ECOSYSTEM PROFILE

MACARONESIA

Draft 9 February 2015

CONTENTS

1. INTRODUCTION

The European Union's BEST (Voluntary scheme for Biodiversity and Ecosystem Services in Territories of European Overseas) has been a concrete follow-up to the Message from Reunion Island issued by the first conference on biodiversity and climate change in the EU overseas entities that took place in Reunion Island in July 2008. The Message stressed the need for the European Union and its Overseas Entities to counter climate change and biodiversity loss.

In 2010 the European Parliament initiated the BEST Preparatory Action (2011-2013) that represents the first European decision to address the critical importance of preserving EU Overseas Biodiversity and the need to support local actors committing to such an objective. The objective of the preparatory action aimed to promote the conservation and sustainable use of biodiversity and ecosystem services in EU Outermost Regions (ORs) and Overseas Countries and Territories (OCTs), drawing on the experience gained with EU nature conservation legislation and programmes, and following up on the recommendations of the Message from Reunion.

Throught the BEST preparatory Action (adopted by the European Parliament and implemented by the European Commission), 16 projects have been selected for funding and granted with the available budget of 2 million Euros per year, in the frame of the 2011 and 2012 Open calls for Proposals. In 2013, the third and last year of the BEST Preparatory Action, it was decided by the European Comission to open a call for tender for optimizing the last year and undertaking measures for sustaining this European inititative. In this context, IUCN (International Union for Conservation of Nature) and partners 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 overarching aim of the 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.

During the project seven regional knowledge hubs are developing seven regional ecosystem profiles with the help of local actors and BEST strategies for better profiling the challenges and the needs for support in the ORs and OCTs. It will seek for synergies with relevant ongoing activities and the establishment of regional ecosystem profiles and BEST strategies for investment with the help of local actors.

This profiling process follows the Critical Ecosystem Partnership Fund (CEPF) approach, which uses a methodology of developing "Ecosystem Profiles" to identify and articulate an investment strategy for each region to be funded.

The preparation of the ecosystem profile is not simply a desk study but involves a regional participation process so that the final outcome is owned and used by stakeholders in the region. Therefore, consultations with diverse governmental and nongovernmental stakeholders are an integral part of the process, with the aim of creating a shared strategy from the outset.

Each ecosystem profile reflects 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. Finally, each profile 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 programes to effectively target their efforts.

The BEST initiative will allow a crucial assessment of priorities in biodiversity conservation in the region, highlighting its value in European and global terms. The strategies to be developed are essential to focus research and management efforts and to direct funds to where their application can have the highest positive impact.

The Macaronesian[1] 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 archipelagoes 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. Although Cape Verde is also part of the Macaronesian region, the area considered in this project is the European Macaronesian biogeographical region for political consistency, to include only archipelagoes that are outermost regions (ORs) of the European Union, linked to Portugal and Spain.

Figure 1 – Map of Macaronesia

These three archipelagos are the most important center 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

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

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.

This report follows the above discussed main principles of ecosystem profiling and will present the biological and thematic basis for conservation investments in the Macaronesian region.

2. BACKGROUND

The ecosystem profile 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 will identify priorities for conservation investment within these.

The ecosystem profile will conclude with an investment strategy for donors interested in supporting civil-society-led conservation efforts in the region. This investment strategy will comprise a series of strategic funding opportunities and termed strategic directions. Civil society organizations (CSOs), individuals or other entities may propose projects that will help implement the strategy by addressing the identified investment priorities. The ecosystem profile will not include specific project concepts or define specific activities, as civil society groups will develop these as part of their funding applications. Applicants for funding will be required to prepare proposals for the activities and the performance indicators that will be used to monitor project success.

The Macaronesia ecosystem profile is being developed through a desktop study and process of consultation 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.

The desk study consisted at first on the development of a i) list of stakeholders; ii) list of threatenead species[2]; iii) list of all areas[3] under diferent protection status.

[2] http://goo.gl/CahYZT

A first notification describing the project and requesting the colaboration of stakeholders was sent in June and July 2014. In addition, a website[4] was created to promote the project and to facilitate the communication and information sharing with stakeholders. The results of the species and sites databases were made available online and circulated for review by all stakeholders during August. Comments received were integrated into the databases or noted for later discussion with stakeholders during the workshops.

The public presentation and the first technical workshops of the BEST III project were carried out during November 2014 in five cities from the three Macaronesian archipelagos: Angra do Heroísmo and Ponta Delgada (Azores), Las Palmas de Gran Canaria and La Laguna (Canary Islands), and Funchal (Serviço do Parque Natural da Madeira). 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 80 people have been mobilized, covering the public and research sectors (25% and 68% respectively), as well as the civil society (7%) (**APPENDIX 1).**

Table 1 – Workshops: locations, dates and atendance

Date	Location	# participants	
		Public session	Technical session
10 Nov 2014	Angra do Heroísmo, Terceira island, Azores	9	8
11 Nov 2014	Ponta Delgada, São Miguel island, Azores	22	9
18 Nov 2014	Las Palmas de Gran Canaria Gran Canaria Island, Canary Islands	14	3
19 Dez 2014	La Laguna, Tenerife Island, Canary Islands	12	11
24 Nov 2014	Funchal, Madeira Island, Madeira	14	10

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 (

[3] https://docs.google.com/spreadsheets/d/1ljlgeSljRk8B3PbMf3hOi_FlzI8jJlKIPwb1l-a8TN4/edit#gid=1075478080

[4] http://www.azores.gov.pt/Gra/BEST_III_Macaronesia/

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 methodology used.

The main highlights of this series of meetings were:

1. Consolidation of the visibility of the project, and of the stakeholder engagement with it. In particular, regional governments in all the 3 archipelagos are aware and support BEST III.
2. 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.
3. Secured access to distribution data and to maps of classified areas.

The outcome of this first consultation process is very positive. The key actors in biodiversity research and conservation were involved and became aware of the BEST III goals and of the methodology involved. In particular, regional governments are now aware of the project and look at it very positively, and researchers are engaged and motivated. Workshop participants have provided important information and suggestions, and have shown their motivation to continue collaboration with the project. From these actors it will be possible to reach others, whose different competences and knowledge will be needed for the subsequent phases of the project.

3. BIOLOGICAL IMPORTANCE OF THE AREA

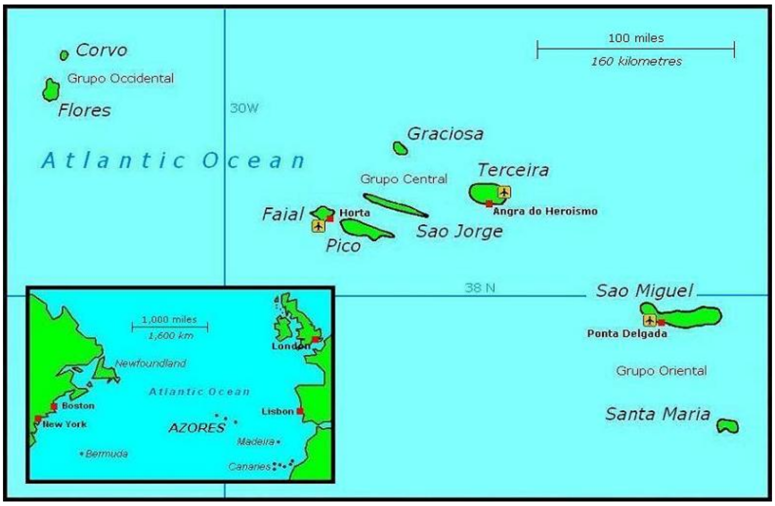
3.1 Geography

Macaronesia comprises three archipelagos in the North Atlantic Ocean off the coast of Europe and Africa: Azores, Madeira and Canary islands.

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 Oriental Group), Terceira, Graciosa, São Jorge, Pico, Faial (that make up the Central Group), Flores and Corvo (that make up the Occidental Group), including also some uninhabited islets.

The Azores archipelago lies in the far out in the Atlantic Ocean between parallels 36°55' and 39°43' latitude North and meridians 24°46' 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 Km^2, 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).

Figure 2 – Map of the Azores



The Azores archipelago has quite varied dimensions (between 17 Km² of Corvo and 747 Km² of São Miguel), with a total surface area of 2,333 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 850 km, which is about equal to the length of the coastline of continental Portugal. The Azores autonomous region includes an Exclusive Economic Zone (EEZ) of 948,439 Km². This surface area accounts for about 30 % of the European EEZ (Governo dos Açores, 2014).

The Madeira archipelago is also an autonomous region of the Republic of Portugal situated in the Atlantic Ocean to the west of Morocco.

Figure 3 – Map of Madeira archipelago

The archipelago consists of 2 main islands, Madeira (742 km², 90% of the archipelago) and Porto Santo (43 km²), three small islets known as Desertas (Ilhéu Chão, Deserta Grande and Bugio, uninhabited nature reserve of 14 km²) and the small archipelago of Selvagens (uninhabited nature reserve of 3.6 km²), with its two small islands (Selvagem Grande and Selvagem Pequena) and several small islets.

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.

Likewise 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.

The Canary Islands is an autonomic community of Spain whose eastern-most point is only 100 kilometres to the west of Morocco. The archipelago is nearly three times the area of the Azores, and 10 times larger than the Madeiran group (see Table 2).

The region consists of seven major islands divided into two administrative provinces. On the one hand we have the Province of Las Palmas, formed by the islands Gran Canaria, Fuerteventura and Lanzarote, and on the other hand, the Province of Sta. Cruz de Tenerife with the islands of La Gomera, Tenerife, La Palma and El Hierro. There are also 4 minor islands, La Graciosa, Alegranza, Montaña Clara and Lobos, the first being the only inhabited one and lying to the North of Lanzarote. To these we should add a great number of small islets and rocks spread over the whole archipelago.

Figure 4 – Map of the Canary Islands

The Canary Islands 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 52 nautical miles at their nearest point, this being Punta de La Entallada, situated on the Eastern coast of Fuerteventura.

The archipelago 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 three islands exceed 1,000 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 metres, is the highest summit in Spain.

Table 2 – Macaronesian archipelagos: geographic facts and figures

	Macaronesia	Azores	Madeira	Canary Is.
Country	Portugal and Spain	Portugal	Portugal	Spain
Number of islands	18 main islands and several islets larger than 1km^2	9	2 main islands (and several islets larger than 1km^2, including the Desertas and the Selvagens)	7 main islands and 4 islets larger than 1km^2
Total area (km^2)	1,932,266	980,515	453,967	497,784
Land area (km^2)	10,608	2,333	828	7,447
Total marine area (km^2)	1,921,658	978,182	453,139	490,337
EEZ (km^2)	1,846,152	948,439	442,316	455,397

(Sources: Governo dos Açores, 2014; INE, 2012a, 2012b, 2013b, 2014; Sea Around Us Project, 2014; SREA, 2012)

Unlike Azores and Madeira, which were uninhabited until the early 15th century, the Canary Islands have a relatively long history of human occupation. 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.

