KBA TEN4, Los Carrizales, Canary Is.

The Teno massif, where this KBA is located, is one of the paleo-islands of which Tenerife is composed (Ancochea et al., 1990). Up to the present, several endemic species of Tenerife (including those in Figure 75) are only found on this 4-7 million years old region.

Acrostira tenerifae is a pamphagid grasshopper endemic to this KBA, one of a group of four species and two subspecies, each a single island endemism. Like all the other species, *A tenerifae* feeds on a single species of endemic plant, *Euphorbia lamarckii*, and has a very low abundance: intensive survey work across its limited distribution range located only 60 individuals (López et al., 2005). Land use changes and goat grazing affecting the *Euphorbia* vegetation are the main threats to this species (Jakobs, 2012).

Hemicycla mascaensis is a ground-dwelling snail found on a single site in typical lowland canary island vegetation. It is threatened by urbanization and habitat degradation from tourist activities, a problem composed by its lack of legal protection (Groh & Alonso, 2011).

Grazing by feral or free-range goats and by rabits is a common threat for plants all over the world, and is a particularly serious problem in many places in the Canary Islands (Gangoso, Donázar, Scholz, Palacios, & Hiraldo, 2006). *Kunkeliella psilotoclada* is a sad example of a species pushed to extinction by these factors. It was know from a single location within this KBA, but has not been seen since 1983 (Martín Cáceres, Santos Guerra, & Marrero Gómez, 2011). *Limonium spectabile* and *Sideritis cystosiphon* face the same prospect, their populations severely reduced in number and range, in the latter case compounded by the construction of a road and the associated habitat degradation (Acevedo Rodríguez, Rodríguez Martín, Rodríguez Martín, Siverio Hernández, & Siverio Hernández, 2011; González González, Pérez de Paz, León Arencibia, & Reyes Betancort, 2011b).

TEN6 – Adeje, Canary Is.

Description

"Adeje" has a total area of 20 km^2, all of it terrestrial. This KBA is mostly covered by protective legislation, namely 3 protected areas, 3 Natura 2000 sites and 1 Important Bird Area. In this KBA a total of 16 trigger species were recorded (Table 81), of which 3 birds, 1 mammal and 12 plants. Of these 16 species, a total of 14 species are listed in IUCN's Red List, 7 of which as vulnerable, 4 as endangered and 3 as critically endangered.

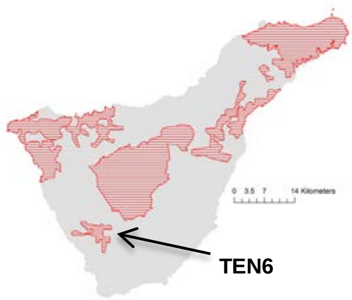


Table 81. Trigger species of KBA TEN6, Adeje, Canary Is.

Group	Species	Status	Endemic	Restricted
Plantae	*Patellifolia webbiana*	CR	CAN	
Plantae	*Echium sventenii*	CR loc	CAN	Yes
Plantae	*Lotus berthelotii*	CR loc	CAN	
Plantae	*Anagyris latifolia*	EN	CAN	
Plantae	*Dracaena draco*	EN	MAC	
Mammalia	*Pipistrellus maderensis*	EN	MAC	
Plantae	*Convolvulus volubilis*	EN loc	CAN	
Plantae	*Asparagus arborescens*	VU	CAN	
Plantae	*Asparagus plocamoides*	VU	CAN	
Plantae	*Crambe scaberrima*	VU	CAN	
Plantae	*Rhamnus integrifolia*	VU	CAN	
Plantae	*Sideritis infernalis*	VU	CAN	Yes
Aves	*Anthus berthelotii berthelotii*	VU loc	MAC	
Plantae	*Sideroxylon canariensis*	VU loc	CAN	
Aves	*Calonectris borealis*	CONGR	No	
Aves	*Corvus corax canariensis*	ENDEM	CAN	

Main trigger species

Echium sventenii (© A. Bañares)

Figure 76. Endangered species know only from KBA TEN6, Adeje, Canary Is.

Echium sventenii (Figure 76) is restricted to alluvial deposits on the head of two narrow creeks within KBA TEN6. Water diversion from these creeks, compounded by competition with other species, is the major threat (Jaén Molina, Mora Vicente, & Tapia, 2004).

TEN16 - Guimar - La Esperanza - Canary Is.

Description

This KBA has a total area of 47 km^2, all of it terrestrial. It is partially covered by protective legislation, namely 3 protected areas and 3 Natura 2000 sites. In this KBA a total of 27 trigger species were recorded (Table 82), of which 6 birds, 2 mammals, 3 mollusks and 16 plants. Of these 27 species, a total of 22 species are listed in IUCN's Red List, 10 of which as vulnerable, 7 as endangered and 5 as critically endangered.

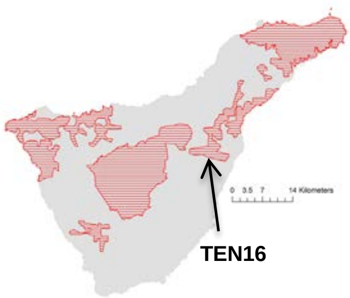


Table 82. Trigger species of KBA TEN16, Guimar, La Esperanza, Canary Is.

Group	Species	Status	Endemic	Restricted
Plantae	*Cheirolophus metlesicsii*	CR	CAN	
Plantae	*Helianthemum teneriffae*	CR	CAN	Yes
Plantae	*Dorycnium broussonetii*	CR loc	CAN	
Plantae	*Urtica morifolia*	CR loc	MAC	
Plantae	*Solanum vespertilio vespertilio*	CR loc	CAN	
Plantae	*Anagyris latifolia*	EN	CAN	
Plantae	*Dorycnium spectabile*	EN	CAN	
Plantae	*Dracaena draco*	EN	MAC	
Plantae	*Juniperus cedrus*	EN	MAC	
Mollusca	*Napaeus nanodes*	EN	CAN	Yes
Mammalia	*Pipistrellus maderensis*	EN	MAC	
Mammalia	*Plecotus teneriffae*	EN	CAN	
Plantae	*Arbutus canariensis*	VU	CAN	

Group	Species	Status	Endemic	Restricted
Plantae	*Asparagus arborescens*	VU	CAN	
Mollusca	*Canariella hispidula*	VU	CAN	
Plantae	*Crambe arborea*	VU	CAN	Yes
Plantae	*Crambe scaberrima*	VU	CAN	
Plantae	*Euphorbia bourgeana*	VU	CAN	
Mollusca	*Hemicycla inutilis*	VU	CAN	Yes
Plantae	*Picconia excelsa*	VU	MAC	
Plantae	*Sideroxylon canariensis*	VU loc	CAN	
Aves	*Anthus berthelotii berthelotii*	VU loc	MAC	
Aves	*Calonectris borealis*	CONGR	No	
Aves	*Columba bollii*	ENDEM	CAN	
Aves	*Columba junoniae*	ENDEM	CAN	
Aves	*Corvus corax canariensis*	ENDEM	CAN	
Aves	*Fringilla teydea teydea*	ENDEM	CAN	

Main trigger species

Helianthemum teneriffae (© Manuel Gil)

Figure 77. Endangered species know only from KBA TEN16, Guimar, La Esperanza, Canary Is.

Helianthemum teneriffae (Figure 77) is know from a single site within KBA TEN16, with a population of less than 200 individuals fragilized by drought periods and threatened by habitat disruption from hiking activities (Ojeda Land, Oval de la Rosa, Marrero Gómez, & Mesa Coello, 2011).

TEN19 - La Viuda - Añaza - Canary Is.

Description

With a total area of 30 km^2, all of it terrestrial, this KBA has no coverage by protective legislation. In it a total of 10 trigger species were recorded (Table 83), of which 4 birds, 1 mammal, 4 mollusks and 1 plant. Of these 10 species, a total of 7 species are listed in IUCN's Red List, 3 of which as vulnerable, 2 as endangered and 2 as critically endangered.

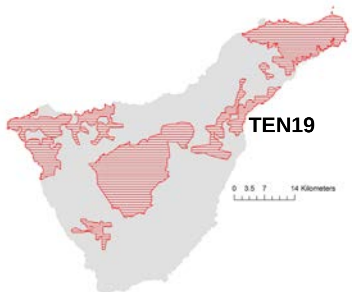


Table 83. Trigger species of KBA TEN19, La Viuda – Añaza, Canary Is.

Group	Species	Status	Endemic	Restricted
Mollusca	*Hemicycla plicaria*	CR	CAN	Yes
Mollusca	*Napaeus teobaldoi*	CR	CAN	Yes
Mollusca	*Hemicycla pouchadan*	EN	CAN	Yes
Mammalia	*Plecotus teneriffae*	EN	CAN	
Plantae	*Asparagus arborescens*	VU	CAN	
Mollusca	*Canariella hispidula*	VU	CAN	
Aves	*Anthus berthelotii berthelotii*	VU loc	MAC	
Aves	*Calonectris borealis*	CONGR	No	
Aves	*Sterna hirundo*	CONGR	No	
Aves	*Corvus corax canariensis*	ENDEM	CAN	

Main trigger species

Hemicycla plicaria (© Miguel Ibañez)

Figure 78. Endangered species know only from KBA TEN19, La Viuda, Añaza, Canary Is.

Two critically endangered endemic snails (including *Hemicycla plicaria,* Figure 78) have their entire distribution range within KBA TEN19. The mains threats are the same, and common to many other coastal snails: habitat destruction from urbanization and infrastructures such as roads (Groh & Neubert, 2011; Ibáñez & Rosario Alonso, 2009).

TEN21 - Garachico - La Montañeta - Canary Is.

Description

This KBA has a total area of 45 km^2, all of it terrestrial. It is partially covered by protective legislation, namely 3 protected areas and 9 Natura 2000 sites. In this KBA a total of 26 trigger species were recorded (Table 84), of which 8 birds, 2 arthropods, 2 mammals, 2 mollusks and 12 plants. Of these 26 species, a total of 20 species are listed in IUCN's Red List, 8 of which as vulnerable, 9 as endangered and 3 as critically endangered.

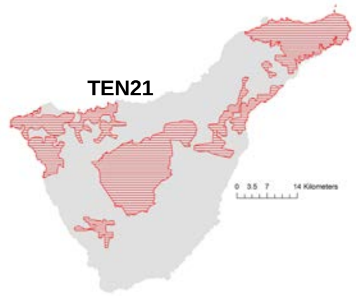


Table 84. Trigger species of KBA TEN21, Garachico, La Montañeta, Canary Is.

Group	Scientific Name	Status	Endemism	Restricted
Plantae	*Kunkeliella subsucculenta*	CR	CAN	Yes
Plantae	*Chenopodium coronopus*	CR loc	CAN	
Plantae	*Urtica morifolia*	CR loc	MAC	
Mammalia	*Pipistrellus maderensis*	EN	MAC	
Mammalia	*Plecotus teneriffae*	EN	CAN	
Plantae	*Anagyris latifolia*	EN	CAN	
Plantae	*Dracaena draco*	EN	MAC	
Plantae	*Himantoglossum metlesicsianum*	EN	CAN	
Plantae	*Pleiomeris canariensis*	EN	CAN	
Arthropoda	*Loboptera subterranea*	EN loc	CAN	Yes
Plantae	*Carduus volutarioides*	EN loc	CAN	Yes
Plantae	*Limonium imbricatum*	EN loc	CAN	
Arthropoda	*Calliphona koenigi*	VU	CAN	
Mollusca	*Canariella pthonera*	VU	CAN	
Mollusca	*Napaeus roccellicola*	VU	CAN	
Plantae	*Arbutus canariensis*	VU	CAN	
Aves	*Chlamydotis undulata*	VU	No	
Plantae	*Pteris incompleta*	VU	No	
Plantae	*Sideroxylon canariensis*	VU loc	CAN	
Aves	*Anthus berthelotii berthelotii*	VU loc	MAC	
Aves	*Puffinus lherminieri*	ENDEM	MAC	
Aves	*Calonectris borealis*	CONGR	No	
Aves	*Columba bollii*	ENDEM	CAN	
Aves	*Columba junoniae*	ENDEM	CAN	
Aves	*Fringilla teydea ssp. teydea*	ENDEM	CAN	
Aves	*Corvus corax canariensis*	ENDEM	CAN	

Main trigger species

Kunkeliella subsucculenta (© Manuel Gil)

Figure 79. Endangered species know only from KBA TEN21, Garachico, La Montañeta, Canary Is.

Kunkeliella subsucculenta is a halophyte growing in coastal cliffs with high marine influence (Figure 79). Its distribution range has been reduced to two small sites, both within KBA TEN21, but even there it is impacted trampling by users of the area and predation by rabits. Small areas are disproportionately affected by random events: in this case an illegal dumping of construction materials severely affected the quality of the habitat of the largest subpopulation (Barrera Acosta, González González, & Beltrán ejera, 2011).

TEN24 - San Cristoval de La Laguna - Canary Is.

Description

The KBA "San Cristoval de La Laguna" has a total area of 5 km^2, all of it terrestrial. It has little coverage by protective legislation, namely 1 Important Bird Area. In this KBA a total of 3 trigger species were recorded (Table 85), of which 2 birds and 1 mollusk. Of these 3 species, 2 species are listed in IUCN's Red List, 1 as vulnerable and 1 as endangered.

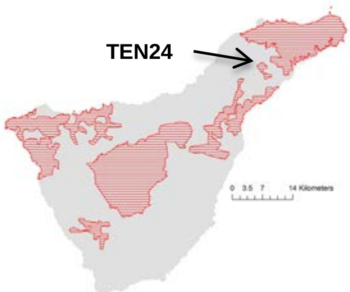


Table 85. Trigger species of KBA TEN21, Garachico, La Montañeta, Canary Is.

TAXA	Species scientific name	Status	Endemic	Restricted
Mollusca	*Parmacella tenerifensis*	EN	CAN	Yes
Aves	*Anthus berthelotii berthelotii*	VU loc	MAC	
Aves	*Corvus corax canariensis*	ENDEM	CAN	

Main trigger species

Parmacella tenerifensis (© Salvador de la Cruz)

Figure 80. Endangered species know only from KBA TEN21, Garachico, La Montañeta, Canary Is.

The giant slug of Tenerife (Figure 80) is only known from an area coinciding with the city and outskirsts of La Laguna, the capital of the island. It is presently restricted to two sites, where it has managed to survive in natural areas between cultivated fields, or in abandoned agricole areas. Maintain this species under these conditions is a challenge to the model of urban development requiring, for instance, the creation of natural corridors (De la Cruz López, López Hernández, & Morales Delgado, 2011).

KBAs and the Natura 2000 network

The Macaronesian Ecosystem Profile has highlited a mismatch between the proposed KBAs and the coverage by the protected areas network in place in the region, and particularly by its Natura 2000 component. To understand why areas important for the conservation of globally threatened species might not already be under legal protection, one must go back a few decades.

The Natura 2000 network has an interesting and complex history, details of which can be found, e.g., in Keulartz & Leistra (2007) and Evans (2012). In brief it has its foundation on two European directives: the Directive on the Conservation of Wild Birds (the Birds directive, adopted in 1979) and the Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (commonly known as the Habitats Directive, adopted on 1992). These directives establish the obligation of Member States to designate protected sites based on the presence of the species and/or habitats listed on the Directive's annexes. These sites were to be described and the information forwarded to the European Commission to be integrated in the Natura 2000 network, either directly (the Special Protected Areas, SPA, established under the Birds Directive) or after discussion in biogeographical seminars (the Sites of Community Importance, SIC, which, when accepted, became Special Areas of Conservation, SAC). According to the latest data on the Natura 2000 Barometer, there are over 27,000 sites, covering more than 18% of the land area of the European Union, making this the "largest coordinated network of protected areas in the world". In spite of it, however, European biodiversity continues to decline: the 2015 European environment - state and outlook report (EEA, 2015) concluded that no significant progress has been made towards the target of halting the loss of biodiversity and the degradation of ecosystem services in the EU by 2020.

Directive criteria used for site selection are varied and include a global assessment of the value of the site for conservation of the natural habitat type or the species concerned. The main feature of the whole process, though, is that sites are designated based on particular species or habitats it contains, but there are no requirements that this must be carried out based on a systematic assessment of the conservation needs of those species and habitats. Moreover, the criteria for including species or habitats on the annexes, although based on scientific evidence and expert opinion, are not given and are also likely to have differed between each successive change resulting from the EU enlargement. As recognized by many authors (e.g. Trochet & Schmeller, 2013), this has resulted in a process that depended too strongly on governmental politics and was limited by economic and cultural criteria. In other words, there is no question that all Natura 2000 sites have high conservation value, but the methodology to its designation does not assure that all high conservation values are included in the network.

Studies based on comprehensive analysis have, therefore, highlighted gaps in coverage of the Natura 2000 network. Lisón et al. (2013), for instance, used ecological niche models to assess the effectiveness of the SAC system for protecting the roosts of six species of cave-dwelling bats in Murcia, Spain, concluding that the protection offered to suitable and optimal habitats was lower than 40% in all cases. Using distribution data from dead wood beetles listed in the European Red List, D'Amen et al. (2013) performed an irreplaceability analysis and noted that, in Italy, conservation targets are achieved for only 7% of the considered species. Furthermore, they found that 13 species are not represented in any protected area, including two that are globally threatened. In a final example from the botanical field, Rubio-Salcedo et al. (2013) have shown, using habitat suitability maps of Spanish lichen species, that the effectiveness of the Natura 2000 was quite low, particularly for species found in coastal, drier and warmer areas.

In this context the KBA methodology, with its basis on documented threatened species and its comprehensive site selection criteria, is expected to highlight some of the gaps in the Natura 2000 process. In fact, a recent vision for the Natura 2000 network put forward by Hochkirch et al. (2013) addresses exactly this point, by calling for "a maximized number of Red List assessments of European species and a regular adaptation of the annexes in order to focus on those sites with the highest conservation value".

Thematic Priorities

This chapter describes the most critical areas for action in the Macaronesian region, identified during stakeholder consultations.

1. Baseline data collection & species assessment

Species records for all Macaronesian archipelagos are incomplete in terms of spatial distribution, abundance and assessment of conservation status. A significant number of species (especially marine species, for which data is extremely limited) were not taken into account for the definition of Macaronesia KBAs due to these gaps, which highlights a pressing need for an improved knowledge base. Without it, meaningful conservation action cannot be undertaken. In the future, an improved baseline data may lead to redrawing KBAs or creating new ones.

2. Mapping of marine habitats and redesign of MPAs

The need for a comprehensive mapping of marine habitats and species distribution has been highlighted during stakeholder consultation in the Canary Islands. In this regard, a study undertaken by Martín-García, González-Lorenzo, Brito-Izquierdo, and Barquín-Dieza (2013) in the MPA of La Palma is taken as a reference and could be applied to the other Canarian and Macaronesian islands. As an outcome there is already a database full of geo-referenced information about marine habitat distribution, communities, endangered species and human activities around La Palma. The authors have then analysed this information, using GIS tools and the algorithm Marxan, and presented seven alternative MPA zones in the sublittoral environment around La Palma (Martín-García, Sangil, Brito, & Barquín-Diez, 2015). This was the first time that an objective and systematic process, combining knowledge about human activities as well as conservation status, has been used to establish the suitable placement of MPAs in the Canary Islands.

The zoning recommended by this study differs significantly from that currently in place, which highlights the need to redesign outdated conservation strategies by redefining the size, shape and location of MPAs. This can be of extreme importance taking into account that the Azores, Madeira and Canary Archipelagos contribute with the largest marine surface to the EU, which is vital for conservation and sustainable management policies.

3. Improving Biodiversity Databanks

The existing Biodiversity databanks in the Azores and the Canary Islands provide access to the detailed distribution of all Azorean and Canarian plant and animal species mapped in a 500x500 m. These have proved being a unique means for fundamental research in systematics, biodiversity, conservation management and education. Despite the Interreg Bionatura project had foreseen the development of a databank also for Madeira, it has not been completed and brought online. The intention to join PORBIOTA (Portuguese E-Infrastructure for Information and Research on Biodiversity) could address this issue.

The Azores Biodiversity Database, in turn, needs to be brought up to date for many taxonomic groups, particularly in the marine realm. A more institutional framing, similar to the one in the Canary Islands, could improve the situation.

4. Species conservation and recovery plans

The importance of creating a legal coverage to the conservation of threatened species has been stressed for the Azores and Madeira. In these archipelagos most protected species have this status as a result of the implementation at national level of European Habitats and Birds Directives. However, these Directives do not cover many threatened and endemic species occurring on the Macaronesian islands that have restricted distributions. Conservation/recovery plans similar to the ones existing in the Canary Islands, addressing local priority species, could be implemented. Baseline work for some species is already available.

In the Canaries, where such plans have already been implemented as an outcome of the Spanish and Canarian catalogues of threatened species, supported by a legal framework, it's necessary to extend them to all listed species. In addition, the implementation of complementing monitoring plans has been suggested. These plans should monitor the distribution, phenology and dynamics of the terrestrial threatened populations.

Table 86 lists specific conservation actions raised by the stakeholders.

Table 86. Stakeholder-recomended conservation actions

Bats

- Identification, preservation and monitoring of shelters.
- Development of campaigns to raise awareness among the owners of bat shelters.
- Preliminary evaluation before starting reconstruction interventions to check if there are bats in there.
- Conservation of natural habitats (e.g. Laurisilva) and recovery of degraded habitats (e.g. habitat restoration on the island of Porto Santo, Madeira, with particular emphasis on reforestation measures, may prove to be essential for the conservation of *Pipistrellus maderensis* in this island).
- Maintenance of mercury lamps in street lighting.
- Reduction of the use of chemical methods in agricultural or farming practices.

Cetaceans

- Implementation of actions targeting whale-watching operators to disseminate good practices to reduce noise, or even lead to replacement of boats and/or engines for more silent solutions as well as less harmful propellers.
- Application of measures to mitigate the risk of vessel-whale collisions, in particular in the Canary Islands, acknowledged as a hot spot for vessel-whale collisions (Carrillo & Ritter, 2010). The main mitigation measures appointed have already been described in published literature, e.g. Fais et al. (2016); Carrillo and Ritter (2010); Ritter (2001); Ritter (2010); WWF and SECAC (2015): reduction in vessel speed, placing dedicated observers onboard, the shift of shipping lanes, remote sensing of cetaceans via night vision, laser, sonar or infrared techniques and passive acoustic monitoring systems, among others. However, a conservation applied research could help defining the most cost-effective measures to be implemented in specific areas of higher whale density within the archipelago that overlap with high shipping activity.

Fish

- Adaptation of fishing techniques and gear (e.g. changing fish hooks and launch speed).
- Awareness campaigns for fishermen addressing waste disposal at sea.

Marine Turtles

- Placing observers on board of longliner fishing boats to diffuse good practices and reduce the impact on marine turtles (while collecting important data for fisheries management).
- Implementation of dynamic conservation measures to avoid by-catch of marine turtles.

Plants

- Marking and delimitation of trails used for tourism and leisure activities to avoid involuntary trampling of specimens (usual in plants that grow close to trails and paths).
- Reinforcement of the populations of various *taxa*, the definition of essential methods of propagation and conservation of *ex situ* populations.

Land invertebrates

- Habitat protection maintenance and habitat surveillance, which involves reinforcing the areas already protected and safeguarding that, not only large areas of forest, even secondary, are preserved but also coastal, dry and warm areas, are left untouched.
- Reinforcement of the populations of various taxa, through an essential ex-situ breeding program to enhance critically endangered species conservation.
- Implementation of monitoring schemes address to endangered taxa.
- Conditioning anthropic activities around volcanic cavities where many arthropods occur.

5. Invasive Alien Species control and eradication

Invasive Alien Species (IAS), introduced deliberately or accidentally, particularly threatens islands ecosystems, as the Macaronesian, which are very rich in endemic species, often with small, isolated populations, that due to the island environment free of predators and competitors have lost defensive behaviours. Control measures include the introduction of nets and other forms of control of herbivores (rabbits, goats, sheep, etc.) that affect plant populations, as well as eradication or reduction of populations of alien species, both introduced vertebrates (rats, mice, cats, etc.) that prey on endangered animal species, and invasive plants that colonize natural and semi-natural habitats. A more recent approach is that of using certain invasive species for economic benefits, which contributes to control the infestation, and helps to confine them to certain areas (*Pittosporum undulatum*, for example, that reproduces only by seed, can be cut and sold as biomass, which helps to control the spread). In addition to control measures, biosecurity frameworks, which are lacking in region, should be implemented to contribute to mitigating new invasions.

The research undertaken for the “TOP 100 invasive terrestrial flora and fauna of Macaronesia” highlights that the control of the large majority of the IAS demand medium to long duration projects with a moderate to large investment (L. Silva et al., 2008). Furthermore, the study suggests the institution of a Macaronesian Observatory for Biological Invasions. This initiative would involve different entities working or related to this phenomenon, at local, archipelagic, and Macaronesian levels. The observatory would be responsible for integrating the information related to the occurrence of biological invasions in Macaronesia and would maintain a communications network between the archipelagos, quickly delivering the available information to the decision makers and to the general public.

6. Creation of Micro-Reserves in areas of severely fragmented habitats

Since the preservation of certain types of habitats may be difficult in certain areas (e.g., urban areas, coastal areas due to tourism pressure), the creation of public or private Plant Micro-Reserves (PMRs) can be implemented. The PMR approach has been under discussion in Madeira Island but not implemented to date. These reserves could facilitate the implementation of erradication activities, delimitation, re-colonization, etc., and would contribute also to the conservation of other *taxa*, in particular molluscs and arthropods.

Box 7. Micro-Reserves

The first formulation of the term 'micro-reserve' as a legally protected site was first established in the Valencia region (Spain) back in 1990 with a focus on the conservation of wild flora, under the name of Plant Micro Reserve (PMR). The concept of PMRs was then successfully implemented in other EU countries within the LIFE / LIFE+ framework. The PMR approach has been proven a successful method for the conservation of endemic, rare and threatened plants, in several European countries (Kadis, Thanos, Lumbreras, & (eds), 2013). The European Commission has acknowledged and promoted the PMR approach as a valuable tool towards plant diversity conservation in Europe.

7. Mapping and assessment of ecosystems and their services

Considering the importance of the services of island ecosystems it's of common agreement that there is a need to identify and quantify the services of natural and modified ecosystems of the Macaronesia so as to understand their relative contribution in food production, clean water, carbon sequestration, ground maintenance, recreation and tourism. These assessments are scarse in the region but are essential not only to sustain conservation proposals but also to inform the development and implementation of related policies on water, climate, agriculture, forest and regional planning.

8. Information and environmental awareness campaigns

Information and environmental awareness campaigns are also considered essential as the conservation of species necessarily involves knowledge and understanding by the public about the importance of their natural heritage. The local population of the islands should be more involved and made more aware of the problems of nature conservation and biodiversity, and of possible solutions. There is a need for significant investments in capacity development in governmental as well as non-governmental organizations. These actions can facilitate the recovery of threatened species and thereby allow a more participatory management by the public, for example in creating micro-reserves.

11. CONCLUSIONS

The biodiversity value of the Macaronesia region is well recognized, in particular its richness in endemic species. There are over 5,300 endemic species in a territory of 10,600 km2. A considerable number of the endemics are ancient relict endemics, with a great affinity with Tertiary flora and fauna.

However, species populations in the region have become increasingly fragmented and isolated as a result of pressures caused by human activities, namely intensive urban and tourism development and agriculture and livestock breeding activities. In addition, many alien species have been introduced.

The Ecosystem Profile allows a crucial assessment of priorities in biodiversity conservation in the region, highlighting its value in global terms. The development of this comprehensive Ecosystem Profile was made possible by extensive consultation with stakeholders. More than 83 stakeholders from government/public organizations, academia and civil society participated in the process. In total, 194 KBAs were identified, covering 656 globally threatened, restricted range and congregatory species. Ninety percent of these species are endemic to the region. Forty-six KBAs are the only known sites (globally) for one or more CR or EN species, which means that the loss of any of them would result in the global extinction of at least one species.

Most of the financial resources used for nature conservation and biodiversity are provided by the regional authorities, and there is also a long and effective tradition in the use of co-financing from European programmes such as LIFE, INTERREG and MAC.

However, current investments do not always target the highest conservation priorities or promote the most effective approaches, and the potential to engage civil society in biodiversity conservation has yet to be fully realized.

Despite the EU financing support targeting Natura 2000 Network, a large number of globally threatened species do not occur in these sites. Further, many globally threatened species are not listed as ‘priority species’ under the Birds and Habitats Directives (and many priority species are not threatened at the global level), and therefore are not considered as priorities for conservation at the EU level. This highlights the need for financing beyond for the Natura 2000 to tackle further biodiversity loss in the Macaronesian region.

In this context, there are various opportunities for funders to support biodiversity conservation in ways that deliver significant and meaningful benefits to the region.

The results of this Ecosystem Profile are the basis for the elaboration of the accompanying regional BEST strategy, which provides a clear picture of what the conservation priorities are, identifying the niche where investment can provide the greatest incremental value for conservation, highlighting the funding opportunities and recommending an investment strategy.

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APPENDICES

Appendix 1. List of participants on the first workshops (November 2014)

Name	Entity	Session*	Sector			
			KRI	NGO	PUB	PRV
Azores (Terceira Island, Nov. 10)						
Cândida Mendes	Azores University - Geva	P/T	1			
Diana Pereira	Azores University	P/T	1			
Eduardo Dias	Azores University	P/T	1			
Enésima Pereira Mendonça	Azores University - Azorean Biodiversity Group	P/T	1			
Maria Conceição Rodrigues	Environmental management and Nature Conservation Society (AZORINA)	P/T			1	
Maria Teresa Ferreira	Azores University	P/T	1			
Nuno Vaz Álvaro	Azores University - PhD student	P/T	1			
Paulo Borges	Azorean Biodiversity Group - Azores University	P/T	1			
Rui Bento Elias	Azores University	P/T	1			
	Sub-total	9	8	0	1	0
Azores (São Miguel Island Island, Nov. 11)						
Afonso Prestes	University of the Azores	P	1			
Ana C. Costa	University of the Azores - Research Centre in Biodiversity and Genetic Resources (CIBIO)	P	1			
Ana Isabel Neto	University of the Azores - Natural Resources Research Centre (CIRN)	P	1			
Ana Moreira	Regional Secretariat of Agriculture and Environment - Planning Office	T			1	

Name	Entity	Session*	Sector			
			KRI	NGO	PUB	PRV
António Frias Martins	University of the Azores - Research Centre in Biodiversity and Genetic Resources (CIBIO)	P	1			
Artur Gil	Private	P	1			
Diogo Caetano	Amigos dos Açores	T		1		
Emanuel Verissimo	DSCNSA - Regional Environment Directorate	P/T			1	
Eva Cacabelos	University of the Azores - Interdisciplinary Centre of Marine and Environmental Research (CIIMAR)	P	1			
Fátima Melo	University of the Azores	P/T	1			
Fernando Diogo	University of the Azores	P	1			
Helena Calado	University of the Azores - Research Centre in Biodiversity and Genetic Resources (CIBIO)	P	1			
Jessica Coulon	University of the Azores	P	1			
João Faria Santos	University of the Azores - PhD Student	P	1			
Joaquim Teodósio	Society for the Study of Birds, Azores (SPEA-Azores)	P/T		1		
José Simas	Environmental management and Nature Conservation Society (AZORINA)	P			1	
Luz Paramio	Private	P	1			
Mafalda Sousa Moniz	Environmental Management and Nature Conservation Society (AZORINA)	P/T			1	
Manuel Leitão	Regional Directorate of Forestry Resources	P			1	
Maria Isabel Condessa	DCE; University of the Azores	P	1			
Maria João Pereira	University of the Azores	T	1			
Maria Vale	University of the Azores	P	1			
Marta Vergílio	University of the Azores	T	1			
Mónica Moura	University of the Azores - Research Centre in Biodiversity and Genetic Resources (CIBIO)	T	1			
Rosa Neves Simas	DLLM, University of the Azores	P	1			
Sílvia Pontes de Oliveira	SRTT / DSE	P			1	

Name	Entity	Session*	Sector			
			KR I	NG O	PUB	PRV
Virginie Leyendecker	University of the Azores	P	1			
	Sub-total	27	19	2	6	0
Canary Islands (Gran Canaria Island, Nov. 18)						
Alejandro Padrón Padrón	DRACAENA Consultants	P				1
Almudena Suárez	FCPCT - University of Las Palmas of Gran Canaria	P	1			
Bruno Berheide	Spanish Bank of Algae	P	1			
Carlos Garcia-Verdugo	Canarian Botanic Garden	P			1	
Cristian Ortiz García	Student ULPGC Geography and Spatial Planning	P	1			
Fernando Tuya Cortés	University of Las Palmas of Gran Canaria	P	1			
Isabel Santana López	Government of the Canary Islands - Biodiversity Service	P/T			1	
Javier Rodríguez	Fundación Canaria Parque Científico Tecnológico	P	1			
Juan Martinez	Government of the Canary Islands	P/T			1	
Mª Rafela Rivero Suárez	Servicio Información Ambiental. Viceconsejería de Medio Ambiente	P			1	
Marimar Villagarcia	Oceanic Platform of the Canary Islands (PLOCAN)	P			1	
Marta Martínez Pérez	Territorial and Environmental Management and Planning (Gesplan) – Gov. Canary Is.	P	1			
Pablo Manent	University of Las Palmas of Gran Canaria	P/T	1			
Pedro Sosa	University of Las Palmas of Gran Canaria	P	1			
	Sub-total	14	8	0	5	1
Canary Islands (Tenerife Island,Nov. 19)						
Alberto Brito Hernández	University of La Laguna	P/T	1			
Carlos Sangil Hernández	University of La Laguna	P/T	1			
Fabiana	Private	T		1		
Giuseppe Nerilli	University of La Laguna	T	1			
Jorge Alfredo Reyes Betancort	Instituto Canario ee Investigaciones Agrarias	P/T	1			
José María Fernández-Palacios	University of La Laguna	P/T	1			

Name	Entity	Session*	Sector			
			KRI	NGO	PUB	PRV
José Ramón Arévalo	University of La Laguna	P	1			
Juana María Gonzalez-Mancebo	University of La Laguna	P/T	1			
Laura Martín	University of La Laguna	P/T	1			
Manuel Arbelo Perez	University of La Laguna	P	1			
María Nieves Pérez	Government of the Canary Islands - Biodiversity Service	P/T			1	
Mariano Hernandez Ferres	University of La Laguna	P	1			
Marta Sansón Acedo	University of La Laguna	P/T	1			
Natacha Aguilar de Soto	University of La Laguna	T	1			
Sonia Ramos Maura	SEO/Birdlife	P		1		
	Sub-total	15	12	2	1	0
Madeira Island (Nov. 24)						
Ana Margarida Salgueiro Rodrigues	CIERL-University of Madeira, Research Centre on Regional and Local Studies	P/T	1			
Carolina Santos	Institute of Forests and Nature Conservation (Gov. Madeira)	P/T			1	
Dília Menezes	Institute of Forests and Nature Conservation (Gov. Madeira)	P/T			1	
Dinarte Teixeira	Institute of Forests and Nature Conservation (Gov. Madeira)	P/T			1	
Duarte Barreto	Institute of Forests and Nature Conservation (Gov. Madeira)	P			1	
Humberto Nóbrega	ISOPlexis – University of Madeira	P/T	1			
Luis Freitas	Madeira Whale Museum (Machico Municipality)	P	1			
Mafalda Freitas	Marine Biology Station of Funchal (Municipality of Funchal)	P/T	1			

Name	Entity	Session*	Sector			
			KRI	NGO	PUB	PRV
Manfred Kaufmann	University of Madeira; Interdisciplinary Centre of Marine and Environmental Research of Madeira (CIIMAR-Madeira)	P/T	1			
Manuel Filipe	Institute of Forests and Nature Conservation (Gov. Madeira)	P			1	
Pedro Diniz	ITB - Investigação e Transferência de Biotecnologia, Lda	P	1			
Ricardo Araújo	Museum of Natural History of Funchal (Municipality of Funchal)	T			1	
Rita Ferreira	Madeira Whale Museum / OOM-ARDITI	P	1			
Sandra Hervías Parejo	Society for the Study of Birds, Madeira (SPEA-Madeira)	P/T		1		
Sara Freitas	Institute of Forests and Nature Conservation (Gov. Madeira)	P/T			1	
	Sub-total	15	7	1	7	0
	TOTAL	80	54	5	20	1

* Session: Public (P); Technical (T)

Appendix 2. Feedback from evaluation forms of the first round of workshops (November 2014)

Public session – 64 participants (Terceira - 10; São Miguel – 22; Gran Canaria – 6; Tenerife –12; Madeira - 14)

Questions	Score*					Comments
	1	2	3	4	5	
Public session dissemination	1	5	8	23	19	**Positive** - Opportunity to clarify objectives; interdisciplinary nature of the project; multi-stakeholder consultation process; potential funding. **Negative** - Dissemination of the event; information made available previously; not clear the benefits for the region.
Clarity of the information presented			5	22	29	
Potential benefits of the project for the region			12	21	20	
Credibility of the project to reach its objectives and implement its results	1	1	16	27	9	
Average rating – 4,1 / 5						

* Scores go from 1 (bad) to 5 (excellent)

Technical session – 41 participants (Terceira – 9; São Miguel – 9; Gran Canaria – 3; Tenerife – 11; Madeira – 10)

Questions	Score					Comments
	1	2	3	4	5	
Workshop information provided in advance (e.g. dates, venue, programme)	2	1	6	11	12	**Positive -** Knowledge/information exchange; inclusive/participatory process of KBA definition; cooperation between institutions; identification of information gaps. **Negative** - Lack of applicability of methods to islands; generalization of IUCN Red List criteria to all taxonomic groups; dissemination of the event; information made available previously; low participation of researchers and public administration officers of relevant departments.
Workshop venue (adequacy of the room where the workshop took place)		1	4	15	13	
Materials used during the workshop to support the sessions		1	6	11	16	
Attainment of the objectives of the workshop			4	16	14	
Positive and collaborative				14	20	

Questions	Score					Comments
	1	2	3	4	5	
atmosphere among participants						
Duration of the workshop			5	14	14	
Opportunity for individual participation and input in the workshop				10	24	
Clear explanation of next steps and tasks after the workshop		1	4	15	14	
Average rating – 4,4 / 5						

* Scores go from 1 (bad) to 5 (excellent)

Appendix 3. List of participants on the second round of workshops (October 2015: Madeira and Canary Islands; February 2016: Azores)

Name	Entity	Sector			
		KRI	NGO	PUB	PRV
Madeira (Madeira Island, Oct. 5-6)					
Ana Dinis	Interdisciplinary Centre of Marine and Environmental Research of Madeira (CIIMAR-Madeira)	1			
Cátia Gouveia	Society for the Study of Birds, Madeira (SPEA-Madeira)		1		
Cláudia Ribeiro	Interdisciplinary Centre of Marine and Environmental Research of Madeira (CIIMAR-Madeira); Oceanic Observatory of Madeira (OOM)	1			
Dinarte Teixeira	Regional Directorate of Forestry and Nature Conservation (Government of Madeira)			1	
Filipe Alves	Interdisciplinary Centre of Marine and Environmental Research of Madeira (CIIMAR-Madeira); Madeira Nature Park	1			
José Jesus	University of Madeira	1			
Juan Silva	Museum of Natural History of Funchal (Municipality of Funchal)			1	
Luís Freitas	Madeira Whale Museum (Machico Municipality)			1	
Mafalda Freitas	Marine Biology Station of Funchal (Municipality of Funchal)	1			
Rúben Faria da Paz	Museum of Natural History of Funchal (Municipality of Funchal)			1	
Sérgio Teixeira	Madeira Fauna & Flora				1
Susana Fontinha	ISOplexis Germobanco, University of Madeira	1			
Thomas Dellinger	University of Madeira	1			
Ysabel Gonçalves	Museum of Natural History of Funchal (Municipality of Funchal)			1	
	Sub-total	7	1	5	1
Canary Islands (Tenerife, Oct. 8-9)					
Alejandro Escárez Pérez	Asociación Toniña, Tenerife		1		
Ana Crespo Torres	Asociación Toniña, Tenerife		1		
Esther Martín González	Museum of Natural Science of Tenerife			1	
Jacopo Marrero Pérez	Asociación Toniña, Tenerife		1		

Name	Entity	Sector			
		KRI	NGO	PUB	PRV
José Luis Martin Esquivel	University of La Laguna	1			
José-Maria Fernandez Palacios	University of La Laguna	1			
Juan Ramón Acebes Ginovés	University of La Laguna	1			
Marcelino José Del Arco Aguilar	University of La Laguna	1			
Nieves Zurita Pérez	Government of the Canary Islands, Biodiversity Service			1	
	Sub-total	4	3	2	0
Canary Islands (Gran Canaria, Oct. 13)					
Agustín Naranjo Cigala	University of Las Palmas of Gran Canaria	1			
Francisco Otero-Ferrer	University of Las Palmas of Gran Canaria	1			
Juan Martínez Barrio	Government of the Canary Islands - Biodiversity Service			1	
Ricardo Haroun	University of Las Palmas of Gran Canaria	1			
	Sub-total	3	0	1	0
Azores (S. Miguel, Feb 2-5)					
Amélia Fonseca	University of the Azores	1			
Ana Rainho	University of Lisbon - Faculty of Science	1			
Anunciação Ventura	University of the Azores	1			
Artur Gil	University of the Azores	1			
Conceição Rodrigues	Environmental management and Nature Conservation Society (AZORINA)			1	
Eduardo Dias (by skype)	University of the Azores	1			
Emanuel Veríssimo	DSCNSA - Regional Environment Directorate			1	
Joaquim Teodósio	Society for the Study of Birds, Azores (SPEA-Azores)		1		
Mafalda Moniz	Environmental management and Nature Conservation Society (AZORINA)			1	
Marco Santos	Regional Directorate for the Environment and the Sea			1	