3.2 Geology

All Macaronesian islands share a number of common features, such as being oceanic and of volcanic origin, having formed over oceanic plates, and never having been connected to continental landmasses. 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 in association with mantle-plume hotspots (Madeira and the Canaries) or the spreading of the Mid-Atlantic ridge (Azores[5]). They have therefore never been connected to any continent, from which they are from 96 (the Canaries from Africa) to 1,500 km (Azores from Europe) apart. In fact, the region in general, and especially the Canary Islands, differs

[5] The Azores arose over three different continental plates, the American, the European and the African.

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 (Kostas A. Triantis *et al.*, 2010a).

The islands exhibit a comparatively old and broad range of geological ages, from 0.25 million years (Balmford *et al*., in Kostas A. Triantis *et al.*, 2010a) for Pico (Azores) to 27 My for Selvagens (e.g. Hoernle & Carracedo, in Kostas A. Triantis *et al.*, 2010a). 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 (Kostas A. Triantis *et al.*, 2010a). The most recent addition to islands from volcanic activity is the one resulting from the Capelinhos eruption of 1957-1958 in the Azores. Situated on the intersection of the tectonic plates of Europe, Africa, and America, the Azores archipelago has an unstable geologic nature and continues to experience earthquakes and volcanic activity.

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.

3.3 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, 3718 m) or even polar (Pico, Azores, 2351 m).

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).

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.

The Canary Islands span a transition zone between two climate types, temperate and subtropical, with mild temperatures that vary between 18 and 21º C, and very small annual variations (WWF, 2015a). However, in function of altitude, orientation 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 microclimates 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. 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 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).

3.4 “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). The Macaronesian region integrates four ecoregions as defined by the World Wildlife Fund (WWF) (Table 5).

Despite the differences in these 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, in Fernández-Palacios, 2010). These forests have disappeared to a large extent but can still be found on all these archipelagos.

This unique subtropical humid forest (very similar to permanent mountain cloud forest) constitutes an extremely important ecosystem type that is rare worldwide. This forest 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.

Table 3 – Ecoregions in Macaronesia

Ecoregion	Ecoregion category	Threat Status
Canary Islands dry woodlands and forests (PA1203)	Palaearctic (biome: mediterranean orests, woodlands and scrub)	Critical/Endangered
Mediterranean acacia-argania dry woodlands and succulent thickets (PA1212)	Palaearctic (biome: mediterranean orests, woodlands and scrub)	Critical/Endangered
Madeira evergreen forests (PA0425)	Palaearctic (biome: temperate broadleaf and mixed forests)	Critical/Endangered
Azores temperate mixed forests (PA0403)	Palaearctic (biome: temperate broadleaf and mixed forests)	Critical/Endangered

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

The laurel forest is the main natural ecosystem from the Azores, extending from the coast to the summits of all islands, with the exception of the tallest Pico, and is well represented in the mid-altitudes of Madeira and the Canaries. It 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 (Fernández-Palacios, 2010).

The name "Laurisilva" derives from the fact that four Lauraceous species predominate: Barbusano (*Apollonias barbujana*), Til (*Ocotea foetens*), Loureiro (*Laurus novocanariensis, Laurus azorica*) and Vinhático (*Persea indica*), and are endemic to Macaronesia. The dominant trees shared by the three archipelagos include genera such as *Picconia, Laurus, Ilex, Prunus* and *Myrica*, whereas *Juniperus brevifolia* is exclusive from Azores and *Apollonias, Persea* and *Ocotea* are restricted to Madeira and the Canaries (E. Dias *et al.*, 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*.

The more or less common scenario for Macaronesian coastal and mid-altitude ecosystems is absent when the summit ecosystems throughout the region are analyzed, 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 (Fernández-Palacios, 2010). Most of the high Canary islands (Gran Canaria, Tenerife, La Palma and El Hierro) present by contrast at the same altitudes an open, tall (> 30 m) pine forest, dominated by the palaeoendemic Canarian pine (*P. canariensis*) (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 (*Spartocytisus* and *Adenocarpus*) (Fernández-Palacios, 2010).

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. On the other hand, with the exception of Madeira and Salvages (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* (Fernández-Palacios *et al.*, 2008).

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 piscatorial* in Madeira, *E. anachoreta* in Selvagens, *E. balsamifera, E. obtusifolia, 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. Directly above this 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* (Fernández-Palacios *et al.*, 2008).

Ecoregion “Canary Islands dry woodlands and forests”

The higher elevation islands in the Canary Islands archipelago form their own ecoregion because the moist climate here permits the development of distinctive vegetation types (including Macaronesian laurel forests) containing many endemic species. The ecoregion “Canary Islands dry woodlands and forests” includes the five western Canary Islands: La Palma, Hierro, Gomera, Tenerife, and Gran Canaria. The western islands are younger than the eastern group and are more mountainous, with well-developed forests (González *et al.*, 1986)

Vegetation can be described according to elevation zones; five major terrestrial ecosystems can be recognized: xerophytic shrub, thermophilous forest, laurel forest, pine forest, and high mountain shrub (Francisco-Ortega *et al.*, 2010; Petit & Prudent, 2010)

At the lowest elevation, coastal vegetation grows, including typical types of cliffs and sandy regions. Endemic palm groves (*Phoenix canariensis*), and semiarid vegetation are present. Generally, these vegetation types occur from sea level to 600 m in the north and up to 1,000 m in the south, and include many endemic taxa. Endemics are mainly found to be from the *Euphorbiaceae*, for example, *Euphorbia canariensis*, and *E. balsamifera*. Other important endemic species are *Ceropegia fusca, Plocama pendula, Salvia canariensis, Argyranthemum frutescens, Rumex lunaria, Convolvulus floridus*, and *Messerschmidia fruticosa* (González *et al.*, 1986).

Along the transition zone from 50 to 500m, between the sea level coastal community and giving way to laurisilva vegetation, there are thermophiles and pre-steppe bush. The species found here are common to both the lower and higher vegetation formations. This zone has been damaged for decades because of its good potential for crops. Some of the endemic and representative species are *Bosea yervamora, Echium strictum, Greenovia aurea, Aeonium sp., Monanthes laxiflora, Campylanthus salsoloides, Forsskaolea angustifolia*, and *Dracaena draco* (González *et al.*, 1986).

Humid and shady laurisilva forest grows between 500 and 1400 m in elevation, with some species reaching more than 20 m in height. 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 azorica, and Picconia excelsa*). There are three distinctive species *Myrica faya, Erica arborea* and *E. scoparia*. Three different patterns of distribution can be seen. The first one is the contact zone with laurisilva, where *Myrica spp*. are dominant, with some *Erica spp*.; the second one is the typical fayal-brezal association (*Myrica-Erica*); and finally the third one is the contact zone with pine forests where *Erica spp*. are more common than *Myrica spp*. (González *et al.*, 1986).

Canarian endemic pine forests (*Pinus canariensis*) are found almost at sea level in southern areas but in the northern parts of the islands are found from 1,200 to 2,400 m in elevation (WWF, 2015a). Previously widespread in southern Europe, they disappeared from the continent with the last glaciations (Pliocene). In their limited range they are mixed with *Adenocarpus spp., Myrica-Erica* associations, or even with laurisilva forest (northern), or with *Chamaecytisus spp., Spartocytisus spp.*, and *Ephedera spp*., or *Cistus spp*. or *Micromeria spp*. (southern). Pines can also be found mixed with *Juniperus cedrus* and *J. phoenicea* 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).

Finally, vegetation grows in the high mountains above 2,000 m on La Palma and Tenerife. Some of the typical species of this vegetation can also be found occasionally on other high islands of the archipelago that hold the following 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. Both endemic species and genera are found and these include *Spartocytisus supranubius, Erysimum scoparium, Nepeta teydea, Plantago webbii, Senecio palmensis, Juniperus cedrus, Polycarpaea tenuis*, and *Echium sp* (González et al, as cited in WWF, 2015a). Once an open forest where the Canary Island juniper, *Juniperus cedrus*, dominated, these high altitude ecosystem is now dominated by shrubs. Having been almost driven to extinction for the extraction of timber, the Canary Island juniper is mostly relegated to inaccessible landscapes on La Palma.

The Canary Islands lack river systems. In spite of that and owing to the steep topography of the western islands, they are crossed by complex systems of ravines produced by water erosion over thousands of years. These gullies serve as drainage for winter rainfall and, on the higher islands like Tenerife, water from the thawing snow and ice flows year-round. Other islands become dry in summer. Generally, the northern parts of the islands are steeper than the southern regions, which have bigger plains and more semiarid landscapes.

Acacia-Argania woodland ecoregion

The lower and drier eastern islands of Fuerteventura and Lanzarote do not contain any wetter forest habitats and are placed within the mainland Acacia-Argania woodland ecoregion.

Argania spinosa forest and Euphorbia-dominant succulent shrubland are the predominant vegetation types in the ecoregion. The major species which develop with Argania are: *Periploca laevigata, Senecio anthephorbium, Launaea arborescens, Warionia saharae, Acacia gummifera, Rhus trpartitum, Withania frutescens, Euphorbia officinarum, Cytisus albidus, Ephedra altissima*, and *Tetraclinis articulate* (WWF, 2015b).

Madeira evergreen forests

The vegetation in Madeira archipelago has marked altitudinal stratification, with four main areas being recognized: coastal vegetation, evergreen dry and wet forest, and upland vegetation (Aguin-Pombo & Carvalho, 2010). 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). The remaining vegetation types are only found at Madeira Island. 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 mocarena,* 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 azorica, Ocotea foetans 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). This luxuriant forest contains many rare endemic species. Here are found hygrophilous tree species of Lauraceae exclusive to Macaronesia, such as *Laurus novocanariensis*, *Ocotea foetens*, and *Clethra arborea*. At higher altitudes, this 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).

Azores temperate mixed forests

Prior to discovery, the archipelago was covered in Atlantic-type forests that persist in some places, for example at the top of the Santa Bárbara range on Terceira (*Reis Maduro Dias 2001*). In the lowlands, most of which have been highly altered, the evergreen fire tree (*Myrica faya*) is the main species to have regenerated on old lava flows. *M. faya*, native to the Azores and Madeira, has become an invasive problem on other islands, such as Hawaii, to which it was introduced (WWF, 2015d).

Above 500 m, the native fragments of vegetation are dense dark green shrub forest composed of *Laurus azorica, Juniperus brevifolia,* and *Erica azorica*. The juniper is endemic to the Azores and has been exploited for timber. These native Macaronesian laurel forests are best preserved on Pico, Terceira, and San Miguel Islands. Associated species are shrubs such as *Ilex, Viburnum, Clethra*, and a tall bilberry (*Vaccinium cylindraceum*) that has showy, dark pink flowers. Peat bogs found on Flores and Terceira are very rich in endemic species and are also in immediate danger from overgrazing. The bryophyte flora is very rich in contrast to the vascular flora, with about 450 species and an endemism rate of 5% (Robertson, as cited in WWF, 2015d). Pico is one of the few islands in the tropical and warm-temperate zone high enough to show timberline and alpine vegetation, with a forest line found at significantly lower elevation than those of the mainland (Leuschner, as cited in WWF, 2015d).