Name	Entity	Sector			
		KRI	NGO	PUB	PRV
Mónica Moura	University of the Azores	1			
Mónica Silva	University of the Azores – DOP, Institute of Marine Research	1			
Paulo Borges	University of the Azores	1			
Verónica Neves	University of the Azores – DOP, Institute of Marine Research	1			
	Sub-total	9	1	4	0
	TOTAL	22	5	13	1

Appendix 4. Species outcomes: globally threatened, restricted-range and congregatory species in the Macaronesian region

Arthropods

Scientific Name	Common Name (EN)	Endemic	RedList category
Acrostira euphorbiae	Palma Stick Grasshopper	CAN	CR
Acrostira tenerifae	Tenerife Stick Grasshopper	CAN	CR
Arthrodeis obesus gomerensis		CAN	RR
Calacalles droueti		AZO	RR
Calathus amplius		CAN	EN loc
Calathus lundbladi		AZO	RR
Calliphona alluaudi	Gran Canaria Green Bush-cricket	CAN	EN
Calliphona gomerensis	Gomera Green Bush-cricket	CAN	EN
Calliphona koenigi	Tenerife Green Bush-cricket	CAN	VU
Calliphona palmensis	Palma Green Bush-cricket	CAN	EN
Canariola nubigena	Canarian Laurel Bush-cricket	CAN	VU
Canarobius oromii		CAN	RR
Carabus coarctatus		CAN	RR
Chrysolina fragariae		MAD	RR
Cionus canariensis		CAN	CR loc
Cixius cavazoricus		AZO	RR
Colletes dimidiatus		CAN	VU
Colletes moricei		CAN	VU
Crotchiella brachyptera	Longhorn beetle	AZO	EN
Cycloptiloides canariensis	Canarian Tiny Cricket	CAN	VU
Delagrangeus schurmanni		CAN	VU
Dericorys minutus	Maspalomas Bow-legged Grasshopper	CAN	CR
Deucalion oceanicum		MAD	RR
Dicrodontus alluaudi		CAN	CR loc
Evergoderes cabrerai	Gran Canaria Bush-cricket	CAN	CR
Gietella faialensis		AZO	RR
Gonepteryx cleobule	Canary Brimstone	CAN	VU
Gonepteryx maderensis	Madeiran Brimstone	MAD	EN
Graptodytes delectus		CAN	EN
Hipparchia bacchus	El Hierro Grayling	CAN	VU
Hipparchia tilosi	La Palma Grayling	CAN	VU
Hogna ingens	Desertas Wolf Spider	MAD	CR
Hydroporus compunctus		CAN	CR
Hydroporus pilosus		CAN	EN
Hymenoptila lanzarotensis	Lanzarote Malpais Cricket	CAN	VU
Ischnura hastata	Damselfly, citrine forktail	No	VU
Leipaspis lauricola		CAN	VU
Leipaspis pinicola		CAN	EN
Loboptera subterranea		CAN	EN loc

Scientific Name	Common Name (EN)	Endemic	RedList category
Macarorchiestia martini	Beachflea	AZO	RR
Maiorerus randoi		CAN	EN loc
Meladema imbricata		CAN	CR
Meladema lanio		MAD	VU
Morlockia ondinae		CAN	RR
Paradeucalion desertarum		MAD	RR
Paradromius tamaranus		CAN	RR
Pararge xiphia	Madeiran Speckled Wood	MAD	EN
Pieris cheiranthi	Canary Islands Large White	CAN	EN
Pieris wollastoni	Madeiran Large White	MAD	CR
Pimelia fernandezlopezi		CAN	VU loc
Pimelia radula radula		CAN	RR
Pseudoblothrus oromii		AZO	RR
Purpuraria erna	Purpurarian Stick Grasshopper	CAN	EN
Purpuraria magna	Lanzarote Stick Grasshopper	CAN	EN
Sphingonotus guanchus	Gran Canaria Sand Grasshopper	CAN	EN
Sphingonotus picteti	Tenerife Sand Grasshopper	CAN	VU
Sphingonotus rugosus	Rugose Sand Grasshopper	CAN	VU
Thalassophilus azoricus		AZO	RR
Trechus detersus		CAN	CR loc
Trechus isabelae	Ground beetle	AZO	RR
Trechus jorgensis		AZO	RR
Trechus oromii		AZO	RR
Turinyphia cavernicola	Dwarf spider	AZO	RR

Birds

Scientific Name	Common Name (EN)	Endemic	RedList category
Anthus berthelotii berthelotii	Anthus berthelotii	MACAR	VU loc ssp
Buteo buteo rothschildi	Azores Buzzard	AZO	RR
Bulweria bulwerii	Bulwer's Petrel	No	CONGR
Calonectris borealis	Cory's Shearwater	No	CONGR
Chlamydotis undulata	African Houbara Bustard	No	VU
Columba bollii	Dark-tailed Laurel-pigeon	CAN	RR
Columba junoniae	White-tailed Laurel-pigeon	CAN	RR
Columba trocaz	Madeira Laurel-pigeon	MAD	RR
Corvus corax canariensis	Common Raven (Canarian)	CAN	RR
Fringilla teydea polatzeki	Canary Islands Chaffinch	CAN	RR
Fringilla teydea teydea	Teyde finch	CAN	RR
Hydrobates castro	Band-rumped Storm-petrel	No	CONGR
Hydrobates monteiroi	Monteiro's Storm-petrel	AZO	VU
Marmaronetta angustirostris	Marbled Teal	No	VU
Neophron percnopterus	Undulate Ray	No	EN
Pelagodroma marina	White-faced Storm petrel	No	CONGR
Pterodroma deserta	Desertas Petrel	MAD	VU
Pterodroma madeira	Zino's Petrel	MAD	EN
Puffinus lherminieri	Barolo shearwater	MACAR	RR

Scientific Name	Common Name (EN)	Endemic	RedList category
Puffinus yelkouan	Yelkouan Shearwater	No	VU
Pyrrhula murina	Azores Bullfinch	AZO	EN
Regulus regulus sanctae mariae	Santa Maria Goldcrest	AZO	CR loc ssp
Saxicola dacotiae dacotiae	**Fuerteventura Stonechat**	CAN	RR
Sterna dougallii	Roseae tern	No	CONGR
Sterna hirundo	Common tern	No	CONGR
Tyto alba gracilirostris	Barn Owl	CAN	RR

Fishes

Scientific Name	Common Name (EN)	Endemic	RedList category
Dipturus batis	Blue Skate	No	CR
Squatina aculeata	Sawback Angelshark	No	CR
Squatina oculata	Smoothback Angel Shark	No	CR
Squatina squatina	Angel Shark	No	CR
Anguilla anguilla	European Eel	No	CR
Lamna nasus		No	CR
Squalus acanthias	Spiny Dogfish	No	CR
Sardinella maderensis	Madeiran Sardinella	No	VU
Raja undulata	Undulate Ray	No	EN
Rostroraja alba	Bottlenose Skate	No	EN
Sphyrna mokarran	Great Hammerhead	No	EN
Epinephelus marginatus	Dusky Grouper	No	EN
Mycteroperca fusca	Island Grouper	MACAR	EN
Rhinobatos rhinobatos	Common Guitarfish	No	EN
Thunnus thynnus	Atlantic Bluefin Tuna	No	EN
Carcharhinus obscurus	Dusky Shark	No	VU
Carcharhinus plumbeus	Sandbar Shark	No	VU
Centrophorus granulosus	Gulper Shark	No	VU
Centrophorus lusitanicus	Lowfin Gulper Shark	No	VU
Galeorhinus galeus	Tope	No	VU
Isurus paucus	Longfin Mako	No	VU
Leucoraja circularis	Sandy Skate	No	VU
Manta alfredi	Reef Manta Ray	No	VU
Oxynotus centrina	Angular Rough Shark	No	VU
Sphyrna zygaena	Smooth Hammerhead	No	VU
Alopias superciliosus	Bigeye Thresher Shark	No	VU
Alopias vulpinus	Common Thresher Shark	No	VU
Bodianus scrofa	Barred hogfish	MACAR	VU
Carcharhinus longimanus	Oceanic Whitetip Shark	No	VU
Carcharodon carcharias	Great White Shark	No	VU
Centrophorus squamosus	Deepwater Spiny Dogfish	No	VU
Cetorhinus maximus	Basking shark	No	VU
Gymnura altavela	Spiny butterfly ray	No	VU
Isurus oxyrinchus	Shortfin Mako	No	VU
Kajikia albida	White Marlin	No	VU

Scientific Name	Common Name (EN)	Endemic	RedList category
Makaira nigricans	Blue Marlin	No	VU
Manta birostris	Giant Manta Ray	No	VU
Mustelus mustelus	Common Smoothhound	No	VU
Odontaspis ferox	Small-tooth Sand Tiger Shark	No	VU
Sphyrna lewini	Scalloped Hammerhead	No	VU
Thunnus obesus	Bigeye tuna	No	VU
Rhincodon typus	Whale shark	No	VU
Balistes capriscus	Gray Triggerfish	No	VU

Crustaceans

Scientific Name	Common Name (EN)	Endemism	RedList category
Palinurus elephas	European Spiny Lobster	No	VU
Megabalanus azoricus	Giant barnacle	MACAR	RR

Mammals

Scientific Name	Common Name (EN)	Endemism	RedList category
Balaenoptera borealis	Sei Whale	No	EN
Balaenoptera musculus	Blue Whale	No	EN
Balaenoptera physalus	Fin Whale	No	EN
Crocidura canariensis	Canarian Shrew	CAN	EN
Eubalaena glacialis	North Atlantic Right Whale	No	EN
Monachus monachus	Mediterranean Monk Seal	No	EN
Nyctalus azoreum	Azores Bat	AZO	EN
Nyctalus leisleri verrucosus	Leisler's Bat	MAD	CR loc ssp
Physeter macrocephalus	Sperm whale	No	VU
Pipistrellus maderensis	Madeira Pipistrelle	MACAR	EN
Plecotus teneriffae	Canary Big-eared Bat	CAN	EN

Molluscs

Scientific Name	Common Name (EN)	Endemism	RedList category
Actinella actinophora		MAD	VU
Actinella armitageana		MAD	VU
Actinella arridens		MAD	CR
Actinella carinofausta		MAD	EN
Actinella giramica		MAD	VU
Actinella laciniosa		MAD	VU
Actinella littorinella		MAD	VU
Actinella obserata		MAD	CR
Amphorella cimensis		MAD	VU
Amphorella hypselia		MAD	VU
Amphorella iridescens		MAD	VU

Scientific Name	Common Name (EN)	Endemism	RedList category
Amphorella melampoides		MAD	VU
Atlantica gueriniana		MAD	CR
Canariella bimbachensis		CAN	VU
Canariella eutropis		CAN	EN
Canariella fortunata		CAN	VU
Canariella hispidula		CAN	VU
Canariella huttereri		CAN	EN
Canariella jandiaensis		CAN	CR
Canariella leprosa		CAN	VU
Canariella pontelirae		CAN	VU
Canariella pthonera		CAN	VU
Canariella ronceroi		CAN	CR
Caseolus baixoensis		MAD	VU
Caseolus calculus		MAD	VU
Caseolus calvus		MAD	EN
Caseolus galeatus		MAD	CR
Caseolus leptostictus		MAD	VU
Caseolus subcalliferus		MAD	CR
Cecilioides eulima		MAD	CR
Craspedopoma lyonnetianum		MAD	VU
Cryptella susannae		CAN	EN loc
Cylichnidia ovuliformis		MAD	VU
Discula bulverii		MAD	CR
Discula lyelliana		MAD	CR
Discula pulvinata		MAD	EN
Discula tabellata		MAD	CR
Discula tectiformis		MAD	EN
Discula testudinalis		MAD	CR
Discula tetrica		MAD	CR
Disculella spirulina		MAD	VU
Geomitra delphinuloides		MAD	CR
Geomitra grabhami		MAD	CR
Geomitra moniziana		MAD	EN
Geomitra tiarella		MAD	EN
Hemicycla efferata		CAN	CR
Hemicycla eurythyra		CAN	VU
Hemicycla inutilis		CAN	VU
Hemicycla mascaensis		CAN	CR
Hemicycla modesta		CAN	CR
Hemicycla paeteliana		CAN	CR
Hemicycla plicaria		CAN	CR
Hemicycla pouchadan		CAN	EN
Hemicycla pouchet		CAN	VU
Hemicycla saulcyi		CAN	CR
Hystricella leacockiana		MAD	VU
Hystricella turricula		MAD	VU
Idiomela subplicata		MAD	CR
Lampadia webbiana		MAD	EN
Leiostyla abbreviata		MAD	CR
Leiostyla arborea		MAD	VU

Scientific Name	Common Name (EN)	Endemism	RedList category
Leiostyla cassida		MAD	CR
Leiostyla cassidula		MAD	CR
Leiostyla colvillei		MAD	VU
Leiostyla corneocostata		MAD	VU
Leiostyla falknerorum		MAD	EN
Leiostyla ferraria		MAD	VU
Leiostyla filicum		MAD	VU
Leiostyla gibba		MAD	CR
Leiostyla heterodon		MAD	VU
Leiostyla laurinea		MAD	VU
Leiostyla macilenta		MAD	VU
Leiostyla simulator		MAD	CR
Leptaxis caldeirarum		AZO	EN
Leptaxis furva		MAD	VU
Leptaxis minor		AZO	EN
Leptaxis simia ssp. portosancti		MAD	VU
Leptaxis wollastoni		MAD	EN
Monilearia arguineguinensis		CAN	CR
Monilearia granostriata		CAN	CR
Monilearia pulverulenta		CAN	CR
Monilearia tumulorum		CAN	CR
Moreletina obruta		AZO	VU
Napaeus boucheti		CAN	VU
Napaeus doliolum		CAN	EN
Napaeus elegans		CAN	VU
Napaeus esbeltus		CAN	VU
Napaeus exilis		CAN	CR
Napaeus isletae		CAN	CR
Napaeus lichenicola		CAN	VU
Napaeus myosotis		CAN	EN
Napaeus nanodes		CAN	EN
Napaeus ornamentatus		CAN	VU
Napaeus osoriensis		CAN	CR
Napaeus roccellicola		CAN	VU
Napaeus rupicola		CAN	VU
Napaeus tagamichensis		CAN	VU
Napaeus taguluchensis		CAN	VU
Napaeus teobaldoi		CAN	CR
Obelus despreauxii		CAN	VU
Obelus discogranulatus		CAN	EN
Obelus moratus		CAN	VU
Oxychilus agostinhoi		AZO	VU
Oxychilus lineolatus		AZO	VU
Parmacella tenerifensis		CAN	EN
Patella candei		MACAR	RR
Plutonia albopalliata		MAD	VU
Plutonia angulosa		AZO	CR
Plutonia dianae		CAN	VU
Plutonia falcifera		CAN	CR
Plutonia machadoi		CAN	CR

Scientific Name	Common Name (EN)	Endemism	RedList category
Plutonia reticulata		CAN	CR
Sculptiferussacia clausiliaeformis		CAN	EN
Serratorotula coronata		MAD	EN
Spirorbula squalida		MAD	VU
Theba arinagae		CAN	CR
Theba grasseti		CAN	EN
Theba impugnata		CAN	VU
Xerotricha pavida		CAN	EN

Plants

Scientific Name	Common Name (EN)	Endemism	RedList category
Adenocarpus ombriosus		CAN	EN
Aeonium balsamiferum		CAN	VU
Aeonium gomerense		CAN	EN
Aeonium saundersii		CAN	VU
Agrostis congestiflora oreophila		AZO	EN loc ssp
Agrostis gracililaxa var. mutica		AZO	EN loc
Agrostis obtusissima		MAD	RR
Agrostis reuteri ssp. botelhoi		AZO	EN loc ssp
Aichryson tortuosum		CAN	RR
Aichryson bituminosum		CAN	EN loc
Aichryson dumosum		MAD	CR
Aichryson pachycaulon spp. praetermissum		CAN	EN loc ssp
Aichryson pachycaulon ssp. pachycaulon		CAN	CR loc ssp
Aichryson porphyrogennetos		CAN	VU loc
Aichryson villosum		MACAR	CR loc
Alophosia azorica	Bird's-nest moss	MACAR	VU loc
Ammi huntii		AZO	CR loc
Ammi trifoliatum		AZO	CR loc
Ammi seubertianum		AZO	CR loc
Ammodaucus leucotrichus ssp. nanocarpus		CAN	EN loc ssp
Amphidium curvipes		MACAR	VU loc
Anagyris latifolia		CAN	EN
Andoa berthelotiana		MACAR	EN loc
Androcymbium hierrense ssp. hierrense		CAN	EN loc ssp
Androcymbium hierrense ssp. macrospermum		CAN	EN loc ssp
Androcymbium psammophilum		CAN	VU
Andryala crithmifolia		MAD	CR
Angelica lignescens		AZO	EN loc
Anthyllis lemanniana		MAD	RR
Aphanolejeunea azorica	Azorean pouncewort	MACAR	VU loc
Aphanolejeunea madeirensis	Pouncewort	MACAR	VU loc

Scientific Name	Common Name (EN)	Endemism	RedList category
Apollonias barbujana ssp. ceballosi		CAN	CR ssp
Arachniodes webbianum		MAD	RR
Arbutus canariensis		CAN	VU
Argyranthemum adauctum ssp. erythrocapon		CAN	CR loc ssp
Argyranthemum adauctum ssp. jacobaeifolium		CAN	EN loc ssp
Argyranthemum adauctum ssp. palmensis		CAN	CR loc ssp
Argyranthemum dissectum		MAD	RR
Argyranthemum haematomma		MAD	RR
Argyranthemum lidii		CAN	EN
Argyranthemum pinnatifidum ssp. succulentum		MAD	VU ssp
Argyranthemum sundingii		CAN	CR loc
Argyranthemum thalassophilum		MAD	EN
Argyranthemum winteri		CAN	CR
Armeria maderensis		MAD	RR
Armeria maritima ssp. azorica		AZO	EN loc ssp
Asparagus arborescens		CAN	VU
Asparagus fallax		CAN	EN
Asparagus nesiotes		MACAR	EN
Asparagus plocamoides		CAN	VU
Asparagus umbellatus subsp. lowei		MAD	RR
Asplenium anceps		MACAR	EN loc
Asplenium trichomanes ssp. maderense		MAD	RR
Atractylis arbuscula		CAN	EN
Atractylis preauxiana		CAN	EN
Azorina vidalii		AZO	EN
Bellis azorica		AZO	CR loc
Bencomia brachystachya		CAN	CR
Bencomia exstipulata		CAN	VU
Bencomia sphaerocarpa		CAN	CR
Berberis maderensis		MAD	RR
Beta patula		MAD	CR
Brachymenium notarisii	Moss	MACAR	VU loc
Bryoxiphium madeirense		MAD	EN
Bunium brevifolium		MAD	RR
Bupleurum handiense		CAN	EN
Bystropogon maderensis		MAD	RR
Camptoloma canariensis		CAN	VU loc
Canariothamnus hermosae		CAN	VU
Cardamine caldeirarum		AZO	EN loc
Carduus bourgeaui		CAN	CR loc
Carduus volutarioides		CAN	EN loc
Carex perraudieriana		CAN	CR loc
Cerastium azoricum		AZO	CR loc

Scientific Name	Common Name (EN)	Endemism	RedList category
Cerastium sventenii		CAN	EN
Cerastium vagans var. vagans		MAD	RR
Ceropegia dichotoma ssp. krainzii		CAN	EN ssp
Ceterach lolegnamense		MAD	RR
Chaerophyllum azoricum		AZO	CR loc
Chamaemeles coriacea		MAD	VU
Cheilolejeunea cedercreutzii		AZO	RR
Cheirolophus arboreus		CAN	EN loc
Cheirolophus arbutifolius		CAN	VU loc
Cheirolophus duranii		CAN	CR
Cheirolophus falcisectus		CAN	EN
Cheirolophus ghomerythus		CAN	EN
Cheirolophus junonianus		CAN	EN
Cheirolophus massonianus		MAD	EN
Cheirolophus metlesicsii		CAN	CR
Cheirolophus santos-abreui		CAN	CR
Cheirolophus satarataensis		CAN	VU
Cheirolophus sventenii gracilis		CAN	RR
Cheirolophus tagananensis		CAN	VU
Chenopodium coronopus		CAN	CR loc
Cicer canariense		CAN	EN
Cistus chinamadensis		CAN	EN
Cistus osbeckiifolius ssp. osbeckiifolius		CAN	EN loc ssp
Cololejeunea schaeferi		MACAR	VU loc
Convolvulus glandulosus		CAN	EN loc
Convolvulus lopezsocasii		CAN	EN
Convolvulus massonii		MAD	VU
Convolvulus scoparius		CAN	VU loc
Convolvulus subauriculatus		CAN	CR loc
Convolvulus volubilis		CAN	EN loc
Corema album ssp. azoricum		AZO	CR loc ssp
Crambe arborea		CAN	VU
Crambe feuillei		CAN	CR
Crambe gomerae		CAN	VU
Crambe laevigata		CAN	EN
Crambe microcarpa		CAN	EN
Crambe pritzelii		CAN	EN
Crambe scaberrima		CAN	VU
Crambe scoparia		CAN	EN
Crambe sventenii		CAN	CR
Crambe tamadabensis		CAN	CR
Crambe wildpretii		CAN	CR
Crepis noronhaea		MAD	RR
Crepis vesicaria andryaloides		MAD	RR
Dactylis metlesicsii		CAN	EN loc
Daphne laureola	Spurge laurel	AZO	CR loc
Delphinium maderense		MAD	RR
Dendriopoterium pulidoi		CAN	VU

Scientific Name	Common Name (EN)	Endemism	RedList category
Deschampsia maderensis		MAD	RR
Descurainia artemisioides		CAN	EN loc
Diphasiastrum madeirense		MACAR	CR loc
Dorycnium broussonetii		CAN	CR loc
Dorycnium spectabile		CAN	EN
Dracaena draco	Canary Island Dragon Tree	MACAR	EN
Dracaena tamaranae		CAN	CR loc
Dryopteris affinis		AZO	VU loc
Echinodium renauldii	Moss	AZO	VU
Echinodium setigerum		MAD	VU
Echinodium spinosum		MACAR	CR loc
Echium acanthocarpum		CAN	CR
Echium callithyrsum		CAN	VU
Echium decaisnei purpuriense		CAN	EN ssp
Echium gentianoides		CAN	VU
Echium handiense		CAN	CR
Echium onosmifolium spectabile		CAN	EN ssp
Echium pininana		CAN	EN
Echium sventenii		CAN	CR loc
Echium wildpretii trichosiphon		CAN	VU loc ssp
Elaphoglossum semicylindricum		MACAR	RR
Erysimum arbuscula		MAD	RR
Erysimum maderense		MAD	RR
Euphorbia anachoreta		MAD	RR
Euphorbia bourgeana		CAN	VU
Euphorbia bravoana		CAN	VU loc
Euphorbia handiensis		CAN	VU
Euphorbia piscatoria		MAD	RR
Euphorbia stygiana santamariae		AZO	CR ssp
Euphorbia stygiana stygiana		AZO	EN loc ssp
Euphrasia azorica		AZO	CR loc
Euphrasia grandiflora		AZO	CR loc
Ferula latipinna		CAN	VU
Fissidens coacervatus	Pocket-moss	MACAR	VU loc
Fissidens nobreganus		MAD	VU loc
Frangula azorica		AZO	EN loc
Frullania sergiae		MAD	VU loc
Fumaria muralis muralis var. laeta		MAD	RR
Gaudinia coarctata		AZO	VU loc
Genista benehoavensis		CAN	VU
Geranium maderense		MAD	CR
Geranium rubescens		MAD	RR
Gesnouinia arborea		CAN	VU loc
Globularia ascanii		CAN	CR
Globularia sarcophylla		CAN	VU
Goodyera macrophylla		MAD	CR
Grimmia curviseta		CAN	VU loc

Scientific Name	Common Name (EN)	Endemism	RedList category
Heberdenia excelsa		MACAR	VU
Hedenasiastrum percurrens		MAD	VU loc
Helianthemum aganae		CAN	CR loc
Helianthemum bramwelliorum		CAN	CR loc
Helianthemum bystropogophyllum		CAN	CR
Helianthemum gonzalezferreri		CAN	CR loc
Helianthemum inaguae		CAN	CR loc
Helianthemum juliae		CAN	CR loc
Helianthemum teneriffae		CAN	CR
Helianthemum tholiforme		CAN	EN loc
Helichrysum alucense		CAN	CR loc
Helichrysum devium		MAD	RR
Helichrysum gossypinum		CAN	VU
Helichrysum monizii		MAD	RR
Helichrysum monogynum		CAN	EN
Himantoglossum metlesicsianum	Metlesics' Himantoglossum	CAN	EN
Holcus azoricus		AZO	VU loc
Hymenophyllum maderense		MAD	RR
Hypericum coadunatum		CAN	CR loc
Hypochaeris oligocephala		CAN	CR
Ilex perado ssp. azorica		AZO	VU loc ssp
Ilex perado ssp. lopezlilloi		CAN	CR ssp
Ilex perado ssp. platyphylla		CAN	VU ssp
Isoetes azorica		AZO	VU
Isoplexis chalcantha		CAN	CR
Isoplexis isabelliana	Cresta de Gallo	CAN	EN
Isoplexis sceptrum		MAD	RR
Jasminum azoricum		MAD	CR
Juniperus brevifolia	Azores Juniper	AZO	VU
Juniperus cedrus	Canary Islands Juniper	MACAR	EN
Kunkeliella canariensis		CAN	CR loc
Kunkeliella psilotoclada		CAN	CR
Kunkeliella subsucculenta		CAN	CR
Lactuca watsoniana		AZO	EN
Laphangium teydeum		CAN	EN loc
Lavandula stoechas maderensis		MAD	RR
Lejeunea canariensis		MACAR	VU loc
Leptodon longisetus		MAD	VU loc
Leucodon canariensis	White-tooth	MACAR	VU loc
Leucodon treleasei		MACAR	VU loc
Limonium benmageci		CAN	CR loc
Limonium bourgeaui		CAN	CR loc
Limonium brassicifolium macropterum		CAN	EN loc ssp
Limonium brassicifolium ssp.brassicifolium		CAN	EN loc ssp
Limonium dendroides		CAN	CR

Scientific Name	Common Name (EN)	Endemism	RedList category
Limonium fruticans		CAN	EN
Limonium imbricatum		CAN	EN loc
Limonium macrophyllum		CAN	VU loc
Limonium ovalifolium canariense		CAN	CR loc ssp
Limonium ovalifolium pyramidatum		MAD	RR
Limonium papillatum var.callibotryum		MAD	RR
Limonium perezii		CAN	VU
Limonium preauxii		CAN	EN
Limonium puberulum		CAN	EN loc
Limonium redivivum		CAN	EN loc
Limonium relicticum		CAN	CR loc
Limonium spectabile		CAN	CR
Limonium sventenii		CAN	CR
Limonium vigaroense		CAN	CR loc
Lobularia canariensis rosula-venti		MAD	RR
Lobularia canariensis succulenta		MAD	RR
Lophochloa azorica		AZO	EN loc
Lotus arinagensis		CAN	CR loc
Lotus azoricus		AZO	CR loc
Lotus berthelotii		CAN	CR loc
Lotus callis-viridis		CAN	EN
Lotus eremiticus		CAN	CR
Lotus kunkelii		CAN	CR
Lotus loweanus		MAD	RR
Lotus macranthus		MAD	RR
Lotus maculatus		CAN	CR
Lotus pyranthus		CAN	CR
Lotus spartioides		CAN	VU loc
Luzula seubertii		MAD	RR
Malva canariensis		CAN	EN loc
Marcetella maderensis		MAD	EN
Melanoselinum decipiens		MAD	RR
Micromeria densiflora		CAN	EN loc
Micromeria glomerata		CAN	CR
Micromeria leucantha		CAN	EN
Micromeria pineolens		CAN	EN loc
Micromeria rivas-martinezii		CAN	CR
Misopates salvagense		MAD	RR
Monanthes lowei		MAD	RR
Monanthes wildpretii		CAN	CR
Monizia edulis		MAD	CR
Musschia wollastonii		MAD	EN
Myosotis azorica		AZO	VU
Myosotis maritima		AZO	EN loc
Myrica rivas-martinezii		CAN	CR

Scientific Name	Common Name (EN)	Endemism	RedList category
Normania triphylla		MAD	RR
Ononis christii		CAN	CR loc
Onopordum carduelium		CAN	CR
Onopordum nogalesii		CAN	CR
Orchis scopulorum		MAD	RR
Orthotrichum handiense		CAN	EN loc
Parafestuca albida		MAD	RR
Parolinia filifolia		CAN	EN loc
Parolinia glabriusucula		CAN	CR loc
Parolinia platypetala		CAN	CR loc
Parolinia schizogynoides		CAN	VU
Patellifolia webbiana		CAN	CR
Pelekium atlanticum		MACAR	VU loc
Pericallis hadrosoma		CAN	CR
Pericallis malvifolia malvifolia		AZO	CR loc ssp
Pericallis malvifolia caldeirae		AZO	CR ssp
Peucedanum lowei		MAD	RR
Phalaris maderensis		MAD	VU
Picconia azorica		AZO	VU loc
Picconia excelsa		MACAR	VU
Pittosporum coriaceum		MAD	CR
Plagiochila maderensis		MACAR	VU loc
Plantago afra var. obtusata		MAD	RR
Plantago famarae		CAN	CR
Plantago malato-belizii		MAD	RR
Platanthera azorica		AZO	CR loc
Platanthera micrantha		AZO	EN
Platanthera pollostantha	butterfly-orchid	AZO	RR
Pleiomeris canariensis		CAN	EN
Polystichum drepanum		MAD	CR
Prunus azorica		AZO	CR loc
Prunus hixa		No	VU
Pteris incompleta		No	VU
Pulicaria canariensis canariensis		CAN	EN loc ssp
Pulicaria canariensis ssp. lanata		CAN	EN loc ssp
Radula jonesii		MACAR	VU
Radula wichurae		MACAR	CR loc
Rhamnus integrifolia		CAN	VU
Rhynchostegiella bourgaeana		MACAR	VU loc
Riccia atlantica		MAD	VU
Rubus grandifolius		MAD	RR
Rumex azoricus		AZO	CR loc
Rumex obtusifolius obtusifolius	Bitter Dock	AZO	EN loc ssp
Rumex simpliciflorus maderensis		MAD	RR
Ruta microcarpa		CAN	EN
Ruta oreojasme		CAN	VU loc
Salvia broussonetii		CAN	EN loc
Salvia herbanica		CAN	CR

Scientific Name	Common Name (EN)	Endemism	RedList category
Sambucus lanceolata		MAD	RR
Sambucus nigra ssp. palmensis		CAN	EN ssp
Sanicula azorica		AZO	EN loc
Saxifraga portosanctana		MAD	VU
Scabiosa nitens		AZO	EN loc
Schizogyne glaberrima		CAN	EN loc
Scilla madeirensis var. melliodora		MAD	RR
Scrophularia calliantha		CAN	CR loc
Scrophularia lowei		MAD	RR
Scrophularia racemosa		MAD	RR
Sedum brissemoretii		MAD	VU
Sedum fusiforme		MAD	RR
Semele gayae		CAN	VU loc
Siderites candicans var. crassifolia		MAD	RR
Siderites candicans var. multiflora		MAD	RR
Sideritis cystosiphon		CAN	CR
Sideritis discolor		CAN	CR
Sideritis guayedrae		CAN	EN loc
Sideritis infernalis		CAN	VU
Sideritis marmorea		CAN	CR
Sideritis nervosa		CAN	EN loc
Sideritis pumila		CAN	EN loc
Sideritis sventenii		CAN	CR loc
Sideroxylon canariensis		CAN	VU loc
Sideroxylon mirmulans		MACAR	VU
Silene nocteolens		CAN	CR
Silene sabinosae		CAN	EN loc
Silene uniflora cratericola		AZO	CR loc ssp
Sinapidendron angustifolium		MAD	CR
Sinapidendron frutescens		MAD	EN
Sinapidendron rupestre		MAD	CR
Sinapidendron sempervivifolium		MAD	EN
Smilax divaricata		AZO	EN loc
Solanum lidii		CAN	CR
Solanum patens		MAD	RR
Solanum vespertilio doramae		CAN	CR loc ssp
Solanum vespertilio vespertilio		CAN	CR loc ssp
Sonchus gandogeri		CAN	CR
Sonchus wildpretii		CAN	CR loc
Sorbus maderensis		MAD	CR
Stemmacantha cynaroides		CAN	EN
Sventenia bupleuroides		CAN	EN
Tanacetum oshanahanii		CAN	CR
Tanacetum ptarmiciflorum		CAN	EN
Telaranea azorica		MACAR	EN loc
Teline maderensis var. paivae		MAD	RR
Teline nervosa		CAN	CR

Scientific Name	Common Name (EN)	Endemism	RedList category
Teline pallida allida		CAN	VU loc ssp
Teline pallida ilensis		CAN	CR loc ssp
Teline rosmarinifolia		CAN	EN
Teline salsoloides		CAN	CR
Teucrium abutiloides		MAD	CR
Teucrium heterophyllum heterophyllum		MAD	RR
Teucrium heterophyllum hierrense		CAN	EN loc
Thamnobryum fernandesii		MAD	EN
Tolpis crassiuscula		CAN	CR loc
Tolpis glabrescens		CAN	EN
Tolpis succulenta		MACAR	EN loc
Tortella limbata		MACAR	VU loc
Tylimanthus madeirensis		MAD	VU loc
Urtica morifolia		MACAR	CR loc
Veronica dabneyi		AZO	CR loc
Viburnum treleasei		AZO	EN loc
Vicia capreolata		MAD	EN
Vicia costae		MAD	CR
Vicia ferreirensis		MAD	CR
Viola palmensis		CAN	RR
Viola paradoxa		MAD	RR
Volutaria bollei		CAN	CR loc
Aichryson santamariensis		AZO	CR loc
Gelidium canariense		CAN	RR

Reptiles

Scientific Name	Common Name (EN)	Endemism	RedList category
Caretta caretta	Loggerhead turtle	No	EN
Chalcides simonyi		CAN	EN
Chelonia mydas	Green Turtle	No	EN
Dermochelys coriacea	Leatherback Turtle	No	VU
Eretmochelys imbricata	Hawksbill Turtle	No	CR
Gallotia auaritae	La Palma Giant Lizard	CAN	CR
Gallotia bravoana	La Gomera Giant Lizard	CAN	CR
Gallotia galloti insulanagae	Tenerife Lizard	CAN	VU loc
Gallotia intermedia	Tenerife Speckled Lizard	CAN	CR
Gallotia simonyi	El Hierro Giant Lizard	CAN	CR
Tarentola bischoffi	Boettger's Wall Gecko	MAD	VU loc
Lepidochelys kempii	Kemp's Ridley Turtle	No	CR
Lepidochelys olivacea	Olive Ridley Turtle	No	VU

CR= Critically Endangered; EN = Endangered; VU = Vulnerable; RR = Restricted range; ssp = sub-species

The suffix “loc” indicates that the species is listed as threatened in a sub-global Red List using the IUCN guidelines.

Restricted range species are endemic species that do not fall under the previous categories, but are listed as endangered in sub-global Red Lists and check lists, using other criteria than IUCN's.

Appendix 5. Key Biodiversity Areas in the Macaronesian region

Code	Key Biodiversity Area	Birds	Artrophods	Crustaceans	Mammals	Molluscs	Fish	Plants	Reptiles	VU	EN	CR	RR	CONGR	Priority Level	Protection	Total area (km^2)	Land area (km^2)
									AZORES									
COR1	Coast of Corvo island	5			1			11		4	6	2	1	4	3	Most	5	5
COR2	Central area of Corvo island	2			1			10		4	4	2	2	1	3	Some	7	7
COR3	Oceanic area north of Corvo and Faial islands	1												1	5	Whole	2,607	0
FAI1	Oceanic coastal areas of Faial	4	2		1			10		1	7	3	4	2	3	Little/none	33	33
FAI2	Central area of Faial		3		1			23		4	11	8	4		3	Some	62	62
FAI3	Great crater of Faial				1			12		3	5	4	1		1	Whole	1	1
FAI4	Castelo Branco						1				1				4	Whole	1	0
FLO1	Marine area of Corvo and Flores	3											1	2	5	Whole	2,104	0
FLO2	Flores islands and adjacent islets	5	1		1			33		8	15	10	3	4	3	Some	143	141
GRA1	Coastal areas and islets of Graciosa island	7			1			10		6	5	1	2	4	2	Some	6	5
GRA2	Marine area of Graciosa island	4								1				3	4	Whole	277	0
GRA3	Southwest area of Graciosa island	4			1			7		1	4	3	2	2	2	Little/none	13	13
GRA4	North and northeast area of Graciosa island	2			1			3		1	2	1	1	1	2	Little/none	20	20
PIC1	Oceanic coastal areas of Pico	3	1		1			20		7	10	5	1	2	3	Some	80	80
PIC2	Faial-Pico channel						2				2				4	Whole	241	0
PIC3	Central area of Pico island	1	3		1			36		9	17	10	5		3	Some	184	184
PIC4	Pico mountain crater							5			3	1	1		1	Some	4	4
SJG1	Western marine area of S. Jorge island	2												2	5	Little/none	331	0

Code	Key Biodiversity Area	Birds	Artrophods	Crustaceans	Mammals	Molluscs	Fish	Plants	Reptiles	VU	EN	CR	RR	CONGR	Priority Level	Protection	Total area (km^2)	Land area (km^2)
SJG2	Topo islet and coastal areas of S. Jorge island	6			2			17		3	11	5	2	4	2	Some	80	80
SJG3	Pico da Esperança		1		2			21		5	10	7	2		1	Some	32	32
SJG4	Beira		1		1						1		1		4	Little/none	1	1
SJG5	Pico do Pedro		1		2			1		1	2		1		3	Little/none	1	1
SJG6	Silveira				1			7		3	3	1	1		3	Little/none	7	7
SJG7	Topo ridge				1			15		3	8	4	1		3	Some	33	33
SJG8	Toledo				1			4		1	3	1			3	Little/none	9	9
SMA1	Vila islet and west coast of Santa Maria	6	1		1	1		10		5	5	4	1	4	2	Little/none	19	19
SMA2	Lagoinhas islet and east coast of Santa Maria	5	1		2			10		3	6	5	1	3	2	Little/none	18	18
SMA3	Santa Barbara-Santo Espirito	3			2	1		12		4	8	3	2	1	2	Little/none	32	32
SMA4	Marine area of Santa Maria	1					1				1			1	4	Whole	506	0
SMA5	São Pedro	1										1			2	Little/none	1	1
SMA6	Formigas islet and Dollabarat reef						1				1				4	Whole	36	9
SMA7	Pico Alto	1	1		1	3		9		3	7	4	1		1	Most	1	1
SMA8	São Lourenço	2	1		1			10		1	5	6	2		1	Little/none	3	3
SMG1	Coastal areas of S. Miguel	4	1		1	1		13		3	8	4	3	2	4	Little/none	95	95
SMG2	Sete Cidades Massif	1	1		1	1		20		6	11	5	2		2	Some	63	63
SMG3	Fogo-Congro Massif	1			1			15		5	10	1	1		4	Some	64	64
SMG4	Pico da Vara	2	2		1			14		3	10	3	3		1	Some	145	145
SMG5	Furnas	1	1		1			3		2	3		1		4	Whole	9	9
SMG6	Ferraria tip - Bretanha tip						1				1				4	Whole	20	0
TER1	Contendas	2			1						1			2	4	Whole	1	0.2
TER2	Coastal areas of Terceira island				1			10		3	6	2			2	Little/none	21	21

Code	Key Biodiversity Area	Birds	Artrophods	Crustaceans	Mammals	Molluscs	Fish	Plants	Reptiles	VU	EN	CR	RR	CONGR	Priority Level	Protection	Total area (km^2)	Land area (km^2)
TER3	S. Barbara and Misterios Negros ridge - Biscoitos da Ferraria	1	2		1			33		10	15	7	5		5	Some	127	127
TER4	Matela-Cinco Picos-Biscoito das Fontinhas	1	1		1			7		5	4		1		3	Little/none	42	42
TER5	South coastal areas of Terceira island	2	1		1			5		2	3	1	1	2	3	Little/none	6	6
	MADEIRA																	
DES1	Desertas Islands	6	1		1	9		15		12	4	7	6	3	1	Whole	765	14
MAD1	Madeira Nature Park (enlarged)	5	4		2	22		62		30	18	15	30	2	1	Most	475	475
MAD10	Machico	2			1					1	1		1		4	Little/none	5	5
MAD12	Coastal marine area of Madeira island				1	1	17			13	4	1	1		4	Whole	42	0
MAD2	Ponta do Pargo	4			1			2		3	1		1	2	5	Whole	12	8
MAD3	Santana	3			2	4		2		2	3	3	2	1	2	Little/none	31	31
MAD4	Coastal cliffs of Madeira island	3			2	5		5		4	2	7	1	1	1	Little/none	32	32
MAD5	Santa Cruz Creek	2				2				1	1		1	1	2	Little/none	6	6
MAD6	Camacho and Caniço					1					1				2	Little/none	9	9
MAD7	São Vicente					2					1	1			2	Little/none	5	5
MAD8	São João creek - Santa Luzia creek - João Gomes creek	1			1	6				2	1	4	1		1	Little/none	15	15
MAD9	Funchal - São Roque					3				1	1	1			2	Little/none	3	3
PSA1	Pico Branco	1				6		12		5	2	5	6	1	3	Whole	1	1
PSA2	Network of Marine Protected Areas of Porto Santo	4			1	14	4	5		11	9	4	2	2	1	Whole	27	0
PSA3	Porto Santo - west	3				7		1		6	2	1		2	2	Whole	9	9
PSA4	Northeast area of Porto Santo	2			1	8		6		6	6	4		1	1	Little/none	11	11
PSA5	Porto Santo Beach	2				11		6		12	3	3		1	2	Little/none	8	8
SEL1	Selvagens Islands	6	1			1	3	17	1	3	4	1	17	4	1	Whole	1,246	3