3.5 Species Diversity and Endemism

The three Macaronesian archipelagos are an extrememly important center of biodiversity in the Mediterranean hotspot. At present, more than 5,300 endemic species are known in about 10,600 km^2 that make up the 18 islands and several islets of these three archipelagos (Martín *et al.*, 2008). As a result of their isolation and geological history, these islands harbour a large number of endemic taxa. This preponderance of endemic species has made the Macaronesian islands an outstanding area for studies of evolution and speciation, and, in particular, arthropods from these islands have been the focus of particularly intensive investigation in the last ten years (Kostas A. Triantis *et al.*, 2010a). The Macaronesian arthropod fauna displays a number of characteristics typical of oceanic islands, including a high degree of endemism, ranging from 19% for the Azores (Borges *et al.*, 2005a), to 28% for Madeira (Borges *et al.*, 2008) and 45% for the Canary Islands (Izquierdo *et al.*, 2004).

As for marine life, several littoral species of marine fish have a distribution restricted to Macaronesia. These include the island grouper *Mycteroperca fusca* and the Madeira rockling *Gaidropsaurus guttatus* (shared with all the Macaronesia island groups) and the wrasse *Symphodus trutta* (shared between Madeira and the Canaries). Other group species, 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 *et al.*, 2012).

Like other isolated islands, the Azores have functioned as a natural evolutionary laboratory - most of the native plant species are living fossils, phylogenetically primitive, and related to, though divergent from, the preglacial flora of Europe (WWF, 2015d). This isolation, along with the very wet, mild climate, coupled with the general low altitude of their islands (with the exception of Pico's peak, 2,351 m), has given rise to an ecologically homogeneous system, impoverished in species diversity (Borges *et al.*, 2005).

This very same isolation, on the other hand, gave rise to a set of endemic species, of which most are terrestrial vertebrates (267 arthropods and 49 gastropods, many of them found only on one island) or vascular plants (68 vascular plants and 9 bryophytes) (Borges *et al.*, 2005b). The primitive terrestrial vertebrate fauna was composed exclusively by flying animals: marine birds (most of which oceanic, using the islands to nest in huge numbers), terrestrial birds and bats. Two endemic bird species are known today, both endangered: the widely-studied Azores bullfinch (*Pyrrhula murina*, EN) 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); the recently described Monteiro's storm-petrel (*Hydrobates monteiroi*, VU) (Bolton *et al.*, 2008) is classified as vulnerable due to its small population size (about 300 breeding pairs) and its restricted distribution (it is only known to breed on two islets, Baixo and Praia, situated off Graciosa Island) (BirdLife International, 2014). One of the species of bats in the Azores, *Nyctalus azoreum* (Salgueiro *et al.*, 2007), is also endemic. A recent paper (Rando *et al.*, 2013) describes an endemic species of owl (*Otus frutuosoi*), possibly extinct after human arrival. Birdlife International designates the Azores as a Secondary Endemic Bird *Area* (EBA) due to the presence of island canary (*Serinus canaria*), which is restricted to these islands, Madeira, and the Canary Islands. Breeding seabirds of the Azores comprise 5 species of Procellariiformes, 4 Charadriiformes, and 1 Pelecaniform, and include Fea's petrel (*Pterodroma feae*), Bulwer's petrel (*Bulweria bulwerii*), manx shearwater (Puffinus puffinus), little shearwater (*Puffinus assimilis baroli*) and two temporally-segregated forms of band-rumped storm-petrel (*Oceanodroma castro*) (Monteiro, 1999).

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 *et al.*, 2002).

Madeira Island stands out as the second biodiversity richest island in all Macaronesia, only surpassed by Tenerife in the Canary Islands (Borges *et al.*, 2008). The Madeira archipelago is outstanding diverse in total (ca. 7,450) and endemic (ca. 1,300) species, among those as much as 980 endemic arthropods, 210 endemic molluscs and 154 endemic vascular plants (Borges *et al.*, 2008). Insects and snail have received particular attention starting with naturalists in the XIXth century, but its species diversity is far from fully known. For arthropods (most of which are insects), for instance, the number of newly described species grows steeply as a function of time, suggesting that many more species await discovery. Presently, over 2,600 native species of arthropods are known, of which over 900 are endemic. An even higher percentage of endemism is recorded on the terrestrial molluscs, where two-thirds of the nearly 300 species and subspecies of are endemic. This is the highest rate of molluscan diversity of all Macaronesia, and one of the highest in the world (Abreu & Teixeira, 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).

Furthermore, Madeira shares as well an important number of endemic species with the Canaries, the so called Canarian-Madeiran endemic elements, mainly related with the Laurisilva flora (Sziemer, 2000). Some vascular plants strictly endemic to Madeira are, for example, *Polysticum 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). Also the Salvages Islands, despite its minimum size, harbour more than 50 endemic species, and many other Macaronesian endemisms shared either with Madeira, the Canaries or both (Borges *et al.*, 2008).

The native vertebrate fauna is composed of 26 species, most of which (19) are birds. Three of these are endemic to the archipelago (a pigeon, *Columba trocaz*, a petrel, *Pterodroma madeira*, 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). Besides, two-hundred ninety-five bird species and subspecies have been recorded from the archipelago, 42 of these breeding here (Zino *et al*, in WWF, 2015c). In fact, Madeira is 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 (BirdLife International, 2015).

Two other Madeiran endemic vertebrates are reptiles: a gecko and a small lizard (*Teira dugesii*, peculiar for having distinct sub-species in each of the 4 island groups).

The rich marine biodiversity of Madeira has clear affinities with the Mediterranean and the tropical and subtropical eastern Atlantic. 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 waters around Madeira there are numerous species of marine mammals, including several species of cetaceans and the Critically Endangered (CR) monk seal (*Monachus monachus*) (Cabral et al., 2005). Also, five species of marine turtles are believed to use these waters during their pelagic life stage. Additionnaly, deep water coral reefs grow at depths of 50 metres around the islands (Petit & Prudent, 2010).

The Canaries archipelago is one of the biologically-richest temperate zones in the world (Petit & Prudent, 2010). In these islands there are more than 12,500 terrestrial and 5,500 marine species in, or around, a land area of only 7,500 km2, from which about 3,800 species and 113 genera are endemic (Izquierdo *et al*., 2004), 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.).

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* (Francisco-Ortega *et al.*, 2010). 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 *Benchonia* genus) and which has been related to competition-mediated selection for higher stature, or selection for longevity in an environment depauperate of pollinators.

Island specific endemicity is even more spectacular in invertebrates, such as beetles and butterflies (Machado, 1998). The Geometridae family (*Lepidoptera*) contains approximately 50 percent endemicity. Other groups like *Orthoptera* and *Diptera* species are almost 45 percent and 40 percent endemic respectively (Machado, 1998). Regarding terrestrial invertebrates over 40% of the native species are endemic (Francisco-Ortega *et al.*, 2010). Insects are the major group, with nearly 6,000 native species and including 77 endemic genera (Francisco-Ortega *et al.*, 2010). Gastropods are also important: nearly 90% of the 214 native species are endemic, of which one genus alone, the Canarian snail genus *Hemicycla*, has 76 species (Francisco-Ortega *et al.*, 2010). The Arachnida (spiders, pseudo-scorpions and mites) are represented by approximately 800 native species, half of which are endemic (Francisco-Ortega *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 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 (*Fringilla teydea*), and Canary Islands kinglet (*Regulus teneriffae*). Berthelot's pipit (*Anthus berthelotii*), plain swift (*Apus unicolor*), and common canary (*Serinus canaria*) are near-endemic to the Canary Islands Dry Woodlands and Forests (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*) (Machado, 1998). The archipelago's ecoregion "Mediterranean Acacia-Argania Dry Woodland and Succulent Thicket" contains the endemic Furteventura 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. Others, mainly marine birds, use the archipelago as a nesting point only in the breeding season and after that return to the sea (WWF, 2015a). This is the case with species of shearwater, such as *Puffinus puffinus* (*Procellariidae*), which nest in gullies of laurisilva.

Non-flying vertebrates have the biggest difficulty in colonizing oceanic islands. For this reason, amphibians and freshwater fishes never colonized the Canary islands, and only 13 species of reptiles and one non-flying mammal are native, all of them endemic (Francisco-Ortega *et al.*, 2010). Eight species of bats complete the native vertebrate fauna. Atlantic Islands Pipistrelle (*Pipistrellus maderensis*) and Canary Big-eared bat (*Plecotus teneriffae*) are considered endemic to the Archipelago. Vertebrates, especially reptiles, went through an evolutionary radiation as species adapted to the varied island habitats. As a result, each island has 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. Both the Eastern Canary gecko and the Haria lizard (*Galiotia atlantic*), and its subspecies *G. a. atlantica*, are endemic to the two larger islands (Fuerteventura and Lanzarote) and associated smaller islets in the eastern Canaries (Clarke & Collins 1996, in WWF, 2015b). In addition, the white-toothed shrew (*Crocidura canariensis*, EN) is the only mammal endemic to the eastern Canary Islands (WWF, 2015b).

Apart from terrestrial species, the islands are also rich in marine reptiles and mammals. Loggerhead (*Caretta caretta*), green (*Chelonia mydas*) and leatherback turtles (*Dermochelys coriacea)* are common, and Kemp's ridley (*Lepidochelys kempi*), olive ridley (*L. olivacea*) and hawksbill turtles (*Eretmochelys imbricata*) are also sighted occasionally (WWF, 2015a). However, only the leatherback turtle has been reported to nest on the islands. The most comprehensively studied groups are the algae and the fish. The Canarian marine flora has approximately 700 species, including three species of sea grasses and approximately 16 endemic algal species (Francisco-Ortega *et al.*, 2010). There are about 730 native species of fish in the Canaries; none of the littoral fish are endemic, but several are shared with other Macaronesian archipelagoes and are not present in the continent (Francisco-Ortega *et al.*, 2010).

4. CONSERVATION OUTCOMES

4.1 Introduction

The Regional Ecosystem Profiles will build, in accordance with the CEPF Ecosystem Profile methodology, around the concepts of conservation outcomes and key biodiversity areas (KBAs).

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.

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.

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.

4.2 Species outcomes

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. According to the CEPF's methodology, species outcomes equate to globally threatened species 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 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. These locally threatened species that have not been assessed globally can be considered candidate species outcomes. On the other hand, endemic species, which were assessed according to the IUCN criteria in regional/national Red Lists as threatened species, may be taken into account. Indeed, if a species of a territory is threatened in a local Red List and it does not exist anywhere else, then this species is globally threatened. According to CEPF, it is only a matter of transcription that the species is not yet in the global Red List.

In theory, conservation outcomes can and should be defined for all taxonomic groups. The process 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. Additionaly, the knowledge and availability of geographical data on the distribution of species is still limited in the Macaronesian region.

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

A comprehensive database on the threatened Macaronesian species was developed to assist this process. Species outcomes in the Macaronesian region include 380 species that are globally threatened according to the IUCN Red List at present. In addition, 116 threatened endemic species, included in Local (regional and national) Red Lists using IUCN criteria (but not yet incuded in the Global Red List), were also listed. Local Red Lists and Assessments include the Red List of Vertebrades of Portugal (Cabral *et al.*, 2005); the Reference List of Azores' fauna (Eduardo Dias, 2010); the Red List of Spanish Vascular Flora (Moreno, 2008); Atlas and Red Book of the Threatened Briophytes of Spain (Garilleti *et al.*, 2012); Atlas of the Threatened Invertebrades of Spain (Verdú & Galante, 2009).