Code	Key Biodiversity Area	Birds	Artrophods	Crustaceans	Mammals	Molluscs	Fish	Plants	Reptiles	VU	EN	CR	RR	CONGR	Priority Level	Protection	Total area (km^2)	Land area (km^2)
									CANARY ISLANDS									
FUE1	Jandía Peninsula	7	2			6		19		9	11	10	2	2	1	Most	178	178
FUE2	Cardón mountain	4	1					6	1	1	6	3	2		3	Most	15	15
FUE3	La Lajita	4						3		2	3		2		2	Little/none	2	2
FUE4	Tarajalejo mountain range	4						2		1	1	2	2		2	Some	3	3
FUE5	Central area of Fuerteventura	8	1					9	1	5	7	3	3	1	3	Most	456	456
FUE6	North area of Fuerteventura	8	1		1			3	1	4	5		3	2	1	Some	222	222
FUE7	Tesejerague	5								2	1		2		4	Little/none	4	4
FUE8	Island of Lobos	6	1		1			1	1	1	4	1	2	2	1	Whole	5	5
FUE9	Marine coastal are of Fuerteventura			1		1	3			2	1	1	1		5	Most	474	5
GCA1	La Solana	4	3					24		8	13	7	2	1	1	Whole	110	110
GCA10	Tufia	2				1		2		2	1	1		1	2	Little/none	7	7
GCA11	Arinaga - El Burrero	2				2		2		2	1	2		1	2	Little/none	8	8
GCA12	Amurga - Fataga	1						8		3	5	1			3	Most	42	42
GCA13	Jinámar	2				1		1		1	1	1		1	1	Little/none	2	2
GCA14	Mogane	2						3			2	1		2	3	Whole	13	13
GCA15	Tauro	2						6		2	3	1	1	1	2	Some	45	45
GCA16	Pilancones	3	1			1		7		3	5	2	1	1	2	Some	131	131
GCA17	San Agostin - Castillo del Romeral	3	1					2		2	2		1	1	2	Little/none	20	20
GCA18	Las Palmas	2				4					1	3	1	1	1	Most	3	3
GCA19	Sardina	1	1							1			1		3	Little/none	1	1
GCA2	Los Marteles	2	6					26		7	14	10	3		1	Some	124	124
GCA20	Marine coastal area of Gran Canaria					1	9	1		6	2	1	2		4	Some	427	0
GCA3	Guiguí	1	1					9		1	7	2		1	3	Whole	23	23
GCA4	Tamadaba - south	3	3					8		2	6	2	2	2	1	Most	18	18

Code	Key Biodiversity Area	Birds	Artrophods	Crustaceans	Mammals	Molluscs	Fish	Plants	Reptiles	VU	EN	CR	RR	CONGR	Priority Level	Protection	Total area (km^2)	Land area (km^2)
GCA5	Tamadaba - north	5	3			2		22		5	17	6	2	2	1	Some	47	47
GCA6	Barrial - Becerril	1	1			1		8		1	6	2	1	1	3	Little/none	25	25
GCA7	Santo Andrés - Valle Seco	1	7			3		22		8	11	12	2		1	Most	61	61
GCA8	Cruz de Pineda - Barranco del Pino		1					3			2	2			1	Some	11	11
GCA9	Pino Santo	2	1			2		5		1	4	3	1	1	1	Some	11	11
GOM1	Garajonay- Chejelipes	7	3		1	1		38		21	14	9	4	2	1	Some	58	58
GOM10	La Fortaleza	2			1	1		4		4	3		1		3	Some	5	5
GOM11	Epina	4	1		1			19		10	6	6	3		1	Most	13	13
GOM12	Alojera	2						1		1	1		1		2	Little/none	1	1
GOM13	Taguluche	5			1	1		10		6	3	4	3	1	1	Some	19	19
GOM14	Argaga gully	3	1					4		2	1	1	3	1	4	Most	3	3
GOM15	Garajonay - Central	3	3		1			9		7	4	3	2		1	Whole	14	14
GOM16	Risco de La Merica	4	1		1				1	1	1	1	3	1	5	Some	1	1
GOM17	Arguayoda	4			1	1				2	1		2	1	4	Some	2	2
GOM18	Punta del Espino							1					1		5	Whole	22	0
GOM2	Cabrito gully	2			1			5		3	2	2	1		2	Some	9	9
GOM3	Igualero - Antocojo	6			1			10		6	4	2	4	1	2	Some	15	15
GOM4	Coast of Vale Hermoso	2	1			1				3			1		5	Whole	2	2
GOM5	Majona	5	2					10		7	6		3	1	4	Most	8	8
GOM6	Coast of Agulo	5			1			8		4	5	1	3	1	2	Some	9	9
GOM7	Los Chapines	5	1		1	2		11		6	6	4	3	1	1	Some	9	9
GOM8	Tazo	4				2		3	1	3	2	2	3		3	Some	9	9
GOM9	Los Organos	1						1			1			1	4	Whole	0.4	0.4
HIE1	Frontera - central area	7	1		2	1		15	1	6	7	8	4	2	1	Most	0.4	0.4
HIE10	Frontera - east	1	1								1		1		4	Some	3	3

Code	Key Biodiversity Area	Birds	Artrophods	Crustaceans	Mammals	Molluscs	Fish	Plants	Reptiles	VU	EN	CR	RR	CONGR	Priority Level	Protection	Total area (km^2)	Land area (km^2)
HIE11	Roques de Salmor	2							1			1		2	3	Whole	0.5	0.5
HIE12	Southwest marine area of El Hierro					1	3			1	2		1		5	Whole	99	0
HIE13	Northeast marine area of El Hierro						3			1	2				3	Little/none	4	0
HIE2	Echedo	2						2		1	2			1	1	Little/none	5	5
HIE3	Timijiraque	1			1	1		1			2	1		1	3	Some	5	5
HIE4	Las Playas - south	2						2				2	1	1	3	Some	3	3
HIE5	Frontera - west	6	1					2	1		2	2	3	3	3	Whole	9	9
HIE6	Valverde	3	2		2			3		2	4	1	3		1	Most	5	5
HIE7	Garoe							1		1					5	Whole	0.4	0.4
HIE8	Las Playas - north	2				1					1			2	2	Some	3	3
HIE9	Frontera - south	4	1						1		1	1	3	1	2	Most	27	27
LAN1	Chinijo archipelago	8	3	1	1	2	5	2		7	6	4	3	2	4	Whole	1,426	39
LAN10	Arrefice	1						1			1		1		2	Little/none	1	1
LAN11	Cable Beach	1						1		1	1				2	Little/none	1	1
LAN12	White Mountain	1						1		1	1				4	Whole	1	1
LAN13	The Islet	3			1			2		2	2		2		4	Whole	5	5
LAN14	Montañas de Fuego	2						1		1	1		1		4	Whole	1	1
LAN15	Los Volcanes - north	2						1		1	1		1		4	Whole	1	1
LAN16	Tinguatón	3						1		2			2		4	Some	4	4
LAN17	Tegoyo - Masdache	3						1		2			2		5	Most	4	4
LAN18	Los Volcanes - east	1	1									1		1	3	Whole	1	1
LAN19	Yaiza		1								1				2	Little/none	1	1
LAN2	Famara sandy plain	6			1			2		3	3		2	1	4	Most	97	97
LAN20	North of Los Hervideros	5						1	1	3	1		2	1	4	Most	30	30
LAN21	North of El Cuchillo	2	1							3					3	Little/none	0.4	0.4

Code	Key Biodiversity Area	Birds	Artrophods	Crustaceans	Mammals	Molluscs	Fish	Plants	Reptiles	VU	EN	CR	RR	CONGR	Priority Level	Protection	Total area (km^2)	Land area (km^2)
LAN22	Los Ajaches - north	6			1					2	2		2	1	4	Whole	7	7
LAN23	Tias	4			1					2	1		2		4	Little/none	16	16
LAN24	Marine coastal area of Lanzarote	1		1		1	5			4	2	1	1		5	Some	53	0
LAN3	PLains of Corona - La Hondura - Tegala Grande and Famara crag	7	2		1			18	1	5	14	5	4	1	1	Some	106	106
LAN4	Plains of Mareta-Hoya de la Yegua	6	1		1			1		3	2	1	2	1	3	Most	41	41
LAN5	Los Ajaches- south	7			1			1		2	3		3	1	4	Most	12	12
LAN6	El Mojón	5	1		1			2		1	3	1	3	1	3	Whole	8	8
LAN7	Caleta del Mariscadero		1					1			1	1			3	Whole	3	3
LAN8	Tenesar	3						1		1		1	1	1	2	Little/none	0.4	0.4
LAN9	Caldera del Agua	1						1		1	1				2	Little/none	0.4	0.4
PAL1	La Palma Central-northeast	6	4		2			29		13	15	7	4	2	1	Most	270	270
PAL10	Azufre Mountain	1						1		1	1				3	Some	1	1
PAL11	Tigalate	1			1			1		1	2				2	Little/none	1	1
PAL12	Teneguia Vucanos	1						1		1	1				1	Most	2	2
PAL13	El Remo	2	1					1		1		2		1	2	Some	2	2
PAL14	Coast of Hiscaguán	4						1		1	1		1	2	4	Most	1	1
PAL15	Coast of Garafía	5	1					6		2	5	1	3	1	1	Most	20	20
PAL16	Monte de Luna	1								1					5	Whole	1	1
PAL17	Puerto	2	1								1			2	2	Little/none	1	1
PAL18	Tamanca	3	2							2		1	1	1	3	Most	10	10
PAL19	San Pedro					1	2	1			2		2		5	Some	73	0
PAL2	El Paso	4			1			1		1	2		3		3	Some	8	8
PAL20	Risco de La Concepción		1							1					3	Little/none	1	1
PAL21	Los Canarios				1						1				4	Some	0.4	0.4

Code	Key Biodiversity Area	Birds	Artrophods	Crustaceans	Mammals	Molluscs	Fish	Plants	Reptiles	VU	EN	CR	RR	CONGR	Priority Level	Protection	Total area (km^2)	Land area (km^2)
PAL3	Tinisara	3						2			2		3		4	Most	2	2
PAL4	Punta Gorda Santo Domingo	4						7		2	5	1	3		3	Most	10	10
PAL5	El Jurado Gully	3	1		2			3			5		4		4	Some	3	3
PAL6	Cumbre Vieja		2		1			2			4	1			3	Most	12	12
PAL7	La Laguna							1			1				3	Some	1	1
PAL8	La Sabina	1						1				1	1		2	Some	0.4	0.4
PAL9	La Centinela							1			1				4	Little/none	4	4
TEN1	El Teíde	4	4		2			11		6	9	2	4		1	Whole	252	252
TEN10	Granadilla	3	2		2	1		6		4	4	3	2	1	2	Some	43	43
TEN11	La Tejita	1						1		1		1			2	Some	1	1
TEN12	San Miguel de Tajao	1						2		1	1	1			2	Little/none	4	4
TEN13	Abades - Ponta Prieta	3						1		1	1		1	1	2	Little/none	7	7
TEN14	La Medida	1						5		4	1	1			2	Little/none	12	12
TEN15	Malpaís de Guimar	3	1			1		2		3	1	1	1	1	2	Some	6	6
TEN16	Guimar - La Esperanza	6			2	3		16		10	7	5	4	1	1	Some	47	47
TEN17	Los Realejos - El Pris	8	2		2	1		14		9	8	2	6	2	2	Some	68	68
TEN18	Coast of Acentejo	5	2		2			3		2	4	1	3	2	3	Whole	3	3
TEN19	La Viuda - Añaza	4			1	4		1		3	2	2	1	2	1	Little/none	30	30
TEN2	Anága	7	5		1	6		40	1	25	17	12	4	2	1	Most	159	159
TEN20	Los Andenes					1						1			2	Little/none	1	1
TEN21	Garachico - La Montañeta	8	2		2	2		12		8	9	3	5	1	1	Some	45	45
TEN22	El Reventon	2	2		1					1	2		2		2	Little/none	6	6
TEN23	Montana Roja	2	1							2				1	5	Whole	2	2
TEN24	San Cristoval de La Laguna	2				1				1	1		1		1	Little/none	5	5
TEN25	Punta Brava	2	1		1					1	1		2		4	Little/none	3	3

Code	Key Biodiversity Area	Birds	Artrophods	Crustaceans	Mammals	Molluscs	Fish	Plants	Reptiles	VU	EN	CR	RR	CONGR	Priority Level	Protection	Total area (km^2)	Land area (km^2)
TEN26	Rasca	5							1	1		1	2	2	3	Whole	1	1
TEN27	Marine coastal area of Tenerife					1	5	1		1	2	2	2		5	Some	119	0
TEN3	Northern Buenavista	7	1		1	3		28	1	15	13	7	4	2	1	Most	50	50
TEN4	Los Carrizales	7	2		2	4		15	1	9	8	8	4	2	1	Some	45	45
TEN5	Tejina	3			2			6		3	6		2		3	Some	20	20
TEN6	Adeje	3			1			12		7	4	3	1	1	1	Some	20	20
TEN7	Las Americas Beach	3						1		1	1		1	1	2	Little/none	1	1
TEN8	Roque de Jama							1			1				4	Some	1	1
TEN9	Las Rosas - Coromoto	4						3		1	1	2	1	2	2	Little/none	8	8

Appendix 6. KBAs qualifying as AZE Sites in Macaronesia

Code	Name	Archip.	AZE Trigger Species	Taxonomic group
SEL1	Selvagens Islands	MAD	*Argyranthemum thalassophilum*	Plant
DES1	Desertas Islands	MAD	*Hogna ingens*	Arthropod
			Discula lyelliana	Mollusc
MAD1	Madeira Nature Park	MAD	*Gonepteryx maderensis*	Arthropod
			Pterodroma madeira	Bird
			Actinella carinofausta	Mollusc
			Leiostyla abbreviata	Mollusc
			Geranium maderense	Plant
			Goodyera macrophylla	Plant
			Marcetella maderensis	Plant
			Musschia wollastonii	Plant
			Pittosporum coriaceum	Plant
			Polystichum drepanum	Plant
			Sinapidendron rupestre	Plant
			Sorbus maderensis	Plant
			Teucrium abutiloides	Plant
MAD4	Coastal cliffs of Madeira island	MAD	*Jasminum azoricum*	Plant
			Andryala crithmifolia	Plant
			Discula tabellata	Mollusc
MAD8	São João creek - Santa Luzia creek - João Gomes creek	MAD	*Leiostyla cassidula*	Mollusc
			Leiostyla gibba	Mollusc
PSA2	Network of Marine Protected Areas of Porto Santo	MAD	*Cecilioides eulima*	Mollusc
			Idiomela subplicata	Mollusc
PSA4	Northeast area of Porto Santo	MAD	*Discula testudinalis*	Mollusc
HIE1	Frontera - central area	CAN	*Argyranthemum adauctum ssp. erythrocapon*	Plant
			Bencomia sphaerocarpa	Plant
			Crambe feuillei	Plant
HIE2	Echedo	CAN	*Teucrium heterophyllum ssp. Hierrense*	Plant
HIE6	Valverde	CAN	*Silene sabinosae*	Plant
PAL1	La Palma Central-northeast	CAN	*Cheirolophus santos-abreui*	Plant
			Lotus pyranthus	Plant
PAL12	Teneguia Vucanos	CAN	*Cheirolophus junonianus*	Plant
PAL15	Coast of Garafía	CAN	*Lotus eremiticus*	Plant
GOM1	Garajonay- Chejelipes	CAN	*Plutonia falcifera*	Mollusc
			Aeonium gomerense	Plant
			Echium acanthocarpum	Plant
			Helichrysum alucense	Plant
			Sideritis marmorea	Plant

Code	Name	Archip.	AZE Trigger Species	Taxonomic group
GOM7	Los Chapines	CAN	*Hemicycla efferata*	Mollusc
GOM11	Epina	CAN	*Apollonias barbujana ssp. Ceballosi*	Plant
GOM13	Taguluche	CAN	*Helianthemum aganae*	Plant
			Limonium relicticum	Plant
GOM15	Garajonay - Central	CAN	*Hydroporus compunctus*	Arthropod
LAN3	PLains of Corona - La Hondura - Tegala Grande and Famara crag	CAN	*Convolvulus lopezsocasii*	Plant
			Helianthemum bramwelliorum	Plant
			Helianthemum gonzalezferreri	Plant
			Limonium puberulum	Plant
			Plantago famarae	Plant
FUE1	Jandía Peninsula	CAN	*Canariella eutropis*	Mollusc
			Canariella jandiaensis	Mollusc
			Cryptella susannae	Mollusc
			Obelus discogranulatus	Mollusc
			Aichryson pachycaulon ssp. pachycaulon	Plant
			Argyranthemum winteri	Plant
			Carduus bourgeaui	Plant
			Echium handiense	Plant
			Ononis christii	Plant
			Onopordum nogalesii	Plant
			Orthotrichum handiense	Plant
FUE6	North area of Fuerteventura	CAN	*Maiorerus randoi*	Arthropod
FUE8	Island of Lobos	CAN	*Limonium ovalifolium ssp. canariense*	Plant
TEN1	El Teide	CAN	*Dactylis metlesicsii*	Plant
			Helianthemum juliae	Plant
			Laphangium teydeum	Plant
			Silene nocteolens	Plant
			Stemmacantha cynaroides	Plant
TEN2	Anága	CAN	*Napaeus doliolum*	Plant
			Argyranthemum sundingii	Plant
			Micromeria glomerata	Plant
			Micromeria rivas-martinezii	Plant
			Monanthes wildpretii	Plant
			Tolpis glabrescens	Plant
TEN3	Northern Buenavista	CAN	*Hypochaeris oligocephala*	Plant
			Limonium fruticans	Plant
			Micromeria densiflora	Plant
			Sideritis nervosa	Plant
			Teline pallida ssp silensis	Plant
			Teline salsoloides	Plant
			Tolpis crassiuscula	Plant
TEN4	Los Carrizales	CAN	*Acrostira tenerifae*	Arthropod
			Calathus amplius	Arthropod

Code	Name	Archip.	AZE Trigger Species	Taxonomic group
			Hemicycla mascaensis	Mollusc
			Crambe laevigata	Plant
			Kunkeliella psilotoclada	Plant
			Limonium spectabile	Plant
			Sideritis cystosiphon	Plant
TEN6	Adeje	CAN	*Echium sventenii*	Plant
TEN16	Guimar - La Esperanza	CAN	*Napaeus nanodes*	Mollusc
			Helianthemum teneriffae	Plant
TEN19	La Viuda - Añaza	CAN	*Hemicycla plicaria*	Mollusc
			Hemicycla pouchadan	Mollusc
			Napaeus teobaldoi	Mollusc
TEN21	Garachico - La Montañeta	CAN	*Loboptera subterranea*	Arthropod
			Carduus volutarioides	Plant
			Kunkeliella subsucculenta	Plant
TEN24	San Cristoval de La Laguna	CAN	*Parmacella tenerifensis*	Mollusc
GCA1	La Solana	CAN	*Crambe scoparia*	Plant
			Helianthemum bystropogophyllum	Plant
			Helianthemum inaguae	Plant
			Limonium vigaroense	Plant
			Micromeria leucantha	Plant
GCA2	Los Marteles	CAN	*Aichryson bituminosum*	Plant
			Bencomia brachystachya	Plant
			Kunkeliella canariensis	Plant
			Onopordum carduelium	Plant
			Parolinia platypetala	Plant
			Pericallis hadrosoma	Plant
GCA4	Tamadaba - south	CAN	*Limonium benmageci*	Plant
GCA5	Tamadaba - north	CAN	*Globularia ascanii*	Plant
			Sventenia bupleuroides	Plant
			Tanacetum oshanahanii	Plant
GCA7	Santo Andrés - Valle Seco	CAN	*Napaeus osoriensis*	Mollusc
			Plutonia machadoi	Mollusc
			Isoplexis chalcantha	Plant
			Sideritis discolor	Plant
			Solanum vespertilio doramae	Plant
GCA8	Cruz de Pineda - Barranco del Pino	CAN	*Teline nervosa*	Plant
GCA9	Pino Santo	CAN	*Napaeus exilis*	Mollusc
			Parolinia glabriusucula	Plant
GCA13	Jinámar	CAN	*Lotus kunkelii*	Plant
GCA18	Las Palmas	CAN	*Monilearia tumulorum*	Mollusc
			Napaeus isletae	Mollusc
			Theba grasseti	Mollusc
SMA7	Pico Alto	AZO	*Leptaxis minor*	Mollusc
			Plutonia angulosa	Mollusc