Table 4 summarizes the taxonomic breakdown of the 496 globally threatened species in the region, while the full list of threatened species is available online at http://goo.gl/CahYZT.

It must be stressed that there are deficiencies in the IUCN Red List with respect to the taxonomic representation in the region, especially on invertebrates (Cardoso *et al.*, 2012), bryophyte and algae that play a crucial role in islands' ecossystems. A note highlighted during the first round of workshops was precisely the need for further research on the "forgotten" biodiversity by the Global Red List.

Table 4 - Summary of Globally Threatened Species in Macaronesia

Taxonomic group	Global threat status				Distribution by archipelago		
	Total	VU	EN	CR	AZO	MAD	CAN
AVES	8	5	3	0	2	2	4
ARTHROPODA	43	16	16	11	2	5	36
MALACOSTRACA	1	1	0	0	1	1	1
MAMMALIA	11	2	8	1	8	7	10
MOLLUSCA	119	55	23	41	7	58	54
FISH	40	26	8	6	22	27	37
PLANTAE	265	64	90	111	42	38	189
REPTILIA	9	2	2	5	4	5	8
Total	496	171	150	175	88	143	339
Percentage	100%	34%	30%	35%	18%	29%	68%

Source: http://goo.gl/CahYZT

Of the 496 globally threatened species in the Macaronesian Islands, 339 (68 percent) occur in the Canary Islands, including 270 endemic; 143 (29 percent) occur in the Madeira archipelago, including 96 endemic; and 88 (18 percent) occur in the Azores, including 47 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.

Regarding the level of threat, it is worth noticing the high number of critically endangered species (35 percent), in relation to the other two categories, for most taxa with the exception of birds. 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.

Although the criterion "Threatened Species" has not yet been changed from to "Threatened Taxa" by the IUCN, subspecies were also considered in the list of threatened species, in the event that this change in the near future[6]. Threatened

[6] Under the original guidelines, sub-species (and other taxa below the level of species) do not trigger the KBA criteria, unless of course the species they belong to is itself a globally threatened (or locally endemic) species. However, under the consultation document on the new KBA standard, which was circulated by IUCN at the end of 2014, the A1 criterion has been changed from Threatened Species to Threatened TAXA. The proposed new language is

subspecies in Macaronesia include 2 birds and 36 plants. This includes the only critically endangered bird in Macaronesia, the "*Regulus regulus sanctae mariae*", an endemic subspecies to one island of the Azores.

4.3 Site outcomes

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. The most important criterion for defining these areas is the confirmed occurrence of one or more globally threatened species. In addition to the occurrence of globally threatened species, KBAs can also be defined on the basis of the occurrence of restricted-range species and congregatory species. 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. This latter criterion is more appropriate for continental regions (restricted range species are species that occur in a range no larger than 50,000) than for small islands, as it is the case of Macaronesia, much smaller than the defined range of 50,000 km^2 and with high levels of endemism.

The defined criteria and thresholds for the identification of KBAs of global importance are summarized on Table 5. Sites that do not meet these criteria and thresholds may qualify as *local* KBAs but cannot be considered as global KBAs.

The starting point for defining KBAs in the Macaronesian region is the network of Important Bird Areas (IBAs) in each archipelago, identified by BirdLife International, partners and collaborating organizations, starting in 1993. Sites for which such assessments exist qualify directly as KBAs. However, as many IBAs in the

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"At the global level, the taxa that can trigger or meet KBA sub-criterion A1 encompass species, subspecies, plant varieties, and isolated subpopulations" (CEPF).

Macaronesian region have been identified based on "Least concern" (LC) or "Near threatened" (NT) species only, it has been agreed with CEPF that only IBAs including also globally threatened trigger species should be considered as KBAs.

Table 5 - 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 of
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)

Completing the identification of site priorities requires supplementing the IBAs by including data for other taxonomic groups through analyses of regionally available data and literature, followed by consultation with local experts in the region.

The guiding principle for the delimitation of KBA is to consider "management units". Therefore, the distribution of species will be 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, protected areas include not only a network of areas protected under local legislation but 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.

At present, geographic information on the distribution of threatened species in the region is being 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). For Madeira, the information is being collected with the support from the governmental division on

Nature Conservation and Biodiversity and local experts. The criteria agreed among experts and databases' administrators to extract data from the databases were:

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 no lower than 500*500 m

A process of consultation among relevant stakeholders will follow to elicit review, refine boundaries, incorporate further species records, and capture contextual data on threats, conservation investments, etc.

In order to help discriminate among the large number of KBAs that will most likely be identified in the region, a biological prioritization process will be undertaken, using the methodology set out in Langhammer *et al.* (2007). This methodology is based upon the principles of irreplaceability and vulnerability. 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. 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). A final 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

While the biological prioritization of sites is an objective approach, it is limited by data availability and a reliance on global measures of conservation priority that may not necessarily have relevance for local stakeholders. Consequently, it will have to be supplemented by a more subjective prioritization, based on expert opinion, undertaken during the stakeholder consultations. The latter approach risks highlighting areas of interest to individuals or organizations, and tends to focus on better known areas at the expense of little known sites of genuine conservation importance. On the other hand, it also helps provide a more rounded assessment of conservation priority, and provides an opportunity to incorporate traditional ecological knowledge into the process. For these reasons, the results of the biological prioritization should be combined with the results of the stakeholder consultations to derive a final list of priority sites for conservation investment.

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Table 6 – 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)

4.4 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).

“Landscape species” - or “islandscape species” in the case of an archipelagic region such as Macaronesia - include those species with wide home ranges, low natural densities, migratory behaviour or other characteristics that make them unlikely to be conserved by site-based interventions alone (Sanderson *et al.*, 2001).

As the Macaronesia is an archipelagic region where continua of natural habitats extend from land areas and coastal zones and into nearshore and offshore marine areas, corridor outcomes could be defined in the form of “islandscapes”: groups of islands and their intervening marine areas. The reality in the region is that conservation at scales above that of the individual site is coordinated most effectively at the archipelago level. For this practical reason, archipelago ‘boundaries’ may be taken into consideration when delineating islandscape boundaries.

5. SOCIO-ECONOMIC CONTEXT

In Macaronesia, the islands (except Canary Islands) were uninhabited before the European colonizers arrived in the 15th century. Today the region has a high population density of 245 inhabitants per square kilometre, on average. With a population of about 2 million people (INE, 2014) , the Canary Islands are the most populated European overseas entity. They share with Madeira a population density of about 300 persons per square kilometre, standing among the highest densities in the EU. The lowest population density in Macaronesia is found in the Azores, with 106 persons per square kilometre (INE, 2012b). The small Desertas and Salvages archipelagos remain uninhabited by humans and protected as Nature Parks.

The region’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, surviving with the support of public and European subsidies.

The Canary islands are a very popular touristic destination, receiving over 12 million visitors a year (ISTAC, 2014). The Madeira archipelago, in turn, has been a tourist destination since the XIXth century and the tourist industry mobilized nearly one million visitors in 2013 (DREM, 2014b).

In the Azores, agriculture remains relevant, with great predominance of livestock and dairy production, with an annual production of over 500 million litters of milk (SREA, 2013), or 25% of Portuguese milk production. Fishing brings in revenues of about € 34 million for the region, with 14,000 tons of fish extracted (SREA, 2014) from an Exclusive Economic Zone of about a million km². The tourist industry is far less well-developed than those of Madeira or the Canary Islands, but is becoming the major service activity in the region: tourist infrastructure has grown markedly over the last 15 years, with the accommodation capacity nearly doubling between 2001 and 2011, reaching nearly 10,000 beds (SREA, 2013). In addition to this, the government of the Azores employs a large percentage of the population directly or indirectly in many aspects of the service and tertiary sectors.

The average GDP per capita in the region is € 16,558: Madeira archipelago stands with an annual income of 15,526 € (DREM, 2014a) (95% of the Portuguese average GDP/per capita), the Azores with € 14,927 (SREA, 2014) and the Canary Islands with € 19,312 (INE, 2013a) (86% of the Spanish average GDP/per capita).

Unemployment rates stand at 18,1% in Madeira (DREM, 2014a), 17% in the Azores (SREA, 2014) and 31% in the Canary Islands (ISTAC, 2015).

Table 7 – Macaronesian archipelagos: socio-economic facts and figures

	Macaronesia	Azores	Madeira	Canary Is.
Total population	2,597,212	246,772	267,785	2,082,655
Inhabitants/km^2	245	106	323	280
GDP/per capita (€)	16,558	14,927	15,526	19,312
Unemployment rate (%)	22	17	18	31

(DREM, 2014a; INE, 2012b, 2013a, 2014; ISTAC, 2015; SREA, 2014)

6. LEGAL AND POLITICAL CONTEXT

6.1 Overview of the Regional and National Political Situation

Azores and Madeira territories are an integral part of the Portuguese Republic, but both archipelagos have the special status of Autonomous Regions since 1976 within the otherwise unitary Portuguese State. The two archipelagos have their own government, legislative assembly and autonomous legislature within its own political-administrative statute and organic law.

The Azores includes an Economic Exclusion Zone (EEZ) of nearly one million Km², the largest of all Portugal. Its strategic location midway between North America and Europe contributed to a historical role in trans-Atlantic navigation.

The Canary Islands Canary form one of the 17 Spanish Autonomous Regions, divided into two administrative provinces. The capital of the Autonomous Community 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 province 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. In 1983, the first autonomous elections were held.

6.2 Global and Regional Agreements

In terms of Global Agreements, Portugal and Spain have concluded or ratified the main Treaties and Conventions on Nature and Biodiversity Conservation, such as the Convention on Biological Diversity (CBD), Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), Bern Convention on the Conservation of European Wildlife and Natural Habitats, Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) and Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention). Other policy instruments of direct importance for biodiversity of the region are the Man and Biosphere programme and the network REDBIOS, and at the EU level, the EC Birds and Habitats directives and the Natura 2000 network, and the EC Marine Strategy Framework Directive.

6.3 Environmental Policies and Legislation

Being part of the European Union, the three Macaronesian archipelagos have a comprehensive and consistent legislation on most environmental subjects (for example, pollution, water management and sewage, Environmental Impact Assessment (EIA), species and site protection, fisheries, and energy), which is among the most developed in the world, showing a proactive attitude on many issues. Additionally, its implementation is well advanced, and means and financial resources have been available.

Regarding policies and legislation on nature and biodiversity conservation, Macaronesia has an extensive network of protected areas designated under local legal frameworks (a total of 11,708,592 ha, from which over 90% are marine sites in the Azores) and Natura 2000 sites cover more than a third of the total land area in this region. Macaronesia also accounts for 121 Important Bird Areas (IBAs), 11 Biosphere Reserves, 14 Ramsar sites and 8 OSPAR areas. The full list of areas under various protection status has been compiled and is available online and is summarized in Table 8.