Code	Name	Archip.	AZE Trigger Species	Taxonomic group
SMA8	São Lourenço	AZO	*Euphorbia stygiana santamariae*	Plant
SMG4	Pico da Vara	AZO	*Pyrrhula murina*	Bird
SJG3	Pico da Esperança	AZO	*Platanthera azorica*	Plant
PIC4	Pico mountain crater	AZO	*Silene uniflora cratericola*	Plant
FAI3	Great crater of Faial	AZO	*Pericallis malvifolia caldeirae*	Plant

Appendix 7. List of Natura 2000 sites in Macaronesia

Region	Classification	Name	Total area (ha.)	Land Area (ha.)	Marine Area (ha.)
AZO	SAC	Costa e Caldeirão - Ilha do Corvo	973	745	228
AZO	SAC	Caldeira e Capelinhos - Ilha do Faial	2,086	1,856	230
AZO	SAC	Monte da Guia - Ilha do Faial	383	99	284
AZO	SAC	Ponta do Varadouro - Ilha do Faial	18	18	0
AZO	SAC	Morro do Castelo Branco - Ilha do Faial	126	23	103
AZO	SAC	Zona Central - Morro Alto - Ilha das Flores	2,931	2,931	0
AZO	SAC	Costa Nordeste - Ilha das Flores	1,251	209	1,042
AZO	SAC	Ilhéu de Baixo - Restinga Ilha Graciosa	244	32	212
AZO	SAC	Ponta Branca - Ilha Graciosa	69	69	0
AZO	SAC	Ponta dos Rosais - Ilha de S. Jorge	307	167	140
AZO	SAC	Costa NE e Ponta do Topo - Ilha de S. Jorge	3,965	3,576	389
AZO	SAC	Lagoa do Fogo - Ilha de S. Miguel	1,263	1,263	0
AZO	SAC	Caloura-Ponta da Galera - Ilha de S. Miguel	200	19	181
AZO	SAC	Banco D. João de Castro (Canal Terceira - S. Miguel)	1,648	0	1,648
AZO	SAC	Baixa do Sul (Canal do Faial)	50	0	50
AZO	SAC	Montanha do Pico, Prainha e Caveiro - Ilha do Pico	8,463	0	8,463
AZO	SAC	Ponta da Ilha - Ilha do Pico	398	106	292
AZO	SAC	Lajes do Pico - Ilha do Pico	142	11	131
AZO	SAC	Ilhéus da Madalena - Ilha do Pico	143	5	138
AZO	SAC	Ponta do Castelo - Ilha de Sta. Maria	317	137	180
AZO	SAC	Ilhéu das Formigas e Recife Dollabarat (Canal S. Miguel - Sta. Maria)	3,594	0	3,594
AZO	SAC	Serra Santa Bárbara e Pico Alto - Ilha da Terceira	4,731	4,731	0
AZO	SAC	Costa das Quatro Ribeiras - Ilha Terceira	267	57	210
AZO	SCI	Lucky Strike	19,126	0	19,126
AZO	SCI	Menez Gwen	9,523	0	9,523
AZO	SCI	Tronqueira-Graminhais	2,011	2,011	0
AZO	SPA	Costa e Caldeirão - Ilha do Corvo	700	700	0
AZO	SPA	Costa Sul e Sudoeste - Ilha das Flores	254	254	0
AZO	SPA	Costa Nordeste - Ilha das Flores	142	142	0
AZO	SPA	Caldeira e Capelinhos - Ilha do Faial	2,047	2,047	0
AZO	SPA	Lajes do Pico - Ilha do Pico	65	65	0
AZO	SPA	Ponta da Ilha - Ilha do Pico	294	294	0
AZO	SPA	Furnas / Sto.António - Ilha do Pico	13	13	0
AZO	SPA	Zona Central do Pico - Ilha do Pico	6,019	6,019	0
AZO	SPA	Ilhéu do Topo e Costa Adjacente - Ilha de S. Jorge	370	370	0

Region	Classification	Name	Total area (ha.)	Land Area (ha.)	Marine Area (ha.)
AZO	SPA	Ilhéu de Baixo - Ilha Graciosa	32	32	0
AZO	SPA	Ilhéu da Praia - Ilha Graciosa	10	10	0
AZO	SPA	Ponta das Contendas - Ilha Terceira	91	91	0
AZO	SPA	Ilhéu das Cabras - Ilha Terceira	28	28	0
AZO	SPA	Pico da Vara / Ribeira do Guilherme - Ilha de S. Miguel	6,067	6,067	0
AZO	SPA	Ilhéu da Vila e Costa Adjacente - Ilha de Sta. Maria	57	57	0
MAD	SAC	Laurissilva da Madeira	15,367	15,367	0
MAD	SAC	Maciço Montanhoso Central da Ilha da Madeira	8,212	8,212	0
MAD	SAC	Achadas da Cruz	184	184	0
MAD	SAC	Moledos - Madalena do Mar	7	7	0
MAD	SAC	Pináculo	34	34	0
MAD	SAC	Ilhéus do Porto Santo	209	209	0
MAD	SAC	Pico Branco - Porto Santo	127	127	0
MAD	SAC	Ponta de S. Lourenço	2,042	427	1,616
MAD	SAC	Ilhéu da Viúva	1,822	2	1,820
MAD	SAC	Ilhas Selvagens	9,432	281	9,151
MAD	SAC	Ilhas Desertas	12,586	1,397	11,189
MAD	SPA	Laurissilva da Madeira	15,366	15,366	0
MAD	SPA	Maciço Montanhoso Oriental da Ilha da Madeira	3,050	3,050	0
MAD	SPA	Ponta de São Lourenço	2,412	312	2,099
MAD	SPA	Ilhas Desertas	76,485	1,398	75,087
MAD	SPA	Ilhas Selvagens	124,606	281	124,325
CAN	SAC	Ojeda, Inagua y Pajonales	3,528	3,528	0
CAN	SAC	Caldera de Taburiente	4,355	4,355	0
CAN	SAC	Garajonay	3,785	3,785	0
CAN	SAC	Pozo Negro	9,995	9,995	0
CAN	SAC	Garoé	1,124	1,124	0
CAN	SAC	Los Órganos	150	150	0
CAN	SAC	Tamadaba	7,449	7,449	0
CAN	SAC	Juncalillo del Sur	186	186	0
CAN	SAC	Macizo de Tauro	1,244	1,244	0
CAN	SAC	Parque Nacional de Timanfaya	5,181	5,181	0
CAN	SAC	Barranco Oscuro	33	33	0
CAN	SAC	El Brezal	109	109	0
CAN	SAC	Azuaje	456	456	0
CAN	SAC	Los Tilos de Moya	89	89	0
CAN	SAC	Los Marteles	2,804	2,804	0
CAN	SAC	Las Dunas de Maspalomas	360	360	0
CAN	SAC	Güigüí	2,898	2,898	0
CAN	SAC	Pilancones	5,782	5,782	0
CAN	SAC	Amagro	488	488	0
CAN	SAC	Bandama	593	593	0
CAN	SAC	Cueva de Lobos	7,613	585	7,027
CAN	SAC	Riscos de Tirajana	750	750	0
CAN	SAC	Roque de Nublo	446	446	0

Region	Classification	Name	Total area (ha.)	Land Area (ha.)	Marine Area (ha.)
CAN	SAC	Área marina de La Isleta	8,562	0	8,562
CAN	SAC	Franja marina de Mogán	29,993	0	29,993
CAN	SAC	Malpaís de la Arena	850	850	0
CAN	SAC	Vega de Río Palmas	366	366	0
CAN	SAC	Fataga	2,726	2,726	0
CAN	SAC	Jinámar	31	31	0
CAN	SAC	Tufia	51	51	0
CAN	SAC	Islote de Lobos	453	453	0
CAN	SAC	Corralejo	2,689	2,689	0
CAN	SAC	Jandía	14,973	14,973	0
CAN	SAC	Montaña Cardón	1,234	1,234	0
CAN	SAC	Sebadales de La Graciosa	1,192	0	1,192
CAN	SAC	Punta del Mármol	30	29.9	0
CAN	SAC	Sebadales de Guasimeta	1,276	1,276	0
CAN	SAC	Barranco de La Virgen	559	559	0
CAN	SAC	El Nublo II	13,956	13,956	0
CAN	SAC	Hoya del Gamonal	627	627	0
CAN	SAC	Barranco de Guayadeque	709	709	0
CAN	SAC	La Playa del Matorral	96	96	0
CAN	SAC	Los Islotes	151	151	0
CAN	SAC	Archipiélago Chinijo	8,865	8,865	0
CAN	SAC	Los Volcanes	9,986	9,986	0
CAN	SAC	La Corona	2,602	2,602	0
CAN	SAC	Arinaga	92	92	0
CAN	SAC	Punta de la Sal	136	136	0
CAN	SAC	Sebadales de Corralejo	1,947	0	1,947
CAN	SAC	Playa de Sotavento de Jandía	5,461	0	5,461
CAN	SAC	Amurga	5,341	5,341	0
CAN	SAC	Bahía del Confital	634	0	634
CAN	SAC	Betancuria	3,329	3,329	0
CAN	SAC	Nublo	7,108	7,108	0
CAN	SAC	Ancones-Sice	223	223	0
CAN	SAC	Malpaís del Cuchillo	55	55	0
CAN	SAC	Bahía de Gando	478	0	478
CAN	SAC	Los Risquetes	9	41,883	0
CAN	SAC	Pino Santo	1,565	1,565	0
CAN	SAC	Macizo de Tauro II	5,118	5,118	0
CAN	SAC	Mencáfete	455	455	0
CAN	SAC	Roques de Salmor	4	4	0
CAN	SAC	Tibataje	593	593	0
CAN	SAC	Risco de Las Playas	967	967	0
CAN	SAC	Timijiraque	375	375	0
CAN	SAC	Pinar de Garafía	1,028	1,028	0
CAN	SAC	Guelguén	1,062	1,062	0
CAN	SAC	Las Nieves	5,115	5,115	0
CAN	SAC	Cumbre Vieja	7,522	7,522	0
CAN	SAC	Montaña de Azufre	76	76	0
CAN	SAC	Risco de la Concepción	66	66	0
CAN	SAC	Costa de Hiscaguán	250	250	0

Region	Classification	Name	Total area (ha.)	Land Area (ha.)	Marine Area (ha.)
CAN	SAC	Barranco del Jorado	98	98	0
CAN	SAC	Playa del Cabrón	956	0	956
CAN	SAC	Tubo volcánico de Todoque	2	2	0
CAN	SAC	Tablado	224	224	0
CAN	SAC	Barranco de las Angustias	1,699	1,699	0
CAN	SAC	Tamanca	2,073	2,073	0
CAN	SAC	Juan Mayor	28	28	0
CAN	SAC	Barranco del Agua	74	74	0
CAN	SAC	La Caldereta	18	18	0
CAN	SAC	Benchijigua	483	483	0
CAN	SAC	Puntallana	286	286	0
CAN	SAC	Majona	1,976	1,976	0
CAN	SAC	Roque Cano	57	57	0
CAN	SAC	Roque Blanco	30	30	0
CAN	SAC	La Fortaleza	53	53	0
CAN	SAC	Barranco del Cabrito	1,160	1,160	0
CAN	SAC	Lomo del Carretón	249	249	0
CAN	SAC	Orone	1,707	1,707	0
CAN	SAC	Charco del Conde	9	9	0
CAN	SAC	Charco de Cieno	5	5	0
CAN	SAC	Parque Nacional del Teide	18,993	18,993	0
CAN	SAC	Ijuana	902	902	0
CAN	SAC	Pijaral	296	296	0
CAN	SAC	Los Roques de Anaga	10	10	0
CAN	SAC	Pinoleris	178	178	0
CAN	SAC	Malpaís de Güímar	286	286	0
CAN	SAC	Montaña Roja	164	164	0
CAN	SAC	Malpaís de la Rasca	313	313	0
CAN	SAC	Barranco del Infierno	1,824	1,824	0
CAN	SAC	Chinyero	2,380	2,380	0
CAN	SAC	Las Palomas	583	583	0
CAN	SAC	Corona Forestal	41,068	41,068	0
CAN	SAC	Barranco de Fasnia y Güímar	151	151	0
CAN	SAC	Montaña Centinela	131	131	0
CAN	SAC	Los Jameos	235	31	203
CAN	SAC	Montañas de Ifara y Los Riscos	285	285	0
CAN	SAC	Roque de Jama	93	93	0
CAN	SAC	Los Sables	3	3	0
CAN	SAC	Montaña de Tejina	168	167.7	0
CAN	SAC	Roque de Garachico	3	3	0
CAN	SAC	La Rambla de Castro	45	45	0
CAN	SAC	Las Lagunetas	3,568	3,568	0
CAN	SAC	Barranco de Erques	263	263	0
CAN	SAC	Montaña de la Centinela	15	15	0
CAN	SAC	Montaña de la Breña	26	26	0
CAN	SAC	Los Acantilados de la Culata	441	441	0
CAN	SAC	Los Campeches, Tigaiga y Ruiz	544	544	0
CAN	SAC	La Resbala	591	591	0
CAN	SAC	Riscos de Bajamar	26	26	0

Region	Classification	Name	Total area (ha.)	Land Area (ha.)	Marine Area (ha.)
CAN	SAC	Acantilado de la Hondura	33	33	0
CAN	SAC	Tabaibal del Porís	48	48	0
CAN	SAC	Interián	100	100	0
CAN	SAC	Barranco de Ruiz	95	95	0
CAN	SAC	Barlovento, Garafía, El Paso y Tijarafe	5,562	5,562	0
CAN	SAC	El Paso y Santa Cruz de La Palma	1,391	1,391	0
CAN	SAC	Santa Cruz de La Palma	216	216	0
CAN	SAC	Breña Alta	61	61	0
CAN	SAC	Sabinar de Puntallana	14	14	0
CAN	SAC	Sabinar de La Galga	81	81	0
CAN	SAC	Monteverde de Don Pedro-Juan Adalid	483	483	0
CAN	SAC	Monteverde de Gallegos-Franceses	1,409	1,409	0
CAN	SAC	Monteverde de Lomo Grande	495	495	0
CAN	SAC	Monteverde de Barranco Seco-Barranco del Agua	1,939	1,939	0
CAN	SAC	Monteverde de Breña Alta	823	823	0
CAN	SAC	Anaga	10,341	10,341	0
CAN	SAC	Teno	6,120	6,120	0
CAN	SAC	Teselinde-Cabecera de Vallehermoso	2,341	2,341	0
CAN	SAC	Montaña del Cepo	1,162	1,162	0
CAN	SAC	Frontera	8,807	8,807	0
CAN	SAC	Cueva del Viento	138	138	0
CAN	SAC	Laderas de Enchereda	683	683	0
CAN	SAC	Barranco de Charco Hondo	392	392	0
CAN	SAC	Barranco de Argaga	187	187	0
CAN	SAC	Valle Alto de Valle Gran Rey	707	707	0
CAN	SAC	Barranco del Águila	164	164	0
CAN	SAC	Cabecera Barranco de Aguajilva	140	140	0
CAN	SAC	Cuenca de Benchijigua-Guarimiar	1,341	1,341	0
CAN	SAC	Taguluche	140	140	0
CAN	SAC	Barrancos del Cedro y Liria	584	584	0
CAN	SAC	Barranco de Niágara	39	39	0
CAN	SAC	Barranco de Orchilla	18	18	0
CAN	SAC	Barranco de las Hiedras-El Cedro	166	166	0
CAN	SAC	Acantilado costero de Los Perros	66	66	0
CAN	SAC	Riscos de Lara	103	103	0
CAN	SAC	Laderas de Chío	197	197	0
CAN	SAC	Barranco de Icor	37	37	0
CAN	SAC	Lomo de Las Eras	2	2	0
CAN	SAC	Barranco Madre del Agua	10	10	0
CAN	SAC	Sebadales de Playa del Inglés	2,722	0	2,722
CAN	SAC	Costa de Sardina del Norte	1,427	0	1,427
CAN	SAC	Cagafrecho	633	0	633
CAN	SAC	Risco de la Mérica	38	38	0
CAN	SAC	Sebadales de Güigüí	7,220	0	7,220
CAN	SAC	Piña de mar de Granadilla	1	1	0
CAN	SAC	Franja marina Teno-Rasca	69,500	0	69,500
CAN	SAC	Mar de Las Calmas	9,898	0	9,898
CAN	SAC	Sebadales del sur de Tenerife	2,693	0	2,693

Region	Classification	Name	Total area (ha.)	Land Area (ha.)	Marine Area (ha.)
CAN	SAC	Cueva marina de San Juan	1	0	1
CAN	SAC	Sebadal de San Andrés	583	0	583
CAN	SAC	Franja marina de Fuencaliente	7,055	0	7,055
CAN	SAC	Franja marina Santiago-Valle Gran Rey	13,139	0	13,139
CAN	SAC	Costa de Garafía	3,475	0	3,475
CAN	SAC	Costa de los Órganos	1,164	0	1,164
CAN	SAC	Costa de San Juan de la Rambla	1,603	0	1,603
CAN	SAC	Sebadales de Antequera	273	0	273
CAN	SCI	Banco de la Concepción	610,067	0	610,067
CAN	SCI	Espacio marino del oriente y sur de Lanzarote-Fuerteventura	1,432,808	0	1,432,808
CAN	SPA	Jandía	15,232	15,121	111
CAN	SPA	Islotes del norte de Lanzarote y Famara	17,864	11,918	5,945
CAN	SPA	Espacio marino de la zona occidental de El Hierro	22,359	0	22,356
CAN	SPA	Espacio marino de los Roques de Salmor	659	0	658
CAN	SPA	Espacio marino del norte de La Palma	39,160	0	39,156
CAN	SPA	Espacio marino de La Gomera-Teno	209,318	0	209,309
CAN	SPA	Espacio marino de los Acantilados de Santo Domingo y Roque de Garachico	2,111	0	2,111
CAN	SPA	Espacio marino del Roque de la Playa	189	0	189
CAN	SPA	Espacio marino de Anaga	773	0	773
CAN	SPA	Espacio marino de Mogán-La Aldea	18,712	0	18,712
CAN	SPA	Espacio marino de La Bocayna	83,413	0	83,389
CAN	SPA	Espacio marino de los Islotes de Lanzarote	130,184	0	130,178
CAN	SPA	ZEPA Banco de la Conceptión	452,305	0	452,305
CAN	SPA	Ojeda, Inagua y Pajonales	3,528	3,528	0
CAN	SPA	Dunas de Corralejo e Isla de Lobos	3,144	3,144	0
CAN	SPA	Caldera de Taburiente	4,355	4,355	0
CAN	SPA	Garajonay	3,785	3,785	0
CAN	SPA	Tigaiga	633	633	0
CAN	SPA	Pozo Negro	9,995	9,995	0
CAN	SPA	Betancuria	16,673	16,673	0
CAN	SPA	Salinas de Janubio	163	163	0
CAN	SPA	Los Ajaches	2,961	2,961	0
CAN	SPA	La Geria	15,305	15,305	0
CAN	SPA	Lajares, Esquinzo y costa del Janubio	7,286	7,286	0
CAN	SPA	Garoé	1,124	1,124	0
CAN	SPA	El Hierro	12,406	12,406	0
CAN	SPA	Gorreta y Salmor	595	595	0
CAN	SPA	Acantilados de Alajeró, La Dama y Valle Gran Rey	668	668	0
CAN	SPA	Teno	8,016	8,016	0
CAN	SPA	Montes y cumbre de Tenerife	68,023	63,023	0
CAN	SPA	Anaga	14,266	14,266	0
CAN	SPA	Ayagaures y Pilancones	9,689	9,689	0

Region	Classification	Name	Total area (ha.)	Land Area (ha.)	Marine Area (ha.)
CAN	SPA	Juncalillo del Sur	186	186	0
CAN	SPA	Macizo de Tauro	1,244	1,244	0
CAN	SPA	Cumbres y acantilados del norte de la Palma	22,701	22,701	0
CAN	SPA	Parque Nacional de Timanfaya	5,181	5,181	0
CAN	SPA	Llanos y cuchillos de Antigua	9,913	9,913	0
CAN	SPA	Acantilado de Las Traviesas	46	46	0
CAN	SPA	Roques de Garafía	3	3	0
CAN	SPA	Roque Negro	2	2	0
CAN	SPA	Los Órganos	183	183	0
CAN	SPA	Costa de Majona, El Águila y Avalo	168	168	0
CAN	SPA	Acantilados de Santo Domingo	9	9	0
CAN	SPA	Roque de La Playa	1	1	0
CAN	SPA	Rasca y Guaza	1,030	1,030	0
CAN	SPA	Tamadaba	8,558	8,558	0
CAN	SPA	Costa del norte de Fuerteventura	1,426	1,426	0
CAN	SPA	Vallebrón y valles de Fimapaire y Fenimoy	5,803	5,803	0
CAN	SPA	Llanos de La Corona y Tegala Grande	2,751	2,751	0
CAN	SPA	Llanos de La Mareta y cantil del Rubicón	2,395	2,395	0
CAN	SPA	La Playa del Matorral	96	96	0
CAN	SPA	Montaña Roja	163	163	0
CAN	SPA	Roque de Garachico	3	3	0
CAN	SPA	Barrancos del Cedro y Liria	584	584	0