All three Macaronesian archipelagos are covered by the Natura 2000 network, the largest network of protected areas in the world. The legal basis for Natura 2000 comes from the Birds Directive and the Habitats Directive, which form the backbone of the EU's internal biodiversity policy. Under the Birds Directive (Directive 92/43/EEC), Member States are required to designate 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” (SIC), which, once adopted, should be designated as “Special Areas of Conservation” (SAC)

As such, the core of the protected areas in the Azores was set up for the Natura 2000 network and comprises 3 SICs, 23 SACs and 15 SPAs, totalling respectively 307 km^2, 336 km^2 and 162 km^2 (DRAA, 2014). These areas, and others designated under regional, national or international frameworks (such as the Ramsar Convention and the Man and Biosphere UNESCO Programme) are managed under a recent (2012) scheme of Nature Parks, one per island. Protected areas cover 561 km^2 on land (24 % of the terrestrial area of the archipelago) and 1,242 km^2 of the coastal sea (DRAA, 2014). An additional management figure is that of the Azores Marine Park. It covers 111,393 km^2 of offshore waters (DRAA, 2014), including seven areas located within the Azorean Economic Exclusive Zone (EEZ) and four others located in areas beyond Portuguese jurisdiction but subject to continental shelf extension claims (Calado *et al.*, 2011). In addition to protected areas, there are 3 Azorean islands totally classified as UNESCO Biosphere Reserves.

Table 8 – Regional protected areas and Natura 2000 sites in Macaronesia

	AZO		MAD		CAN		MACARONESIA	
	Nº	Area (ha)	Nº	Area (ha)	Nº	Area (ha)	Nº	Area (ha)
Protected areas - total	**134**	**11 319 551**	**6**	**70 054**	**146**	**318 986**	**286**	**11 708 592**
IUCN - I	24	533 804	0	0	11	7 474	35	541 278
IUCN - Ia	0	0	3	21 273	0	0	3	21 273
IUCN - Ib	0	0	2	4 385	0	0	2	4 385
IUCN - II	0	0	0	0	15	143 794	15	143 794
IUCN - III	10	733	0	0	52	29 812	62	30 545
IUCN - IV	53	10 650 880	0	0	34	15 506	87	10 666 386
IUCN - V	16	26 612	0	0	27	39 000	43	65 612
IUCN - VI	31	107 522	0	0	0	0	31	107 522
IUCN - V, VI	0	0	0	0	7	83 401	7	83 401
several	0	0	1	44 396	0	0	1	44 396
Natura 2000 sites - total	**41**	**n.a.**	**16**	**245 195**	**231**	**1 403 970**	**288**	**n.a.**
SCI	3	30 660	0	0	0	0	3	30 660
SAC	23	33 569	11	50 022	177	463 236	211	546 827
SPA	15	16 189	5	221 919	54	1 237 340	74	1 475 448
IBA	**42**	**948 459**	**10**	**152 917**	**69**	**510 004**	**121**	**1 611 380**
BIO	**3**	**97 025**	**1**	**15 218**	**7**	**771 393**	**11**	**883 636**
RAM	**13**	**12 900**	**0**	**0**	**1**	**127**	**14**	**13 027**
OSP	**8**	**569 999**	**0**	**0**	**0**	**0**	**8**	**569 999**

Source:
https://docs.google.com/spreadsheets/d/1ljlgeSljRk8B3PbMf3hOi_FlzI8jJlKIPwb1l-a8TN4/edit#gid=40982630

The archipelago of Madeira has 16 Natura 2000 sites extended by 2,452 km^2 (SPNM, 2014): a network of 11 SAC and 5 SPA, with their respective management plans, has been set up since 2002. 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 (SPNM, 2014) and 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 network of marine protected areas). The Nature Park and the Nature Reserves cover 701 km^2 that partially overlap the Natura 2000 sites. Today, 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 is spread across the 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.

In the Canary Islands, 146 areas are safeguarded in a network 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 southeastern sector of El Hierro, and the southwestern coast of La Palma.

In addition to the protected area instrument, national and regional 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. Recent changes in the Canarian catalogue of protected species have prompted critics from biodiversity experts (Fernández-Palacios & de Nascimento, 2011) which have since been addressed.

Besides legislation on protected areas, the Macaronesia is covered by EU Biodiversity Policy Development as well. The EU is committed to the protection of biodiversity and to halting biodiversity loss within the EU by 2020. Thus, on May 3 2011, the European Commission adopted a new strategy to halt the loss of biodiversity and ecosystem services in the EU by 2020, in line with two commitments made by EU leaders in March 2010 – 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 - and a vision for 2050: "by 2050, European Union biodiversity and the ecosystem services it provides – its natural capital – are protected, valued and appropriately restored for biodiversity's intrinsic value and for their essential contribution to human wellbeing and economic prosperity, and so that catastrophic changes caused by the loss of biodiversity are avoided". The strategy is also in line with the global commitments made in Nagoya in October 2010, in the context of the Convention on Biological

Diversity, where world leaders adopted of a package of measures to address global biodiversity loss over the coming decade.

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. The new regulation foresees three types of interventions: prevention, early warning and rapid response, and management. A list of invasive alien species of Union concern will be drawn up and managed with Member States using risk assessments and scientific evidence.

7. CURRENT STATUS OF THE CONSERVATION COMMUNITY

8. THREATS AND PRESSURES ON BIODIVERSITY

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. The native laurel forest occupies presently only 12,5% of its primitive range (Fernández ‐ Palacios *et al.*, 2011), having been nearly wiped out from the Azores and the Canaries. The best remaining examples are found in Madeira and La Gomera (Canaries).

In the Azores, the primitive forest is presently reduced by 95% (Gaspar *et al.*, 2008) and restricted to small, fragmented patches on the summits of only 4 islands, but some of the endemic species that composed it or lived within it can be found in other habitats as well. All the mid and low altitude land had been converted to agriculture or urbanized by the beginning of the XIXth 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 after Portugal's entry into the European Union in 1986 and subsequent availability of agricultural subsidies, grants, and quotas. Aided by subsidies from the Common Agriculture Policy, large areas of pastures became the norm in low altitudes, especially in two of the largest islands, creating "green deserts" of low biodiversity. 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. 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).

Native vegetation that has escaped clearing for pasture is still threatened by introduced species such as Japanese red cedar (*Cryptomeria japonica*), the Incenso tree (*Pittosporum undulatum*), kahili ginger (*Hedychium gardnerianum*), Hottentot fig (*Carpobrotus edulis*), *Gunnera tinctoria*, and *Clethra arborea* (native to Madeira Island) (WWF, 2015d). It is estimated that, today, approximately 70 per cent of the vascular plants and 58 per cent of the arthropods found in the Azores are exotic, many of them invasive (Ladle & Whittaker, 2011).

As a result, the current major vegetation habitats across the archipelago comprise native forest, exotic forest, seminatural pasture, and intensively managed pasture (K.A. Triantis *et al.*, 2010b). Breeding seabird populations on the Azores are believed to have also declined dramatically since the time of human settlement. The main islands were once important breeding places, but now most sites are restricted to small islets or precipitous cliffs, probably due to predation by introduced mammals (Monteiro, 1999).

The discovery and colonization of the Madeira archipelago by the Portuguese in the XVth century was equally accompanied by a wave of deforestation, intensive hunting and introduction of exotic species. All the available low and mid altitude land was either used for agriculture and urban settling or explored for timber. 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 (EC, 2010).

Today, Madeira's native vegetation is currently threatened by invasive species, mismanagement of pastures and grazing, and tourism development. 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 highlands of Madeira Island, grazing was the main threat to the native vegetation, but restrictions beginning in the early XIXth century and culminating in a recent total ban give hope of restricting the degradation trend. Reforestations with non-native species, *Pinus pinaster* and *Eucalyptus globulus*, are widespread at mid-altitudes (WWF, 2015c).

The human intervention on the Madeira ecosystems was also negatively reflected on the native terrestrial fauna, although the information available is deficient. Fossil records exist for molluscs and birds. They show that 9 terrestrial molluscs disappeared in the 600 years since human colonization (Goodfriend *et al.*, 1994), and also that the archipelago of Madeira was inhabited by endemic birds (at least three flightless rails, two quails, a scops owl, and several passerines) that probably went extinct after human arrival (Pieper, 1985). The inconspicuousness of most arthropod species and the lack of standardized population studies make it difficult to establish their conservation status. Many, however, have not been found since they were described from laurel forests in the XIXth century. The Laurisilva area was much larger then that it is today, leading researchers to fear that some of these described but never seen again species may have in fact disappeared.

The information available for the marine species and habitats is even scarcer, but there are indications of impacts, including those related to intensive fishing. One of them are the wide areas deprived of the typical macro algae which characterize the temperate rocky reefs of the Madeira littoral (Alves, 2001). This situation, particularly marked on the south coast, is 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.

A similar process took place in the island of Porto Santo, which today is almost completely humanized.

In the Canaries, direct destruction of habitats, over-exploitation of resources and invasive species are the three principal past and present threats to the biological diversity of the islands (Petit & Prudent, 2010).

Since the arrival of the first pre-Hispanic population to the Canary Islands, the Canarian biota has been extensively modified. It is believed that the pre-Hispanic inhabitants drove to extinction endemic species such as *Gallotia goliath, Coturnix gomerae, Puffinus olsoni* (Francisco-Ortega et al., 2010). Early settlers introduced goats, dogs and pigs. Shortly after the arrival of the first Europeans, land was heavily cleared for both urban and agricultural development. 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. More recently, the coastal zones have been the main focus of human development, namely urban/tourism development and road construction. The vegetation of the dunes and coastal Tamarix forests have been destroyed or fragmented by urban and tourist development, especially after the 1970s. The low-lying euphorbia shrubs have been damaged by pasture and urban development. Similarly, the sclerophyllus woods (thermophilous forest) have seen their surface areas considerably diminished, because of their proximity to human settlements. The pine forests, for their part, are very vulnerable to fires. Accidentally and intentionally set for livestock grazing, crop planting, timber and real estate speculation, fires have also dramatically reduced forests in the last decades. Over-exploitation of the forests for wood has had a major impact on these ecosystems in the past. Just about all the thermophilous forests and a large section of the Laurel forest have been lost to massive deforestation. The pine forests, for their part, have been able to regenerate thanks to reforestation programmes (Petit & Prudent, 2010).

The biodiversity of the Canaries has also been damaged by the introduction of alien species, which threaten local taxa with foreign diseases, hybridization risks, competition and predatory effects. The rate of introduction has increased since the abolition of border controls following the entry into force of the Schengen Accords

(Petit & Prudent, 2010) about 20 years ago. Among these alien species are the Barbary ground squirrel (*Atlantoxerus getulus*), which has decimated numerous plant species on the island of Fuerteventura, and the very aggressive Argentine ant (*Linepithema humile*), whose rapidly growing colonies are pushing out indigenous ants and other insects from their habitats (Petit & Prudent, 2010). Among vascular plants, it is estimated that over 400 species introduced by humans (approximately 32% of the flora) are currently established and naturalized in the Canarian ecosystems (e.g. *Opuntia dillenii, O. maxima, Agave Americana, Ageratina adenophora, Tradescantia fluminensis,* Eschscholzia *californica) (Francisco-Ortega et al., 2010).* Several species have recently been considered extinct in the wild, such as *Solanum nava*, *Kunkelliela psilotoclada, Viola plantaginea, Helianthemum cirae, Monachus monachus*, *Haematopus meadewaldoi.* (Francisco-Ortega et al., 2010).

9. ASSESSMENT OF CURRENT INVESTMENTS

As already described in chapter 6.3, there has been an effort in each of the archipelagos to establish an official system of protected areas and Natura 2000 sites with an integral government conservation policy and strategy. All the Madeira Laurisilva is completely included within the boundaries of the Madeira Natural Park. In addition, through the UNESCO programme MaB (Man and Biosphere) a total of 11 reserves have been declared in Macaronesia. Other activities carried out by the governments have also been implemented to halt biodiversity loss. In the Azores, for example, the University of Azores and Faial Island Botanical Garden have done much to collect and study native and endemic flora of the islands, and also propagate certain plants in project sites (Pereira et al. 1998).

At the European scale, many 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. LIFE Nature and Biodiversity (and former LIFE+ Nature & Biodiversity strand) co-finance action grants for best practice, pilot and demonstration projects that contribute to the implementation of the Birds and Habitats Directives Directives and the Union Biodiversity Strategy to 2020, and the development, implementation and management of the Natura 2000 network. 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, 22 in the Madeira archipelago and 29 in the Canary Islands (EC, 2015). Accomplishments thus far include recovery plans and 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*) and others. A number of marine projects have been conducted including measures for the recovery of the monk seal (*Monachus monachus*) in the Atlantic and support projects for the conservation of the loggerhead turtle (*Caretta caretta*) and the bottlenose dolphin (*Tursiops truncatus*).

Some of the ongoing LIFE projects in the Macaronesian region are briefly described below:

- LIFE *Terras do Priolo*: a partnership between SPEA (a Portuguese NGO, partner of Birdlife International) and the Azores government dedicated to the study and conservation of *Pyrrhula murina*, an endemic bullfinch to the Azores. Conservation projects involving this species have been running since 2003. The current project counts with a budget of € 3.363.260 and lasts for 5 years (2013-2018). Among the main activities involved are planning actions for the recovery and management of the bullfinch's habitat; production of native plants; control of predators; evaluation of new threats; improvement of the visitation area and monitoring of its impact. Main results of previous projects are the enlargement of the SPA "*Pico da Vara/Ribeira do Guilherme*", the natural habitat of the species, and the transition of the species from "CR" to "EN" in the IUCN's Red List. Expected results for the current project include the 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; the 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+Rabiche: Expansion of the range of the white-tailed laurel pigeon (*Columba junoniae*) by re-introducing it to the island of Gran Canaria. The € 1,401,870€ project will take place from 2013 to 2017 and its main activities are the development of management and action plans; conservation actions; monitoring the impact of the project actions; public awareness and dissemination of results. The expected results include the captive breeding and release on Gran Canaria of 15-30 white-tailed laurel pigeons per year; the 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; and raised awareness amongst local people of the laurel forests
- LIFE Madeira Monk Seal: Mediterranean monk seal conservation in Madeira and development of a conservation status surveillance system. A project for the conservation of the monk seal (*Monachus monachus*) and its habitat started in 1988 and has been extended through several strategies for the conservation of the species and recently by the current LIFE project. The budget attributed for the 4 year project (2014-2018) is € 1,143,364. Main activities are *in situ* protection; monitoring and studying of the monk seal; environmental education. Results achieved from previous projects and strategies include the recovery of the only surviving Macaronesian population of the monk seal, a critically endangered species with an overall declining trend (presently, the Nature Reserve shelters 30-35 adults, from a low point of 6-8 individuals in 1980) and the creation of a Nature Reserve, specifically to protect the monk seal.

Still in the context of the European Union, there is an important cooperation between the Canaries and the Madeira and Azores islands supported by EU programmes, namely the INTERREG III-B 2000-2006 Community Initiative

Programme and the Transnational Cooperation Programme Madeira-Açores-Canarias (MAC) 2007-2013.

The INTERREG initiative is designed to strengthen economic, social and territorial cohesion in the European Union by promoting cross-border, transnational and interregional cooperation. INTERREG was launched as INTERREG I for the programming period 1989-1993, and continued moving on for following periods. INTERREG VC Interregional is currently operational, covering 2014-2020. INTERREG differs from the majority of Cohesion Policy programmes in one important respect: it involves collaboration among authorities 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.

Likewise the INTERRREG initiative, 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 Program MAC and its predecessor INTERREG III B have been regarded as successful programmes 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 *et al.*, 2011).

Some examples of initiatives funded by European Commission INTERREG Funds, are the following projects:

- Bionatura: management and Conservation of Macaronesian Biodiversity which main objective was the production of a priority species list and a list of the most important exotic species in Macaronesia;
- MACETUS: creation of a Macaronesian Network for the study of cetaceans;
- Atlantico: a database of the Macaronesian Biodiversity that improves access to biodiversity information for decision-making;
- BASEMAC: an ex-situ conservation project for the threatened endemic species of Madeira, Azores and Canary Islands;
- OGAMP: planning and Management of Marine Protected Areas to promote the Integrated Coastal Zone Plans for those marine and coastal areas included in Natura 2000 network;
- Reia-Mac: network of Environmental Education and Information Centres in Madeira, Azores and the Canary islands.

10. NICHE FOR INVESTMENT

11. INVESTMENT STRATEGY

12. SUSTAINABILITY

13. CONCLUSION

ACCRONYMS AND ABBREVIATIONS

BEST	Voluntary Scheme for Biodiversity and Ecosystem Services in Territories of European Overseas
CBD	Convention on Biological Diversity
CEPF	Critical Ecosystem Partnership Fund
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CSO	Civil Society Organizations
EBA	Endemic Bird Area
EES	European Economic Space
EEZ	Exclusive Economic Zone
EU	European Union
IBA	Important Bird Area
IUCN	International Union for Conservation of Nature
KBA	Key Biodiversity Area
OCT	Overseas Countries and Territories
OR	Outermost Regions
SAC	Special Area of Conservation
SIC	Site of Community Importance
SPA	Special Protection Area for birds
WWF	World Wide Fund for Nature

REFERENCES

Abreu, C., & Teixeira, D. (2008). The Molluscs (Mollusca) of the Madeira and Selvagens Archipelagos *In P.A.V. Borges, C. Abreu, A.M.F. Aguiar, P. Carvalho, R. Jardim, I. Melo, P. Oliveira, C. Sergio, A.R.M. Serrano, P. Vieria (eds). A list of terrestrial fungi, flora and fauna of Madeira and Salvages archipelagos*. Funchal and Angra do Heroismo: Direcção Regional do Ambiente da Madeira and Universidade dos Açores.

Aguin-Pombo, D., & Carvalho, M. A. A. P. d. (2010). Madeira Archipelago *In R. Gillespie & D. Clagu (Eds.), Encyclopedia of Islands* (pp. 582-585). California: University of California Press.

Almada, V., Almada, F., Henriques, M., Santos, R. S., & Brito, A. (2002). On the phylogenetic affinities of Centrolabrus trutta and Centrolabrus caeruleus (Perciformes: Labridae) to the genus Symphodus: molecular, meristic and behavioural evidences. *Arquipelago, Life and Marine Sciences, 19A*, 85-92.

Alves, F., Chícharo, L. M., Serrao, E., & Abreu, A. D. (2001). Algal cover and sea urchin spatial distribution at Madeira Island (NE Atlantic). *Scientia Marina, 65*(4), 383-392.

Ávila, S. P., Goud, J., & Frias Martins, A. M. (2012). Patterns of diversity of the Rissoidae (Mollusca: Gastropoda) in the Atlantic and the Mediterranean region. *The Scientific World Journal, 2012*.

BirdLife International (2014). Species factsheet: Hydrobates monteiroi. http://www.birdlife.org/datazone/speciesfactsheet.php?id=32544. Accessed on 7 August 2014.

BirdLife International (2015). Endemic Bird Area factsheet: Madeira and the Canary Islands. http://www.birdlife.org. Accessed on 11 January 2015.

Bolton, M., Smith, A. L., Gómez-Dí−az, E., Friesen, V. L., Medeiros, R., Bried, J., Roscales, J. L., & Furness, R. W. (2008). Monteiro's Storm‐petrel Oceanodroma monteiroi: a new species from the Azores. *Ibis, 150*(4), 717-727.

Borges, P. A. V., Abreu, C., Aguiar, A. M. F., Carvalho, P., Jardim, R., Melo, I., Oliveira, P., Sergio, C., Serrano, A. R. M., Vieria, P., & (eds) (2008). A list of terrestrial fungi, flora and fauna of Madeira and Salvages archipelagos. Direcção Regional do Ambiente da Madeira and Universidade dos Açores. Funchal and Angra do Heroismo. 440 pp.

Borges, P. A. V., Azevedo, E. B., Borba, A., Dinis, F. O., Gabriel, R., & Silva, E. (2004). Ilhas oceânicas *In: Pereira, H.M, T. Domingos, and L. Vicente (Eds.) Ecossistemas e Bem-Estar Humano: Resultados da Avaliação para Portugal do Millennium Ecosystem Assessment*: Centro de Biologia Ambiental, Faculdade de Ciências da Universidade de Lisboa.

Borges, P. A. V., Bried, J., Costa, A., Cunha, R., Gabriel, R., Gonçalves, V., Martins, A. F., Melo, I., Parente, M., Raposeiro, P., Rodrigues, P., Santos, R. S., Silva, L., Vieira, P., Vieira, V., Mendonça, E., & Boieiro, M. (2010). Description of the terrestrial and marine biodiversity of the Azores *In: P.A.V Borges, A. Costa, R. Cunha, R. Gabriel, V. Gonçalves, A.F. Martins, I Melo, M. Parente, P. Raposeiro, P. Rodrigues, R.S. Santos, L. Silva, P. Vieira & V. Vieira (Eds.) A list of the terrestrial and marine biota from the Azores* (pp. pp. 9-33). Cascais: Princípia.

Borges, P. A. V., Cunha, R., Gabriel, R., Martins, A. F., L. Silva, L., Vieira, V., & (eds) (2005a). A list of terrestrial fauna (Mollusca and Arthropoda) and flora (Briophyta, Pteridophyta and Spermatophyta) from the Azores. Direcção Regional do Ambiente and Universidade dos Açores. Horta, Angra do Heroismo and Ponta Delgada.

Borges, P. A. V., Cunha, R., Gabriel, R., Martins, A. F., Silva, L., Vieira, V., Dinis, F., Lourenço, P., & Pinto, N. (2005b). Description of the terrestrial Azorean biodiversity *In: A list of the terrestrial fauna (Mollusca and Arthropoda) and flora (Bryophyta, Pteridophyta and Spermatophyta) from the Azores (eds). P.A.V. Borges, R. Cunha, R. Gabriel, A.M.F. Martins, L. Silva, & V. Vieira)* (pp. pp. 21-68). Horta, Angra do Heroísmo and Ponta Delgada: Direcção Regional de Ambiente and Universidade dos Açores.

Borges, P. A. V., & Hortal, J. (2009). Time, area and isolation: Factors driving the diversification of Azorean arthropods. *J. Biogeogr., 36*, 178-191.