SCI = Site of Community importance; SAC = Special Area of Conservation; SPA = Special Protection Area

Appendix 8. List of Protected Areas in Macaronesia

Region	Classification	Code	Name	Total area (ha.)	Land Area (ha.)	Marine Area (ha.)
AZO	IUCN - I	FAI02	Reserva Natural da Caldeira do Faial	313	313	
AZO	IUCN - I	SMG01	Reserva Natural da Lagoa do Fogo	507	507	
AZO	IUCN - I	PICO01	Reserva Natural da Montanha do Pico	1341	1341	
AZO	IUCN - I	TER01	Reserva Natural da Serra de Santa Bárbara e dos Mistérios Negros	1587	1587	
AZO	IUCN - I	TER03	Reserva Natural da Terra Brava e Criação das Lagoas	369	369	
AZO	IUCN - I	FLO03	Reserva Natural das Caldeiras Funda e Rasa	426	426	
AZO	IUCN - I	FAI01	Reserva Natural das Caldeirinhas	10		10
AZO	IUCN - I	PICO04	Reserva Natural das Furnas de Santo António	.2	.2	
AZO	IUCN - I	TER02	Reserva Natural do Biscoito da Ferraria e Pico Alto	709	709	
AZO	IUCN - I	PICO02	Reserva Natural do Caveiro	266	266	
AZO	IUCN - I	GRA02	Reserva Natural do Ilhéu da Praia	219	10	209
AZO	IUCN - I	SMA02	Reserva Natural do Ilhéu da Vila	8	8	
AZO	IUCN - I	GRA01	Reserva Natural do Ilhéu de Baixo	139	10	129
AZO	IUCN - I	FLO01	Reserva Natural do Ilhéu de Maria Vaz	10	10	
AZO	IUCN - I	PICO03	Reserva Natural do Mistério da Prainha	716	716	
AZO	IUCN - I	FLO02	Reserva Natural do Morro Alto e Pico da Sé	1,593	1,593	
AZO	IUCN - I	FAI03	Reserva Natural do Morro do Castelo Branco	16	16	
AZO	IUCN - I	SMG02	Reserva Natural do Pico da Vara	786	786	
AZO	IUCN - I	SMA01	Reserva Natural dos Ilhéus das Formigas	52,393		52,393
AZO	IUCN - I	PMA01	Reserva Natural Marinha do Banco D. João de Castro	1,631		1631
AZO	IUCN - I	PMA03	Reserva Natural Marinha do Campo Hidrotermal Lucky Strike	30,052		30,052

Region	Classification	Code	Name	Total area (ha.)	Land Area (ha.)	Marine Area (ha.)
AZO	IUCN - I	PMA02	Reserva Natural Marinha do Campo Hidrotermal Menez Gwen	26,448		26,448
AZO	IUCN - I	PMA04	Reserva Natural Marinha do Campo Hidrotermal Rainbow	2,215		2,215
AZO	IUCN - I	PMA05	Reserva Natural Marinha do Monte Submarino Sedlo	412,050		412,050
AZO	IUCN - III	GRA03	Monumento Natural da Caldeira da Graciosa	120	120	
AZO	IUCN - III	SMG03	Monumento Natural da Caldeira Velha	13	13	
AZO	IUCN - III	PICO05	Monumento Natural da Gruta das Torres	64	64	
AZO	IUCN - III	SMG04	Monumento Natural da Gruta do Carvão	33	33	
AZO	IUCN - III	SMA03	Monumento Natural da Pedreira do Campo, do Figueiral e Prainha	230	230	
AZO	IUCN - III	SJO01	Monumento Natural da Ponta dos Rosais	170	170	
AZO	IUCN - III	FLO04	Monumento Natural da Rocha dos Bordões	10	10	
AZO	IUCN - III	TER05	Monumento Natural das Furnas do Enxofre	14	14	
AZO	IUCN - III	TER04	Monumento Natural do Algar do Carvão	39	39	
AZO	IUCN - III	SMG05	Monumento Natural do Pico das Camarinhas - Ponta da Ferraria	40	40	
AZO	IUCN - IV	PMA10	Área Marinha Protegida do MARNA	9,379,497		9,379,497
AZO	IUCN - IV	PMA08	Área Marinha Protegida do Monte Submarino Altair	438,090		438,090
AZO	IUCN - IV	PMA09	Área Marinha Protegida do Monte Submarino Antialtair	285,543		285,543
AZO	IUCN - IV	PMA06	Área Marinha Protegida Oceânica do Corvo	267,975		267,975
AZO	IUCN - IV	PMA07	Área Marinha Protegida Oceânica do Faial	260,958		260,958
AZO	IUCN - IV	SMA06	Área Protegida para a Gestão de Habitats ou Espécies da Baía do Cura	186	186	
AZO	IUCN - IV	TER10	Área Protegida para a Gestão de Habitats ou Espécies da Costa das Quatro Ribeiras	57	57	
AZO	IUCN - IV	SJO04	Área Protegida para a Gestão de Habitats ou Espécies da Costa das Velas	62	62	

Region	Classification	Code	Name	Total area (ha.)	Land Area (ha.)	Marine Area (ha.)
AZO	IUCN - IV	SJO07	Área Protegida para a Gestão de Habitats ou Espécies da Costa do Topo	388	388	
AZO	IUCN - IV	COR01	Área Protegida para a Gestão de Habitats ou Espécies da Costa e Caldeirão do Corvo	777	777	
AZO	IUCN - IV	FLO05	Área Protegida para a Gestão de Habitats ou Espécies da Costa Nordeste	884	884	
AZO	IUCN - IV	SJO02	Área Protegida para a Gestão de Habitats ou Espécies da Costa Noroeste	702	702	
AZO	IUCN - IV	SJO03	Área Protegida para a Gestão de Habitats ou Espécies da Costa Sudoeste	207	207	
AZO	IUCN - IV	SMA04	Área Protegida para a Gestão de Habitats ou Espécies da Costa Sudoeste	47	47	
AZO	IUCN - IV	FLO07	Área Protegida para a Gestão de Habitats ou Espécies da Costa Sul e Sudoeste	497	497	
AZO	IUCN - IV	SJO06	Área Protegida para a Gestão de Habitats ou Espécies da Fajã das Almas	97	97	
AZO	IUCN - IV	SMG15	Área Protegida para a Gestão de Habitats ou Espécies da Ferraria	5	5	
AZO	IUCN - IV	PICO06	Área Protegida para a Gestão de Habitats ou Espécies da Lagoa do Caiado	136	136	
AZO	IUCN - IV	SMG16	Área Protegida para a Gestão de Habitats ou Espécies da Lagoa do Congro	38	38	
AZO	IUCN - IV	TER08	Área Protegida para a Gestão de Habitats ou Espécies da Matela	27	27	
AZO	IUCN - IV	GRA05	Área Protegida para a Gestão de Habitats ou Espécies da Ponta Branca	102	102	
AZO	IUCN - IV	GRA06	Área Protegida para a Gestão de Habitats ou Espécies da Ponta da Barca	42	42	

Region	Classification	Code	Name	Total area (ha.)	Land Area (ha.)	Marine Area (ha.)
AZO	IUCN - IV	SMG13	Área Protegida para a Gestão de Habitats ou Espécies da Ponta da Bretanha	77	77	
AZO	IUCN - IV	FLO06	Área Protegida para a Gestão de Habitats ou Espécies da Ponta da Caveira	74	74	
AZO	IUCN - IV	GRA04	Área Protegida para a Gestão de Habitats ou Espécies da Ponta da Restinga	70	70	
AZO	IUCN - IV	TER06	Área Protegida para a Gestão de Habitats ou Espécies da Ponta das Contendas	91	91	
AZO	IUCN - IV	SMG10	Área Protegida para a Gestão de Habitats ou Espécies da Ponta do Arnel	22	22	
AZO	IUCN - IV	SMA05	Área Protegida para a Gestão de Habitats ou Espécies da Ponta do Castelo	137	137	
AZO	IUCN - IV	SMG09	Área Protegida para a Gestão de Habitats ou Espécies da Ponta do Cintrão	25	25	
AZO	IUCN - IV	SMG12	Área Protegida para a Gestão de Habitats ou Espécies da Ponta do Escalvado	68	68	
AZO	IUCN - IV	SMG07	Área Protegida para a Gestão de Habitats ou Espécies da Serra de Água de Pau	1670	1670	
AZO	IUCN - IV	PICO09	Área Protegida para a Gestão de Habitats ou Espécies da Silveira	13	13	
AZO	IUCN - IV	PICO11	Área Protegida para a Gestão de Habitats ou Espécies da Terra Alta	112	112	
AZO	IUCN - IV	SMG08	Área Protegida para a Gestão de Habitats ou Espécies da Tronqueira e Planalto dos Graminhais	5373	5373	
AZO	IUCN - IV	PICO13	Área Protegida para a Gestão de Habitats ou Espécies da Zona do Morro	37	37	
AZO	IUCN - IV	SMG11	Área Protegida para a Gestão de Habitats ou Espécies das Feteiras	44	44	

Region	Classification	Code	Name	Total area (ha.)	Land Area (ha.)	Marine Area (ha.)
AZO	IUCN - IV	PICO08	Área Protegida para a Gestão de Habitats ou Espécies das Furnas de Santo António	22	22	
AZO	IUCN - IV	PICO07	Área Protegida para a Gestão de Habitats ou Espécies das Lajes do Pico	76	76	
AZO	IUCN - IV	PICO12	Área Protegida para a Gestão de Habitats ou Espécies das Ribeiras	89	89	
AZO	IUCN - IV	TER09	Área Protegida para a Gestão de Habitats ou Espécies do Biscoito das Fontinhas	105	105	
AZO	IUCN - IV	FAI04	Área Protegida para a Gestão de Habitats ou Espécies do Cabeço do Fogo	27	27	
AZO	IUCN - IV	SMG14	Área Protegida para a Gestão de Habitats ou Espécies do Faial da Terra	206	206	
AZO	IUCN - IV	SMG06	Área Protegida para a Gestão de Habitats ou Espécies do Ilhéu de Vila Franca do Campo	8	6	2
AZO	IUCN - IV	SJO08	Área Protegida para a Gestão de Habitats ou Espécies do Ilhéu do Topo	12	12	
AZO	IUCN - IV	PICO10	Área Protegida para a Gestão de Habitats ou Espécies do Mistério de São João	38	38	
AZO	IUCN - IV	SMA07	Área Protegida para a Gestão de Habitats ou Espécies do Pico Alto	121	121	
AZO	IUCN - IV	SJO05	Área Protegida para a Gestão de Habitats ou Espécies do Pico da Esperança e Planalto Central	1,087	1,087	
AZO	IUCN - IV	TER12	Área Protegida para a Gestão de Habitats ou Espécies do Pico do Boi	217	217	
AZO	IUCN - IV	TER11	Área Protegida para a Gestão de Habitats ou Espécies do Planalto Central e Costa Noroeste	3,933	3,933	
AZO	IUCN - IV	FAI05	Área Protegida para a Gestão de Habitats ou Espécies dos Capelinhos, Costa Noroeste e Varadouro	407	407	

Region	Classification	Code	Name	Total area (ha.)	Land Area (ha.)	Marine Area (ha.)
AZO	IUCN - IV	TER07	Área Protegida para a Gestão de Habitats ou Espécies dos Ilhéus das Cabras	28	28	
AZO	IUCN - IV	FAI07	Área Protegida para a Gestão de Habitats ou Espécies Lomba Grande	275	275	
AZO	IUCN - IV	FAI06	Área Protegida para a Gestão de Habitats ou Espécies Varadouro - Castelo Branco	99	99	
AZO	IUCN - V	SMA10	Área de Paisagem Protegida da Baía da Maia	55	55	
AZO	IUCN - V	SMA09	Área de Paisagem Protegida da Baía de São Lourenço	60	60	
AZO	IUCN - V	PICO14	Área de Paisagem Protegida da Cultura da Vinha - Ponta da Ilha	297	297	
AZO	IUCN - V	PICO15	Área de Paisagem Protegida da Cultura da Vinha - Ponta do Mistério	88	88	
AZO	IUCN - V	PICO17	Área de Paisagem Protegida da Cultura da Vinha - São Mateus/São Caetano	151	151	
AZO	IUCN - V	PICO16	Área de Paisagem Protegida da Cultura da Vinha - Zona Norte	1,747	1,747	
AZO	IUCN - V	PICO18	Área de Paisagem Protegida da Cultura da Vinha - Zona Oeste	1,009	1,009	
AZO	IUCN - V	FAI09	Área de Paisagem Protegida da Zona Central	1799	1,799	
AZO	IUCN - V	PICO19	Área de Paisagem Protegida da Zona Central	9,518	9,518	
AZO	IUCN - V	FLO08	Área de Paisagem Protegida da Zona Central e Falésias da Costa Oeste	2,565	2,565	
AZO	IUCN - V	SJO09	Área de Paisagem Protegida das Fajãs do Norte	2,926	2,926	
AZO	IUCN - V	SMG18	Área de Paisagem Protegida das Furnas	3,150	3,150	
AZO	IUCN - V	SMG17	Área de Paisagem Protegida das Sete Cidades	2,173	2,173	
AZO	IUCN - V	TER13	Área de Paisagem Protegida das Vinhas dos Biscoitos	165	165	
AZO	IUCN - V	SMA08	Área de Paisagem Protegida do Barreiro da Faneca	835	835	
AZO	IUCN - V	FAI08	Área de Paisagem Protegida do Monte da Guia	74	74	

Region	Classification	Code	Name	Total area (ha.)	Land Area (ha.)	Marine Area (ha.)
AZO	IUCN - VI	TER19	Área Marinha Protegida de Gestão de Recursos da Baixa da Vila Nova	42		42
AZO	IUCN - VI	TER16	Área Marinha Protegida de Gestão de Recursos da Costa das Contendas	181		181
AZO	IUCN - VI	TER18	Área Marinha Protegida de Gestão de Recursos das Cinco Ribeiras	3		3
AZO	IUCN - VI	TER15	Área Marinha Protegida de Gestão de Recursos das Quatro Ribeiras	357		357
AZO	IUCN - VI	TER20	Área Marinha Protegida de Gestão de Recursos do Monte Brasil	48		48
AZO	IUCN - VI	TER17	Área Marinha Protegida de Gestão de Recursos dos Ilhéus das Cabras	112		112
AZO	IUCN - VI	PMA11	Área Marinha Protegida do Banco D. João de Castro	34,869		34,869
AZO	IUCN - VI	SMA11	Área Protegida de Gestão de Recursos da Baía de São Lourenço	178		178
AZO	IUCN - VI	TER14	Área Protegida de Gestão de Recursos da Caldeira de Guilherme Moniz	1218	1218	
AZO	IUCN - VI	SMG19	Área Protegida de Gestão de Recursos da Caloura - Ilhéu de Vila Franca do Campo	1,349		1,349
AZO	IUCN - VI	SJO12	Área Protegida de Gestão de Recursos da Costa das Fajãs	876		876
AZO	IUCN - VI	SMG20	Área Protegida de Gestão de Recursos da Costa Este	363		363
AZO	IUCN - VI	GRA08	Área Protegida de Gestão de Recursos da Costa Noroeste	283		283
AZO	IUCN - VI	FLO09	Área Protegida de Gestão de Recursos da Costa Norte	3,974		3,974
AZO	IUCN - VI	SMA12	Área Protegida de Gestão de Recursos da Costa Norte	2,458		2,458
AZO	IUCN - VI	SJO10	Área Protegida de Gestão de Recursos da Costa Oeste	209		209
AZO	IUCN - VI	GRA07	Área Protegida de Gestão de Recursos da Costa Sudeste	136		136
AZO	IUCN - VI	SMA13	Área Protegida de Gestão de Recursos da Costa Sul	2,160		2,160

Region	Classification	Code	Name	Total area (ha.)	Land Area (ha.)	Marine Area (ha.)
AZO	IUCN - VI	SMG23	Área Protegida de Gestão de Recursos da Ponta da Ferraria - Ponta da Bretanha	1,955		1,955
AZO	IUCN - VI	PICO21	Área Protegida de Gestão de Recursos da Ponta da Ilha	595		595
AZO	IUCN - VI	SMG21	Área Protegida de Gestão de Recursos da Ponta do Cintrão - Ponta da Maia	2,310		2,310
AZO	IUCN - VI	SJO11	Área Protegida de Gestão de Recursos de Entre Morros	247		247
AZO	IUCN - VI	FAI10	Área Protegida de Gestão de Recursos do Canal Faial-Pico/Sector Faial	17,386		17,386
AZO	IUCN - VI	PICO22	Área Protegida de Gestão de Recursos do Canal Faial-Pico/Sector Pico	6,689		6,689
AZO	IUCN - VI	SMG22	Área Protegida de Gestão de Recursos do Porto das Capelas - Ponta das Calheta	1,499		1,499
AZO	IUCN - VI	PICO20	Área Protegida de Gestão de Recursos do Porto das Lajes	153		153
AZO	IUCN - VI	SJO13	Área Protegida de Gestão de Recursos do Topo	610		610
AZO	IUCN - VI	FAI12	Área Protegida de Gestão de Recursos dos Capelinhos	500		500
AZO	IUCN - VI	FAI13	Área Protegida de Gestão de Recursos dos Cedros	891		891
AZO	IUCN - VI	FAI11	Área Protegida de Gestão de Recursosdo Castelo Branco	133		133
AZO	IUCN - VI	COR02	Área Protegida para a Gestão de Recursos da Costa do Corvo	25,738		25,738
CAN	IUCN - I	-	Reserva Marina Isla de La Palma	3,455		3,455
CAN	IUCN - I	-	Reserva Marina Isla Graciosa e Islotes del norte de Lanzarote	70,700		70,700
CAN	IUCN - I	-	Reserva Marina LA RESTINGA - MAR DE LAS CALMAS	1,180		1,180
CAN	IUCN - I	ES702051	Reserva Natural Integral de Benchijigua	491	491	
CAN	IUCN - I	ES702078	Reserva Natural Integral de Ijuana	919	919	
CAN	IUCN - I	ES701029	Reserva Natural Integral de Inagua	3,920	3,920	
CAN	IUCN - I	ES701056	Reserva Natural Integral de Los Islotes	165	165	
CAN	IUCN - I	ES702081	Reserva Natural Integral de Los Roques de Anaga	10	10	

Region	Classification	Code	Name	Total area (ha.)	Land Area (ha.)	Marine Area (ha.)
CAN	IUCN - I	ES702079	Reserva Natural Integral de Mencafete	464	464	
CAN	IUCN - I	ES702080	Reserva Natural Integral de Pinoleris	181	181	
CAN	IUCN - I	ES702082	Reserva Natural Integral de Roques de Salmor	4	4	
CAN	IUCN - I	ES701033	Reserva Natural Integral del Barranco Oscuro	35	35	
CAN	IUCN - I	ES702077	Reserva Natural Integral del Pijaral	301	301	
CAN	IUCN - I	ES702052	Reserva Natural Integral del Pinar de Garafía	984	984	
CAN	IUCN - II	ES702003	Parque Nacional de Garajonay	3,984	3,984	
CAN	IUCN - II	ES702002	Parque Nacional de La Caldera de Taburiente	4,690	4,690	
CAN	IUCN - II	ES701001	Parque Nacional de Timanfaya	5107	5,107	
CAN	IUCN - II	ES702001	Parque Nacional del Teide	18,990	18,990	
CAN	IUCN - II	ES702026	Parque Natural de Corona Forestal	46,613	46,613	
CAN	IUCN - II	ES701041	Parque Natural de Corralejo	2,669	2,669	
CAN	IUCN - II	ES702062	Parque Natural de Cumbre Vieja	7500	7,500	
CAN	IUCN - II	ES701025	Parque Natural de Jandía	14,319	14,319	
CAN	IUCN - II	ES702074	Parque Natural de Las Nieves	5,094	5,094	
CAN	IUCN - II	ES701049	Parque Natural de Los Volcanes	10,158	10,158	
CAN	IUCN - II	ES702039	Parque Natural de Majona	1,757	1,757	
CAN	IUCN - II	ES701026	Parque Natural de Pilancones	5,794	5,794	
CAN	IUCN - II	ES701012	Parque Natural de Tamadaba	7,539	7,539	
CAN	IUCN - II	ES701002	Parque Natural del Archipiélago Chinijo	46,005	9,112	36,893
CAN	IUCN - II	ES701048	Parque Natural del Islote de Lobos	468	468	
CAN	IUCN - III	ES701058	Monumento Natural de Ajuí	32	32	
CAN	IUCN - III	ES701003	Monumento Natural de Amagro	408	408	
CAN	IUCN - III	ES701004	Monumento Natural de Arinaga	91	91	
CAN	IUCN - III	ES701035	Monumento Natural de Bandama	326	326	
CAN	IUCN - III	ES701006	Monumento Natural de Caldera de Gairía	241	241	
CAN	IUCN - III	ES701038	Monumento Natural de Cuchillos de Vigán	6,090	6,090	