Cabral, M. J., (coord.), Almeida, J., Almeida, P. R., Dellinger, T., Almeida, N. F. d., Oliveira, M. E., Palmeirim, J. M., Queiroz, A. I., Rogado, L., Santos-Reis, M., & (eds.) (2005). *Livro Vermelho dos Vertebrados de Portugal*. Lisboa: Instituto da Conservação da Natureza.

Calado, H., Ng, K., Lopes, C., & Paramio, L. (2011). Introducing a legal management instrument for offshore marine protected areas in the Azores—The Azores Marine Park. *Environmental Science & Policy, 14*(18), 1175-1187.

Cardoso, P., Borges, P. A. V., Triantis, K. A., Ferrández, M. A., & Martín, J. L. (2012). Letter to the Editor. The underrepresentation and misrepresentation of invertebrates in the IUCN Red List. *Biological Conservation, 149*, 147–148.

Ceia, R. S., Ramos, J. A., Heleno, R. H., Hilton, G. M., & Marques, T. A. (2011). Status assessment of the critically endangered Azores bullfinch Pyrrhula murina. *Bird Conservation International, 21*(4), 477-489.

CEPF (2015). Critical Ecosystem Partnership Fund. http://www.cepf.net. Accessed on 11 January 2015.

Climate Atlas (2012). Climate atlas of the archipelagos of the Canary Islands, Madeira and the Azores. The Meteorological State Agency of Spain and the Institute of Meteorology, Portugal. http://www.aemet.es/documentos/es/conocermas/publicaciones/2Atlas_climatologico/Atlas_Clima_Macaronesia___Baja.pdf

Cooper, G., Benzaken, D., Collin, A., Renard, Y., & Tyack, O. (2011). Regional Perspective on Future Directions for Biodiversity Action in Europe Overseas: Outcomes of the Review of the implementation of the Convention on Biological Diversity. IUCN. Gland, Switzerland. ix+38 pp.

Cropper, T. E., & Hanna, E. (2014). An analysis of the climate of Macaronesia, 1865–2012. *International Journal of Climatology, 34(3)*, 604-622.

Dias, E. (2010). Lista de Referência da Flora dos Açores: Herbário da Universidade dos Açores (AZU). Departamento de Ciências Agrárias. Universidade dos Açores.

Dias, E., Elias, R. B., Melo, C., & Mendes, C. (2007). Biologia e ecologia das florestas das ilhas. Açores. *In: Açores e Madeira. A floresta das ilhas (ed.J.Sande Silva)* (pp. 51-80): Fundação Luso Americana / Público / Liga para a Protecção da Natureza.

DRAA (2014). [Direcção Regional do Ambiente dos Açores - personal communication].

DREM (2014a). Anuário Estatístico da Madeira 2013. Direção Regional de Estatística da Madeira. Funchal.

DREM (2014b). Estatísticas do Turismo da Região Autónoma da Madeira. Resultados definitivos Ano 2013. Direção Regional de Estatística da Madeira.

Dudley, N., Boucher, J. L., Cuttelod, A., Brooks, T. M., Langhammer, P. F., & (Eds.) (2014). Applications of Key Biodiversity Areas: End-user consultations. IUCN Cambridge. United Kingdom and Gland, Switzerland.

EC (2010). European Commission - Press Release Database. http://europa.eu/rapid/press-release_IP-10-1205_en.htm. 2015.02.05.

EC (2015). European Commission - Environment LIFE Programme. http://ec.europa.eu/environment/life/project/Projects/index.cfm

Emerson, B. C. (2002). Evolution on oceanic islands: molecular phylogenetic approaches to understanding pattern and process. *Molecular ecology, 11*(6), 951-966.

Fernández-Palacios, J. M. (2010). The islands of Macaronesia (chapter 1) *In Artur R. M. Serrano, Paulo A. V. Borges, Mário Boieiro, Pedro Oromí (eds.), Terrestrial Artrhropods of Macaronesia - Biodiversity, Ecology and Evolution*

Fernández-Palacios, J. M., & de Nascimento, L. (2011). Fernández-Palacios, J. M., & de Nascimento, L. (2011). Political erosion dismantles the conservation network existing in the Canary Islands. Frontiers of Biogeography, 3(3). *Frontiers of Biogeography, 3*(3).

Fernández-Palacios, J. M., Otto, R., Delgado, J. D., Arévalo, J. R., Naranjo, A., González-Artiles, F., Morici, C., & Barone, R. (2008). Los bosques termófilos de Canarias. Proyecto LIFE04/NAT/ES/000064. Santa Cruz de Tenerife. 192

Fernández‐Palacios, J. M., Nascimento, L. d., Otto, R., Delgado, J. D., García‐del‐Rey, E., Arévalo, J. R., & Whittaker, R. J. (2011). A reconstruction of Palaeo‐Macaronesia, with particular reference to the long‐term biogeography of the Atlantic island laurel forests. *Journal of Biogeography, 38(2)*, pp. 226-246.

Francisco-Ortega, J., Santos-Guerra, A., & Bacallado, J. J. (2010). Canary Islands, Biology *In R. Gillespie & D. Clagu (Eds.), Encyclopedia of Islands* (pp. 127-133). California: University of California Press.

Garilleti, R., Albertos, B., & (Coord.). (2012). Atlas y Libro Rojo de los Briofitos Amenazados de España (pp. 288). Madrid: Organismo Autónomo Parques Nacionales.

Gaspar, C., Borges, P. A. V., & Gaston, K. J. (2008). Diversity and distribution of arthropods in native forests of the Azores archipelago. *Arquipél Life Mar Sci, 25*, 1-30.

González, M. N., Rodrigo, J. D., & Suárez, C. (1986). *Flora y Vegetación del Archipiélago Canario*: EDIRCA S.L.

Goodfriend, G. A., Cameron, R. A. D., & Cook, L. M. (1994). Fossil evidence of recent human impact on the land snail fauna of Madeira. *Journal of Biogeography, 21*, 309-320.

Governo dos Açores (2014). Diretiva Quadro Estratégia Marinha – Subdivisão Açores. Versão Consulta Pública. http://servicos-sraa.azores.gov.pt/grastore/DRAM/DQEM/DQEM_Final_Acores.pdf. Downloaded on 18 September 2014.

INE (2012a). Censos 2011 Resultados definitivos - Região Autónoma da Madeira. http://estatistica.gov-madeira.pt/jdownloads/Social/Populao e Condies Sociais/Censos/Censos_Publicaes/pdf_-_censos_2011_ram.pdf. Downloaded on 10 September 2014.

INE (2012b). Censos - Resultados definitivos - Região Autónoma dos Açores - 2011. http://censos.ine.pt/xportal/xmain?xpid=CENSOS&xpgid=ine_censos_publicacao_det&contexto=pu&PUBLICACOESpub_boui=156658963&PUBLICACOESmodo=2&selTab=tab1&pcensos=61969554%3E. Donloaded on 13 September 2014.

INE (2013a). Cuentas Económicas. Contabilidad Regional de España. http://www.ine.es/jaxi/menu.do?type=pcaxis&path=%2Ft35%2Fp010&file=inebase&L=0

INE (2013b). Produto interno bruto por NUTS III (preços correntes, anual). http://www.ine.pt/xportal/xmain?xpid=INE&xpgid=cn_quadros&boui=95392006. Accessed on 10 September 2014.

INE (2014). http://www.ine.es. Acessed on 5 September 2014.

ISTAC (2014). FRONTUR-Canarias/ Series mensuales de entradas de turistas y excursionistas. Islas de Canarias. 2009-2014 http://www.gobiernodecanarias.org/istac/jaxi-istac/menu.do?uripub=urn:uuid:6b42b90e-b71f-41a5-b2e6-363e854bfdc9

ISTAC (2015). Indicadores de Coyuntura Económica. Empleo. http://www3.gobiernodecanarias.org/istac/dw/indicadores/coyunturaeconomica/verTablaSimple.jsp

Izquierdo, I., Martín, J. L., Zurita, N., Arechavaleta, M., & (eds) (2004). Lista de especies silvestres de Canarias (hongos, plantas y animales terrestres). Consejería de medio ambiente y ordenación territorial, Gobierno de Canarias. Santa Cruz de Tenerife.

Ladle, R. J., & Whittaker, R. J. (2011). *Conservation Biogeography*. Oxford: Wiley-Blackwell.

Langhammer, P. F., Bakarr, M. I., Bennun, L. A., Brooks, T. M., Clay, R. P., Darwal, W., Silva, N. D., Edgar, G. J., Eken, G., Fishpool, L. D. C., Fonseca, G. A. B. d., Foster, M. N., Knox, D. H., Matiku, P., Radford, E. A., Rodrigues, A. S. L., Salaman, P., Sechrest, W., & Tordoff, A. W. (2007). *Identification and Gap Analysis of Key Biodiversity Areas: Targets for Comprehensive Protected Area Systems*. Gland, Switerzland: IUCN.

Machado, A. (1998). Biodiversidad. Un paseo por el concepto y las Islas Canarias. . Ed. Cabildo Insular de Tenerife.

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.

Monteiro, L. R., Ramos, J. A, Pereira, J. C, Monteiro, P. R, Feio, R. S, Thompson, D. R, Bearhop, S, Furness, R. W, Laranjo, M, Hilton, G, Neves, V. C, Groz, M. P, Thompson, K. R. (1999). Status and distribution of fea's petrel, bulwer's petrel, manx shearwater, little shearwater and band-rumped storm-petrel in the azores archipelago. *Waterbirds, 22*, 358-366.

Moreno, J. C., coord. (2008). Lista Roja 2008 de la flora vascular española. Dirección General de Medio Natural y Política Forestal (Ministerio de Medio Ambiente, y Medio Rural y Marino, y Sociedad Española de Biología de la Conservación de Plantas). Madrid. 86 pp.

Morton, B., & Britton, J. C. (2003). The origins of the coastal and marine flora and fauna of the Azores. *Oceanography and Marine Biology: an Annual Review, 38*, 13-84.

Petit, J., & Prudent, G. (2010). Climate Change and Biodiversity in the European Union Overseas Entities. Reprint, Gland, Switzerland and Brussels, Belgium: IUCN. 192 pp.

Pieper, H. (1985). The fossil land birds of Madeira and Porto Santo. *Bocagiana, 88*, 1-6.

Quintal, R. (2013). *Pico do Areeiro - Ilha da Madeira. Uma experiência de recuperação da biodiversidade.*: Biblioteca Pública Regional.

Rando, J. C., Alcover, J. A., Olson, S. L., & Pieper, H. (2013). A new species of extinct scops owl (Aves: Strigiformes: Strigidae: Otus) from São Miguel Island (Archipelago of Azores, North Atlantic Ocean). *Zootaxa, 3647*, 343–357.

Salgueiro, P., Ruedi, M., Coelho, M. M., & Palmeirim, J. M. (2007). Genetic divergence and phylogeography in the genus Nyctalus (Mammalia, Chiroptera): implications for population history of the insular bat Nyctalus azoreum. *Genetica, 130*(2), 169-181.

Sanderson, E. W., Redford, K. H., Vedder, A., Coppolillo, P. B., & Ward, S. E. (2001). A conceptual model for conservation planning based on landscape species requirements. *Landscape and Urban Planning, 878*, 1-16.