Region	Classification	Code	Name	Total area (ha.)	Land Area (ha.)	Marine Area (ha.)
CAN	IUCN - III	ES702059	Monumento Natural de Idafe	0.4	0.4	
CAN	IUCN - III	ES702009	Monumento Natural de La Caldera	39	39	
CAN	IUCN - III	ES702010	Monumento Natural de La Caldera del Rey	181	181	
CAN	IUCN - III	ES701007	Monumento Natural de La Corona	1,797	1,797	
CAN	IUCN - III	ES702011	Monumento Natural de La Costa de Hiscaguán	253	253	
CAN	IUCN - III	ES701037	Monumento Natural de La Cueva de Los Naturalistas	2	2	
CAN	IUCN - III	ES702060	Monumento Natural de La Fortaleza	53	53	
CAN	IUCN - III	ES702023	Monumento Natural de La Montaña Amarilla	28	28	
CAN	IUCN - III	ES702012	Monumento Natural de La Montaña Centinela	132	132	
CAN	IUCN - III	ES702013	Monumento Natural de La Montaña Colorada	515	515	
CAN	IUCN - III	ES702014	Monumento Natural de La Montaña de Guaza	726	726	
CAN	IUCN - III	ES702015	Monumento Natural de La Montaña de Los Frailes	26	26	
CAN	IUCN - III	ES702024	Monumento Natural de La Montaña de Tejina	170	170	
CAN	IUCN - III	ES702017	Monumento Natural de Las Montañas de Ifara y Los Riscos	288	288	
CAN	IUCN - III	ES701039	Monumento Natural de Las Montañas del Fuego	393	393	
CAN	IUCN - III	ES702018	Monumento Natural de Las Playas	985	985	
CAN	IUCN - III	ES701008	Monumento Natural de Los Ajaches	3,010	3,010	
CAN	IUCN - III	ES702020	Monumento Natural de Los Derriscaderos	268	268	
CAN	IUCN - III	ES702021	Monumento Natural de Los Órganos	154	154	
CAN	IUCN - III	ES702061	Monumento Natural de Los Roques	107	107	
CAN	IUCN - III	ES702022	Monumento Natural de Los Volcanes de Aridane	100	100	
CAN	IUCN - III	ES702087	Monumento Natural de Los Volcanes de Teneguía	857	857	
CAN	IUCN - III	ES701010	Monumento Natural de Montaña Cardón	1,267	1,267	
CAN	IUCN - III	ES702016	Monumento Natural de Montaña de Azufre	75	75	
CAN	IUCN - III	ES702025	Monumento Natural de Montaña Pelada	153	153	
CAN	IUCN - III	ES701011	Monumento Natural de Montaña Tindaya	187	187	
CAN	IUCN - III	ES702029	Monumento Natural de Roque Blanco	27	27	

Region	Classification	Code	Name	Total area (ha.)	Land Area (ha.)	Marine Area (ha.)
CAN	IUCN - III	ES702030	Monumento Natural de Roque Cano	58	58	
CAN	IUCN - III	ES701017	Monumento Natural de Tauro	1,257	1,257	
CAN	IUCN - III	ES702004	Monumento Natural del Barranco de Fasnia Y Güímar	152	152	
CAN	IUCN - III	ES701005	Monumento Natural del Barranco de Guayadeque	726	726	
CAN	IUCN - III	ES702005	Monumento Natural del Barranco del Cabrito	1,180	1,180	
CAN	IUCN - III	ES701059	Monumento Natural del Barranco del Draguillo	235	235	
CAN	IUCN - III	ES702006	Monumento Natural del Barranco del Jorado	99	99	
CAN	IUCN - III	ES701036	Monumento Natural del Islote de Halcones	11	11	
CAN	IUCN - III	ES702019	Monumento Natural del Lomo del Carretón	244	244	
CAN	IUCN - III	ES701009	Monumento Natural del Malpaís de La Arena	871	871	
CAN	IUCN - III	ES701040	Monumento Natural del Montañón Negro	194	194	
CAN	IUCN - III	ES702028	Monumento Natural del Risco de La Concepción	66	66	
CAN	IUCN - III	ES701016	Monumento Natural del Roque de Aguayro	807	807	
CAN	IUCN - III	ES702007	Monumento Natural del Roque de Garachico	5	5	
CAN	IUCN - III	ES702008	Monumento Natural del Roque de Jama	94	94	
CAN	IUCN - III	ES701050	Monumento Natural del Roque Nublo	452	452	
CAN	IUCN - III	ES702064	Monumento Natural del Teide	3,607	3,607	
CAN	IUCN - III	ES702065	Monumento Natural del Tubo Volcánico de Todoque	0.5	0.5	
CAN	IUCN - III	ES701042	Monumento Natural Riscos de Tirajana	772	772	
CAN	IUCN - IV	ES701051	Reserva Natural Especial de Azuaje	61	61	
CAN	IUCN - IV	ES701052	Reserva Natural Especial de El Brezal	107	107	
CAN	IUCN - IV	ES702045	Reserva Natural Especial de Guelguén	1,074	1,074	
CAN	IUCN - IV	ES701053	Reserva Natural Especial de Güigüi	2,921	2,921	
CAN	IUCN - IV	ES701034	Reserva Natural Especial de Las Dunas de Maspalomas	404	404	
CAN	IUCN - IV	ES702076	Reserva Natural Especial de Las Palomas	584	584	
CAN	IUCN - IV	ES701054	Reserva Natural Especial de Los Marteles	3,569	3,569	
CAN	IUCN - IV	ES701055	Reserva Natural Especial de Los Tilos de Moya	92	92	

Region	Classification	Code	Name	Total area (ha.)	Land Area (ha.)	Marine Area (ha.)
CAN	IUCN - IV	ES702048	Reserva Natural Especial de Montaña Roja	166	166	
CAN	IUCN - IV	ES702049	Reserva Natural Especial de Puntallana	292	292	
CAN	IUCN - IV	ES702050	Reserva Natural Especial de Tibataje	4	4	
CAN	IUCN - IV	ES702044	Reserva Natural Especial del Barranco del Infierno	1,843	1,843	
CAN	IUCN - IV	ES702075	Reserva Natural Especial del Chinyero	2,379	2,379	
CAN	IUCN - IV	ES702046	Reserva Natural Especial del Malpaís de Güímar	290	290	
CAN	IUCN - IV	ES702047	Reserva Natural Especial del Malpaís de La Rasca	315	315	
CAN	IUCN - IV	ES702058	Sitio de Interés Científico de Acantilados de Alajeró	297	297	
CAN	IUCN - IV	ES702086	Sitio de Interés Científico de Interian	102	102	
CAN	IUCN - IV	ES701031	Sitio de Interés Científico de Jinámar	30	30	
CAN	IUCN - IV	ES702054	Sitio de Interés Científico de Juan Mayor	29	29	
CAN	IUCN - IV	ES701032	Sitio de Interés Científico de Juncalillo del Sur	192	192	
CAN	IUCN - IV	ES702031	Sitio de Interés Científico de La Caleta	78	78	
CAN	IUCN - IV	ES702063	Sitio de Interés Científico de Las Salinas de Fuencaliente	7	7	
CAN	IUCN - IV	ES702083	Sitio de Interés Científico de Los Acantilados de Isorana	24	24	
CAN	IUCN - IV	ES701057	Sitio de Interés Científico de Los Jameos	31	31	
CAN	IUCN - IV	ES701013	Sitio de Interés Científico de Playa del Matorral	116	116	
CAN	IUCN - IV	ES701015	Sitio de Interés Científico de Tufia	54	54	
CAN	IUCN - IV	ES702057	Sitio de Interés Científico del Acantilado de La Hondura	38	38	
CAN	IUCN - IV	ES702084	Sitio de Interés Científico del Barranco de Ruíz	96	96	
CAN	IUCN - IV	ES702055	Sitio de Interés Científico del Barranco del Agua	75	75	
CAN	IUCN - IV	ES702085	Sitio de Interés Científico del Charco de Cieno	6	6	
CAN	IUCN - IV	ES702053	Sitio de Interés Científico del Charco del Conde	11	11	
CAN	IUCN - IV	ES701030	Sitio de Interés Científico del Janubio	169	169	
CAN	IUCN - IV	ES701014	Sitio de Interés Científico del Roque de Gando	0.5	0.5	
CAN	IUCN - IV	ES702027	Sitio de Interés Científico del Tabaibal del Porís	49	49	
CAN	IUCN - V	ES702034	Paisaje Protegido de Costa de Acentejo	401	401	

Region	Classification	Code	Name	Total area (ha.)	Land Area (ha.)	Marine Area (ha.)
CAN	IUCN - V	ES701044	Paisaje Protegido de Fataga	3,005	3,005	
CAN	IUCN - V	ES702068	Paisaje Protegido de Ifonche	775	775	
CAN	IUCN - V	ES701045	Paisaje Protegido de La Geria	5,255	5,255	
CAN	IUCN - V	ES701018	Paisaje Protegido de La Isleta	462	462	
CAN	IUCN - V	ES702035	Paisaje Protegido de La Rambla de Castro	46	46	
CAN	IUCN - V	ES702069	Paisaje Protegido de La Resbala	777	777	
CAN	IUCN - V	ES701019	Paisaje Protegido de Las Cumbres	4,329	4,329	
CAN	IUCN - V	ES702070	Paisaje Protegido de Las Lagunetas	3,800	3,800	
CAN	IUCN - V	ES702071	Paisaje Protegido de Las Siete Lomas	1,014	1,014	
CAN	IUCN - V	ES701046	Paisaje Protegido de Lomo Magullo	176	176	
CAN	IUCN - V	ES702056	Paisaje Protegido de Los Acantilados de La Culata	552	552	
CAN	IUCN - V	ES702072	Paisaje Protegido de Los Campeches, Tigaiga Y Ruíz	691	691	
CAN	IUCN - V	ES701047	Paisaje Protegido de Malpaís Grande	3,245	3,245	
CAN	IUCN - V	ES701020	Paisaje Protegido de Montaña de Agüimes	285	285	
CAN	IUCN - V	ES702036	Paisaje Protegido de Orone	1,788	1,788	
CAN	IUCN - V	ES701021	Paisaje Protegido de Pino Santo	3,012	3,012	
CAN	IUCN - V	ES701022	Paisaje Protegido de Tafira	1,414	1,414	
CAN	IUCN - V	ES702073	Paisaje Protegido de Tamanca	2,007	2,007	
CAN	IUCN - V	ES701023	Paisaje Protegido de Tenegüime	421	421	
CAN	IUCN - V	ES702037	Paisaje Protegido de Timijiraque	383	383	
CAN	IUCN - V	ES701024	Paisaje Protegido de Vallebrón	1,680	1,680	
CAN	IUCN - V	ES702038	Paisaje Protegido de Ventejís	1,143	1,143	
CAN	IUCN - V	ES702032	Paisaje Protegido del Barranco de Erques	238	238	
CAN	IUCN - V	ES702033	Paisaje Protegido del Barranco de Las Angustias	1,696	1,696	
CAN	IUCN - V	ES702066	Paisaje Protegido del Remo	183	183	
CAN	IUCN - V	ES702067	Paisaje Protegido del Tablado	222	222	
CAN	IUCN - V, VI	ES702040	Parque Rural de Anaga	14,419	14,419	

Region	Classification	Code	Name	Total area (ha.)	Land Area (ha.)	Marine Area (ha.)
CAN	IUCN - V, VI	ES701027	Parque Rural de Betancuria	16,544	16,544	
CAN	IUCN - V, VI	ES701028	Parque Rural de Doramas	3,586	3,586	
CAN	IUCN - V, VI	ES702041	Parque Rural de Frontera	12,488	12,488	
CAN	IUCN - V, VI	ES702042	Parque Rural de Teno	8,064	8,064	
CAN	IUCN - V, VI	ES702043	Parque Rural de Valle de Gran Rey	1,993	1,993	
CAN	IUCN - V, VI	ES701050	Parque Rural del Nublo	26,307	26,307	
MAD	IUCN - Ia	-	Reserva Natural das Ilhas Desertas	11,460	1,398	10,063
MAD	IUCN - Ia	-	Reserva Natural das Ilhas Selvagens	9,437	281	9,157
MAD	IUCN - Ia	-	Reserva Natural Parcial do Garajau	375		375
MAD	IUCN - Ib	-	Rede de Áreas Marinhas Protegidas do Porto Santo	2,675	210	2,466
MAD	IUCN - Ib	-	Reserva Natural da Rocha do Navio	1710	2	1,709
MAD	several	-	Parque Natural da Madeira	44,396	44,396	

Appendix 9. List of Important Bird Areas (IBAs) in Macaronesia

Region	Code	Name	Total area (ha)	Land Area (ha)	Marine Area (ha)
AZO	PT055	Baía do Varadouro	111		
AZO	PT058	Cabeço do Fogo	995		
AZO	PT054	Capelinhos	215		
AZO	PT067	Contendas	90		
AZO	PTM05	Corvo e Flores	210,400	0	210,400
AZO	PT052	Costa das Flores	937		
AZO	PT053	Costa do Corvo	374		
AZO	PT071	Costa Sudoeste do Pico	209		
AZO	PTM06	Faial	38,500	0	38,500
AZO	PT079	Faial da Terra e Ponta do Arnel	254		
AZO	PT065	Fajã das Almas	55		
AZO	PT076	Feteiras	63		
AZO	PT074	Furnas - Santo António	53		
AZO	PTM10	Graciosa	27,700	0	27,700
AZO	PT061	Ilhéu da Baleia e Ponta da Barca	39		
AZO	PT060	Ilhéu da Praia - Ilha Graciosa	11		
AZO	PT068	Ilhéu da Vila	8		
AZO	PT081	Ilhéu das cabras	28		
AZO	PT069	Ilhéu das Lagoínhas e Costa Adjacente	210		
AZO	PT059	Ilhéu de Baixo e Costa Adjacente	74		
AZO	PT064	Ilhéu do Topo e Costa Adjacente	230		
AZO	PT082	Lajes do Pico	68		
AZO	PT057	Lomba Grande	265		

Region	Code	Name	Total area (ha)	Land Area (ha)	Marine Area (ha)
AZO	PT073	Mistério da Prainha	73		
AZO	PT077	Mosteiros – Bretanha	295		
AZO	PTM14	Norte do Corvo - oceânica	268,900	0	268,900
AZO	PTM15	Norte do Corvo e Faial - oceânica	260,700	0	260,700
AZO	PT080	Pico da Vara	6,083		
AZO	PTM07	Pico Norte	9,200	0	9,200
AZO	PT072	Ponta da Ilha e Terra Alta	194		
AZO	PT070	Ponta da Malbusca e Ponta do Castelete	128		
AZO	PT078	Ponta do Cintrão	29		
AZO	PT063	Ponta dos Rosais - Urzelina	979		
AZO	PT066	Raminho – Pesqueiro Velho	71		
AZO	PT056	Ribeirinha	91		
AZO	PTM13	Santa Maria	38,600	0	38,600
AZO	PTM09	São Jorge - Nordeste	7,100	0	7,100
AZO	PTM08	São Jorge - Oeste	31,100	0	31,100
AZO	PTM12	São Miguel - sul	10,800	0	10,800
AZO	PT062	Serra Branca	95		
AZO	PTM11	Terceira	27,300	0	27,300
AZO	PT075	Zona Central do Pico	5,832		
MAD	PTM16	Desertas	45,500	0	45,500
MAD	PT085	Ilhas Desertas	1,384		
MAD	PT089	Ilhéus do Porto Santo	204		
MAD	PT083	Laurissilva	15,242	15,242	0
MAD	PT084	Maciço Montanhoso Oriental	3,411	3,411	0
MAD	PT087	Ponta de São Lourenço	321	321	0
MAD	PT088	Ponta do Pargo	1,161		
MAD	PT090	Porto Santo Oeste	929		

Region	Code	Name	Total area (ha)	Land Area (ha)	Marine Area (ha)
MAD	PT086	Selvagens	265		
MAD	PTM17	Selvagens - oceânica	84,500	0	84,500
CAN	367	Acantilado de Los Gigantes	1,219	1,219	0
CAN	364	Acantilados de Santo Domingo y Roque de Garachico	26	26	0
CAN	400	Aguas de La Gomera - Teno	210,549	0	210,549
CAN	381	Aguas y Acantilados del Norte de La Palma	41,618	1,188	40,431
CAN	327	Archipiélago Chinijo (Islotes al Norte de Lanzarote)	140,010	3,903	136,108
CAN	391	Bahía de Naos - Hoya de Tacorón	207	207	0
CAN	475	Banco de La Concepción	452,321	0	452,321
CAN	346	Barranco de Ajuí - Betancuria	14,698	14,698	0
CAN	347	Barranco de Los Molinos - Llano de La Laguna - Alto de Matías	4,145	4,145	0
CAN	339	Barranco de Río Cabras - Reserva de Tesjuate	1,016	1,016	0
CAN	368	Barranco de Tágara	1,280	1,280	0
CAN	330	Barranco de Tenegüime	274	274	0
CAN	351	Costa de Arinaga - Castillo del Romeral	749	749	0
CAN	350	Costa de Corralejo a Tostón	1,442	1,442	0
CAN	374	Costa de Majona	163	163	0
CAN	377	Costa de Vallehermoso	526	526	0
CAN	378	Costa meridional de La Gomera	709	709	0
CAN	389	Costa Ocidental de El Hierro	22,998	668	22,330
CAN	395	Costa y Aguas de Mogán - La Aldea	29,247	10,502	18,746
CAN	340	Cuchilete de Buenavista - Barranco de La Torre - Los Alares	8,675	8,675	0
CAN	380	El Canal y Los Tiles	526	526	0
CAN	372	El Médano	1,287	1,287	0
CAN	333	El Mojón	141	141	0

Region	Code	Name	Total area (ha)	Land Area (ha)	Marine Area (ha)
CAN	384	El Roque	46	46	0
CAN	401	Estrecho de la Bocaina	83,832	0	83,832
CAN	329	Haría - Tabayesco	2,545	2,545	0
CAN	336	Isla de Lobos	455	455	0
CAN	345	Jable del Istmo de Jandía	4,504	4,504	0
CAN	337	Jamble de Corralejo	2,695	2,695	0
CAN	332	Jamble de Famara	6,952	6,952	0
CAN	390	La Dehesa	2,057	2,057	0
CAN	363	Ladera de Tigaiga	966	966	0
CAN	392	Llano Grande - Malpaís Grande - Malpaís Chico	9,177	9,177	0
CAN	331	Llanos de La Corona - La Hondura - Tegala Grande	2,748	2,748	0
CAN	335	Llanos de Las Maretas - Hoya de la Yegua (El Rubicón)	3,337	3,337	0
CAN	386	Llanos de Nizdafe	1,855	1,855	0
CAN	360	Los Rodeos - La Esperanza	1,286	1,286	0
CAN	341	Macizo de Pozo Negro - Vigán	10,572	10,572	0
CAN	342	Macizo de Tarajalejo	2,281	2,281	0
CAN	385	Macizo de Ventejís	1,290	1,290	0
CAN	373	Malpaís de Rasca - Montaña de Guaza - Llano de las Mesas	1,489	1,489	0
CAN	371	Montaña Centinela y Llano de La esquina	1,679	1,679	0
CAN	471	Montaña El Cardón - Jable de Bigocho	8,685	8,685	0
CAN	366	Monte del Agua, Barranco de Los Cochinos y Barranco de Cuevas Negras	2,415	2,415	0
CAN	357	Monteverde de Anaga	3,447	3,447	0
CAN	388	Monteverde de Frontera	2,448	2,448	0
CAN	379	Monteverde de La Palma	31,354	31,354	0
CAN	362	Monteverde de Santa Úrsula y La Victoria	1,850	1,850	0

Region	Code	Name	Total area (ha)	Land Area (ha)	Marine Area (ha)
CAN	376	Parque Nacional de Garajonay	4,824	4,824	0
CAN	383	Parque Nacional de La Caldera de Taburiente	4,355	4,355	0
CAN	344	Península de Jandía	13,339	13,339	0
CAN	370	Pinar de Arico	5,949	5,949	0
CAN	355	Pinar de Tamadaba	3,501	3,501	0
CAN	353	Pinar de Tauro	867	867	0
CAN	352	Pinar de Tirajana	3,551	3,551	0
CAN	369	Pinar de Vilaflor	5,577	5,577	0
CAN	354	Pinares de Pajonales, Ojeda, Inagua, La Data y la Cumbre	8,446	8,446	0
CAN	343	Playa de Sotavento	372	372	0
CAN	348	Playa del Castilo - Costa de Esquinzo Y Tebeto - Puertito de Los Molinos	321	321	0
CAN	349	Reserva de Lajares - Cotilo - Ezquinzo	8,146	8,146	0
CAN	328	Riscos de Famara	1,391	1,391	0
CAN	375	Riscos de Hermigua y Agulo	751	751	0
CAN	361	Roque de La Playa	1	1	0
CAN	356	Roques de Anaga	10	10	0
CAN	387	Roques de Salmor	661	4	657
CAN	334	Salinas de Janubio	162	162	0
CAN	338	Vallebrón-Montaña Escanfraga-Llanos de Guisguey-Laderas del Time	9,237	9,237	0