Schwartz, M. W. (1999). Choosing the appropriate scale of reserves for conservation. *Annual Review of Ecology and Systematics, 30*, 83-108.

Sea Around Us Project (2014). http://www.seaaroundus.org. Accessed on 16 September 2014.

Segers, W., Swinnen, F., & Prins, R. D. (2009). *Marine Molluscs of Madeira*. Heule, Belgium: Snoeck Publishers.

Serviço do Parque Natural da Madeira (2014). Áreas Classificadas na Região Autónoma da Madeira. http://www.aemet.es/documentos/es/conocermas/publicaciones/2Atlas_climatologico/Atlas_Clima_Macaronesia___Baja.pdf. Acessed on 15 July 2014.

SPNM (2014). Serviço do Parque Natural da Madeira - personnal communication.

SREA (2012). Anuário Estatístico Açores 2012, III.1.2 - Indicadores de contas regionais por NUTS II e atividade económica, 2010. http://www.ine.pt/xportal/xmain?xpid=INE&xpgid=ine_publicacoes&PUBLICACOESpub_boui=209572160&PUBLICACOESmodo=2. Downloaded on 4 September 2014.

SREA (2013). Séries Estatísticas: 2001-2011. http://estatistica.azores.gov.pt/upl/%7Bc65c1938-9640-43f7-92b8-594f387d1d9c%7D.pdf

SREA (2014). Anuário Estatístico dos Açores 2013. Serviço Regional de Estatística dos Açores. Angra do Heroísmo.

Sziemer, P. (2000). *Madeira's Natural History in a nutshell*. Funchal.: Francisco Ribeiro & Filhos Lda.

Triantis, K. A., Borges, P. A. V., Hortal, J., & Whittaker, R. J. (2010a). The Macaronesian province: patterns of species richness and endemism of arthropods *In Artur R. M. Serrano Paulo A. V. Borges Mário Boieiro Pedro Oromí (eds.), Terrestrial Artrhropods of Macaronesia - Biodiversity, Ecology and Evolution* Sociedade Portuguesa de Entomologia

Triantis, K. A., Borges, P. A. V., Ladle, R. J., Hortal, J., Cardoso, B., Miguel, P., Gaspar, C., Dinis, F., Mendonca, E., Silveira, L. M. A., Gabriel, R., Melo, C., Santos, P. R. d., Cecilia, M., Amorim, I. S., Ribeiro, S. P., Serrano, A. R. M., Quartau, J. A., & Whittaker, R. J. (2010b). Extinction debt on oceanic islands. *Ecography, 33*(2), 285–294.

Tuya, F., Boyra, A., Sanchez-Jerez, P., Barbera, C., & Haroun, R. J. (2004). Relationships between rocky-reef fish assemblages, the sea urchin Diadema antillarum and macroalgae throughout the Canarian Archipelago. *Marine Ecology Progress Series, 278*, 157-169.

Verdú, J., & Galante, E. (2009). Atlas de los Invertebrados Amenazados de España (Especes en peligro critico y en peligro). (pp. 340 pp.). Madrid: Direccion General para la Biodiversidad, Ministerio de Medio Ambiente.

Whittaker, R. J., & Fernández-Palacios, J. M. (2007). *Island biogeography: ecology, evolution, and conservation, 2nd edn*. Oxford: Oxford University Press.

WWF (2015a). Canary Islands dry woodlands and forests. http://www.worldwildlife.org/ecoregions/pa1203. Accessed on 11 January 2015.

WWF (2015b). Mediterranean Acacia-Argania Dry Woodland and Succulent Thicket. http://www.worldwildlife.org/ecoregions/pa1212. Accessed on 11 January 2015.

WWF (2015c). Madeira evergreen forest. http://www.worldwildlife.org/ecoregions/pa0425. Accessed on 12 January 2015.

WWF (2015d). Azores temperate mixed forests. http://www.worldwildlife.org/ecoregions/pa0403. Accessed on 11 January 2015.

APPENDICES

APPENDIX 1 - List of participants on the November 2014 workshops, per locality, affiliation, session (public or technical) and sectorial provenance (knowledge/research, non-governamental organization, public or private)

Name	Entity	Session	Sector			
			Knowl	NGO	Publ	Priv
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	Azorean Biodiversity Group - Azores University	P/T	1			
Maria Conceição Rodrigues	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		8	0	1	0
Azores (São Miguel Island Island, Nov. 11)						
Afonso Prestes	Azores University	P	1			
Ana C. Costa	CIBIO-Açores; Azores University	P	1			
Ana Isabel Neto	CIRN; Azores University	P	1			
Ana Moreira	SRAA - Gab. Planeamento	T			1	
António Frias Martins	Azores University	P	1			
Artur Gil	Private	P	1			
Diogo Caetano	Amigos dos Açores	T		1		

Name	Entity	Session	Sector			
			Knowl	NGO	Publ	Priv
Emanuel Verissimo	DRA/DSCNSA	P/T			1	
Eva Cacabelos	CIIMAR; Azores University	P	1			
Fátima Melo	Azores University	P/T	1			
Fernando Diogo	Azores University	P	1			
Helena Calado	CIBIO Açores; Azores University	P	1			
Jessica Coulon	Azores University	P	1			
João Faria Santos	Azores University - PhD Student	P	1			
Joaquim Teodósio	SPEA	P/T		1		
José Simas	AZORINA	P			1	
Luz Paramio	Private	P	1			
Mafalda Sousa Moniz	AZORINA	P/T			1	
Manuel Leitão	Direção Regional dos Recursos Florestais	P			1	
Maria Isabel Condessa	DCE; Azores University	P	1			
Maria João Pereira	Azores University	T	1			
Maria Vale	Azores University	P	1			
Marta Vergílio	Azores University	T	1			
Mónica Moura	Azores University	T	1			
Rosa Neves Simas	DLLM, Azores University	P	1			
Sílvia Pontes de Oliveira	SRTT / DSE	P			1	
Virginie Leyendecker	Azores University	P	1			
	Sub-total	27	19	2	6	0
Canary Islands (Gran Canaria Island, Nov. 18)						
Alejandro Padrón Padrón	DRACAENA Consultores	P				1
Almudena Suárez	FCPCT - UNIVERSIDAD LAS PALMAS DE GRAN CANARIA	P	1			

Name	Entity	Session	Sector			
			Knowl	NGO	Publ	Priv
Bruno Berheide	Banco Español de Algas	P	1			
Carlos Garcia-Verdugo	Jardin Botanico Canario	P			1	
Cristian Ortiz García	Student ULPGC Geography and Spatial Planning	P	1			
Fernando Tuya Cortés	Universidad de Las Palmas de GC	P	1			
Isabel Santana López	Servicio Biodiversidad. Gobierno de Canarias	P/T			1	
Javier Rodríguez	Fundación Canaria Parque Científico Tecnológico	P	1			
Juan Martinez	Gobierno de Canarias	P/T			1	
Mª Rafela Rivero Suárez	Servicio Información Ambiental. Viceconsejería de Medio Ambiente	P			1	
Marimar Villagarcia	PLOCAN	P			1	
Marta Martínez Pérez	Gesplan	P	1			
Pablo Manent	UNIVERSIDAD LAS PALMAS DE GRAN CANARIA	P/T	1			
Pedro Sosa	UNIVERSIDAD LAS PALMAS DE GRAN CANARIA	P	1			
	Sub-total	14	8	0	5	1
Canary Islands (Tenerife Island,Nov. 19)						
Alberto Brito Hernández	Universidad de La Laguna	P/T	1			
Carlos Sangil Hernández	Universidad de La Laguna	P/T	1			
Fabiana	Private	T		1		
Giuseppe Nerilli	Universidad de La Laguna	T	1			
Jorge Alfredo	Instituto Canario ee	P/T	1			

Name	Entity	Session	Sector			
			Knowl	NGO	Publ	Priv
Reyes Betancort	Investigaciones Agrarias					
José María Fernández-Palacios	Universidad de La Laguna	P/T	1			
José Ramón Arévalo	Universidad de La Laguna	P	1			
Juana María Gonzalez-Mancebo	Universidad de La Laguna	P/T	1			
Laura Martín	Universidad de La Laguna	P/T	1			
Manuel Arbelo Perez	Universidad de La Laguna	P	1			
María Nieves Zurita Pérez	Servicio de Biodiversidad. Dirección General de Protección de la Naturaleza	P/T			1	
Mariano Hernandez Ferres	Universidad de La Laguna	P	1			
Marta Sansón Acedo	Universidad de La Laguna	P/T	1			
Natacha Aguilar de Soto	Universidad de 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-UMa, Centro de Investigação em Estudos Regionais e Locais	P/T	1			
Carolina Santos	Serviço do Parque Natural da Madeira - SRA	P/T			1	
Dília Menezes	Serviço do Parque Natural da Madeira - SRA	P/T			1	
Dinarte Teixeira	Direcção Regional de Florestas e Conservação da Natureza	P/T			1	
Duarte Barreto	Direção Regional de	P			1	

Name	Entity	Session	Sector			
			Knowl	NGO	Publ	Priv
	Florestas e Conservação da Natureza (DRFCN)					
Humberto Nóbrega	ISOPlexis - Universidade da Madeira	P/T	1			
Luis Freitas	Museu da Baleia da Madeira	P	1			
Mafalda Freitas	Estação de Biologia Marinha do Funchal	P/T	1			
Manfred Kaufmann	Univ. Madeira + CIIMAR-Madeira	P/T	1			
Manuel Filipe	Direção Regional de Florestas e Conservação da Natureza	P			1	
Pedro Diniz	ITB - Investigação e Transferência de Biotecnologia, Lda	P	1			
Ricardo Araújo	Museu de História Natural do Funchal	T			1	
Rita Ferreira	Museu da Baleia Madeira / OOM-ARDITI	P	1			
Sandra Hervías Parejo	SPEA	P/T		1		
Sara Freitas	Serviço do Parque Natural da Madeira - SRA	P/T			1	
	Sub-total	15	7	1	7	0
	TOTAL	80	54	5	20	1

APPENDIX 2 - Feedback from evaluation forms

Public session – 64 participants (Terceira - 10; São Miguel – 22; Gran Canaria – 6; Tenerife –12; Madeira - 14)

	Number of scores (1=poor; 5=excellent)					Comments
Questions	1	2	3	4	5	**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; no clear the benefits for the region.
Public session dissemination	1	5	8	23	19	
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						

Technical session – 41 participants (Terceira – 9; São Miguel – 9; Gran Canaria – 3; Tenerife – 11; Madeira – 10)

	Number of scores (1=poor; 5=excellent)					Comments
Questions	1	2	3	4	5	**Positive -** Knowledge/information exchange; inclusive/participatory process of KBA definition; cooperation between institutions; identification of information gaps.
Workshop information provided in advance (e.g. dates, venue, programme)	2	1	6	11	12	
Workshop venue (adequacy of the room where the workshop took place)		1	4	15	13	
Materials used during the workshop to support the		1	6	11	16	

sessions						**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.
Attainment of the objectives of the workshop			4	16	14	
Positive and collaborative atmosphere among participants				14	20	
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						